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مع تحيات إدارة الموقع وفريق عمله



[www.4electron.com](http://www.4electron.com)

# **Dictionary of Video and Television Technology**

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# **Dictionary of Video and Television Technology**

**Keith Jack  
Vladimir Tsatsulin**



Amsterdam  
San Diego

Boston  
San Francisco

London

New York  
Singapore

Oxford  
Sydney

Paris  
Tokyo



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# PREFACE

Just a few short years ago, the applications for video were fairly confined— analog broadcast and cable television, analog VCRs, analog settop boxes with limited functionality, and simple analog video capture for PCs. Since that time, a tremendous and rapid conversion to digital video has taken place, with consequent changes in broadcast standards and technologies. “Convergence” is the buzzword that has come to mean this rapid coming together of various technologies that were previously unrelated. Today we have:

- DVD and SuperVCD players and recorders, with entire movies being stored on one disc, with newer designs supporting progressive scan capability for even higher video quality.
- Digital VCRs and camcorders, that store digital audio and video on tape.
- Digital settop boxes, which interface the television to the digital cable, satellite, or broadcast system. Many also now support interactivity, datacasting, sophisticated graphics, and internet access.
- Digital televisions, which receive and display digital TV broadcasts, either via cable, satellite, or over-the-air. Both standard-definition (SDTV) and high-definition (HDTV) versions are available.
- Game consoles, with high-definition graphics and powerful processing, and with the newer systems supporting DVD playback and internet access.



- Video editing on the PC, using real-time MPEG decoding, fast MPEG encoding, and other powerful techniques.
- Digital transmission of content for broadcast, cable and satellite systems, with the conversion to HDTV underway.

This is a complex and ever-changing field and there is a need for a reference that documents the evolving terminology, standards, and acronyms. The *Dictionary of Video and Television Technology* contains the most up-to-date terms and their usage. The book is a valuable reference for engineers working in the fields of analog and digital video, broadcast personnel, technicians, or anyone charged with the task of understanding, using, or implementing video and television signals. We hope this companion volume to the popular *Video Demystified, 3<sup>rd</sup> Edition* proves just as valuable to those creating and working with the converging technologies of the 21<sup>st</sup> century.

# ABOUT THE AUTHORS

*Keith Jack* has architected and introduced to market over 25 multimedia ICs for the PC and consumer markets. Currently director of product marketing for Sigma Designs, Inc., he is working on next-generation digital video and audio solutions. He has a BSEE from Tri-State University in Angola, Indiana, and holds two patents for video processing.

*Vladimir Tsatsulin* is a retired military officer with an electronics engineering degree from MVIZRU Military Academy. Following his retirement from the military, he worked as a TV technology professor at “Elektrons” state company in Riga, Latvia and later was a member of the expert group that developed a TV and PC database for the Invention Machine Co. Today Tsatsulin is a technical writer and translator for the Belorussian State University of Informatics and Electronics in Minsk, Belarus. He is co-author of *The English-Russian Dictionary on Television and Audio/Video Equipment*, a standard reference now in its third edition.





- 0h** A reference time moment at the mid-level crossing point of the leading edge of the line sync pulse. This is the default timing reference in the TV environment (as opposed to the active line start which is commonly used in computing environments). Syn.: line datum; line start [moment]; time datum.
- 0v** A reference time moment given by the line datum coincident with the beginning of the first equalizing pulse (525-line standard) or with the beginning of the first broad pulse in the vertical sync group (625-line and 1125-line standards). Commonly accepted as a timing reference point for color framing and SCH determination in 625-line standard. Syn.: frame datum.
- 1.78:1** 16:9 ratio for “wide-screen” TV.
- 10-bit** The generic description for equipment having a data path 10 bits wide. Such a path can represent data having up to 1024 different values (four times that of an 8-bit system).
- 100% [color] bars** 1. In PAL/SECAM countries and in Japan: color bars with the nomenclature 100/0/100/0. 2. In the USA and other NTSC countries: color bars with the nomenclature 100/7.5/100/7.5.
- 12-12-12 rule** The maximum number of stations that can be owned by one company: 12 TV stations, 12 AM radio stations, and 12 FM radio stations. This rule of the FCC replaces the longtime limitation of 7-7-7.
- 12-14 truck** Ku-track, named for the GHz range.
- 12-14 unit** Ku-track.
- 1080i** Number of active vertical scanning lines in interlaced scan format specified by HDTV standard adopted by the FCC. See *Interlaced scanning*.
- 1,300-nm optical-wavelength transmission window** An optical wavelength frequently used for cable-TV trunk and other multi-km fiber-optic systems.
- 16-VSB system** Zenith’s 16-level digital transmission system, using vestigial sideband modulation technology. Can send two digital HDTV MPEG-2 signals on a single 6-MHz cable channel, doubling the number of HDTV signals on a cable channel. Alternately, it can be used to deliver as many as 24 SDTV MPEG-2 channels, or a mix of HDTV and SDTV channels. With a data rate of 38.8 megabits/s, it has twice the data rate of 8-VSB. Although designed for digital cable, many digital cable systems continue to use QAM modulation technology.
- 2-D** Two-dimensional.
- (2+3)D mode** A mixture mode in which both the 2D-image and the 3D-image are displayed as mixed.
- 2.5D effect** A digital video effect similar to a 2D effect but with the appearance of three dimensions. E.g., a picture can be distorted and put on the surface of a disk to give the illusion of being put on a sphere. If this disk is rotated 90 degrees about its x-axis it will be seen to be a single line, providing its 2D nature. A true 3D effect may be rotated and viewed about any axis and still maintain an appropriate shape.
- 2D effect** A digital video effect where picture transformations and manipulations are restrained within an arbitrary plane surface.
- 2H** Sync pulse with period of two lines, the rising edge of which marks the start of a line with positive polarity of V component in a PAL chrominance signal or the start of a Dr line in Dr/Db sequence in a SECAM chrominance signal. Syn.: 7.8 kHz; Dr/Db switch; PAL switch; PAL switching signal; SECAM switch.
- 3C** Computer, communication, consumer. Color videophone is an example of a 3C integrated product.
- 3-D** Also 3D. Three-dimensional.
- 3-D display technology** A technique, developed by Sanyo Electric Co. Ltd of Osaka, that does not require special viewing glasses. Instead, a proprietary image splitter separates images into right-side and left-side elements. The splitter works in conjunction with a conventional LCD to produce the image. A special algorithm and digital-signal processing can produce real-time 3-D images from ordinary 2-D signals such as conventional TV and video programming.
- 3:2 pull-down** A method used to map film (24 fps) onto 480-line TV (30 fps), in which one film frame occupies three TV fields, the next two, and so forth. Since the two fields of alternate TV frames are from different film frames, operations such as rotoscoping are not possible, and editing must be done carefully. Advanced equipment can unravel the 3:2 sequence to allow frame-by-frame treatment.
- 3/4-inch U (EIAJ) Video Recording Format** The first mass-produced and practical videocassette format

## 4:1:1 Y'CbCr

and machine to be used in the US. Introduced by Sony in 1971, this videotape format uses the trade name U-matic (shortened to just U), which has become synonymous with the machine. It was endorsed as the standard for 3/4" tape recording by the Electronic Industry Association of Japan (EIAJ).

**4:1:1 Y'CbCr** Means that for every four horizontal Y' samples, there is one sample each of Cb and Cr.

**4:2:0 Y'CbCr** Means that for every block of 2 x 2 Y' samples, there is one sample each of Cb and Cr. There are three variations of 4:2:0 YCbCr, with the difference being the position of Cb and Cr sampling relative to Y.

**4:2:2** Also CCIR 601, ITU-R BT.601. The most commonly accepted standard for component digital video. The active picture area of the luminance Y' component is 720 pixels horizontally by 480 or 576 lines vertically (per frame). Each of the color difference signals, Cb and Cr, are sub-sampled horizontally so that, per frame, they each have 360 pixels horizontally by 480 or 576 lines vertically. At 8 bits per pixel, the total active picture rate is 166 Mbps. The full bit rate including line and field blanking periods is 216 Mbps. Likewise for 10 bits per pixel, the active picture data rate is 207 Mbps with the full bit rate at 270 Mbps. This is the standard for digital studio equipment; the terms "4:2:2" and "601" are often used synonymously (but technically incorrectly).

**4:2:2 Y'CbCr** Means that for every two horizontal Y' samples, there is one sample each of Cb and Cr.

**4:4:4 Y'CbCr** Means that for every Y' sample, there is one sample each of Cb and Cr.

**4fsc** Four times the frequency of the NTSC or PAL color subcarrier. Also the sampling rate of a D2 digital video signal with respect to the subcarrier frequency of an NTSC or PAL analog video signal.

**5.1** A type of surround sound using six audio channels: left, center, right, left rear (or side) surround, right rear (or side) surround, and a subwoofer, considered the ".1" since it is bandwidth-limited.

**601** See 4:2:2.

**7-7-7 rule** An FCC restriction that formerly limited ownership by one company to a maximum of seven TV stations (of which only five could be VHF), seven

AM radio stations, and seven FM radio stations; now 12-12-12.

**7.8 kHz** See 2H.

**780p** Number of active vertical scanning lines in progressive scan format specified by HDTV standard adopted by the FCC. See *Progressive scanning*.

**8mm Hi-Fi** High sound quality built into the 8mm video recording format. This format was originally designed to automatically incorporate AFM hi-fi recording in all 8mm camcorders and VCRs. Unlike standard VCRs that place the separate audio track longitudinally on the tape, 8mm AFM units "write" the audio track on the tape diagonally along with the video information. The high quality sound, however, is restricted to one monophonic track, thereby not necessarily producing stereo. Some 8mm units are equipped with Pulse Code Modulation, a digital audio recording process that can produce stereo audio.

**8mm/VHS, VCR; Sony** A dual-deck VCR that can edit from 8mm to VHS and vice versa. Both decks have high-end features such as stereo audio and the capability of accommodating high-band recordings (Hi8 and S-VHS), but in standard resolution only. Included are several editing features, including jog/shuttle controls.

**8mm video.** A mini-video camcorder format that uses a compact cassette (60-, 90- or 120-minute lengths) and is capable of producing hi-fi audio. Flying erase heads provide smooth edits and clean scene transitions. The video quality of the 8mm format equals that of VHS in many respects and surpasses it, although only slightly, in color reproduction. In addition, its built-in hi-fi audio capability offers superior sound to competing formats. However, 8mm video is not compatible with most home VCRs. Some models have added advanced features, such as automatic focus, glitch-free editing and the capability of superimposing time and date upon an image. Other competitive formats include Hi8, S-VHS, S-VHS-C, VHS-C.

**8-pin connector** A type of jack commonly used for the VTR-to-monitor connection; provides a full set of audio and video connections—one ground and one lead each for audio-in, audio-out, video-in, and video-out.

**8-VSB** See *vestigial sideband*.

# A

- A** The cable TV midband channel occupying 120-126 MHz. May also refer to an advertising rate for commercials (see *AAA rate*).
- A&E** Abbreviation for Arts and Entertainment cable channel.
- A.F.** Abbreviation for audio frequency.
- A/D** Short for analog-to-digital converter.
- A/D converter** Short for analog-to-digital converter.
- A/PAL** An early version of PAL used in Ireland and the United Kingdom. Characteristics were 405 lines per frame, 50 fields per second, 2:1 interlaced.
- A-1** The cable TV midband channel occupying 108-114 MHz.
- A-2** The cable TV midband channel occupying 114-120 MHz. May also refer to Antenne-2, or the second French state broadcast TV network.
- AA** The cable TV hyperband channel occupying 300-306 MHz. May also refer to an advertising rate for commercials (see *AAA rate*).
- AAA rate** The most expensive advertising rate for radio and TV commercials. AA is the next lower rate, followed by the A rate, and finally the B rate (the lowest rate).
- A-B color frame code** Another name for color frame code.
- A-B mix** A transition where one video source (A) fades out while another video source (B) fades in. The amount of each source used to generate the result is determined by the relative position of a mixer fader arm. When the fader arm is all the way at the source A side, then only video source A appears at the output. Also means cross-fade or mix.
- A-B roll** A video editing system where two or more sources are used, in conjunction with a video mixer, to create dissolves and other transitions between the different sources.
- A-B roll editing** An editing procedure using two synchronized sources of the same program material.
- A-B switch** A device that inputs two video sources (A and B), and outputs either A or B. Since it doesn't affect the signal quality, it is also called a passive switcher.
- A-B test** A direct comparison of sound and/or picture quality of two sources, or devices, by playing one, then the other.
- ABC** Commonly refers to the American Broadcasting Corporation or the Australian Broadcasting Corporation. May also be an abbreviation for automatic brightness control.
- aberration** In CRT displays, a distortion of an image caused by failure of the electron beam to focus all points accurately on the screen.
- ABL** Abbreviation for automatic brightness limiter.
- above the line** A budget category that includes the artistic or creative elements, primarily nontechnical personnel and activities.
- abstract set** A set, such as on a TV news program, that has a neutral background.
- AC adapter** An external device for equipment that converts alternating current (AC) power into direct current (DC) power.
- AC coupled** AC coupling passes a signal through a capacitor to remove any DC offset, or the overall voltage level that the video signal "rides" on. One way to find the signal is to remove the DC offset by AC coupling, and then do DC restoration to add a known DC offset (one that we selected). Another reason AC coupling is important is that it can remove large (and harmful) DC offsets.
- AC hum** A low-pitched sound (50 or 60 Hz) heard whenever AC power is converted into sound. It is usually the result of ground loops or inadequate shielding of cables.
- AC interlock** A safety function on equipment that turns off power when the back of the device is opened.
- AC transmission** See *Alternating-current transmission*.
- AC'97, AC'98** These are definitions by Intel for the audio I/O implementation for PCs. Two chips are defined: an analog audio I/O chip and a digital controller chip. The digital chip will eventually be replaced by a software solution. The goal is to increase the audio performance of PCs and lower cost.
- AC-3** Original name for Dolby® Digital. Also, the version of Dolby compressed audio used in some movie theaters for surround sound.
- ACATS** Abbreviation for Advisory Committee on Advanced Television Service.
- ACC** Abbreviation for automatic color control.
- accelerating anode** See *Electron gun*.
- accelerating electrode** An electrode that accelerates

## acceleration voltage

the electrons of an electron beam. See also *Electron gun*.

**acceleration voltage** A voltage that produces an acceleration of a beam of charged particles.

**accentuation** Another name for pre-emphasis.

**accentuator** Another name for a circuit that provides pre-emphasis.

**access** In videotex, the number of frames requested by a user.

**access time** In video, the amount of time it takes to reach the desired point of a program.

**ACE head** On newer VCRs, the control-track and audio heads are combined into one unit. This head is often referred to as the ACE head, for Audio, Control, and audio Erase.

**achromatic** Without color or varying brightness information. May also refer to being capable of transmitting light without breaking it up into its constituent colors. Also see *Monochromatic*.

**achromatic color** A shade of gray. Also see *Variables of perceived color*.

**achromatic lens** A lens corrected for chromatic aberration. In its simplest form, it consists of a pair of lenses, designed so that the dispersion produced by one lens (being divergent) corrects the dispersion produced by the other (being convergent). Usually, a convex lens of crown glass and a concave lens of flint glass are used. The combination brings all colors closer to the same focal point.

**achromatic locus** The area on the chromaticity diagram that contains all points representing acceptable reference white standards. Also called the achromatic region.

**achromatic point** A point on the chromaticity diagram representing an acceptable reference white standard.

**achromatic region** See *Achromatic locus*.

**achromatic stimulus** A visual stimulus that gives the sensation of white light and thus has no color.

**ACK** Abbreviation for automatic color killer.

**acoustic delay line** A delay line used to delay sound. It may be mechanical or electronic.

**acoustic feedback** This may occur when the input to a system (such as a microphone) receives sound from the output of the system (such as a speaker), forming an uncontrolled closed loop. It usually results in a high-pitched squeal.

**acoustic holography** Using a single-frequency sound wave to produce a 3D image of an object. It is usually viewed on a CRT display.

**acoustic wave** A wave that is transmitted through a solid, liquid, or gaseous material as a result of vibrations of the particles. Also called a sound wave.

**acoustic wave device** A device used in signal processing that transfers acoustic waves on a substrate, enabling a wide variety of processing functions to be performed. Delay lines, attenuators, phase shifters, etc. may be implemented.

**acoustics** The reverberation of sound, or lack of it, in a room. Acoustics can affect the results of the audio recording. Some parts of a room have "dead" spots while others are more "lively." The built-in microphone of a video camera operates better in dead areas; hiss and noise occur in live portions of a room.

**ACS** Abbreviation for alternate channel selectivity.

**action line** See *Line*.

**action shot** See *Moving shot*.

**action track** A digital video effect where fast-moving objects appear to remain on-screen. This effect requires motion detection to isolate the moving objects so that they may be frozen and accumulated into a single image. The technique was developed for sports action replay analysis. Also called image trail-freeze.

**active filter** A filter that requires power to operate. Also refers to a filter designed to reject noise and ripple that may otherwise be transmitted to a TV tuner.

**active image** The visual portion of a video signal.

**active image area** See *Active picture area*.

**active interval** The portion of an *active line* that contains video information. Also see *Trace interval* and *Sawtooth*.

**active lines** The scan lines of a video signal that contain picture information. Most, if not all, of these lines are visible on the display. Scan lines that do not contain video information are usually said to be in the vertical blanking interval.

**active material** A fluorescent material used in CRT displays.

**active mixer** An audio mixer that compensates for signal losses. Some active mixers can also modify the audio signal by compressing it, adding echo, or modifying a specific frequency range.

**active part** The portion of a video scan line that carries picture information. Also called analog active part.

**active picture area** The useful portion of a video display.

**active pixel region** The area of the display used for the actual display of information. There may be a visible region not used to display information, called the border region.

**active position** The position on a display where subsequent actions will occur.

**active satellite** See *Communications satellite*.

**active scan line** See *Active lines*.

**active signal correction** A common name for the fuzzy logic used in some video equipment. See *ASC*.

**active video** The part of the video waveform that contains picture information. Most of the active video, if not all of it, is visible on the display.

**active-matrix LCD** Active matrix is a technique for making color LCD displays, by using transistors to make up each of the pixels. The most common type of active matrix LCD is based on a technology known

as TFT. The two terms, active matrix and TFT, are often used interchangeably.

**actuator** In general, a device, under the control of an electrical signal, which carries out a mechanical action. It may also refer to the VCR device that causes the video head to be moved to the videotape track. In satellite TV, it controls the movement of the satellite dish so that it receives the strongest signal.

**ACTV** Abbreviation for Advanced Compatible Television.

**ACTV-1** In 1988, a proposed system described by Isnardy had undergone computer simulation at the David Sarnoff Research Center. The system was named ACTV-1, for "Advanced Compatible TV, First System." It was intended to provide a 16:9 wide-screen picture, while being compatible with standard NTSC receivers, and use the standard 6-MHz NTSC channel. To accomplish this, a second subcarrier was added to the NTSC signal. This second subcarrier was a 395th multiple of one-half the line frequency, or about 3.1075171 MHz. An additional "helper signal," quadrature modulated with the picture carrier, was used to improve the vertical resolution. The ACTV-1 receiver was to be a 16:9 wide-screen 525-line progressive TV.

**ACTV-2** This proposed system used two 6-MHz NTSC channels, with the ACTV-1 system being used for one of the channels. The ACTV-2 system was an extension of the ACTV-1 system. The ACTV-2 receiver was to be a 16:9, 1050-line interlaced TV.

**adaptation** The dynamic change of the type of audio or video processing performed, dependent on the sound or picture content.

**adapter** A device that makes electrical and mechanical connections between equipment not originally intended to be used together.

**adaptive comb decoder** A NTSC/PAL video decoder that uses an adaptive comb filter.

**adaptive comb filter** A filter that performs luminance (Y) and chrominance (C) separation based on the picture content. The frequency responses of the Y and C filters look like the teeth on a comb, hence the name comb filter.

**adaptive control** Processing that varies automatically to generate the desired results regardless of the input. The automatic gain control (AGC) is an example of an adaptive control: the gain of the amplifier varies automatically to generate a constant output level, regardless of the input level.

**adaptive range coding** A process that condenses the entire NTSC or PAL video bandwidth into a digital signal that can be recorded on tape. The technique requires the use of high-grade metal-particle tape.

**adaptive transform/sub-band coding** See *Zenith Spectrum-Compatible HDTV System*.

**adaptive transformation** A video compression technique. The amount of information that must be transmitted for a particular portion of the image is

proportional to the fineness of detail in that portion. A portion of the picture with little detail can be transmitted with very few bits, and this provides extra time for transmitting portions with high detail. A buffer is used to restore the original spatio-temporal relationship. If the entire picture has high detail, the buffer may become overloaded, so the rate of information transfer is reduced by reducing high-frequency details. This, of course, reduces the image quality by introducing artifacts.

**ADC, A/D** Abbreviation for analog-to-digital converter.

**Add-A-Vision** A combined film and TV camera system based on the Mitchell BNC but of British design. A variant of Add-A-Vision known as EFS (Electronic Filming System) is basically similar, but employs the Mitchell Mark 2 camera.

**additive color system** Color based on the addition of light. For video, the three primary colors are red, green, and blue. These may be added together in varying amounts to generate any other color. Color printing and film use the subtractive color system.

**additive primaries** Three colors from which all other colors can be generated by adding some mixture of them together.

**add-on recording** Also called transition editing recording. Most VCRs allow pause during recording, but due to timing problems, there is usually a disturbance of the picture during playback at the place where the pause was used. To eliminate this disturbance, transition editing recording backs up the tape for about 2.2 seconds during pause recording. When the pause is released, the deck will play back for about 1.2 seconds while aligning the control timing already on the videotape to the desired timing. After about 1.2 seconds, the deck switches to the record mode, with the overall effect of there being no artifacts during playback.

**address search** Also known as VASS or VHS Address Search System, it is a VCR feature that permits the user to assign a number to each index stop by marking it magnetically or electronically. Most VCRs use one or more search methods to find a specific scene on a videotape. These machines automatically place an electronic mark on the tape each time the Record button is activated, thereby marking the beginning of every program recorded. Other features allow for specific scenes within a program to be marked.

**address track** In VCRs, a path for laying down a specific code number for each frame of video on the tape. This code consists of a time so that, for example, 00:27:14:03 would be read as 00 hours, 27 minutes, 14 seconds, and 3 frames.

**addressability** The ability of a cable or satellite TV provider to control a set-top box in a subscriber's home. If communication from the set-top box to the provider is also possible, it is called a two-way system. Otherwise, it is called a one-way system.

**addressable box** A set-top box used by cable and



## addressable converter

satellite TV providers that supports addressability. It connects between the cable outlet (or satellite dish) and the TV, allowing viewers to order and receive pay-per-view programs and subscription channels.

**addressable converter** See *Addressable box*.

**addressable decoder** See *Addressable box*.

**addressable programming** A cable or satellite TV provider may enable or disable a specific program from being decoded and displayed by a specific addressable box. For example, a viewer orders a pay-per-view movie. They call a phone number; a computer answers and confirms the request. The provider then sends a coded message, which is received by the viewer's addressable set-top box. The message temporarily enables that particular set-top box to descramble the channel, offering the desired program.

**addressable set-top box** See *Addressable box*.

**addressable system** A cable or satellite TV system that supports addressable programming.

**adjacent channel** A channel that is immediately next to another channel in frequency. For example, NTSC channels 5 and 6 are adjacent. However, channels 4 and 5 are not since they are separated by non-TV signals.

**adjacent sound carrier** The RF carrier that conveys the audio information for the channel immediately below the desired channel.

**adjacent video carrier** The RF carrier that conveys the video information for the channel immediately above the desired channel.

**adjacent-channel interference** Interference caused by an adjacent channel.

**adjacent-channel selectivity** The ability of a receiver to reject signals on adjacent channels.

**adjustment switches** For a display, the controls for horizontal synchronization, vertical synchronization, luminance, hue, contrast, etc.

**ADO** Abbreviation for Ampex Digital Optics by Ampex Corporation. This is a video special effects device for creating effects such as flips and twists.

**ADP** Abbreviation for automatic data processing.

**ADSL** Asymmetric Digital Subscriber Line, a technology that converts existing copper telephone lines into access paths for multimedia and high-speed data communications while maintaining the regular phone voice services. The ANSI T1 committee has standardized Discrete Multi-Tone (DMT) as the line code to be used in ADSL. See *DMT*.

**ADTV** Abbreviation for Advanced Digital Television.

**advance ratings** When an audience-survey company provides a preview (by telephone) to a client of the ratings of a radio or TV program or station.

**Advanced Compatible Television** Several techniques were developed to transmit additional information within the NTSC and PAL video signal. Conventional TVs would ignore the additional information, and display the usual picture. Advanced TVs would use

the additional information to display an improved picture, usually with a 16:9 aspect ratio. None of the techniques were popular, although *PALplus* was introduced in Europe.

**Advanced Digital Television (ADTV)** A proposed fully digital HDTV system, since replaced by the ATSC HDTV standard; Advanced Television Research Consortium (Thomson Consumer Electronics, Philips, NBC, David Sarnoff Research Center, Compression Laboratories Inc.). The baseband input was 1050 lines, 2:1 interlaced, and 59.94 fields/s. Source coding was based on the ISO MPEG draft specification for the transportation of moving images over communication data networks. ADTV modified the MPEG standard to handle the more stringent requirements of HDTV, and it referred to its scheme as MPEG++. After video and audio signals were digitized and encoded, the transport encoder separated data into two streams in order of their importance to overall system operation. Data critical for maintaining the basic integrity of received pictures — typically the gray-scale levels, audio signals, data-cell headers and motion descriptors — were assigned High Priority (HP). The low-frequency coefficients and then the higher frequency (fine detail) coefficients formed the Standard Priority (SP) data stream. Assignment states were adaptive, so SP data could transcend to the HP stream when HP loading was light. The two streams were formatted into separate 148-byte data transport cells. The cell format was similar to data-communication packets. The single-byte service header identified the type of data being carried in the main 120-byte block. The two data streams were quadrature amplitude-modulated onto separate carriers contained within a 6-MHz band. The HP channel was 960 kHz wide; the SP channel occupied 3.84 MHz, and was filtered to have minimum power at the NTSC carrier frequencies. ADTV receivers had similar functioning filters so that a co-channel NTSC station did not interfere with HDTV reception.

**advanced editing** Special VCR features to assist in making glitch-free, professional-looking edits. Such features may include assemble editing, edit preview, digital image superimposer, and the flying erase head.

**advanced systems** See *System terminology*.

**advanced television** A family of TV systems that improve the quality of standard TV. This includes EDTV, IDTV, HDTV.

**Advanced Television Systems Committee** The necessity for standardizing the HDTV format in the United States required the FCC to make a choice that would have a large economic impact. To make the choice with impartiality and expertise, the FCC appointed an ad hoc committee, the ATSC, to study competing proposals, including field testing, and make a recommendation to the FCC.

**Advisory Committee on Advanced Television Ser-**

**vice** Established in 1987 at the request of the United States television broadcast industry. The original plan was to develop an advanced television system using reserved, but unassigned, frequency spectrum. Another objective became the development of a digital HDTV standard.

**AES/EBU digital audio interface** A commonly used digital audio interface specified as a result of cooperation between the Audio Engineering Society and the European Broadcasting Union. It is a serial transmission format for two-channel linearly represented digital audio data. Each audio sample is carried by a sub-frame containing: 20 bits of sample data, 4 bits of auxiliary data (which may be used to extend the sample to 24 bits), 4 other bits of data and a 4-bit preamble. Two sub-frames make up a frame that contains one sample from each of two audio channels. Frames are further grouped into 192 frame blocks. AES/EBU signal includes channel status data containing information about signal emphasis, sampling frequency, channel mode (stereo, mono, etc.), use of auxiliary bits (extend to 24 bits or other uses), and a CRC (cyclic redundancy code) for error checking. There are several allowed sampling frequencies within the 32-kHz to 48-kHz range, the most common being 44.1 and 48 kHz.

**AFC** Abbreviation for automatic frequency control.

**AFM** See *Beta hi-fi*.

**AFT** Abbreviation for automatic fine tuning.

**afterglow** See *Persistence*.

**AFV** Abbreviation for audio-follows-video.

**AGC** Abbreviation for automatic gain control.

**aggregate** Gathered into, or considered as, a whole. A picture image is perceived as an aggregate of individual points.

**agile receiver** A satellite receiver that can be tuned to any desired channel.

**AIF** Audio Interchange File. An audio file format developed by Apple® Computer to store high quality sampled sound and musical instrument information.

**aircraft flutter** Sudden changes in the quality of a TV picture, caused by the reflection of the TV signal from an aircraft flying somewhere over the direct path between a transmitter and receiver. The reflected signal interferes with the normal signal at the receiving antenna.

**airplane flutter.** See *Aircraft flutter*.

**airwaves** Slang for radio waves, used in radio and TV broadcasting.

**ALC** Abbreviation for automatic level control or automatic light control.

**alfecon** An iron/silicon/aluminum alloy, used for video heads.

**alfesil** An iron/silicon/aluminum alloy, used in video heads.

**algorithm** A formula, or set of steps, used to simplify, modify, or predict data. Complex algorithms are used

to compress files and reduce high digital video and audio data rates.

**alias** See *Aliasing*.

**alias frequency** An erroneous lower frequency obtained when a periodic signal is sampled at a rate equal to or less than twice the signal's frequency.

**aliasing** Distortion in a video signal. It shows up in different ways depending on the type of aliasing in question. When the sampling rate interferes with the frequency of program material the aliasing takes the form of aliasing frequencies that are known as sidebands. Spectral aliasing is caused by interference between two frequencies such as the luminance and chrominance signals. It appears as herringbone patterns, wavy lines where straight lines should be and lack of color fidelity. Temporal aliasing is caused when information is lost between line or field scans. It appears when a video camera is focused on a CRT and the lack of scanning synchronization produces a very annoying flickering on the screen of the receiving device. In sampling, aliasing is the impairment produced when the input signal contains frequency components equal to or higher than half of the sampling rate. Typically produces jagged steps on diagonal edges. See also *Nyquist limit*. Syn.: alias.

**aliasing noise** A distortion component that is created when frequencies present in a sampled signal are equal to or greater than one-half the sample rate.

**alignment** In VCRs, the angle the video heads make with the tracks on the videotape. Misalignment often causes distortion, signal loss, video noise and snow. May also refer to TV tuners and IF amplifiers operating at the correct frequency.

**alignment disc** See *Test disc*.

**alignment tape** A special-purpose videotape containing audio and video reference signals that are used to correctly adjust the recording and playback heads of VCRs. Alignment tapes are produced by manufacturers and are not generally available to the public. They are normally for use within the company and its authorized service centers.

**alkali metal** An alkali-producing metal, such as lithium, cesium, or sodium, that has photoelectric characteristics. Commonly used in phototubes and camera tubes.

**all-channel tuning** The ability of a TV or VCR to receive all the available channels.

**all-digital** This term means that everything is done digitally—storage, processing, editing, etc. No analog signals are present in the system.

**alpha** See *alpha channel* and *alpha mix*.

**alpha channel** The alpha channel is used to specify an alpha value for each sample. The alpha value is used to control the blending, on a sample-by-sample basis, of two images: new pixel = (alpha)(pixel A color) + (1 - alpha)(pixel B color). Alpha typically has a normalized value of 0 to 1. In a computer environment, the alpha values can be stored in additional

## alpha mix

bit planes of frame buffer memory. A 32-bit frame buffer actually has 24 bits of color, 8 each for red, green, and blue, along with an 8-bit alpha channel. Also see *Alpha mix*.

**alpha mix** This is a way of combining two images using the alpha channel. The box that appears over the left-hand shoulder of a news anchor is put there by an alpha mixer. Wherever the samples of the little box appear in the frame buffer, an alpha number of "1" is put in the alpha channel. Wherever they don't appear, an alpha number of "0" is placed. When the alpha mixer sees a "1" coming from the alpha channel, it displays the little box. Whenever it sees a "0," it displays the news anchor. (Of course, it doesn't matter if a "1" or a "0" is used, but you get the point.)

**alpha wrap** When the videotape almost completely encircles the head drum of the VCR, permitting the use of only one head.

**alphabetic** Pertaining to letters of the alphabet.

**alphageometric** In videotex, simple picture description instructions that enable line drawings, colored polygons, curved lines, etc., in addition to text, to be displayed. An accepted standard for alphageometric display is the North American Presentation Level Protocol Syntax (NAPLPS). See *Alphamosaic*, *Alphaphotographic*.

**alphamosaic** In videotex and teletext, a method of coding that displays a mosaic of 2 x 3 rectangles. This method uses a simple and inexpensive decoder, but is restricted to text and graphics that do not require curved or diagonal lines. See *Alphageometric*, *Alphaphotographic*.

**alphanumeric** Using both letters and numbers.

**alphanumeric code** Pertaining to a character set that represents numbers or letters of the alphabet.

**alphanumeric display** The display of information using only letters and numbers. When a display is called an alphanumeric display, it is usually not capable of displaying sophisticated graphics.

**alphaphotographic** In videotex, a method of coding that allows photographic quality images to be displayed. The time needed for transmission and the complexity of decoding restricts its use. See *Alphageometric*, *Alphamosaic*.

**alternate channel selectivity** The ability of a tuner to focus on one channel at a time, while rejecting interference from adjacent channels. The tuner's ability to suppress this interference is measured in dB; the higher the number, the better the performance. A rating of about 80 dB is considered excellent. This term should not be confused with *capture ratio*, referring to two channels occupying the same frequency.

**alternating-current transmission** A method of transmission used in TV in which the direct-current component of the luminance signal is not transmitted. A direct-current restorer must be used in this form of transmission. See *direct-current transmission*.

**aluminized screen** A CRT display that has a thin coating of aluminum on the back of the phosphor layer. Electrons readily penetrate the coating, activating the phosphors to produce an image. The aluminum reflects outward light that would otherwise go back inside the tube, thereby improving the brilliance and contrast of the display. Also called a metal-backed screen, metallized screen, and mirror-backed screen.

**AM, amplitude modulation** A method of encoding data onto a carrier, such that the amplitude of the carrier is proportional to the data value.

**amateur TV (ATV)** A part of ham radio in which hobbyists send and receive TV (also called fast-scan TV) pictures.

**AMA-type screen** Actuated-mirror array (AMA) display system for civilian uses. Developed by Daewoo Electronics Co. Ltd., Seoul. The AMA system can be applied to almost all kinds of TVs, projectors and laptop portable displays. If used on 40" or larger TVs, it can drastically increase the screen brightness because AMA-type screens are 10 times more efficient in light production and 2,000 times quicker in response time than LCD screens.

**ambience** Reflected light or sound that reaches the viewer or listener from a variety of directions. Light or sound waves bounce off the ceiling, walls and other boundaries of an area.

**ambient light** The normal illumination. The term is commonly used with projection TV systems and video cameras, since how these devices function in ambient light is one method of measuring their effectiveness.

**ambient noise** Refers to normal background noise, which can be measured with a sound-level meter.

**ambient-light filter** A filter used in front of a display to reduce the amount of ambient light reflecting off the display. The filter, generally of a dull finish, can be incorporated into the faceplate of the display or it can be a separate sheet of plastic.

**American Museum of the Moving Image** A showplace that emphasizes the hardware of the TV and film industry, including costumes, sets and other paraphernalia. Located in Queens, New York, the museum exhibits a variety of equipment, ranging from 19th-century devices to the Sony Walkman. Other highlights include interactive exhibits, video art displays, video screenings and a host of consumer products based on popular TV shows and personalities.

**American Television Alliance (ATVA)** Consists of General Instrument Corp. (GI) and Massachusetts Institute of Technology (MIT).

**AML** Abbreviation for amplitude-modulated link.

**AML frequencies** In an AML system, there are four groups of frequencies: C, D, E, and F. Group C channels add 12,646.5 MHz to the VHF frequency. Group D channels add 12,705.7 MHz to the VHF frequency. Group E channels add 12,898.5 MHz to the VHF

frequency. Group F channels add 12,958.5 MHz to the VHF frequency.

**A-mode** See *MUSE-9 system*.

**AMOL/SID** Abbreviation for Automated Measurement Of Lineups/Source Identification. An identification signal included in the vertical blanking interval (VBI), broadcast by virtually all TV networks. It is used by TV-ratings services to identify the network, show, date, time, hour, minute and second of a broadcast. As part of the AMOL system, the signal helps a TV-ratings service verify when specific shows and commercials were broadcast on local stations.

**amp** Short for amplifier.

**amplified coupler** A device typically used to boost a TV signal so it can be adequately received by several TVs and VCRs throughout the home.

**amplifier** A device that outputs a magnified version of the input signal.

**amplifier power** The amount of magnification an amplifier can produce, usually specified in watts. The larger the number, the greater the magnification the amplifier can produce.

**amplitude** Strictly, the peak value of a signal in the positive or negative direction. The difference between minimum and maximum values is the peak-to-peak amplitude. May also refer to the value of a signal in the positive or negative direction at a particular moment.

**amplitude distortion** See *Distortion*.

**amplitude fading** See *Fading*.

**amplitude modulation** A method of encoding data onto a carrier, such that the amplitude of the carrier is proportional to the data.

**amplitude-modulated link** This system converts cable TV frequencies to microwave frequencies and transmits the signal to a receiving site, where the microwave frequencies are converted back down to the standard cable TV frequencies. The AML system used by cable operators is called community-antenna radio service (CARS) and is in the frequency band of 12-12.95 GHz. The studio transmitter link AML service is used for connecting studio facilities, usually in a city, to the transmitter or up-link site out of the city. The antenna systems used at these frequencies are usually parabolic dishes of 4-10 feet in diameter. Also see *Cable television relay service*.

**amplitude-shift keying** A method of encoding data onto a carrier, such that a finite number of different amplitude levels of the carrier are produced.

**anaglyph** An image made up of two slightly different views, in contrasting colors, of the same subject. When viewed through a pair of corresponding color filters, the image seems three-dimensional.

**anaglyphic method** A three-dimensional viewing method based on colored light, such as the familiar red and green viewing glasses. It usually yields imperfect pictures because the filters fail to eliminate the complementary color completely.

**analog** The representation and measurement of the performance or behavior of a system by continuously variable physical entities such as current, voltages, etc. Analog data yields an exact replication of the original information. Most conventional VCRs, for example, record information using the analog process. Analog differs from digital, which duplicates information in a discrete, or discontinuous, form, as with more advanced VCRs.

**analog active lines** See *Active lines*.

**analog active part** See *Active part*.

**analog channel** A transmission channel that is used to transmit an analog signal.

**analog component format** A format that uses three signals to specify color and brightness. The most common video formats are YPbPr and YUV.

**analog component video** See *Analog component format*.

**analog encryption** A video scrambling method that operates within the standard video bandwidth. Some approaches may result in degradation of the original video signal when it is decoded.

**analog monitor** In reality, all displays based on CRT technology are analog. Some analog monitors are incorrectly called digital monitors since they accept digital signals, and convert them to analog internally.

**analog signal processing** The conventional method used by audio and video equipment manufacturers to reproduce a signal. A broadcast signal is produced in the shape of a series of waves, each wave height representing voltage while the distance between peaks in these waves determines the frequency of that part of the signal. These components of the signal, along with others, are separated, amplified and fed into VCRs, TV sets and so on for reproduction. Much of the original quality of the signal, however, is lost through this process, although some units are better able to rebuild the signal than others, thereby producing a better picture. A more sophisticated approach to reproducing a signal is by means of digital signal processing.

**analog tuning** A method of tuning a TV, VCR, etc. Analog tuning permits setting the system to any channel within its frequency range. This tuner, because of its manual capability, either of the mechanical or electronic variety, differs from the frequency-synthesis tuner, that is preset.

**analog video** Video signals that use a continuous-time signal, with varying amplitude.

**analog/digital converter** See *Analog-to-digital converter*.

**analog-to-digital converter** A device that transforms a signal from analog form to digital form. This is done by taking samples of the analog signal at regular intervals. Each analog sample value is then converted into a binary code. For video applications, additional functions are usually incorporated, such

## analogue

as automatic gain, filtering and black level clamping. An ADC for digitizing video must be capable of sampling at 10 to 150 million samples per second. Sometimes also called a digitizer.

**analogue** The European spelling of analog.

**anamorphic** Viewed picture format with geometric deformation of the wide-screen picture aimed to achieve full vertical screen occupation while using the conventional TV display.

**anamorphic lens** A special camera lens that allows the user to make videotapes in wide-screen format using a standard video camera.

**ANC/WNL** Abbreviation for Automatic Noise Canceling and White Noise Limiting. These circuits are in some TVs to process the video and sound signals.

**ancillary data** Non-video data transmitted within a digital video data stream, usually during the horizontal and vertical blanking intervals. It may be digital audio, teletext, etc.

**ancillary timecode** BT.1366 defines how to transfer VITC and LTC as ancillary data in digital component interfaces.

**angle modulation** Modulation where the angle of a sine-wave carrier is the characteristic varied from its normal value. Phase modulation and FM are particular forms of angle modulation.

**angle of view (AOV)** The area or width of a subject or scene that a lens takes in or covers. The AOV depends on the focal length of the lens and is given by the equation  $\cot A/2 = 2F/W$ , where A is the AOV, F is the focal length of the lens and W is the width of the photosensitive surface. The smaller F, the greater the AOV. For example, a 12.5mm focal length has a wider angle than a 75mm lens.

**ANIK** The name given to Canadian TV, and more recently, to Canadian TV satellites. ANIK is an Inuit word meaning "brother." ANIK satellites have both 4-GHz C-band and 12-GHz Ku-band transponders.

**animation** Also called time lapse. See *Frame-by-frame recording*, *intervalometer*, *interval timer*, *optical animation*, *pipeline architecture*, *pixilation*, *time lapse video*.

**anode-voltage-stabilized camera tube** Syn.: high-electron-velocity camera tube. See *Camera tube*. See also *Iconoscope*.

**anomalistic period** The interval of time between one passage of a satellite through its apogee and the next consecutive passage.

**anomalous propagation** Accidental transmission of VHF radio waves beyond the horizon, probably caused by temperature inversion in the lower atmosphere.

**ANSI** Abbreviation for American National Standards Institute. This organization sets standards for the computer languages, electrical specifications, communications protocols, etc.

**antenna** In TV, that part of a transmitter or receiver facility that sends out waves into or accepts them

from the air. Also, a wire or set of metal rods constructed for the purpose of intercepting waves in the air and changing them into an electrical signal that is sent to a TV receiver. TV antennas are affected by various external factors, such as the location of the transmitters, the contours of the land and certain obstructions, and the physical condition of the antenna and connecting cables. Most antennas (except satellite dishes) utilize the dipole technique: two equal rods or arms, each as long as 1/4 the wavelength of the anticipated signal. The antenna lead-in is located at the center of the two arms. Since direction is important for maximum reception, most antennas have a combination of reflecting rods and directors (shorter rods) to provide additional directivity. Commercial TV antennas are usually designed for local (15-20 miles), suburban or mid-range (20-30 miles), or fringe use.

**antenna combiner** A device that combines the signals from several antennas, each of which is aimed at a different TV station. Antenna combiners are helpful where all the TV transmitters are not located in a single direction.

**antenna coupler** A device that is used when more than one TV is connected to a single antenna. Also known as an antenna splitter, it helps prevent impedance mismatch and interference between TVs. Several commercial types are available. The resistance antenna splitter prevents some impedance mismatch and offers some isolation, but contributes to a reduction in signal strength. The transformer antenna splitter reduces both impedance mismatch and insertion loss.

**antenna farm** The location for the transmitting antennas for most or all of the TV stations in an area.

**antenna rotator** A small motor mounted externally on an antenna mast and remotely controlled to adjust the antenna direction so that it receives the best possible signal from a TV station. In some areas where multiple TV stations do not transmit their signals from a central location, a single dipole antenna is not effective. Either several antennas or a single antenna with a rotator must be used for best reception.

**antenna splitter** See *Antenna coupler*.

**antenna-switching circuitry** Controls to select alternate inputs to the TV set (pay decoder, TV games, VCR, etc.). Found in the front-end stages of some TV sets. It improves reception of cable-TV signals.

**anti-alias filter** A filter (typically a lowpass filter) used to bandwidth-limit a signal to less than one-half the sampling rate. Also called an anti-aliasing filter.

**anti-aliasing** The process of smoothing jagged edges, especially along curved or diagonal edges of displayed objects, such as graphics and text.

**anti-aliasing circuitry** An electronic circuit that performs anti-aliasing. Many professional character generators offer anti-aliasing as one of their features.

**anti-aliasing filter** See *Anti-alias filter*.

**anti-comet tail gun** A device in a TV camera tube to reduce or eliminate streaks, called comets.

**anti-copy signal** See *Anti-piracy signal*.

**anti-logarithmic amplifier** Used in 3D-image TV camera systems to form a depth video signal.

**Antiope** The French teletext system.

**antiPAL test pattern** A video signal that has a deliberately wrong PAL switch function. The polarity of the U component, instead of the V component, is switched. This enables measuring the performance of the line averaging function in the PAL decoder. When it works correctly, the display has no color since the antiPAL chrominance is cancelled by the decoder's line averaging.

**anti-piracy signal** A method of preventing pre-recorded videotapes from being "pirated" or duplicated illegally. One system places a special signal electronically on the tape; another modifies the horizontal and vertical sync pulse and the color burst phase, causing rolling or other forms of instability in the picture during the copying process. Supposedly, this signal has no effect during playback on a TV set. Also called anti-copying signal.

**anti-reflection coating** A thin coating deposited on the surface of glass to reduce reflection of ambient light.

**anti-top flutter pulse** Disables the phase detector during equalization and framing times.

**AO** A category of the movie rating system that indicates the program is for adults, 18 and older.

**AOD** Abbreviation for audio optical deflector.

**AOM** Abbreviation for audio optical modulator.

**APC** Abbreviation for automatic phase control.

**APEL** Abbreviation for Advanced Product Evaluation Laboratory.

**aperture** An opening through which electrons, light, radio waves, or other radiation can pass. The aperture in the electron gun of a CRT determines the size of the electron beam. The aperture in a TV camera is the effective diameter of the lens that controls the amount of light entering the camera tube. The dimensions of the horn mouth or parabolic reflector determine the aperture of a microwave antenna. The aperture in a lens is an adjustable orifice controlling the amount of light transmitted by a lens. The maximum diameter of the aperture in relation to the focal length of the lens determines its theoretical speed. Its effective speed depends also on the transmission of the glass elements of the lens.

**aperture correction** Method of compensating for loss of higher picture frequencies caused by the scanning spot in a camera tube having a finite size, and thus failing to respond sharply to sudden vertical boundaries between dark and light areas. Consider a square spot of finite size scanning a sharp black-to-white transition. The resulting signal output changes level with a linear slope. In practical electron devices the spot tends to be circular or nearly

so, and to have a Gaussian distribution of energy, so that the signal changes with a more rounded transition. This effectively reduces the high frequency content of the signal, and compensation must be made by increasing the gain in the high frequencies, taking care not to exceed the bandwidth of the channel or unduly increase noise or introduce phase distortion.

**aperture corrector** An equalizer designed specifically to offset aperture distortion.

**aperture delay** The time from an edge of the input clock of the ADC until the time the ADC actually takes the sample. The smaller this number, the better.

**aperture distortion** Attenuation of the high-frequency components of a TV picture signal caused by the finite cross-sectional area of the scanning beam in the camera. The beam then covers several mosaic globules in the camera simultaneously, causing loss of picture detail.

**aperture grille** A slotted metal screen located just behind the inside of a TV display tube's screen surface, used to limit the points at which the electrons hit the phosphor coating of the screen. A Sony invention, the function is similar to that of a shadow mask, the purpose of both being to ensure the reproduction of a true color TV picture. See also *Color picture tube*.

**aperture jitter** The uncertainty in the aperture delay. The aperture delay time changes a little bit each time, and that little bit of change is the aperture jitter.

**aperture mask** Shadow mask. An opaque disk behind the faceplate of a color picture tube; it has a precise pattern of holes through which the electron beams are directed to the color dots on the screen.

**aperture reduction ring** An accessory on some projection TV systems to make the image appear sharper by cutting down on the  $f$  stop, or aperture, of the projecting lens. The disadvantage is that using a smaller aperture also decreases the amount of light transmitted to the screen.

**aperture response** The aperture response of a component or system is a graph of the peak-to-peak amplitude of its response (e.g., of the variations in reflected light) as a function of the TV line number. Assume that a pattern of black-and-white lines of varying widths is scanned by a narrow light beam, and the peak-to-peak variation in the reflected light from the black and light lines is measured. On lines that are much wider than the diameter of the spot, these variations will be of full amplitude. As the width of the lines is decreased so that the scanning spot always overlaps a portion of black and white line, the amplitude of the variations will decrease. When the width of the lines is twice the diameter of the spot, the variations disappear. The width of these lines is specified by its reciprocal, the number of alternate black and white lines (counting both black and white lines) that can be fitted into the vertical



## aperture slit

dimension of the picture. This parameter is known as the TV Line Number. The aperture response of a component or system can be specified either by its response to a square-wave pattern, i.e., alternate dark and light bars, known as the contrast transfer function (CTF), or by its response to a theoretical pattern in which the cross-sectional darkness of the bars varies sinusoidally, the modulation transfer function (MTF). The CTF is physically measurable, but the MTF is more useful for analytic purposes. Aperture response is a universal criterion for specifying picture definition and other aspects of imaging system performance. It can be used for film images, camera lenses, TV camera imagers, video amps and other bandwidth-limiting components, the scanning process, receiver picture tubes, and the human eye.

**aperture slit** In 3D-image display with parallax barrier, an interval between the stripe barriers. A viewer observes the displayed image through the aperture slits by both eyes.

**APL** Abbreviation for average picture level.

**apochromatic lens** A lens that has been corrected for chromatic aberration for three colors.

**apple tube** A color CRT with vertical red, green, and blue phosphor stripes. The spacing varies at the top and bottom of the CRT, so the face somewhat resembles an apple.

**Applegate diagram** A diagram used to illustrate the principle of electron bunching in velocity-modulated tubes (e.g., klystron, traveling-wave tube).

**APT** Abbreviation for automatic picture transmission.

**APTV** Abbreviation for Associated Press TV.

**Aquadag** A trademark of Acheson Colloids Co. for their brand of colloidal graphite in water, widely used to produce a conductive coating on the inside surface of the glass envelope for CRTs, where it collects secondary electrons emitted by the fluorescent screen. Also used on the outside of some picture tubes, where it serves as the final capacitor of the high-voltage filter circuit.

**ARC** Abbreviation for adaptive range coding.

**arc of good location** The portion of the geosynchronous orbit (22,300 miles above the equator) that provides optimum coverage of a country.

**archiving** The storage of TV shows, movies and other programs for future playback.

**arcing** A curved movement, as in the circular motion of a TV pedestal camera, for which the instructions are "arc left" and "arc right."

**ARO** Abbreviation for Audio Receive Only, small dish antennas used by radio networks for music and news programming distribution from TV satellites.

**A-roll** The primary material, as opposed to B-roll. In video editing, alternate scenes are arranged on two reels (A-roll and B-roll) and then assembled.

**ARS board** RF record/playback amplifier, servo circuit, and audio signal record/playback circuit; Betamax VCR.

**art card** A cardboard (generally 11 "x14") with a dark background and light letters (although it may be black letters on a white background). As used in TV, it contains credits and other information and is mounted on an easel in front of a TV camera.

**Article 810** See *National Electrical Code*.

**artifacts** Distortions in a video signal; spurious signals created artificially (hence the term artifact) by the imaging process. One of the most common is cross-luminance, a characteristic of composite systems employing a color subcarrier. It is a dot pattern that results from failure of the subcarrier signals on successive frames to cancel each other completely, e.g., on vertical edges of areas with high saturation. They can also be produced by moving objects in an interlaced scanning and appear as interline flicker. They can be eliminated or greatly reduced by the use of progressive scanning and component color systems. In the video domain, artifacts are blemishes, noise, snow, spots, etc. When you have an image artifact, something is wrong with the picture from a visual standpoint. Don't confuse this term with not having the display properly adjusted. For example, if the hue control is set wrong, the picture will look bad, but this is not an artifact. An artifact is some physical disruption of the image.

**artificial HDTV** See *Osborne compression system*.

**artificial satellite** See *Satellite*.

**Arts & Entertainment** A cable TV advertiser-supported network specializing in cultural programs, documentaries, variety shows and chiefly foreign feature films.

**ASC** 1. American Society of Cinematographers. 2. Active Signal Correction. Syn.: fuzzy logic (in Sony usage—see, e.g., KV-27XBR50, Sony monitor/receiver).

**ASCII** American Standard Code for Information Interchange, a code for transmitting data, made up of 128 letters, numbers, symbols, and special codes each represented by a unique binary number.

**ASIC** Application specific integrated circuit.

**ASK** Abbreviation for amplitude-shift keying.

**aspect ratio** The width-to-height ratio of a display. It is usually expressed as two numbers separated by a colon (width:height), such as 4:3 or 16:9. It may be expressed as a normalized single number, such as 1.33. A 35-mm frame of film measures 36 x 24 mm, meaning it that it has an aspect ratio of 3:2. Since it is different in size from a 4:3 or 16:9 TV screen, a little bit of the sides or tops of movies are chopped off when displayed on TV.

**aspect ratio conversion** Conversion of the TV picture geometry preserving the scanning standard, e.g., from the so-called anamorphic format to letterbox format. The video signal itself is aspect-ratio independent.

**aspheric corrector plate** Lens, one surface of which is specially shaped and is not part of the surface of a sphere as are the surfaces of most lenses. Used in

- some large-screen TV projectors and some wide-range room lenses.
- ASR** Abbreviation for automatic standard recognition.
- assemble edits** Edits that record all aspects of the program (audio, video, and control) at the same time.
- assembly edit** VCR feature that allows for clean transitions when adding audio or video sequences to prerecorded material. Also an editing technique in which pretaped segments are rerecorded end-to-end in a preferred order with selected transitions.
- astigmatism** 1. A type of spherical aberration in which light rays from a single point of an object do not converge at the corresponding point in the image. 2. A defect in an optical or electron lens that causes focusing in different axial planes to occur at different points along the lens axis. As a result of astigmatism, a point object gives rise to an image in the form of a horizontal line at another point. Normally the best compromise is between these two points where the image has the form of a circle of least confusion, representing equal vertical and horizontal resolution.
- Astra** Luxembourg's broadcast satellite. Frequency band: 11.2-11.45 GHz. Channels: 16 transponders. Polarization: linear.
- Asymmetric Digital Subscriber Line** See *ADSL*.
- asymmetrical compression** Techniques where the decompression process is not the reverse of the compression process. Asymmetrical compression is more compute-intensive on the compression side so that the decompression of video images can be easily performed at the desktop or in applications where sophisticated codecs are not cost effective. In short, any compression technique that requires a lot of processing on the compression end, but little processing to decompress the image. Used in DVD-Video creation, where time and cost can be incurred on the production end, but playback must be inexpensive and easy.
- asymmetrical-sideband transmission** Vestigial sideband transmission.
- asynchronous** Refers to circuitry and operations without common timing (clock) signals.
- asynchronous transfer mode (ATM)** The technology selected by the CCITT in 1988 to realize a B-ISDN. It is a fast, cell-switched technology based on a fixed-length 53-byte cell. All broadband transmissions (whether audio, data, imaging or video) are divided into a series of cells and routed across an ATM network consisting of links connected by ATM switches. Each ATM link comprises a constant stream of ATM cell slots into transmissions that are placed or left idle, if unused. The most significant benefit of ATM is its uniform handling of services allowing one network to meet the needs of many broadband services. ATM accomplishes this because its cell-switching technology combines the best advantages of both circuit-switching (for constant bit rate services such as voice and image) and packet-switching (for variable bit rate services such as data and full motion video) technologies. The result is the bandwidth guarantee of circuit switching combined with the high efficiency of packet switching.
- asynchronous transmission** The transmission mode by which characters may be sent with random timing. The data bits of each character are introduced by a start bit and followed by a stop bit. The asynchronous mode is common for low-speed transmission, less than 2.4 Kbps.
- ATC** See *ancillary timecode*.
- ATM** See *Asynchronous Transfer Mode*.
- atomic bomb wipe** A transition in which a scene is slowly moved up on the screen (suggesting an atom bomb cloud) as it is replaced by another scene.
- ATR** Abbreviation for audio tape recorder.
- ATSC** Advanced Television Systems Committee, a private sector organization founded in 1982 to develop voluntary standards for the entire spectrum of advanced television systems, including high definition (HDTV). See *HDTV*.
- ATSC A/49** Defines the ghost cancellation reference signal for NTSC.
- ATSC A/52** Defines the (Dolby Digital) audio compression for ATSC HDTV.
- ATSC A/53, A/54** Defines ATSC HDTV for the USA.
- ATSC A/57** Defines the program, episode, and version ID for ATSC HDTV.
- ATSC A/58** PSIP for Taiwan.
- ATSC A/63** Defines the method for handling 25 and 50 Hz video for ATSC HDTV.
- ATSC A/65** Defines the program and system information protocol (PSIP) for ATSC HDTV.
- ATSC A/70** Defines the method for conditional access for ATSC HDTV.
- ATSC A/90, A/91** Defines the data broadcast standard for ATSC HDTV.
- ATSC A/92** Defines IP multicasting using data broadcasting for ATSC HDTV.
- attached** A physical channel of a digital picture manipulator is said to be attached to a logical channel of a controller when the physical channel is successfully acquired by the controller.
- attenuation cable** A cable designed to connect the line-level audio output of one device to the low-level microphone input of another device.
- attenuation distortion** Syn. frequency distortion. See *Distortion*.
- attributes display** In videotex, a means of modifying the presentation of characters on the screen. Attributes may be applied to the full screen, a full row, part of a row (serial), or to subsequently printed characters (parallel).
- ATV** Abbreviation for Advanced Television or amateur television. 1. Advanced Television. Refers to any type of advanced TV system not presently in general use or production. The most recent example of ATV is the HDTV system now reaching the marketplace.



## ATV identification

ATV standards in North America include standard, enhanced, and high-definition versions. Although ATV systems are collectively considered to offer better quality than the NTSC signal, they can carry multiple pictures of lower quality and can also support the cancellation of artifacts in ordinary NTSC signals. 2. Amateur TV. Sending pictures by amateur radio. You'd expect this abbreviation to apply equally to fast-scan TV (FSTV), slow-scan TV (SSTV) and fax, but it's generally applied only to FSTV.

**ATV identification** Short for Amateur TV identification.

**ATVA** Abbreviation for American Television Alliance.

**ATVA-P** 6-MHz simulcast HDTV/EDTV format. Scanning: 787.5/59.94, sequential; channel coding: digital. The signal is sampled initially at a rate well above the Nyquist limit. By various bandwidth reduction techniques, the bit rate is brought within the capacity of a 6-MHz frequency band.

**AU** (also SND) Interchangeable file formats used in Sun and other workstations. Basically it is a raw audio data format preceded by a header.

**audimeter** An early device attached to home TV sets and designed to measure a family's viewing habits. Placed in representative homes, it was used by the A.C. Nielsen Company to measure the popularity of TV shows. The rating information determined the advertising rates of the shows and which shows would be renewed or cancelled. In addition, the ratings revealed which channel or channels were watched the most.

**audio** Latin for "I hear." Used to describe frequencies capable of being heard by the human ear, between 15 Hz and 20 kHz. The sound segment of a videotape, VCR, VDP or other component. Also, the input, output, cable wire, attachment or other feature, accessory or software referring to the sound portion of a system. For example, there are audio inputs, audio cables, audio mixers, etc. Slang for sound.

**audio alarm** A feature that presents an audible signal to tell the user that certain functions have been activated. For instance, some VCRs beep once when recording begins and twice when it ends.

**audio bandwidth** In reference to videotape, the parameters or audio range of a tape. Although human hearing can respond to frequencies from approximately 15 or 20 Hz to 20 kHz, the audio portion of a videotape has a bandwidth that is much shorter, somewhere from 50 Hz to 10 kHz, depending on certain tolerance limits measured in dB. This poorer response is caused by the small area of the tape allotted to the audio track and by the extremely slow speed at which the tape travels past the audio head. Higher-quality tapes extend these numbers on both ends of the bandwidth to produce less distortion, hiss, etc. However, the audio bandwidths of most tapes do not present any true limitations to many low-priced VCRs since these machines have an even shorter range than that of the videotape.

**audio cable tester** A device designed to check cables for shorts, phasing, continuity, etc. Used mostly by professionals, the cable tester is used with standard XLR3 pin-type cables and 3-conductor phone plugs.

**audio cue** The identification of an event by the use of a sound to alert those producing either an audio or video tape to the fact that something is about to happen. In video productions, certain words in the script are used as "cues" to denote shifts in action, camera position, microphones, or other technical events; in electronic editing, audio cues are often used to signal edit points.

**audio decoder** Accessory used in conjunction with VCR-equipped stereo sound to send the signals to various speakers for the purpose of creating a theatrical effect at home. The audio decoder picks up the encoded stereo track on the videotape and interprets the appropriate paths for the signal, directing it to front, back and side speakers.

**audio demodulation circuit** A circuit to separate the audio information from its carrier. This carrier is actually a subcarrier that is impressed onto the video carrier.

**audio distribution amplifier** A device designed to improve the sound quality of videotapes. A typical model contains a special filter circuit that decreases buzz and other noise, a microphone input for mixing sound-on-sound or adding narration, bass and treble tone control, etc. Some models provide a bypass feature for comparison of the affected and unaffected signal. The amp is often used to prevent generation loss of audio when duplicating tapes.

**audio dub** To rerecord the audio portion of a video tape without disturbing the video portion of the signal; also, to make a copy of an audio tape.

**audio dubbing narration** The addition of narration to a videotape. The process requires the following steps: Connect an external microphone into the mic input of the VCR. If you decide to use the built-in mic of the video camera, connect the camera to the VCR. Turn down the volume of the TV set to avoid feedback. Press Audio Dub, start the tape and the narration.

**audio dubbing recorded music** The addition of music to a previously recorded videotape. One simple procedure is to place the mic next to one of the speakers and switch the sound system to mono. Another, more desirable, method is to connect the amplifier or receiver of a stereo system or an audio-tape recorder to the audio input of the VCR.

**audio equalizer** See *Equalizer*.

**audio essay** A discussion of a specific film or program added to a commercial videodisc or videotape. Usually applied to classic works, the audio essay, which utilizes one of the stereo channels, presents an "expert" who takes the viewer on an oral and visual journey of the production. The historian or critic covers such items as biographical information per-

taining to the performers or director, missing or added scenes, interviews and related still shots and trailers.

**audio expander** A feature on an audio processor to improve the dynamic range of sound.

**audio expansion circuitry** A development found in TVs to provide a simulated stereo effect when receiving monaural broadcasts, cable TV, or signals from monaural external units (VCR, video disc player, etc.) connected to the rear panel audio/video inputs.

**audio for video** The term to describe two components of audio production used in the video medium: 1. High-quality stereophonic audio. 2. Multi-track production techniques. The adaptation of these components for the medium of video has given production teams the ability to further improve TV through the introduction of creative, high-quality audio.

**audio frequency modulation (AFM)** See *Beta hi-fi*.

**audio head** In video, a stationary magnetic head capable of recording and playing back sound signals. After receiving the audio signal, the head pulses it onto the videotape during recording or takes it from the tape for reproduction during playback. The audio head is the third and last process that affects the videotape. The erase head is the first, followed by the video heads. The audio head assembly is sometimes called the audio/control head and contains three heads. One performs the audio recording and playback, the second is designed for audio dubbing and the third is the control track head that transmits pulses onto the tape to control the start of each alternate field, that is, to track the original recorded signal.

**audio input** A jack, often located at the rear of a VCR and TV, that accepts audio signals.

**audio modulation** Refers to modifying a carrier with audio information so that it may be mixed with the video information and transmitted.

**audio optical deflector (AOD)** In 3D viewing systems, a device that serves as a horizontal scanning system.

**audio optical modulator (AOM)** In 3D viewing systems, a device that serves as an optical modulating system. The incident laser beam is intensity modulated by the AOMs in response to a video signal.

**audio output** A jack, often located at the rear of a VCR, DVD player, and TV, that outputs audio signals. One, two (for stereo), or six audio outputs may be present.

**audio plug** The metal connector at either end of an audio cable that fits into component receptacles called jacks. The three basic types of audio plugs used in home video are mini-plugs, phono plugs and phone plugs. The mini-plug is a smaller version of and similar to the phone (for telephone) plug. Both have a shaft that protrudes from a metal sleeve. The phono (from phonograph) plug, often referred to

as an RCA-type plug, also has a small shaft, but it is surrounded by a petal-shaped metal cup.

**audio processor** A device that can be used in audio; e.g., between a VCR and a stereo system. The audio processor usually contains such features as inputs for microphones, VCRs and tape; a multiple-band equalizer for improved sound; a stereo delay simulator and an audio expander to extend the dynamic range of the sound signals.

**audio response** The ability to reproduce audio signals. Better-quality videotapes, especially those listed as HG (high grade), produce less hiss, or an above-average signal-to-noise ratio. Tapes of poorer quality cause more audio distortion, hiss, etc. Audio response becomes more critical in the slower speed modes of both Beta and VHS machines. The average listener can respond to frequencies from approximately 20 Hz to 20 kHz. Videotape, however, falls short of this range, and is somewhere between 50 Hz and 10 kHz. Distortion and poor response result beyond these parameters. Tapes that exceed this audio bandwidth range (within certain tolerance limitations measured in dB) may be considered better than average, although most home video machines have a range narrower than that of most tapes. DVD-Video and DVD-Audio offer much improved audio capabilities over videotapes.

**audio signal** An electrical signal whose frequency falls within the audible range, the lowest measured at about 15 to 20 Hz and the highest at approximately 20 kHz.

**audio signal-to-noise ratio** In videotape, a measurement that determines the loudness of an undistorted signal relative to tape noise. Audio signal-to-noise ratio is measured in dB. The larger the number, the better the audio quality of the tape.

**audio subcarrier** The carrier wave that transmits audio information within a video broadcast signal. Audio subcarriers are frequency modulated. They are transmitted above the video, in the 4.5 to 8.0 MHz range for NTSC and from 5.5 to 8.5 MHz for PAL/SECAM broadcasts.

**audio/control head** See *Audio head*.

**audio/video amplifier** An accessory that adds sound processing to videotapes. The unit usually comes equipped with multiple audio/video inputs and outputs on its rear panel and digitally delayed audio modes that offer such special effects as stage, stadium, theater and matrix. The switchable amplifier may power several channels, depending upon the watts-per-channel used. Some models accommodate S-VHS and ED-Beta formats and feature a title generator and a video enhancer.

**audio/video combiner** Device serving to embed several digital audio signals within a digital video signal stream (usually using a serial digital interface).

**audio/video dub** A video camera feature that permits the replacement of a current segment of audio

## audio/video input

and video information on tape with new material. When audio/video dub is activated, new information is inserted over both tracks. Most present cameras offer this feature while other models provide only audio dub.

**audio/video input** Basic RCA jacks found on VCRs and TV monitor/receivers. Stereo models provide one input for video and two for audio. Mono units offer only one audio and one video jack.

**audio/video memory function** A feature, found on some TVs, that permits optimum control set-ups to be stored in memory for later recall.

**audio/video mixer** An editing accessory that allows switching back and forth between two video sources, such as two VCRs or a VCR and camcorder. Some A/V mixers offer additional features such as a fader, wipe effects and special-effects generator. There are manual and electronic mixers. The electronic type may use computer software and IR technology to "learn" the tape transport commands of the recording VCR. The user simply marks and names the scenes on the footage to be edited and instructs the mixer that scenes should appear in the final tape.

**audio/video mute** Special electronic circuits designed to silence a TV set to circumvent annoying noise and static. The mute feature also darkens the screen when the tuner is between channels or a videotape ends. Muting is sometimes referred to as blanking.

**audio/video processor** A multi-function device for use with various video components. The processor usually provides inputs and outputs for audio and video switching, an audio and video distribution amp, a video stabilizer, an image enhancer, an RF converter, etc. Some sophisticated models may offer color tint control, color intensity control, split screen enhancer, audio/video mute, a bypass switch and a fade duration control.

**audio/video receiver** A separate unit designed to function as a control center of home entertainment systems. These systems usually accommodate several audio inputs (CD, phono, tape and line) and several video inputs (VCRs, DVD and cable/satellite set-top box). Some units permit two-way dubbing, includes S-video and component video terminals and offer memory that can store several surround sound settings as well as "memorize" 30 stations for instant recall.

**audio/video signal** See *Signal*.

**Audio/Video Support System (AVSS)** In DVI runtime software, the software package that plays motion video and audio.

**audio/video switcher** See *Switcher*.

**audio-follows-video** An advanced feature of a professional/industrial editing console or switcher that permits the audio signal to follow the video edit operations, thereby facilitating audio crossfades to be produced under editor control. AFV offers a wide range of possibilities for professional editors. Scene

transitions produced in the video mode can automatically activate fades between complex audio balances. Thus, video edits and scene transitions can contain more tightly synchronized crossfades. Also, AFV facilitates the addition of music, dialog and special audio effects to multi-track master tape before a work print is produced.

**audio-follows-video switcher** A switcher that changes both audio and video sources with the push of one button.

**audio-mix control** A stereo VCR feature that designates the amount of audio each channel feeds to the mono RF output. Table-model and portable stereo VCRs produce dual channel sound by means of two individual audio tracks laid down on the top portion of the videotape. During the normal stereo playback, both tracks are utilized. The audio-mix control, however, permits an increase in either left- or right-channel sound by simply rotating the knob.

**audition** The preliminary studio test of a performer, act, or complete program for a TV or radio show.

**augmentation channel** See *Terrestrial HDTV broadcasting, MUSE-9 system*.

**augmented reality** A subset of virtual reality which attempts to generate a composite view for the user of the real world combined with a computer-generated virtual scene. The technology has applications in medicine, the military, entertainment, and manufacturing.

**aural signal** The audio portion of a TV signal; the picture portion is called the video signal.

**aural transmitter** The equipment used to transmit the audio portion of a TV program. The audio and video transmitters together make up the TV transmitter.

**AUSSAT** Australia's broadcast satellite. Frequency band: 12.25-12.75 GHz, 15 channels. Polarization: cross-polarized continental beams.

**authoring** The process of using multimedia applications to create multimedia materials for others to view. Multimedia authoring uses many tools, from the text editor or desktop publishing application, to tools for capturing and manipulating video images or editing audio files.

**authoring platform** A computer that has been outfitted with the hardware for creating material to be viewed in a multimedia box. The video quality of the authoring platform has to be high enough that the playback equipment is the limiting factor.

**auto channel search** See *Automatic channel scan*.

**auto cue and play** Functions of VCRs. Just insert a pre-recorded video cassette without an erasure prevention tab and the VCR turns itself on, then skips over the no-signal portion and immediately starts playback at the beginning of the recording.

**auto image stabilization** Syn.: Lens stabilization.

**auto lock switch** A feature, found on some camcorders, designed to simplify and speed up the

operation of the camera. When the user activates the Auto lock switch, it simultaneously sets the auto-focus system, white balance, shutter speed and backlight compensator.

**auto play** See *auto cue and play*.

**auto program** See *Automatic channel scan*.

**auto repeat** A VCR feature that allows the viewer to automatically play back a videotape. Auto repeat differs from *repeat play*, a feature that plays a videotape up to a specific point, stops and rewinds to a previous point, and continues to play that portion of the tape indefinitely until the button is pressed again.

**auto selection tool** An imaging term. A tool that selects an entire area within a specified range of color values around a selected pixel.

**auto start** See *auto cue and play*.

**auto tracking** A VCR feature that seeks out the most accurate playback tracking position for a given videotape. Since VCRs differ in their video head placement, some tapes, especially those recorded at the slowest speed, may not play properly on other VCRs. Many machines come equipped with a manual tracking control to adjust for these variations; auto tracking handles these differences automatically.

**auto/manual aperture control** A device that places the control of the *f*-stops or aperture openings into the hands of the user. Many camcorders feature automatic iris control, a less desirable feature for some camera owners who prefer to make their own selections. Some users choose to open or close the lens one or two additional stops for special effects.

**auto/manual iris control** Syn.: Auto/manual aperture control.

**auto-assemble** Generation of an edited master by a video or audio-for-video edit controller using an existing edit decision list.

**autodialer** A device which, when activated by a short code or mnemonic key or, in videotex, by the selection of a number from a menu, causes the dialing of a prerecorded telephone number.

**auto-focus** Also called automatic focus. A process built into some video cameras in which an impulse of invisible light is emitted to the subject and returned to a pair of IR sensors. This distance is then calculated by an IC. Finally, a drive motor adjusts the lens. Hitachi, Toshiba and Akai were among the first companies to feature auto-focus in their cameras. Some of today's video cameras offer a more sophisticated—and more accurate—auto-focus technique. Instead of relying on the not-too-precise IR reflection to measure distances, the focal adjustment of these later cameras operates directly off the image-sensing elements.

**auto-framing** See *Automatic framing*.

**automatic background control** Automatic brightness control.

**automatic backlight compensator** Syn.: Backlight switch.

**automatic backspace editing** A VCR feature that eliminates frame overlapping for glitch- and distortion-free transitions. A built-in microprocessor, after checking the signals of the control track, makes certain that a new recording starts at the end of the last frame each time a recording is begun from the Pause mode.

**automatic brightness control (ABC)** 1. A TV receiver circuit to keep the average brightness of the reproduced image essentially constant. Its action is like that of an automatic volume control in a sound receiver. Also called automatic background control. 2. In a TV receiver, a circuit that automatically adjusts the brightness of the display in accordance with the level of ambient light near the receiver. A photocell may be used to measure the ambient light, its output, after amplification, being used to control the grid bias of the picture tube.

**automatic brightness limiter (ABL)** A circuitry in TVs to limit the maximum beam current to prevent overdriving the CRT.

**automatic channel scan** A TV or VCR feature that automatically programs the TV or VCR tuner memory to lock in only active channels. Usually operated from the remote control unit, the ACS, sometimes described as auto program, automatic channel search, or programmable scan, searches up and down those channels active in a particular area and ignores the inactive ones that only bring in noise and static.

**automatic channel search** Automatic channel scan.

**automatic chapter search** A videodisc player feature that, when activated, takes the viewer to a particular selection on the disc. This chapter search feature is often found on the remote control unit of a player.

**automatic chroma control** Automatic color control.

**automatic chroma correction** See *Automatic chroma gain control*.

**automatic chroma gain control** Automatic correction of chrominance channel gain typically using subcarrier burst level as a reference. Syn.: ACC, automatic chroma correction.

**automatic chrominance control** Automatic color control.

**automatic color circuitry** Electronic circuits built into some TV sets, TV monitors and monitor/receivers designed to retain factory-preset color levels. Automatic color circuitry locks in this balanced color arrangement regardless of discrepancies between channels and scenes. One disadvantage or criticism of this feature concerns the viewer's preference—the colors may appear too weak, too intense, too bluish, etc. However, the color circuitry usually comes with a switch that can be deactivated so that the colors can be adjusted manually. Also a technician can modify the automatic color circuitry so that it operates more to the owner's liking.

## automatic color compensation

**automatic color compensation** A feature found on some TV sets which monitors the three color guns or electron beams so that the colors retain their accuracy for the life of the CRT. Under normal conditions, tubes lose their color intensity as they age. With the addition of the special electronic circuitry, the TV set can compensate for this imbalance.

**automatic color control (ACC)** A circuit in a color TV set to keep color intensity levels essentially constant despite variations in the strength of the received color signal. Also called automatic chroma control and automatic chrominance control.

**automatic color purifier** Automatic degausser.

**automatic color tint control** See *Color tint control*.

**automatic contrast control** A circuit that maintains the contrast of the TV picture at a constant average level. The manual contrast control determines the average level and the automatic contrast control maintains this average, despite variations in signal strength as different stations are tuned in.

**automatic contrast correction** A TV feature that helps to bring out almost imperceptible detail in overly bright or extremely dark sections of a screen image.

**automatic degausser** An arrangement of degaussing coils mounted around a color TV picture tube, combined with a special circuit that energizes these coils only while the set is warming up after being turned on. The coils demagnetize any parts of the receiver that have been affected by the earth's magnetic field or by the field of any nearby home appliance. Automatic degaussing permits a color TV receiver to be moved around a home without readjusting purity controls. Also called automatic color purifier.

**automatic digital tracking** A VCR feature that automatically monitors its own playback. Special circuitry continually compares the RF signals on the videotape to reference signals in the circuit. If the two signals are not in sync, the special circuit emits a correcting signal to the capstan servo, which permits the video head to make adjustment for the best possible signal.

**automatic fade control** A video camera feature designed to provide fade-outs at the end of scenes and fade-ins at the openings. When the fade control is engaged during the middle of a scene, nothing occurs until the end, when the fade-out ends the scene. If the control is pressed before starting the camera, the scene will open with a fade-in. Some cameras can be programmed to fade in and out on a scene.

**automatic fine-tuning (AFT) control** A circuit on such units as VCRs and TV sets that keeps the frequency of the oscillator in the tuner correct for best color picture by compensating for drift and incorrect tuning. Eliminates the need for careful manual fine-tuning each time a station is changed.

**automatic focus** See *Auto-focus*.

**automatic focus compensation** A projection TV feature that adjusts for the disparity in projection differences between the lens and the center of the screen and the lens and the edges of the screen.

**automatic focusing** Electrostatic focusing in which the focusing anode of a TV picture tube is internally connected through a resistor to the cathode so that no external focusing voltage is required.

**automatic framing** A video camera zoom lens feature that keeps the size of the subject constant. Whether the subject moves toward or away from the camera, the automatic framing function maintains the original size of the image. Canon was the first company to offer the special zoom lens feature, also known as auto-framing, on some of its higher-price 8mm camcorders.

**automatic frequency control (AFC)** A circuit that locks onto a chosen frequency and will not drift away from that frequency; a technique to lock onto and track a desired frequency. Used in TV transmitters, VCRs, and TV receivers to keep undesirable changes to a minimum.

**automatic gain control (AGC)** A control circuit that automatically changes the gain (amplification) of a signal so the desired output signal remains essentially constant despite variations in input signal strength. In a camcorder, this feature is designed to increase the signal only to the degree that the image gains an even intensity. AGC increases a blank signal to gray; in poorly lighted scenes it adds noise to shadowed areas and produces less saturated colors. Usually in the form of a switch, the AGC when activated has one disadvantage: some deterioration occurs in the video image. In most VCRs a circuit controls the intensity of incoming audio and video signals so that they match predetermined output levels while taping off the air or recording with a camcorder. AGC is different from the sensitivity switch that affects the general amplification of the video signal. In audio, the AGC automatically boosts or attenuates audio signals to optimum levels. AGC is also known as automatic level control, a feature found on other instruments such as a color noise meter, where it serves to stabilize input levels.

**automatic hue control** A signal inserted into the vertical blanking interval to help a TV set adjust the proper color. Found on only a few TV models, automatic hue control, which is placed on line 18 of the blanking interval, may cause a problem when pre-recorded tapes encoded with the anti-piracy code Macrovision are played. The anti-piracy signal uses this same line for its white pulses that are placed here to defeat copying the tape information to another VCR. Automatic hue control is similar in function to automatic color circuitry.

**automatic image stabilization** As applied to video cameras, a method of achieving a steady recorded picture while the user is walking with the video cam-

era. Normally, the results of such camera recording show up as images that are jumpy at best or unintelligible at worst. The use of servo mechanisms and rapidly responding compensating motors converts camera movement into relatively smooth pictures. Modern video cameras do the stabilization electronically by using only a portion of the CCD array to capture the image. What portion of the CCD array is used to capture the image is determined by the amount and type of movement. All this is accomplished by activating a special switch on cameras equipped with automatic image stabilization.

**automatic iris control** A camcorder feature designed to automatically operate the lens opening by “reading” the average light within a scene. If the automatic control cannot be overridden manually, then there is no way to correct for extreme light or dark backgrounds, etc. Some cameras are equipped with auto/manual aperture control, a more desirable method, offering both flexibility and automation.

**automatic level control (ALC)** When used to describe an audio signal control, means the same as AGC.

**automatic light control (ALC)** In video, an electronic circuit that modifies any incoming light to a predetermined level. In a vidicon camera, it is the control that automatically adjusts the target voltage to compensate for variations in light levels. The ALC affects light the way the AGC affects video.

**automatic lock** A DVD player feature that holds the optical assembly in place when the power is shut off. Similar to a “park” program for a computer disk drive, the automatic lock helps to prevent damage to the internal assembly whenever the machine has to be moved.

**automatic pedestal control** A process that automatically adjusts the pedestal height in a received TV signal as a function of input signal strength or some other specified parameter.

**automatic phase control (APC)** 1. A circuit in color TV sets to reinsert a 3.58-MHz carrier signal with exactly the correct phase and frequency by synchronizing it with the transmitted color-burst signal. 2. An automatic frequency-control circuit in which the difference between two frequency sources is fed to a phase detector that produces the required control signal.

**automatic picture control** A switch in some color TVs to disable one or more of the regular controls and use corresponding preset values. Pushing one button corrects for accidental misadjustment of controls. Sometimes also referred to as an automatic gain control.

**automatic picture transmission (APT)** A slow-scan TV system in weather satellites; it is capable of transmitting conventional TV pictures of clouds in the daytime and IR pictures of clouds in at night. Each image is stored for about 200 seconds in a vidicon while being scanned for transmission to earth.

**automatic program delay** A professional/industrial unit designed to provide delays from a few minutes to several days, play back multiple feeds simultaneously and accommodate incoming feed record-only sessions. Delay actions are operated via time codes, are frame-accurate and are affixed to the studio reference clock. Some units can handle a schedule of up to 1,000 events that can be programmed for automatic operation.

**automatic program edit** A feature, found mainly on top-of-the-line laserdisc combination players, that aids in the process of dubbing from disc to tape. Once the user enters the length of tape selected for recording, the player automatically calculates the number of tracks that can be recorded within that time range.

**automatic programming** A feature on VCRs designed for presetting a number of programs on different channels and at various times to record automatically.

**automatic sag compensation** Refers to a feature, built into some test instruments such as color video noise meters, that helps to produce uniform input signals.

**automatic scan tracking** A feature, found on some VCRs, designed to provide distortion-free slow motion from freeze frame to play mode. See *Visual scan*.

**automatic standard recognition (ASR)** A circuit that automatically selects the video standard of the received signal. When TV reception is difficult, because the signals are weak, noisy, or badly distorted, this feature can be turned off and the video transmission standard chosen manually.

**automatic switchover** A feature that enables a device to accommodate either 110V or 220V operation without any manual adjustment.

**automatic timing** See *Programmable timer*.

**automatic tint control** A circuit in color TVs to maintain the correct flesh tones.

**automatic tracking** A method of holding the video head of a VCR on the track during playback. Tracking adjustments are sometimes necessary to play back a tape recorded on a different machine.

**automatic tracking reset** A feature, found on some older VCRs, that sets the tracking control to its default setting each time a videotape is ejected or when the power is turned off. Without this feature, the VCR owner must reset the tracking control manually. Otherwise, the next recording will permanently be “off center,” a familiar problem with forgetful VCR owners. Automatic tracking reset differs from auto tracking, which works completely automatically, requiring no adjustments.

**automatic transition editing** A process that permits glitch-free editing by automatically winding videotape back a few frames when recording is stopped. When record is resumed, ATE aligns the beginning of the new recording with the end of the previous one, thereby eliminating glitches and picture



## automatic turn-on

breakup. The problem with some types of ATE is that the last part of the previous scene is sometimes lost. Also, exact editing is almost impossible. JVC was one of the first manufacturers to offer this editing technique found today on many VCRs and portable models. Other VCR manufacturers use different approaches, all of which achieve similar results—almost glitch-free edits. Sony, for example, introduced its time-phase circuit. When the tape restarts, its movement is delayed electronically by special circuitry until the beginning of a field rather than the middle of one. ATE is also known as edit-start, edit-start control, scene transition stabilizing.

**automatic turn-on** See *auto cue and play*.

**automatic variable frequency scanning** A feature of display monitors that allows them receive a range of signals that allows the user to switch from video to computer graphics. Some models can scan from 15 to 36 kHz while others offer more limited ranges such as 31.5 and 35 kHz. Several monitors designed exclusively for computers call this feature “multisync.”

**automatic white balance** A feature on camcorders to help simplify white balance control. By aiming the camera at a white card or similar object and pressing a button for a few seconds, a special circuit in the camera scrutinizes and compares the RGB channels and automatically corrects them. Sometimes automatic white balance is only one, two, or three controls used on a camera for color adjustment. Other cameras have improved the automatic white balance adjustment by allowing it to be put on hold. By preventing the adjustment from changing automatically to match the shifting light conditions, the camera user can capture the dramatic changes in such scenes as sunsets without the camera compensating for these light changes.

**auto-phasing** A video mixer with auto-phasing has the ability to compensate for timing differences between the input sources, allowing it to perform transitions free of artifacts. This is usually accomplished by built-in line or frame synchronizers.

**auto-setup** A type of professional/industrial TV monitor that adjusts itself automatically, thereby eliminating the fine tuning previously required by technicians. These monitors are especially useful in viewing the same image when interchanging videotapes from one facility to another. Another advantage is the capture of the same image when several auto-setup monitors, adjusted for the same color temperature, are arranged in a row.

**autosizing** 1. Syn.: Character sizing. 2. In graphics hardware, autosizing refers to a monitor's ability to accept signals at one resolution and display the image at a different resolution. Without autosizing, an image must be adjusted manually so that it fills the screen properly.

**autostereogram** A technique used for 3D TV with-

out using special glasses for the viewer. Large lenses are employed and the viewer must be in a very specific, fixed location to watch the 3D picture. It is not compatible with normal TV programming.

**autostereoscopic system** A 3D-image display system that doesn't require special glasses.

**auto-stop circuit** A circuit that puts a VCR into stop mode if any of the detectors that generate the auto-stop operations sense a need to automatically stop the machine. See *Head drum rotation detector*, *Tape end sensor*, and *Tape slack sensor*.

**autotiming** The capability of some digital video equipment to automatically adjust input video timing to match a reference video input. Eliminates the need for manual timing adjustments.

**auto-transition** A transition (such as a mix or wipe) that 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 in the case of an editor (such as via a GPI interface). In a DVE or vision mixer a “take” button (which may be remote controlled) will usually trigger a predefined transition. In this context, “take” is sometimes called “auto-transition.”

**auto-winder** See *Rewinder*.

**aux** See *Auxiliary bus*.

**auxiliary bus** Some video mixers have extra switching buses that allow video signals connected to the switcher to be fed to external equipment such as digital effects systems, slow-motion VTRs, etc. The auxiliary bus usually has no specific mixer function; it is a utility feature. Syn.: aux.

**auxiliary preset button** A feature found on some VCRs that is designed for setting in advance the output channel of a decoder that may be required for some cable TV systems.

**auxiliary radio services, CATV** Three auxiliary radio services, Multipoint Distribution Service (MDS), Multichannel Multipoint Distribution Service (MMDS), and Cable Television Relay Service (CARS), are used to supplement and broaden the coverage of CATV systems.

**auxiliary trigger** A video camera option that provides an additional pause button. It can be useful in certain situations such as shooting in awkward or unusual positions.

**available light** The amount of natural or artificial light that is present. Light is measured in lux or footcandle numbers. The lower the number, the greater the sensitivity of the camera.

**average picture level (APL)** The average level of the luminance within an active picture. Usually expressed as a percentage of reference white level. APL is often incorrectly used instead of “flat field.”

**average transmitted power** In TV transmitting systems, a power depending on the picture content, being minimum for an all-white picture and maximum for all black. The NTSC/PAL composite video

waveform is inefficient in its power use, and most of it is used for the sync and blanking pulses. See *Rated transmitted power*.

**AVI** Audio-video interleaving. Microsoft® Video for Windows file format for combining video and audio into a single block in time, such as a video frame. ASF is intended to replace AVI.

**AVO** Audiovisual object. In MPEG-4, audiovisual objects (also AV objects) are the individual media objects of a scene, such as video objects, images, and 3D objects. AVOs have a time dimension and a local coordinate system for manipulating the AVO.

**AVSS** Abbreviation for Audio-Video Support System.

**A-weighted** See *Weighting noise*.

**axis** Relating to digital picture manipulation, the x axis is a horizontal line across the center of the screen, the y axis is a vertical line, and the z axis is perpendicular to plane of the x and y axes, indicating depth and distance.

**axis of action** See *Line*.

**AYH option** See *HP 89400*.

**azimuth** 1. The angle of the recording head in relation to the tape path. To prevent crosstalk, or the confusion of the video heads in playing back the proper tracks that are crowded together, the head gap angle is lifted slightly away from the perpendicular. In Beta format the tilt is 7 degrees. Thus, each of the two heads lays down a different pattern on the tape. It is as if one recording head placed down a horizontal design within its diagonal track while the second head recorded a vertical pattern. When the tape is played back, each head can retrieve only the design or pattern it recorded, thereby eliminating crosstalk. The azimuth system provides a second advantage. The tracks that the two heads

produce can be placed next to each other, eliminating the guardbands or spaces previously required between tracks. This permits storing more information on the tape. Sony first introduced the azimuth system in 1975. Some Super-VHS camcorders have a double-azimuth 4-head system that reduces the size of noise bars during the search mode and provides noise-free still frames. 2. A compass bearing expressed in degrees of rotation CW from true north. It is one of the two coordinates (azimuth and elevation) used to align a satellite antenna.

**azimuth blanking** Automatic blanking of a radar transmitter beam as the antenna scans a predetermined horizontal sector of its scanning region. This may be used to prevent interference with TVs in a city close to the search radar site.

**azimuth-elevation (Az-El) mount** An antenna mount that tracks satellites by moving in two directions. The azimuth is the horizontal plane and elevation is up from the horizon.

**azimuth error correction** Electronic circuitry designed to help correct artifacts in prerecorded Dolby surround sound. It helps with such problems as dialogue, targeted for the front center channel, being directed to the rear speakers.

**azimuth recording** This recording is used in VHS to eliminate the interference, or crosstalk, picked up by a video head. Since adjacent video tracks touch, a video head can pick up some information from the adjacent track. The azimuth of the head gaps assure that head "A" only gives an output when scanning across a track made by head "A." Head "B," therefore, only gives an output when scanning across a track made by head "B."

**azimuth technique** See *Azimuth recording*.



# B

- b** 1. Bit; for example, bps for bits per second. 2. Binary; for example, 1101b for the binary number 1101.
- B** 1. Blue. 2. CATV midband channel, 126-132 MHz. 3. See AAA rate. 4. Byte. 5. Baud. 6. Bel. 7. TV standard; Australia, Austria, Denmark, Egypt, Finland, Germany, Greece, Hong Kong, India, Iran, Israel, Italy, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Portugal, Rhodesia, Saudi Arabia, Singapore, Spain, Sweden, Switzerland, Turkey, Yugoslavia. Characteristics: 625 lines/frame, 50 fields/s, interlace—2:1, 25 fr/s, 15,625 lines/s, aspect ratio—4:3, video band—5 MHz, RF band—7 MHz, visual polarity—negative, sound modulation—F3, pre-emphasis—50 us, deviation 50 kHz, gamma of picture signal—0.5, used band—VHF.
- B channel** A “bearer” channel is a fundamental component of ISDN interfaces. It carries 64,000 bits/s in either direction, is circuit switched and should be able to carry either voice or data. Can be used for videophone (see *Common intermediate format*).
- B&W** Black-and-white.
- b/s** Bits per second.
- B+** Supply voltage; the plus sign indicates the polarity.
- B+ boost** A circuit in TV sets that adds to, or boosts, the basic B+ voltage. The boost source is a by-product of the horizontal deflection system. See also *Damper*.
- baby** 750-watt spotlight.
- baby legs** Low camera tripod.
- back channel** A means of communication from users to content providers. As content providers are transmitting interactive television (analog or digital) to users, users can also connect through a back channel to a Web site, for example. The back channel can be used to provide feedback, purchase goods and services, etc. A simple type of back channel is an Internet connection using a modem.
- back light** Light placed behind objects in a scene and pointing toward the camera to provide a rim of light, that outlines the object and creates a sense of depth by setting off that object from the rest of the scene. See *Lighting*.
- back lot** An area of a movie studio or TV station where exterior scenes are shot.
- back matching** The matching of the input and output of electronic devices to reduce signal reflection and ghosting. Also known as impedance matching.
- back plate** The electrode to which the stored charge image of a camera tube is capacitively coupled. Syn.: signal electrode. Used in vidicon, iconoscope.
- back porch** The area of the analog video waveform between the end of horizontal sync and the start of active video. In NTSC and PAL video signals, this part is largely occupied by the color burst.
- back porch clamping** The process of resetting video signal level offset to zero by using the black level at the back porch as a reference. Syn.: clamping; black level clamping.
- back porch switching** Video signal switching performed within the vertical blanking interval to minimize the visibility of switching artifacts. Syn.: vertical interval switching.
- back projection** When the projection is placed behind a screen (as it is in TV and various video conferencing applications where the image is displayed on a monitor or a fabric screen) it is described as a back projection system. In these systems the viewer sees the image via the transmission of light as opposed to reflection used in front projection systems. Audiences generally prefer back projection systems since they seem brighter.
- back up** In camcorders, an indicator on the menu display. When the indicator appears, the settings are retained even when the battery is removed, as long as the lithium battery is in place.
- back-back porch** The portion of a back porch that follows the color burst.
- background** 1. Short form of the term color background—the same as matte generator. 2. One of the video sources involved in keying. Specifically, the background video is the video that has parts of it replaced with the key fill, or foreground video. When associated with chroma-keying, for example in a weather report, the background is the weather map and the foreground is the weather reporter.
- background color** In videotex, the color of the area of the character cell not occupied by the foreground color; the color of the remaining area of the character. The color may be any from the available color

tables or be transparent, in which case the full-screen background color (or the cumulative result of all picture elements previously set or the video picture) is seen.

**background generator** Usually part of vision mixer. The color and sometimes even the texture of the generated background is adjusted with such controls as "Luminance," "Chrominance," "Hue," etc. Syn.: matte generator.

**background music jack** An audio feature on some camcorders that permits the user to connect an external sound source during the recording process. Adding background sound while the original recording is in progress eliminates the usual generation loss that is inherent in tape editing when music is recorded after a recording session.

**background video** See *Background*.

**backing** The plastic-ribbon base, usually mylar, onto which is coated the oxide formulation of both audio and video tape. The backing is resistant to stretching and decomposition. A binder to hold a coating of magnetic oxide particles is placed on the backing. Backing is also called base film.

**backlight switch** On some video cameras with automatic iris control, a feature designed to provide one *f*-stop more light. In a scene containing a bright background with a dark subject, the automatic iris usually reads the darker part of the picture, causing the main subject to be underexposed. Activating the backlight switch compensates for this by adding more light. Different from a contrast compensation switch, the backlight switch only opens the lens wider. The backlight switch is sometimes listed as an automatic backlight compensator.

**backspace edit** A feature on many VCRs whereby the tape will automatically rewind a certain number of frames to create a clean cut when the camera is reactivated.

**backspacing** 1. Reverse cueing technique. 2. A feature on VCRs designed to eliminate picture breakup between scenes by backing up the tape when the Pause mode is engaged. Then when Record is pressed, the tape begins at the end of the previously recorded section. On some machines the tape is backed up over the last few frames of the previous scene.

**backtiming** 1. Reverse cueing technique for editing backspace used in electronic editing. 2. A technique in live news, variety, or other programs in which the last segment is rehearsed and timed. Thus, in the actual broadcast, as the time to begin this segment approaches, the director is prepared to stretch it, speed it up, or replace it. In TV news programs, backtime is the clock time (the actual time) at which the last segment should begin if the program is to end on time. Thus, if the last segment is 40 s long and the newscast must end at 11:28:55, the last segment must begin at its backtime, 11:28:15. Each

of the preceding segments also can be backtimed from the end of the program working toward the beginning.

**backward compatibility** The capability of an improved or enhanced piece of hardware to accept software designed for an earlier model. For instance, S-VHS VCRs, that require special tape to benefit from the improved features of the VCR, can play back standard videotapes. However, the conventionally recorded tapes will not reflect the higher quality of S-VHS VCR. See also *Compatibility*.

**Baer, Ralph** Developed the first video games in 1971 while he was employed by Magnavox.

**Baird, John Logie** Pioneer in British TV, inventor of the first marketable home videodisc system in 1928. Using a TV system based on electro-mechanics (a light-sensitive cell and a mechanical revolving disc), he was able to send a TV signal from London to New York in 1928. The BBC employed his system when TV was introduced into England in 1929. Within a few years the process succumbed to an all-electronic TV system developed in the USA by such scientists as Vladimir Zworykin and Philo T. Farnsworth.

**balanced converter** See *Balun*.

**balanced modulator** A modulator in which the carrier and modulating signal are introduced in such a way that the output contains the two sidebands without carrier. Used in color TV transmitters to apply the I and Q signals to the subcarriers, as well as in suppressed-carrier communications transmitters.

**balop** Balopticon, an opaque projector made by Baush and Lomb (hence the name) that casts positive images by reflection for a TV camera. The images generally are artwork on a large slide (a balop) used as background for a TV or film scene or as part of a sequence, such as a card or slide of a book jacket, product, name and address of a sponsor, or other identification.

**balun** BALanced to UNbalanced. An adapter used for converting 300 ohms into 75 ohms. Usually supplied with a VCR to convert 300-ohm antenna wire, the balun is often needed to connect a video game, VCR or other component to a TV set, etc. One example of its function involves connecting a 300-ohm video game to a 75-ohm projection TV system. Also used to balance the impedance of an outdoor antenna (usually 300 ohms) to the impedance of modern TV sets and VCRs (usually 75 ohms). There are two types of baluns: a VHF-only and UHF/VHF model. Sometimes called balanced converter, bazooka (slang), line-balance converter, and matching transformer.

**balun coil** A set of balun coils are found between antenna connection and TV tuner to match the input of 300 ohms to 75 ohms at the tuner input.

**banana tube** A type of color picture tube in which television signals were sent through a long, thin tube, followed by RGB signals flashed at timed intervals.

**band** In audio/video, a span or range of frequency

## band separator

signals. Most TV sets and VCRs can be adjusted for any one of three ranges: L (low band) for VHF channels 2-6; H (high band) for VHF channels 7-13, mid-band A-I and superband J-W; and U for UHF channels 14-83. However, more sophisticated machines offer four ranges: VHF low (channels 2-6), VHF mid-high (channels 7-13 and cable A-I), UHF (14-83) and VHF super (for superband channels on cable). TV satellites work within two frequency ranges. Large dish antennas require the popular C-band, whereas smaller dish antennas utilize the Ku-band.

**band separator** An accessory that separates incoming UHF, VHF and AM antenna signals so that they can be directed to their respective terminals. Some band separators accept a 300-ohm (twin lead) input while others take a 75-ohm input and, with a built-in matching transformer (75 to 300 ohms), provide a VHF output as well as a UHF output. Band separator is essentially a set of filters.

**band switch** See *Turret tuner*.

**banding** A video defect in TV transmission in which strips of the picture differ from adjacent areas, often due to a videotape player.

**bandpass filter** A circuit that transmits alternating currents whose frequencies are between given upper and lower cutoff values, while substantially attenuating all frequencies outside this band. Used in TVs, VCRs. These filters are also used in signal processors to affect color and definition to allow only a selected range of frequencies to pass through.

**band-stop filter** A filter that attenuates alternating currents whose frequencies are between given upper and lower cutoff values while transmitting frequencies above and below this band. It is the opposite of a bandpass. The band rejected is generally much wider than that suppressed by a trap. Also called band-rejection filter, bandstop filter, and rejector circuit.

**bandwidth (BW)** 1. Refers to the frequency range transmitted by an analog system. In video systems, specifying the highest frequency value is sufficient, since all video systems must transmit frequencies down to 30 Hz or lower. In transmission, the U.S. analog and digital SDTV channel width is 6 MHz. 2. Incorrectly used as the equivalent of information-carrying capability of digital TV systems, e.g. "the compression system has a 6-MHz bandwidth." The particular artifacts generated by such systems may make nonsense of the quoted frequency response.

**bandwidth compression** A technique to reduce the bandwidth needed to transmit a given amount of information. Bandwidth compression is used to transmit voice, video and data.

**bandwidth efficiency** In TV, the ratio of picture quality to RF bandwidth.

**bandwidth, HDTV** (color set and color-difference set). See *SMPTÉ 240 standard*.

**bandwidth on demand** Say you want two 56-Kbps circuits right now for a videoconference. Use one of the newer pieces of telecommunications equipment and "dial up" the bandwidth you need. An example of such a piece of equipment is an inverse multiplexer. Uses for bandwidth on demand include video conferencing, LAN interconnection and disaster recovery. Bandwidth on demand is typically only for digital circuits and it's typically carved out via a T-1 permanently connected from a customer's premises to a long distance carrier's central office, also called a POP—Point of Presence.

**bandwidth reduction, EUREKA-95 HDMAC system**

To transmit the 21-MHz luminance baseband compatibly to the D-MAC and D2-MAC receivers, bandwidth reduction by a factor of approximately four is required. This is accomplished by the coding and decoding process as follows. The encoder has "branches" for three degrees of motion: an 80-ms (4 fields) branch for stationary and slowly moving areas of the scene; a 40-ms (2 fields) branch for moving areas; and a 20-ms (1 field) branch for rapid motion and sudden scene changes. These branches are switched to the transmission channel by the motion processor. The switching signals are also transmitted to the receiver via DATV channel, where the branch in use at a particular time, after decoding, is connected to the receiver for processing and display at the 1250/50/2:1/16:9 rates of the camera or telecine equipment at the transmitter.

The chrominance signals, each of 10.5 MHz baseband, are transmitted after similar 3-branch encoding, but without motion compensation. The encoding in the 80-ms branch extends over four fields. Hence, the luminance bandwidth for stationary areas is reduced from 21 MHz to 5.25 MHz. But the 40-ms and 20-ms branches extend only over two fields and one field, respectively, so additional bandwidth reduction is required. This is achieved by several processes, e.g., "quincunx" scanning (scanning of successive picture elements alternately from two adjacent lines) on alternate fields, which produces a synthetic interlace; and line shuffling that interleaves high-definition samples so that two lines within a field are transmitted as one MAC/packet line, to which the D-MAC and D2-MAC receivers respond compatibly. The clues required to perform the inverse operations at the receiver are transmitted over the DATV channel.

**bandwidth requirements** The bandwidth required by a TV signal is half the number of pixels transmitted per second. A wide bandwidth is required to resolve fine detail while maintaining a high enough picture repetition rate to avoid objectionable flicker. This explains the huge spectrum requirements of TV systems.

**Bandwidth Segmented Orthogonal Frequency Division Multiplexing** BST-OFDM attempts to improve on COFDM by modulating some OFDM car-

- riers differently from others within the same multiplex. A given transmission channel may therefore be "segmented," with different segments being modulated differently.
- bank** 1. A set of similar devices connected together for use as a single device (bank of resistors). 2. A storage area (data bank). 3. In film and TV, rows of lighting. 4. In broadcasting, a pool or collection of commercials (commercial bank).
- bank timer** A VCR timer-related feature that can store several sets of timer-recording instructions under different categories. On-screen menus help the viewer to code in timing information under such topics as news, cinema, cartoons and drama. These instructions are then entered into the timer section for upcoming recordings.
- bar** A common test pattern component. The bar looks on a TV screen as a vertical strip, usually specified by color, level and edge rise-time, e.g. 75% 2T White Bar. Sometimes the bar component is called "windows" or "box."
- bar code** A pattern of vertical lines of differing widths. These can be read by a bar-code scanner to provide data to a VCR. See also *LCD digital scanner programming system*.
- bar code programming** A VCR feature that simplifies transmitting recording instructions to the clock/timer of the VCR. VCRs that come equipped with this programming function provide a pen-like device, called a bar-code scanner, and a programming card containing a list of days, time segments and channel numbers. The owner, using the scanner, simply checks off the appropriate day, time and channel on the card for each program to be recorded. The information is then transferred to the VCR to be displayed for confirmation on the TV screen.
- bar generator** A signal generator that delivers pulses uniformly spaced in time and synchronized to produce a stationary bar pattern on a TV screen. A color-bar generator produces these bars in different colors on the screen of a color TV set.
- bar pattern** The pattern of repeating color bars produced by a bar generator, for adjusting color TV receivers.
- barrier grid** See *stabilizing mesh*.
- bar tilt** Time domain parameter indirectly showing low-frequency response distortion by checking bar waveform. The tilt of the flat top of the bar is usually expressed as a percentage of the bar's amplitude, ignoring overshoots. Syn.: tilt.
- bar-code scanner** An optical character reader that can automatically read data from documents bearing information formed with a special bar code. See also *LCD digital scanner programming system*.
- barker audio** See *Video inversion*.
- barker channel** A channel to advertise the pay TV service to nonpaying would-be viewers. The main audio channel can be used as a barker channel.
- Barkhausen** A term applied to a display of one or two black vertical lines on the left side of the TV picture tube due to some spurious behavior (oscillation) in the circuit. These lines are usually seen best when there is no picture on the screen (just a blank raster).
- Barkhausen magnet** A permanent magnet mounted on the horizontal output tube of a TV receiver to reduce Barkhausen oscillations.
- Barkhausen oscillation** An undesired oscillation in the horizontal output tube of a TV receiver; it causes one or more ragged dark vertical lines on the left side of the picture.
- barn doors** Adjustable flaps that fit over a video light to concentrate the beam in a broad or narrow path. Also called flippers.
- barracuda** British TV and film slang for a telescopic light support, made from lengths of metal pole.
- barrel distortion** 1. The characteristic distortion of a scene by a wide-angle lens: a rounded and out-of-proportion look around the edges of the scene, caused by objects being too close to the lens. 2. Distortion in which all four sides of a received TV picture bulge outward, like a barrel. See *Distortion*.
- barrel effect** Vertical edge distortion of a screen image. The effect tends to be more pronounced in rear projection TV systems.
- barrier display section** In (2+3)D-image display system with parallax barriers, a section in which the number of parallax barriers, width aperture ratio, shape including the interval, and generating position can be freely programmably controlled in accordance with an instructed input.
- barrifocal mirror system** One of the 3D-image display systems that doesn't require special glasses.
- bars and red** Popular two-part test pattern with standard color bars above red field. Useful for the detection of noise and moire. Professional jargon sometimes refers to this signal as "Bars in Blood"! Syn.: split field/red.
- base** The part of an electron tube that has the pins, leads, or other terminals to which external connections are made either directly or through a socket.
- base film** Backing.
- base light** The general illumination of an area. The base light helps provide the camcorder with a lighting level above that which is needed to prevent electronic noise. All video units, such as VCRs and cameras, produce video noise that affects the video signal. The base light, which is usually located over the subject, helps to overcome this.
- baseband** 1. The band of frequencies containing the information, prior to modulation (and subsequent to demodulation). The band that transmits picture and synchronizing signals in TV; the band containing all the modulated subcarriers in a carrier system. When applied to audio and video, baseband means an audio or video signal that is not RF modulated (to channel 3 or 4 for example). 2. In satellite TV,

## baseband signaling

the raw audio and video signals prior to modulation and broadcasting. Most satellite headend equipment utilizes baseband inputs. More exactly, the composite unclamped, non-de-emphasized and unfiltered receiver output. This signal contains the complete set of FM modulated audio and data subcarriers.

**baseband signaling** The transmission of a digital signal without modulation. Only one signal at a time can be present on a baseband channel.

**baseband transmission** A type of data transmission in which each medium carries only one signal, or channel, at a time.

**baseband video** Same as composite video (CVS or CVBS).

**baseline sequential JPEG** The most popular of the JPEG modes that employs the lossy DCT (Discrete Cosine Transform) to compress image data as well as lossless processes based on variations of DPCM (Differential Pulse Code Modulation). The "baseline" system represents a minimum capability that must be present in all Sequential JPEG decoder systems. In this mode, image components are compressed either individually or in groups. A single scan pass completely codes a component or group of components.

**basic cable** A term referring to the minimum services a U.S. subscriber of a CATV system gets for the minimum monthly charge. These services usually include VHF and UHF channels, CNN, religious and weather channels and other programming nationally distributed. Other services, like HBO, require additional monthly fees.

**basic rate interface (BRI)** There are two "interfaces" in ISDN: BRI and PRI. In BRI, you get two bearer B-channels at 64 kilobits/s and a data D-channel at 16 kilobits/s. The bearer B-channels are designed for PCM voice, video conferencing, group four facsimile machines, or whatever you can squeeze into 64,000 bits/s full duplex. The data D-channel is for bringing in information about incoming calls and taking out information about outgoing calls. It is also for access to slow-speed data networks, like videotex, packet switched networks, etc. One BRI standard is the "U" interface, which uses two wires. Another BRI standard is the "T" interface, using four wires.

**basic set** A film, TV, or stage set with furniture and scenery but without props.

**basic television service** A charge for delivery of TV broadcast by cable; typically a monthly fee for the lowest level of service.

**basket** Cassette lift mechanism in front-loading VCRs. Also called elevator.

**bat blacks** In video, to fade out; to turn a picture to darkness or superimpose over a picture.

**battery** See *Lead acid battery*, *Nickel cadmium battery*.

**baud** (B) A unit used to measure the number of times/s that a data transmission channel changes state. Since, even in a binary channel, the baud rate in-

cludes all elements transmitted including coordination elements, the baud rate is not necessarily equivalent to the data rate, and baud is not necessarily synonymous with bits/s.

**bazooka** Slang for a large item. Slang term for balun.

**BB** 1. Black burst. 2. CATV hyperband channel, 306-312 MHz. See *TV channel assignments*.

**BBC [color] bars** Color bars with the nomenclature 100/0/100/25 in 625/50/2:1 scanning standard.

**BBC standard** The British Broadcasting Company in London began transmissions in 1929, but their first service was more or less experimental even though the public was "invited" to buy receivers. It was an electromechanical system with a picture resolution of 30 lines and a field rate of 25 Hz. Then, in 1936, an all-electronic system was adopted and the standard was set at 405 lines/50 Hz, which has remained in effect since then as the standard for VHF black and white TV in England.

**BCU** A big close-up of a picture in photography, film, or TV; ECU is an extreme close-up.

**BDC** Block Downconversion.

**beam** 1. A semi-coherent flow of electrons. 2. A narrow stream of essentially unidirectional electromagnetic radiation (as in a radio wave) or charged particles (as in an electron beam).

**beam adjustment** A control on vidicon cameras that regulates the amount of current flowing in the beam.

**beam angle** See *Cathode-ray tube*.

**beam bender** Ion-trap magnet. See *Ion trap*.

**beam bending** Deflection of the scanning beam by the electrostatic field of the charges stored on the target of a camera tube.

**beam blanking** Blanking.

**beam convergence** The adjustment that makes the three electron beams of a 3-gun color picture tube meet or cross at a shadow-mask hole.

**beam current** The current of a scanning beam in camera or TV CRTs.

**beam deflection tube** A color picture tube with a single electron gun and in which the screen is composed of horizontal stripes of red, green and blue phosphors arranged in sequence. A grid of horizontal wires is mounted close to the screen and, by applying suitable potentials to these wires the electron beam can be deflected so as to strike the phosphor stripe giving the required color. Also called beam-switching tube.

**beam indexing** Refers to a signal generated by an electron beam that is deflected and fed back to a control device. Beam indexing is one of several methods of presenting images upon a screen.

**beam landing errors** Errors that can occur when the electron beam does not strike the target correctly, owing to distortions of the magnetic fields. This may happen in cameras and TV CRTs in areas where two fields interact, such as line and frame deflecting fields.

**beam magnet** Convergence magnet.

**beam splitting** Method of dividing the color components of the image so they can be cast upon more than one vidicon target area (or tube); used in 2-, 3- and 4-tube color cameras.

**beam-indexing tube** A color TV picture tube with a single electron gun and in which the screen is composed of vertical stripes of red, green and blue phosphors arranged in sequence. A beam indexing system operated, e.g., by signals from vertical stripes interleaved with the red, green and blue groups ensures that at any instant the electron gun is always switched to the phosphor stripe on which the beam is incident.

**beam-splitting systems** Devices for splitting a light beam to form two or more separate images from a single lens. Often used in color TV cameras to form the three primary color images. Beam-splitting can be accomplished by prisms, semi-reflecting surfaces and dichroic mirrors.

**beam-switching tube** Beam deflection tube.

**beamwidth** The acceptance angle of an antenna, usually measured between half-power (3 dB) points.

**bearding** A video distortion appearing as short black lines to the right of bright objects. It's caused by interruptions in the horizontal sync of the tape.

**Beck, Stephen** Video artist, electronic engineer. Working with a video synthesizer, he originated the concept of combining color, form, texture and motion to produce abstract kinetic video art. His works are recognized worldwide. In the early 1970s he worked on a PBS series called "Video Visionaries."

**beeper feedback** See *Audio alarm, Trigger alarm.*

**bel** Symbol: B. A relative measurement, equal to the logarithm to the base 10 of the ratio of two amounts of power. One power value is a reference value. The decibel, a smaller unit equal to 1/10 B, is more commonly used.

**bell filter** Filter in a SECAM decoder to de-emphasize the chrominance signal prior to frequency demodulation.

**bells and whistles** Special effects, flashy graphics, and other extras added to films, TV programs, or any audiovisual presentation.

**below the line** Technical and production costs as indicated in the program budget—includes production equipment and technical personnel.

**BER** (or B.E.R.) Bit Error Rate. Accuracy of digital demodulation or decoding. Analogous to SNR, but refers to digital transmission.

**best time available** (BTA) An instruction with a purchase order for a TV or radio station to broadcast a commercial at the most favorable time available.

**Beta format** A system of home videotaping using a special 2-hub plastic videocassette, 1/2-inch tape and recording speeds incompatible with other formats. Introduced for home use in 1975 by Sony, the Beta format uses a cassette smaller than that of its com-

petitor, the VHS format. Although the originator of home VCR, Beta has almost completely disappeared in the U.S. Other companies, including Zenith, Toshiba, Marantz and Sanyo, had originally selected the Beta format for their VCRs and video cameras, but have since abandoned that format in favor of the more successful VHS.

**Beta hi-fi** A full-frequency stereo process for VCRs developed by Sony in 1982. Conventional video stereo as found on VHS machines uses longitudinal sound tracks (tape passing across a stationary head), but this method produces poor sound quality because of two factors. The tape speed of video machines is very slow, only a fraction of that of audio recorders. Secondly, the small space of the tape allotted to the normal mono audio track has to be split in half to provide for the dual channels necessary for stereo. For these reasons, a noise reduction system such as Dolby B is required to improve some of the less-than-adequate sound. Sony avoided these two shortcomings by using the video heads to place the FM-modulated audio (AFM — Audio FM) signals onto the tape, superimposing the channels over the video signal. A greater dynamic range results, with a frequency response said to be from approximately 20-20,000 Hz. The portion of the tape otherwise assigned to the audio signal can still be used for a mono sound track (to keep the system compatible with other Beta machines). It can also be used as a third audio track for different functions, such as recording a foreign language.

**Betacam** Sony's trade name for component analog tape recording format. The term is often incorrectly associated with component analog video interfacing in general. The system has continued to be developed over the years, offering models for the professional/industrial markets. Digital versions also exist as the high-end Digital Betacam and Betacam SX for ENG and similar applications.

**Betacam color bars** Historically these bars followed early Betacam signal levels, giving rise to 75% color bars in YPrPb format with PrPb gain boosted by a factor 1.333. At the righthand side of the pattern, the "black set" test and 100% white bar are added. In the 625 version the white level is 700 mV, in the 525 version the white level is 100 IRE (714.825 mV).

**Betacam SP** The Sony trademarked "Superior Performance" analog component video tape recording format similar to the Betacam format. Betacam SP players will play back Betacam recordings but not vice-versa. Betacam SP is recorded on oxide or metal tape.

**Betacam-SX** Sony's trademark for a component digital tape recording format with signal compression. Developed for news acquisition. Compression is similar to MPEG-2, but with fixed GOP structure to allow easier edits. The digital signal recorded on tape uses a higher level of digital compression (DCT-based)



## Betamax

than Digital Betacam, which results in a lower bit-rate after coding. At the interface level it is compatible with D-1 format, i.e. conforms to ITU-R BT.656. Betacam-SX players can play back analog component Betacam SP tapes.

**Betamax** Sony's trade name for its initially popular 1/2-inch Beta format VCR. The first Betamax, the SL-7200, was introduced in 1975. The Betamax has virtually disappeared in the U.S., losing marketshare to the VHS format.

**Betascan** Sony-developed feature found on Beta VCRs that allows for quick picture search (15x, Beta III).

**Betaskipscan** Sony Betamax feature that provides instant switching from high-speed FF or REW mode to Betascan search mode to determine location on the tape.

**bezel** In video, the frame surrounding a video picture that has different proportions from that of the TV screen. For example, when some cable or broadcast stations present a wide-screen theatrical film in its correct aspect ratio (about 16:9), the top and bottom portions of the screen (4:3 aspect ratio) remain blank. Some local and network stations provide a decorative bezel to replace the normally black portions of the screen. Bezels may come in different proportions.

**BF** Burst flag.

**B frames** Bi-directional predictive frames used by MPEG. These are composed by assessing the difference between the previous and the next frames in a television picture sequence. As they contain only predictive information, they do not make up a complete picture and so have the advantage of taking up much less data than the I frames. However, to see the original picture requires a whole sequence of MPEG pictures to be decoded. See *MPEG*.

**BG** Burst flag.

**bias light** Internal illumination of a TV camera tube that reduces or removes the halo (reflected light that extends beyond the desired boundaries).

**biased automatic gain control** Syn.: delayed AGC. It is a process that comes into operation only for signals above a predetermined level.

**bible** In the production of a TV series, the general outline of plots and character development prepared before the first program of the season. Some producers refuse to bible the show, in order to maintain the flexibility to make plot and cast changes during the season.

**biconcave** A lens configuration in which the lens element has an inward curve on both sides.

**biconvex** A lens configuration in which the lens element has an outward curve on both sides. A magnifying glass is the most common example of a biconvex lens.

**bicycling** The shipment of videotape recordings of TV programs from one transmitting entity to another. In order to save film and videotape costs, the pro-

grams are sent to a station or cable system when they are needed for the station's schedule. After a program is broadcast, that station or system sends it on to the next operation.

**bidirectional** Describes a microphone that accepts sound waves from two different directions, while attenuating sound waves from any other direction.

**bifilar transformer** A transformer in which wires for the two windings are wound side by side to give extremely tight coupling. When used as TV IF transformers to couple stagger-tuned IF stages, the high coupling eliminates the need for a DC blocking capacitor.

**BIFS** Binary format for scenes. In MPEG-4, a set of elements called nodes that describe the layout of a multimedia layout. BIFS-Update streams update the scene in time, BIFS-Anim streams animate the stream in time. BIFS are organized in a tree-lined hierarchical scene graph node structure derived from VRML.

**Bildschirmtext** (Btx, BTX) Now called Datex-J. The public videotex system in the Federal Republic of Germany.

**billy-** A prefix denoting one thousand million, synonymous with "giga."

**binary gradation** A gradation of black and white.

**binary pair** Synonymous with bistable circuit.

**binary variable** A variable that can have one of two values (0 or 1). Also known as two-valued variable.

**binary-coded character** A character represented by a binary code.

**binder** A chemical adhesive to hold the magnetic oxide particles to the backing or base of the videotape. The quality of the binder is important in that its composition determines the number of dropouts that are likely to occur.

**bipolar PG** In VCRs, pulse generator signals that have both positive and negative excursions.

**bipolar sync** See *Tri-level sync*.

**bird** Jargon or nickname for communications satellites.

**birdseye** In film and TV, a spotlight with a reflector back invented by Clarence Birdseye (1886-1956), who is better known for developing methods for quick-freezing foods.

**B-ISDN** Broadband ISDN. See *ISDN*.

**bistable** Having two states.

**bistable circuit** A circuit that can be triggered to adopt one of two stable states. Also known as binary pair, bistable trigger circuit, trigger pair.

**bistable trigger circuit** Syn.: bistable circuit.

**bit** A single binary information unit. Usually represented by "0" or "1." As a jargon term can be used to describe a single step of the quantization scale.

**bit assignment** In video compression, the process of creating the compressed data bit stream from the raw output of the compression algorithm.

**bit bucket** Any device able to store digital data—whether it be video, audio or other types of data.

**bit budget** The total number of bits available on the

media being used. In DVD, the bit budget of a single-sided/single-layer DVD5 disk is 4.7 GB.

**bit depth** The number of levels that a pixel might have, such as 256 with an 8-bit depth or 1,024 with a 10-bit depth.

**bitmap** A digital representation of an image in which the bit-mapped characters, composed of dots or pixels, are readable on a screen.

**bit parallel format** See *Parallel digital [video] interface format*.

**bit pattern** A sequence of bits. Bit patterns may be used to represent characters in a binary code.

**bit plane** In digital video, with display hardware that has more than one video memory array contributing to the displayed image in real time, each memory array is called an image plane. However, if the arrays have only one bit-per-pixel, they may be called bit planes.

**bit rate** Relating to the speed of a device, e.g., the speed with which binary digits can be transferred over a communications channel. May be measured in bits/s or baud. It is the digital equivalent of bandwidth.

**bit rate conversion** See *Sampling rate conversion*.

**bit serial format** Format where 10-bit serialized video data are transmitted via BNC type connector or fiber-optical connector with clock rate: 10 x 4 x 3.579 = 143 MHz (digital composite NTSC and PAL-M), 10 x 4 x 4.433 = 177 MHz (digital composite PAL), 10 x 27 = 270 MHz (digital component 4:2:2) or 10 x 36 = 360 MHz (ITU-R BT.601, digital component). Syn.: Serial Digital [Video] Interface.

**bit stream** A serial sequence of bits.

**BitBit** Abbreviation for bit boundary block transfer, a data transfer function that moves a rectangular region of pixels within or between bitmaps. This function often is used for displaying pop-up windows, cursors, and small symbols such as text. BitBit traditionally is capable of performing a Boolean (e.g., XOR) operation between the source and destination during the transfer. Also called RasterOp.

**BITC** Burned-In Time Code. This means the time code information is displayed within a portion of the picture, and may be viewed on any monitor or TV.

**bite** A short segment, or take, that is repeated on network radio and TV news programs.

**bitmap** A region of memory or storage that contains the pixels representing an image arranged in the sequence in which they are normally scanned to display the image. If a bitmap can be directly displayed on the screen, it is referred to as a frame buffer. If the bitmap cannot be viewed directly, then its data must be moved to display memory to be viewed. For example, a text font can be stored in an off-screen bitmap, and each character is moved to the proper place on the screen (using BitBit) as it is needed.

**bitmap descriptor** In the DVI runtime software, a data

structure that contains the parameters of a bitmap including its location in memory, its dimensions, and its pixel format.

**bitmap font** A special format of a text font that contains pixel values for each text character.

**bitmapping** A technique used in graphics display in which the information displayed on a screen corresponds, pixel by pixel, with bits held in memory.

**bits per pixel (bpp)** The number of bits used to represent the color value of each pixel in a digitized image.

**bits per second** The number of bits transmitted per second over a communications line.

**BK** Black.

**BL** Black; also blue, depending on the context, so when in doubt, spell it out.

**blab-off-switch** British slang for a remote-control device to mute the sound of a TV program, such as during the commercials.

**black** Very dark. Pitch black or pure black means totally without light. Television black reflects a very small amount of light from the screen, about 3% reflectance.

**black after white** A TV receiver defect in which an unnatural black line follows the right-hand contour of any white object on the picture screen. The same defect also causes a white line to follow a sudden change from black to a lighter background. It is caused by receiver misalignment.

**black and white signal** 1. A signal wave that controls luminance values in black and white TV. 2. The portion of a signal wave that has major control of the luminance values in a color TV system, regardless of whether the picture is displayed in color or in black and white.

**black and white television** Television that reproduces a picture in black and white (b&w) with shades of gray between black and white. Black and white receivers use the brightness information transmitted as part of the color signal—the luminance signal—but the image is produced in black and white.

**black and white transmission** Transmission of a signal wave that controls the luminance values in a TV picture but not the chromaticity values. The result is a black and white picture.

**black body** A perfect absorber of all incident radiant energy. It radiates energy solely as a function of its temperature.

**black body radiator** See *Full radiator*.

**black box** 1. An electronic device with known performance characteristics but unknown constituents. 2. A general term given to a variety of electronic devices because of their color and shape. They include image enhancers, image stabilizers, video amps and up converters that can be connected to a VCR or a TV set.

**black burst (BB)** A video signal that contains the color black. This gives the signal the major reference points of color-burst pulse, a black reference, and sync. It is



## black-burst generator

used as a base "neutral" signal to format tape and to reference most video hardware. Black burst tells the video equipment the vertical sync, horizontal sync, and the chroma burst timing. Syn.: house sync.

**black-burst generator** See *black burst*.

**black clipper** See *Black limiter*.

**black clipping** A video control circuit that regulates and contains the black level of the video signal so that it does not disturb or appear in the sync portion of the signal.

**black compression** A reduction in TV picture-signal gain at levels corresponding to dark areas in a picture. The effect reduces contrast in the dark areas of the picture as seen on monitors and receivers. Also called black saturation.

**black crushing** Compression of low values of signal (i.e., black) resulting in loss of significant detail in the darker picture areas.

**black current stabilizer** An adjustment on each CRT gun (R, G, B) for setting the leakage current when the gun is in the vertical blanking interval. If not adjusted there will be background discoloring. The leakage is measured via sensing resistors in the CRT cathode circuits.

**Black Entertainment TV** A CATV channel targeted for a black audience and offering entertainment, sports and films. BET also covers interviews and other news pertaining chiefly to its black audience.

**blacker-than-black** 1. Excursion of the TV video waveform signal downwards below the nominal black level; e.g., the excursion of the synchronizing pulses to zero signal. 2. The amplitude area of the composite video signal below the reference black level in the direction of the synchronizing pulses (e.g., the luminance signal overshoots after a white-to-black transition). ITU-R BT.601 quantization scale provides 15 levels of headroom below reference black to allow some blacker-than-black throughput.

**blacker-than-black region** The portion of the standard TV signal in which the electron beam of the picture tube is cut off and synchronizing signals are transmitted. These synchronizing signals have greater peak power than those for the blackest portions of the picture.

**black filter** A filter, used in devices for direct display of an image on the retina of the eye using a scanning laser, that attenuates the intensity of the incident laser beam to such a level that laser beam will not be harmful to an eye into which it is introduced.

**black level** The bottom level of the picture signal, below which are the sync, blanking, and other control signals that do not appear as picture information. This level is generally set at 75% of the maximum signal amplitude of the synchronizing pulses and represents the darkest an image can get. It defines what black is for the particular video system. If for some reason the video dips below this level, it is

referred to as blacker-than-black. You could say that sync is blacker-than-black.

**black level clamp** Circuit that establishes the signal level corresponding to black at a finite level. Necessary after AC coupling to restore the DC component in the TV signal, and to eliminate low-frequency distortion and hum. The signal is fed through a capacitor and shorted to a fixed direct voltage during line blanking intervals. Used also in line clamp amplifiers.

**black level clamping** The process of resetting video signal level offset to zero by using the black level at the video back porch as a reference. Syn.: back porch clamping; clamping.

**black level control** A feature on some TV sets that controls the extent of black within picture areas. This may affect the contrast of the image, but it is not strictly a contrast control; it does not determine which portions of the image should turn black but rather the degree of blackness. The conventional contrast control, on the other hand, constricts or extends the range of contrast only. On broadcast-studio quality video cameras the black level control feature is called "pedestal" while the contrast control is known as gain.

**black level noise** Very similar to a white spot noise spike except it is in the opposite or black level direction.

**black level retention** The ability of a TV set, VCR or similar unit to reproduce black areas on a TV screen. Although no TV receiver produces an absolute black, manufacturers have constantly experimented in this area to improve the overall image contrast. The range of color contrasts depends on the span between the darkest gray and purest white. The wider the range, the more noticeable the distinctions between hues. This variation in shades helps to give the appearance of depth or three dimensions to the image on the TV screen. The contributions over the years of several companies, including NEC, Proton, Zenith, Sony and Panasonic, have resulted in subtle improvements in black level retention. These enhancements are more prominent in the higher-priced TV monitor/receivers than in low-end TV sets. Black level retention is measured by percentage; e.g., 80% or better is rated satisfactory while 90% is considered good.

**black limiter** A device preventing a video signal being lower than some pre-set threshold near black level. Syn.: black clipper.

**black matrix** Picture tube in which the color phosphors are surrounded by black for increased contrast.

**black matrix lenticular screen** See *Black stripe projection television*.

**black matrix/black surround** A technique to reduce the unexcited field brightness and the light reflected by the phosphors of color kinescopes. The results can be seen by observing the kinescope of a color

- receiver of recent design when the set is turned off. In contrast with older sets in which the kinescope was whitish gray, new sets appear black.
- black negative** A TV picture signal in which the voltage corresponding to black is negative with respect to the voltage corresponding to the white areas of the picture.
- blackout** A suppression or stoppage, such as a news blackout. In sports TV, the suppression of coverage in a particular area because of contractual agreements with the home team of the league.
- black-out** A temporary loss of sensitivity of any electronic device following the passage of an intense transient signal.
- black-out point** Cut-off.
- black peak** A peak excursion of the TV picture signal in the black direction.
- black positive** A TV picture signal in which the voltage corresponding to black is positive with respect to the voltage corresponding to the white areas of the picture.
- black saturation** Black compression.
- black set [test] [pattern]** Same as pluge, but for black level only.
- black stretch** Nonlinearity applied to the TV signal so that the part toward black is increased in amplitude relative to the rest of the signal. The effect is to make detail in the black more visible, and correct the crushing caused by the nonlinear toe of the typical transfer curve. As in film technique, a slightly higher contrast than is theoretically desirable often improves the picture.
- black stripe** The process of prerecording a video tape with no input signal in order to lay down a uniform sync signal over the length of the tape. Black-stripping makes it easier to hide editing glitches because blank spots in the video program simply appear black rather than full of visual static. Video production studios use a special video signal for this purpose, known as black burst. Studio black burst ensures that all the video tape produced at the studio is black-striped with the same video frequency because every tape is black-striped with a black burst from the same source. Amateur videographers can accomplish this same task by placing a lens cap over a video camera and recording an entire tape.
- black stripe projection television** Refers to a process designed to increase the contrast of a picture in a projection TV system. It was introduced by Sylvania and later incorporated by Magnavox into its large-screen TV sets. The black stripe projection method, introduced in 1981, is considered a significant advance in projection TV systems since they are continually compared to standard TVs for sharpness and brightness. Also known as black matrix lenticular screen. The black stripe refers to a slightly recessed black line that is imprinted onto the screen. This tends to add sharpness and contrast to the projected image.
- blank** To cut off the electron beam of a CRT.
- blanked picture signal** The signal resulting from blanking a TV picture signal.
- blanking** Suppression. Process of the cutting off of the electron beam of a TV picture tube, or camera tube, or during retrace by applying a rectangular pulse voltage to the grid or cathode during each retrace interval. On the screen, the scan line moves from the left edge to the right edge, jumps back to the left edge, and starts out all over again, on down the screen. When the scan line hits the right-hand limit and is about to be brought back to the left-hand edge, the video signal is blanked so that you can't "see" the return path of the scan beam from the right to the left-hand edge. To blank the video signal, the video level is brought down to the blanking level, which may or may not be the black level if a pedestal is used. There are usually two blanking components to eliminate the horizontal and vertical components of the return trace. Also called beam blanking. The opposite action is called gating.
- blanking and muting circuit** The VCR is permanently video-blanked and audio-muted in all modes, except play, record, and the mode known as "E-E," that stands for electronics-to-electronics. The E-E mode allows the operator to view the picture that is to be recorded.
- blanking level** The level that separates picture information from synchronizing information in a composite TV picture signal. It coincides with the level of the base of the synchronizing pulses. This could be the black level if a pedestal is not used or below the black level if a pedestal is used.
- blanking pulse level** The reference level for video signals. The blanking pulses must be aligned at the input to the picture tube.
- blanking signal** A wave of recurrent pulses, related in time to the scanning process, to effect blanking in TV. The pulses occur at both the line and field frequencies and cut off the electron beam during retrace at both transmitter and receiver.
- Blay, Andre** Founder and originator of the home video prerecorded videocassette industry. In 1977 he purchased the rights to a package of 20th Century Fox films for the purpose of home video sales. Included in the 50 features were such classics as "The Grapes of Wrath." Blay's company, Magnetic Video, transferred the films to Beta and VHS formats and retailed them for \$50 to \$60 each, thereby introducing the first prerecorded programs for the home market.
- bleed** A small amount of space at the edges of a shot to compensate for any loss between the picture as it appears on the studio monitor and on the home TV screen.
- bleed through** The result of one channel superimposed over another. With a VCR, this may occur if the wrong open channel is employed. A local station may be transmitting at that frequency. Switch-

## bleeding whites

ing from channel 3 to 4 (both known as “open” channels, with a switch located on the back of most VCRs) or vice versa usually eliminates bleed through.

**bleeding whites** A condition in which white areas in a TV picture appear to flow into black areas, caused by excessive signal strength at the picture tube.

**B-level title** In home video, a secondary movie that is not carried by all retail video outlets.

**blinds [wipe]** A periodic wipe pattern consisting of repetitive identical stripes, a background image being seen through these “venetian blinds.” Changes in the width of the stripes give the appearance of the blinds opening and closing. Of course the blinds themselves may be either a color matte or different live video.

**blip** 1. A white streak or speck that appears momentarily on a TV screen during playback of a videotape. Blips are caused by dropouts. These streaks occur occasionally, but if they seem to be excessive then the video heads need cleaning or the tape brand should be changed. 2. To remove a portion of the recorded sound from a videotape of a TV program, such as expletive or other undesired words.

**blit** Short for bit-blit, which is short for bit-boundary block transfer.

**blitter** A circuit or device that does blitting. See *bit-blit*.

**block** 1. To work out talent and camera positions within a scene before taping. 2. Rectangular area of picture, usually 8 x 8 pixels, that is individually subjected to DCT coding as part of a digital picture compression process. 3. Artifact of digital compression, usually displaying momentarily as misplaced rectangular areas of picture.

**block cipher** In video scrambling, a cipher that is produced by simultaneously transforming a group of message bits into a group of cipher bits. In general, the groups are the same size.

**block converter** Syn.: Up converter.

**block downconversion** (BDC) The process of lowering an entire band of frequencies in one step to some intermediate range to be processed inside a satellite receiver. Multiple BDC receivers are capable of independently selecting channels because each can process the entire block of signals. See also *Down-converter*.

**block matching** Method of motion estimation based on a sequential search for a maximal correlation between pixel blocks from the current video picture and shifted blocks from the adjacent video picture.

**block out** Prior to taping, to draw a sketch of, write down, or run through the action that a scene or series of scenes will contain.

**block product cipher** See *Encryption*.

**blocking** The process of positioning actors, cameras, lights, props, and other video production equipment.

**blocking oscillator** A type of oscillator in which blocking occurs after completion of (usually) one cycle of oscillation and lasts for a predetermined time. The

whole process is then repeated. Fundamentally it is a special type of squegging oscillator and has application as a pulse generator and a time-base generator.

**blocking tape** In TV production, tape affixed to places on the floor to indicate where a performer should stand.

**blonde** A medium-size (2000 W) quartz iodine lamp used in TV.

**bloom** Undesirable video picture caused by excessive light saturation.

**blooming** A fuzziness at the edges of bright objects or with subjects wearing white shirts in bright light, as seen on a TV screen. This is an effect, sometimes caused when video becomes whiter-than-white, in which a line that is supposed to be thin becomes fat and fuzzy on the screen. Blooming also occurs during slide-to-tape transfer when recording slides continuously. When the camera records a dark, underexposed slide followed by a brighter one, the camera needs time to adjust between the two, causing an annoying overexposure or blooming effect. Blooming also occurs when the brightness control is turned too high. This leads to an increase in the size of the scanning spot on a CRT, or an out-of-focus image. See also *Photoconductive lag*.

**blower** Microphone.

**blue gain control** An adjustment that controls the amount of gain of the blue color relative to red and green.

**blue gun** The electron gun whose beam strikes phosphor dots emitting the blue primary color in a 3-gun color TV picture tube.

**blue restorer** The DC restorer for the blue channel of a 3-gun color TV picture tube circuit.

**blue video voltage** The signal voltage output from the blue section of a color TV camera, or the signal voltage between the receiver matrix and the blue gun grid of a 3-gun color TV picture tube.

**blue/red balance** See *Red/blue balance control*.

**blue-beam magnet** A small permanent magnet used as a convergence adjustment to change the direction of the electron beam for blue phosphor dots in a 3-gun color TV picture tube.

**blur** 1. Artifact in form of reduced dynamic resolution. 2. Generic term for out of focus (blurred).

**blur pan** See *Swish pan*.

**BMK-multy** Software capable of transmitting and receiving SSTV. Used in computer-based SSTV systems.

**B-mode** (of sound transmission). See *MUSE-9 system*.

**BNC** Bayonet Normalized Connector; Bayonet Neil-Concelman; Baby N Connector. A weatherproof twist-lock coax connector standard on commercial video equipment and used on some brands of satellite receivers. The most popular type of connector in professional TV and video.

**BNR** A noise reduction system introduced by Sony. The Beta Noise Reduction technique is similar to those systems already in use but not compatible.

- Bode equalizer** An equalizer used to correct the frequency response of TV sound circuits in which the amount of equalization can be adjusted, without change in the shape of equalizer characteristic, by operation of a single control.
- body brace** A metal frame worn over the upper torso to which a camera is attached and which supports that camera.
- Boella effect** A reduction in the effective resistance of fixed composition resistors when operated at VHF or higher frequencies, because of dielectric losses.
- boob tube** An unfavorable description of a TV set. A boob is a stupid or foolish person.
- boom** Can be a microphone boom, light boom, or camera boom; a microphone or light boom is a long piece of metal piping at the end of which a light or microphone is attached to allow either microphone or light to be positioned over the heads of subjects in a scene while remaining outside the camera angle of view; a camera boom is a complex piece of heavy-duty equipment that allows the camera and operator to be raised to selected heights.
- boom microphone** A sensitive, directional microphone usually suspended above the camera or over the action. Its function is to pick up specific sounds or voices.
- boom operator** Sound technician, a member of the TV crew responsible for manipulating the microphone and boom.
- boom shot** See *Crane*.
- boost** To turn up; to increase in volume; to make the video/audio signal stronger.
- booster** 1. A generator or transformer inserted in a circuit in order to increase (positive booster) or decrease (negative booster) the magnitude or to change the phase of the voltage acting in the circuit. 2. A separate RF amplifier connected between an antenna and a TV set to amplify weak signals.
- booster diode** A diode in the line output stage of a TV set that recovers much of the energy stored in the line deflection coils and makes it available as an additional source of supply. This can be added to the normal supply to provide a high-voltage (boost) supply for the line output stage and other stages in the receiver.
- booster station** A low-power repeater of a full-power TV station that simply amplifies the signal of the parent station and rebroadcasts it on the same channel to an immediate area. Boosters always broadcast on the same channel as the parent and thus differ from translator stations that convert an incoming signal from a parent station and rebroadcast it on another channel.
- booster voltage** The additional voltage supplied by the damper transistor to the horizontal output, horizontal oscillator, and vertical output transistors of a TV set to give greater sawtooth sweep output.
- bootstrapping** A technique used in a variety of applications in which a capacitor—the bootstrap capacitor—is used to provide 100% positive feedback for alternating currents across an amplifier stage of unity gain or less. Bootstrapping is used for control of the output signals by using the positive feedback to control the conditions in the input circuit in a desired manner. Bootstrapping is commonly used in circuits that generate a linear time base, particularly in a sawtooth generator.
- 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. Syn.: edge.
- border area** That part of the display screen (visible display) that is outside the defined display area.
- boresight** The direction along the principal axis of either a transmitting or a receiving antenna.
- boresight point** 1. The area of maximum signal strength of a downlink signal. 2. The center of the transponder footprint.
- bottles** See *Color framing*.
- bounce** 1. A sudden variation in TV picture brightness or size, independent of illumination of the original scene. 2. In broadcasting, signals bounced off the ionosphere, satellites, or other bounce points. 3. A method of testing the very low frequency response of video systems (e.g. clamping performance) by periodic abrupt change of picture content, in particular by the abrupt change of average picture level. Typically, the bounce test is generated by interleaving the test line with several stuffing lines and by alternating the stuffing lines between black and white. Usually the bounce rate is adjustable through a wide range, e.g., from 0.1 Hz to 2 Hz.
- bounce light** A light source or lighting technique used to soften shadows on a subject's face, etc. A bounce light may be the main light source that is aimed at the ceiling or a light-colored wall. The diffused light will "bounce" off the surface and minimize harsh shadows on the subject.
- bouncing** A fault or design condition in which the d.c. level of a TV signal varies suddenly to cause the waveform display to appear to bounce up and down and brightness of the picture monitor to vary sharply.
- bow-tie antenna** A dipole antenna in which the two rods are replaced by triangular metal plates to give a bow-tie appearance. Used chiefly with a reflector for UHF TV reception.
- bow-tie timing test signal** Analog component test signal in a form of frequency bursts put in Y and Pb, Pr channels. The frequencies are intentionally made slightly different so that the summation of two signals, e.g., Y and Pb, produces a beating waveform called "bow-tie." The shape of the bow-tie clearly shows gain and delay inequalities between channels.
- box** 1. Test pattern in the form of a white box on black or gray background. A change of window size provides an easy way to control average picture level.

## boxed mode

2. A mode of test pattern or wipe generation where the main signal is gated by a window signal to provide a background image at the perimeter. 3. Informal: To present on TV.

**boxed mode** In teletext, a method of displaying characters of one color on a rectangular background of another color and superimposing the whole on a broadcast picture displayed on a TV set.

**Bozo box** Audio equipment linked to a TV camera, so simple that even Bozo the Clown could operate it.

**BPP** Bits per pixel.

**BPS** Bits per second.

**BPSK** Biphase shift keying. BPSK is a digital frequency modulation technique used for sending data over a coaxial cable network. This type of modulation is less efficient, but also less susceptible to noise, than similar modulation techniques such as QPSK and QAM.

**branch** 1. The action of routing a user to a particular part of a computer program or videodisc segment based on the user's responses. 2. See *Bandwidth reduction* (EUREKA-95 HDMAC system).

**branch-switching** See *bandwidth reduction* (EUREKA-95 HDMAC system).

**break** An accidental interruption of a broadcast program.

**break point** An abrupt change of shape in a gamma correction circuit. While such a circuit properly requires a smooth curve, the gain is more commonly varied in three discrete steps. If a smooth signal is passed through such a circuit, and then displayed on a waveform monitor, it is seen to consist of three straight lines, each at an angle relative to the others. The break point is the point at which the change in gain occurs.

**break-out box** An accessory designed to permit equipment with multiple-pin jacks to interconnect with separate, conventional audio and video plugs. The box often has two built-in jacks, one for accepting BNC connectors and the second for audio miniplugs. It also has an extended cable with a multi-pin connector (8- or 10-pin). Break-out boxes, mostly used by professionals, are available in different configurations.

**breakthrough** Unwanted signals present at the output.

**break-up** 1. Total picture distortion that lasts for only a second or two. This usually occurs between scenes when using a video camera or when stopping or pausing a VCR and starting again. Some portable and home VCRs contain electronic circuitry that helps to minimize these break-ups or "glitches," as they are sometimes called. 2. Disruption of the video signal producing a noisy, distorted, or otherwise imperfect video picture. Used to describe various problems that produce an incoherent video picture. 3. Any other video or audio interference, such as static.

**breezeway** The time interval between the trailing edge

of the horizontal synchronizing pulse and the start of the color burst in the standard NTSC color TV signal.

**bridge** 1. A brief audio or visual passage or sequence intended to connect segments of a program. 2. In voice and videoconferencing, a device that connects three or more telecommunications channels so that they all communicate together. In video conferencing, bridges are often called MCUs—Multipoint Conferencing Units. One feature of some video bridges is their ability to figure out who's speaking and turn the camera onto that person and have that person be on everyone's screen.

**bridged-T network.** A T-network with a fourth branch connected across the two series arms of the T, between an input terminal and an output terminal. Used in TV IF-amps as a filter. For example, two bridged-T filters can be used: one is tuned to 39.75 MHz and paralleled across the other, which is tuned to 47.25 MHz.

**bridging amplifier** A device that boosts CATV signals and then feeds branching cables. It has a high-impedance input and is used to tap the signal from a trunk line without disturbing its performance.

**brightness** 1. The subjective of the amount of light received from a source. The objective measured brightness is more properly called luminance. The brightness of a TV set determines the grid bias applied to the CRT and hence the light output from the screen. Since the eye is not equally sensitive to all colors, brightness cannot be a quantitative term. 2. Former name for luminance. See also *Variables of perceived color*. 3. In projection screens, the brightness of the image in both front and rear projection screens is determined by the directional characteristic of the screen material. In either type, the brightness for a given projector luminance output (lumens) varies in proportion to the reciprocal of the square of any linear dimension (width, height, or diagonal) of the screen as follows:  $B = L/A$ , where B — perceived brightness, nit; L — projector light output, lumen; A — screen viewing area (HxW), mxm. To improve the apparent brightness, screens can be designed with directional characteristics. This characteristic, called screen gain, changes the brightness equation as follows:  $B = G \times L/A$ . 4. The intensity of the video level. Refers to how much light is emitted by the display.

**brightness control** A control that varies the brightness of the fluorescent screen of a CRT by changing the grid bias of the tube, thereby changing the beam current. Used in TV sets. On a video processor, a feature designed to adjust the video level. In this respect, it is used to improve scenes that are either too dark or too light, to fade in and out when eliminating commercials and to soften the effects of glitches and edits.

**brightness equation** See *Brightness*.

**brightness ratio** An indication, expressed as a ratio of the difference between the whitest and the blackest object in a scene; the range from brightest white to darkest black as it occurs in the scene being recorded. Too wide a range between brightest and darkest can lead to an unacceptable contrast ratio when the scene is displayed on a TV screen.

**brightness value (luminance)** The relative brightness of a particular object in a scene; the point on the gray scale at which the object is between absolute black and absolute white, either of which can be used as a point of reference to determine the brightness value of the object. Essentially a relative determination made by the observer.

**brilliant** 1. Full of light. 2. A color with high lightness and strong saturation. 3. Describing sound that is sharp and clear. The relationship between the bass and treble frequencies can be regulated (brilliance control) to achieve a more brilliant quality.

**bring up** Syn.: Fade in.

**broad pulses** Field-synchronizing pulses in the standard TV waveform, so called because they are broader (i.e., of longer duration) than line-synchronizing pulses. The receiver can distinguish between field- and line-sync pulses. In the NTSC 525-line system there are six broad pulses, and in PAL 625-line system five broad pulses after each field.

**broadband** Also called wideband. 1. A band covering a wide range of frequencies, usually greater than those required for voice communications. Contrasts with baseband; synonymous with wideband. 2. Denoting an electronic device or circuit, such as an amp, that operates satisfactorily over a large range of input signal frequencies. 3. A transmission facility that has a bandwidth (capacity) greater than a voice grade line of 4 kHz. (Some say that to be “broadband” it should be 20 kHz.) Such a broadband facility—typically coaxial cable—may carry numerous voice, video and data channels simultaneously. Each channel will take up a different frequency on the cable. There’ll be guardbands (empty spaces) between the channels to make sure each channel doesn’t interfere with its neighbor. A coaxial CATV cable is the classic broadband channel. Simultaneously it carries many TV channels.

**broadband antenna** An antenna that will function satisfactorily over a wide range of frequencies, such as for all 12 VHF TV channels.

**broadband communications system** System that delivers multiple channels over a wide bandwidth to users. CATV is the quintessential broadband communications system.

**broadband ISDN (B-ISDN)** A standard for transmitting voice, video, and data at the same time over fiber optic telephone lines. B-ISDN supports data rates of 1,500,000 bps. Has not been widely implemented.

**broadband transmission** A type of data transmis-

sion in which a single medium (wire) can carry several channels at once. Cable TV, e.g., uses broadband transmission. In contrast, baseband transmission allows only one signal at a time.

**broadcast** To send information to two or more receiving devices simultaneously—over a data communications network, a voice mail, electronic mail system, a local TV or radio station or a satellite system.

**Broadcast FTP Protocol (BFTP)** A one-way IP multicast-based resource transfer protocol, the unidirectional Broadcast File Transfer Protocol (BFTP) is a simple, robust resource transfer protocol that is designed to efficiently deliver data in a one-way broadcast-only environment. This transfer protocol is appropriate for IP multicast over television vertical blanking interval (IPVBI), in IP multicast carried in MPEG-2, as with the DVB multiprotocol encapsulation, or in other unidirectional transport systems. It delivers constant bitrate (CBR) services or opportunistic services, depending on the characteristics and features of the transport stream multiplexor or VBI insertion device.

**broadcast message** A message from one user sent to all users, as with a TV station signal.

**broadcast quality** A level of picture and/or signal quality that is assumed to be acceptable for main broadcast contribution, thus taken to mean “being of the highest quality.”

**broadcast station** A TV or radio station that transmits programs to the general public. Also called station.

**Broadcast Technology Association** See *BTA*.

**broadcast television** Conventional, common, TV broadcasting; TV with accompanying sound for public use.

**broadcast transmitter** A transmitter for use in a commercial AM, FM, or TV broadcast channel.

**broadcast TV** Over-the-air broadcasting of TV programs, in contrast to cable TV, microwave, etc. The major networks (ABC, CBS and NBC) and many local TV stations use broadcast TV for the transmission of their programs.

**broadcast TV standard** Set of technical specifications defining the method of over-the-air RF-transmission of a TV picture with accompanying sound. The scanning standard and color TV system are also included in the definitions.

**broadcasting** Radio or TV transmission to the public. Specific frequency bands are available for public broadcasts and are assigned in accordance with international agreements. Broadcasting differs from other methods of transmission, such as the two-way radio, that is aimed at a limited audience.

**broadcasting satellite (BS)** An artificial body in earth orbit to relay back to the earth radio and TV signals.

**broadcasting service** A radio communications service in which the transmissions, including sound and TV, are intended for direct reception by the general public.



## broadcast-level video monitor

**broadcast-level video monitor** See *Video monitoring equipment*.

**B-roll** Supplementary or backup material. With video news releases, the B-roll generally follows the primary material on the same cassette. In editing, alternate scenes are arranged on two reels, an A-roll and a B-roll, and then assembled.

**brown goods** Electrical goods of a type traditionally housed in wooden cabinets—for example, TVs, radios, and hi-fis.

**browse mode** A feature that enables many electronic slides or other items to be shown simultaneously on a video screen; useful for library browsers, TV editors, and others.

**Burch blanking [sequence]** See *Burst blanking sequence*.

**BS** Broadcasting satellite.

**BS.707** This ITU recommendation specifies the multichannel audio specifications for the PAL and SECAM video standards. Covers the Zweiton and NICAM 728 standards.

**BS antenna** A parabolic antenna to receive microwaves from a geostationary satellite.

**BskyB** The broadcaster of the Sky Multichannels Package, that carries three movie channels and a few general entertainment channels intended for Ireland and the UK.

**BST-OFDM** See *Bandwidth Segmented Orthogonal Frequency Division Multiplexing*.

**BT** British Telecom.

**BT.470** This ITU recommendation specifies the various NTSC, PAL, and SECAM video standards used around the world. SMPTE 170M also specifies the (M) NTSC video standard used in the United States. BT.470 has replaced BT.624.

**BT.601** This ITU recommendation was developed for the digitization of component video signals (YUV and RGB). ITU-R BT.601 defines R'G'B' to Y'CbCr color space conversion, digital filtering, sample rates, 4:4:4 and 4:2:2 YCbCr formats, and the horizontal and vertical resolutions. Both 4:3 and 16:9 aspect ratios for 525-line and 625-line systems are supported.

**BT.653** This ITU recommendation defines the various teletext standards used around the world. Systems A, B, C, and D for both 525-line and 625-line TV systems are defined.

**BT.656** This ITU recommendation was developed for the transmission of BT.601 4:2:2 Y'CbCr digital video between equipment. It defines a parallel interface (8-bit or 10-bit, 27 or 36 MHz clock rate) and a serial interface (270 or 360 Mbps).

**BT.709** This ITU recommendation specifies the 1920 x 1080 RGB and 4:2:2 YCbCr interlaced and progressive 16:9 digital video standards. Frame refresh rates of 60, 59.94, 50, 30, 29.97, 25, 24, and 23.976 Hz are supported.

**BT.799** Defines the transmission of 4:3 BT.601 4:4:4:4

YCbCrK and RGBK digital video between pro-video equipment. Two parallel interfaces (8-bit or 10-bit, 27 MHz) or two serial interfaces (270 Mbps) are used.

**BT.809** This ITU recommendation specifies information sent during the vertical blanking interval using teletext to control VCRs in Europe.

**BT.1119** This ITU recommendation defines the wide-screen signaling (WSS) information for NTSC and PAL video signals. For (B, D, G, H, I) PAL systems, WSS may be present on line 23, and on lines 22 and 285 for (M) NTSC. EIA-J CPX-1204 also specifies a WSS signal on lines 20 and 283 for NTSC systems.

**BT.1124** This ITU recommendation defines the ghost cancellation reference (GCR) signal for NTSC and PAL.

**BT.1197** This ITU recommendation defines the PALplus standard, allowing the transmission of 16:9 programs over normal PAL transmission systems.

**BT.1302** Defines the transmission of 16:9 BT.601 4:2:2 YCbCr digital video between pro-video equipment. It defines a parallel interface (8-bit or 10-bit, 36 MHz) and a serial interface (360 Mbps).

**BT.1303** Defines the transmission of 16:9 BT.601 4:4:4:4 YCbCrK and RGBK digital video between pro-video equipment. Two parallel interfaces (8-bit or 10-bit, 36 MHz) or two serial interfaces (360 Mbps) are used.

**BT.1304** Specifies the checksum for error detection and status for pro-video digital interfaces.

**BT.1305** Specifies the digital audio format for ancillary data for pro-video digital interfaces. Also see *SMPTE 272M*.

**BT.1358** 720 x 480 (59.94 Hz) and 720 x 576 (50 Hz) 4:2:2 YCbCr pro-video progressive standards. Also see *SMPTE 293M*.

**BT.1362** Pro-video serial interface for the transmission of BT.1358 digital video between equipment. Two 270 Mbps serial interfaces are used.

**BT.1364** Specifies the ancillary data packet format for pro-video digital interfaces. Also see *SMPTE 291M*.

**BT.1365** Specifies the 24-bit digital audio format for pro-video HDTV serial interfaces. Also see *SMPTE 299M*.

**BT.1366** Specifies the transmission of timecode as ancillary data for pro-video digital interfaces.

**BT.1381** Specifies a serial digital interface-based (SDI) transport interface for compressed television signals in networked television production based on BT.656 and BT.1302.

**BTA** 1. Broadcast Technology Association. An organization of Japanese manufacturers and research, BTA has proposed the Clearvision system. 2. Broadband Telecommunications Architecture, an architecture introduced by General Instrument's Broadband Communications Division at the Western TV Show on December 1, 1993. General Instrument said the plant is built to 750 MHz and can support reduced node size and add services such as video-on-demand, te-

lephony, interactivity, data services, etc. 3. Best Time Available.

**BTA Clearvision system** See *Clearvision system*.

**BTA system** See *Clearvision system*.

**BTSC** This EIA TVSB5 standard defines a technique of implementing stereo audio for NTSC video. One FM subcarrier transmits a L+R signal, and an AM subcarrier transmits a L-R signal.

**BTV** Business TV.

**Btx** Also BTX. Bildschirmtext.

**bubble** A new TV serial developed from an already existing one (typically a soap opera) and incorporating some of its characters.

**buffer** 1. A circuit or component that isolates one electrical circuit from another. 2. A digital storage device used to compensate for a difference in the rate of flow of information or the time of occurrence of events when transmitting information from one device to another. 3. In telecommunications, a protective material used in cabling optical fiber to cover and protect the fiber. The buffer material has no optical function.

**build day** The day scheduled to erect a set in a TV station. Also called set day or setup day.

**built-in antenna** An antenna located inside the cabinet of a radio or TV receiver.

**bulk acoustic wave** An acoustic wave that travels through a piezoelectric material.

**bulk videotape eraser** A device with an electronically generated neutral magnetic field that can clear a recording on tape by "scattering" the tape oxide particles. Erasers are available in various sizes and prices. Usually the wider the tape, the stronger the model necessary. Normally, home VCRs effectively erase videotape automatically before re-recording so that a bulk eraser is not required. The bulk videotape eraser, also known as a tape eraser or simply eraser, has several advantages: it works faster and more effectively and assures security by erasing the entire tape. VCRs only erase up to the point where the re-recording ends.

**bull's eye pattern** A zone plate pattern (circular or elliptic) with lowest spatial frequency in the center and uniform rise of spatial frequency along any radius, so that the spatial frequency is directly proportional to the distance from the center. Syn.: circular zone plate; Fresnel zone plate.

**bump mapping** See *Relief mapping*.

**bumping down** See *Dubbing*.

**bumping up** See *Dubbing*; Eng.

**bunching** In a velocity-modulated tube the process whereby the density of the electron stream is modulated by the applied signal so as to gather the electron into clusters at particular points along the drift space. See *Velocity modulation*.

**bundle of data** In video compression, a group of pixels—usually a two-dimensional array of pixels from an image.

**burn** 1. To destroy the light conversion function of a certain portion of the vidicon target area by exposing it to a light source that is too intense; also the result, an image permanently impressed on the target area, that appears as black spots during display. See also *Image burn*. 2. The light spots or flares on videotape that result from a damaged pickup tube (caused by pointing the camera at a hot or bright light source). A particular problem with older cameras using Vidicon pickup tubes.

**burn out** TV images are said to suffer from burnt-out whites, or bleached whites, when they appear on a TV screen to lack tonal gradation in the white and near-white portions. The four most common causes of this picture degradation are: (1) Over-exposure of the studio camera tube. (2) Unsuitable film densities or gamma, effectively giving overall distortion. (3) Amplitude nonlinearity in the vision signal chain, causing the higher amplitude portions to be compressed or, in the most severe cases, clipped completely. (4) Incorrect setting of receiver brightness and contrast controls.

**burned-in image** An image that persists in a fixed position in the output signal of a TV camera tube after the camera has been turned to a different scene.

**Burned-In Time Code (BITC)** This means the time code information is displayed within a portion of the picture, and may be viewed on any monitor or TV.

**burst** 1. A term used in video to refer to the color burst portion of a video signal. On a color vectorscope graticule the burst portion of a video camera signal, for example, is seen as a heavy horizontal line along the 180 degrees axis. If no line appears on this testing unit, it signifies that no color is being transmitted; hence, only a black-and-white picture will be produced on a TV screen. 2. A rapid, intense sequence of words, as by a speaker cramming material into a 15 s or other brief TV sequence.

**burst amp control** A function usually found on a color processor and designed to manipulate the gain of the control subcarrier in relation to the luminance signal. The burst amp control mainly affects the color mid-range, especially the flesh tones. Normally, the color deviations in the color subcarrier are corrected in VCRs and TV sets by the ACC. However, in some components in which the ACC may not be that effective, the burst control can help.

**burst amplifier** In color TV set, an amp stage keyed into conduction and amplification by a horizontal pulse at the exact of each arrival of the 3.58- or 4.43-MHz color-burst signal.

**burst blanking sequence** A rule defining the specific line numbers in the vertical blanking interval on which the subcarrier burst must be suppressed. In the PAL system it is often called "Bruch blanking [sequence]" (after Dr. Walter Bruch).

**burst flag** A pulse produced by a color sync genera-



## burst gate

tor; when present, it causes the signaling color camera to produce a burst signal, or color burst. Syn.: BF; BG; burst key; burst strobe.

**burst gate** A signal that tells the system where the color burst is located within the scan line.

**burst gating** Process of separating the color burst from the complete color signal. The encoded color TV signal, as transmitted, must include a phase reference for the chrominance detector in the receiver. This is done by transmitting a short burst of the color sub-carrier during the line-blanking interval that follows the synchronizing signal. To keep the signal as immune as possible from noise, the burst is maintained for the longest possible time. This usually allows about 10 cycles of the sub-carrier to occur during the burst interval. To avoid phase errors between the burst and the encoded picture signal, the burst is applied to the video waveform in the encoder or colorplexer. This is done by matrixing the burst gating pulse from the studio sync pulse generator, into the encoder modulators. The sub-carrier is then produced by these modulators for the allotted period. In a receive-type signal decoder, the burst is gated into the phase reference circuits by a pulse derived from the flyback of the horizontal scan. In other types of decoder, the gating pulse is derived from the signal synchronizing waveform.

**burst keying pulse** Pulse for correctly timing the color burst in a TV color system, usually by a gating circuit.

**burst phase** Phase of subcarrier signal forming the color burst with which reference the modulated sub-carrier signal is compared.

**burst phase control** A feature usually found on a signal processor such as a color processor or processing amplifier and designed to adjust the tint of the color signal. When the burst phase control is rotated in one direction, red turns toward blue, blue changes toward green and green shades veer toward red ones. When the control is rotated in the opposite direction, the color shifts also reverse their roles. The burst phase control differs from the chrome control that affects color intensity rather than tint.

**burst separator** The circuit in a color TV receiver that separates the color burst from the composite video signal.

**burst signal** In a color TV transmission, the burst of high frequency associated with the color information. Syn.: color burst.

**burst-locked oscillator** Oscillator, for example in a color receiver, locked to the color burst for subsequent application to later circuits.

**bursts** See *Explosion*.

**bus** 1. A channel along which signals travel from one of several sources to one of several destinations. 2. One complete channel of an audio or video mixing system, including inputs, gain controls, and output;

two or more buses are required for video signal switching. 3. A row of buttons on a video mix/effects switcher that controls hundred of special effects such as wipes, fades, etc.

**Bushnell, Nolan** Inventor of the first successful electronic video game, Pong; founder of Atari. While working at Bally Manufacturing Company, he soon learned that his employers showed little interest in his video game technology. He therefore built a coin-operated version of Pong on his own. Shortly after, he founded Atari.

**business television (BTV)** 1. Videos and TV programs sponsored by companies, generally about their business and transmitted free via closed circuit or other distribution. 2. Point-to-multipoint video-conferencing. Often refers to the corporate use of video for the transmission of company meetings, training and other one-to-many broadcasts. Typically uses satellite transmission methods and is migrating from analog to digital modulation techniques.

**Butterworth filter** A filter that has essentially flat amplitude response in the passband and an attenuation rate beyond cutoff 6 dB per octave for a single-pole filter. Transient response is much better than for a comparable Chebyshev filter. See also *Filter*.

**buttonhook feed** A rod shaped like a question mark supporting the feedhorn and LNA. A buttonhook feed for use with commercial grade antennas is often a hollow waveguide that directs signals from a feedhorn to an LNA behind the antenna.

**buzz** This is sometimes called intercarrier buzz, a raspy version of AC hum, usually caused by improper adjustment of some IF circuits in TVs and VCRs.

**BW** Bandwidth.

**BWF Broadcast WAV** An audio file format based on Microsoft's WAV format. It can carry PCM or MPEG encoded audio and adds the metadata, such as a description, originator, date and coding history, needed for interchange between broadcasters.

**B-Y matrix** A circuit to construct color difference signal B-Y according to the equation  $B-Y = -0.30R - 0.59G + 0.89B$ .

**B-Y signal** A blue-minus-luminance color-difference signal used in color TV. It is combined with the luminance signal in a receiver to give the blue color-primary signal.

**bypass switch** An electronic circuit, found on some image enhancers and processors, designed to permit the user to circumvent all video processing for instant comparison between original and electronically enhanced signal information.

**bypassed mixed highs** The mixed-highs signal, containing frequencies between 2 and 4 MHz, that is shunted around the chrominance-subcarrier modulator or demodulator in a color TV system.

**bypassed monochrome** Deprecated term for shunted monochrome.

- C** 1. Cyan. 2. Color component of s-video signal. 3. CATV midband channel, 132-138 MHz. 4. Clock. 5. TV standard; Belgium, Korea. Characteristics: 625 lines/frame, 50 fields/s, interlace—2:1, 25 fr/s, 15,625 lines/s, aspect ratio—4:3, video band—5 MHz, RF band—7 MHz, visual polarity—positive, sound modulation—A3, pre-emphasis—50  $\mu$ s, gamma of picture signal—0.5. 6. Children through age 7—see *Movie rating systems*. 7. Compatible.
- c/aph** Cycles per active picture height, the measure of the spatial frequency of a periodic pattern in TV picture expressed as a ratio of picture height to the period of the pattern. It could be derived from tvl units: frequency value expressed in c/aph is equal to half of the frequency expressed in tvl; i.e., “288 c/aph” is the same as “576 tvl.”
- C1,C2** SC-HDTV chroma difference components.
- CAA** Constant Angular Acceleration. A laser video enhancement designed to eliminate crosstalk, or unwanted extraneous signals. CAA, a modification of CLV, is accomplished by making rotational speed changes part of a sub-multiple of the horizontal sync frequency. As a result, rolling horizontal noise bars are kept out of the screen image.
- CAB** Cabletelevision Advertising Bureau; Canadian Association of Broadcasters.
- cabinet** The housing for a radio receiver, TV receiver, or other piece of electronic equipment.
- cable** Short form of cable TV.
- Cable Act of 1984** An act passed by the U.S. Congress that deregulated most of the CATV industry including subscriber rates, required programming, and fees to municipalities. The FCC was left with virtually no jurisdiction over cable TV except among the following areas: (1) registration of each community system prior to the commencement of operations; (2) ensuring subscribers had access to an A-B switch to permit the receipt of off-the-air broadcasts as well as cable programs; (3) carriage of TV broadcast programs in full without alteration or deletion; (4) non-duplication of network programs; (5) fines or imprisonment for carrying obscene material; and (6) licensing for receive-only earth stations for satellite-delivered via pay cable. The FCC could impose fines on CATV systems violating the rules. This act was superseded by

the Cable Reregulation Act of 1992, and by the 1996 Telecommunications Act.

**cable compatible** A consumer electronics phrase coined in the 1980s to describe TV sets and VCRs that are designed to be directly connected to a cable drop in a home. The units (sometimes called cable-ready sets) contain a tuner that can receive all cable as well as broadcast channels.

**cable compensation circuits** Circuits designed to compensate for losses in TV signal links and not designed for a wide frequency range. Some units can be adjusted over a wide range of gain and frequency with reasonably constant phase equalization.

**cable control** See *Cable television*.

**cable converter** Syn.: Up converter.

**cable correction, TV camera** Since TV cameras may be used with varying amounts of camera cable, a variable amount of cable correction must be provided. A typical loss figure for coaxial camera cables is 10 dB at 10 MHz for a 1,000 ft. run. It is important that the correcting network be properly matched to the attenuation characteristic of the cable, the loss being proportional to the square root of the frequency, as streaking effects will otherwise occur on the picture.

**cable drop** The last connecting element of a cable system in a tree network configuration. The cable drop consists of a small coaxial cable (about 1/4" in diameter) that connects the feeder cable of the distribution system to the subscriber's home and then to his converter or TV set. Also called *house drop*.

**cable loss** See *Coaxial*.

**cable modem** A data modem that uses the bandwidth of a cable system, providing internet access over cable TV networks at speeds much faster than modems using telephone lines.

**cable origination** Cablecasting.

**cable penetration** The percentage of homes that subscribe to CATV, generally within a specified area.

**cable plant** The system of wires in a building. For data communications purposes, the cable plant will typically be made of coaxial cable, twisted pair, other wire, or now, more commonly, optical fibers.

**cable puller** A person responsible for setting up and handling power, sound, and picture cables. Gener-

## cable ready

ally one cable puller is allocated to each camera. The cable puller follows the camera during moving shots and makes sure that the cables do not become tangled.

**cable ready** Cable compatible. The FCC developed a series of specifications that a TV set (or VCR) must have to be advertised or sold as "cable ready" or "cable compatible." Those include the ability to tune all standard cable channels up to 804 MHz and meet standards on adjacent-channel, image-channel, and direct-pickup interference; tuner overload; cable input conducted emissions; and radiated emissions. In addition, all cable-ready sets must contain a standard back-of-set decoder interface, designed to replace the set-top box and permit the TV's features to be used with scrambled signals by separating scrambling functions from program functions.

**Cable Reregulation Act of 1992** Reregulation Bill 1515 passed the U.S. Congress in October 1992, forcing the FCC to reregulate cable television and CATV rates (after the Cable Act of 1984 effectively deregulated the cable TV industry). After the act was passed, the FCC forced the industry to reduce its rates by 10% in 1993 and then again by 7% in 1994.

**cable system** See *Cable television*.

**cable system operator** See *Cable television*.

**Cable Telephony Transport System (CTTS)** Transmission system that allows multiplexed telephony traffic to be carried through a single coaxial cable simultaneously with TV channels; Hughes Network Systems Ltd., Hertfordshire, England. The system converts telephony signals onto an RF carrier for distribution through existing fiber and coaxial TV cables. With a coaxial cable-TV distribution system, TV signals are modulated onto an RF carrier that runs between 550 and 600 MHz. Multiplexed telephony channels are then assigned to carrier signals either side of the TV signal. The path from a cable company's headend to subscribers runs at 650 MHz, and the return link at between 40 MHz and 50 MHz.

**cable television (CATV)** A TV program distribution system in which signals from all local stations and usually a number of distant stations are picked up by one or more high-gain antennas at elevated locations, amplified on individual channels, then fed directly to individual receivers of subscribers by overhead or underground coaxial cable. The mechanical connections or electrical conductors are operated by cable control. Cable TV systems are generally called cable systems; the companies that own and operate them are known as cable system operators. Used to improve reception and to make more stations available in a given area. The system sometimes includes equipment for originating local programs, time and weather reports, news bulletins, and other services. Also called community antenna TV.

**cable television adapter** An automatic switching ac-

cessory designed to permit the viewing and taping of various broadcast, CATV and pay TV channels by using certain programmable VCRs. Watching one program while recording another from pay TV or cable can present problems as well as complex connections. The components include a cable converter with a decoder for the pay TV channel, a VCR and a TV receiver. If the VCR is cable ready, it can be used to tune in various cable channels, but the pay TV decoder presents another obstacle. To overcome this, a CATV adapter can be added as a fourth unit, providing greater flexibility. For instance, to record a pay channel while simultaneously viewing a VHF channel, the VCR has to have one of the preset channels tuned to that used by the cable operator. Then the VCR/TV switch is set at TV, the receiver channel at the one to be viewed and the converter box positioned at the pay TV channel. The adapter offers other possible combinations such as recording a VHF channel while viewing a pay TV program. Without this device, a viewer must have either two decoder boxes, a patch box or an RF switcher to perform the same functions. The latter two accessories are preferable if more inputs are required, the patch box being less permanent than the switcher.

**cable television carrier system** An arbitrary method employed by cable systems in which the transmission of broadcast signals is "offset." This results in minimal screen interference from neighboring channels. Although typical TV broadcast channels start and finish with MHz numbers that are even (e.g., 66-74 MHz for channel 4), different carrier systems use varying offset frequencies. Two basic types are the HRC (Harmonically Related Carrier) and the ICC (Incremental Coherent Carrier) systems. With HRC, the cable operators offset all channel frequencies, channels 5 and 6 by 1.25 MHz and the remainder by .75 MHz. Cable companies utilizing the ICC system offset the frequencies of channels 5 and 6 by 2 MHz. Offsetting, however, can create problems. The cable converter may have to be retained, whereas with normal channels it can be eliminated since cable-ready tuners can lock in on these stations. Finally, another disadvantage of offset frequencies is that these channels become difficult to tune in with any degree of accuracy.

**cable television converter** A device used with CATV to carry multiple channels to subscribers who could receive them on an unused channel. Based on the principle that many channels could be carried in exactly the same electronic space as one, cable operators started to offer 12 channels through their converter box. (The Focus-12 device was first used in New York's borough of Manhattan.) The number of channels capable of being carried by the converter grew and the Gamut-26 was introduced. Because of the shielding of the converter, the channels are transmitted to the box by cable, not over the air.

**cable television cooperative** A CATV station owned by subscribers. There are fewer than 3 dozen cable cooperatives of the more than 4,700 cable systems in the US. Most of these co-ops are in the Midwest. Cable co-ops differ from municipally owned cable stations that are owned by the local governments. See *Public access TV*.

**cable television frequency distribution** The channel-numbering plan developed by the EIA/NTCA Joint Committee on Receiver Compatibility and published by both organizations as an Engineering Standard. Standard frequencies refer to cable systems that transmit on the standard off-air frequencies for channels 2 to 6 and 7 to 13. Supplemental channels are in 6-MHz increments, counting down from channel 7 (175.25 MHz) to 91.25 MHz and upward from channel 13 (211.25 MHz).

**Cable Television Relay Service (CARS)** An inexpensive microwave service for transmitting a large number of CATV program signals from one site to another, as from head end to head end. The amplitude-modulated CATV channels from 112 to 300 MHz are heterodyned upward to 12,758.5 to 12,946.5 MHz and transmitted as microwave channels. This is called an amplitude-modulated link, or AML. For relatively short distances, an AML is usually more economic than cable or conventional microwave service. See also *Auxiliary radio services*.

**Cable Television Relay Station (CARS)** A fixed or mobile station used for the transmission of TV and related audio signals, signals of standard and FM broadcast stations, signals of instructional TV fixed stations, and cablecasting from the point of reception to a terminal point from which the signals are distributed to the public.

**cable up** To (cause to) become connected to a cable TV system.

**cablecasting** 1. Programming carried on CATV, as opposed to over-the-air broadcasting; also called cable origination. 2. The transmission of such programming.

**cable-compatible tuner** This tuner eliminates the need for external channel selection and provides direct tuning of regular VHF/UHF channels plus additional unscrambled cable channels. (A convertor may be necessary to view scrambled CATV channels.)

**cabletext** Teletext transmitted by cable or satellite to CATV systems.

**cache** Local or temporary storage.

**caddy** A protective plastic jacket, sleeve or holder that stored the now defunct CED videodisc. The caddy was inserted into VDP that automatically removed the disc and prepared it for play. The CED, developed by RCA, contained delicate microscopic grooves that were protected by the caddy. The CED system, that employed a stylus that physically tracked the disc grooves, differed from the LaserVision system. The latter uses a laser beam that "reads" the information of a grooveless videodisc that is virtu-

ally indestructible and therefore needs no protective caddy. By the mid-1980s the public virtually rejected both systems, selecting videotape as the medium of its choice. However, the laserdisc made a comeback by the late 1980s.

**call** In film, TV, theater, the stipulated time to report for work on any given day.

**call letters** The name of a radio or TV station. Most stations east of the Mississippi River have call letters beginning with W; west of the Mississippi, call letters usually begin with K. Canadian stations begin with C; Mexican stations, with X.

**call sheet** A list of dates and times the cast and crew must report for a TV, film, theatrical, or other production.

**call-in** Referring to a radio or TV program that broadcasts telephone conversations with listeners.

**camcorder** A portable video camera that incorporates its own videotape and audio tape recorder. It is capable of recording full-color videotapes with sound. Many are equipped with telephoto lenses to permit panning from near to distant objects or scenes. Camcorders come in a variety of formats: VHS, S-VHS, VHS-C, S-VHS-C, 8mm, Hi8.

**Cameo** 1. Macintosh-based personal video-conferencing system, announced by Compression Labs (CLI) in January of 1992. Developed jointly with AT&T and designed to work over ISDN lines the Cameo transmitted 15 fps of video and needed an external handset for audio. 2. A lighting technique used in TV production in which only the foreground is lighted. The background remains intentionally dark or unlit.

**camera** The eye of the video system; an instrument capable of absorbing the light values of a scene and converting them to a corresponding series of electrical pulses through the use of a cathode ray pickup tube such as vidicon; a light-sensitive CRT (and its associated electronic circuitry and lens optics), that translates the light values of any scene it views into a set of voltage variations that can be used to recreate those light values on another CRT such as that used for TV display. A solid-state camera has also been developed in which the transduction element is an array of CCDs. This type of camera is very much smaller and lighter than those containing electron tubes and is typically the size of an ordinary handheld photographic camera.

**camera categories** There are two major TV camera categories, live and film. Live cameras generate video signals from the optical images of indoor and outdoor scenes. Film cameras generate TV signals from film or slide images.

**camera chain** The configuration of apparatus required to produce a video signal from an optical image, e.g., a TV camera, associated amps, power supply, a monitor, and the cable needed to bring the camera output signal to the control room of large studio camera system.

## camera control unit

**camera control unit (CCU)** See *Studio camera*.

**camera cue** A red light or buzzer indicating that a TV camera is shooting a scene for transmission, live or taped; also called cue light, tally light, or warning light.

**camera flow diagram** A diagram that traces output from the cameras to its ultimate destinations. Used in TV studios.

**camera head** See *Studio camera*.

**camera jack** An input on VCRs that accepts video camera connections. Manufacturers use 10-pin, 14-pin (Type K) or 5-pin DIN jacks. However, two similar jacks may not necessarily be compatible. For example, a 10-pin jack on a specific camera may fit a 10-pin VCR, but not all functions assigned to each pin will operate as intended. Adapters are available for connecting jacks of different pin numbers and configurations.

**camera log** A detailed listing of the shots each camera is expected to take.

**camera mode** Mode of vertical-temporal video signal processing that assumes that odd and even fields of the TV frame contain information from different time moments, typical of interlaced TV camera output.

**camera mounting head** An accessory video camera support designed for moving and manipulating the video camera efficiently. Mounting heads, originally simple devices based on friction and gears that were designed for the film industry, have taken on new engineering techniques, resulting in complex (e.g. fluid) heads for use with professional video cameras and camcorders.

**camera opticals** Special effects, such as IRIS IN or IRIS OUT, that are generated using only the camera itself.

**camera rehearsal** A full-dress rehearsal, one with costumes, at which the movements of the camera are blocked; more advanced than a reading or script rehearsal.

**camera search** A video camera feature that allows the user to review existing scenes while the camera remains in Record mode.

**camera signal** The video output signal of a TV camera.

**camera tube** An electron-beam tube in a TV camera that converts an optical image into a corresponding charge-density electric image and scans the resulting electric image in a predetermined sequence to provide an equivalent signal. Examples are the iconoscope, image dissector, image orthicon, and vidicon. A chip MOS can replace the conventional camera tube, though the cameras using this process are more costly. Also called image pickup tube, pickup tube and TV camera tube.

**camera-to-VCR adapter** See *Adapter*.

**campus environment** An environment in which users—voice, video and data—are spread out over a broad geographic area, as in a university, hospital,

medical center, prison. There may be several telephone systems. There may be several LANs on a campus. They will be connected with bridges and/or routers communicating over telephone, microwave or fiber optic cable.

**Cannon connector** A particular brand of audio jack that features three leads—two for the signal and one for the overall system grounding; a very secure type of connecting jack often found on high-quality microphones, video monitors, and VTRs.

**cans** Headphones worn by TV and radio production personnel. The slang term is also used to refer to the circular metal containers in which a film is stored, leading to the industry use of the phrase, “in the can,” for a completed motion picture or TV program.

**cap sheet** Caption sheet.

**capacitance electronic disc** See *CED*.

**capacitor** An electronic component that accepts an electrical charge that it can dispense at a consistent and predictable rate. In relation to a VHD videodisc system, a capacitor is formed by the combination of the disc and a tiny piece of metal, known as an electrode, that is part of the stylus.

**capstan** A rotating shaft on the VCR that is turned by a motor and which, in turn, governs the speed of the tape as it proceeds from the supply reel to the take-up reel. The capstan is supplemented by the pinch roller. Pressure holds the tape firmly against the capstan.

**capstan lock** A method of stabilizing videotape playback that essentially relies on the stability of the power source for a constant base. It is the first degree of lockup, suitable mainly for home VTRs. Capstan lock is not a very stable state. See *Lockup*.

**capstan servo** 1. The control of the tape to assure accurate and uniform speed during record and playback by passing the tape between a spinning post in the tape path, which is an extension of the VCR motor and is called capstan, and a rubber pinch roller. Internal electronic circuitry in the VCR senses any fluctuations in tape speed and advances or retards the tape to a predetermined rate as it passes between the capstan post and the pinch roller. 2. An electronic circuit built into editing VTRs to provide smooth edits. The servo is a speed control system that locks into the sync of another recorder to insure that both video signals are interlocked for glitch-free edits. Without this feature, picture breakup appears between scenes. See *Lockup*; *Vertical lock*.

**capstan servo editing** Head override editing. A method of electronic editing in which a new video signal replaces an already existing signal without disrupting the picture (except for a switch from signal 1 to signal 2 at the point of addition). The motor speed of the capstan—which controls the speed of the videotape—on VTR B is controlled by the vertical sync pulses on the videotape on VTR A during

the “editing” of the signal on tape A onto tape B so that no disruption of the flow of signal information occurs during the switch of signals.

**CAPTAIN** Character And Pattern Telephone Access Information Network system, Japanese version of Teletext resembling Minitel in France.

**caption generator** Device used to generate text and simple graphics for video titles or captions.

**caption key** A key signal derived from a title source such as a character generator. Syn.: title key.

**caption sheet** Also called cap sheet, dope sheet. In TV, a list of scenes.

**Caption Writer VCR** Instant Replay, Inc., Miami. A VCR that can print instant transcripts of TV programs through an ordinary computer printer. The VCR is intended to be connected directly to a printer, using the parallel port, or to a computer, using the serial port.

**captioning** The process of superimposing subtitles at the bottom of a TV screen.

**capture** (of data) The recording of data on a form or its entry into a computer.

**capture effect** A property of an FM system to receive only the stronger of two signals, suppressing the weaker of the two. In the case of an AM system (as used in conventional TV broadcasting for video, and in AM broadcasting and CB radio), a signal that is 20 dB weaker than the desired signal can cause a noticeable, annoying interference. In an FM system (assuming we are above threshold), the weaker signal will be suppressed to the point where it is inaudible. A performance figure given for hi-fi FM receivers, called the capture ratio, is the numerical value that measures this effect.

**capture range** Range of the input signal frequencies to which a phase locked loop (PLL) is able to lock. Once locked, the PLL generally has a greater input frequency range known as hold range. The term is similarly applicable to genlocking SPGs.

**capture ratio** 1. The ability of a tuner to restrict or reject a second, weaker signal in proximity to the main signal. This permits the strong signal to be received without interference from secondary signals traveling on the same frequency. Capture ratio is measured in dB; the lower the number, the more effective the tuner in terms of “capturing” the strong signal. Moderate-priced tuners may have a capture ratio of approximately 3 dB while more costly units approach a figure of 1 dB. The term, that applies more to audio than to video, should not be confused with alternate channel selectivity that refers to adjacent stations. 2. In FM systems, that ratio of two received signals in which the stronger signal suppresses the weaker one. Since the systems used for satellite TV use FM for both video and audio, a satellite transponder will respond to a (received) pirate signal only a few dB stronger, completely suppressing the legitimate program carrier. This is an inher-

ent property of both an FM system and the satellite transponder.

**cardioid** One of many possible pickup patterns of a directional microphone. As the name suggests—cardioid means heart-shaped—sound waves coming to the microphone’s rear and sides are rejected, while those directly in front of it are received.

**carrier** 1. Short for carrier frequency, carrier wave. A pure-frequency signal that is modulated to carry information. In the process of modulation it is spread out over a wider band. The carrier frequency is the unmodulated frequency on any TV channel. 2. A company that provides communications circuits. Carriers are split into “private” and “common.” A private carrier can refuse service to anyone, but a common carrier can’t. Most of the carriers in U.S. industry—local phone company, AT&T, MCI, US Sprint, etc.—are common carriers. Common carriers are regulated. Private carriers are not. 3. The mechanism that holds the cassette inside the VCR; part of the cassette-lift mechanism.

**carrier chrominance signal** Chrominance signal.

**carrier frequency** A certain wavelength of a special frequency on which a signal is registered for transmission in a clear way to a receiver. The audio or video signal is then isolated from its carrier frequency, amplified and reproduced.

**carrier synchronization** In a TV set, the generation of a reference carrier with a phase closely matching that of a received signal.

**carrier wave** Syn.: carrier. The wave that is intended to be modulated, or, in a modulated wave, the carrier-frequency spectral component. The process of modulation produces spectral components falling into frequency bands at either the upper or lower side of the carrier frequency. These are sidebands, denoted upper or lower sideband according to whether the frequency range is above or below the carrier frequency. A sideband in which some of the spectral components are greatly attenuated is a vestigial sideband. In general these components correspond to the highest frequency in the modulating signals. A single frequency in a sideband is a side frequency. The baseband is the frequency band occupied by all the transmitted modulating signals.

**CARS** Community antenna, or cable television, relay service. A fixed or mobile station used for the transmission of television and related audio signals, signals of standard and FM broadcast stations, signals of instructional television fixed stations and cablecasting from the point of reception to a terminal point from which the derived signals are distributed to the public.

**cartridge** A plastic container holding a single reel, closed loop of videotape. In contrast, a videocassette contains two reels. Cartridges are presently found only on industrial machines.

**cartridge lamp** A pilot or dial lamp that has a tubular



## Cartvision format

glass envelope with metal-ferrule terminals at each end. It resembles a TV or radio fuse and is mounted in the same type of socket clips.

**Cartvision format** A now-defunct 1/2-inch-wide tape cassette system capable of two hours of playing time; 1972. Developed by Avco and distributed by Sears. This format used a skip field, 3-head system, resulting in a reduction of tape consumption. Only every third TV video field was recorded. On playback, each of the three heads was played in order on the same track, producing a proper TV signal. Vertical resolution was one-half of a standard TV signal. Fast motion of the picture content could not be reproduced because of the loss of two out of three TV fields.

**cascade voltage multiplier** A circuit consisting of some stages of the half-wave doubler stacked together. Used in TVs.

**cascode amplifier** A common-emitter transistor amp in series with a common-base stage analogous to a grounded-cathode, grounded-grid amp. Its input resistance and current gain are nominally equal to the corresponding values for a single common-emitter stage, and the output resistance is approximately equal to the high output resistance of the common-base stage. Found in TV receiver-tuned amps where the collector load is replaced with a tuned circuit, it is most effective in amplifying signals that are 25 MHz and higher.

**Cassegrain feed system** In satellite TV, an antenna feed design that includes a primary reflector, the dish and a waveguide to a LNA.

**cassette** A cartridge for holding and winding magnetic tape. Also called cassette shell; shell.

**cassette eject** The method used to remove a video-cassette from the VCR housing. Older machines simply allowed the cassette chamber to spring up with a loud thud. Today's more sophisticated methods include the use of gears, air-dampened pistons, coil springs and pneumatic fan blades—all much quieter and gentler.

**cassette indicator** An icon that appears in the display window of some VCRs to indicate whether the machine contains a videocassette and the direction of the tape movement. A series of LEDs connects the two circles that make up the icon and light up sequentially to describe in what direction the tape is moving. The indicator is not illuminated when the machine is shut down.

**cassette shell** The container that holds the videocassette. The shell usually has several vital parts to help move the tape accurately from the supply to the take-up reel. These include a flange, hub and clamp, leaf spring, tape pad, guide pin, guide roller, tape guide and tape guide rib. A window is provided on the top to view the two tape reels. Also called shell.

**cassette-in switch** A small leaf switch used to detect when a cassette tape is fully loaded in the VCR.

**cassette-lift mechanism** A mechanism that brings

the cassette into threading position. The mechanism includes the carrier.

**castellation [of test pattern]** Alternating white and black boxes at the perimeter of a test chart. Useful to test TV picture positioning on the display screen, also to observe picture cropping, display registration, etc.

**CATA** Community Antenna Television Association. An association of CATV operators and owners, based in Fairfax, VA.

**cathode-ray tube (CRT)** An electronic tube in which a beam of electrons can be controlled and directed by an electronic lens so as to produce a visible display of information on the surface of the tube or to store data in the form of an energized portion of the tube's surface. All CRTs have an electron gun to produce an electron beam, an electrode (cathode or grid) that varies the electron beam intensity and hence the brightness, and a luminescent screen to produce the display. The electron beam is moved across the screen either by deflection plates or magnets. The deflection sensitivity of the tube is the distance moved by the spot on the screen per unit change in the deflecting field. Electromagnetic deflection is used when high-velocity electron beams are required, as in TV sets, that need a bright display. Focusing of the beam may also be done electrostatically or electromagnetically or by a combination of methods. A greater degree of focusing is required when the electron beam is deflected towards the edges of the screen. The point at which the electron beam comes to a focus is the crossover area and the solid angle of the cone of electrons emerging from this area is the beam angle. For convenience the deflection and focusing coils are often mounted around the narrow neck of the tube as a single unit, termed a scanning yoke. Such an arrangement reduces the overall physical dimensions of the assembly and is particularly important when the tube contains more than one electron beam, as in the double-beam CRT or some forms of color picture tube, and therefore requires more than one set of coils. The screen of the CRT may be coated with aluminum on the inside and this coating held at anode potential. Such an aluminized screen prevents the accumulation of charge on the phosphor and improves its performance by increasing the visible output and reducing the effects of ion broadening. In the case of a CRT in which the screen is not aluminized, the maximum potential difference that can be applied between the anode and cathode is limited to the value at which the secondary emission ratio of the screen rises to unity and is known as the sticking potential. There are three types of CRT displays: the familiar TV receiver, the monitor and the monitor/receiver. The electronic viewfinder of a video camera is actually a miniature monitor. CRT was originally called Braun tube. Also



- called kinescope and picture tube when used in TV sets.
- cathode-ray-tube display** 1. The presentation of a received signal on the screen of a CRT. 2. That part of a system (a TV receiver, monitor or monitor/receiver) in which controlled electron beams provide data in visual form.
- cathode-voltage-stabilized camera tube** Syn.: low-electron-velocity camera tube. See *Camera tube*; *Image orthicon*; *Vidicon*.
- cathodoluminescence** The emission of light when substances are bombarded by cathode rays (electrons). The frequency of light emitted is characteristic of the bombarded substance.
- CATV** Originally Community Antenna Television. Also Cable Television (now generally meaning cable TV). CATV grew from a select service to small communities who were isolated from the reception of conventional TV programs. Local companies supplied transmission to these remote areas—for a slight fee. Since the telephone lines could not carry the “broadband” TV required, cables were used instead.
- CATV adapter** See *Cable television adapter*.
- CATVI** Cable-TV Interference.
- CAV** 1. One of the two formats of the laservision (LV) videodisc system. A constant angular velocity (CAV) disc plays for 30 minutes per side and is capable of many special effects not available to the CLV, one-hour-per-side format. The CAV disc turns at a constant speed of 1800 rpm or 30 revolutions per second, matching TV’s standard of 30 frames per second. This permits such special effects as freeze frame, single frame advance, slow motion, visual scan, etc. 2. Component Analog Video.
- cavity resonator** Type of tuned circuit used at ultrahigh frequencies (Bands IV and V). Instead of the more conventional inductor and capacitor, a hole or cavity inside a piece of metal can be made to resonate with a very high frequency.
- Cb** Coded color difference signal (digital B-Y).
- C-Band** The range of frequencies from 3.5 to 6 GHz. The microwave frequency range of a satellite TV signal. These signals usually fall between 5.9 and 6.4 GHz when transmitted to a satellite and range from 3.7 to 4.2 GHz when returned to earth.
- C-Band satellite** Relatively low-powered communications satellite that uses the C-band. These satellites cover the entire US. They are used by cable systems and TV broadcasters to receive the signals on large TVRO dishes. C-Band offers over 250 channels of video and 75 audio services to about 850,000 subscribers in the U.S., at the time of this writing (2002).
- CBC** Canadian Broadcasting Corporation.
- CBR** Constant bit rate. CBR refers to multimedia delivery when there is dedicated bandwidth and the data can be delivered at a guaranteed constant bit rate. MPEG-1 and 2 are designed for CBR delivery. Constant bit rate cannot be assured on the Internet or most Intranets. Protocols such as RSVP are being developed and deployed to provide bandwidth guarantees.
- CBS** Columbia Broadcasting Service, one of the major U.S. television networks.
- CC** 1. Closed Caption. 2. CATV hyperband channel, 312-318 MHz.
- CCD** Charge-coupled device.
- CCD color comb filter** Advanced electronic circuitry, usually found only on a TV monitor/receiver, designed to improve image detail and definition without color fringing or video noise appearing on screen. The color comb filter makes use of a CCD to gain greater luminance/chrominance separation. Separating these two elements of the signal—while keeping the full luminance bandwidth—results in less distortion in the final picture.
- CCD telecine** Telecine device where the scanning is achieved by the linear passing of film across a single TV line CCD sensor array. The complete TV frame is built up in a suitable buffer store. Syn.: line array telecine.
- CCDC** Channel-Compatible DigiCipher, one of the proposed HDTV simulcast systems.
- CCF system** Chroma crawl free system. Chroma crawl is an artifact of encoded video, also known as dot crawl or cross-luminance, that occurs in the video picture around the edges of highly saturated colors as a continuous series of crawling dots. It is a result of color information being confused as luminance information by the decoder circuits. A CCF system eliminates chroma crawl.
- CCIR** Comité Consultatif International des Radiocommunications or International Radio (Consultative Committee in International Radio). The international body to determine standards for telecommunications. Used to describe 625-line TV system used primarily in W. Europe. The US system of TV is 525 lines. The HDTV system is 1125 lines. The CCIR no longer exists—it has been absorbed into the parent body, the ITU.
- CCIR 1119** See *BT.1119*.
- CCIR 1124** See *BT.1124*.
- CCIR 470** See *BT.470*.
- CCIR 601** (BT.601) Now known as ITU-R BT.601-2. An internationally agreed-upon standard for the digital encoding of component color TV that was derived from the SMPTE RP125 and the EBU 324E standards. It uses the 4:2:2 sampling scheme for Y,U and V with luminance sampled at 13.5 MHz and chrominance (U and V components) sampled at 6.75 MHz. After sampling, 8-bit digitizing is used for each channel. These frequencies are used because they work for both 525/60 (NTSC) and 625/50 (SECAM and PAL) TV systems. The system specifies that 720 pixels be displayed on each line of video. The D1 digital videotape format conforms to CCIR 601. See *CCIR 656*, *ITU-R BT.601-2*.

**CCIR 653** See *BT.653*.

**CCIR 656** (*BT.656*) The international standard defining the electrical and mechanical interfaces for digital TV operating under the CCIR 601 standard. It defines the serial and parallel interfaces in terms of connector pinouts as well as synchronization, blanking and multiplexing schemes used in these interfaces. A simplified version of this interface is commonly used for transferred digital video between IC chips. Now known as ITU-R BT.656.

**CCITT** Consultative Committee in International Telegraphy and Telephony. The international body that determines standards for telecommunications.

**CCITT V.23** International videotex modem standard (1200/75 bps or 75/1200 bps).

**C-clamp** A metal device shaped like the letter C, used to connect lighting instruments to a pipe grid above a TV studio. A version of the C-clamp is also used to temporarily hold flats together or pieces of scenery in place.

**CCR** Central Control Room.

**CCTV** Closed-circuit TV.

**CCU** Camera Control Unit. See *Studio camera*.

**CCVS** Composite Color Video Signal.

**CCW** Counter-clockwise.

**CD** 1. Color Difference signals of (R-Y) and (B-Y). The Green signals (G-Y) can be extracted from these two signals. 2. Abbreviation for compact disc.

**CD graphics player** A CD unit, resembling the conventional CD player, but equipped to play back still images, in addition to the usual 80 minutes of music, recorded on CD+G (Graphics) discs. Once the unit is connected to a TV set, the owner can view song lyrics, biographical data about performers and drawings—items usually appearing as liner notes. Normal CD players do not have the necessary features, such as outputs for video or S-video, to play back these images; neither do they offer a graphics output jack for an add-on decoder that can access these still images.

**CCDI** Copper distributed data interface. A high-speed data interface, similar to FDDI but using copper instead of fiber.

**CD+G** A CD disc, similar in appearance to the conventional disc, that contains visual information in the form of still images or graphics. When a specially equipped CD graphics player is connected to a TV set, these discs can provide pictures, musical information or text. The resolution is similar to that produced by computer graphics. CD+G discs, which first appeared in 1988, can be played on standard CD players, but the added visual benefits will not be available. Because of its limited technology, the CD+G disk produces only still images, differing sharply from the CD-Video disc or CD-I format, that turns out “moving pictures.” However, this format allows the disc to retain its full 80 minutes of playing time. Another advantage of CD+G discs is that

they will work with different TV formats, such as PAL or SECAM. Since the discs are encoded using the binary system, each system translates this code to fit its own TV standard before it appears on screen. The music portion of the disc, of course, is not affected.

**CD-i** Compact Disc-Interactive. A compact optical disc system containing text, graphics, still images and high-quality sound, which can be played back in a dedicated CD-i player. The CD-i player can be connected to a standard TV set and optionally to a stereo system. CD-i was developed jointly by Sony Corp. and Philips Electronics NV, who defined its basic specifications in what is known as the Green Book, in the 1980s. By 2000, DVD and other platforms largely supplanted CD-i.

**CD-ROM** Compact Disc Read Only Memory. An optical disk capable of storing large amounts of data. A CD-ROM player is needed to read a CD-ROM. CD-ROMS are well-suited to large software applications, graphics, sound and video.

**CD-ROM XA** Compact Disc Read Only Memory eXtended Architecture. Microsoft’s extensions to CD-ROM that allow audio to be interleaved with data. Though it is not a video specification, limited video can be included on disc.

**CDS** Color Difference Signal.

**CDTV** 1. The first computer to incorporate a built-in CD-ROM drive, designed and sold by Commodore. 2. Canadian Digital Television Association.

**CD-V** Compact video disc. A format for putting 5 minutes of video on a 3-inch disc. This format has come and gone.

**CDV** Compression Labs Compressed Digital Video, a compression technique used in satellite broadcast systems. CDV is the compression technique used in CLI’s SpectrumSaver® system to digitize and compress a full-motion NTSC or PAL analog TV signal so that it can be transmitted via satellite in as little as 2 MHz of bandwidth. (A normal NTSC signal takes 6 MHz.)

**CED** Capacitance Electronic Disc system; the RCA video disc marketed in the 1980s. System of video recording a grooved disc, employing a groove-guided capacitance pickup. Could be considered the final chapter in grooved media that began with the Edison cylinder.

**Ceefax** The teletext service of the BBC. Its name is a corruption of the phrase “see facts.” Ceefax transmits some 100 pages of information such as news, weather, and entertainment options, that can be displayed on the TV. The information can be called up at any time by the viewer using a keypad.

**cellular vision** Microwave TV transmission system in 28-GHz band to send voice and video over the airwaves. The cellular vision system, financed by the Suite 12 Group (Freehold, NJ), was invented by Bernard Bossard. An alternative to CATV, it makes use

of a band that was once considered to be too high a frequency for effective TV transmission. The TV signals are received by a 4.5-inch-square, flat antenna that can be mounted either inside or outside a customer's house. Microwaves at 28 GHz can carry more information than longer-wave transmissions, and they can be bounced off buildings. The major drawback to microwave transmission is seen as its limited range—only a few miles from the transmitter. To eliminate mutual interference and ghosting, microwave transmissions from adjacent transmitters will be polarized as “vertical” or “horizontal” signals that can be distinguished by a customer's antenna. With only slight modification, a cellular vision microwave receiving antenna can be converted so it will transmit signals back to the base antenna. This would give cellular vision interactive capability.

**center frequency blue, SECAM** 4,250.000 kHz.

**center frequency red, SECAM** 4,406.000 kHz.

**center up** An instruction to place an image in the middle of an area, such as a TV screen.

**centered sweep** A variant of line sweep with the highest or lowest frequency in the center of TV line (effectively a double sweep), hence the small variations of the frequency response at this central point are more visible.

**central control room** Area in the TV center dedicated to routing and switching functions. Syn.: CCR; master control room; MCR.

**ceramic microphone** See *Piezoelectric microphone*.

**certificate of compliance** The FCC approval that must be obtained before a cable system can carry TV broadcast signals.

**C-format VTR** An industrial machine with 1" tape format used by professionals. Introduced in the 1970s, the C-format VTR is aimed to replace the 2" machines in use since the development of VTRs in 1956. The C-format, with its two quality audio channels and the addition of Dolby noise reduction, brought forth a potential for improved sound.

**CG** Character Generator.

**CGA** Color Graphics Adapter. The original low-resolution color standard for IBM-compatible microcomputers, introduced in 1981. The CGA is capable of several character and graphics modes. It can be used to turn a TV set into a monitor. CGA was superseded by EGA, VGA, XGA, and SVGA.

**CGMS-A** Copy Generation Management System – Analog (CGMS-A). See *EIA-608*.

**chain** A network of radio, TV, radar, navigation, or other similar stations connected by special telephone lines, coaxial cables, or radio relay links so all can operate as a group for broadcast or communication purposes or determination of position.

**channel** 1. Band of frequencies allocated to a specific use—for example, a single TV transmitter. TV bands are subdivided into numbered channels, and the standard channel width therefore determines the

number of channels the band can accommodate; width varies from country to country. In the US, spectrum space is about 6 MHz wide for each channel.

2. Signal transmission or processing path dedicated to specific signal or signal component, e.g. “chrominance channel.” 3. Part of digital video effects device having its own control parameters and dedicated to manipulation of one TV picture. For example, two-channel DVE is able to rotate one picture and simultaneously squeeze another picture.

**channel 1** The 44–50-MHz spectrum, which the FCC assigned to land-mobile and two-way radio service in 1948. Hence, VHF TV station channels start with channel 2.

**channel capacity** Refers to the number of channels a cable TV system can handle simultaneously.

**channel coding** Data encoding and error correction techniques to protect the integrity of data being transported through a channel. Typically used in channels with high bit error rates, such as terrestrial and satellite broadcast and videotape recording.

**Channel F Video Game System** One of the first video games to introduce programmability with a large selection of game cartridges. Introduced by Fairchild in 1976, Channel F had a short-lived career after selling a few hundred thousand systems. The company decided to abandon the game a short time after its inception. Then, in 1982, Zircon took over the Channel F inventory and brought out a revised version, Channel F II.

**channel flashback** This function makes it possible to instantly switch between two selected TV channels at the touch of a button on the remote controller. This button returns to the previously viewed channel.

**channel index** An advanced TV set or VCR feature that displays every channel in the tuner memory. Channel index, or channel search as it sometimes is called, accomplishes this by showing a consecutive sequence of images, in the form of freeze frames, along the side and bottom of the screen while the main picture appears on screen in a larger format. Advances in digital technology have made this feature, along with others, possible.

**channel labeling** A TV feature that permits the viewer to enter the identification letters of an area network into a channel/time display. For instance, ABC, CNN or HBO can be listed on screen along with the channel number and time each time that display mode is pressed.

**channel lock** A feature found on some TV sets that allows one channel to be locked with access only via a private code. The channel lock is primarily designed to allow parents to prevent the authorized viewing of certain channels by children. Once locked, even unplugging the set will not restore the access without the proper code. Some lock-out techniques involve the use of conventional lock and key.

## channel search

**channel search** See *Channel index*.

**channel selector** A switch or other control that tunes in the desired channel in a TV set.

**channel strip** An amp that has sufficient bandpass for one TV channel. Used in cable TV systems and fringe-area home locations to improve reception of a single desired station.

**channel surfing** Flipping channels on a TV set.

**Channel-Compatible DigiCipher** (CCDC) A proposed fully digital HDTV system, American TV Alliance (ATVA). Operated with the same baseband standards as the DSC system.

**Chaoji VideoCD** Another name for Super VideoCD.

**chapter** In videodisc terminology, one of several arbitrary portions of a program into which a disc can be divided electronically. These chapters—e.g., musical numbers or short film subjects—can readily be located by special features on the videodisc player. Some VDPs can be programmed to play back a sequence or more than a dozen chapters on one side of a disc. Each chapter is made up of many frames, also easily accessible.

**chapter search** See *Automatic chapter search*.

**Character And Pattern Telephone Access Information Network system** (CAPTAIN) A form of videotext developed in Japan and operated through the public switched telephone network. Displays are on a TV set. It is interactive.

**character generator** (CG) 1. In TV receiver, a built-in device that electronically displays letters, numerals and other symbols on the video screen (e.g., in teletext or videotex mode). 2. A professional/industrial device designed to produce electronic letters and numerals by way of a specially designed keyboard. It is basically used for titling and graphics as well as for special key and fade effects. Broadcast-type units offer such advanced features as anti-aliasing, and many fonts including italic, drop shadows, outlines, autosizing, embossing and bevels. Some home video cameras and VCRs have built-in character generators. See also *Video effect titler*.

**character sizing** Refers to a generally standard feature of an industrial/professional character generator designed to create electronically or digitally various sizes and types of letters, numbers and symbols.

**character space** In videotex, the space on a screen display occupied by a character or graphic symbol.

**charge image** The pattern of electrical charges on the target surface of a camera tube that results from the optical-image input and which, when scanned, gives rise to the picture-signal output from the tube.

**charge-coupled device** (CCD) A form of light-sensitive microprocessor that converts an image into an electrical flow. This charge-transfer device consists of an array of MOS capacitors suitably designed so that they are coupled and therefore charges can be moved through the semiconductor substrate in a

controlled manner. The CCD may be used for imaging, as in the solid-state TV camera, primarily in camcorders and lightweight cameras. Used also in still video cameras.

**charge-coupled image sensor** A CCD in which charges are introduced when light from a scene is focused on the surface of the device. The image points are accessed sequentially to produce a TV-type output signal. Also called solid-state image sensor.

**charge-injection device** (CID) A charge-transfer device used as an image sensor in which the image points are accessed in an XY manner. The major advantages of the CID over the CCD are its resistance to blooming an image and its resistance to defects in the array.

**charge-transfer device** (CTD) A semiconductor device in which discrete packets of charge are transferred from one location to the next. Several different types of CTD exist, e.g., CCDs. Applications of CTDs include short-term memory systems, shift registers, and imaging systems. Information is usually only available for serial access.

**cheater cord** A special extension cord used to apply AC power to a TV or radio receiver when the back cover with its protective power interlock is removed for servicing.

**Chebyshev filter** A constant-k filter that achieves sharp frequency cutoff at the expense of amplitude ripple in the passband. See also *Filter*.

**check disc, CD and CDV players** See *Test disc*.

**checkerboard** [test pattern] Test pattern in a form of several bands with alternating white and black boxes. This pattern is useful to test geometry, registration, medium and low frequency distortions.

**checkerboard assembly** In video editing, a nonsequential method of auto assembly in which the computerized editing system records all edits from the videotape playback reels currently in use, leaving gaps to be filled later by subsequent reels. Also called B-mode assembly.

**checksum** An error-detecting scheme that is the sum of the data values transmitted. The receiver computes the sum of the received data values and compares it to the transmitted sum. If they are equal, the transmission was error-free.

**cherry picker** Motorized high-angle camera crane position with an operator bucket.

**chinese** Referring to horizontal flaps on TV, film, or other lamps.

**chip chart** Standard black and white scale test chart for video camera alignment. Consists of two sets of horizontal gray scales. Also called chipchart, crossed gray scale.

**chopper** A device that interrupts a current or beam of light or IR radiation at regular intervals, to permit amplification of the associated electrical quantity or signal by an AC amplifier.

**chopper power supply** A pulse-width-modulated

(PWM) chopper regulated power supply working like the horizontal deflection systems in many modern TV sets. The chopper power supply may consist of a low-voltage bridge rectifier circuit providing voltage to the primary winding of the chopper transformer. The dc voltage via the chopper transformer is connected to the chopper transistor. Was first used in Japanese TV chassis.

**chroma** 1. Indication of degree of color saturation. Two parameters together define any color in the visible spectrum. One of these describes the dominant hue. This is the pure spectral color, or wavelength, which when mixed with white light produces a color equivalent to the sample color. The second parameter indicates the amount of white light that has to be added to obtain this color match. A color that requires no white to be added is a pure spectral color and is said to be saturated. As white light is added to a spectral color, it becomes paler and desaturated. 2. The dimension of the Munsell system of color that corresponds most closely to saturation, which is the degree of vividness of a hue. Chroma is frequently used, particularly in English works, as the equivalent of saturation. Also called Munsell chroma. See also *Variables of perceived colors*. 3. A boxed photo, art, or graphics, relevant to a news item, that appears on a TV screen next to the newscaster. Sometimes the photo or art is shown behind the newscaster, projected by means of a rear projection or chromakey system.

**chroma amplitude modulation** See *Chroma signal-to-noise*.

**chroma bandpass filter** In a NTSC or PAL video signal, the luma (black and white) and the chroma (color) information are combined together. If you want to decode an NTSC or PAL video signal, the luma and chroma must be separated. The chroma bandpass filter removes the luma from the video signal, leaving the chroma relatively intact. This works reasonably well except in images where the luma information and chroma information overlap, meaning that we have luma and chroma information at the same frequency. The filter can't tell the difference between the two and passes everything within a certain area. If there is luma in that area, it is passed through too, which can make for a funny-looking picture. Next time you're watching TV and someone is wearing a herringbone jacket or a shirt with thin, closely spaced stripes, take a good look. You may see a rainbow color effect moving through that area. What's happening is that the chroma demodulator thinks the luma is chroma. Since the luma isn't chroma, the video decoder can't figure out what color it is and it shows up as a rainbow pattern. This problem can be overcome by using a comb filter.

**chroma bar** Test signal in a form of color subcarrier modulated by a bar signal, usually on gray level pedestal.

**chroma blanking** See *Chrominance blanking*.

**chroma burst** Color burst.

**chroma control** 1. The control that adjusts the amplitude of the carrier chrominance signal fed to the chrominance demodulators in a color TV set, to change the saturation or vividness of the hues in the color picture. When in its zero position, the received picture becomes black and white. Also called color control and color-saturation control. 2. On color processors, process amplifiers, etc., a feature designed to modulate the color intensity of the video signal. When the chroma control is tuned up, the intensity of the colors is increased and they become more vivid; when the knob is turned down, the intensity is decreased and the colors develop a pastel-like quality. The chroma control, which is similar to the chroma control of a TV set, differs from the burst phase control (also located on these signal processors) that adjusts color tint rather than intensity.

**chroma crawl** See *Cross-luminance*.

**chroma crawl free system** See *CCF system*.

**chroma decoder** A video processor designed to decode a composite video signal into its red, green and blue components. Used chiefly by professionals, the decoder is a chroma demodulator compatible with RGB monitors, video projectors, chroma keyers, etc.

**chroma demodulator** After the NTSC or PAL video signal makes its way through the Y/C separator, the colors must be decoded, which is what a chroma demodulator does. It takes the chroma output of the Y/C separator and recovers two color difference signals (typically I and Q or U and V). With the luma information and color difference signals, the video system can figure out what colors to put on the display.

**chroma key tracking** A digital effect that compresses the signal from a video source into the available chroma key window.

**chroma keying** Also chromakeying. 1. The electronic introduction of a color background into a scene; process differs from black and white keying because the presence of color makes it possible for the operator of the keying unit to introduce the background by adjusting the color values. See also *Genlock*. 2. The keying in of an object against an established background—two images fused together electronically. A blue-green background against an object placed for keying against another scene is called chroma key blue. To produce this effect, the subject is placed in front of a blue background. The cameras are then connected to a SEG with a chromakeyer that automatically switches the subject/key camera to the background camera each time the camera beam "sees" blue. There are different types of chroma keying, such as upstream and downstream chroma keying, each using various combinations of cameras and backgrounds.

## chroma matte

**chroma matte** See *Linear chroma-key*.

**chroma noise** See *Chrominance noise*.

**chroma oscillator** A crystal oscillator used in color TV sets to generate a 3.579545- or 4.433619-MHz (NTSC, PAL) signal for comparison with the incoming 3.579545- or 4.433619-MHz chrominance-subcarrier signal being transmitted. Also called chrominance-subcarrier oscillator, color oscillator, and color-subcarrier oscillator.

**chroma phase modulation noise** See *Chroma signal-to-noise*.

**chroma ramp** Test signal in a form of color subcarrier modulated by a ramp signal; i.e., the chroma amplitude rises linearly along the TV line. This signal is usually on a gray level pedestal. Syn.: chroma sawtooth.

**chroma sawtooth** See *Chroma ramp*.

**chroma signal-to-noise** The amount of interference influencing either the color saturation or the hue within the picture. There are two types of chroma noise. Chroma amplitude modulation applies to color saturation and appears as minor changes in color strength, especially in large blocks of a particular color. The effect within the color takes on a mottled pattern. The second type, chroma phase modulation noise, is manifested by traces of different colors from that of the original. Both types of chroma noise subtract from the fine detail and purity within the color signal that is reproduced on the TV screen. Chroma signal-to-noise is measured in dB; the higher the number, the sharper and more detailed the color picture. See also *Color response*.

**chroma trap** In a NTSC or PAL video signal, the luma (black and white) and the chroma (color) information are combined together. If you want to decode the video signal, the luma and chroma must be separated. The chroma trap is a method for separating the chroma from the luma, leaving the luma relatively intact. How does this work? The NTSC or PAL signal is fed to a trap filter. For all practical purposes, a trap filter allows some types of information (actually certain frequencies) to pass through but not others. The trap filter is designed with a response to remove the chroma so that the output of the filter only contains the luma. Since this trap stops chroma, it's called a chroma trap. The sad part about all of this is that not only does the filter remove chroma, it removes luma as well if it exists within the region where the trap exists. The filter only knows ranges and, depending on the image, the luma information may overlap the chroma information. The filter can't tell the difference between the luma and chroma, so it traps both when they are in the same range. This means that the picture is degraded somewhat. Using a comb filter for a Y/C separator is better than a chroma trap or chroma bandpass.

**chroma-key** A device that permits one video image to replace another video image of a particular color,

usually a solid blue or green drape or screen. Broadcast TV studios use chroma-keys to create the illusion of a weather forecaster standing in front of a wall-sized satellite photo. The forecaster is actually standing in front of a colored screen, while a video engineer, working in a booth out of the camera's view, uses a chroma-key and switcher to replace the video image of the colored screen with the image of a satellite photo.

**chroma-key blue** See *Chroma keying*.

**chromatic** Relating to color.

**chromatic aberration** 1. Defect of a lens appearing as colored fringes around the image, resulting from the material of the lens having different refractive indices for different colors of light, so that the blue rays come to a focus at a different point from the red rays. This defect is reduced in achromatic lenses. 2. An electron-gun defect that causes enlargement and blurring of the spot on the screen of a CRT because electrons leave the cathode with different initial velocities and are hence deflected differently by the electron lenses and deflection coils.

**chromatic color** See *Variables of perceived colors*.

**chromatic dispersion** One of the mechanisms that limits the bandwidth of optical fibers by producing pulse spreading because of the various colors of light traveling in the fiber. Different wavelengths of light travel at different speeds. Since most optical sources emit light containing a range of wavelengths, each of these wavelengths arrive at different times and thereby cause the transmitted pulse to spread as it travels down the fiber. Chromatic dispersion affects both single-mode and multimode fibers, and it is the principal bandwidth limitation for single-mode fibers.

**chromaticity** The color quality of light that can be defined by its chromaticity coordinates. It is an objective term for the definition of the characteristic of a color in colorimetry, corresponding to the subjective qualities of hue and saturation. Chromaticity depends only on hue and saturation of a color, not on its luminance (brightness). Chromaticity applies to all colors, including shades of gray, whereas chrominance applies only to colors other than grays.

**chromaticity coefficient** Measure of the purity of a color. Often arbitrary scales are quoted for practical work.

**chromaticity coordinate** One of the two coordinates (x or y) that precisely specify the exact identity or chromaticity of a color on the CIE chromaticity diagram. Also called color coordinate and trichromatic coefficient.

**chromaticity diagram** System of representing colors in problems of colorimetry as points on a two-dimensional diagram whose coordinates may be employed in calculation, generally in the form known as the color triangle. The most common version is the CIE chromaticity diagram used in color TV.



**chromaticity flicker** Flicker in a color TV set caused by fluctuation of chromaticity only.

**chromatron** A single-gun color picture tube that has color phosphors deposited on the screen in strips instead of dots. The R,G, and B color signals are applied in sequence to the single grid of the tube as the beam is deflected to the correct color strip by horizontal grid wires adjacent to the screen. Also called Lawrence tube.

**chrominance** (In video, the terms chrominance and chroma are commonly (and incorrectly) interchanged.) 1. The color portion of the video signal. Chrominance includes hue and saturation information but not brightness. Low chroma means the color picture looks pale or washed out; high chroma means the color is too intense, with a tendency to bleed into surrounding areas. Black, gray and white have a chrominance value of 0. Brightness is referred to as luminance. The chrominance signal is modulated onto a 4.43-MHz carrier in the PAL TV system and a 3.58-MHz carrier in the NTSC TV system. 2. The difference between any color and a specified reference color of equal brightness. In color NSTC TV, this reference color is white, having coordinates  $x=0.310$  and  $y=0.316$  on the chromaticity diagram.

**chrominance bandwidth** Chrominance-channel bandwidth.

**chrominance blanking** Blanking of chrominance signal. Syn.: chroma blanking.

**chrominance carrier** Chrominance subcarrier.

**chrominance channel** 1. That part of the frequency spectrum of a color transmission containing chrominance information. 2. Any path that is intended to carry the chrominance signal in a color TV system.

**chrominance demodulator** A demodulator in a color TV receiver for deriving the I and Q components of the chrominance signal and the chrominance-subcarrier frequency. Also called chrominance-subcarrier demodulator.

**chrominance modulator** A modulator used in a color TV transmitter to generate the I and Q components of the chrominance signal from the video-frequency chrominance components and the chrominance subcarrier. Also called chrominance-subcarrier modulator.

**chrominance noise** Refers to a particular kind of video interference that affects color signals in the form of temporary traces of color aberrations. Visible as randomly colored spots on TV picture. Chrominance noise differs from luminance noise that affects both black and white and color signals. Also called chroma noise; color noise.

**chrominance phase switching** See *SECAM chrominance phase switching*.

**chrominance primary** The nonphysical color represented by either the I and Q chrominance signal component in a color TV system. These chrominance signals are chosen to be electrically convenient com-

ponents remaining after the luminance signal is removed, from a full-color signal at the transmitter.

**chrominance reversal** See *Image reversal*.

**chrominance signal** The color component of the composite baseband video signal assembled from the I and Q portions (NTSC) or U and V (PAL). Phase angle of the signal represents hue and amplitude color saturation.

**chrominance staircase** Test signal in a form of color subcarrier modulated by staircase signal; i.e., the chroma amplitude rises in discrete steps along the TV line. This signal is usually on a gray level pedestal. Syn.: multi-level chroma bar.

**chrominance subcarrier** The 3.579545- (NTSC), 4.433618- (PAL), or 4.406-/4.250-MHz (SECAM, R-Y/B-Y) carrier (SECAM — two carriers) whose modulation sidebands are added to the black and white signal to convey color information in a color TV set. The chrominance subcarrier is transmitted unmodulated in the form of color bursts that are used for synchronizing purposes in the receiver. Also called chrominance carrier, color carrier (deprecated), color subcarrier (deprecated), and subcarrier.

**chrominance tube** See *Color dissector tube*.

**chrominance vector** In a color TV signal, the finite mathematical vector whose angle represents the hue and whose length represents saturation. The reference frequency burst gives the necessary phase information.

**chrominance/luminance delay inequality** In video, an effect caused by the color and black and white signals being recorded separately on the tape or differing luminance and chrominance filtering characteristics in the system, resulting in colored edging or fringing around objects.

**chrominance-carrier reference** A continuous signal that has the same frequency as the chrominance subcarrier in a color TV system and fixed phase with respect to the color burst. This signal is the reference to which the phase of a chrominance signal is compared for modulation or demodulation. In a color receiver it is generated by a crystal-controlled oscillator. Also called chrominance-subcarrier reference, color-carrier reference, and color-subcarrier reference.

**chrominance-channel bandwidth** The bandwidth of the path intended to carry the chrominance signal in a color TV system. Also called chrominance bandwidth.

**chrominance-subcarrier demodulator** Chrominance demodulator.

**chrominance-subcarrier modulator** Chrominance modulator.

**chrominance-subcarrier oscillator** Chroma oscillator.

**chrominance-subcarrier reference** Chrominance-carrier reference.

**chroming** A method of producing a special effect on



## chromium dioxide

a videotape recording. A videotape is recorded normally and then rerecorded onto another tape. The recorded signals from the original tape have neighboring pixels electronically aggregated to artificially reduce the resolution of the picture. Chosen sections of the picture may also have the color electronically altered to give the desired effect.

**chromium dioxide** One of the coatings available in the composition of videotape. It is magnetically sensitive and used mostly on Beta tapes. The VHS format generally utilizes ferric oxide.

**chromostereoscopy** Part of a three-dimensional TV system employed in Japan but developed in California. Chromostereoscopy uses a technique in which red-colored objects appear closer than blue-colored ones, thereby giving the impression of depth. The process is compatible with 2-D or conventional TV broadcasting. But for a full, 3-D effect, the viewer needs special glasses.

**CID** Charge-injection device.

**CIE** Commission Internationale de l'Eclairage. French acronym for the International Illumination Commission, an international standardization organization that issues documents defining the colorimetry of all TV systems.

**CIE chromaticity diagram** A chromaticity diagram established as an international standard by the CIE. In this diagram, used in color TV, the color wavelengths are plotted as coordinates of x and y.

**CIF** Common Interface Format. A videophone ISDN standard that is part of the CCITT's H.261/Px64 standard. This video format was developed to easily allow video phone calls between countries. The CIF format has a resolution of 352 x 288 active pixels and a refresh rate of 29.97 frames per second. It produces a color image of 288 noninterlaced luminance lines, each containing 352 pixels to be sent at a rate of 30 fr/s. The format uses two B channels, with voice taking 32 Kbps and the rest for video. Note: CIF now commonly means any 352 x 288 image, regardless of refresh rate.

**Cinemax**, Owned by Time Warner. A pay-TV service offered to subscribers for a monthly fee. Cinemax, similar to Home Box Office, offers current Hollywood films, classics and foreign features 24 hours per day. Owned by Time, Inc.; began operation in 1980.

**Cinepak** A high-quality medium bandwidth compression that is not real-time but can play back in software. Its 24-bit format produces high-quality video at 320 x 240 resolution and 15 frames per second at a 150 Kbps data rate. A CD-ROM solution developed a number of years ago and not a competitor to more current techniques.

**circle-in** An optical effect in which a picture diminishes and disappears as it is replaced by a second picture that grows in a circle from the center; the opposite of a circle-out. See also *Iris in*, *Iris out*.

**circle-out** See *Circle-in*.

**circuit** The combination of a number of electrical devices and conductors, when connected together to form a conducting path, fulfil a desired function such as amplification, filtering, or oscillation. A circuit may consist of discrete components or may be an integrated circuit (IC). Some circuits, such as CCDs, can only be produced in integrated form.

**circuit breaker** The breaker that may work in place of the line fuse to open when an overload is found in the TV circuits. Some horizontal output stages have a separate circuit breaker.

**circular polarization** Electromagnetic waves whose electric field uniformly rotates along the signal path. Broadcasts used by INTELSAT and other international satellites use circular, not horizontally or vertically polarized, waves as are common in North American and European transmission.

**circular zone plate** A zone plate pattern (circular or elliptic) with lowest spatial frequency in the center and uniform rise of spatial frequency along any radius, so that the spatial frequency is directly proportional to the distance from the center. Syn.: bull's eye pattern; Fresnel zone plate.

**circularly polarized antenna** Antenna producing a circularly polarized wave. In one form of circularly polarized antenna, used for TV stations, the single horizontally polarized dipole in the panel antenna is replaced by crossed dipoles that are fed in quadrature, producing a circularly polarized wave.

**circularly polarized wave** An electromagnetic wave for which the electric and/or magnetic field vectors at a point describe a circle.

**city grade service** The area closest to a TV transmitter, one of three areas of a TV station's coverage. Further away from the transmitter is called A contour, and the peripheral area is called B contour.

**CIVDL** Collaboration for Interactive Visual Distance Learning, a collaborative effort by ten U.S. universities that uses dial-up videoconferencing technology for the delivery of engineering programs.

**cladding** 1. When referring to an optical fiber, a layer of material of lower refractive index, in intimate contact with a core material of higher refractive index.  
2. When referring to a metallic cable, a process of covering with a metal (usually achieved by pressure rolling, extruding, drawing, or swaging) until a bond is achieved.

**cladding diameter** The diameter of the circle that includes the cladding layer in an optical fiber.

**cladding mode** In an optical fiber, a transmission mode supported by the cladding; i.e., a mode in addition to the modes supported by the core material.

**cladding mode stripping** A device for converting optical fiber cladding modes to radiation modes; as a result, the cladding modes are removed from the fiber. Often a material such as the fiber coating or jacket having a refractive index equal to or greater than that of the fiber cladding will perform this function.

**cladding ray** In an optical fiber, a ray that is confined to the core and cladding by virtue of reflection from the outer surface of the cladding. Cladding rays correspond to cladding modes in the terminology of mode descriptors.

**clamp** A circuit for ensuring constancy of the potential of a particular section of a recurrent waveform. This is basically another name for the DC-restoration circuit. It can also refer to a switch used within the DC-restoration circuit. When it means DC restoration, then it's usually called "clamping." When it's the switch, then it's just "clamp." Clamps are used to ensure that the parts of the waveform that represent black in displayed pictures are maintained at a constant potential. To enable a clamp to operate at the desired instants it is driven by clamping pulses synchronized with the waveform to be clamped.

**clamper** An electronic circuit that sets the video level of a picture signal before the scanning of each line begins to ensure that no spurious electronic noise is introduced into the picture signal from the electronics of the video equipment. Also called DC restorer.

**clamping** The action of the electronic clamper circuit; the process of resetting video signal level offset to zero, e.g., by using the black level at the composite video back porch as a reference. Syn.: back porch clamping; black level clamping.

**Clarke belt** The circular orbital belt at 22,247 miles above the equator, named after the writer Arthur C. Clarke, in which satellites travel at the same speed as the earth's rotation. Also called the geostationary orbit.

**Class I time** In TV, preemptible time, as opposed to Class II.

**clean editing** An electronic edit of a video picture free of noise, distortion, or other disruption in the signal when it changes from picture 1 to picture 2. In a clean edit, the picture is instantly replaced by a subsequent picture. Most camcorders provide clean edits.

**cleaner** See *Video head cleaner*.

**cleaning solvent** The special cleaning fluid used on video and audio heads and other elements along the tape path of a VCR. The most popular and recommended liquid solvent is trichlorotrifluoroethane or Freon. This solvent is more effective than alcohol, which evaporates more slowly and may leave a residue.

**clearline 45** A Sprint name for DS-3 service. This high-capacity point-to-point private line service transmits voice, data, and video at 44.736 Mbps.

**clearline fractional 1.5** A Sprint name for all-digital private line service that transmits voice, data, and video at speeds from 112/123 Kbps up to 672/768 Kbps—a fraction of a T-1, also called a DS-1. The service may be ordered in 56/64 Kbps increments from two channels (112/128 Kbps) to 12 channels

(672/768 Kbps). Point-to-point service connects customer sites via dedicated T-1 access lines.

**Clearvision system** (also BTA Clearvision system, BTA system), Broadcast Technology Association, Japan, 1988. It was a single-channel NTSC-compatible EDTV system: 6-MHz channel, 525-line scanning, 59.94 fields per second, interlace 2:1. Five changes from conventional NTSC practice were proposed: progressive scan in the receiver display, separate luminance-chrominance processing in the receiver, compensation of detail rendition in highly saturated color images, adaptive emphasis of the high-frequency components at low levels of the luminance signal, and higher-resolution signal sources. Aspect ratio: NTSC — 4:3, EDTV — 16:9.

**CLI** Compression Labs, Inc. One of the foremost codec (compression/decompression) makers and developer of some of the first "low-bandwidth" codecs in the US. Their VTS 1.5 codec was one of the first two codes (the other was from NEC) to compress full-motion video to 1.5 Mbps (T-1 speed).

**Click and drag** A computer term for the user operation of clicking on an item on-screen, using a mouse, and dragging it to a new location.

**click tuner** A mechanical TV tuner that clicks into position for each of the 70 available UHF channels and the 12 VHF channels.

**cliff effect** In digital television, when a receiver can no longer receive a viable signal.

**clinching** See *Windowing*.

**clip** To cut off sharply. See also *Film clip*.

**clipper** Limiter. Both black and white clippers are normally used in video processing to prevent unwanted signal excursions above nominal peak-white or below black.

**clipping** 1. An effect of distortion where the peaks of driven signals are chopped off. Clipping usually occurs in the amp when it is turned up too high, but it can also occur in maladjusted circuits in a VCR or TV set. 2. Any action that cuts off the peaks of a TV signal. This may affect either the positive (white) or negative (black) picture-signal peaks or the synchronizing signal peaks.

**clipping logic** A circuit used to prevent illegal conversion. Some colors can exist in one color space but not in another. Right after the conversion from one color space to another, a color space converter might check for illegal colors. If any appear, the clipping logic is used to chop off, or clip, part of the information until a legal color can be represented.

**clip sheet** A nonlinear editing term referring to the location of individual audio/video clips (or scenes). Also called a clip bin.

**clock/calendar** A video camera feature that permits the user to stamp the time or date, or both, over a video image being shot. The information is superimposed over the recorded image for further reference.

## clock jitter

**clock jitter** Undesirable random changes in clock phase.

**clock phase deviation** See *Clock skew*.

**clock recovery** The reconstruction of timing information from digital data.

**clock-setting by TV** (VCR, Sony) Sony has introduced VCRs whose clocks are set automatically by TV. The recorders use the TV signal's vertical blanking interval (VBI), especially field 2 of line 21, which is the closed-caption line. PBS stations are transmitting the clock-setting signal. When the VCR is turned off, it automatically searches through the channels until it finds one that is transmitting the clock signal.

**clock skew** A fixed deviation from proper clock phase that commonly appears in D1 digital video equipment. Some digital distribution amplifiers handle improperly phased clocks by relocking the output to fall within D1 specifications.

**close shot** Closed loop drive system.

**closed caption decoder** A device that allows the user to view conversations, narration and other sounds from TV programs or prerecorded videotape as subscript on TV screens. Primarily intended for the hard-of-hearing. It decodes an otherwise invisible signal and presents captions at the bottom portion of the screen, revealing what the performers are saying. Captioned subtitles are inserted on one of the lines within the vertical blanking interval.

**closed captioning** A service which decodes text information transmitted with the audio and video signal and displays it at the bottom of the display. See the EIA-608 specification for (M) NTSC usage of closed captioning. For digital transmissions such as HDTV and SDTV, the closed caption (CC) characters are multiplexed as a separate stream along with the video and audio data. It is common practice to actually embed this stream in the MPEG video bitstream itself, rather than at the transport layer. Unfortunately there is no wide-spread standard for this closed captioning stream—each system (DSS, DVB, ATSC, DVD) has its own solution. The practical place in MPEG to put closed captioning data is in the `user_data` field, which can be placed at various frequencies within the video stream. For DVD, it is the `group_of_pictures` header, which usually proceed intra pictures (this happens about two times a second). ATSC broadcasts, the EIA-708 data is inserted in the `user_data` field of individual picture headers (up to 60 times/sec).

**closed information** Videotex information that is intended for only a restricted user audience and which can be accessed only by the use of a key (code) number. It may consist of company confidential information or text, data, and images sold to subscribers. The concept makes a closed user group possible.

**closed loop drive system** Tape drive system that includes a feedback in the loop. Used for accurate

positional control of quadruplex heads in transverse-scan VTRs. Also called a close shot.

**closed user group** (CUG) A service on a database, videotex, or other electronic information system available only to preassigned users, such as lawyers, physicians, or other professional or affinity groups.

**closed-captioned TV** A broadcast with captions on line 21 of the VBI.

**closed-circuit** Distribution system using wires or microwaves to connect receiving sets to transmission equipment (e.g., CCTV).

**closed-circuit television** (CCTV) A TV system, other than broadcast TV, that forms a closed circuit between TV camera and receiver. CCTV has many industrial and educational applications—for example, in security systems. See *X-ray television*.

**Closed Subtitles** See *subtitles*.

**close-up** A relative determination of a camera angle of view; usually, a shot that shows the subject of a picture in great detail.

**close-up lens** A special video camera adapter lens designed for extremely close work, such as recording coins, stamps, insects, etc. Many recent camcorders provide macro settings to accomplish this function. When using either a supplementary lens or the macro feature built into the camera, the operator will notice that the depth of field is severely restricted.

**CLUT** Color look-up table.

**CLV** Constant Linear Velocity. One of the two formats of the LaserVision (LV) videodisc system. CLV discs can play for up to 1 h per side but lack the many special effects features offered by the CAV format of 30 minutes per side. Since the larger outer tracks of the disc hold more information than the smaller diameter inner tracks, the playing time is extended. However, the 30 revolutions per second of the CAV speed, that matches TV's 30 frames per second, is altered, thereby eliminating such features as freeze frame, single frame advance and slow motion. However, some advanced models of laserdisc players incorporate digital memory to handle smooth freeze frames, slow motion and other special effects.

**c-mount** A standard lens mount used on many video cameras and camcorders to permit compatibility and interchangeability with other lenses by diverse manufacturers. A typical use would be temporarily fitting a wide angle or telephoto lens to the camera in place of the normal one. Since almost all camcorders come equipped with a zoom lens, which offers a wide range of focal lengths, the average home videographer has little need to change lenses.

**CMX** A trademarked, computer-interfaced video editing system, made by Chyron Corporation, of Melville, NY, developed by a joint venture of CBS and Memorex.

**CMYK** This is a color space primarily used in color printing. CMYK is an acronym for Cyan, Magenta, Yellow, and black. The CMYK color space is subtractive,

meaning that cyan, magenta, yellow and black pigments or inks are applied to a white surface to remove color information from the white surface to create the final color. The reason black is used is because even if a printer could put down hues of cyan, magenta, and yellow inks perfectly enough to make black (which it can't for large areas), it would be too expensive since colored inks cost more than black inks. So, when black has to be made, instead of putting down a lot of CMY, they just use black.

**C/N** (also CNR) Carrier-to-noise ratio.

**C/N threshold** The C/N at threshold of visibility (TOV) for random noise.

**coarse chrominance primary** The least important of the two chrominance primaries in a color TV signal, called the Q signal. Because its bandwidth is typically limited to 0.5 MHz, this signal affects only the larger, coarser variations in the color picture. The other primary is the fine chrominance primary or I signal, going up to 1.5 MHz.

**coating** The magnetic oxide particles on videotape, which are formed into diagonal fields of information by video heads. Beta tapes are generally coated with chromium dioxide (original Sonys were designed for optimum efficiency with chrome tapes) while VHS tapes generally are composed of ferric oxide. Beta tapes, when combined with cobalt, provide better resistance to dropout or flaking of particles but are weaker in the area of high frequencies. VHS tapes offer better frequency response, but the oxide composition may present a problem with the excessive snow or distortion, especially with low-grade tapes.

**coaxial** A special cable designed to carry one or more TV channel signals with minimum power loss and high video frequency transmission. Rated at 75 ohms, this cable offers a thicker surrounding of the center conductor and rejects undesirable interference. In video, a few types of coaxial cable are available, but the RG-59 is the most popular. It has a thick coating around the center conductor for strength and protection from interference. It is designed for cameras, monitors, VCRs, etc. RG-6 is heavier and uses a larger center conductor than RG-59 and is considered the all-around better cable when using long cable lengths. The reason is that there is less signal loss per 100 feet of RG-6 than with RG-59. However, RG-6 has a higher capacitance per foot than RG-59, so when using short lengths of cable—less than 4 or 5 feet—the better choice is really RG-59. Most F connectors are made for RG-59. If using RG-6, the F connectors with the larger crimp barrel should be used. Cable loss is expressed in dB at different TV broadcasting frequencies. Every 3-dB drop doubles the signal loss. Signal loss increases at higher frequencies. Capacitance is expressed in pF and is cumulative for the length of the cable. That is, if cable capacitance is 15.5 pF per

foot, a 3-foot length has a total capacitance of 46.5 pF. The higher the capacitance, the more the signal is degraded.

**coaxial CATV** A multichannel video transmission system. In coaxial CATV systems, video signals amplitude-modulate carriers with frequencies of 70 MHz or higher and are multiplexed on a frequency-division basis.

**coaxial connector** See *F connector*.

**cochannel** A channel in which the TV set receives two TV stations on the same channel. In the US, the FCC has meticulously placed TV stations on the same channel far apart. Also, the frequency of the TV stations is displaced  $\pm 10$  kHz. Therefore, the separation in frequency may be as much as 20 kHz (one +10 kHz, the other -10 kHz). This allows the primary TV station to be received by the TV set even though there is some picture impairment caused by the other station.

**cochannel interference** Interference between two signals of the same type in the same channel. Cochannel interference occurs when two TV stations operating on the same frequency are received at the same location. The most common effect is "venetian blinds," alternate black and white horizontal bars across the picture that results from the "beat" between the two carriers.

**codec** Coder-decoder. A device to convert analog video and audio signals into a digital format for transmission, and also to convert received digital signals back into analog. Also compression/decompression.

**codec conversion** The back-to-back transfer of an analog signal from one codec into another codec in order to convert from one proprietary coding scheme to one used by another codec manufacturer. The analog signal, instead of being displayed to a monitor, is delivered to the dissimilar codec where it is redigitized, compressed and passed to the receiving end. This is obviously a bi-directional process. Conversion service is offered by carriers such as AT&T, MCI and Sprint.

**coded image** A representation of an image in a form suitable for storage and processing.

**coded orthogonal frequency division multiplexing** Coded orthogonal frequency division multiplexing, or COFDM, transmits digital data differently than 8-VSB or other single-carrier approaches. Frequency division multiplexing means that the data to be transmitted is distributed over many carriers. Thus, the data rate on each COFDM carrier is much lower than that required of a single carrier. The COFDM carriers are orthogonal, or mutually perpendicular, and forward error correction ("coded") is used. COFDM is a multiplexing technique rather than a modulation technique. One of any of the common modulation methods, such as QPSK, 16-QAM or 64-QAM, is used to modulate the COFDM carriers.

## coder

**coder** 1. In general: Device performing an "encoding" function, e.g., an analog-to-digital converter.  
2. Specifically: Composite color video coder, e.g., "NTSC coder," "SECAM coder," for producing composite signals from component video sources.

**coding** Representing each video signal level as a number, usually in binary form.

**coercivity** Also called magnetic coercivity. In videotape, the ability of the particles that compose the magnetic medium to be magnetized. Therefore, the higher the coercivity, the better the quality of the tape.

**COFDM** See *Coded Orthogonal Frequency Division Multiplexing*.

**cogging** Break-up of vertical edges caused by a displacement of the raster from one field to the next. A TV receiver fault.

**coherent detection** Syn.: synchronous detection. See *Suppressed-carrier transmission*.

**cold color** Pale, often with a blue or green tint, as opposed to warm color.

**Colecovision** A revised video game system introduced in 1982 by Coleco. The system had realistic and above average color graphics, 8-direction control sticks, a pushbutton keyboard and a special controller for changing the speed as well as the action during the game. An optional adapter permitted playing the Atari VCS game cartridges.

**collaboration** A multimedia term. Collaboration involves two or more people working together in real-time, or in a "store-and-forward" mode. Applications enable a group of people to collaborate in real time over the network using shared screens, shared whiteboards, and video conferencing. Collaboration can range from two people reviewing a slide set on line to a conference of doctors at different locations sharing patient files and discussing treatment options.

**collector** Anode which collects the secondary electrons emitted from the mosaic of an iconoscope or similar device.

**collimation** Process of setting up a lens system to produce a parallel beam from a source emitting rays which diverge or converge. Collimators, which produce these parallel beams, play a part in many pieces of optical equipment such as relay systems in TV color cameras. Collimators are also used for checking the calibration and performance of lenses.

**collision** The result of two devices trying to use a shared transmission medium simultaneously. The signal interference requires both devices to retransmit the data lost due to the collision.

**color** A characteristic of light that can be specified in terms of luminance, dominant wavelength, and purity. Luminance is the magnitude of brilliance. Wavelength determines hue and ranges from about 400 nm for violet to 700 nm for red. Purity corresponds to chroma or saturation and specifies vividness of a hue. In video, color is formed by the three primary

colors (red, green and blue) and their composites.

**color adjustment circuitry** An advanced TV feature that allows the user to modify the color temperature of white while retaining natural skin tones of the subject. The special circuits adjust for cooler or warmer white color temperature.

**coloration** See *Microphone*.

**color background generator** An electronic circuit used in chroma keying to produce a solid color background of any desired hue and saturation.

**color balance** Adjustment of the circuits that feed the three electron guns of a color picture tube to compensate for differences in light-emitting efficiencies of the three color phosphors on the screen of the tube.

**color bar chart** See *Video test chart*.

**color bar generating signal** In video cameras, a signal produced as a set of vertical color bars. This can be used as a test pattern when compared to a color bar chart such as the Munsel color chip chart. By using this chart in conjunction with a color vectorscope, it is simple to determine whether the video camera components are in good working order.

**color-bar generator** A signal generator that delivers to the input of a color TV receiver the signal needed to produce a color-bar test pattern on one or more channels.

**color bars** A test pattern of specially colored vertical bars used as a reference to test the performance of a color TV and transmission path. Peak white and black level bars are also provided. The R,G and B bars correspond to the system primary colors. The other three are yellow (R+G), magenta (R+B) and cyan (G+B). Colors that are 100% saturated as well as having 100% luminance are very abnormal. To avoid overload conditions at the transmitter, therefore, it is normal to transmit the color bars with reduced luminance. The test pattern is used to check whether a video system is calibrated correctly. A video system is calibrated correctly if the colors are the correct brightness, hue, and saturation. This can be checked with a vectorscope.

**color-bar test pattern** A test pattern of different colors of vertical bars, used to check the performance of a color TV set.

**color breakup** Momentary separation of a color picture into its primary components as a result of a sudden change in the condition of viewing, such as fast movement of the head or blinking of the eyes.

**color burst** In a color TV system, that portion of the video waveform that sits between the breezeaway and the start of active video. The color burst tells the color decoder how to decode the color information contained in that line of active video. By looking at the color burst, the decoder can determine what's blue, orange, or magenta. Essentially, the

decoder figures out what the correct color is. In NTSC, the color burst is a short series of oscillations at the chrominance subcarrier frequency of 3.579545 MHz, following most transmitted horizontal sync pulses. Also called burst; burst signal.

**color-burst pedestal** The rectangular pulse-like component that is part of the color burst when the axis of the color-burst oscillations does not coincide with the back porch. Also called burst pedestal.

**color carrier** Alternate term for chrominance subcarrier.

**color-carrier reference** Chrominance-carrier reference.

**colorcast** A TV program broadcast in color.

**color cell** See *Color picture tube*.

**color constancy** In video, the continuity of color intensity either in a single frame or over a short range of time.

**color contamination** 1. Refers to the appearance of small traces of color that spill over to black and white portions of a video image and detected (as unwanted color) between closely set lines in a video picture; color contamination can distort the image. The amount of color contamination that a video camera produces can be determined by the use of a black and white pattern and is measured in IREs. A smaller numerical reading represents a purer or better picture. An average rating is 7 IRE. 2. Poor rendition of color in a color TV set, caused by incomplete separation of color component paths.

**color control** Chroma control.

**color control unit** An accessory connected between a video camera and recorder which adjusts or corrects color temperature for both indoors and outdoors. The color control unit, used if no filter or electronic system of correction comes with the camera, offers two advantages. It is a more flexible method of adjusting color temperature and, because it is a separate unit, the camera remains lighter in weight. However, there are also a few inconveniences. The color control unit is another piece of equipment that has to be made off camera.

**color conversion filter** A colored glass disc fitted over the front of a lens of a video camera to change the color temperature. Since the camera tube is normally balanced for proper exposure with tungsten (indoor) light, some type of conversion is required when the camera is used outdoors. One method is using a special orange-colored filter. However, manufacturers have devised more sophisticated ways of correcting color temperature: built-in, behind-the-lens optical filters, electronic switching, etc. Also known as color correction filter, conversion filter.

**color coordinate** Chromaticity coordinate.

**color correction filter** Color conversion filter.

**color corrector** Equipment for adjustment of the color values of a color video signal. Color corrector is usually required for proper reproduction of images from motion picture film. In VCRs, a feature that helps

correct any defects in videotape. The special circuitry, along with dropout compensators, noise reduction and picture enhancement circuits, helps to compensate for any imperfections in tape manufacture and design. In camcorder, an optional accessory designed to allow the user to adjust white balance, correct for color and add color wipe transitions between scenes. The unit may have additional features, such as the capability for audio mixing and the transfer of film negative to positive video pictures.

**color-crawl** See *Moire*.

**color cycling** A special process that permits dramatic color changes of screen images ranging from diagrams to music-video effects. Color cycling is often performed by professional videographers using such highly technical equipment as computers with special computer-generated animation programs that allow for color ranges and user-definable timing.

**color decoder** The circuit in the video decoder that uses the chroma portion of a video signal to derive the two color difference signals. The color decoder sits right after the Y/C separator. In NTSC, the color decoder needs a reference signal that is accurately phase-locked to the color burst. If it isn't locked well enough, then the color decoder can't figure out the right colors. Also called a chroma demodulator.

**color decoding** In broadcast TV, the transformation of composite video into primary color signals (or luminance and color difference signals).

**color demodulator** See *chroma demodulator*.

**color depth** The number of bits per pixel. One bit per pixel allows two colors (often black and white) to be displayed, two bits per pixel allow four colors, three bits allow eight colors, etc.

**color difference signals** The video signals (R-Y) and (B-Y) obtained by subtraction of the luminance value Y from each of the primary color signals. There are many scaled, matrixed and therefore different versions of color difference signals such as: I, Q; U, V; Pr, Pb; Cr, Cb; Dr, Db, which should not be confused with basic color difference signals.

**color difference set, HDTV** See *SMPTE 240M standard*.

**color dissector tube** Coloring tube; chrominance tube. A CRT designed to separate a scene's hue and saturation values into their R,G,B components for electronic encoding as part of the color video signal.

**color-dot-crawl** See *CCF system*.

**color edging** Spurious color at the boundaries of differently colored areas in a color TV picture; extraneous colors that appear along the edges of objects, but don't have a color relationship to those areas. Color edging includes color fringing and misregistration.

**color encoder** The color encoder does the exact opposite of the color decoder. It takes the two color difference signals, such as I and Q or U and V, and



## color encoding

combines them into the chroma signal. The color encoder, or what may be referred to as the color modulator, uses the color subcarrier to do the encoding.

**color encoding** The transformation of primary color signals (or luminance and color difference signals) into composite video.

**color enhancement light** A special light, found on some camcorders, designed to illuminate an area several yards in front of the camera. The small 10 W light, first introduced in 1989 by Panasonic on one of its camcorder models, usually provides enough light to capture the natural colors of a particular scene.

**color fidelity** The ability of a color TV system to reproduce faithfully the colors in an original scene.

**color field** TV field numbered with reference to the start of color frame. E.g., in NTSC the color frame starts with color field I and ends with the color field IV.

**color field corrector** A device positioned outside a color picture tube to produce an electric or magnetic field that acts on the electron beam after deflection to produce more uniform color fields.

**color filter** A sheet of material that absorbs certain wavelengths of light while transmitting others. Used in video cameras to compensate for wide variations in lighting conditions without excessive adjustment of operating controls. The spectral response of color filters is specified by their color temperature. The color temperatures of a typical complement of color filters are 3200 and 5600 K. These permit the camera to switch from daylight to artificial illumination without major readjustment of the electronic controls.

**color flash** A color dot rushing across a black and white telecast as seen on a color TV set. These red, green and blue dots—or color flashes—occur when random noise, after being picked up by the decoder and matrix, reaches the picture tube.

**color flicker** Flicker due to fluctuations of both chromaticity and luminance in a color TV receiver.

**color frame** Set of several frames that begins and ends with the same SCH value (NTSC and PAL) or same color difference signal type (SECAM). Depending on the color TV system it consists of: NTSC – 2 frames (4 fields); PAL – 4 frames (8 fields); SECAM – 2 frames (4 fields). If chrominance phase switching is taken into account then one SECAM color frame consists of six frames (12 fields).

**color frame code** A code to identify alternating video frames involved in an edit. Color video frames have an alternating nature, which can be indicated by designating them as either A or B. Each frame ending in an even number is defined as having the A characteristic, and each frame ending in an odd number is defined as having the B characteristic. The presence of a binary one in bit 11 of the time code word indicates the presence of this A-B color frame code.

**color framing** TV synchronization providing synchronization of color frames, usually for post-production purposes. Modern VTRs do color framing automatically as part of the run-in process. Lack of color framing will result in chroma flashes after insert or assemble edits on some VCRs. Syn.: color ID; color identification; color sync.

**color fringing** 1. Spurious chromaticity at boundaries of objects in a color TV picture. Small objects may appear separated into different colors. It can be caused by a change in position of the televised object from field to field or by misregistration. Fringing is particularly noticeable when a black and white signal is received. It is minimized using a color killer. 2. Artifact of chrominance coding-decoding process due to the limited bandwidth. It gives the appearance of the color not precisely fitting the object defined by the luminance signal.

**color graphics** The capability of a system to draw pictures, create graphs, highlight text, etc., using colors.

**Color Graphics Adapter (CGA)** A circuit board for the color monitors of PCs that supplies R,G,B, and intensified (RGBI) video and composite video signal. Up to 16 colors can be formed on an RGBI TTL-compatible monitor, and up to 16 shades of gray can be formed on a composite video monitor.

**color ID** See *Color framing*.

**color identification** See *Color framing*.

**colorimeter** An instrument that measures color by determining the intensities of the three primary colors that will give that color.

**colorimetry** The science of color measurement. In video, the procedure of measuring color and analyzing the results. Colorimetric characteristics include such elements as wavelength and primary-color content.

**coloring tube** See *Color dissector tube*.

**color intensity** In video, the saturation of a color. The original color signal and the concentration of the electron beam determine color intensity or saturation. If a certain color has high saturation, that color is usually considered bright; if the color consists of low saturation, it is said to be dull. More recent TV sets have introduced special circuitry to improve saturation. These models prevent the automatic color circuitry from oversaturating individual scenes so that the color of objects is not emphasized to the detriment of the entire picture. Saturation differs from hue, which refers to the shade of a color.

**color intensity control** A feature, found on some video processors, designed to adjust color level. This increase or decrease in color intensity helps to produce rich, natural color; boost weak, faded colors; and reduce overly bright colors. Especially useful in copying videotapes, color intensity control allows boosting color before the recording process to help prevent generation loss.



**colorization** A process that converts black and white movies to color. The technique involves the use of computers that assign pre-selected colors to individual areas or shapes of the original black and white film. These colors are then carried throughout the scene or sequence for the purpose of consistency. Those film makers connected with the original work and other critics of the process have voiced their protest against colorization on the grounds that it tampers with the original creative talents that went into the making of the film.

**colorizer** Electronic circuitry used to generate a chrominance signal in relation to the gray values of a black and white video signal. Each gradation of gray from black to white is assigned a color value. The result is an artificially, and often inaccurately, colored picture.

**color key** This is essentially the same thing as chroma key.

**color killer** 1. The circuit in a color TV set to cut off chrominance amplifier during reception of black and white programs. 2. An electronic circuit used in a VTR to suppress the 3.58-MHz color carrier frequency when a black and white tape is being shown; the same circuit in a black and white VTR used to suppress the color carrier frequency when a color tape is being played back in black and white. Without a color killer, the color signal would appear in the displayed black and white picture as random noise.

**color look-up table (CLUT)** In digital video, a table of color values with any bits per pixel (bpp) format, and indexed by a pixel value of smaller value. This allows display of a selected group of colors by a low bpp system, where the group of colors is chosen from a much larger range (the palette) of colors represented by the bpp value used in the CLUT.

**color mapping** The process of using a CLUT for a color display.

**color model** A technique for describing a color (e.g., RGB).

**color modulator** Color encoder.

**color noise** Random interference in the video. Because of reduced color bandwidth or color subsampling, color noise appears as relatively long streaks of incorrect color in the image.

**color oscillator** Chroma oscillator.

**color phase** The proper timing relationship within a color signal. Color is considered to be in phase when the hue is reproduced correctly on the screen. In the NTSC and PAL systems, color phase is the difference in phase between a chrominance signal (I or Q) and the chrominance-carrier reference in a color TV receiver. Also called tint. See *Hue*.

**color phase alternation (CPA)** The periodic changing of the color phase of one or more components of the chrominance subcarrier between two sets of assigned values after every field in a color TV system.

**color phase correction** That which produces the cor-

rect color hues. Color phase refers to the color signal in terms of its timing relationship.

**color phase detector** The color TV receiver circuit that compares the frequency and phase of the incoming burst signal with those of the locally generated 3.579545-MHz chroma oscillator.

**color picture signal** The electric signal that represents complete color picture information, excluding all synchronizing signals. In composite form it consists of a monochrome component plus a sub-carrier modulated with chrominance information.

**color picture tube** A type of CRT designed to produce colored images in color TV. The colored image is produced by varying the intensity of excitation of three primary colors R, G, and B. The 3-gun color picture tube consists of a configuration of 3 electron guns—the red gun, blue gun, and green gun—that are tilted slightly so that the electron beams intersect just in front of the screen. Each electron beam has an individual electron lens system of focusing and is directed towards one of the three sets of color phosphors. There are several different types of color picture tubes, the main differences being in the configuration of electron guns and arrangement of the phosphors on the screen.

One main type is the dot matrix tube, an example of which is the Colortron. It has a triangular arrangement of electron guns and has the phosphors arranged as triangular sets of colored dots. A metal shadow mask is placed directly behind the screen, in the plane of intersection of the electron beams, to ensure that each beam hits the correct phosphor. The mask acts as a physical barrier to the beams as they progress from one location to the next and minimizes the generation of spurious colors by excitation of the wrong phosphor.

The other main type of 3-gun color picture tube is the slot matrix tube, which has the electron guns arranged in a horizontal line. The phosphors are arranged as vertical stripes on the screen and the shadow mask is replaced by an aperture grille of vertical wires. This type has advantages in focusing the beams but has a smaller field of view than the triangular arrangement of electron guns.

The Trinitron is a type of color picture tube that has certain advantages over 3-gun tubes. It has a single electron gun with three cathodes aligned horizontally, an aperture grille, and vertical striped phosphors. The cathodes are tilted towards the center so that the electron beams intersect twice, once within the electron lens focusing system and once at the aperture grille. This allows a single electron lens system to be used for all three beams, thus requiring fewer components. The system is therefore much lighter and cheaper than the 3-gun tubes. The effective diameter of the electron lens is greater and sharper focusing of the three beams is therefore possible.

## colorplexer

Microconvergence of the electron beams as they traverse the screen increases with the distance from the center of the screen. In the horizontal arrangement of electron guns, microconvergence only occurs along the line direction rather than in both line and field directions as occurs in the triangular configuration. The 3-cathode arrangement of the Trinitron, however, allows a greater lens aperture than in the 3-gun arrangement. The diameter of the electron tube for a given screen size is also reduced in the Trinitron. CRTs of the Trinitron type can be used for applications where multiple electron beams are required; the angle of the tube may be increased to give a relatively wide-angle color picture tube and hence a relative reduction in the overall size of color TV sets. The color quality and definition of the picture on the screen of a picture tube depends greatly on the dynamic convergence of the beams and the size of the color cell. Scanning of the three electron beams across the screen is effected by a system of deflection coils to which sawtooth waveforms are applied in synchronism with the transmitter, the flyback signal being blanked. Extra convergence coils are frequently used to ensure the correct convergence of the beams at the shadow mask or aperture grille. A system of dynamic focusing is also used in which the voltage applied to the convergence coils is varied automatically according to the relative position of the spots on the screen; this minimizes microconvergence. The size of the color cell is the smallest area on the screen that includes a complete set of the three primary colors. A smaller color cell is available with horizontally aligned electron guns or cathodes than is possible in the triangular configuration.

**colorplexer** Encoder; the section of a color TV transmitter that accepts the R, G and B separation signals and produces a complete encoded video signal. Composite sync signals are also added.

**color primaries** The R,G, and B primary colors that are mixed in various proportions to form all the other colors on the screen of a color TV receiver.

**color processor** A device designed to enhance a picture by individually controlling brightness, color tint and intensity, and the skin tones. Among its many uses, it can color-correct duplicate tapes while recording or during playback. It is similar to a proc amp but without its number of corrective steps or special effects.

**color purity** Absence of undesired colors in the spot produced on the screen by each beam of a TV color picture tube. This term is used to describe how close a color is to the theoretical. For example, in the Y'UV color space, color purity is specified as a percentage of saturation and  $+/-q$ , where  $q$  is an angle in degrees, and both quantities are referenced to the color of interest. The smaller the numbers, the closer the actual color is to the color that it's really supposed to be. For a studio-grade device, the saturation is

$+/-2\%$  and the hue is  $+/-2$  degrees. On a vectorscope, if you're in that range, you're studio grade.

**color purity magnet** A magnet on the neck of a color picture tube, to improve color purity by changing the path of the electron beam.

**color recording** Two methods have been used in the recording of color signals onto tapes. One is called the direct method, and the other is called the color-under method. In the direct method, the NTSC signal is coupled to the FM modulator, just as is done with the black and white signal. The color signal consists of an AC, 3.58-MHz signal on a DC level. The DC portion of the signal determines, through the FM modulation action, the carrier frequency for the video and color signal modulation. The AC portion of the signal produces sidebands of this FM carrier. The color signal can be easily demodulated as with the black and white signal. One problem with this direct method is that the sidebands on demodulation can cause interference beats in the picture. The color-under method separates the color and luminance signals from the incoming signal. Each portion of the total signal is processed individually. The color is heterodyned down from 3.58 MHz to a lower carrier frequency and recorded directly onto tape. The FM carrier is used as a bias that is amplitude-modulated. During playback in this method, the color carrier is recovered and heterodyned back up to 3.58 MHz.

**color registration** The accurate superimposing of the R,G, and B images used to form a complete color picture in a color TV receiver.

**color response** 1. The sensitivity of a device to different wavelengths of light. 2. In videotape, the ability of the tape to reproduce color signals. Various tapes respond differently to color signals. Those of poorer quality display signs of color smear, also known as chroma signal-to-noise. Both terms refer to the ability of the tape to accurately reproduce color.

**color sampling rate** The number of times per second that each primary color is sampled in a digital video system.

**color saturation** The degree to which a color is mixed with white. High saturation means little or no white, as in a deep red color. Low saturation means much white, as in light pink. The amplitudes of the I/Q, U/V, and Cb/Cr signals determine color saturation in a color TV receiver. Also called saturation.

**color saturation control** Chroma control.

**color separation overlay (CSO)** A technique used in color TV for superimposing part of one scene on another. When a particular color, such as blue, occurs in one scene viewed by a camera, the output of another camera filming a different scene is automatically switched in to replace the areas of the chosen color in the original picture. All other colors are transmitted normally from the first camera. The technique is widely used for achieving special effects.

**color set**, HDTV. See *SMPTE 240M standard*.

**color shift** In video, the extent to which colors hold their hue after being recorded in a particular format. Color shift may occur within a single format. For example, a top-of-the-line VHS machine often displays less color shift than one of the economy models. In addition, the recording speed affects color shifting; SP normally provides better color rendition than does EP, or 6-hour recording mode. Also, viewers who participated in comparison tests of different formats (LaserVision, 8mm, Super-Beta, ED-Beta, VHS, S-VHS, Hi8), conducted by a leading video magazine, selected LaserVision videodiscs as having the least color shift.

**color sidebands** The signals that extend for about 0.5 MHz above and below the 3.579545-MHz color subcarrier signal, which is broadcast as part of a color TV signal. The color sidebands contain picture chrominance information, which is removed from the color subcarrier by a synchronous detection process in receivers.

**color signal** Any signal that controls the chromaticity values of a color TV picture, such as the color picture signal and the chrominance signal.

**Color Slide Theater** A TV system developed by Sylvania in 1968 to show slides on the TV screen. A color console TV had a built-in Kodak Carousel slide projector which projected slides onto the TV screen. The console also contained an audio tape recorder for presenting an accompanying narrative while the slides were advanced by remote control. The model remained on the market for only one year.

**color space** A mathematical representation for a color. No matter what color space is used—RGB, YIQ, YUV, etc.—orange is still orange. What changes is how you represent orange in an imaging system. For example, the RGB color space is based on a Cartesian coordinate system and the HSI color space is based on a polar coordinate system.

**Colorstream** The name Toshiba uses for the analog YUV video interface on their DVD players and televisions. If it also supports progressive (noninterlaced) video, it is called Colorstream Pro.

**Colorstream Pro** See *Colorstream*.

**color-stripping** An anti-copying process designed to prevent VCR and DVD users from copying videodiscs or pay-per-view cable broadcasts. This technique is also added to the pressings of videodiscs so that a videotape which has copied the material will play back an image filled with rotating color bands.

**color subcarrier** Alternate term for chrominance subcarrier. The carrier wave on which the color signal information is impressed; contains the color burst and alternating phase color information, usually off to 3.58 MHz. For (M) NTSC the frequency of the color subcarrier is about 3.58 MHz (3.57954 MHz) and for PAL (B, D, G, H, I) it's about 4.43 MHz. The color subcarrier is used to run the color encoder or

color decoder. In the color encoder, a portion of the color subcarrier is used to create the color burst, while in the color decoder, the color burst is used to reconstruct a color subcarrier.

**color-subcarrier oscillator** Chroma oscillator.

**color-subcarrier reference** Chrominance-carrier reference.

**color subsampling** The technique of using reduced resolution for the color difference components of a video signal compared to the luminance component. Typically the color difference resolution is reduced by a factor of two or four.

**color sync** 1. The reference and control signal that is required to record and play back color—designated by the figure 3.58 MHz. This number becomes the reference point to which VCRs lock in for color. 2. See *Color framing*.

**color sync burst** A “burst” of 8 to 11 cycles in the 4.43361875 MHz (PAL) or 3.579545 MHz (NTSC) color subcarrier frequency. This waveform is located on the back porch of each horizontal blanking pulse during color transmissions. It serves to synchronize the color subcarrier's oscillator with that of the transmitter in order to recreate the raw color signals.

**color table** A table of color values that are displayed in an indexed color system.

**color television** A TV system that produces a colored image on the screen of a color picture tube. An additive color reproduction process is used on the screen whereby three primary colors — red, green, and blue — are combined by eye to produce a wide variety of colors. The apparent color of the image depends on the relative intensities of the three primary colors and a properly adjusted color TV receiver approximates the original colors of the transmitted scene.

Three separate video signals are produced by a color TV camera. These signals are used to produce a composite signal that is broadcast and received by a color receiver. The receiver extracts the original video information from the composite signal and modulates the intensities of the three electron beams of the color picture tube in order to excite the appropriate red, green, or blue phosphors on the screen.

The composite signal transmitted in color TV needed to be compatible with the large number of black and white receivers in use. It is therefore composed of two parts: the luminance signal and chrominance signal. The luminance signal contains brightness information. It is obtained by combining the outputs of the three color channels and is used for amplitude modulation of the main picture carrier frequency. This produces the black and white image. The color information is contained in the chrominance signal, which is transmitted using a subcarrier wave at a frequency chosen to cause the least interference on a monochrome set. The chromi-

## color television signal

nance signal is obtained by combining, in a color coder circuit, fixed specified fractions of the separate video signals into sum and difference signals. Two quadrature components of the chrominance signal are produced and used for amplitude modulation of the chrominance subcarriers. The subcarriers are suppressed at transmission. The original information is extracted from the chrominance signal in the color decoder in the receiver. The frequency overlap is the range of transmitted frequencies that are common to both the luminance and chrominance channels.

The composite color signal contains the luminance and chrominance signals; it also contains synchronizing pulses for line and field scans as well as color burst signal. The color burst establishes a phase and amplitude reference signal that is used to demodulate the chrominance signal. In color receivers the chrominance circuits are disabled by the color killer during weak signal or black-white TV program reception. This ensures that only luminance information reaches the tube and prevents color fringing on the image.

**color television signal** The entire signal used to transmit a full-color picture. It consists of the color picture signal and all the synchronizing signals.

**color temperature** The temperature of a black-body radiator that produces the same chromaticity as the light under consideration. Color temperature is measured in degrees Kelvin. Measurement of the color quality of a light source, being the temperature on the Kelvin scale at which a black body must be operated to give a color matching that of the source in question. In this definition, a black body is a temperature radiator whose radiant flux in all parts of the spectrum is the maximum obtainable from any temperature radiator at the same temperature. It is called a black body because it absorbs all the radiant energy that falls upon it. If a TV has a color temperature of 8,000 degrees Kelvin, that means the whites have the same shade as a piece of pure carbon heated to that temperature. Low color temperatures have a shift towards red; high color temperatures have a shift towards blue. The standard for (M) NTSC in the United States is 6,500 degrees Kelvin. Thus, professional TV monitors use a 6,500-degree color temperature. However, most consumer TVs have a color temperature of 8,000 degrees Kelvin or higher, resulting in a bluish cast. By adjusting the color temperature of the TV, more accurate colors are produced, at the expense of picture brightness. In color TV, to avoid color distortion, the color temperature of the lighting of the scene must be matched to that of the system which is to record and reproduce it.

**color temperature switch** A control on many video cameras which adjusts for different lighting conditions such as bright sun, indoor light, etc. The more

sophisticated—and costly—cameras may have a switch with as many as four settings: incandescent indoor lighting (3200 degrees K), fluorescent lighting (4500 degrees K), sunlight (5200 degrees K) and cloudy bright (6000 degrees K). Color temperature control, which corrects the camera for various kinds of light, is different from white balance control, which helps to set or establish colors, but both may be used together to adjust for natural color rendition.

**color tint control** A function on older TV receivers designed to adjust color when a channel is changed. Different channels transmit colors that are always consistent. Some of the reasons for this diversity include the frequent adjusting of the transmitter for color balance, the individual channel's deliberate decision to enhance its color in the hopes of attracting more viewers, and the peculiar whims of station engineers whose personal visual and esthetic tastes affect the color that is telecast to home TV sets. As a result, the TV viewer often has to adjust the color tint control when he or she switches channels. Some more sophisticated TV receivers provide a memory chip which stores the proper tint adjustment for each channel, thereby automatically making corrections as the viewer changes channels.

**color transient improvement** A circuit for color difference signals with transient detecting, storage and switching stages resulting in faster transients of color difference signals.

**color transmission** The transmission of a signal wave for controlling both the luminance and chromaticity values in a picture.

**color triangle** Method of representing colors as points within a triangle to permit the calculation and specification of a number of aspects of colorimetry. The three corners of the triangle represent three color stimuli of R, G, and B lights, whose wavelengths are defined, and any color which can be produced by mixing these three stimuli in different proportions can be represented by a point within the triangle. The position at which a mixture of the three stimuli gives the effect of white is known as the white point. Pure spectral colors fall outside the bounds of the triangle since they cannot be absolutely matched by mixtures of three stimuli.

**Colortron** See *Color picture tube*.

**color-under method** A process employed by all home video recorders to record color and black and white information separately. The color portion of a video signal is converted to a lower frequency while the black and white part of the video image is left unchanged. These two signals are rejoined during playback. But since the union is never exact, fringing, erratic color or video noise may result from what is known as chrominance/luminance delay inequality. See *Color recording*. See also *Down-converted color*.

**color value** The three numbers which specify a color. See also *Pixel value*.

**color vectorscope** A testing instrument used to measure the color purity, frequency response and so on of video components. It can test RF and video signals as well as check the time delay between two signals. When used in the field, the unit can help with multiple camera setups by providing precise phase matching (genlock) adjustments.

**color video noise meter** A professional/industrial instrument designed to measure luminance noise, chroma AM noise and chroma PM noise for either NTSC or PAL signals. These electronic meters usually provide other features, such as automatic level control, automatic sag compensation, character displays that indicate present operations and warning messages, special circuitry for automatic testing and automatic memory.

**color video printer** See *Video printer*.

**color wheel** A graphic depiction of the color components. The color wheel principle shows how the three primary colors blend into intermediate colors and white. In the present color TV system, this basic three-color system is used to produce the color TV picture.

**color zero** The color in the Amiga's palette that can be replaced by a genlocked video signal from another source, e.g., a video camera.

**coma** 1. Lens defect associated with images away from the optical axis. A non-axial point object does not give rise to a point image even in the absence of spherical aberration, and the best image that can be produced consists of a small patch of light with a tail to one side in the shape of a comet. 2. A CRT image defect that makes the spot on the screen appear comet-shaped when the spot is away from the center of the screen. See also *Distortion*.

**combat camera** A hand-held camera used to film or tape warfare or other action.

**comb filter** A filter whose insertion loss causes its spectrum to form a sequence of equispaced narrow passbands or stop bands centered at multiples of some specified frequency. The frequency response resembles the teeth of a comb. One major application for comb filters is separating NTSC and PAL color and brightness signals.

**combination-tone distortion** Syn.: intermodulation distortion. See *Distortion*.

**combined head** Syn.: read/write head.

**combiner** In digital picture manipulators, a device that controls the manner in which two or more channels work together. Under software control, it determines the priority of the channels (which picture appears in front and which in back) and the types of transitions that can take place between them.

**combiner circuit** The circuit that combines the luminance and chrominance signals with the synchronizing signals in a color TV camera chain.

**combining filter** Passive device for feeding the outputs of two transmitters to a common aerial system.

**combining unit** Circuit designed to combine sound and vision outputs to enable them to use a common aerial array. The requirements of the combining unit are that a minimum loss should occur within the unit, that a minimum signal should be fed back to the other transmitter, and that the impedances of the inputs and output should correctly match those of the transmitters and aerial, in order to achieve a maximum transference of power.

**combi player** A general term used by journalists and columnists to describe a unit that can play various sizes of audio and video discs.

**comet tail** Also called comet. A streak, generally caused by an overload camera tube. They can be prevented or minimized by means of an ACT gun in the tube. See *Photoconductive lag*, *Anti-comet tail (ACT) gun*, *Sky*.

**commercial eliminator** A device designed to eliminate commercials during unattended recording on a VCR. One type works only during black and white programs and films, cutting out color commercials by a special color burst signal that activates the VCR. A second type operates with recordings of black and white and color programs. This unit disconnects an internal circuit when the program fades to black and activates another circuit when the audio goes silent. Because these devices require that the VCR be in Pause, they don't work on many machines which cannot operate in Pause mode when the automatic timer is engaged. Commercial eliminators of either type are not 100% accurate; often part of a program is edited out along with the unwanted commercials. By the late 1980s, they had all but disappeared from the video marketplace.

**commercial killer** Commercial eliminator.

**commercial-killing VCR** A VCR with a system that kills commercials; RCA. When the recorder makes a tape from a broadcast or cable program, it automatically rewinds it to the beginning and fast forwards to the start of the first commercial break (whose location has been memorized on the VCR's tape counter based on visual and audio cues). The VCR then encodes commercial-start and -end signals on the tape's control track. It continues to seek out and mark recorded commercials to the end of the tape, and then rewinds. On playback, the VCR goes into the forward search mode during the commercials, while a blue field masks the picture. The end signal puts the VCR back in the play mode. Thus, instead of a commercial, the viewer sees a blank blue screen for a maximum of 30 s.

**Commission Internationale de l'éclairage (CIE)** An international group that has set most of the basic standards of light and color now used in color TV.

**Commodore Dynamic Total Vision** See *CDTV*.

**Common Carrier Bureau** A department of the Federal Communications Commission responsible for recommending and implementing regulatory poli-

## Common Image Format

cies on interstate and international common carrier (voice, video, data) activities.

**Common Image Format** See *CIF*.

**Common Interface Format** See *CIF*.

**Common Intermediate Format** A videophone ISDN standard which is part of the CCIT's H.261. It produces a color image of 352 by 288 pixels. The format uses two B channels, with voice taking 32 Kbps and the rest for video.

**comms** Informal communications.

**communications satellite** (comsat) An artificial unmanned satellite in earth orbit that provides high-capacity communication links between widely separated locations on earth. International telephone services and the exchange of live TV programs and news are achieved by transmitting microwave signals, suitably modulated, from an earth station to an orbiting satellite and back to another earth location.

The first satellites, including the large metallized balloons ECHO-1 and ECHO-2, were passive systems; they simply reflected or scattered the microwave beam back to another earth station. Present-day systems use active satellites, in which the signal is amplified and its frequency changed by a transponder before it is retransmitted to earth. The first successful active satellites included the Telstar and Relay satellites (1962-64). They were in relatively low orbits and were only in line of sight of any two earth stations for a short period each day and then had to be tracked as they moved across the sky.

A satellite in a geosynchronous orbit revolves from west to east in an orbital period equal to that of the earth's rotation (about 23 hours 56 minutes). It traces a figure-of-eight pattern in the sky with equatorial plane. A geostationary orbit is a circular synchronous orbit lying in the equatorial plane at an altitude of 35,790 km. A geostationary satellite will appear to be stationary to an observer on stationary orbits. One such satellite can cover an extensive surface area, excluding polar regions. For global coverage at least three geostationary satellites are needed, situated over the equatorial Atlantic, Indian, and Pacific Oceans. For long east-west links at high northerly latitudes the Russians have used satellites in highly elliptical 12-hour orbit.

The International Telecommunications Satellite Consortium (Intelsat), established in 1964, is responsible for international nonmilitary satellite communications. Early Bird, later renamed Intelsat 1, was launched in 1965. The much heavier Intelsat IVa, launched in 1975, have up to 6000 circuits and a much longer life.

The radio window covers the frequency range from 15 MHz to 50 GHz, with the optimum transmission in the range 1 to 10 GHz. The frequency bands used by Intelsat systems are from 5.925-6.425 GHz for the earth-to-satellite path and from 3.7-4.2 GHz for the satellite-to-earth path.

Solar cells form the primary power supply for satellites with a back-up of batteries for use during the brief periods of solar eclipses. The operational lifetime of a modern satellite should be at least 5 years.

A geostationary satellite can be maintained in a stable attitude by spinning about an axis parallel to the earth's axis. In Intelsat IV the high-gain aerials are mounted on a platform that rotates about the spin axis but in the opposite direction. The aerials then appear stationary with respect to the earth, at their desired orientation. Parabolic reflectors allow spot-beam transmission to regions of limited size, such as W. Europe, which have high communication traffic densities.

The earth stations must be situated some distance from terrestrial microwave relay systems to avoid radio interference. The aerials of the stations in the Intelsat system, such as at Goonhilly in Cornwall, have apertures of 25 to 30 meters. The aerials should be steerable to compensate for perturbations of the orbits caused by gravitational effects of moon and sun. Present-day systems provide simultaneous multiple access to one satellite from a large number of earth stations within one coverage zone. This is achieved by time-division multiplexing or frequency-division multiplexing. In the former case a station does not share the transponder power with other stations and can operate at close to saturation where the transponder is most efficient.

**community antenna relay service** (CARS) See *Microwave relay*.

**community antenna television** (CATV) Another name for cable TV. Signals from distant TV stations are picked up by a large antenna, typically located on a hill, then amplified and piped all over the community below on coaxial cable.

**compact disc** (CD) The 12 cm. (4.75 in.) optical read-only disc used for digital audio, data, or video in different systems.

**Compact Disc-Interactive** (CD-i) An interactive audio/video/computer system developed by Sony and Philips for the consumer market. Provides audio, digital data, still graphics and limited motion video. Geared toward home entertainment. Unlike conventional CD-ROMs, CD-i drives have a built-in microprocessor to handle many of the computing functions. CD-i also has commercial and industrial applications. CD-i has been superseded by DVD and other platforms.

**compact disc, read-only memory** (CD-ROM) A compact disc adapted for home entertainment that is capable of storing video and audio data in digital format for playback through a computer. Data bits are stored as microscopic pits on the disc and are read by a laser beam.

**Compact Disc Video** (CDV) A compact laser disc, introduced by Philips, which plays both pictures and sound. Compared with video cassettes, they have



better sound, last longer, give easier and faster access to the section you want, and have better freeze-frame. You can't, however, record onto or from them. The basic technology of the CDV is similar to that of the audio or sound CD (called CD-DA to distinguish it). They look the same, but CDVs are usually colored gold, whereas CD-DAs are silver. Initially they were made in three sizes, which contain respectively 6, 20, and 60 minutes of audio-visual material on each side. Superseded by DVD.

**compact source iodide (CSI)** An iodide gas-discharge mercury arc lamp that is small-size and produces near-daylight illumination, used in film and TV.

**compact video cassette** See *CVC*.

**Compact Video Compressor** One of several software algorithms for compressing video into QuickTime movies. It is very asymmetrical, in some cases taking as much as 1 hour to compress 1 minute of video, which can later be quickly decompressed. The advantage here is that a movie with Compact Video Compression looks better and runs faster than the Apple Video-compressed movie. The Compact Video Compressor was also optimized to create movies that can be smoothly played back from a CD-ROM disc.

**comparator** A circuit that is a basic component of flash ADCs. Has two inputs, X and Y, along with one output we call Z. The comparator implements the following mathematical function: if  $A - B$  greater than 0, then  $Z = 1$ ; if  $A - B$  less than 0, then  $Z = 0$ . If  $A = B$ , Z may be undefined and oscillate between 1 and 0 wildly until that condition is removed, it may be a "1," or it may be "0," depending on how the comparator was designed.

**compatibility, HDTV/conventional TV** In 1988 Robert Hopkins suggested five levels of compatibility:

Level 0 — Incompatible. The conventional receiver cannot display the HDTV image, and the HDTV receiver cannot display the conventional image.

Level 1 — The HDTV signal can be converted by an expensive adapter to provide a display on the conventional receiver.

Level 2 — Same as level 1, except that the adapter is inexpensive.

Level 3 — The HDTV image is received and displayed by the conventional receiver, but at a loss of quality relative to the receiver's optimum performance.

Level 4 — The same as level 3, except that the quality of the image is the highest of which the receiver is capable.

Level 5 — The image displayed by the conventional receiver has all the quality of the HDTV image.

Other terms applicable to compatible systems are "forward" versus "backward." In a forward system, the conventional receiver obtains service from the advanced or HDTV signal at levels 1 through 4. In the backward version, the HDTV or advanced receiver obtains service from the conventional signal. When the audience is served by substantial num-

bers of HDTV and conventional receivers, both types of compatibility are highly desirable.

**compatible color television system** A color TV system that permits the substantially normal black and white reception of the transmitted color picture signal on a typical unaltered black and white receiver. This is accomplished in the NTSC and PAL systems by dividing the color video information into a luminance signal and two chrominance signals. The luminance signal is the equivalent of a black and white TV picture signal and is used alone by a black and white receiver.

**complementary colors** Colors which result from subtracting in turn the three primary colors from the visible spectrum: minus-green (magenta), minus-red (blue-green or cyan) and minus-blue (yellow).

**component digital** A digital representation of a component analog signal set, most often Y, B-Y, R-Y. The encoding parameters are specified by ITU-R BT.601-2 (CCIR 601). The pro-video parallel interface is specified by ITU-R BT.656 (CCIR 656) and SMPTE 125M.

**component digital editing** A sophisticated editing process used in relation with professional/industrial equipment such as digital or production switchers. This advanced editing technique usually employs other features, such as compositing in real time and color correction functions.

**component switcher** A video switcher that deals with the individual color components (R, G, B or YPbPr) of the picture instead of the encoded composite video signal. It's almost like having three separate switchers combined into one package. The three color components travel through the switcher in parallel. This generally produces a much sharper picture and crisper special effects.

**component television** The use of individual units such as a TV monitor, tuner, speakers and so on which make up a TV system otherwise combined in one box, the TV set or receiver. Proponents of component TV speak of advantages such as better video and improved sound as well as flexibility in component selections. The center of such a system is the monitor which, although it lacks a tuner, has direct audio and video inputs, higher resolution, more circuitry, etc. The component tuner is capable of better electronic isolation, thereby eliminating more noise, distortion and signal loss than its counterpart built into the conventional TV set. Component tuners also feature frequency-synthesized tuning, various audio/video inputs/outputs, wireless remote control, etc. Sony introduced the first component TV in 1980 in Japan and later to the US. It provided a choice of two monitors with dual channel 10-watt amplifiers and external speakers as well as other optional accessories. Discriminating American videophiles have opted for TV monitor/receivers instead of component TV.



## component tuner

**component tuner** An individual unit which, along with a TV monitor, audio amp, speakers and other parts, make up a TV system or component video. The tuner portion of this system provides a video signal with less loss, noise and distortion than is usually present in conventional TV sets. This is the result of quality components within the tuner, better isolation of the parts and generally higher manufacturing standards. Component tuners offer several features, including, among others, wireless remote control, frequency-synthesis tuning and direct inputs and outputs for connections to monitors, VCRs, cameras and speakers.

**component video** 1. Three color video signals that describe a color image. Typical component systems are R,G,B; Y,I,Q; or Y,U,V. 2. Transmission and recording of color TV with luminance and chrominance treated as separate signals.

**composite color signal** The color picture signal plus all blanking and synchronizing signals. The composite color signal thus includes the luminance signal, the two chrominance signals, vertical and horizontal sync pulses, vertical and horizontal blanking pulses, and the color-burst signal.

**composite color sync** The signal comprising all the sync signals necessary for proper operation of a color receiver. This includes the horizontal and vertical sync and blanking pulses, and the color-burst signal.

**composite digital** A digitally encoded video signal, such as NTSC or PAL video, that includes horizontal and vertical synchronizing information.

**composite master** An original program produced by editing various portions of other recordings onto a new reel of tape; in electronic editing the resulting tape is one generation from the master materials from which it was recorded.

**composite picture signal** The complete picture signal as it leaves the TV transmitter. The picture consists of picture data, blanking pulses, synchronizing pulses for monochrome, and the color subcarrier, color burst, and other information needed for transmission of color pictures. Also called composite signal and composite video signal.

**composite signal** Composite picture signal.

**composite sync** The total sync system containing both vertical and horizontal scan controls.

**composite triple beats** See *Triple beats*.

**composite video signal** Composite picture signal. (CVS/CVBS) A signal that carries video picture information for color, brightness and synchronizing signals for both horizontal and vertical scans. Sometimes referred to as "Baseband Video." Typical composite TV standard signals are NTSC, PAL, and SECAM. RGB is not an example of composite video, even though each red, green, and blue signals may each contain sync and blank information, because all three signals are required to display the picture with the right colors.

**compositing system** A sophisticated professional/in-

dustrial device designed to produce shadows, transparencies, reflections, blue foreground objects and other effects. Used chiefly in post-production, the compositing system can correct corner darkening and unnatural shadows in a multi-layered image. Some models provide a built-in time-code reader, capabilities for hundreds of events to be programmed for real-time on-line compositing and a menu-driven remote control.

**compressed serial digital interface (CSDI)** A way of compressing digital video for use on SDI-based equipment proposed by Panasonic. Now incorporated into Serial Digital Transport Interface.

**compressed video** TV signals transmitted with much less than the usual bit rate. Full standard coding of broadcast quality SDTV typically requires 45 to 90 megabits per second. Compressed video includes signals from 2 Mb/s down to 56 Kb/s. The lower bit rates typically involve some compromise in picture quality, particularly when there's rapid motion on the screen.

**compression** 1. A digital process that allows data to be stored or transmitted using less than the normal number of bits. Video compression refers to techniques that reduce the number of bits required to store or transmit images. 2. Audio term similar to video clipping is the automatic adjustment of volume variations to produce a nearly consistent level of sound. Elimination of audio overmodulations produces a sound track lacking in dynamics—it is never soft or loud, but always at the same level. 3. Digital effect where the size and/or aspect of the picture is changed on the TV screen; zoom effect with objects decreased in size.

**compression artifacts** Compacting of a digital signal, particularly when a high compression ratio is used, may result in small errors when the signal is decompressed. These errors are known as artifacts, or unwanted defects. The artifacts may resemble noise or may cause parts of the picture, particularly fast moving portions, to be displayed with the movement distorted or missing.

**compression/expansion noise reduction** See *Noise reduction system*.

**compression ratio** A number used to tell how much information is squeezed out of an image when it has been compressed. For example, suppose we start with a 1-Mbyte image and compress it down to 128 Kbytes. The compression ratio is 8:1; 1/8 of the original amount of storage is now required. For a given compression technique—MPEG, for example—the higher the compression ratio, the worse the image looks. This has nothing to do with which compression method is better, for example JPEG vs. MPEG. Rather, it depends on the application. A video stream that is compressed using MPEG at 100:1 may look better than the same video stream compressed to 100:1 using JPEG.

**communications** A recent creation meaning the combination of telephones, computers, TV and data systems.

**computerized editing** A system of editing that permits the numbering of each frame of video as it is being shot on location with a video camera. This reference then makes it possible to edit the tape immediately. Computerized editing is available only with industrial VCRs. Also called computer-assisted editing.

**computerized TV** See *Telecomputer*.

**COMSAT** COMMunications SATellite.

**concave** A lens configuration in which the lens element has an inward curve.

**condenser** Describes a type of microphone element that uses two condenser plates to convert sound waves to voltage variations.

**condenser lens** A lens to concentrate the image so that it will all enter the video camera lens.

**condenser microphone** A wide-range mic usually built into video camera or camcorder. It is designed basically to pick up all the sound in the shooting area and is characterized by wide frequency range and low distortion. The mic contains circuitry that uses a condenser and requires batteries.

**conditional access** This is a technology by which service providers enable subscribers to decode and view content. It consists of key decryption (using a key obtained from changing coded keys periodically sent with the content) and descrambling. The decryption may be proprietary (such as Canal+, DigiCipher, Irdeto Access, Nagravision, NDS, Viaccess, etc.) or standardized, such as the DVB common scrambling algorithm and OpenCable. Conditional access may be thought of as a simple form of digital rights management.

Two common DVB conditional access (CA) techniques are SimulCrypt and MultiCrypt. With SimulCrypt, a single transport stream can contain several CA systems. This enables receivers with different CA systems to receive and correctly decode the same video and audio streams. With MultiCrypt, a receiver permits the user to manually switch between CA systems. Thus, when the viewer is presented with a CA system which is not installed in his receiver, he simply switches CA cards.

**connector** The metal fitting or connection at the end of a wire or cable. A connector can be male or female, thread-type or slip-on. The barrel-shaped female connector has external threads and is usually located at the rear of the component, while the male part is on the cable. There are various types of connectors. The BNC is most often utilized for professional hook-ups. The PL-259 is double the size of its look-alike, the F-fitting, and is sometimes used with video cameras and some industrial equipment as well as for transmitting video-only signals. The F-connector, the most popular, is designed basically for RF

signals which transmit both audio and video signals. All the above connectors use coaxial cable. The twin lead cable usually doesn't need connectors. Generally, VHS machines use the RCA phono type while Beta VCRs employ mini-plugs for audio and RCA phono jacks for video. Another type is the multi-pin connector used between a video camera and a VCR.

**console** 1. A large cabinet for a radio or TV receiver that stands on the floor rather than on a table. 2. A main control desk for TV station.

**constant angular velocity** See *CAV*.

**constant bit rate** Constant bit rate (CBR) means that a bitstream (compressed or uncompressed) has the same number of bits each second.

**constant linear velocity** See *CLV*.

**constant luminance system** A color TV system in which the brightness of the reproduced picture depends solely on the transmitted luminance signal and is unaffected by the chrominance signal transmitted with it. This is an ideal which is not perfectly achieved in the NTSC, PAL and SECAM color systems.

**Constant-Minimum Wavelength-Constant Angular Velocity (CWL-CAV)** Method for high-density magneto-optical disc recording; NEC Corp., Tokyo. The technique allows up to 23 Gbytes of multimedia data to be written to a single 30-cm disc. 32 minutes of NTSC composite digital signals can be recorded without compression. Using MPEG-2 compression at 8 Mb/s, up to 5 h of full-motion video can be recorded on a disc.

**Consumer Electronics Show (CES)** A seasonal event originating in the 1960s consisting of independent dealers, buying groups, domestic and foreign manufacturers, government officials, importers, chain and department store buyers, trade guests and members of the press. New products and innovations in consumer electronics are highlighted and displayed.

**consumer-level monitoring equipment** See *Video monitoring equipment*.

**continuous film scanner** A TV film scanner in which the motion-picture film moves continuously while being scanned by a flying-spot kinescope.

**continuously variable slope delta (CVSD) modulation** A technique for converting an analog signal (such as audio or video) into a serial bit stream. Modulator/demodulator circuits that encode and decode functions on the same chip with a digital input for selection.

**continuous motion** In video, a smooth, moving image such as that which is produced on videotape, DVD or some videodisc formats such as CD-I or CD-V. Other disc formats, such as CD+G, produce graphics, with some new images displayed on screen in less than 1 s. However, the total effect resembles strobe display—a sequence of images—rather than the more familiar continuous motion that viewers know from TV and films.

## continuous presence

**continuous presence** In teleconferencing, the simultaneous presence of two or more video images. The images may appear on a single monitor in a split screen mode or on two separate monitors.

**contour control** Refers to the capabilities of a projection TV system or similar unit to adjust the sharpness at the edges of a screen image in relation to its contrast. See also *Horizontal image delineation*.

**contouring** In digital systems, the appearance of patterns in a digitized image because the quantization did not have enough levels. This is an image artifact caused by not having enough bits to represent the image. The reason the effect is called "contouring" is because the image develops vertical lines.

**contours-out-of-green** In TV cameras, a technique for increasing picture sharpness. Pulses are generated from the green signal at each edge in the image by separating its high-frequency components. The green channel is used to generate these pulses because it has the best signal-to-noise level. The "white" contours—changes from dark to light—are added at the aperture correction circuit, while the "black" contours are added after gamma correction.

**contrast** The degree of difference in tone between the lightest and darkest areas in a TV picture; a video term referring to how far the whitest whites are from the blackest blacks in a video waveform. 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. With poor contrast, an image may be referred to as being "washed out"—you can't tell the difference between white and black, and the image looks gray. Contrast is measured in terms of gamma, a numerical indication of the degree of contrast. Pictures with high contrast have deep blacks and brilliant whites, and pictures with low contrast have an overall gray appearance.

**contrast compensation switch** On some video cameras with automatic iris control, a feature designed to provide more or less light by opening or closing the lens approximately one  $f$ -stop. In scenes with lighter or darker backgrounds than the subject, the automatic iris may not give the desired lighting, thereby resulting in over- or underexposure. The contrast compensation switch corrects for this by either opening or closing the lens. This feature is different from and more flexible than the backlight switch which can only open the lens.

**contrast control** A manual control that adjusts the range of brightness between highlights and shadows on the reproduced image in a TV set. Usually, the contrast control varies the gain of a video amplifier. In a color TV set a dual control can be used, with one section controlling the luminance signal

and the other section controlling the chrominance signals; this permits adjustment of contrast without changing color.

**contrast gradient** See *Gamma*.

**contrast range** See *Contrast ratio*.

**contrast ratio** Contrast range. The ratio of the maximum to minimum luminance values on a CRT, liquid-crystal display or active display for a TV set, a computer monitor, or a video terminal. A contrast ratio of at least 10:1 is needed for the best readability. In (2+3)D-image display systems with parallax barrier stripes, at least 6:1 or more is needed as a contrast ratio of the barrier and the opening portion (portion without any barrier). When the contrast ratio is less than 6:1, a crosstalk occurs.

**contrast resolution** The number of gray levels at each pixel in a digital image, determined by raising two to the power of the number of bits at each pixel.

**contrast transfer function (CTF)** See *Aperture response*.

**contribution** In B-ISDN applications, the use of broadband transmission of audio or video information to the user for post-production processing and distribution.

**contribution quality** The level of quality of a television signal from the network to its affiliates. For digital television this is approximately 45 Mbps.

**control desk** Console.

**control grid** An electrode situated between the cathode and the other electrodes of an electron tube, the potential of which determines the magnitude of the electron current flowing from the cathode to the other electrodes. The control grid is usually situated very close to the cathode and is constructed in the form of a wire spiral, the pitch of which can be adjusted during manufacture to give the required degree of control over the density of the electron stream. Thus, the pitch of the grid determines the mutual conductance of the tube. In a CRT, the control grid (sometimes known as the modulator) is often in the form of a disk containing a small aperture through which the electron beam passes.

**control room** A room from which engineers and production personnel control and direct a TV or radio program. It is adjacent to the main studios and separated from them by large, soundproof, double-glass windows.

**control signal** A special signal recorded onto the videotape at the same time a video signal is being recorded. Using during playback as a reference of the servo circuits.

**control track** The lower portion along the length of a videotape on which sync control information is placed and used to control the recording or playing back of the video signal on a VCR. Editing a tape that has only control track instead of time code is very difficult. Master tapes (edited) have control track information instead of time code. Time code must

be added to master tapes in order to have editing flexibility in combining master elements.

**control track counter editing controller** A device to control videotape editing by counting the control track pulses on the tapes.

**control track pulse** An electronic control signal placed on the bottom portion of the videotape during recording. When the tape is played back, the control track pulses guide the video heads in reproducing accurately the original information. The pulses, which make up the control track, usually govern the speed of the VCR and designate the start of every second video field recorded on the tape.

**CONUS** Continental U.S. Also, a TV news company that provides global news coverage to local TV stations that are members on an exclusive market basis.

**conventional systems** 525-line NTSC system and 625-line PAL and SECAM. See also *System terminology*.

**convergence** 1. A condition in which the electron beams of a multibeam CRT intersect at a specified point, such as at an opening in the shadow mask of a three-gun color TV picture tube. Both static and dynamic convergence are required. 2. A measure of the clarity of a color monitor. A measure of how closely the R,G and B guns in a color monitor track each other when drawing a color image. 3. See *Multimedia*.

**convergence alignment** A process which lines up or overlaps the three primary colors of TV (red, green, blue) and brings them into registration to form a perfect image.

**convergence coil** One of the coils used to obtain convergence of electron beams in a three-gun color TV picture tube.

**convergence control** An adjustment or set of adjustments that brings together the three primary colors (red, green, blue) into one focal point. In projection TV using a three-tube system, alignment is needed to merge the three separate images into registration without color fringing. Controls for two colors are adjusted both horizontally and vertically while the third primary color (usually green) serves as reference for the other two.

**convergence electrode** An electrode whose electric field converges two or more electron beams.

**convergence magnet** A magnet assembly whose magnetic field converges two or more electron beams. Used in three-gun color picture tubes. Also called beam magnet.

**convergence plane** A plane that contains the points at which the electron beams of a multibeam CRT appear to experience a deflection applied for the purpose of obtaining convergence.

**convergence surface** The surface generated by the point of intersection of two or more electron beams in a multibeam CRT during the scanning process.

**converging meniscus** A lens configuration in which

the lens element has an outward curve on one side and an inward curve on the other.

**conversion factor** (CF) In digital video, the ratio between the digital and the normalized representation of the signal. Normalization is done to  $R = G = B = 1$  at peak white and the digital signals are represented on a scale of 256 (8 bits).

**conversion filter** See *Color conversion filter*.

**converted chrominance signal** See *Converted subcarrier direct recording method*.

**converted subcarrier** The process of frequency shifting the color 3.58-MHz subcarrier and its sidebands down to 629 kHz. See also *Converted subcarrier direct recording method*.

**converted subcarrier direct recording method** In order to avoid visible beats in the picture caused by the interaction of the color (chrominance) and brightness (luminance) signals, the first step in the converted subcarrier method is to separate the chrominance and luminance portions of the video signal to be recorded. The luminance signal, containing frequencies from dc to about 4 MHz, is then FM recorded. The chrominance portion, containing frequencies in the area of 3.58 MHz, is down-converted in frequency in the area of 629 kHz. This converted chrominance signal can be recorded directly on the tape. The frequencies in the area of 629 kHz are still high enough to allow equalized playback. In practice, the converted chrominance signal and the FM signals are mixed and then simultaneously applied to the tape. Upon playback, the FM and converted chrominance signal are separated. The FM is demodulated into a luminance signal again. The converted chrominance signal is reconverted back up in frequency to the area of 3.58 MHz. The chrominance and luminance signals are combined, which reproduces the original video signal.

**converter** See *Cable television converter*, *Single conversion block converter*, *Up converter*.

**convex** A lens configuration in which the lens element has an outward curve.

**cookie** A cutout screen placed before a light source to cast random wall shadows. Light source should be a focused source through a lens (an ellipsoidal lamp is ideal, or a slide projector can be used).

**coordinate data** In (2+3)D-image display systems, information to indicate the position and size of the window.

**Coppola, Francis Ford** Film director; early proponent of previsualization, a videotaping of artists' views and scenes of a film to help form a rough version of the finished work; and the first director to utilize electronic cinema during the making of *One from the Heart* (1982). Although more popularly known for his films (*The Godfather* and *Apocalypse Now*), Coppola remains in the forefront of video and electronic experimentation as they relate to filmmaking.

**copy block** In radio and TV broadcasting, the portion

## copy guard

of the script to be read. In TV broadcasting, this is written on the right half or two thirds of the page, with cues and technical details written on the left.

**copy guard** See *Anti-piracy signal*.

**copying** In video, the term refers to making a duplicate copy of the audio and video material of a tape. The process can include dubbing, as it is often called, from a 1/2-inch machine to an industrial 3/4-inch, 1-inch or 2-inch VTR. Or it can involve a Beta format and a VHS machine or vice versa. There are two basic methods employed, RF copying and direct copying. In the first, the open channel output is connected to the VHF input of the machine doing the recording. In the second method, cables are connected from the audio and video outputs of the first machine to the audio and video inputs of the recording VCR. This method is much preferred since its direct connections produce a better copy. However, special cable connections may be needed since Beta and VHS use different phono plugs, especially in the audio input and output. If your original tape is a master, the new copy is called a first generation tape; if your tape is a prerecorded one, then the copy you have just made is called a second generation tape. Each generation removed from the original or master adds to the degradation of the picture quality. Duplicating copyrighted material is not legal.

**copy-protection signal** A signal to prevent home copying of prerecorded videotapes. Located in the VBI, that signal includes pulses that affect the AGC of the VCR that is recording the copy-protected tape. The nature of the signal in the VBI distorts the video of the unauthorized recording.

**core** The light-transmitting material at the center of a fiber optic cable.

**corner antenna** Corner-reflector antenna.

**corner insert** A second video picture signal added to an area of the first video picture signal. Corner inserts are achieved by halting the horizontal and vertical scanning of the first picture in a predetermined area and inserting the second picture's scanning portions into that area. See *PIP*.

**corner-reflector antenna** An antenna that consists of two conducting surfaces intersecting at an angle, which is usually 90 degrees, with a dipole or other antenna located on the bisector of the angle. The surfaces are often made of wire mesh to reduce wind resistance. Maximum pickup is along the bisector of the reflector angle. Used as a UHF TV and radio receiving antenna. Also called corner antenna.

**corona** Similar to an electric arc, except that this is a characteristic of much higher voltages (thousands). Corona occurs as a continuous, fine electrical path through air between two points, sometimes accompanied by a faint violet glow, usually near the picture tube.

**correlator filter** Used in certain noise reduction systems to separate and cut out noise from overtones.

The filter permits the passage of overtones which it "reads" based on the original tone. When no tone is present, the filter blocks the passage of any extraneous sound (noise) from getting through. The results of the correlator filter are similar to those of the dynamic noise filter, but the methods of achieving them are different.

**co-siting** Relates to component digital video, in which the luminance component (Y) and the two chrominance components (Cb and Cr) are sampled at the same time.

**couch potato** A person who stays at home (sits on a couch) and vegetates (is sedentary, like a potato), especially by watching TV for long periods.

**coupler** An accessory which accepts two sources or units and permits them to be fed through one output. In other words, a two-way splitter can be used in reverse to form a coupler. The splitter/coupler should be the signal splitter type, not the VHF/UHF version. See *Signal splitter*.

**coverage** (CVG) 1. The geographic area in which a TV station is received by viewers, as indicated on a coverage map. See *Service area*. 2. In film, TV, the shooting of a scene from various views and using various exposures.

**coverage map** See *Coverage*.

**covering power** In film and TV, the capacity of a camera lens to pick up (cover) a clear image over the entire frame.

**cover shot** In TV, a wide or long-distance view, generally begins a sequence to establish the location.

**cover story** An article featured on the cover of a magazine or other publication, generally the major article in the issue. With the development of magazine-style TV programs, many print terms have come into use by broadcasters; thus, cover story also denotes a major feature or sequence on a TV program.

**CPA** Color Phase Alternation.

**C-Phone** (short for computer phone) A Twincom's personal videoconferencing kit that includes the necessary software and a single piece of hardware—housing the camera, mic, and speaker. It sits atop the computer monitor. In addition to full-motion color video at 30 fr/s, the C-Phone system bounces the incoming audio off the PC's screen to create the impression that the caller's voice is coming from the display.

**CPS emitron tube** Syn.: Orthicon.

**Cr** Coded color difference signal (digital R-Y).

**crab** A method of moving a TV or film camera on a pedestal, on which all wheels are steered simultaneously; mobile unit used in crabbing. The method is used for lateral movements (crab shots), particularly in small areas. The instructions are crab left (or truck left) and crab right (or truck right).

**crane** A vehicle with a movable arm or boom (generally hydraulic) that moves a platform on which are a camera and a crew; sometimes called whirly. A crane

typically has three seats, for the director, camera operator, and camera assistant or focus puller. The base of the vehicle is called a trolley. A crane shot or boom shot is a shot taken from a crane.

**crane shot** See *Crane*.

**crash editing** A simple, basic editing technique of adding one segment after another of recorded programming from one tape onto another. The method utilizes the Pause control (instead of Stop), then Record, to help minimize picture breakup between scenes. Most recent video equipment compensates for pausing and recording, thereby virtually eliminating the annoying breakup that used to show up between scenes edited on older VCRs. As in all editing, two home video recorders, audio and video input and output connections and a TV set used as a monitor provide the bare essentials. Also called assemble or assembly editing.

**crawl** Lettering that moves across all or part of a TV screen (often the bottom). The crawl can refer to news of national importance, local election results, dramatic changes in local weather conditions, etc. Also called crawl roll. The effect is produced by mounting the text on a drum like mechanism, also known as the crawl roll. The crawl can be horizontal (across the top or bottom of the screen) or vertical (from the bottom, moving up). It is positioned in the crawl space.

**crawling dot pattern** See *Moire*.

**crawl roll** See *Crawl*.

**crawl space** See *Crawl*.

**CRC** Cyclic redundant check. Used in data transfer to determine if the data has been corrupted. It is a check value calculated for a data stream by feeding it through a shifter with feedback terms EXORed back in.

**creepy-crawlies** A specific image artifact that is a result of the NTSC system. When the nightly news is on, and a little box containing a picture appears over the anchorperson's shoulder, or when some computer-generated text shows up on top of the video clip being shown, along the edges of the box, or along the edges of the text, you'll notice some jaggies "rolling" up (could be down) the picture. That's the creepy-crawlies. Some people refer to this as zipper.

**creepy peepy** A portable TV camera, or minicam; also spelled creepy-peepy, creepie peepie, or creepie-peepie.

**crispening** Process of electrically sharpening the edges of a TV image.

**crimping** A mechanical method of attaching a jack to the end of a cable. The sleeve of the jack is squeezed around the cable so that it will stay on; most often used in coaxial cable installation.

**critical flicker frequency** The frequency at which a flickering light source is perceived by the eye to be changing from pulsating to continuous. The lowest

frequency at which the TV picture does not flicker is about 60 Hz.

**critical focus** Precision-sharp clarity of image; an instruction to a camera operator of this requirement for a specific scene. Areas in front of and behind the subject may be blurred or imperfect.

**critical fusion frequency** The lowest repetition rate at which a continuous image is perceived. Both TV and motion pictures depend on the retentivity of the eye to merge a rapid sequence of images into a single continuous one. If the repetition rate of the images is too low, the eye will fail to merge them, and flicker results.

**critical section** In the DVI RTX software, a critical section is a segment of code in one RTX task which must not be interrupted by another RTX task.

**crop** Camera framing; or framing of an object to exclude some picture information.

**cross** A movement of a performer across a stage or set. Types include direct cross (movement in a straight line) and curved cross (one or more curves in moving from one place to another). The starting and ending points of the movement are sometimes shown on the stage or stage plan with an X (cross).

**cross backlight** Kicker.

**cross-channel fade** See *Cross-fade*.

**cross-color** In NTSC or PAL, a signal intermodulation arising in the bands occupied by the chrominance subcarrier signal. It causes a display of false colors to be superimposed on repetitive patterns in the luminance image. This occurs when the video decoder incorrectly interprets high-frequency luma information (brightness) to be chroma information (color), resulting in color being displayed where it shouldn't.

**cross-color interference** Interference produced in the chrominance channel of a color TV set by crosstalk from the monochrome signal.

**cross-fade** To fade out one video signal and fade in another as a simultaneous movement; can be written as X on taping scripts. May be applied to vision, sound or lighting. Also known as cross-channel fade or fader.

**crosshatch generator** A signal generator that generates a crosshatch pattern for adjusting color TV set circuits.

**crosshatching** In projection TV, the converging of colored lines on a screen to bring the three color tubes into alignment. In three-tube systems (each tube or "gun" representing a primary color) it is essential that all three converge exactly. Projection TV systems, therefore, provide each color tube with a test pattern of intersecting lines to facilitate crosshatching.

**cross-hatch signal** A grid-like pattern produced on a TV screen designed to check horizontal and vertical linearity as well as align convergence. The cross-hatch signal pattern consists of 14 by 17 lines (NTSC standard) or 14 horizontal by 19 vertical lines to match the PAL 625-line standard. Some units, such



## cross-luma

as the TV signal generator, produce a cross-hatch signal which can be internally switched to a dot pattern, the dots appearing at the crossing points of the lines.

**cross-luma** See *Cross-luminance*.

**cross-luminance** Signal intermodulation arising in the bands occupied by the chrominance subcarrier signal; artifact in the luminance channel due to deficiency of Y/C separation in the decoder. This occurs when the video decoder incorrectly interprets chroma information (color) to be high-frequency luma information (brightness). It causes a crawling dot pattern, primarily visible around colored edges and looks like parasitic dots at the sharp or moving edges of saturated colored objects. Syn.: chroma crawl; cross luma dot crawl; moving dots.

**cross modulation** A condition occurring when one signal erroneously modulates another signal.

**crossover area** See *Cathode-ray tube*.

**crossover distortion** See *Distortion*.

**crossover voltage** In CRTs, the secondary-emitting surface voltage (SESV) at which the secondary emission ratio (SER) is unity. There are generally two such voltages, V1 and V2. It is possible to predict the voltage at which the target of a TV camera tube or the screen of a CRT will stabilize. For example, if the initial target potential is below V1 the secondary emission ratio is less than unity and the number of electrons striking the target exceeds those lost from it. Thus the target potential is driven negative until it stabilizes at a potential near that of the electron-gun cathode. This is the type of target stabilization used in all low-velocity camera tubes. If, however, the initial target potential is between V1 and V2 and if the final anode potential of the electron gun is also between these two voltages then the secondary emission ratio is greater than one and the target releases more electrons than it gains from the electron beam. If the target potential is initially below that of the final anode all the secondary electrons released are collected by the final anode and the target potential rises until it is approximately equal to that of the final anode. If the target potential is initially above that of the final anode the retarding field between target and anode returns the secondary electrons to the target and the target potential falls until again it is approximately equal to the final anode potential. This is the type of stabilization that occurs in high-velocity TV camera tubes and in CRTs.

**cross-pulse generator** An electronic circuit, available as a separate component or built into high-priced TV studio monitors, which shifts the video picture on a TV screen so that the horizontal and vertical pulses are visible on the screen, making it possible to adjust tracking and screw and thereby achieve as stable a picture as possible.

**crosstalk (XT)** 1. Interference from one signal that is

detected on another. 2. The sound heard in a receiver along with a desired program because of cross-modulation or other undesired coupling to another communication channel. 3. Interaction of audio and video signals in a TV system, causing video modulation of the audio carrier or audio modulation of the video signal at some point. 4. Interaction of chrominance and luminance signals in a color TV receiver. 5. An effect created by crowding together the diagonal tracks on a tape, thereby confusing the heads during playback. Packing the signals may get more information into a given space on the videotape, but it eliminates the guard bands or spaces between tracks. To correct XT, the azimuth technique was introduced by Sony in 1975. In videodisc playback, XT refers to the rolling horizontal noise bars and other extraneous signals that "spill over" from adjacent pits to affect the main picture area. More advanced solid-state laser pickups have virtually eliminated this problem.

**crossview** Reception of an unwanted picture on a vision circuit analogous to cross talk on sound. Depending on the system, crossview becomes visible at about 30 dB difference in level between the wanted and unwanted signals.

**CRT** Cathode ray tube. The glass display device found in TV sets and video computer terminals. See *Cathode ray tube*.

**CRTC** Canadian Radio TV and Telecommunications Commission. Canada's federal telecom regulator.

**CRT coating** A method designed to increase the brightness and contrast of a TV picture image. The technique, called internal angular reflection coating, accomplishes these gains by improving the focus of the path of light from the CRT to the projection lens.

**crush** Tendency to reduce excessively the tonal range of some part of the picture signal, e.g., white crush, black crush.

**crystal** Generic term for devices based on piezo-electricity. Each crystal is cut to vibrate at the desired frequency.

**crystal control** Technique of generating various electrical frequencies from one stable piezo-electric crystal source. The timing of the scanning functions in a TV system may be derived from a crystal timing oscillator, whose inherent stability results in very stable scanning. This is vital if the TV signal is recorded on tape recorders with poor servo stability, or if it is a color signal which has to be encoded with a subcarrier that is frequency-related to the line scan rate. A disadvantage of crystal control is that the picture frequency is no longer locked to the a.c. power line. Display devices with poor power supply filtering may then exhibit a moving hum bar. Improvement in receiver design, however, is such that crystal control has become general practice.

**crystal lock** Operation of a TV synchronizing pulse



system from a stable crystal frequency reference rather than from mains frequency reference.

**crystal microphone** See *Piezoelectric microphone*.

**CSA** Canadian Standards Association.

**CSDI** See *Compressed serial digital interface*.

**CTD** Charge-transfer device.

**CTF** Contrast Transfer Function. See *Aperture response*.

**CTL coding** A VCR feature that magnetically marks the beginning of individual recordings for future reference. CTL coding differs in some ways from conventional indexing. The unique digital coding function, very similar to address search, permits the user to add or erase codes at any point on the tape. In addition, by specifying a particular code, the user can locate in any direction a particular program or segment. The user simply enters a number on the remote control and activates the shuttle search mode. When the marked number is located, the VCR will automatically play back the selected segment.

**CTTS** Cable Telephony Transport System.

**CTV** Color TV.

**cucaloris** A small sheet, usually of metal, with a pattern stamped out of it. When placed in front of a light source, it casts its pattern onto a background.

**cue** To scan the playback picture at a faster-than-normal speed in the forward direction. Syn.: search-forward.

**cue and review** A very general term describing different features on different machines. Sony uses it for its visual scan; on its SL 3000 portable, Sony applies Cue and Fast Forward without a picture. According to Akai, Cue means high-speed search with a picture. JVC uses the term Cue with its program indexing feature. Finally, there is Cue/Review, another concept when applied to video cameras.

**cue card** A large card containing lines to be spoken by a performer, often used off-camera on TV; also called flip card, idiot card, or idiot sheet.

**cueing** Presetting a record, transcription or a tape on the first playback machine for immediate starting.

**cue light** (in British usage) Tally light.

**cue mark** A signal or code placed on a video tape or film to warn the VCR or the movie operator where a section begins or when to change reels. In video, cue marks are placed on tape electronically when a special control is activated. Each time the VCR goes into Record, an electronic signal is encoded on the tape. The machine can then quickly locate those sections in either Fast Forward or Rewind. Also known as index mark.

**cue/review** A feature on virtually all video cameras with an electronic viewfinder which permits replaying almost instantly a portion of recorded tape. Cue/review may go under different names, depending on the manufacturer. The term is also used with VCRs and is synonymous with "search" or the individual speed of the search in each mode, such as 6x in SP, etc.

**cue track** An area that runs longitudinally along the videotape and carries audio and editing information in the form of reference pulses or time codes.

**curved cross** See *Cross*.

**cut** 1. An abrupt transition between two scenes. Also describes video editing. 2. To instantly replace one picture with a second picture.

**cut-away** Videotape shot of an interviewer that may be interspersed during the editing process to avoid a jump-cut editing of the interviewee. Any shots (close-ups, reactions, etc.) that can be used to break up long scenes or allow transitions to other parts of the program.

**cut in blanking** Interfield cut.

**cut-off** 1. Syn.: black-out point. The point at which the current flowing through an electronic device is cut off by the control electrode. In a CRT the cut-off bias is the bias voltage that just reduces the electron-beam current to zero. 2. Syn.: TV-cutoff. Section of the transmitted image that is hidden from viewers by the receiver's mask. All final video shots, edits must be viewed in the TV-cutoff mode—switchable on most editing monitors to show what information will be in the final viewed product.

**cut-off voltage** (of a camera tube) See *Target voltage*.

**cutting on the action** A production or editing technique in which two events are set in contrast to each other; as event A is taking place on the screen, the camera switches to event B before event A has ended; often used to develop plot, create tension, or produce contrast.

**cutting on the reaction** A production or editing technique in which one event is followed by a scene that displays the results of that event; after event A has taken place, the camera cuts to event B to show the impact of event A on the plot or characters.

**cutting to tighten** An editing procedure used to shorten a series of shots. Used to eliminate excess footage and to produce a coherent whole.

**CVBS** Abbreviation for Composite Video Baseband Signal or Composite Video, Blanking, Synchronization.

**CVC** Compact Video Cassette. A 1/4" VCR format incompatible with other video formats. No longer being produced, the format was introduced by Technicolor in 1980. The CVC recorder used 1/4" videotape in a cassette approximately the size of an audio cassette. The maximum record/play time was about 1 h. CVC was unlike UCM, another 1/4" system which featured a one-unit combination of camera/recorder. These two systems were also incompatible.

**cvg** Coverage.

**CVP-M3** Color video printer; Sony. Connects to a VCR, camcorder, or laser disc player and creates color prints from video footage in about 1 minute. Prints may be dated and titled, and multiple images can be merged for PIP effects.

## CX

**CX** Introduced by CBS Records, a noise reduction system which compresses and expands a program, thereby extending the dynamic range. However, like its competitors DBX and Dolby, it must be played back through a decoder to benefit from the extension. The advantage that CX offers is that a program played back without the decoder will still be intelligible. Although CX also operates on the compression/expansion principle, it compresses and expands only loud signals. CX was used with the first opera videodiscs, produced in stereo by Pioneer Artists in 1982.

**cyan** Color obtained by mixing equal intensities of green and blue light. It is also the correct name for the subtractive primary color usually called "blue."

**cylinder servo** The cylinder motor drives the video heads at the proper speed and position with respect to the tape. Except for the hi-fi machines that use spinning audio heads, cylinder servo problems affect only the picture. One frame consists of two fields of video information, or 525 lines. These frames of information are repeated 30 times each second. The VCR upper cylinder contains two video head tabs mounted 180 degrees apart. Each head tab records one field of video information each revolution of the cylinder to form a complete frame. The cylinder motor speed is about 1800 rpm or 30 rps. This speed must be maintained even during periods when the tape is not moving around the cylinder. This is the job of the cylinder servo signal.

# D

- D 1.** CATV midband channel, 138-144 MHz. 2. PAL TV standard; ex-USSR, Bulgaria, China, Czechoslovakia, Hungary, Poland. Characteristics: 625 lines/frame, 50 fields/s, interlace—2:1, 25 frames/s, 15,625 lines/s, aspect ratio—4:3, video band—6 MHz, RF band—8 MHz, visual polarity—negative, sound modulation—F3, pre-emphasis—50  $\mu$ s, gamma of picture signal—0.5, used band—VHF.
- D-1** A professional/industrial noncompressed component digital video tape format (19-mm tape) for very high-end digital video tape decks that is capable of producing sophisticated visual effects. D-1 VTRs offer a separate black and white image from color image, a feature that allows the professional to experiment with color difference matting, color correction and perspective moves. In addition, D-1 can handle simple and 3-D graphics and accurate scene matches. This flexibility in picture manipulation has made the D-1 format a popular tool in turning out visual effects for broadcast TV.
- D-2** A professional/industrial recording noncompressed composite video tape format (19-mm tape) for medium- to high-end digital video tape decks. On a professional/industrial level, there are two major digital formats—D-1, the component digital standard, and D-2, the composite digital standard. The former records the luminance and two color-difference channels digitally, while the latter, D-2, records such basic standard signals as NTSC and PAL. D-2 VTRs, which serve as playback and postproduction machines, offer several state-of-the-art advances as well as compactness and higher quality than their rival units.
- D-3** A noncompressed composite video tape format (0.5" tape) for medium- to high-end digital video tape decks.
- D-5** A noncompressed component digital video tape format (0.5" tape) for very high-end digital video tape decks.
- D-6** A digital tape format using a 19-mm helical-scan cassette tape to record uncompressed high-definition television material at 1.88 Gbps (1.2 Gbps). D-6 is initially the only high-definition recording format defined by a recognized standard. D-6 accepts both the European 1250/50 interlaced format and the Japanese 260M version of the 1125/60 interlaced format that uses 1035 active lines. It does not accept the new HDTV standard format of 1080 active lines. ANSI/SMPTÉ 277M and 278M are D-6 standards.
- D-7** DVCPRO, Panasonic's development of native DV component format which records an 18-micron (18x10-6m, eighteen thousandths of a millimeter) track on 6.35 mm (0.25-inch) metal particle tape. DVCPRO uses native DCT-based DV compression at 5:1 from a 4:1:1 8-bit sampled source. It uses 10 tracks per frame for 525/60 sources and 12 tracks per frame for 625/50 sources; both use 4:1:1 sampling. Tape speed is 33.813mm/s. It includes two 16-bit digital audio channels sampled at 48 kHz and an analog cue track. Both Linear (LTC) and Vertical Interval Time Code (VITC) are supported. There is a 4:2:2 (DVCPRO50) and progressive scan 4:2:0 (DVCPRO P) version of the format, as well as a high-definition version (DVCPROHD).
- D-9 (Formerly Digital-S)** A 1/2-inch digital tape format, developed by JVC, which uses a high-density metal particle tape running at 57.8mm/s to record a video data rate of 50 Mbps. Video sampled at 4:2:2 is compressed at 3.3:1 using DCT-based intra-frame compression (DV). Two or four audio channels are recorded at 16-bit, 48 kHz sampling; each is individually editable. The format also includes two cue tracks. Some machines can play back analog S-VHS. D-9 HD is the high-definition version recording at 100 Mbps.
- D-9 HD** A high-definition digital component format based on D-9. Records on 1/2-inch tape with 100 Mbps video.
- D-16** A recording format for digital film images making use of standard D-1 recorders. The scheme was developed specifically to handle Quantel's Domino (Digital Opticals for Movies) pictures and record them over the space that sixteen 625 line digital pictures would occupy. This way three film frames can be recorded or played every two seconds. Playing the recorder allows the film images to be viewed on a standard monitor; running at 16x speed shows full motion direct from the tape.
- DA** Distribution amplifier. A piece of equipment that produces multiple outputs identical to its input signal.

**DA-88** A Tascam-brand 8-track digital audio tape machine using the 8mm video format of Sony. It has become the de facto standard for audio post-production, although numerous other formats exist, ranging from swappable hard drives to analog tape formats.

**DA-C, D/A** Digital-to-analog.

**daisy chain** Refers to a single playback VCR, used as “master” in a duplicating process, feeding more than one machine. The recording units are called “slave” units. Many home VCR owners have gotten together in this manner to duplicate videotapes. However, signal loss is bound to occur if too many machines are connected. A video distribution amp may be employed to increase the signal level.

**damp** A diode in the horizontal deflection circuit of a TV receiver that makes the sawtooth deflection current decrease smoothly to zero instead of oscillating at zero. The diode conducts each time the polarity is reversed by a current swing below zero. It incidentally provides B+ boost voltage.

**dark clip** After emphasis, the negative-going spikes (undershoot) of a video signal might be too large in amplitude for safe FM modulation. A dark clip circuit is used to cut off these spikes at an adjustable level. See *White clip*.

**dark current** Current in a photoelectric or photoconductive device when the device is supplied with its normal operating voltages and there is no light on the target.

**dark field brightness** Unexcited field brightness.

**DAT** Digital audiotape.

**datacasting** See *Teletext datacasting*.

**data compression** A technique that provides for the transmission or storage, without noticeable information loss, of fewer data bits than were originally used when the data was created.

**data recorders** Machines designed to record and replay data. They usually include a high degree of error correction to ensure that the output data is absolutely correct and, due to their recording format, the data is not easily editable. This compares with video recorders that can conceal missing or incorrect data by repeating adjacent areas of the picture and that are designed to allow direct access to every frame for editing. Where data recorders are used for recording video there must be an attendant “workstation” to see the pictures or hear the sound, whereas VTRs produce the signals directly. Typically VTRs are more efficient for pictures and sound while data recorders are most appropriate for data.

**data slicing** The process of extracting digital data from an incoming analog signal.

**Datavision** Videotex system, Sweden.

**Datex-J** Videotex service, Germany. It is the former Bildschirmtext (BTX). Services: online-shopping, home-banking, travel reservations and the like.

**DATV channel** See *Bandwidth reduction* (EUREKA-95 HDMAC system).

**DATV signal** Digitally assisted TV signal.

**DAVIC** Abbreviation for Digital Audio Visual Council. It's goal was to create an industry standard for the end-to-end interoperability of broadcast and interactive digital audio-visual information, and of multimedia communication. The specification is now ISO/IEC 16500 (normative part) and ITR 16501 (informative part).

**day/event** Refers to a VCR's programming capabilities. “Day” pertains to the length of time a machine can record in advance; e.g., 14 days, 1 year, etc. “Event” points out the number of programs the VCR can record in that time period; e.g., four events over 21 days.

**day modulation** A means of doubling the use of a radio channel by transmitting two carrier waves in quadrature, each separately modulated with different signals.

**day picture** A photo of a scene depicting the weather, used by newspaper and TV assignment editors.

**dB** Decibel, a standard unit for expressing relative power, voltage, or current.

**D.B.** Delayed broadcast.

**D<sub>B</sub>'** Transmitted blue color difference signal (SECAM);  $D'_B = +1.5(B-Y)$ .

**dBm** Measure of power in communications. 0 dBm = 1 mW, with a logarithmic relationship as the values increase or decrease. In a 50-ohm system, 0 dBm = 0.223 V.

**Dbrn** Decibels with reference to noise.

**DBS** Direct broadcast by satellite. Also direct broadcast satellite, direct broadcast service, digital broadcast system.

**DBS HDTV** The DBS service for HDTV occupies frequencies in the 12- and 22-GHz bands, and the bandwidths of each channel have been set at 24 MHz (in the Americas) and 27 MHz (in Europe and Asia). FM is used with approximately a 3-to-1 ratio between the baseband modulation and the channel width. The maximum video bandwidth thus falls between 8 and 9 MHz. The Japanese MUSE HDTV system operates with an 8.1-MHz video band, the European MAC system with 8.5 MHz. These bandwidths are barely sufficient for a multichannel HDTV system, e.g., one using the 6-MHz NTSC channels plus an auxiliary channel of 2-3 MHz. If the full channel requirement for the NHK Hi-Vision system (up to 30 MHz) is to be accommodated, the signal must be compressed in frequency.

**dBV** Decibels above/below 1 V (in video, relative to 1 V p-p).

**dBW** Decibels referenced to 1 watt.

**dbx** A noise reduction system designed to eliminate unwanted sound from a program while still maintaining that program's full audio range. By compressing a program before it is recorded and expanding

it during playback, dbx restores or recaptures the original dynamic range. A linear compression/expansion system similar to Dolby, CX and others, dbx covers the entire frequency range, yielding approximately 30 dB improvement in signal/noise over the whole band at mid-frequencies. It also provides better than 40 dB of noise reduction.

**DC** 1. Direct current. 2. Downconverter, satellite TV.

**DC-1** Digital pocket camera that captures motion and sound; Ricoh Co. Ltd., Tokyo. DC-1 can record up to 492 still images, 100 minutes of sound, and, while not a video camera, can record short motion sequences (four video scenes of 5 s each). The effective resolution of the DC-1 is 380,000 pixels, comparable to S-VHS quality.

**DC component** The average value of a signal. In video it represents the average luminance of the picture.

**DC/DC converter** An electrical circuit that accepts a direct-current input at one voltage level and converts it to direct-current output at a higher or lower voltage. This is typically accomplished by “chopping” the input DC, converting it to a coarse alternating current, then amplifying and rectifying the AC. For example, there is a DC/DC converter that steps up 1.5-VDC of power cell to 12 VDC for operating portable TV sets. Circuit also permits operation from AC line.

**DC inserter** A TV transmitter stage that adds to the video signal a DC component known as the pedestal level.

**DC light** A video camera feature that draws power from the internal battery of the unit for the purposes of improving image detail. In addition, the feature is used to enhance color. Only a small number of cameras offer DC light.

**DC picture transmission** TV transmission in which the signal contains a DC component that represents the average illumination of the entire scene.

**DC restoration** 1. The capability of the TV monitor, receiver or camera to respond to alterations in brightness as viewed by a video camera. The better the DC restoration, the greater the picture detail in night scenes or low-lit shots. DC restoration makes use of a special circuit that returns the direct current signal to the TV or camera outputs. 2. DC restoration is what you have to do to a video waveform after it has been AC coupled and has to be digitized. Since the video waveform has been AC coupled, we no longer know absolutely where it is. For example, is the bottom of the sync tip at  $-5\text{ V}$  or at  $100\text{ V}$ ? Is the back porch at  $3.56\text{ v}$  or at  $0\text{ v}$ ? In fact, not only don't we know where it is, it also changes over time, since the voltage level of the active video changes over time. Since the resistor ladder on the flash ADC is tied to a pair of voltage references, such as REF- to  $0\text{ V}$  and REF+ to  $1.3\text{ V}$ , the video waveform needs to be referenced to some known DC level; otherwise, we couldn't digitize it correctly. DC restora-

tion is essentially putting back a DC component that was removed to make an AC-coupled signal. We don't have to put back the original DC value—it could be a different one. In decoding video, the DC level for DC restoration is such that the sync tip is set to the ADCs REF- level. Therefore, when sync tip is digitized it will be assigned the number 0.

**DC restorer** A clamping circuit used in video to restore the DC component of the video signal after AC amplification. The resulting DC voltage also serves as the bias voltage for the grid of the TV picture tube, to make average reproduced brightness correspond to the average brightness of the scene being transmitted. Also called clamper, inserter, and restorer.

**DCSC** Digital Color Space Converter; converts the YCbCr signal to RGB.

**DCCT** Discrete Cosine Transform. Used in the MPEG, H.261, and H.263 video compression algorithms.

**DC transmission** TV transmission in which the DC component of the picture signal is still present. The true level of background illumination is thus maintained at all times.

**DCV** Digital Compressed Video.

**DD** CATV hyperband channel, 318-324 MHz.

**DD2** Using D-2 tape, data recorders have been developed offering (by computer standards) vast storage of data (which may be images). A choice of data transfer rates is available to suit computer interfaces. Like other computer storage media, images are not directly viewable, and editing is difficult.

**DDC** Direct Drive Cylinder.

**DDR** Digital disk recorder.

**DDS** 1. Dynamic Drum System. 2. Direct Digital Synthesis. 3. Digital Data Service.

**dead** 1. (of a conductor or circuit). At earth potential.

A conductor or circuit not at earth potential is termed live or alive. 2. Exact or precise, as in dead sync.

**dead roll** A technique of starting a taped program or a film at its scheduled time on a station but not broadcasting it, so that the preceding program, specifically a live sports or news event, is continued. When the live program ends, the dead rolling tape or film is telecast at the point it has rolled to, usually with the announcement, “We now join the program already in progress.”

**dead sync** Exact synchronization of audio and video.

**deaf aid** A small earpiece used by TV reporters, anchors, and others.

**decay characteristic** Persistence characteristic.

**decelerating electrode** An electrode in a CRT biased so as to slow down the electron beam. It is usually in the form of a mesh or a short cylinder. Such an electrode is used in low-velocity TV camera tubes such as the image orthicon in which the electron beam is required to approach the target at a very low velocity. Syn.: decelerator.

**decibel** (dB) One-tenth of a bel, used to define the

## decibels with reference to noise

ratio of two powers, voltages, or currents, in terms of gains or losses. It is 10x the log of the power ratio and 20x the voltage or current ratio. The logarithmic ratio of power levels (usually satellite TV) or voltage levels (usually conventional TV) is used to indicate gains or losses of signals. Decibels relative to 1 watt, milliwatt and millivolt are abbreviated as dBW, dBm and dBmV, respectively. Zero dBmV is used as the standard reference for all SMATV calculations.

**decibels with reference to noise** A measure in dB of the signal-to-noise ratio on a communications line.

**decimation** When a video waveform is digitized so that 100 pixels are produced, but only every other one is stored or used, the video waveform is decimated by a factor of 2:1. The image is now 1/4 of its original size, since 3/4 of the data is missing. Decimation is a quick-and-easy method for image scaling and is in fact the method used by low-cost systems that scale video into a window.

**decimation filter** A filter designed to provide decimation without the artifacts associated with throwing data away.

**decipher** To remove the effects of a secret encryption code or scrambling from data, restoring the code to an intelligible form.

**deck** A magnetic-tape transport mechanism. See *VCR deck*.

**declination offset angle, satellite TV** The adjustment angle of a polar mount between the polar axis and the plane of a satellite antenna used to aim at the geosynchronous arc. Declination increases from zero with latitude away from the equator.

**decode** Decipher.

**decoder** A device used to alter data from one coded form to another. Contrasted with encoder.

**decoder box** A device supplied by a pay TV system designed to unscramble signals so that subscribers, who usually pay a monthly fee, can receive a clear picture of a particular channel. Pay TV companies scramble their signals so that their channels appear on screen as unintelligible to nonsubscribers.

**decoding** In general, the recovery of the original signal from a coded form of the signal. In particular, in stereophonic radio reception, the recovery of the left and right signals from the multiplex received signal and in color TV reception the recovery of the three primary color signals from the color video signal.

**decor** The decorative scheme of an area, such as a stage, or film or television set.

**dedicated chip** A small piece of silicon imprinted with logic circuits. Used in early video games such as Pong, these chips permitted the games to provide such basic activities as paddle movement. The games, however, were non-programmable since the chip was an inherent part of the game console.

**dedicated design** A term applied to an accessory or software which attaches to or fits equipment only of the same manufacturer. For example, because

of a particular thread design, a supplementary lens of one manufacturer may only fit that company's camera-equipped standard lens. The problem is even more prevalent with multi-pin connectors and adapters.

**de-emphasis** Inverse of pre-emphasis, a reduction of the higher frequency portions of an FM signal (restoration of flat base-band frequency response after demodulation) used to neutralize the effects of pre-emphasis. Deemphasis performs a frequency-response characteristic that is complementary to that introduced by pre-emphasis. When combined with the correct level of pre-emphasis, it reduces overall noise levels and therefore increases the signal-to-noise ratio. Syn.: post-emphasis; post-equalization.

**deemphasis network** A circuit used to restore the pre-emphasized frequency response to its original form.

**deep** Dark and rich (a deep red). In 3D TV camera systems with laser projectors, now it is preferred that the radiant energy of laser beam be out of the visible range of light that the video camera senses, therefore IR or deep red may be utilized.

**defeat** Turn off.

**defeat filter** In electronics, a filter which cuts any frequencies in the band it rejects. Defeat filters, as well as others such as bandpass filters, permit the boosting and suppressing of selected material at a choice of frequencies. These filters are used in signal processors to affect color and definition.

**defined display area** The rectangular position of the display in which all text and pictorial images may be presented.

**definition** The degree or extent of detail or sharpness in a TV image. Definition depends on various factors. With a camera, sharpness is affected by the quality of the lens, the lighting, etc. With a VCR, it is affected by the quality of the tape, the speed mode selected, the condition of the heads, etc.

**deflection** The orderly movement of the electron beam in a picture tube. Horizontal deflection pertains to the left-right movement, vertical deflection the up-down movement of the beam.

**deflection coils** Coils (in a deflection yoke) external to the CRT in TV systems with electro-magnetic scanning. Wound in two distinct sections, one each for line and frame, often on a single former, they deflect the electron beam to scan the screen of the CRT. Also called Deflector coils.

**deflection defocusing** Defocusing that becomes greater as deflection is increased in a CRT because the beam hits the screen at an increasingly greater slant, and its spot becomes increasingly more elliptical as it approaches the edges of the screen.

**deflection electrode** An electrode whose potential provides an electric field that deflects an electron beam. Also called *deflection plate*.

**deflection factor** The reciprocal of the deflection sen-

- sitivity in a CRT. Deflection factor is usually expressed in amperes per inch for electromagnetic deflection and volts per inch for electrostatic deflection.
- deflection IC** In TV sets, the deflection circuits usually have both the vertical and horizontal oscillator and amplifier circuits in one IC component. You now find the deflection circuits in one large IC with many different circuits.
- deflection plane** A plane perpendicular to the CRT axis containing the deflection center.
- deflection plate** Deflection electrode.
- deflection sensitivity** The displacement of the electron beam at the target or screen of a CRT per unit of change in the deflection field. Usually expressed in inches per ampere in a deflection coil. Deflection sensitivity is the reciprocal of deflection factor.
- deflection voltage** The voltage applied between a pair of deflection electrodes to produce an electric field.
- deflection yoke** Complete assembly of horizontal and vertical deflection coils in their special mounting. Deflection yoke for TV picture tube contains four separate coils. Syn.: scanning yoke. Also called *yoke*.
- defocus** To make a beam of electrons, light, or other radiation deviate from an accurate focus at the intended viewing or working surface.
- defocusing dissolve** A TV technique in which one camera slowly goes out of focus while another camera slowly brings its image into focus.
- degausser** Device to demagnetize color picture tube for color purity.
- degaussing** Demagnetizing. In color TV sets, an internal or external circuit device that prevents or corrects any stray magnetization of the iron in the picture tube faceplate structure. Magnetization results in color distortion.
- degaussing coil** A plastic-encased coil, about 12" (30 cm) in diameter, that can be plugged into a 120-VAC wall outlet and moved slowly toward and away from a color TV picture tube to demagnetize adjacent parts.
- degradation** The deterioration of the video information on a second tape that has been copied from another, or master, tape. Each generation removed from the original or master adds to the degradation of the picture quality. Other factors besides duplicating tapes can cause degradation. Some methods of signal scrambling or encoding, for example, may result in degradation of the original video information when it is decoded. On the other hand, digital VCRs, as opposed to conventional analog machines, maintain the integrity of the original information. Using this process, signals converted into numbers not only are safe from distortion and noise, but can produce unlimited copies without degradation. Since the digital signal remains permanent, there is no loss in detail with successive generations of recordings. Professionals have isolated five other basic types of degradation that affect NTSC picture quality—noise, intermodulation, microreflections, envelope delay and phase noise.
- deinterlacing** Also progressive scan conversion. Interlaced-to-noninterlaced conversion.
- delay distortion** Phase distortion in which the rate of change of phase shift with frequency of a circuit or system is not constant over the frequency range required for transmission. Also called envelope delay distortion. It occurs on communication lines because of differences in signal propagation speeds at different frequencies. It can seriously impair data transmission. See *Distortion*.
- delayed automatic gain control** An AGC system that does not operate until the signal exceeds a predetermined magnitude. Weaker signals thus receive maximum amplification. Also called *biased automatic gain control*.
- delayed broadcast (DB)** The broadcast of a radio or TV program at a time later than its original transmission.
- delayed recall** An interviewing technique to determine what an individual remembers. For example, TV viewers are called the day after they have watched TV for at least half an hour and questioned about the programs and commercials regarding their opinions and the degree of idea communication and name registration.
- delay line (DL)** Any circuit, device, or transmission line that introduces a known delay in a transmission of a signal. Coaxial cable or suitable L-C networks may be used to provide short delay times but the attenuation is usually too great when longer delay times are required. Acoustic DLs are often employed (in TVs, VCRs, etc.) when a longer delay is needed. The signals are converted to acoustic waves, usually by means of the piezoelectric effect. They are then delayed by circulation through a liquid or solid medium before being reconverted into electrical signals. Fully electronic analog DLs are now being provided by CCDs. Shift registers and CCDs may be used for digital DLs.
- delay line aperture control** An electronic method of improving contrast by artificially increasing the strength of the original video signal. Similar to another technique known as horizontal image delineation, delay line aperture control strengthens the beginning and end of the signal as it repeatedly passes from black to white.
- delay-line cable** A special cable in the black and white channel of a color TV set that provided a time delay just long enough to make the monochrome and chrominance signals arrive together at the CRT. Now done digitally.
- Del Rey HD-NTSC system** HD-NTSC system.
- delta-array picture tube** A shadow-mask color picture tube the screen of which is composed of a very



## delta factor

large number of color cells, each consisting of a dot of red, green and blue phosphor arranged in a delta (triangular) formation.

**delta factor** A term used in VCRs to indicate that a playback signal has some jitter or wow and flutter. Delta factor or a change in frequency, means that the color signal off the tape is not a stable frequency of 629 kHz, but rather a signal whose frequency at any instant is some small amount above or below 629 kHz.

**delta modulation** A pulse-modulation technique in which a continuous analog signal is converted into a serial bit stream which corresponds to changes in analog input levels.

**demagnetization** Removal of residual magnetism.

**demagnetizer** A device for removing undesired magnetism.

**demagnetizing** Removing magnetism from a ferrous material. Also called *degaussing*.

**demagnetizing force** A magnetizing force applied in the direction that reduces the residual induction in a magnetized object.

**demand priority** Access method providing support for time-sensitive applications such as video and multimedia as part of the proposed 100BaseVG standard offering 100 Mbit/s over voice-grade UTP (Unshielded Twisted Pair) cable. By managing and allocating access to the network centrally, at a hub rather than from individual workstations, sufficient bandwidth for the particular application is guaranteed on demand. Users, say its proponents, can be assured of reliable, continuous transmission of information.

**demassified media** Channels of communications, or media, that reach small or selective audiences, as opposed to mass media.

**demodulation** The reverse of modulation. The process of recovering an original signal from a modulated carrier, for example the process of converting a modulated RF carrier signal to a form that can be heard or displayed.

**demodulator** A circuit that separates or extracts the desired signal, such as sound energy or picture information, from its carrier. In video, demodulation is the technique used to recover the color difference signals in NTSC, SECAM or PAL systems. Chroma Demodulator and Color Decoder are two other names for a demodulator used in a video application. For SSTV, a device that extracts image and sync information from an audio signal.

**demonstration mode** A feature on some VCRs designed to help the user understand the various programming functions. The demonstration mode leads the user through these functions and the contents of the several on-screen menus. Time shifting, or setting up the VCR to record one or more programs at a later time or day, has been a difficult operation for many VCR owners who simply end up using their

machines only for playing back prerecorded tapes. Manufacturers, realizing this, have come up with several methods for making recording easier. These include OTR (one-touch recording for taping a show presently being telecast), on-screen programming (which guides the viewer step by step) and, finally, demonstration mode.

**demultiplexing** Separating elementary streams or individual channels of data from a single multi-channel stream. For example, video and audio streams must be demultiplexed before they are decoded. This is also true for multiplexed digital television transmissions.

**depth default signal** In 3D TV camera systems with laser projector, a signal to indicate that either (or both) sensors does (do) not receive sufficient reflected laser energy (for example, if the scene is very distant) to output an electrical signal. In that case, it is necessary to set the depth video output to a "default" voltage, thus communicating that condition to the receiver. Presence of a default value of depth video would signal to the receiver monitor that it should treat those scene points as if they were at "infinite" distance.

**depth information** In apparatus for direct display of an image on the retina of the eye using a scanning laser, a perspective information that is provided by the variable focus optical system to a laser beam at a suitable stage after optical modulation by the optical modulating means, and the laser beam after scanning in response to a scanning signal by the scanning means is focused to form an image on the retina of an eye.

**depth matrix** In 3D TV receiver systems, a circuitry to combine the depth video signal and the horizontal sweep signal H in accordance with the equation:  $H' = cD + H$ ; "c" is a constant between +1 and -1, "D" is the instantaneous depth position with  $D = 0$  corresponding to the position of a reference frontal plane or "window," H' is the modified horizontal sweep signal. The horizontal sweep signal H' will thus be a nonlinear sweep signal.

**depth-multiplex recording** The process of recording hi-fi audio on VHS hi-fi VCRs. The system uses separate rotating heads to record the audio portion.

**depth of field** Refers to the range of focus of a camera lens, or, in other words, that which is in focus behind and in front of a subject. Depth of field changes with the lens opening (the smaller the opening, the greater the depth of field), the distance between subject and camera (the closer the subject, the shorter the depth of field) and the type of lens (wide angle lenses provide greater depth of field than telephotos).

**depth of focus** The allowable latitude of lens image plane to vidicon target area that ensures that a given picture remains in focus. Depth of focus is adjusted by moving the vidicon closer to or farther away from

the end of the lens. Not normally used in video as a focusing adjustment.

**depth of modulation chart** A method of measuring the sharpness of a video camera. The chart consists of a predetermined pattern of short vertical lines spaced according to “bursts” that are calibrated in MHz. The bursts range from 0.5 to 4 MHz. Depth of modulation, or modulation transfer function, refers to determining the “quantity” of resolution or sharpness of an image. Normally, the degree of sharpness is highly subjective. Depth of modulation charts seek to remove this aspect, replacing subjectivity with mathematical calibrations that result in percentages. For example, a pattern can now be considered properly registered if the depth of modulation totals 80%. Depth of modulation problems, such as dark objects appearing light or light objects becoming darkened, may be the result of a faulty camera or lens.

**depth perception** A subjective evaluation of the distance between objects viewed with regard to their size and the planes they describe.

**depth video signal** In 3D TV systems, a signal containing 3D-image information.

**derivative equalizer** An equalizer that operates by adding to the signal to be equalized controllable amounts of the time derivatives of the signal. Such equalizers are used in TV transmission for correcting waveform distortion in video circuits and normally only the first and second derivatives are used.

**desaturation** Reduction of color saturation often as result of distortion or defect in the TV transmission system.

**descrambler** A device which corrects a signal (often video) that has been intentionally distorted to prevent unauthorized viewing. Used with satellite TV systems.

**Descriptive Video Service (DVS)** Video for the blind. In 1990, Boston PBS station WGBH launched the Emmy-winning DBS. Via the SAP channel available on stereo TVs and VCRs, DVS soundtracks describe visual elements—facial expressions and body language, costumes, sets, scene changes—during pauses in dialog. The descriptions are written in a prose-like style to help bring listeners more fully into the program.

**description** A process of decoding or unscrambling TV signals, as with pay-TV services.

**deserializer** A device that converts serial digital information to parallel digital.

**Designated Market Area (DMA)** An A.C. Nielsen Co. term for a group of counties in which a TV station obtains the greatest portion of its audience. Each US county is part of only one such DMA. The DMA rating is the percentage of TV homes within the area viewing an individual station during a particular period.

**deskewing** An imaging term. Adjusting—straighten-

ing—an image in software to compensate for a crooked scan.

**desktop video** 1. The combination of computers and video; the creation and editing of video images on a computer. Desktop video refers to three basic applications: Videotape editing; Special effects and graphics; Digital video editing. There are two other applications that incorporate elements of desktop video, but can't really be considered desktop video per se: interactive multimedia (like CD-ROM) and TV tuners for computers. 2. Communications that rely either on videophones or PCs offering a video window. See *Desktop videoconferencing*.

**desktop videoconferencing** Delivery system for providing two-way voice and full-motion color pictures. Since video calling takes place on a PC, you can share information—computer companies call this data or document conferencing. Desktop videoconferencing products must be connected to either a PC network or ISDN phone lines. The system offers convenience, privacy, and the useful combination of video calling and data sharing. Also called personal videoconferencing.

**detail enhancement circuitry** An image processing technique designed to add contrast and produce sharper outlines to images. An electronic circuit splits the incoming video signal and sends it along two paths, one ignoring the split signal and the other modifying the black-to-white transitions so that certain objects appear sharper. The two signals are then joined to produce a better image.

**detail enhancer** Refers to electronic circuitry built into a VCR to help deliver a clear screen image during playback. This electronic feature is usually part of the HQ circuitry of many VCRs. Sometimes described as a “detail switch,” this feature may have two settings—one for use with conventional videocassettes and another for HG (High Grade) tapes for producing sharper images.

**detailer** Image enhancer.

**detail set** A part of a set used for closeups in film and TV; also called insert set.

**detector** 1. Syn.: demodulator. A circuit that was used in older TVs to demodulate the received signal—i.e., to extract the signal from a carrier with minimum distortion. 2. In an optical communications receiver, a device that converts the received optical signal to another form. Currently, this conversion is from optical to electrical power; however, optical-to-optical techniques are under development.

**detent** A part that stops or releases a movement.

**detent tuner** “Click” type of TV tuner.

**detent tuning** 1. Tuning into a satellite channel by selecting a preset resistance. 2. A TV receiver tuning control in which a detent mechanism determines the correct position of the tuning shaft for receiving a desired station.

**Deutsche Industrie Normenausschuss (DIN)** A Ger-

## deviation

man institute that sets industrial standards. In the audio field, plugs and sockets having DIN geometry are used throughout the world.

**deviation** The level of modulation of an FM signal—the extent by which the base-band of subcarrier signal shifts the main carrier frequency. In VHS the upper limit is 4.4 MHz.

**device control** A multimedia definition. Device control enables you to control different media devices over the network through software. The media devices include VCRs, laser disc players, video cameras, CD players, and so on. Control capabilities are available on the workstation through a graphical user interface. They are similar to the controls on the device itself, such as play, record, reverse, eject, and fast forward. Device control is important because it enables you to control video and audio remotely—without requiring physical access.

**dew detector** A passive device, found in some VCRs, whose resistance value depends upon ambient humidity; the resistance drops when moisture is present. Also called dew sensor.

**dew indicator** A warning light that goes on when there is too much moisture in the atmosphere. This feature appears on many VHS machines but on few Beta VCRs. Simple remedies consist of shutting off the machine for a while, using a hair blower near the VCR to minimize the moisture, putting on the air conditioner, etc. Some machines have a dew control that shuts off the VCR when moisture is excessive.

**dew sensor** Dew detector.

**DFM SSTV bandpass filter** A bandpass filter especially designed for SSTV.

**DG** Differential gain. Change of the chrominance amplitude (i.e., chrominance gain) as function of luminance level. In a color video channel, the voltage gain for a small chrominance subcarrier signal at a given luminance signal level expressed as a percentage difference relative to the gain at blanking or some other specified level. Can cause changes of hue with changes of level.

**DG/DP** Differential gain/phase.

**D/I** Drop and insert. A point in the transmission where portions of the digital signal can be dropped out and/or inserted.

**DIA/DCA** Document Interchange Architecture/Document Content Architecture. IBM-promulgated architectures, part of SNA, for transmission and storage of documents over networks, whether text, data, voice or video. Becoming industry standards by default.

**Diagnostics** Tests to check the correct operation of hardware and software. As digital systems continue to become more complex, built-in diagnostics become an essential part of the equipment.

**diagonal audio recording** Another method of recording sound on videotape, as opposed to linear audio and stereo. Diagonal recording places the

audio track along with the diagonal video track for better quality. In contrast to linear stereo, or linear track stereo as it is sometimes called, the superior Beta or VHS Hi-Fi technique uses diagonal audio recording.

**dial** A panel on a radio or TV set on which the frequencies are indicated.

**diamond display** See *Synthetic diamond display*.

**diaphragm** 1. A thin flexible sheet that can be moved by sound waves, as in a microphone, or can produce sound waves when moved, as in a loudspeaker. 2. An adjustable opening used in TV cameras to reduce the effective area of a lens to increase the depth of focus. Also called iris. 3. A conducting plate mounted across a waveguide to introduce impedance.

**diascope** A built-in test pattern that allows the TV camera to generate test signals for registration and other setup adjustments without the use of an external test pattern. It is a useful feature of many lenses.

**diathermy interference** TV interference caused by diathermy equipment. It produces a herringbone pattern in a dark horizontal band across the picture.

**dichroic** Having two colors.

**dichroic conversion filter** A camera lens filter that balances the color values of objects in direct sunlight so they will match the value of scenes shot under artificial light.

**dichroic daylight conversion filter** A lens filter that balances the color values of objects in direct sunlight so that they will match the values of scenes taped in artificial light.

**dichroic filter** An optical filter designed to transmit light selectively according to wavelength (most often, a high-pass or low-pass filter).

**dichroic mirror** A glass surface coated with a special metal film that reflects certain colors of light while allowing other colors to pass through. Used in some color TV cameras to reflect one designated visible frequency band and transmit all others.

**dichroic reflector** (mirror) Selectively reflecting surface from which light of certain wavelengths is reflected and other incident wavelengths transmitted. For example, a dichroic surface may be made which reflects only the longer wavelengths corresponding to the red region of the spectrum and transmits the remainder, so that the light transmitted is blue-green in color. Dichroic reflectors have particular application in color processes involving beam-splitting systems since they permit very efficient subdivision of the available light into the required spectral regions. In the TV camera, dichroic filters may be used to analyze the subject in terms of the separate primary colors. Red and blue reflecting dichroics, in conjunction with plain front-surfaced mirrors, direct the red and green components to their respective pick-up tubes. The

green tube takes the remaining image after its passage through both dichroics.

**differential gain (DG)** How much the color saturation changes when the luma level changes (it isn't supposed to). The result on the display will be incorrect color saturation. For a video system, the better the differential gain—that is, the smaller the number specified—the better the system is at figuring out the correct color.

**differential gain/phase** Video (color) nonlinear distortion parameters.

**differential nonlinearity (DNL)** A measure of the maximum amount by which the distance between the midpoints of adjacent steps on the ADC transfer function (quantized output level) differs from the width of one LSB.

**differential phase (DP)** Change of the chrominance phase as function of luminance level. The result on the display will be incorrect colors. For a video system, the better the differential phase—that is, the smaller the number specified—the better the system is at figuring out the correct color.

**differential pulse code modulation (DPCM)** Refers to a digital system in which the data transmitted or stored represents the difference between data elements (for images it is pixels), rather than the data elements themselves. See also *Prediction*.

**DigiCipher** Proposed fully digital HDTV system, American TV Alliance (ATVA). Operated with a 1050-line analog RGB input. The scan was interlaced 2:1, and the field rate was 59.94. The line rate, twice that of NTSC, was chosen to allow easy conversion of signals between the two systems.

**digital** Of or referring to a quantity that is expressive numerically. See also *Digitization*.

**Digital 8** Digital 8 compresses video using standard DV compression, but records it in a manner that allows it to use standard Hi-8 tape. The result is a DV "box" that can also play standard Hi-8 and 8 mm tapes. On playback, analog tapes are converted to a 25 Mbps compressed signal available via the i-Link digital output interface. Playback from analog tapes has limited video quality. New recordings are digital and identical in performance to DV; audio specs and other data also are the same.

**digital advanced television** An alternate term for high-definition television (HDTV).

**digital audio processor** A device that is used in conjunction with any standard VCR to record digital audio tracks on videotape.

**digital audiotape (DAT)** An audiotape designed for use in systems that employ digital, rather than analog, recording technology. DAT cassettes are more compact than conventional audio cassettes and are used for data and image storage as well as audio.

**Digital Betacam** A VCR format introduced by Sony in 1993. It is a high-quality digital format that can record 100 generations without signal degradation

because the signal is component digital. This means the video signal is broken into its two pieces, or components: luminance (black and white information) and chrominance (color information). The information is converted into a digital data stream, which is then recorded on the tape. This format also has four independently editable CD quality audio channels.

**digital clock** The component of a VCR or a tuner/timer serving a dual function: time-keeping and time-setting for unattended recording. Usually different controls set the clock or the timer.

**digital color art** A VCR feature that permits the viewer to place a tint over the video image. Provided the VCR is equipped with the necessary digital circuitry, this digital playback function offers the viewer a choice of several colors from which to choose.

**digital color space converter (DCSC)** A circuitry that converts the YCbCr signal to RGB.

**digital component video** Digital video using separate color components, such as YCrCb or RGB. See CCIR 601. Sometimes incorrectly referred to as D-1.

**digital composite video** Digital video that is essentially the digitized waveform of composite NTSC or PAL video signals, with specific digital values assigned to the sync, blank, and white levels. Sometimes incorrectly referred to as D-2 or D-3.

**digital compression** A process designed to permit full-motion video to be sampled, stored in a computer, and played back in real time. MPEG compression is the current standard.

**digital delay line** See *Delay line*.

**digital disk recorder (DDR)** A video recording device using a hard disk drive or optical disk drive. DDRs afford nearly instantaneous access to recorded material.

**digital effects** A series of special image enhancements resulting from digital circuitry built into some VCRs, TV sets and video cameras. For example, a VCR equipped with this circuitry can produce steady still pictures without the usual streaks and other visual interferences that often accompany this function. These stills can be obtained from a live broadcast as well as from a videotape. In addition, the audio portion of the program continues while the still remains on screen. Other features of digital circuits include noise reduction, PIP, slow motion (without video interferences) and a quick succession of still pictures known as strobe display. Strobe display, which differs from the conventional continuous slow motion function, produces images without interference and offers a wider range of slow motion. Digital circuitry also allows the viewer to watch two pictures at the same time. Some VCRs apply digital techniques to improve the overall image quality of poorly recorded tapes. Advanced circuitry accomplishes these feats by digitally "capturing" video frames from the moving videotape and parading them on the TV screen. Unlike conventional VCRs,

## digital encryption

which use analog signal processing, machines with digital circuitry also reduce the graininess of multi-generation tapes.

**digital encryption** An electronically advanced method of encoding or scrambling video information for security purposes. Digital encryption, which rephrases original video information line by line, is generally a more costly procedure than its counterpart, analog encryption, but results in a higher quality video image after the information is restored or decoded. The digital system requires a larger bandwidth than does the analog technique, which uses the standard 4.5-MHz bandwidth.

**digital field comb filter** A feature, usually found in advanced TV sets, that greatly reduces the NTSC interference effects often accompanying conventional TV sets. These special comb filters surpass the performance of standard line filters by delivering as many as 480 lines of horizontal resolution from wide band sources such as DVD and S-VHS tapes.

**digital gain-up** A feature, found on some video cameras, that enhances image contrast through the use of special electronic circuitry. Digital gain-up is particularly important in improving pictures shot under extremely low light conditions. Some camcorders advertise a digital gain-up circuitry response of 1 lux.

**digital image superimposer** A video camera feature designed to electronically store high contrast images. These images are usually used for a variety of purposes, such as superimposing titles, graphics or captions. When the user activates the button of this feature, the digital superimposer memorizes an image. Some cameras provide a built-in superimposer with a 4-page, 8-color memory. The digital image superimposer, also known as a digital superimposer or word register, is more sophisticated than a character generator. The latter also creates titles but more slowly and with limited typefaces.

**digital intro scan** This function scans the videotape and plays about 10 seconds of the beginning of each program (the part immediately following each encoded index signal) then freezes still images onto the three subscreens.

**digital leased-line service (DLS)** A system with a 634-km fiber-optic network, handling 48 TV channels or carrying 2.5 billion bits information per second; Dacom, Seoul, South Korea.

**digitally assisted television signal (DATV signal)** A signal of the HDMAC system. It is transmitted during the vertical field interval of  $1/50$  second = 2000 microseconds. This time permits a maximum bit rate of 1 Mb/s, but after allowance for error correction, a maximum bit rate of 960 Kb/s is available. A principal function of the DATV signal bit stream is to keep the branch-switching in precise synchronism at the transmitter and receiver.

**digital light processing (DLP)** A completely digital approach to projection display. The all-digital char-

acteristic of DLP-based display offers a unique capability to simultaneously display video, graphics and text that provides optimum performance for multimedia applications.

**digital light switch** See *Digital Micromirror Device*.

**Digital Micromirror Device (DMD)** All-digital display system, completely compatible with digital broadcasting, requiring no D/A conversion; Texas Instruments (TI). TI calls DMD a digital light switch. DMD has an array of hundreds of thousands of aluminum mirrors fabricated on a silicon chip. Each tiny mirror represents one pixel. When a voltage is applied to a mirror, it pivots slightly, reflecting light from an external light source through a projection lens onto a screen. When in the "off" state, light reflected from the mirror doesn't enter the lens.

**digital monitor** Computer monitor that accepts digital in addition to analog signals. DVI is the standard digital video interface.

**digital multi-audio** A feature built into a few VCRs that assigns auxiliary audio tracks to the videotape in lieu of video information. With Hi8 VCRs, e.g., digital multi-audio permits up to 24 hours of audio recording.

**digital multi-effects system** A professional/industrial system designed chiefly for TV stations that is capable of manipulating flat video images into 3-D images in real time. In addition, the system can produce such effects as sparkle, degrade (image breakup) and centipede (elongation of an object or subject).

**digital noise reduction** See *Digital video noise reduction*.

**digital oversampling** See *Oversampling*.

**digital paint art** A feature, found only on digital VCRs, that produces a rough gradation to a screen image to simulate the effect of an oil painting. Digital paint art usually offers several levels of contrast.

**digital photography** See *Still video camera*.

**digital picture memory** An advanced electronic feature, found on some VDPs and VCRs, which permits the audio portion of a program to continue while a picture "freezes" on the screen.

**digital remote control** A remote control in which the user selects or adjusts a desired function by punching out one or more digits on a calculator-like keyboard. Applications include direct selection of TV programs by channel number. In one version used for remote control of color TV, an ultrasonic receiver converts the 14 possible ultrasonic frequencies into digital codes that control the desired ON/OFF, channel-select, color, tint, and volume functions.

**digital rights management (DRM)** Digital rights management is a generic term for a number of capabilities that allow a content producer or distributor to determine under what conditions their product can be acquired, stored, viewed, copied, loaned, etc. Popular proprietary solutions include InterTrust, etc.

**digital satellite system (DSS)** A digital system, offering 400 to 500 lines of resolution and CD-quality audio. Compared to the 330 lines of resolution currently available on TV, or the 260 lines of resolution on VHS tapes, this is a major step up. In your home, the system consists of a small 18" satellite dish mounted outside your home and an integrated receiver/decoder (IRD), about the size of a VCR, which sits near your TV. A telephone line plugs into the back of the receiver, either directly or through an optional wireless transceiver, so that you can order programming and other services directly through the telephone line. DSS uses both MPEG-1 and MPEG-2 digital compression and decompression. Some systems are switching to MPEG-4. See also *RCA DSS, SAS-AD1*.

**digital scan** A feature on specially equipped VCRs designed to allow the viewer to see a picture in FF or REW mode. Only some VCRs with digital effects include this function.

**digital servo transport circuitry** A VCR system that controls both the capstan and head-drum motors to provide better track positioning. Some motors may produce phase and frequency errors. These defects in destabilization are sensed and corrected by a crystal oscillator. Image quality depends upon accurate tracking, which, in turn, relies upon the precision and rigidity of the motors. Imprecise tracking may result in audio wow-and-flutter or picture jitter or both.

**digital signal processor (DSP)** A specialized digital microprocessor that performs calculations on digitized signals that were originally analog (e.g., video) and then sends the results on. The big advantage of a DSP lies in the programmability of digital microprocessors.

**digital signal sound processor** An accessory designed to offer a simplified version of surround sound audio effects. Usually composed of dual speakers, an amp and digital delay circuits, the sound processor comes equipped with jacks for hooking it up to VCRs or TV receivers. The unit can be used without the complex wiring often necessary for surround sound.

**Digital Spectrum Compatible (DSC)** A proposed fully digital HDTV system, Zenith/AT&T. Operated with progressively scanned baseband video at 787.5 lines per frame and 59.94 frames/s. The line-scan rate was 47,203 Hz, three times that of the NTSC system to permit easy conversion between the two systems. DSC used the discrete cosine transform coding as a basis for its spatial compression.

**digital still-frame memory** An electronic feature, found on some VCRs and video cameras, that can play back single frames with perfect steadiness. VCRs and cameras with digital circuitry usually provide unstable freeze frames containing electronic interference or video noise in the form of lines, streaks or snow. Digitally produced special effects, such as

still-frame, eliminates these interferences. In addition, still-frames can be acquired from live broadcasts as well as videotape.

**digital stereo** In VCRs, the enhancement of audio by means of special digital and error-correction circuitry that virtually eliminates interference. Discrete right and left digital audio signal processing helps to produce a dynamic range of over 90 dB. Digital stereo has proven effective with video cameras as well. This is especially true with digital audio dubbing, which adds hi-fi sound to special effects and music.

**Digital Storage Media Command Control (DSM-CC)**  
See *Multi- and Hyper-media coding Experts group*.

**digital superimposer** See *Digital image superimposer*.

**digital S-VHS** An experimental audio enhancement process that records audio signals in a lower level of a videotape than conventional video signals. The digital system is compatible with existing S-VHS recorders and S-VHS-C camcorders. Developed by JVC, which calls the process D-MPX (depth-multiplexed signal AC bias recording system), digital S-VHS promises benefits for both consumer and professional applications. The system provides a sampling frequency of 48 kHz in 2-channel mode and 32 kHz in 4-channel mode.

**digital switcher** A professional/industrial unit that speeds up component digital editing by providing additional sophisticated capabilities to the production switcher, including multi-layer compositing in real time and color correction functions. In addition, digital switchers can accommodate several chroma keyers simultaneously to isolate different areas during the composite procedure. See *Switcher*.

**digital sync** A TV feature that eliminates the need for a manual vertical hold control. Digital sync automatically produces vertical hold modifications by sensing variations in video sync and locking into the correct reference for vertical adjustment.

**digital television (DTV)** Digital broadcasting represents a more efficient means of transmitting a broadcast signal than the analog delivery system. Up to 12 SDTV programs can fit into the spectrum space occupied by one analog program. In the U.S., the FCC has mandated a transition to DTV for broadcasters. See *HDTV*.

**digital television converter** A converter used to convert TV programs from one system to another, such as for converting 525-line 60-field US broadcasts to 625-line 50-field European PAL or SECAM standards. The video signal is digitized before conversion. Also called *digital television standards converter*.

**digital television standards converter** A professional electronic accessory which uses digital technology to convert different broadcasting and recording standards of other countries. Ordinarily incompatible standards such as SECAM, PAL and PAL M are connected to the TV converter, which processes the signal for line and field conversion. A memory output compen-



## digital tracking

sates for distortion usually caused by such conversion. The converter also operates with satellite broadcasts of foreign programs. Other functions of the device include its use as an editor, mixer and frame synchronizer to integrate local shows into network programs. Also called *digital television converter*.

**digital tracking** A VCR feature, most notably on some S-VHS models, that automatically compensates for disparities in videotapes recorded on different machines. Occasionally, a tape recorded on one machine may not play correctly on another VCR because the video heads or video head drums of the two machines may not be positioned at the same exact height. This difference causes video noise or bars to appear on the TV screen. The viewer may eliminate this interference by manually adjusting the tracking or skewing control dial. Digital tracking (sometimes called twin digital tracking), when activated, will correct the video signal automatically and optimize playback in any of the speed modes. Another advantage of digital tracking is that the user does not have to return the tracking control to its default position. This adjustment is necessary on VCRs without digital tracking to prevent future tapes from being recorded incorrectly.

**digital traffic** Traffic consisting of digital data that may or may not be combined with voice, video, or other forms of analog information which has been converted to a format suitable for pulse-code modulation.

**digital transcoder** An accessory designed to convert digital signal formats from D-1 to D-2 VTRs and vice versa. The transcoder is used chiefly with industrial tape machines.

**digital transfer** A technique that uses digital circuitry to transfer wide-screen theatrical films to video. Digital transfer, which is superior to other, older methods, produces better image quality while providing special sophisticated effects such as enlarging images, zooming in and out and simulating the original movements of the movie camera.

**Digital Transmission Content Protection (DTCP)** An encryption method (also known as "5C") developed by Sony, Hitachi, Intel, Matsushita and Toshiba for IEEE 1394 interfaces.

**Digital Transmission of Increased Capacity (DTIC)** Parallel transmission of data across the channel; Digital Compression Technology (New York City) and Stevens Institute of Technology (Hoboken, N.J.). Used in digital signal compression technique that permits existing communication systems to transmit the same volumes of advanced voice, video and data as state-of-the-art optical fiber. The patented technology is based on a breakthrough algorithm that compresses signals, at a ratio 16:1 in channel, rather than at the source as with MPEG.

**digital tuning** The use of quartz crystals that are tuned to each FM and AM frequency. Digital tuning, which

replaces the conventional dial readout, does away with the need for a manual tuner.

**digital TV receiver** A TV set designed to produce superior audio and video through the use of digital encoding of the broadcast signal. Instead of the conventional method of analog signal processing, the digital system uses large-scale integrated circuitry. Some of these chips digitally decode the video signal and process it while another handles the audio in a similar manner. Meanwhile, another special circuit in the TV receiver controls the tuning, power supply and other components. Digital TV reconstructs the signal more accurately than its counterpart, the analog process, which tends to lose much of the original quality. However, the relatively higher cost of this technique has affected its general acceptance in the marketplace.

**digital VCR** A VCR that uses special electronic circuitry to store and process information using electrical pulses to represent numbers. Video signals, which are waveforms, are normally recorded in analog form along with inherent video noise, or electronic interference. Digital machines, on the other hand, convert video signals into a predetermined code, or set of binary numbers. This method virtually eliminates video noise to produce an improved screen image and clearer special effects such as freeze frame, slow motion, PIP, strobe display, mosaics and posterization. Digital VCRs, first introduced to the general public in 1986, offer other benefits. For instance, viewers can call up two different programs simultaneously on their TV screens. In addition, signals converted into numbers not only are safe from distortion and noise, but can produce unlimited copies without degradation. Since the digital signal remains permanent, there is no loss in detail with successive generations of recordings.

**Digital Versatile Disc (DVD)** Compact discs that hold over two hours of digital audio, video, data, and graphics. The video is compressed and stored using MPEG-2. Beginning to replace VHS as the standard for in-home video viewing. See also *Digital videodisc*.

**Digital Vertical Interval Timecode** DVITC digitizes the analog VITC waveform to generate 8-bit values. This allows the VITC to be used with digital video systems. For 525-line video systems, it is defined by SMPTE 266M. BT.1366 defines how to transfer VITC and LTC as ancillary data in digital component interfaces.

**digital video** 1. A system where all of the information that represents images is in some kind of computer data form, which can be displayed or manipulated by a computer. Digital video specifically excludes analog video, where images are represented by continuous-scale electrical signals. 2. A video signal represented by machine-readable binary numbers that describe a finite set of colors and luminance levels.



3. A process of videotape recording with a potential for more accurate color renditions and pictures of higher resolution. Conventional recordings use the analog system of placing information on tape. On a professional/industrial level, there are two major digital formats—D-1, the component digital standard, and D-2, the composite digital standard. The former records the luminance and two color-difference channels digitally, while the latter, D-2, records such basic standard signals as NTSC and PAL. MII is another format competing for recognition. Digital compression, another technique, is still in the experimental stage.

**digital video camera** A professional video camera that has fewer moving parts and is generally lighter and smaller than its counterpart, the analog camera. First introduced by Panasonic in 1989, digital video cameras can filter out video cross-color and can make any necessary adjustments automatically. The company also introduced the first digital camcorder, which has 1/2" format.

**digital video cassette** See *DVC*.

**digital video compression** Reducing the amount of information necessary to reconstruct video frames at the receiving end of a transmission. The electronic signals are squeezed and thus signal capacity can be increased by factors of 8, 10, or more. The process can expand the number of channels per satellite transponder and create sufficient channel capacity to make DBS systems practical, and is used in HDTV. Cable operations are able to transmit hundreds of channels over a single fiber optic cable.

**Digital Video Disc (DVD)** Refers to standards for the higher density CD. DVD also stands for Digital Versatile Disc.

**digital video effects system** A professional/industrial workstation designed to produce numerous special video effects during the editing process. These units can be used for transitional or non-transitional functions. Some transitional uses (dissolving from one scene to another) include warp, prism, curvilinear, montage, mirror, mosaic, sparkle, trailing, decay, drop shadow, multi-freeze and rotation effects. In addition, a DVE system can be utilized to perform non-transitional tasks, such as correcting errors in a source tape. An intrusive shadow, window glare or overhead microphone can be removed by simply enlarging the picture and trimming it until the unwanted image does not appear. DVE units generally cost thousands of dollars.

**digital video frame storage** A laser VDP feature designed to retain one frame in memory, or in a buffer. This single frame appears on the TV screen until random access search for a new segment is completed. Before the introduction of this feature, VDPs would go to a black screen whenever random access was activated. Digital video frame storage operates automatically whenever the viewer presses the random

access function. The last frame seen on screen is then stored in the buffer and appears until the new material is located.

**Digital Video Interactive (DVI) technology** (David Sarnoff Research Center) A technology with the objective of putting TV-style video and audio on a personal computer. Digital video interactive technology made possible the first systems which truly merged PCs and TV. The technology was first shown publicly on March 1, 1987. The audiovisual material for this presentation was done entirely with the DVI system, displayed on a large screen projector, showing slides from hard disk, motion video and audio from CD-ROM, and application demonstrations.

Digital video interactive technology consists of four unique elements:

- A custom VLSI chip set, which is the heart of the video system
- A specification for a runtime software interface
- Some audio/video data formats
- Compression and decompression algorithms.

**digital video noise reduction** Special electronic technology that improves signal-to-noise ratios by combining two video fields. First introduced into S-VHS VCRs, this electronic video noise reduction system differs greatly from other attempts to reduce image interference from video signals. Using special comb and notch filters, this new system, also known as field correlation, adds a complete field of information to each succeeding field. Since both fields are almost identical, the signal power is therefore doubled. Although distortion and video noise is inherent in all video signals, the interference does not double along with the enhanced dual-field video image. This results in a clearer screen image without the usual additional video noise and wavy lines. Several sophisticated VCRs with this digital feature, sometimes listed as DVNR, offer several settings. They include one for use with prerecorded tapes, another to compensate for poor reception caused by a weak signal, and the usual on/off switch. The digital system, introduced by NEC in 1986, works with both broadcast signals and prerecorded tapes.

**digital video recorder (DVR)** DVRs can be thought of a digital version of the VCR, with several enhancements. Instead of a tape, the DVR uses an internal hard disk to store compressed audio/video, and has the ability to record and playback at the same time. The main advantage that DVRs have over VCRs is their ability to time shift viewing the program as it is being recorded. This is accomplished by continuing to record the incoming live program, while retrieving the earlier part of the program that was just recorded. The DVR also offers pause, rewind, slow motion, and fast forward control, just as with a VCR.

**digital video stabilizer** A device to eliminate video copy guards. While watching rental movies, you may notice annoying periodic color darkening, color shift,

## digital video transmission

unwanted lines, flashing or jagged edges. This is caused by the copy protection jamming signals embedded in the videotape, such as Macrovision copy protection. The digital video stabilizer eliminates copy protections and jamming signals and brings you clear pictures.

**digital video transmission** An experimental method that permits specially equipped VCRs to receive rented or purchased movies by way of satellite. By calling on the telephone, the consumer can order a movie to be transmitted to his or her VCR. Because of the digital process, the rented film can usually be recorded in about 10 minutes and can be played back two times. If the film is purchased by this method, it can be played countless times. The only limitation, albeit a major one, is that at the present time a satellite dish is required. Developers hope that in the future they can build receiving capabilities directly into the VCR.

**digital zoom** 1. A VCR feature that employs special electronic circuitry to produce various effects such as enlarging one portion of a screen image to full screen size. Some viewers may find this a useful method of examining an image more closely. The digital zoom feature, which appears only on digital-type VCRs, can be used on any segment of the screen. For example, some digital VCRs can divide a screen picture into four parts with a fifth image appearing in the center. This last image can be enlarged four times its original size. 2. A camcorder feature that achieves a close-up effect not through the optics of the lens, but via manipulation of the electronic signal. These digital telephoto shots generally suffer from decreased resolution.

**digitization** The process of changing an electronic analog signal such as a TV signal into a discrete numerical form. Digitization is subdivided into the processes of sampling the analog signal at a moment in time, quantizing the sample (assigning it a numerical level), and coding the number in binary form. The advantages of digitization include improved transmission and repeatable quality; the disadvantages include the need for more storage space than the analog signal. Data compression works to reduce that disadvantage.

**digitize** To convert an analog or continuous signal into a series of ones and zeros—that is, into a digital format.

**digitized video** Today's analog TV systems contain a large number of digital subsystems. The signals used by these are digitized representations of the composite NTSC, PAL, or SECAM TV signals and are referred to as digitized video.

**digitizer** 1. A device that converts an analog signal into a digital representation of that signal. Usually implemented by sampling the analog signal at a regular rate and encoding each sample into a numeric representation of the amplitude value of the

sample. 2. A device that converts the position of a point on a surface into digital coordinate data.

**digitizing** The process of converting an analog signal into a digital signal. With images, it refers to the processes of scanning and A/D conversion.

**dihedral** A term used to describe the relative position between the two video heads as they are mounted in the head cylinder. Perfect dihedral means that the tips of the heads are exactly 180 degrees apart.

**diheptal base** A tube base having 14 pins or possible pin positions. Used chiefly on TV CRTs.

**dilution** Reducing the intensity of a color by adding white.

**DIN** Deutsche Industrie-Norm. German standard for electronic connections. DIN plugs can be 3-, 4-, 5-, or 6-pin plugs, depending on their use, although they all have the same outer diameters and appearance. DIN connectors were used in earlier Sony professional equipment. Today DIN plugs and connectors are still available in 3-pin and 6-pin configurations.

**diode gun** A small aperture, high-resolution gun found in camera tubes for HDTV.

**diopter** A unit of measurement of a lens, equal to the power of a lens with a focal distance of 1 m, commonly used in eyeglasses. A lens with a plus (+) number of diopters is converging; a minus (-) number of diopters is diverging. A plus diopter is used in TV for close-ups. See also *diopter lens*.

**diopter lens** A feature found on the electronic viewfinder of some video cameras that permits magnification and adjustment for users who wear eye glasses.

**DIP** Dual in-line package; refers to integrated circuits.

**diplexer** Specialized piece of equipment for joining power radio feeds. A diplexer sometimes denotes a unit for combining two feeds of the same frequency (joining of parallel transmitters), sometimes for splitting a feed to two separate feeders (to feed two aerial arrays). A diplexer is also used in TV receiver aerial systems, either for joining two aerials together to a common feeder (e.g., Band I and Band III) or for splitting the output of an aerial into separate bands for separate receiver inputs.

**diplexing** 1. The simultaneous transmission or reception of two signals while using a common antenna, made possible by using a device called a diplexer. Used in TV broadcasting to transmit visual and aural carriers by means of a single antenna. 2. A process in which video circuits carry two full frequency audio channels, thereby making stereo TV possible. The two audio channels are transmitted above the video signal, the main one at 5.8 MHz and the other at 6.4 MHz. Diplexing is capable of operating on telephone and microwave transmissions.

**direct broadcast by satellite** (DBS) A method of broadcasting that uses a communications satellite in geostationary orbit as the main transmitter. The

signal to be broadcast is transmitted from its point of origin on the earth to the satellite where it is received, amplified, and retransmitted to cover a wide area. It is detected directly by individual receivers using a suitable dish antenna tuned to the DBS signals.

**Direct Broadcast Satellite (DBS)** 1. A term commonly used to describe Ku-band broadcasts via satellite directly to individual end-users. 2. A satellite transmitting TV programs which can be received by small fixed dish antennas often installed in backyards or on the roofs of houses. DBS services carry a large number of channels and directly compete with cable TV. In the U.S., at present two companies offer DBS service, DirecTV and EchoStar.

**direct channel access** Electronic channel selection.

**direct chapter search** A videodisc feature, usually found on the wireless remote control component, that allows the user to access different programs on the disc.

**direct copying** See *Copying*.

**direct cross** See *Cross*.

**direct-current restorer (DCR)** A device that restores the DC component or low-frequency component to a signal that has had its low-frequency components removed by a circuit element with high impedance to direct current. The device may also be used to add DC or low frequency to a signal lacking these components. DCR is used in TV sets to reconstruct the original video signal. It is required either to restore the DC component to the received signal as in AC transmission or to correct for the presence of an unwanted spurious DC component.

**direct-current transmission** A method of transmission used in TV in which the DC component of the luminance signal is directly represented in the transmitted signal. See *AC transmission*.

**direct-drive capstan servo motor** See *VTR*.

**direct drive cylinder** As used in VHS, this means that the video heads are driven by a self-contained brushless DC motor using no belts or gears. DDCs produce pictures with better stability.

**directional microphone** A microphone which is more sensitive to the sound in front of it, blocking any sound coming from its rear. It is preferred for recording from a distance.

**direct method** See *Color recording*.

**direct pickup** The transmission of TV images without intermediate photographic or magnetic recording.

**direct recording** Recording that produces a record immediately without subsequent processing, in response to received signals.

**direct reflection** Reflection of light, sound, or radio waves in accordance with the laws of optical reflection, as by a mirror. Also called mirror reflection, regular reflection, and specular reflection.

**direct scanning** A scanning method that illuminates the subject at all times and only one elemental area

of the subject is viewed at a time by the TV camera. Used in live TV broadcasting, whereas indirect or flying-spot scanning is sometimes used in industrial TV systems.

**direct-to-home (DTH) satellite television** Satellite systems providing television service direct to homes. At present in the U.S., there are three commercially available systems: C-Band, DirecTV, and Dish Network. See *C-Band*, *DBS*, and *high power satellite TV*.

**DirecTV** One of two DBS satellite companies in the U.S. The other is Dish Network, owned by EchoStar.

**direct video/stereo audio inputs** A TV monitor/receiver feature that permits the connection of a stereo VCR directly into the TV's A/V inputs. This technique improves picture quality. In addition, the hookup provides stereo sound by way of the built-in speakers of the monitor/receiver.

**direct view** A CRT or projected image that is watched directly, as opposed to a hard-copy print.

**direct view TV** Refers to conventional TV as opposed to rear or front projection TV. Some large-screen direct view monitors/receivers feature screens ranging from 27 to 40 inches, measured diagonally.

**disconnect** In CATV, telephone, and other fields, a subscriber whose service has been terminated, usually for nonpayment.

**discrete cosine transform (DCT)** A pixel-block based process of formatting video data where it is converted from a three-dimensional form to a two-dimensional form suitable for further compression. In the process the average luminance of each block or tile is evaluated using the DC coefficient. Used in the CCITT's Px64 videoconferencing compression standard and in the ISO/IEC's MPEG and JPEG image compression recommendations. A DCT is a way to represent an image. Instead of looking at it in the time domain—which, by the way, is how we normally do it—it is viewed in the frequency domain. It's analogous to color spaces, where the color is still the color but is represented differently. In the same way that the YCbCr color space is more efficient than RGB in representing an image, the DCT is more efficient at image representation.

**discrete multi-tone** See *DMT*.

**discrete time oscillator (DTO)** A digital version of the voltage-controlled oscillator.

**discriminator** A circuit that converts a frequency-modulated or phase-modulated signal into an amplitude-modulated signal. An audio detector in an FM receiver or TV sound circuit. Also, a detector performing a similar function in other frequency control circuits, such as horizontal frequency control.

**dish** Jargon for a parabolic microwave antenna, used for receiving line-of-sight terrestrial signals or signals from satellites.

**Dish Network** One of two DBS satellite companies operating in the U.S. The other is DirecTV.

## display

**display** The visual presentation of information, usually on a TV-like screen or an array of illuminated digits. The display may take the form of a CRT, LCD or beam indexing. Hand-held or pocket TVs may use any one of these three types of displays.

**display list** A list of commands placed in memory by the host CPU. A display processor then interprets and executes the display list commands independently from the activity of the host CPU. This is how the two processors communicate while running in parallel.

**display primaries** Primary colors that, when mixed in proper proportions, produce other desired colors. The three primaries usually used are red, green, and blue. Also called receiver primaries.

**display screen** Refers to the presentation of various kinds of information on the TV screen other than prerecorded or over-the-air broadcast programs. VCR displays may take the form of menus that permit the viewer to program the unit to record events for later viewing. Displays of some TV receivers provide on-screen menus for adjusting the color or audio portions of a picture, switching from one antenna source to another or confirming a channel selection. Many VDPs display, often by means of superimposed images, such functions as chapter, track, frame, speed, playback or scan direction.

**display window** That part of a VCR, located on the face of the unit, that provides the user with a variety of information, such as tape counter, current time, etc. If the VCR is programmed, the window will display the time, day, channel and number of shows to be recorded as well as the recording speed. Also, the display window shows Play, FF, Reverse and Rew modes when these have been activated. Different models, depending on sophistication, offer other features, such as auto-rewind when tape has reached its end and an indicator light when a cassette is inserted.

**dissector tube** Image dissector.

**dissolve** 1. Fading between scenes without going to black. 2. The merging of two TV camera signals in such a way that as one scene disappears, another slowly appears.

**distance change command** In some autostereoscopic 3D-image display systems, a command to provide the image can be stereoscopically observed from a position of the designated distance.

**distance learning** 1. Video and audio technologies used in education so students can attend classes in a location distant from where the course is being presented. 2. A Pacific Bell term for students sitting in front of TVs and phones and participating in classes that are being held and delivered elsewhere. In one of PacBell's trials, they used a T-1 signal, so the distant lecturer could see and hear his distant students using full-color video.

**distant signal** In CATV, a station "imported" from a

market other than the one in which the cable system is located.

**distortion** 1. Any undesired change in the waveform of a signal. 2. Any undesired deviation of an image from proportionality with the original scene. Distortion is a significant problem in telecommunication systems. There are several different types of distortion.

Amplitude distortion occurs when the ratio of the root-mean-square value of the output to the r.m.s. value of the input varies with the amplitude of the input, both waveforms being sinusoidal. If harmonics are present in the output waveform only the fundamental frequency is considered.

Aperture distortion of an image occurs in a scanning system when the scanning spot has finite dimensions rather than infinitely small dimensions.

Attenuation distortion occurs when the gain or loss of the system depends on frequency. Also called frequency distortion.

Barrel and pincushion distortion are seen when the lateral magnification is not constant but depends on image size. Barrel distortion occurs when the magnification decreases with object size, pincushion distortion when it increases with object size.

Coma is a plumlike distortion of the spot occurring when the focusing elements of the electron gun are misaligned.

Crossover distortion occurs in push-pull operation when the transistors are not operating in the correct phase with each other.

Delay distortion is a change in the waveform because of the variation of the delay with frequency.

Harmonic distortion is due to harmonics not present in the original waveform.

Intermodulation distortion results from spurious combination-frequency components in the output of a nonlinear transmission system when two or more sinusoidal voltages, applied simultaneously, form the input. Intermodulation distortion of a complex waveform arises from intermodulation (see *Modulation*) within the waveform.

Keystone distortion is due to the length of the horizontal scan line varying with the vertical displacement of the line. It is most pronounced when the electron beam is at an acute angle to the screen and results in a trapezoidal image instead of a rectangular one. It can be removed using suitable transmitter circuits.

Nonlinear distortion is produced in a system when the instantaneous transmission properties depend on the magnitude of the input. Amplitude, harmonic, and intermodulation distortion are all results of nonlinear distortion.

Phase distortion of an image is seen in electronic systems, such as CRTs, TV picture tubes, etc. It is due to errors in the electron-lens focusing systems.

Trapezium distortion is a trapezoidal pattern on

the screen of a CRT instead of a square one and occurs when the deflecting voltage applied to the plates is unbalanced with respect to the anode.

See also *Envelope delay*; *Field tilt*; *Foldover*; *Glitch*; *Hook*; *Line tilt*; *Meshbeat*; *Shading signals*; *Smear*.

**distribution amplifier (DA)** A piece of equipment that takes an input and gives multiple outputs of that same input. An RF power amp used to feed TV or radio signals to a number of receivers, as in an apartment house or hotel.

**distribution control** Linearity control.

**distribution system** A communication system consisting of coax but occasionally of line-of-sight microwave links that carries signals from the headend to end-users.

**distribution systems** See *System terminology*.

**distribution quality** The level of quality of a television signal from the station to its viewers. For digital television this is approximately 19.39 Mbps.

**distribution-quality television** TV conforming to the NTSC standard, the SECAM standard, the PAL standard, or the PAL-M standard. Syn.: (in CCITT usage) existing-quality TV. See also *Enhanced-quality television*, *High-definition television*.

**disturbance** 1. An undesired interference or noise signal affecting radio, TV, or facsimile reception. 2. An undesired command signal in a control system.

**dithering** 1. The process of spreading the energy of a signal. The 6-MHz satellite signal is shifted up and down the 36-MHz satellite transponder spectrum to distribute the energy of the video signal. The purpose is to reduce the interference that any terrestrial microwave transmitter could cause to the satellite transmission. 2. A method for making digitized images appear smoother using alternating colors in a pattern to produce a new, perceived color. For example, displaying an alternating pattern of black and white pixels produces gray. Also, a technique of adding random noise to pixel values before quantization.

**divcon** Device for displaying printed messages on a TV screen from information received from its computer-type store, a tape reader, or a keyboard provided. Developed in the US by RCA.

**divergence** The spreading of a cathode-ray stream due to repulsion of like charges (electrons).

**diverging meniscus** A thicker version of the converging meniscus lens configuration. One side curves inward and the other side curves outward, but the edges of the curves do not meet at the rim as they do in converging meniscus lens.

**dk** Dark; Deck.

**DL** Delay Line.

**DLP** Digital Light Processing.

**DM** Delta Modulation.

**DMA** Designated Market Area.

**D2-MAC** One of two European formats for analog HDTV.

**D-MPX** See *Digital S-VHS*.

**DMD** See *Digital Micromirror Display*.

**DMT** Discrete Multi-Tone. A technology using digital signal processors to pump more than 6 megabits/s of video, data, image and voice signals over today's existing one-pair copper wiring. DMT technology is actually a form of frequency division multiplexing (FDM). It provides the following:

- Four "A" channels at 1.5 Mbps. Each "A" channel may carry a "VCR"-quality video signal, or two channels may be merged to carry a "sports"-quality real-time video signal. In the future, all 4 channels operating together will be able to transport an Extended Definition TV signal with significantly improved quality over anything available today. ("A" channels are asymmetric, carrying information only from the telephone company to the subscriber's residence. All other channels within ADSL are symmetric or bi-directional.)
- One ISDN "H zero" channel at 384 Kbps (kilobits per second). This channel is compatible with Nortel's multirate ISDN Dialable Wideband Service or equivalent services. This channel could also be used for fast, efficient access to corporate LANs for work-at-home applications, using Nortel's DataSPAN or other frame-relay services.
- One ISDN Basic Rate channel, containing two "B" channels (64 Kbps) and one "D" channel (16 Kbps). Basic Rate access allows the home user to access the wide range of emerging ISDN services without requiring a dedicated copper pair or the expense of a dedicated NT1 unit at the home. It also permits the extension of Nortel's VISIT personal video conferencing to the home at fractional-T1 rates (Px64).
- One signaling/control channel, operating at 16 Kbps giving the home user VCR-type controls over movies and other services provided on the "A" channel including fast-forward, reverse, search, and pause.
- Embedded operations channels for internal system maintenance, audits, and telephone company administration.
- Finally, the home user can place or receive telephone calls over the same copper pair without affecting the digital transmission channels listed above. And since ADSL is passively coupled to the POTS line, the subscriber's POTS capability is unimpaired in the event of a system failure.

**DNG** Digital news gathering. Electronic news gathering (ENG) using digital equipment and/or transmission.

**DNL** Differential nonlinearity.

**DNR** See *Dolby Noise Reduction System*.

**DOC** A professional term or abbreviation that refers to dropout compensation. Several industrial products, such as the time base corrector, provide this feature in addition to their major functions.

## dock

**dock** Loading slot in VCRs.

**dockable video camera** A professional/industrial video camera designed to connect to a specially designed unit so that the camera can be operated in several formats. Cameras so equipped usually have a multi-standard switchable encoder that offers special outlets for Beta, S-VHS and other formats.

**docudrama** A combination of documentary and drama, such as *Roots* and other TV shows that are semifictionalized versions of history.

**docu-fantasy** A TV presentation that uses factual elements as the basis of a far-fetched dramatic reconstruction or projection of events. The overt encroachment of speculation and dramatization into documentary programs, and of documentary techniques into drama, began with the docudrama, but with the advent of the docu-fantasy seems to leave the tiresome world of facts behind altogether.

**document camera** A specialized camera on a long neck that is used for taking pictures of still images—pictures, graphics, pages of text and objects which can then be sent stand alone or as part of a video conference.

**Dolby, Ray** Engineer; co-developer (with Charles Ginsburg) of the first video recorder, demonstrated in 1956; inventor of the famous Dolby Noise Reduction System used in almost all quality audio recorders and many VTR and VCR machines.

**Dolby Digital** An audio compression technique developed by Dolby. It is a multi-channel surround sound format used in DVD and HDTV. First used in movie theaters in 1992, it is the result of decades spent by Dolby Laboratories developing signal-processing systems that exploit the characteristics of human hearing. (Formerly Dolby AC-3.)

**Dolby E** An audio coding system designed specifically for use with video, available from Dolby Laboratories. The audio framing is matched to the video framing, which allows synchronous and seamless switching or editing of audio and video without the introduction of gaps or A/V sync slips. All of the common video frame rates, including 30/29.97, 25, and 24/23.976, can be supported with matched Dolby E audio frame sizes. The Dolby E coding technology is intended to provide approximately 4:1 reduction in bit rate. The reduction ratio is intentionally limited so that the quality of the audio may be kept very high even after a number of encode-decode generations. The fact that operations such as editing and switching can be performed seamlessly in the coded domain allows many coding generations to be avoided, further increasing quality.

**Dolby Noise Reduction System (DNR)** A technique invented by Ray Dolby designed to increase hi-fi signals during recording and condense them in reproduction. This results in weak segments of the signal being boosted during recording and decreased to normal when they are played back, thereby mini-

mizing background noise. DNR provides an inexpensive method of adding quality stereo to videotape in both professional machines and home VCRs. Variations of the system include Dolby A, B and C. Dolby B provides an increase in noise reduction to 10 dB above 7,000 Hz, while Dolby C is said to offer an increase of 20 dB over a wider range than B.

**Dolby Pro Logic** A circuitry to recreate the sound of a Dolby Stereo theater in home A/V systems. Dolby Pro Logic decodes movies, TV shows and musical recordings that have been encoded with Dolby Surround, directing sound to the proper, realistic location in a 5-speaker system while creating expanded listening area. Unlike the old 3-channel Dolby Surround Systems that used a phantom center channel derived from the left and right speakers, Dolby Pro Logic is a 4-channel system: left, right, center and rear. Center-channel information is derived from the left and right channels and fed to a separate amp for separation and accurate positioning. Dialogue is anchored to the center-channel speaker, which should be positioned directly above or below the TV. The rear-channel information is derived by extracting the differences between the front channels and then delaying and processing them using a modified, Dolby B-type noise reduction.

**Dolby Surround (Dolby Stereo and Dolby 4:2:4)** Matrix Analog coding of four audio channels—Left, Center, Right, Surround (LCRS)—into two channels referred to as Right-total and Left-total (Rt, Lt). On playback, a Dolby Surround Pro Logic decoder converts the two channels to LCRS and, optionally, a subwoofer channel. The Pro Logic circuits are used to steer the audio and increase channel separation. The Dolby Surround system, originally developed for the cinema, is a method of getting more audio channels but suffers from poor channel separation, a mono limited bandwidth surround channel and other limitations. A Dolby Surround track can be carried by analog audio or linear PCM, Dolby Digital and MPEG compression systems.

**dolly** 1. Wheeled mounting device for TV cameras. It allows the camera to be tracked forward and back by an operator other than the cameraman, while the cameraman controls the height of himself and the camera. The cameraman can also pan and tilt the camera in the usual way. 2. Wheels on the feet of a tripod. 3. The action of moving a camera toward or away from a scene, as to dolly in or dolly out.

**dollying** See *Tracking*.

**dolly shot** See *Tracking*.

**domain** In magnetic substances, such as tapes, a region of molecules that is the smallest known permanent magnet. On an unmagnetized tape, these domains are oriented in a random fashion over the entire surface of the tape. The result of this random magnetization is that N and S magnetic poles effec-



tively cancel one another. When a signal is recorded onto tape, the magnetization from the recording head orients the individual domains into specific directions, so their combined magnetism produces an average magnetic flux force at the surface of the tape. The video recording process takes place in a bandwidth of much higher frequency than does the audio recording process. Therefore, the basic tape formulation for video recording must be highly refined, in order to increase the domain particle density and to reduce the dropouts.

**domestic satellite** See *Satellite focus*.

**DOMSAT** DOMestic communication SATellite.

**Donald Duck effect** An unintelligible sound track caused by speeding up videotape playback without modifying the audio pitch. Some VCRs have double- or triple-speed play, in which the unmuted audio track emerges sounding like the Walt Disney character. Some machines, on the other hand, disengage the sound track in this mode, while others use special digital processing which makes the sound track intelligible.

**dope sheet** Caption sheet.

**doppler shift** A general phenomenon, of importance in satellite communications. Denotes an apparent change of frequency of a wave train caused by relative motion between the wave source and an observer. If a source emitting waves approaches the observer, the waves are crowded together and their frequency thereby increased. Similarly, if the source recedes, the waves are stretched out and their frequency is decreased. An example of the doppler shift is in the change of note of a train whistle as the locomotive approaches and passes an observer.

**dot** Picture element.

**dot crawl** See *Cross-luminance*.

**dot generator** A signal generator that produces a dot pattern on the screen of a 3-gun color TV picture tube, for use in convergence adjustments. When convergence is out of adjustment, the dots occur in groups of three, one for each of the receiver primary colors. When convergence is correct, the three dots of each group converge to form a single white dot.

**dot matrix tube** See *Color picture tube*.

**dot pattern** Tiny dots of light made by the signal of a dot generator and appearing on the screen of a color picture tube. The three color-dot patterns (R,G,B) merge into one white-dot pattern once the beam convergence is attained.

**dot pitch** The distance between screen pixels measured in millimeters. The shorter the distance, the better the resolution. It is a measure of the clarity of a RGB color monitor. Dot pitch is the major determinant in the clarity of an image on screen.

**dot-sequential color television** A system in which signals from the primary color sources (for instance, the three tubes of a color camera) are transmitted

in sequence so rapidly that each signal persists for only the duration of scanning one picture element. Thus neighboring elements are reproduced in different primary colors but the elements are so small and so closely spaced that at normal viewing distances the eye cannot resolve them and sees the color formed by the addition of the primary components.

**double amplitude** Syn.: peak-to-peak amplitude.

**double azimuth** A Sony innovation in the videohead drum that practically eradicates interference (i.e., "noise") during still frame, slow motion, and picture search modes.

**double-azimuth 4-head system.** See *Azimuth*.

**double-beam CRT** See *Cathode-ray tube*.

**double buffering** As the name implies, you need two buffers—for video, this means two frame buffers. While one of the buffers is being displayed, the other buffer is operated on by a filter, for example. When the filter is finished, the buffer that was just operated on is displayed while the first buffer is now operated on. This goes back and forth, back and forth. Since the buffer that contains the correct image (already operated on) is always displayed, the viewer does not see the operation being performed and sees a perfect image all the time.

**double chain** In TV, the simultaneous running of two projectors, each with different film or tape, in order to intercut from one to the other, such as for cut-away or reaction shots in an interview.

**double-eye system** A 3D-image system based on a single observer. See *multi-eye system*.

**double image** A TV picture consisting of two overlapping images, due to reception of the signal over two paths that differ in length so signals arrive at slightly different times. The longer path generally involves reflection of the signal by a hill, building, or large metal structure. The later-arriving reflected signal is often called a ghost because it is usually weaker than the direct signal and produces a phantomlike image to the right of the regular image.

**double mirror** A digital video effect where the displayed picture appears as though split by an imaginary line, one side having the original image and on the other side of the split is a complementary mirror image. Syn.: symmetry.

**double sided page turn** See *Page turn*.

**double-side videodisc player** A relatively high-priced unit that permits both sides of a CLV or CAV 12" videodisc to play continuously without the viewer's having to change or turn over the disc. These players usually provide a quick transition from one side to the other with little interruption.

**double-sideband transmission** The transmission of a modulated carrier wave accompanied by both of the sidebands resulting from modulation. The upper sideband corresponds to the sum of the carrier and modulation frequencies, whereas the lower side-

## double-sided mosaic

band corresponds to the difference between the carrier and modulation frequencies. Low-power UHF TV stations with less than 1 kW radiated power are allowed to use double-sideband transmission, except that the lower subcarrier sideband must be attenuated by at least 42 dB.

**double-sided mosaic** An array of photosensitive elements insulated one from the other and mounted in a TV camera tube in such a way that an image can be projected optically on one side of the mosaic. The corresponding electric signal is obtained by electronically scanning the other side of the mosaic.

**double speed play** A technique that permits viewing a program at two times the normal speed and listening to an intelligible sound track without the Donald Duck effect which usually accompanies audio tracks that are speeded up. This feature was first used on a VCR manufactured by JVC.

**down-converted color** The color information in a VCR is converted down to about 600 kHz, placing it below the luminance frequency (thus the term "color under"). This signal is still amplitude- and phase-modulated for color saturation and tint. The down-converted color signal is recorded directly onto the magnetic tape using the same heads that record the FM luminance signal. As with the FM luminance, the color signal is converted back to the standard video signal during playback. As the tape moves through a VCR, variations in tape speed occur that cause severe problems for the critically phased color signal. During the playback process of converting the 600 kHz signal back to 3.58 MHz, these errors are easily corrected.

**down-converter** A circuit that lowers the high-frequency signal to a lower, intermediate range. It is used in conjunction with single pay TV systems that send their signals via multipoint distribution service (MDS) microwave. The down-converter lowers the frequency of the signal so that it can be received by the TV set. In satellite TV, there are three distinct types of downconversion used in satellite receivers: single downconversion; dual downconversion; and block downconversion.

**downlink** The radio or optical transmission path downward from a communication satellite to the earth. The upward path is the uplink.

**downlink antenna** 1. The antenna on-board satellite which relays signals back to earth. 2. The spherical dish, which receives the return signal from a satellite. The original signal is sent from an earth station called the uplink to the satellite 22,300 miles above the equator, where the signal is then transmitted to various (downlink) receiving stations. The downlink TV signal usually ranges from 3.7 to 4.2 GHz.

**downloading** Recording an off-the-air program for viewing at a more convenient time. Downloading, or using the time-shift capacity of the VCR or PVR,

is one of the machine's strongest selling points. Home View Network, the now-defunct brainchild of ABC, introduced broadcast downloading—for a monthly fee—as an alternate pay TV service. Today, the term downloading is more often used with computers, particularly with users who have modems and can download data from other sources. See *Time shift*.

**downstream** In interactive or 2-way TV, the programming to the subscribers.

**downstream channel** The frequency multiplexed band in a CATV channel that distributes signals from the headend to the users.

**downstream keyer** A special-effects generator that enables the technical director (TD) to insert or key over composite video signal just before the video signal leaves the switcher to go over the air.

**downward modulation** (US) Negative modulation.

**downwards conversion** Standards conversion to a lower (for example, 625 to 405) line standard.

**DP** Differential phase. Change of the chrominance phase as function of luminance level. In a color video channel, the phase shift of a small chrominance subcarrier signal at a given luminance signal level, relative to the phase shift at blanking level. Can cause changes of hue with changes of level.

**DPCM** Differential pulse code modulation.

**DQPSK** Differential quadrature phase shift keying, a digital modulation technique commonly used with cellular systems.

**D<sub>R</sub>'** Transmitted red color difference signal (SECAM);  $D'_R = -1.9(R-Y)$ .

**DRAM** Dynamic RAM (Random Access Memory). High density, cost-effective memory chips (integrated circuits) used extensively in computers and generally in digital circuit design, but also for building framestores and animation stores. Being solid state, there are no moving parts and they offer the densest available method for accessing or storing data. Each bit is stored on a single transistor, and the chip must be powered and clocked to retain data.

**drama-com** Syn.: dramedy.

**dramedy** A TV comedy-drama.

**drape** To cover, hang, or decorate; cloth hanging, perhaps in folds, as in drapery or drapes, often used as a backdrop on a TV set.

**Dr/Db switch** Sync pulse with period of two lines, the rising edge of which marks the start of a line with positive polarity of V component in PAL chrominance signal or the start of a Dr line in Dr/Db sequence in SECAM chrominance signal. Syn.: 2H; 7.8 kHz; PAL switch; PAL switching signal; SECAM switch.

**drive control** Horizontal drive control.

**drive pulses** Signals from the sync generator that control the scanning of the electron beams.

**driver** A software entity that provides a software interface to a specific piece of hardware. For example, the DVI video driver provides software access to the video board hardware.

**drive unit** The unit that drives the large output stages in a high-powered TV transmitter, normally of 5 kW upwards and operating in the VHF and UHF bands of 40 MHz to 850 MHz.

**DRM** See *Digital rights management*.

**drop** 1. A wire or cable from a pole or cable terminal to a building; the hookup between a CATV system and the subscriber's set. 2. Syn. insert. Sound effect inserted on an audio- or videotape after the initial recording.

**drop field scrambling** This method is identical to the sync suppression technique, except there is no suppression of the horizontal blanking intervals. Sync pulse suppression only takes place during the vertical blanking interval. The descrambling pulses still go out for the horizontal blanking intervals (to fool unauthorized descrambling devices). If a descrambling device is triggering on descrambling pulses only, and does not know that the scrambler is using the drop field scrambling technique, it will try to reinsert the horizontal intervals (which were never suppressed). This is known as double reinsertion, which causes compression of the active video signal. An unauthorized descrambling device creates a washed-out picture and loss of neutral sync during drop field scrambling.

**drop frame** SMPTE time code format to reconcile the difference between the frame rate for black and white TV (30 fr/s) and color TV (29.97 fr/s).

**drop-in** A TV channel that can be added to existing allocations without causing interference to stations located elsewhere but on the same channel.

**dropout** Loss of a portion of the video picture signal caused by lack of iron oxide on that portion of the video tape or by dirt or grease covering that portion of the tape.

**dropout compensator** Circuitry that senses signal loss produced by dropout and substitutes for missing information the signal from the preceding line—if one line drops out of a picture, it is filled in with the preceding line, resulting in no visible dropout on the screen. Dropout compensators are built into VTRs and time base correctors.

**dropout count** The number of dropouts detected in a given length of magnetic tape.

**dropout measurement** Refers to the length of time the signal does not appear on the TV screen and the loss of signal strength caused by the dropout. The time-length of dropouts, measured in microseconds, varies. The dropout may last for as short a time as a fraction of one line scan or continue for the length of a few lines. If this dropout time is relatively short, built-in dropout compensator circuitry in later-model VCRs corrects the problem automatically; otherwise, streaks appear across the screen. Signal strength loss resulting from dropouts is measured in dB.

**dry block** In film, TV, a rehearsal without cameras.

**dry edit** See *Paper edit*.

**DS-** A hierarchy of digital signal speeds used to classify capacities of lines and trunks. The fundamental speed level is DS-0 (64-kilobits/s) and the highest is DS-4 (about 274 million bits per second. Here are definitions: DS-1, DS-1C, DS-2, DS-3, DS-4. They correspond to 1.544, 3.152, 6.312, 44.736, and 274.176 Mbps. DS-1 also called T-1.

**DS-0** Digital Service, level 0. It is 64,000 bps, the worldwide standard speed for digitizing one voice conversation using pulse code modulation (PCM).

**DS-1** Digital Service, level 1. It is 1.544 Mbps in North America, 2.048 Mbps elsewhere. The 1.544 standard is an old Bell System standard. The 2.048 standard is a CCITT standard.

**DS-1c** Digital Service, level 1C. It is 3.152 Mbps in North America and is carried on T-1.

**DSC** See *Digital Spectrum Compatible*.

**DS-2** Digital Service, level 2. It is 6.312 Mbps in North America and is carried on T-2.

**DS-3** Digital Service, level 3. Equivalent of 28 T-1 channels, and operating at 44.736 Mbps. Used for delivery of broadcast TV signals. Also called T-3.

**DS-4** Digital Service, level 4. 274,176,000 bits per second.

**DSL** Digital subscriber line. The ability to use a standard telephone line to transport data. xDSL is the generic term for each of two varieties: ADSL (asynchronous), where the upstream and downstream data rates are different, and SDSL (synchronous), where the upstream and downstream data rates are the same.

**DSM-CC** Digital Storage Media Command Control. See *Multi- and Hyper-media Coding Experts Group*.

**DSP** Digital signal processor. A specialized computer chip designed to perform speedy and complex operations on digitized waveforms. Useful in processing sound and video.

**DSS** Digital Satellite System. No longer used.

**DTCP** Digital Transmission Content Protection. Technology to safeguard copy-protected material transmitted via IEEE 1394 digital interface connections. DTCP was developed by Matsushita along with other consumer electronics manufacturers.

**DTIC** Digital Transmission of Increased Capacity.

**DTO** Discrete time oscillator. A digital version of the voltage-controlled oscillator.

**DTS®** DTS stands for Digital Theater Systems. It is a multi-channel surround sound format, similar to Dolby Digital. For DVDs that use DTS audio, the DVD - Video specification requires that PCM or Dolby Digital audio still be present. In this situation, only two channels of Dolby Digital audio may be present (due to bandwidth limitations).

**DTT** Digital terrestrial television. A term used in Europe to describe the broadcast of digital television services using terrestrial frequencies.

**DTV** Short for digital television, including SDTV, EDTV, and HDTV.

## DTV Team

**DTV Team, The** Originally Compaq, Microsoft and Intel, later joined by Lucent Technologies. The DTV Team promotes the computer industry's views on digital television—namely, that DTV should not have interlaced scanning formats but progressive scanning formats only. (Intel, however, now supports all the ATSC formats, including those that are interlaced, such as 1080i.)

**dual-band feedhorn** In satellite TV, a feedhorn which can simultaneously receive two different bands, typically the C and Ku-band.

**dual-band LNB** A type of low noise block downconverter (LNB) that incorporates two switchable local oscillators to receive two distinct bands. With a single-band LNB, receiving both Europeans DBS (11.7 - 12.5 GHz) and ECS (10.95 - 11.7 GHz) broadcasts, for example, would require one or two parabolic antennas, two feedhorns and two single-band LNBs. With a dual-band LNB, on the other hand, a single system (one parabolic antenna, one feedhorn, and one dual-band LNB) is sufficient to receive broadcasts from both satellite broadcasting systems by simply switching the local oscillators. The dual-band LNB thus offers great savings in space and expense.

**dual camera recording system** A video camera feature that permits the integration of two different pictures from two cameras. First introduced by Panasonic in 1989, the dual camera recording system allows the user to record one video image with one camera and superimpose another picture with a second camera mounted on top and connected with a multipin attachment. Video from the mounted camera can be blended into the main image as an inset, as a dissolve or as a superimposed picture.

**dual-channel sound** A technique used in TV receivers to separate the sound and video signals after the common first detector stage. Separate IF stages are employed for each signal.

**dual-channel system** An approach to HDTV system design. See *HDTV*.

**dual deck VCR** A VCR with two slots designed for editing or duplicating tapes. Companies experimenting with these units boast that tapes copied on these machines cannot be distinguished from the original. Dual deck VCRs offer several advantages. They can record one program while playing a second cassette, record two different programs simultaneously and edit from one tape to another. As expected, manufacturers who have announced production of dual deck VCRs have come under heavy fire from several sources, including the Motion Picture Association of America. The unit, critics charge, promotes piracy of copyright material and could cost the software industry a loss of millions of dollars. Although several Japanese firms have dismissed the dual deck VCR as an unprofitable product, several American companies have demonstrated such units.

**dual digital/analog converter** A videodisc player feature designed to improve the stereo output. These converters usually come in pairs for left and right channels and permit concurrent decoding, resulting in enhanced stereo that simulates a live concert hall.

**dual electromagnetic focus** A feature used with some projection-TV systems to produce a very small beam for better horizontal resolution. In conventional TV, electromagnetic focusing is accomplished by a single coil attached to the neck of the CRT. As direct current passes through the coil, magnetic field lines are produced parallel to the axis of the tube.

**dual feedhorn** A waveguide feed system designed for both vertically and horizontally polarized signals.

**dual field auto exposure system** The ability of the CCD image sensor of a camcorder to simultaneously measure the light levels of an entire image and the central zone, calculate these and adjust the exposure with emphasis upon the central zone. Some cameras allot about 35% of the image to the central area.

**dual image effect** A video camera feature that permits the user to mix a still image with live images recorded by the camera. Several types of effects are possible with this feature, such as creating a split-screen with a still frame on one side of the screen; inserting a still image in the center of an action scene; or putting an active image in the middle of a full-screen still picture. These effects can be accomplished only with a digital-type camera.

**dual-in-line package (DIP)** A flat rectangular, leaded package for circuit board mounting of ICs, relays, resistor networks, and other miniature components.

**dual-loading system** A method of loading tape, employed by some VCRs, that combines the standard full-loading procedure with half-loading. Dual-loading is designed to speed up the FF and REW modes. The high-speed tape transport also results in accelerated searches in all three playback modes.

**dual orthomode coupler** A dish-mounted device that allows reception of both vertically and horizontally polarized signals.

**dual-side play** See *Double-side videodisc player*.

**dual standard receiver** Receiver capable of receiving TV pictures on more than one line standard, e.g., 405/625 lines in Britain.

**dubbed soundtrack** See *Dubbing*.

**dubbing** 1. The combining of two sound signals into a composite recording. At least one source of sound will have been prerecorded. 2. Duplicating an audio and/or video signal, such as composite master tape, to make additional tape copies. Dubbing puts the resulting copy or dub one generation away from the tape from which it was recorded. Dubbing can be accomplished from one videotape format to another—e.g., from a larger format to a smaller one

(2" to 1") or from smaller to larger (3/4" to 1"). Those processes are called bumping up or bumping down. 3. Can also refer to erasing an audio track and recording a new track in its place. Lip synchronization is often used in TV and film production to replace one person's voice with another's. The new version is said to have a dubbed soundtrack. See also *Audio dub*. 4. Refers to re-recording a new section of video over existing footage without affecting the audio track. Some camcorders provide a flying erase head, a few of which are designed to produce this video dubbing feature. Dubbing also refers to copying a tape.

**dub in/dub out connectors** Used by Sony on its professional VCRs to provide high-quality duplicated tapes. Other manufacturers also use special connectors for this purpose. The technique should not be confused with the audio/video inputs/outputs used with home VCRs for copying.

**DuMont, Allen B.** Inventor who in 1939 marketed the first all-electronic TV receivers.

**duobinary signal** A pseudobinary-coded signal in which a "0" (zero) bit is represented by a zero-level electric current or voltage, a "1" (one) bit is represented by a positive-level current or voltage if the quantity of "0" bits since the last "1" bit is odd. Duobinary signals require less bandwidth than NRZ. Duobinary signaling also permits addition of error-checking bits.

**duplexer** A device that combines audio and video signals, or separates signals on a single-transmission path.

**duplicating of tapes** See *Copying*.

**DV** Digital consumer video cassette format, formerly DVC.

**DVB** Digital video broadcasting. The group, with over 200 members in 25 countries, that developed the preferred scheme for digital broadcasting in Europe. The DVB Group has put together a satellite system—DVB-S—that can be used with any transponder, current or planned, a matching cable system called DVB-C, and a digital terrestrial system called DVB-T. See *DVB-T*.

**DVB-T** A transmission scheme for terrestrial digital television. Its specification was approved by ETSI in February 1997 and DVB-T services began in 1998. As with the other DVB standards, MPEG-2 picture coding forms the basis of DVB-T. Sound may be either MPEG or Dolby Digital. It uses a transmission scheme based on Coded Orthogonal Frequency Division Multiplexing (COFDM), which spreads the signals over a large number of carriers to enable it to operate effectively in very strong multipath environments. The multipath immunity of this approach means that DVB-T can operate an overlapping network of transmitting stations with a single frequency. In the areas of overlap, the weaker of the two received signals is rejected. See *COFDM*, *DVB*.

**DVC** Digital Video Cassette. DVC format. In the 1990s, 55 member companies formed the DVC consortium to finalize the interface format for connection to PCs. The interface is based on the IEEE-1394 format proposed by Apple Computer. The DVC format is an industry standard for videotape recording agreed upon by all 55 member companies. The digital camcorder is the core equipment in the multimedia era. DVC was ultimately shortened to DV.

**DVCPAM** Sony's proprietary professional DV format introduced in 1996, directly competing with DVCPRO. See *DV*, *DVC*, *DVCPRO*.

**DVCPRO** A proprietary digital videotape format developed by Panasonic Broadcast. It is based on the consumer DV format and uses much of its hardware and electronics. Using 1/4-inch tape, the cassettes are the same size as the larger cassettes of the DV format. The recording system uses efficient error correction to reduce the need for mechanical accuracy but, otherwise, it is a conventional helical-scan system with a control track. The video signals are compressed using DCT algorithms and chip-sets developed for the DV format. The signal coding is 4:1:1. Each frame is coded individually (intraframe-only) at a video data-rate of about 20 Mbits/s. Two studio-quality (48 kHz, 16 bit) PCM audio channels are provided. The format has a longitudinal control track and a longitudinal audio cue track.

**DVCPRO50** This variant of DV uses a video data rate of 50 Mbps—double that of other DV systems—and is aimed at the higher quality end of the market. Sampling is 4:2:2 to give enhanced chroma resolution, useful in post production processes (such as chromakeying). Four 16-bit audio tracks are provided. The format is similar to Digital-S (D-9).

**DVCPRO HD** This variant of DV uses a video data rate of 100 Mbps, four times that of other DV systems, and is aimed at the high-definition EFP end of the market. Eight audio channels are supported. The format is similar to D-9 HD.

**DVCPRO P** This variant of DV uses a video data rate of 50 Mbps, double that of other DV systems, to produce a 480 progressive picture. Sampling is 4:2:0.

**DVD** Digital Video Disc or Digital Versatile Disc. A faster CD that can hold cinema-like video, better-than-CD audio, and computer data. DVD has received widespread support from major electronics companies, computer companies, and movie/music studios, and has rapidly become a popular home video device. The main features include:

- Over 2 hours of high-quality digital video
- up to 8 tracks of digital audio, each with as many as 8 channels
- up to 32 subtitle/karaoke tracks
- automatic seamless branching of video
- menus and simple interactive features
- instant rewind and fast forward

## DVD-Audio

- instant search to title, chapter, music track, and timecode
- digital audio output (PCM stereo and Dolby Digital)
- compatible with audio CDs
- low cost.

The capacities currently available are:

- DVD-5: 4.7 GB (1 side, 1 layer)
- DVD-9: 8.5 GB (1 side, 2 layers)
- DVD-10: 9.4 GB (2 sides, 1 layer each)
- DVD-18: 17.0 GB (2 sides, 2 layers)
- DVD-R: 4.7 GB (1 side, 1 layer) (write once)
- DVD-RAM: 2.6 GB (per side, 1 layer) (rewritable) and 4.7 GB (per side, 1 layer) (rewritable)

In 2002, DVD players are available in the U.S. for under \$100.

**DVD-Audio** DVDs that contain linear PCM audio data in any combination of 44.1, 48.0, 88.2, 96.0, 176.4, or 192 kHz sample rates, 16, 20, or 24 bits per sample, and 1 to 6 channels, subject to a maximum bit rate of 9.6 Mbps. With a 176.4 or 192 kHz sample rate, only two channels are allowed.

Meridian Lossless Packing (MLP) is a lossless compression method that has an approximate 2:1 compression ratio. The use of MLP is optional, but the decoding capability is mandatory on all DVD-Audio players.

Dolby Digital compressed audio is required for any video portion of a DVD-Audio disc.

**DVD-Interactive** DVD-Interactive is under development (due summer 2002), and is intended to provide additional capability for users to do interactive operation with content on DVDs or at Web sites on the Internet. It will probably be based on one of three technologies: MPEG-4, Java/HTML, or software from InterActual.

**DVD-R** DVD-ROM. The base physical format of a DVD that holds data.

**DVD-Video** Often simply DVD. The application format that defines how video programs, such as movies, are stored and played in a DVD player.

**DVE** See *Digital Video Effects system*.

**DVI, DVI-D, DVI-I, DVI-CE** Abbreviation for Digital Visual Interface. This is a digital video interface to a display, designed to replace the analog Y'PbPr or R'G'B' interface. For analog displays, the D/A conversion resides in the display. The EIA-861 standard specifies how to include data such as aspect ratio and format information. The VESA EEDID and DI-EXT standards document data structures and mechanisms to communicate data across DVI.

DVI-D is a digital-only interface. DVI-I handles both analog and digital.

DVI-CE (now known as HDMI) is a proposed modified version of DVI that is targeted for consumer equipment. It proposes to use YCbCr instead of RGB data, includes audio capability and uses a smaller connector.

**DVITC** See *digital vertical interval timecode*.

**DVI technology** An all-digital audio, video, and computer system. Owned by Intel Corporation. See *Digital Video Interactive*.

**DVNR** Digital Video Noise Reduction.

**DVR** See *Digital video recorder*.

**DVTR** Digital videotape recorder.

**DVTS** Pronounced "Divitz." Stands for Desktop Video conferencing Telecommunications System.

**dynamic convergence** The process whereby the locus of the point of convergence of electron beams in a color TV tube is made to fall on a specified surface during scanning. Without dynamic convergence that varies with beam angle, the locus would be a spherical surface at a constant radius from the center of deflection of the beam.

**dynamic demonstrator** A large schematic circuit diagram that has been cemented to a board, with all components mounted near or on their symbols and connected together to give a working circuit of a radio, TV receiver, or other electronic apparatus. Used for training purposes in classrooms and laboratories.

**Dynamic Drum System (DDS)** JVC's VHS technology that makes possible virtually noiseless special effects, longer playing tapes, and "endless recordings" (due to its ability to play in both directions, reversing the tape at the end). DDS can also accomplish smooth slow-motion (without the frame-by-frame jerkiness) and noiseless FF or reverse, accompanied by intelligible sound for high-speed viewing. In addition, it permits still-frame recording while the recorder is in the pause mode.

**dynamic focusing** The process of varying the focusing electrode voltage for a color picture tube automatically so the electron-beam spots remain in focus as they sweep over the flat surface of the screen. Without dynamic focusing, part of the image would be out of focus at all times.

**dynamic mike** A type of very sound-sensitive uni- or omni-directional microphone, which can stand rough handling.

**dynamic picture control** Horizontal image delineation.

**dynamic range** The weakest to the strongest signal a circuit will accept as input or generate as an output.

**dynamic resolution** Resolution when there is a movement in the TV picture, for example when the camera is zooming or panning. Syn.: motion resolution.

**dynamic rounding** The intelligent truncation of digital signals. Some image processing requires that two signals be multiplied, for example in digital mixing, producing a 16-bit result from two original 8-bit numbers. This has to be truncated, or rounded, back to 8 bits. Simply dropping the lower bits can result in visible contouring artifacts, particularly when handling pure computer generated pictures. Dynamic rounding is a mathematical technique for truncating the word length of pixels, usually to their nor-



mal 8 bits. This effectively removes the visible artifacts and is non-cumulative on any number of passes. Dynamic rounding is a licensable technique, available from Quantel, and is used in a growing number of digital products both from Quantel and other manufacturers.

**dynamic track following** A feature first used on Grundig V-2000 VCRs which eliminated white noise bars during slow motion, freeze frame and visual scan. On conventional Beta and VHS machines the video heads in Fast Scan cannot accurately retrace the diagonal tracks laid down during recording; instead, the heads cross over to adjacent tracks or signals, causing interference of white bars. Grundig solved this problem by having the two video heads move up or down to avoid inaccurate retracing and by keeping them on the full width of the recorded track. Dynamic track following also assures noise-

free pictures in slow motion and freeze frame modes without the use of additional or oversized heads as found in some Beta and VHS machines. Digital video equipment has overcome the problem in its own unique way.

**dynamic tracking head** A videotape head that automatically aligns itself with the center of the video track on the tape for slow motion or freeze frames.

**dynode effect** A form of distortion produced by image orthicon tubes. In an image orthicon, the beam, after scanning the target, is amplified in an electron multiplier section. The multiplier often consists of five dynode sections and a collector, and the return beam is directed on the first dynode under the influence of the persuader voltage. Occasionally imperfections in the dynode surface cause a small ghostly highlight with a spreading tail to appear on the picture.

# E

- E** 1. CATV midband channel, 144-150 MHz. 2. TV standard; France, Monaco. Characteristics: 819 lines/frame, 50 fields/s, interlace—2:1, 25 fr/s, 20,475 lines/s, aspect ratio 4:3, video band—10 MHz, RF band—14 MHz, visual polarity—positive, sound modulation—A3, gamma of picture signal—0.6. 3. Effects.
- early bird** See *Communications satellite*.
- early fringe** A time period in TV broadcasting, preceding prime time, usually 5 to 8 P.M. on weekdays.
- earth station** A station equipped with transmitting equipment for the production of uplink signals, and also a complete receiving system for picking up downlink signals. Known as a ground station. Sometimes used synonymously, but incorrectly, with TVRO. There are more than 5,000 earth stations in the US, most owned by private citizens. See *Satellite TV*.
- EAV** End of active video in component digital systems.
- EBICON** Electron Bombardment Induced Conductivity. A TV camera tube that differs from orthicon and vidicon tubes chiefly in the construction of its target.
- EBU** European Broadcasting Union.
- EBU code** European standard for encoding time onto magnetic tape for broadcast and production use. It uses an 80-bit time code word, as does the American standard. The only major difference is that the EBU code operates at a rate of 25 fr/s. Since both black and white and color video signals in EBU run at exactly 25 fr/s, there is no necessity for drop frame code or for any indication of its absence or presence within bit 10 of the time code word. With EBU code, a binary one in bit 11 denotes the presence of the PAL 8-field frame sequence.
- EC** Electronic Cinematography.
- ECC** Error Check and Correct. A block of check data, usually appended to a data packet in a communications channel or to a data block on a disk, which allows the receiving or reading system both to detect small errors in the data stream (caused by line noise or disk defects) and, provided they are not too long, to correct them.
- ECG** Electronic Character Generator.
- echo** Ghost signal.
- echo-1, -2** See *Communications satellite*.
- echo cancellation** An isolation and filtering of unwanted signals caused by echoes from the main transmitted signal.
- echo equalizer** See *Ghost*.
- EchoStar Communications Corporation** A leader in the satellite TV industry. The parent company of its small dish direct broadcast satellite (DBS) service, Dish Network, one of the two DBS companies serving the U.S.
- echo waveform corrector** Corrector for linear phase and amplitude distortions on a TV signal, resulting from multi-path signals or echoes. Operates by mixing with the input signal other samples of the signal, advanced or delayed in time relative to the main signal and variable in amplitude and polarity.
- E-Cinema (also D-Cinema)** Electronic cinema. Typically the process of using video at 1080/24p instead of film for production, post-production and presentation.
- eclipse-protected** Refers to a transponder that can remain powered during the period of an eclipse.
- ECU** Extreme close-up.
- ED-Beta** A professional-quality format for VCRs or camcorders that can deliver over 500 lines of resolution through the use of an extended bandwidth. Introduced in 1987, ED-Beta (Extended Definition) generates superior resolution and offers digital special effects, specially designed video heads for high-density metal particle tape, flying erase head, 8-segment assemble editing, automatic audio and video insert editing, linear time and frame counter, jog/shuttle variable speed search and various on-screen displays. The format records at a very high bandwidth (up to 9.3 MHz), compared to 5.6 MHz for many of its conventional counterparts, and requires special metal videotape. ED-Beta can record and play back regular Beta tapes.
- edge** A boundary in an image. The apparent sharpness of edges can be increased without increasing resolution.
- edge noise** Refers to the grain or fuzz that appears on the edge of objects. Edge noise reduces the sharply defined look of objects in a screen image. Some VCRs offer a built-in digital time-base corrector to compensate for edge noise. The color version of edge noise is referred to as edging.

**edge track recording** The placement of the audio track in a linear position on videotape. Edge track, or linear, recording differs from diagonal recording.

**edging** Refers to unwanted edge noise in the form of color that appears around objects of different colors. Similar to edge noise in B&W TV, edging affects the otherwise sharply defined color of objects on screen.

**EDH** Error detection and handling, for recognizing inaccuracies in the serial digital signal. It may be incorporated into serial digital equipment and employ a simple LED error indicator.

**edit** Any point on a videotape where the audio or video information has been added to, replaced, or otherwise altered from its original form.

**edit code** Time code; videotape retrieval code added to the original recording and using a time structure of hours, minutes, seconds and frames to locate a particular frame in the tape. Can be read off the screen through the use of a window burn-in over the screen.

**edit control jack** A special VCR receptacle that permits two units to be connected for synchronized operation during editing.

**edit controller** 1. The main device that controls and synchronizes all video decks in an editing system. 2. A VCR feature, either built into or added externally to the machine, designed to operate the controls of two VCRs during the editing process. Chiefly made up of miniature computers capable of storing memory, the edit controller allows the user to assign to it several edits at one time. Once the controller has stored the information in its memory, it automatically performs assemble edits. Beta and 8mm units have incorporated the concept of the edit controller into their systems for several years. Sony, which offers the controller as an accessory and calls the unit a remote editing control, allows the user to assemble eight video sections before it automatically executes the editing sequence. To be effective, an edit controller or similar device should be able to find and return to edit points. Some units use the VCR counter, others rely on a vertical interval time code recorded between video fields, and still others depend on coded track different from the video. A more sophisticated version of the controller is the editing console.

**edit decision list (EDL)** A listing of scenes with which a video editor assembles a video program from individual shots; takes the form of a printed copy, paper tape, or floppy disk and is used to automatically assemble the program. Also called edit list.

**edit master (EM)** In post production for audio or video, the first copy produced by the process of editing together the original material. Edited master is the final edited videotape with continuous program material and time code from beginning to end. Also called edit master, production master.

**edit fader** A device used in editing to fade a video signal to black. It is utilized mostly by professionals and in conjunction with industrial video recorders.

**edit-in** The point at which, or the process whereby, one video signal replaces another during the editing process. See also *Edit points*.

**editing** 1. In video, an electronic process of transferring or duplicating selected recorded segments of tape onto another tape. A second VCR is required, one functioning as a "player" and the other as the "recorder." For best results they are connected through their audio and video inputs and outputs. The recording machine is also hooked up to a TV receiver, which acts as a monitor. Industrial machines in either 1/2-inch or 3/4-inch format are best suited for this purpose. They provide more accuracy in eliminating unwanted video frames and guarantee glitch-free edits. However, some top-of-the-line Beta and VHS machines can produce very satisfactory editing results. Some VCRs come equipped with built-in edit controllers, a computerized system complete with memory, that can perform accurate and professional-looking assemble edits. In addition, edit controllers, and editing consoles, complete with readout panels, can be added as an external accessory for even more fancy editing. Also called electronic editing. See *Editing methods*. 2. See *Stroke*.

**editing console** An accessory, used in conjunction with a video camera and a VCR, that automatically synchronizes and controls both units during the editing and copying processes. These more costly components offer several advantages. They provide a variety of special-effects transitions, including wipes, fades and dissolves, which can be inserted between edited scenes. In addition, these consoles allow different titles and fonts to be added, in an array of colors. Editing is usually accomplished by first previewing tapes, then entering into a keyboard the selected editing points. The computerized console, which contains its own memory bank, stores the information and predetermined sequence in its multi-scene memory and then automatically carries out the transfers with precise edits. Some consoles, also known as editing controllers, operate between camera and VCR by IR beam, while others must be connected using the appropriate cables and jacks. Some models include a digital effects generator, an audio processor, a video distribution amp, a color processor and enhancer.

**editing controller** See *Editing console*.

**editing deck** A specially constructed VTR which has, in addition to play and record circuitry, circuitry and controls for assembly and/or insert editing; an editing deck is used in conjunction with a second VTR to record a master program tape (on the editing deck from various tape-recorded segments being played back on the second VTR).

**editing methods** There are three basic methods of

## editing terminal

controlling and editing videotape: manual, control track and SMPTE time code. See *Types of edit*.

**editing terminal** In videotex, a terminal designed for use in projecting, preparing, or modifying videotex pages. It is distinguished by its facilities for encoding alphanumeric, color, and graphics information. Online editing terminals operate directly to the view database computer. Offline (or local) editing terminals permit the preparation, viewing, and modification of videotex pages (both routing and information) on a local basis.

**edit list** Edit decision list.

**edit master** Edited master; production master.

**editor** An electronic device used by professionals to control synchronization of at least two devices for the purpose of switching video and audio material to a specific point in a program. The editor permits merging pictures and sound from two VCRs or one video camera and one VCR into one master tape. Most of these devices have various controls for different functions such as Play, Forward, Reverse, Preview, etc. Some less costly models are available for the nonprofessional.

**edit-out** The point at which, or the process whereby, an inserted video signal stops and the signal it replaced for a predetermined length of time resumes. The other end of an edit-in when insert editing is being done. With currently available editing decks, edit-ins are more electronically stable than edit-outs (except in the case of computer-controlled Quad machines).

**edit points** The beginning (edit-in) and ending (edit-out) points of a selected event within a program being assembled on magnetic tape.

**edit search** In camcorders, a function used to view the recorded picture for a moment during recording. Using edit search, you can review the last recorded scene or check the recorded picture in the viewfinder.

**edit/start** See *Automatic transition editing*.

**edit/start control** See *Automatic transition editing*.

**edit switch** In VCRs, a feature designed to switch a low-pass filter out of the video output circuitry as a means of cutting back on video noise. However, the function presents one major drawback. Since the process simultaneously lessens image resolution, it also accelerates generation loss during editing. An edit switch on a video camera is designed to change the video signal that the camera transmits to compensate for any degradation that may occur during the editing or copying process. Relatively few cameras offer this feature.

**EDL** Edit Decision List.

**EDTV** Enhanced Definition Television, which is a subset of the DVB's and ATSC's Digital Television (or Digital TV) specifications. The EDTV format is essentially 480 or 576 scan lines with progressive scanning, or 480p/576p (the "p" stands for progressive scanning). Also see *HDTV*, *SDTV*.

**educational television (ETV)** TV used primarily for educational purposes, such as for broadcasting lectures from a master studio to receivers in satellite classrooms or to receivers in homes of those unable to attend schools.

**edutainment** The answer to the question "What do you get when you cross educational material with interactive video?" A term coined by "someone who obviously knows nothing about either education or entertainment," says Laura Buddine, president of multimedia games maker Tiger Media. But it is becoming popular in residences and it's typically played on PCs with CD-ROM players.

**EDV** In (2+3)D-image display systems, data indicative of the display of a digital signal from an external apparatus through interface.

**EE** CATV hyperband channel, 324-330 MHz.

**e-e** Electronics-to-electronics. The picture viewed on the TV screen when a recording is being made. This picture goes through some but not all of the recorder's circuits and is used to test the operation of said circuits.

**EEPROM** Electrically Erasable Programmable ROM. A special type of EEPROM, referred to as flash memory, can be rewritten while it is in the device.

**effect** A multisource transition, such as colorizing, chroma-keying, etc.

**effective isotropic radiated power** (or equivalent isotropically radiated power) (EIRP) Combined result of transmitter (or transponder) RF power, and transmitting antenna gain. Refers to the satellite signal level strength that reaches earth. EIRP is described in dB per watt (dBW). Satellites transmit relatively narrow beams that widen as they approach earth. The pattern or surface area that they cover is called the footprint. It is this footprint shape that determines the EIRP.

**effective radiated power** (ERP). The power of a station's visual signal. In the US, TV stations are authorized by the FCC to operate at a certain power. In order to avoid interfering with other electronic communications, stations are limited in the amount of power that can be emitted from their transmitters and antennas. A station may have 149 kW visual power and 29.5 aural power, but its ERP is expressed as 149 kW.

**effects** Property, impression. Special effects are optics (optical effects) or visual effects to produce illusions, or sound, for simulation of a specific sound. The abbreviation is FX or sometimes, as with video effects, E.

**effects buttons** The push-button controls on a special effects generator that indicate the special effects (inserts, wipes, keying, etc.) available on that SEG and which are engaged when an effect is desired.

**effects channel** That bus in a 3-bus switcher set aside to produce special effects.

**effects switcher** An electronic switcher that activates the generation control and coordination of special effects.

**EFP** Electronic Field Production.

**EGA** Enhanced Graphics Adapter. A video display adapter, introduced by IBM in 1984. The video display standard for IBM-compatible microcomputers featuring 640-by-350-pixel resolution. EGA can display no more than 16 colors at once. It was superseded by VGA.

**EHT** Extra-High Tension.

**EIA** Electronics Industries Alliance; Electronic Industries Association. The people who determine audio and video standards in the US.

**EIA-516** United States teletext standard, also called NABTS.

**EIA-608** United States closed captioning and extended data services (XDS) standard. Revision B adds Copy Generation Management System - Analog (CGMS-A), content advisory (v-chip), Internet Uniform Resource Locators (URLs) using Text-2 (T-2) service, 16-bit Transmission Signal Identifier, and transmission of DTV PSIP data.

**EIA/IS-702** NTSC Copy Generation Management System - Analog (CGMS-A). This standard added copy protection capabilities to NTSC video by extending the EIA-608 standard to control the Macrovision anti-copy process. It is now included in the latest EIA-608 standard, and has been withdrawn.

**EIA-708** United States DTV closed captioning standard. EIA CEB-8 also provides guidance on the use and processing of EIA-608 data streams embedded within the ATSC MPEG-2 video elementary transport stream, and augments EIA-708.

**EIA-744** NTSC "v-chip" operation. This standard added content advisory filtering capabilities to NTSC video by extending the EIA-608 standard. It is now included in the latest EIA-608 standard, and has been withdrawn.

**EIA-761** Specifies how to convert QAM to 8-VSB, with support for OSD (on screen displays).

**EIA-762** Specifies how to convert QAM to 8-VSB, with no support for OSD (on screen displays).

**EIA-766** United States HDTV content advisory standard.

**EIA-770** This specification consists of three parts (EIA-770.1, EIA-770.2, and EIA-770.3). EIA-770.1 and EIA-770.2 define the analog YPbPr video interface for 525-line interlaced and progressive SDTV systems. EIA-770.3 defines the analog YPbPr video interface for interlaced and progressive HDTV systems. EIA-805 defines how transfer VBI data over these YPbPr video interfaces.

**EIA-775** EIA-775 defines a specification for a base-band digital interface to a DTV using IEEE 1394 and provides a level of functionality that is similar to the analog system. It is designed to enable interoperability between a DTV and various types of

consumer digital audio/video sources, including settop boxes and DVRs or VCRs.

EIA-775.1 adds mechanisms to allow a source of MPEG service to utilize the MPEG decoding and display capabilities in a DTV.

EIA-775.2 adds information on how a digital storage device, such as a D-VHS or hard disk digital recorder, may be used by the DTV or by another source device such as a cable set-top box to record or time-shift digital television signals. This standard supports the use of such storage devices by defining Service Selection Information (SSI), methods for managing discontinuities that occur during recording and playback, and rules for management of partial transport streams.

EIA-849 specifies profiles for various applications of the EIA-775 standard, including digital streams compliant with ATSC terrestrial broadcast, direct-broadcast satellite (DBS), OpenCable™, and standard definition Digital Video (DV) camcorders.

**EIA-805** This standard specifies how VBI data are carried on component video interfaces, as described in EIA-770.1 (for 480p signals only), EIA-770.2 (for 480p signals only) and EIA-770.3. This standard does not apply to signals which originate in 480i, as defined in EIA-770.1 and EIA-770.2. The first VBI service defined is Copy Generation Management System (CGMS) information, including signal format and data structure when carried by the VBI of standard definition progressive and high definition YPbPr type component video signals. It is also intended to be usable when the YPbPr signal is converted into other component video interfaces including RGB and VGA.

**EIA-861** The EIA-861 standard specifies how to include data, such as aspect ratio and format information, on DVI.

**EIAJ** Electronic Industry Association of Japan.

**EIA-J CPX-1204** This EIA-J recommendation specifies another widescreen signaling (WSS) standard for NTSC video signals. WSS may be present on 20 and 283.

**EIAJ Type #1 Recommended Color Standard** The color standard established by the EIAJ to be compatible with the EIAJ Type #1 Standard; color tapes can be played back in b&w on EIAJ Type #1 b&w VTRs, and b&w tapes can be played back in b&w on EIAJ Type #1 color VTRs.

**EIAJ Type #1 Standard** That standard established by the EIAJ for 1/2-inch helical scan VTRs.

**EIA Linearity Chart** A test chart available from the Electronic Industries Association with configurations to equal the bar and dot patterns from a sync generator in the average broadcast studio. The function of the chart is to test and measure the scan linearity of professional, broadcast-type equipment. It is designed to duplicate the normal broadcast configurations of 14 horizontal and 17 vertical bars. Also known as a ball chart.

## EIA sync

**EIA sync** Also called EIA RS-170 sync. The standard waveform for broadcast equipment in the US as established by the EIA.

**EIA/TIA STANDARD—ELECTRICAL PERFORMANCE FOR TV TRANSMISSION SYSTEMS, EIA/TIA-250-C** A joint publication of the EIA and the TIA. This document contains a comprehensive listing of the criteria for evaluating the quality of TV images, together with performance standards for both color and B&W.

**E-I-C** Engineer-In-Charge, as of a TV production.

**Eidophor** A projection system developed in Switzerland for theater TV and other applications requiring a large and bright display. Unlike conventional projection systems, in which the total light available is limited by the output of a CRT, the primary source for the Eidophor is an arc light or equally bright source. The image is formed by a Schlieren optical system, a complex electrooptical system.

**EIRP** Effective Isotropic Radiated Power.

**Electra** A broadcast teletext operation consisting of a one-way information service. It contains pages of digital information from a central computer data base, emanating from TV station WKRC-TV in Cincinnati. Electra information is also fed to and transmitted by superstation WTBS to cable systems, and some TV stations pick up and retransmit the information from the WTBS signal. The Electra operation is based on the World Standard Teletext (WST) system.

**Electret condenser** A type of very sensitive microphone requiring dc power (usually supplied by a battery built into the mike).

**electric image** An array of electric charges, either stationary or moving, in which the density of charge is proportional at each point to the light values at corresponding points in an optical image to be reproduced.

**electroluminescence** The direct conversion of electrical energy into light.

**Electroluminescent TV screen** A system of flat screen TV utilizing numerous microscopic elements. Electroluminescent TV, or EL, is one of a few systems considered as a replacement for the CRT in producing large-screen TV. EL can be compared in effect to a large array of light bulbs.

**electromagnet** A device comprising a ferromagnetic core within a winding which displays magnetic properties only when a current flows in the winding.

**electromagnetic deflection** Syn.: magnetic deflection. Deflection of an electron stream by means of a magnetic field. In a TV picture tube, the magnetic fields for horizontal and vertical deflection of the electron beam are produced by sending sawtooth currents through coils in a deflection yoke that goes around the neck of the picture tube.

**electromagnetic focusing** Syn.: magnetic focusing. Focusing the electron beam in a TV picture tube by means of a magnetic field parallel to the beam, pro-

duced by sending an adjustable value of direct current through a focusing coil mounted on the neck of the tube.

**electromagnetic frequency spectrum** In TV, the broadcasting frequency which holds the various TV signals transmitted from broadcast stations. A certain part or band of this spectrum is allotted to each signal. The FCC apportions each slot to a channel, thereby permitting many signals while avoiding interference. For instance, a TV channel is given a band 6MHz wide and must carry its video, audio and color information within these parameters. New forms of TV transmission may require a wider slot than the standard 6 MHz. High definition broadcasting, for example, whose signal transmits much more information and therefore requires an area five times greater than the above standard, will have to utilize either cable systems or the 12-GHz portion of the spectrum via satellite broadcast.

**electromagnetic interference (EMI)** An electromagnetic disturbance caused by such radiating and transmitting sources as electrostatic discharge, lighting, radio and TV signals, and power lines. It can induce unwanted voltages in electronic circuits, damage components, and cause malfunction. Shields, filters, and transient suppressors protect electronics from EMI.

**electromagnetic lens** Syn.: magnetic lens. An electron lens consisting of an arrangement of coils that focuses an electron beam electromagnetically. There are two basic types; in one type, used with TV camera tubes, the entire tube is included within a coil carrying DC which produces a magnetic field parallel to the tube axis. This field has no effect on electrons travelling along the tube axis but those moving at angles to the axis rotated about the axis and return to it at regular intervals along the axis. Thus, there are a number of points at which the electron beam is in focus and by adjustment of the accelerating electric field or of the magnetic field one of these focus points can be made to coincide with the target.

The second type of magnetic lens employs a very short magnetic field which can be produced by a permanent magnet. The field from such a magnet has pronounced radial components and the interaction of these with the electron beam causes the beam to rotate about the tube axis. The axial component of the field causes the beam to be deflected towards the tube axis so that an image, usually rotated, can be produced on the target. See *electrostatic lens*.

**electron beam** A beam of electrons that is usually emitted from a single source, such as a thermionic cathode. In TV camera tubes and picture tubes such a beam originates in an electron gun and is focused by an electron lens on the target or screen. See also *Electron gun*.



**electron beam recording** A technique employed in video-to-film processes in which movie film images are created by electronic impulses. The electronic beam replaces the light, which normally exposes motion picture film.

**electron gun** Also called gun. A device that produces an electron beam and forms an essential part of many instruments, such as CRTs, etc. It consists of a series of electrodes usually producing a narrow beam of high-velocity electrons. Electrons are released from the indirectly heated thermionic cathode, the intensity being controlled by variation of the negative potential of the cylindrical control grid surrounding the cathode. The control grid has a hole in front to allow passage of the electron beam. The electrons are accelerated by a positively charged accelerating anode before being focused by the focusing electrode and then further accelerated by the second anode.

**Electronicam** System of program production using combined film and TV cameras, first employed in the US in 1955, and later developed in Germany under the name Electronic-Cam.

**electronic blackboard** This is a teleconferencing tool. At one end there's a large "whiteboard." Write on this board and electronics behind the board pick up your writing and transmit it over phone lines to a remote TV set. The idea is that remote viewers can hear your voice on the phone and see the presentation on the electronic blackboard. The product has not done well because it is expensive—typically several hundred dollars a month just for rent, plus extra hundreds for transmission costs. In Japan, there are similar boards called OABOards, for Office Automation Boards. They do one thing differently: they will print a copy on normal letter-size paper of what's written on the board. This takes about 20 seconds. Some of these Japanese OABOards will also transmit their contents over phone lines.

**electronic camera** The combination of video cameras recording simultaneously with film cameras. The electronic images are delivered to a central control board for a director's perusal and editing. Electronic cinema was first used successfully by Francis Ford Coppola during the production of his 1982 film *One From the Heart*.

**electronic channel selection** A feature on a VCR permitting remote control, faster electronic bypassing of channels and multiple channel recording. The mechanical rotary-type tuner allowed only one-channel recording with the timer. Electronic channel selection combines the benefits of the versatile microprocessor chip with those of the Varactor tuner. Also called direct channel access.

**electronic character generator (ECG)** A typewriter-like machine that produces reports, sports scores, identifications, and other lettering as part of a TV picture.

**electronic cinematography (EC)** The use of video cameras to produce the picture quality of 35mm film cameras.

**electronic classroom** A supplemental system of education using interactive video so that teachers and students can listen to and interact with one another. Although the video portion is restricted to one-way (the students can see the instructor), the electronic classroom offers several benefits. Federal and state governments, universities and public and commercial TV networks can provide a vast array of courses. Small, budget-tight schools and systems can avail themselves of sophisticated subject matter and lessons while retaining the all-important communication between instructor and students. The system usually involves a satellite dish, electronic keypads and cordless telephones. The initial outlay for the basic equipment comes to much less than the annual salary for one teacher.

**electronic darkroom** In still video photography, a facility capable of using a laser beam to scan photographs or art work and converting the images into digital signals that are then transmitted to a computer. The electronic darkroom, usually part of a newspaper, periodical or other publishing enterprise, permits the image to be edited for proper color, size and detail. The picture is then sent to another unit that converts it into a film image ready for the printed page. Since images can be manipulated quite easily, professionals in various fields have found the technique effective in removing distracting materials such as blurred objects, poles or overhead wires. But some capabilities, such as inserting one image into another existing one to form a completely different picture, has caused critics to voice concern about the ethics of reconstructing electronic images. Another related consideration is that no original negative will exist to confirm the authenticity of a picture under question.

**electronic editing** Repositioning video signal segments on a reel of videotape without physically cutting the tape; a rerecording of the video signal segments in different order. Electronic editing implies that the edited version of the program will be one generation removed from the recordings from which it was assembled.

**electronic field production (EFP)** Refers to professional video equipment which usually features more sophisticated capabilities and a more rugged housing than equivalent home video units. For example, EFP cameras operate more efficiently in low light levels, hold registration better, contain special prism optics, provide superior electronic stability and offer more durability. Some companies, which sell home video equipment, have a professional products division, which specializes in EFP components. Other companies produce only professional equipment.

**electronic frequency synthesizing tuner** Frequency-synthesis tuner.

## electronic game

**electronic game** A self-contained version of a video game, with its own microprocessor-controlled screen or other type of display. Miniature, pocket-sized versions that are battery-powered and can display animated figures and symbols for game playing on a liquid-crystal panel.

**electronic image mail** The transmission of slow scan TV or facsimile via "Store and Forward." Not a common term.

**electronic image stabilization** In a camcorder, a function that helps eliminate the shakiness inherent in hand-held shooting.

**electronic indexing** See *Electronic program indexing*.

**Electronic Industries Association (EIA)** A trade association made up chiefly of electronic component and equipment manufacturers. Its functions include standardization of sizes, specifications, and terminology for electronic products in the US. Known as Radio Manufacturers Association (RMA) 1924-1950, Radio-Television Manufacturers Association (RTMA) 1950-1953, and Radio-Electronics-Television Manufacturers Association (RETMA) 1953-1957.

**Electronic Industries Association of Japan (EIAJ)** The Japanese committee that sets electronic standards for 1/2-inch helical scan video recorders, etc.

**electronic matte** The process of combining images from two cameras. See also *Matte*.

**electronic media** Radio and TV.

**electronic news gathering (ENG)** 1. A term used to describe the process of a TV crew covering news events at the scene of the event. Production teams that shoot at remote locations typically use a Betacam, a professional camcorder developed by the Sony Corporation. (Sony has also licensed several other manufacturers, such as Ampex, to produce Betacam equipment.) Betacams use specialized 1/2-inch tape that permits the integration of a professional quality VTR with a professional quality camera into a single shoulder-mount unit. Most TV studios that use Betacams dub the material to 1-inch videotape (a process known as bumping up) in order to take advantage of the superior quality and editing features available with that level of studio equipment. Another professional 1/2-inch tape format, although not as widely used as Betacam, is MII. 2. A recording system used in TV in which scenes outside the TV studio are recorded directly on to videotape rather than onto film. A portable TV camera and VTR are used, often in conjunction with a mobile transmitter that relays the recording directly to the main control center.

**electronic photography** See *Kodak still-picture process*, *Still video camera*, *Still video printer*.

**electronic program guide (EPG)** A schedule of forthcoming programs, shown on the TV screen for the viewer.

**electronic program indexing** In a VCR, a feature designed to place an electronic signal at the start of

each recording. When the machine is switched to FF or REW and the index control is turned on, the tape stops automatically at each point that a program was recorded. With the switch off, the tape continues to rewind or move forward. On some VCRs the signal is not automatically encoded on the tape unless so desired. There are other techniques for locating segments of tape. One system designates numbers to the portions of tape. In the LV videodisc system, electronic encoding permits the viewer rapid access to marked sections. Each chapter or frame on the disc can be recalled. More prerecorded programs, including sports discs and music-oriented shows, are using this feature. The indexing feature is also known as electronic indexing, picture indexing, program indexing, etc.

**electronic publishing** The production of text (and illustrations, if used) on media other than paper, including CATV, computer, teletext, videocassette, videodisc, and videotex.

**electronic redlining** A term for disenfranchising people and institutions because of their lack of telecommunications services and apparatus.

**electronic scanning** Scanning a TV image with an electron beam in a cathode-ray TV camera tube, as distinguished from mechanical scanning.

**electronic shopping** An interactive Videotex system that enables a consumer to obtain information and to purchase and pay for items ordered.

**electronic setup (ESU)** The prebroadcast time during which equipment is set up and tested.

**electronic still camera** An appliance using a memory card in place of traditional film. By integrating optical and electronic technology with precision mechanics, images from the memory card can be instantly displayed on a TV or a computer monitor, or transmitted over telephone lines.

**Electronic Still Camera Standardization Committee (ESCSC)** An organization composed of more than 40 manufacturers of still video cameras dedicated to promoting the relatively new cameras and accessories and to setting universal standards for the products. The ESCSC, founded in 1983, focused on the still video floppy disc (VF) as the standard medium for the emerging system of electronic still photography (ESP).

**electronic still video** See *Still video camera*.

**electronic switching** In video, a process used with certain accessories such as switchers to avoid problems of noise usually associated with electrical signals and mechanical switching. Electronic switching is performed by diodes and ICs built into these accessories. The use of electronics in signal switching provides another major advantage—no deterioration of parts.

**electronic text generation** Refers to the electronic production of characters for TV and broadcast purposes. The first successful TV character generator

appeared during the early years of TV. The characters were relatively crude, and the technique was unable to produce proportionally spaced letters and numbers. During the 1960s CBS Laboratories experimented with an electronic character generator that turned out Helvetica Medium typeface in 18- and 28-line sizes and proportional characters of graphic-arts quality. In 1964 RCA had the capability to produce by way of a twin-channel generator upper-case characters in two sizes. With the advent of PCs, character generators combined with software to offer scores of print styles by the early 1980s. Today, a host of manufacturers offer compact, sophisticated, less expensive character generators with such features as italics, drop shadows, anti-aliasing, character sizing, graphic symbols, and animated characters.

**electronic tuner** A feature which allows the tuning of TV channels electronically via a keyboard-type panel instead of the rotary knobs. By employing a micro-processor, the electronic tuner can adjust itself to receive local channels in numerical order, can be programmed with various instructions and can offer cable-ready TV sets and VCRs. Another advantage of electronic tuning is the remote control accessory for changing channels, a feature not possible with the mechanical knobs. In addition, since hundreds of mechanical parts are eliminated, tuner reliability has vastly improved.

**electronic viewfinder** A TV camera viewfinder that has a small cathode-ray picture tube to show the image being televised.

**electron image** 1. An image formed in a stream of electrons. The electron density in a cross section of the stream is at each point proportional to the brightness of the corresponding point in an optical image. 2. A pattern of electric charges on an insulating plate, with the magnitude of the charge at each point being proportional to the brightness of the corresponding point in an optical image.

**electron lens** An assembly of electrodes or of permanent electromagnets that can be used to focus an electron beam at a given point, for example on the target of a camera tube or on the screen of a CRT.

**electron multiplier** An electron-tube structure that produces secondary electron emission from solid reflecting electrodes (dynodes) to produce current amplification. The electron beam containing the desired signal current is reflected from each dynode surface in turn. At each reflection, an impinging electron releases two or more secondary electrons, so the beam builds up in strength. A typical arrangement of nine dynodes can give an amplification of several million. Used in multiplier phototubes and TV camera tubes. It is also called a multiplier or a secondary-electron multiplier.

**electron optics** The study of the behavior of electron beams subjected to electric and magnetic fields, particularly the use of such fields to deflect and fo-

cus electron beams. By applying suitable potentials to a system of electrodes it is possible to produce an electric field with equipotential surfaces shaped like convex or concave lenses. The behavior of an electron beam entering such a system is similar to that of a light beam entering an optical lens system and this analogy has prompted the adoption of the term electron optics. See *Electron lens*.

**electron scanning** See *Scanning*.

**electro-optical effect** See *Kerr effects*.

**electro-optical shutter** Syn.: Kerr cell.

**electro-optics** The study of the interactions between the refractive indices of some transparent dielectrics and the electric fields in which they are placed. Changes in the optical properties of dielectrics are produced. See *Kerr effects*.

**electrostatic discharge element** An element on top of the head drum to neutralize the static that can build up in the head as the tape rubs past it. Most VCRs made since the early 1980s use this element.

**electrostatic focusing** A method of focusing an electron beam by the action of an electric field, as in the TV picture tube.

**electrostatic lens** An electron lens consisting of an arrangement of electrodes that focuses an electron beam electrostatically.

**electrostatic voltmeter** An instrument for measuring high direct voltages that relies for its action on the attraction between the opposite charges on the plates of a capacitor. One form of the instrument resembles a multi-plate variable capacitor, one set of plates being fixed and the other free to move against the pull of a spring. The extent of the movement is an indication of the magnitude of the applied voltage. The instrument, being capacitive, takes no current from the source of voltage after the initial charging current and is therefore useful for measuring voltages with a very high source resistance, such as the EHT supply in TV receivers.

**elemental area** Picture element.

**elephant doors** Large doors to a TV studio or other place.

**elevation angle** The vertical angle measured from the horizon up to a targeted satellite.

**elevator** Cassette lift mechanism in front-loading VCRs.

**Emergency Broadcast System (EBS)** A system that is composed of AM, FM, and TV broadcast stations; low-power TV stations; and non-government industry entities operating on a voluntary, organized basis during emergencies at national, state, or operational (local) area levels.

**EM** 1. Edited Master. 2. Extremely Mature—see Movie rating systems.

**embedded audio** Digital audio that is multiplexed and carried within an SDI connection, thus simplifying cabling and routing. The standard (ANSI/SMPT 272M-1994) allows up to four groups each of four

## EMI

mono audio channels. Generally VTRs only support Group 1 but other equipment may use more, for example Quantel's Clipbox server connection to an edit seat uses groups 1-3 (12 channels). 48 kHz synchronous audio sampling is close to universal in TV but the standard also includes 44.1 and 32 kHz synchronous and asynchronous sampling.

**EMI** Electromagnetic interference.

**Emitron** A TV camera tube similar to an iconoscope, made in Great Britain and named after the manufacturers, Electrical and Musical Industries. Also called a super iconoscope. Now obsolete.

**emphasis** Also called preemphasis. In FM transmission, the intentional alteration of the amplitude-versus-frequency characteristics of the signal to reduce adverse effects of noise in a communication system. The higher frequency signals are emphasized to produce a more equal modulation index for the transmitted frequency spectrum, and therefore a better signal-to-noise ratio for the entire frequency range. In TV, the process of boosting the level of the high-frequency portions of the video signal.

**emphasizer** Preemphasis network.

**Emshwiller, Ed** Video artist who uses digital cameras, minicomputers, video synthesizers, chromakeyers and character generators to create new concepts in art.

**encipher** To scramble or otherwise alter data so that they are not readily usable unless the changes are first undone.

**encode** In general, to encipher.

**encoder** A device which converts an information into a coded form. Colorplexer is an example. Syn.: coder.

**encoder adjustment** A necessary function if multiple camera setups are to operate accurately. Precise phase matching, or genlock, adjustments or realignments can be made in the field by experienced technicians with a special portable instrument known as a vectorscope.

**encryption** The transformation of data from its original intelligible form to an unintelligible cipher form, as in the scrambling of TV signals. Pay-TV transmission often is encrypted, and subscribers have devices that decrypt, or unscramble. Two basic transformations may be used: permutation and substitution. Permutation changes the order of the individual symbols comprising the data. In a substitution transformation, the symbols themselves are replaced by other symbols. During permutation, the symbols retain their identities but lose their positions. During substitution, the symbols retain their positions but lose their original identities. Combining the basic transformations of permutation and substitution produces a complex transformation termed a product cipher.

**end-of-tape marker** An indication placed on a videotape to specify that the tape is reaching its physical end. When the marker is reached, most VCR ma-

chines automatically begin to rewind if in the Record or Play mode. The marker may take several forms, including among others a photoreflexive strip or a transparent segment of tape.

**energy dispersal** In satellite TV, the modulation of an uplink carrier with a triangular waveform. This technique disperses the carrier energy over a wider bandwidth than otherwise would be the case in order to limit the maximum energy compared to that transmitted by an unclamped carrier. By spreading the spectrum, there is less chance of interfering with other users of the same frequencies. This triangular waveform is removed by a clamp circuit in a satellite receiver.

**ENG** Electronic News Gathering.

**engineering setup (ESU)** A TV technique to freeze an image on the screen. It is most frequently used, by an ESU operator, to project an image over the shoulder of the anchor, or news broadcaster, during the lead-in of a news item.

**enhance control** A function on an image enhancer (or mini-enhancer) designed to increase the sharpness of high-frequency information. The control adjusts the amount of "boost" applied to the high-frequency signal. Enhancers are signal processors and are used to increase the detail in a video picture. Therefore they exaggerate the high frequency information in the video signal. Rotating the enhance control helps to improve sharpness. The control often has a range capable of increasing 2 MHz from 0 to about 3 times. For maximum effectiveness, the enhance (sharpness) control usually operates in conjunction with a response (noise reduction) control.

**enhanced definition systems** Same as IDTV.

**enhanced definition television** See *EDTV*.

**enhanced NTSC systems** Types of proposed Advanced Television (ATV) systems that used an approach that modified the existing TV technical standards in a modest manner. The enhanced systems sought to improve (or "enhance") the current NTSC system with better picture quality, but the method did not increase the number of scanning lines. The systems did, however, improve the aspect ratio and worked within the current 6-MHz channel. They were described as NTSC-compatible in that the basic signal could be received on current TV sets, but in order for the picture improvements to be seen, a new TV set was required. This approach is sometimes called enhanced definition TV (EDTV). Three variations of such a system were proposed. They are viewed as an evolutionary step toward HDTV using digital technology.

**enhanced-quality television** Syn.: (in CCITT usage) improved-definition TV.

**enhanced services** Services offered over transmission facilities which may be provided without filing a tariff. These services usually involve some computer-related feature such as formatting data or restructuring the information. Most Bell operating

companies (BOCs) are prohibited from offering enhanced services at present. But the restrictions are disappearing. The FCC defines enhanced services as "services offered over common carrier transmission facilities used in interstate communications, which employ computer processing applications that act on the format, content, code, protocol or similar aspects of the subscriber's transmitted information; provide the subscriber additional, different or restructured information." In other words, an enhanced service is a computer processing application that changes in some way the information transmitted over the phone lines. Value-added Networks, Transaction Services, Videotex, Alarm Monitoring and Telemetry, Voice Mail Services and E-Mail are examples of enhanced services.

**enhanced TV (ETV)** A general term for several experimental systems intended as an alternative to HDTV. The more formal term for ETV is IDTV, or improved definition TV. The search for an enhanced system grew out of the need for a compatible process that would not make the millions of current TV receivers obsolete. The topic, however, has become academic since the FCC early in 1990 decided to opt for a true HDTV system as a national standard before considering any ETV system. Manufacturers of HDTV have developed simulcast systems in which TV stations would use one channel for standard NTSC broadcasts while part of an empty adjacent channel would transmit information required for HDTV's wide-screen image. See *High Definition TV, IDTV*.

**enhancement hardware** In video, accessory equipment designed to electronically improve the video or audio signal of a recording. Image stabilizers, image detailers, line doublers and noise reduction systems are examples of enhancement hardware.

**enhancement light** See *Color enhancement light*.

**enhancer** A video signal processing device that allows the user to improve picture sharpness and increase color contrast. See also *Image enhancer*.

**envelope delay** A type of distortion that takes place during transmission when a phase shift fails to maintain its constancy over the frequency range. Envelope delay is one of several types of degradation that affects NTSC picture quality.

**EOL** End Of Life (of a transponder or satellite).

**E'pb** Blue color difference, HDTV.  $E'pb = (E'b - E'y):1.826$ . See also *SMPTE 240M standard*.

**E'pr** Red color difference, HDTV.  $E'pr = (E'r - E'y):1.576$ . See also *SMPTE 240M standard*.

**EP** Extended Play.

**EPG** Electronic Program Guide.

**EP speed** See *Extended play*.

**EQ** Equalization.

**equal energy white** Light composed of equal energy of red, green and blue of the correct wavelengths. White light may still appear white over a fairly wide mixture of its components.

**equalization (EQ)** The normalization of an electronic signal, either audio or video; adding EQ in audio or video means reshaping the frequency response to emphasize certain frequency ranges and eliminate others.

**equalization pulses** These are two groups of pulses, one that occurs before the serrated vertical sync and another group that occurs after. These pulses happen at twice the normal horizontal scan rate. They exist to ensure correct 2:1 interlacing in early televisions.

**equalizer** In audio, a unit designed to selectively increase or decrease portions of the frequency range, thereby customizing the sound to personal taste or to accommodate the ambience of a specific room. The equalizer, a feature on many audio/video receivers, may be positioned between the output of a microphone mixer and the input of a VCR. It is also known as graphic equalizer. In video, it acts as a multi-function video processor which provides (1) color and definition control during dubbing, (2) its own modulator to direct viewing, (3) a distribution amp to permit making more than one copy simultaneously, and (4) a stabilized image for copying. In general, a video equalizer is used to control video signal loss. An equalizer provides equalization either automatically (usually in the case of video) or manually (often available in audio mixers). See also *Line amplifier*.

**equalizing amp** A video circuit preset to provide a selected equalization to the video signal.

**equalizing pulse** One of the pulses occurring just before and just after the vertical synchronizing pulses in a TV signal and serving to minimize the effect of line-frequency pulses on interlace. The equalizing pulses occur at twice the line frequency and make each vertical deflection start at the correct instant for proper interlace.

**equatorial mount** Polar mount.

**Equivalent Isotropically Radiated Power** See EIRP.

**equivalent line number (Ne)** The line number that defines a rectangle having the same area as the area under the aperture response squared curve. Although Ne is not widely used as a criterion of picture quality, it is very useful for TV-system analysis.

**erase** In video, to clear program material or information electronically each time new material is recorded. Tape may also be erased by using a bulk videotape eraser.

**erase (or erasing) head** The device on a tape transport which erases information before new information is recorded to the tape. Flying erase (or erasing) heads, found on 8mm camcorders and some VCRs, provide seamless edits between scenes. In addition, they save space by eliminating the larger erase (or erasing) heads.

**ERP** Effective Radiated Power.

**error concealment** The ability to hide transmission

## error correction

errors that corrupt the content beyond the ability of the receiver to properly display it. Techniques for video include replacing the corrupt region with either earlier video data, interpolated video data from previous and next frames, or interpolated data from neighboring areas within the current frame. Decoded MPEG video may also be processed using deblocking filters to reduce blocking artifacts. Techniques for audio include replacing the corrupt region with interpolated audio data.

**error correction** In digital video recording systems, a technique that adds overhead to the data to permit a certain level of errors to be detected and corrected.

**error detection** Checking for errors in data transmission. A calculation is made on the data being sent and the results are sent along with it. The receiver then performs the same calculation and compares its results with those sent. If an error is detected the affected data can be deleted and retransmitted, the error can be corrected or concealed, or it can simply be reported.

**error detection and handling** See *EDH*.

**error resilience** The ability to handle transmission errors without corrupting the content beyond the ability of the receiver to properly display it. MPEG-4 supports error resilience through the use of resynchronization markers, extended header code, data partitioning, and reversible VLCs.

**ESCS** Electronic Still Camera Standardization Committee.

**ESPN** Entertainment and Sport Programming Network.

**establishment shot** A long shot used to set the scene by showing the environment in which the action to follow takes place; e.g., a long shot of a burning house preceding a medium shot of firemen with hoses. Also called establishing shot.

**ESU** 1. Electronic setup. 2. Engineering setup.

**E-to-E** Also E-E. Electronics-to-electronics. Monitoring the output signal of a VTR while it is recording is an E-to-E process. The signal monitored has not yet been recorded on tape; rather, a sample of the signal is being fed from the VTR directly to the monitor. With E-to-E it is not possible to be certain that the signal is being recorded on the tape.

**ETSI EN 300 163** This specification defines NICAM 728 digital audio for PAL.

**ETSI EN 300 294** Defines the widescreen signaling (WSS) information for PAL video signals. For (B, D, G, H, I) PAL systems, WSS may be present on line 23.

**ETSI EN 300 421** This is the DVB-S specification.

**ETSI EN 300 429** This is the DVB-C specification.

**ETSI EN 300 744** This is the DVB-T specification.

**ETSI EN 301 775** This is the specification for the carriage of Vertical Blanking Information (VBI) data in DVB bitstreams.

**ETSI ETR 154** This specification defines the basic MPEG audio and video parameters for DVB applications.

**ETSI ETS 300 231** This specification defines informa-

tion sent during the vertical blanking interval using PAL teletext (ETSI ETS 300 706) to control VCRs in Europe (PDC).

**ETSI ETS 300 706** This is the enhanced PAL teletext specification.

**ETSI ETS 300 707** This specification covers Electronic Program Guides (EPG) sent using PAL teletext (ETSI ETS 300 706).

**ETSI ETS 300 708** This specification defines data transmission using PAL teletext (ETSI ETS 300 706).

**ETSI ETS 300 731** Defines the PALplus standard, allowing the transmission of 16:9 programs over normal PAL transmission systems.

**ETSI ETS 300 732** Defines the ghost cancellation reference (GCR) signal for PAL.

**ETSI ETS 300 743** This is the DVB subtitling specification.

**ETV** Educational TV.

**EU-95** One of the projects of EUREKA. A central objective of this project is to establish standards for a European HDTV system compatible with the conventional D-MAC and D2-MAC packet DBS systems in use there. The organizations principally involved in the project are Philips (Netherlands), Thomson (France), and Siemens (Germany). Since the project is one of the MAC family of DBS systems, it is generally known as HDMAC (high-definition MAC). See also *Bandwidth reduction (EUREKA-95 HDMAC system)*.

**EUREKA** A research and development organization established by the nations of the European Economic Community.

**EuroCrypt-M** Encryption system in European satellite TV, used by Canal Plus, TV3, FilmNet, TV1000, and a few other programmers.

**europium (Eu)** A rare-earth element. Atomic number is 63. Used as the red phosphor in color TV picture tubes and does not change at higher beam currents. This permits operating all three guns at higher levels, giving brighter color pictures.

**EUTELSAT** European TELEcommunications SATellite organization. Intergovernmental organization that aims to provide and operate a space segment for public intra-European international telecommunications services. The segment is also used to meet domestic needs by offering leased capacity, primarily for TV. UK and France are the largest shareholders, with about 25 member countries in total.

**Eu:YSO** Europium-doped yttrium silicate. A crystal material which, when used together with a precision-control dye laser, can theoretically record holographic motion pictures at the rate of 1 frame per nanosecond. It is theoretically possible to record up to 10 million frames. For video recorded at 30 fr/s, that would up to 100 hours of recording time.

**EV** European Videotelephony.

**even field** Field with even number in the interlaced field sequence.

**event** In video, refers to a timed, recorded, single-



continuous program. The first VCRs permitted only a single event to be programmed for recording per 24 h period. Today's VCRs with their programmable timers and electronic tuners allow multiple programming of several events over a period of as many weeks. The greater the programmability, the more expensive the machine.

**event flags** In DVI technology, the data elements used by RTX to indicate that something has happened.

**event number** A number assigned by the editor to each edit that is recorded in the EDL.

**EVR** An obsolete electronic video recording device that was a miniaturized cassette system played through a TV set. Introduced in 1970 by CBS, the unit played a 7" diameter cartridge of 8.75 mm film containing 1 h of programming, through a TV set. The cartridge was produced by exposing film to a beam of electrons using an electron beam recorder.

**excessive AMTEC error** Refers to the improper duplication of master tapes. Faulty equipment at the copying plant can cause a pattern of dark horizontal streaks on prerecorded tapes. The term is often used in conjunction with the recording of professional 2-inch tape.

**excitation purity** Purity.

**exciter modulator** The heart of a TV transmitter. Its outputs are the modulated visual and aural carriers at low power levels. Exciter modulator includes the following components:

1. Aural preemphasis circuitry to preemphasize the high-frequency components in accordance with FCC requirements.
2. Processing amps to correct deficiencies, for example, improper sync level, in the input visual signal and to provide DC restoration.
3. Visual and aural carrier generators with the frequency tolerances specified by the FCC.
4. Visual and aural modulators.
5. Filters to remove the lower sidebands of the modulated visual carriers and to remove spurious frequency components from both carriers.
6. Linearity correction devices in the visual chain to compensate for incidental phase modulation and differential gain. Ideally, these corrections should be made in both the video and RF domains.

**existing-quality television** Syn.: distribution-quality television.

**expand** Expansion of the picture details within the zoomed picture area. Syn.: zoom in.

**exponential antenna** A TV receiving antenna that has a series of active elements mounted parallel to each other, with element lengths adjusted so their ends form two natural logarithmic curves. The antenna gives good gain over the VHF and UHF TV bands.

**exposure** Process of subjecting a photosensitive surface to light. In photography, exposure results in a latent image on a photographic emulsion, and ac-

ording to the reciprocity law, exposure is determined by the product of time and intensity of illumination. In TV, exposure produces an electronic image, which is scanned and removed as a signal.

**exposure control** Manual iris control.

**exposure level lock** A video camera feature that permits the operator to "lock in" the proper exposure setting for a predetermined scene before shooting. This helps to compensate for sudden lighting changes, such as the camera panning or the subject moving to where backlight would otherwise affect the exposure.

**exposure meter** Device for determining the light flux incident upon or reflected from a scene to be recorded by TV cameras, the corresponding instruments being known as incident-light meters and reflected-light meters.

**extended-definition television (EDTV)** TV that includes improvements to the standard NTSC TV system, which improvements are receiver-compatible with the NTSC standard, but modify the NTSC emission standards. Such improvements may include (a) a wider aspect ratio, (b) higher picture definition than distribution-quality definition but lower than HDTV, and/or (c) any of the improvements used in improved-definition TV. When EDTV is transmitted in the 4:3 aspect ratio, it is referred to simply as "EDTV." When transmitted in a wider aspect ratio, it is referred to as "EDTV-Wide."

**extended play (EP)** The slowest speed on a VHS VCR: the 6-hour tape speed with T-120 VHS cassettes or the 8-hour speed with a T-160 cassette. On earlier models, EP was called SLP, probably for Super Long Play. The other speeds are Standard Play (SP) and Long Play (LP).

**extended resolution format** Refers to such video-cassette or camcorder recording systems as Hi8, S-VHS and ED Beta that employ special techniques to enhance the picture quality, thereby producing a video image with 400 lines of resolution. One popular method, for example, uses an advanced form of comb filtering to separate signals into groups, which are then placed into predetermined spaces to prevent crosstalk. In addition, some Hi8 camcorders use a CCD image sensor capable of generating more than 400,000 pixels. These extended resolution formats usually require more costly, specially prepared tapes to capture the additional video information.

**extended studio PAL** A 625-line video standard that allows processing of component video quality digital signals by composite PAL equipment. The signal can be distributed and recorded in a composite digital form using D-2 or D-3 VTRs.

**extended VGA** See SVGA.

**extender** A lens accessory that lengthens the barrel and in so doing reduces the minimum focusing distance of the lens and increases the effective f-stop.

**extender lens** An accessory lens placed between the

## external keying

video camera lens mount and the standard lens to change the latter's viewing range. Extender lenses can be used in conjunction with telephotos and wide angles to increase their ranges. Other extenders permit 35-mm lenses normally used with film cameras to operate with video cameras. Extender lenses can only work with cameras that accept interchangeable lenses.

**external keying** A keying effect accomplished when a particular camera is assigned to supply the key signal through an SEG. Cf. internal keying, in which any of the cameras can supply the key signal.

**external sync input** A jack, chiefly found on industrial video recorder decks, designed to allow the unit to follow the commands of a time base corrector. The inputs help to synchronize signals so that they can be controlled and mixed with other signals from different units.

**extra** In video production, a player who appears in a program but has no lines of dialogue except where mob voices or voices in unison are required.

**extra high tension** (EHT) British term for the high DC

voltage applied to the second anode in a CRT, ranging from about 4 to 50 kV in various sizes of tubes.

**Extravision** The first national Videotex service in the US, started in 1983 by the Columbia Broadcasting System. It was an over-the-air electronic information service requiring decoders attached to or built into TV sets. See also *Prodigy*.

**extreme closeup** (ECU) See *BCU*.

**eye-controlled camcorder** See *Hi8 Movieboy E1*.

**eye-light** A small pencil-beam spotlight which, when directed at subject's eyes, produces a glitter that appears natural on the screen.

**"eyes of a fly" lens** Also fly's eye lens. Lenticular array, lenticular raster. Used in 3D-image display systems to see an object that is moved in the vertical direction.

**eye-strain** Also eyestrain. A tired or strained condition of the eye muscles, caused by too much use or an incorrect use of the eyes. In 3D viewing systems, methods where both images are printed interleaved, and the viewer is required to focus his eyes beyond them in order for them to be perceived as a single 3D image, can cause eye-strain.

# F

- F** 1. CATV midband channel, 150-156 MHz. 2. TV standard; Luxembourg. Characteristics: 819 lines/frame, 50 fields/s, interlace—2:1, 25 frames/s, 20,475 lines/s, aspect ratio—4:3, video band—5 MHz, RF band—7 MHz, visual polarity—positive, sound modulation—A3, pre-emphasis—50  $\mu$ s, gamma of picture signal—0.5. 3. Family—see *Movie rating systems*.
- f** Focal length: the relative aperture of a lens, written as f/ followed by a number.
- face** Faceplate.
- faceplate** Front part of a camera tube on which light is focused to form the image. In a receiver CRT (kinescope), the front of the tube on which the picture is formed. Also called *face*.
- face time** The amount of time that the head of a TV newscaster or other person is shown on the screen.
- face tone** Mean light level of a human face properly lit for TV.
- facilities** An imprecisely defined word that usually refers to the equipment and services which make up a telecom system. It can mean offices, factories, and/or buildings. In TV, facilities are the physical aspects of a TV station or production company. The term is applied more specifically to technical and production gear, including distribution amplifiers, camcorders, character generators, videotape formats, and all other production and engineering equipment, and is often expanded to include the station's transmitter and earth station installations. The equivalent of facilities in the CATV industry is plant.
- fade** 1. Optical effect in which a TV scene gradually disappears into darkness (fade-out) or appears out of darkness (fade-in). One way to do a fade is to use an alpha mixer. 2. Also, decrease in strength of a received radio signal caused by increased attenuation, refraction of a beam or cancellation due to interference between direct and reflected signals. See also *Fading*.
- fade duration control** A feature designed to adjust the length of a specific fade. Found chiefly on image enhancers/processors, the fade duration control operates with both audio and video signals.
- fade in** Syn.: bring up. To increase the strength of a signal, be it audio or video.
- fade in/fade out** A video camera editing feature that allows for smooth transitions between scenes. Fade in usually refers to going from dark to light while fade out implies going to dark or black. See *Fade through black*.
- fade margin** The depth of fade, expressed in dB, that a microwave receiver can tolerate while still maintaining acceptable circuit quality.
- fade out** Syn.: attenuate. To reduce the strength of a signal, be it audio or video.
- fadeout** A gradual and temporary loss of a received radio or TV signal caused by magnetic storms, atmospheric disturbances, or other conditions along the transmission path. A blackout is a fadeout that can last several hours or more at a particular frequency.
- fader** 1. A signal processing device that permits fading to black or from black to full video. It usually operates with color as well as with black and white video. In home video the fader is generally employed during editing from one VCR to another or from a video camera to a VCR for smoother transitional scenes. Many video cameras have a built-in automatic fade-in and fade-out feature, making a fader accessory unnecessary with these models. 2. A sliding pot control with which an audio or video signal is faded.
- fader bar** A video switch-control device to dissolve and fade the picture.
- fade through black** A technique used in video in which a picture or image is made to fade to black before a second picture appears. Fade through black provides smoother transitions between scenes. Some video cameras offer this as a built-in feature; in fact, not only do they permit fade to black, but they can also go from black to full video. Special effects generators, signal processors and other devices also provide fade through black.
- fading** Variations in signal strength at a receiver due to variations in the transmission medium. Destructive interference between two waves traveling by two different paths to the receiver is the most common cause of fading; this is termed interference fading. Amplitude fading occurs when all transmitted frequencies are attenuated approximately equally,

## fan dipole

resulting in a smaller received signal. Selective fading occurs when some frequencies are more attenuated than others, resulting in a distorted received signal.

**fan dipole** A dipole antenna built with triangular sheets of metal instead of rods for the reception of all signals in the UHF TV band. Input impedance is about 300 ohms. The figure-eight radiation pattern can be changed to a single directional lobe by placing a wire-screen reflector behind the dipole.

**“fantasy” decoder** A type of descrambler used for satellite descrambling. It uses a 94-kHz sine-wave scrambling plus video inversion. Audio is encoded on a 15.7-kHz carrier that is 1/6 that of the scrambling sine wave. The 94-kHz sine wave is not an exact multiple of the scan rate, in general.

**Faroudja, Yves** California-based French engineer and experimenter in improved, large-screen video; inventor who contributed to the development of Super-VHS video recording and the 8mm camcorder. He developed a system of enhancing the present TV picture that, unlike the proposed HDTV, does not make current home TV sets obsolete or alter current broadcasting standards. His method involved doubling the number of lines per picture for more image detail, resulting in a theater-size video image that almost matched the quality of 35mm film projection. Although his system required the use of additional image processors—at relatively little cost—present TV sets could still derive some benefits from the system without upgrading.

**Faroudja superNTSC system** See *SuperNTSC system*.

**fast forward/cue** A button to fast-forward wind the videotape. When this button is pressed during playback, the picture can be scanned at five times normal speed.

**fast packet multiplexing** Multiplexing is putting more than one “conversation” onto one circuit. You can do this in either of two ways: by splitting the channels sideways into subchannels of narrower frequency, called frequency division multiplexing, or by splitting it by time. Fast packet multiplexing is a combination of three techniques—multiplexing, packetizing of analog signals, and computer intelligence.

**fast packet switching** A recent wide-area-networking technology capable of transmitting data, digitized voice and digitized image information. It makes use of short, fixed length packets (or cells) that are all the same size. The underlying switching technology is based on the statistical multiplexing of data and voice in fixed length cells. Any of these packets could carry digital voice, data or digital image information. All the packets travel at Level Two of the OSI model, and routing is performed on the basis of the Level Two addressing. Fast packet is claimed to be a very effective way of make best use of available bandwidth. It is claimed to offer the benefits of

conventional multiplexing techniques and circuit switching techniques because of the way it operates. It is one of the transmission technologies being developed for use with B-ISDN (Broadband ISDN). The switch used to route packets in a fast packet network is termed a fast packet switch. Also, fast packet technology can carry data transmissions that enter the network using frame relay. For particularly high speed networking, an implementation of fast packet switching known as ATM has been developed. See *ATM* and *Fast packet multiplexing*.

**fast scan** See *Visual scan*.

**fast-scan amateur television** Fast-scan TV, also referred to simply as amateur TV (ATV), uses a transmission format fully compatible with video equipment designed for the home consumer market. ATV offers a major advantage over broadcast TV, though, and that is rooted in our ability to communicate interactively or two ways. ATV people have been communicating in round table nets for many years—long before industry discovered the benefits of interactive video or, as it’s called, “teleconferencing.” To transmit FSTV, all you need is a home-video type camera, microphone, ATV transmitter and antenna. Depending on your application, a personal computer terminal or VTR can be used instead of a camera. To receive, all you need is an antenna, RF converter (also called a downconverter, it shifts the received signal to a standard VHF TV channel) and an unmodified home TV set. Most ATV is performed in the 420- to 440-MHz and 1240- to 1294-MHz segments of the 70- and 23-cm bands. Some ATV activity can be found in the 902-928 MHz band.

**fast-scan television** See *FSTV*. See also *Fast-scan amateur television*.

**+f<sub>B</sub>** See *Maximum frequency blue*.

**-f<sub>B</sub>** See *Minimum frequency blue*.

**f<sub>OB</sub>** See *Center frequency blue, SECAM*.

**fast search** See *Visual scan*.

**favor** An instruction to a TV camera operator to focus on a specific person or object, as in “favor (name of performer).”

**FC** 1. Fiber optic connector (developed by NTT). 2. Footcandle.

**FCC** The Federal Communications Commission, the regulatory board which sets standards for communication within the US.

**FCC zones** Zones with rules that govern the separation of broadcasting stations within each zone. There are three geographic zones. In Zone 1, the minimum co-channel separation is 170 miles for VHF channels and 155 miles for UHF. In Zone 2, 190/175. In Zone 3, 220/205.

**F connector** A threaded barrel-type metal fitting used by the TV industry to connect coaxial cable to equipment. The F connector is designed basically for RF signals which transmit both audio and video signals. An F-barrel connector, with a female thread on both

- ends, is used to join together two coaxial cables. Also known as coaxial connector, F type connector.
- FDDI** Fiber Distributed Digital Interface. Also Fiber Distributed Data Interface. A set of ANSI protocols for sending digital data over fiber optic cable. FDDI supports data rates of up to 100 megabits per second.
- FDDI-2** A second generation of FDDI networks that support isochronous channels to enable voice and video to be transmitted.
- FDS** Frequency Division Switching. Seldom used for voice switching. Primarily used for radio and TV broadcasting.
- “feather touch” operation** Just a light touch of the machine buttons or remote control unit keys supplies mode command signals to the various circuits, motors, switches, and solenoids to set up the selected mode.
- FEC** Forward error correction, technique used in video compression.
- FED** Field emission display. A new way of making TV and computer screen displays. FED screens are flat and potentially cheap. A typical FED screen packs millions of tiny individual emitters between two ultra-thin glass layers. Each emitter fires electrons simultaneously across a vacuum gap onto a phosphor coating very much like a CRT’s.
- Federal Communications Act: Section 605** The section quoted in reference to receiving Pay TV signals without permission or without paying for the service:
- “No person not being authorized by the sender shall intercept any radio communication and divulge or publish the existence, contents, substance, purport, effect, or meaning of such intercepted communication to any person. No person not being entitled thereto shall receive or assist in receiving any interstate or foreign communication by radio and use such communication (or any information therein contained) for his own benefit or for the benefit of another not entitled thereto. No person having received any intercepted radio communication or having become acquainted with the contents, substance, purport, effect, or meaning of such communication (or any part thereof) knowing that such communication was intercepted, shall divulge or publish the existence, contents, substance, purport, effect, or meaning of such communication (or any part thereof) or use which communication (or any information therein contained) for his own benefit or for the benefit of another not entitled thereto. This section shall not apply to the receiving, divulging, publishing, or utilizing the contents of any radio communication which is broadcast or transmitted by amateurs or others for the use of the general public, or which relates to ships in distress.”
- Federal Communications Commission (FCC)** A US government agency responsible for the following:
1. The policy governing allocation of radiated emissions (frequencies).
  2. Establishing owner eligibility for commercial radio and TV stations and their licensing.
  3. The qualification and licensing of amateur and professional radio and radar operators and electronic technicians.
- feed** Broadcasts sent by radio and TV networks to local stations or by a local station or medium to the headquarters office or other media.
- feedback** The return of a portion of the output of a circuit or device to its input. See *Video feedback*.
- feeder cables** An element of a tree network cable operation consisting of the coaxial cables that connect the cable trunk lines to the cable drop lines. This intermediate portion of the distribution system carries the electronic signals from large trunk-cable lines to a specific area or neighborhood of homes. Sometimes called feeder lines, they are installed underground or strung between telephone poles.
- feedline** A transmission line, such as a coaxial cable.
- feeder lines** Feeder cables.
- feed horn** The component of a satellite TV system that is attached to the low noise amplifier and faces the center of the antenna. The feed horn, usually rectangular or circular in shape, performs various functions: (1) it captures the signals reflected from the parabolic or spherical antenna; (2) it shuts out other, interfering signals; (3) it eliminates noise from land sources; and (4) it directs the received signal into the LNA. Also known as feeder horn, feedhorn.
- feevee** Pay TV, pay cable, subscription TV, or any other fee-for-viewing service.
- FEQ** Frequency Equalization. Frequency correction.
- ferric oxide tape** A magnetic audio- or videotape with a coating of ferric oxide, a reddish-brown oxide of iron. Since this chemical occurs naturally as rust (oxidized iron), tapes and heads must be cleaned regularly.
- ferrite** A ceramic-structured, magnetic substance formed by combining iron oxide and other metallic oxides under high temperatures. The quality of a videotape depends upon the density of its ferrite particles. Ferrite was developed in the 1930s by the Japanese.
- FET** Field Effect Transistor. Very thin and small devices used to control pixels in a TFT (Thin Film Transistor) display.
- FF** 1. Fast Forward. 2. CATV hyperband channel, 330-336 MHz.
- FFTD** Frame/Field Transfer Device.
- FG** A frequency generator used in VCR servo circuits to create FG pulses that related to the speed of the capstan rotation. See also *Capstan servo*, *Hall-effect IC*.
- fiber** Dielectric waveguide that guides light.
- Fiber Distributed Data Interface** See *FDDI*.
- Fiber Distributed Digital Interface** See *FDDI*.
- fiber optics** A technology for transmitting information (voice, video, data) via light waves through hair-thin strands of flexible glass. Signals are encoded by

## fibre

varying some characteristic of the light waves generated by a low-power laser, whose output is sent through a light-conducting fiber to a receiving device that decodes the signals. Fiber optics is one of the several new technologies that are revolutionizing the TV industry.

**fibre** The European, Australian, Canadian and British spelling. See *Fiber*.

**Fibre Channel** A highly reliable, gigabit-per-second interconnect technology, which allows concurrent communications among computers and peripherals.

**field** 1. One half (every other line) of an interlaced TV picture frame. There are 60 fields per second in American TV. In twin-interlaced scanning, as used in most TV systems, two vertical sweeps are needed to cover all the lines of the picture and each field is thus a half-picture. If the lines are numbered in sequence from the top to the bottom of the picture, the scanning agent first covers lines 1,3,5, etc. (this being known as the odd field) and then returns to the top of the picture to cover lines 2,4,6, etc. (this being known as the even field). The field was formerly known as a frame. 2. The area covered by a lens. 3. A region containing electric or magnetic lines of force, or both. 4. An operating location for equipment.

**field blanking** In TV, the suppression of the picture signal during the interval between successive fields. The field-blanking period occupies 13-21 lines in the American 525-line system, and 18-22 lines in the CCIR 625-line system. It contains a group of field-sync pulses (broad pulses) flanked by groups of equalizing pulses, and the line-sync pulses continue throughout the field-blanking period.

**field camera** A camera that has the camera head and the camera control unit (CCU) combined into one unit. Any adjustments needed must be made before shooting begins. See *studio camera*.

**field drive signal** Signal used to establish field sync in studio systems—for example, in non-composite working.

**field emission display (FED)** Thin, flat, light-weight display. In FEDs a tiny CRT sits behind each of the many pixels in the screen.

**field emitter display technology** See *Synthetic diamond display*.

**field frequency** In TV, the number of vertical sweeps made by the scanning beam in 1 s. For interlaced scanning it is equal to the product of the picture frequency and the number of fields per picture. In most TV systems the field frequency is approximately equal to the frequency of the supply mains. In Europe this is 50 Hz, in the US, 60 Hz. Also called field repetition rate; field rate; Fv.

**field identification signal** Often called ident signal. In the SECAM system, different components of the chrominance information are transmitted on succeeding lines, so that ident signals must be inserted

in the waveform to ensure that the R-Y signal does not reach the B-Y output, and vice versa.

**field interlacing** In TV, a process of creating a complete video frame by dividing the picture into two halves with one containing the odd lines and the other containing the even lines. This is done to eliminate flicker.

**field-neutralizing coil** A coil that is placed around the faceplate of a color TV picture tube. Direct current is sent through this coil to produce a constant magnetic field that offsets the effect of the earth's magnetic field on the electron beams.

**field-neutralizing magnet** A permanent magnet mounted near the edge of the faceplate of a color picture tube to serve the same function as a field-neutralizing coil. Also called rim magnet.

**field of view** Also field of vision. A scene seen by camera. The video camera scans the field of view in its conventional way, first starting at a point, such as in the upper left-hand corner of the field of view, and then scanning horizontally. As it scans horizontally it also moves down slowly, then snaps back and makes another horizontal scan. This pattern is repeated until the full field of view has been encompassed with nearly horizontal lines (in the conventional manner). Once the camera has completely scanned the field of view, the scan is then repeated. In most American and Japanese conventional video cameras, the field of view is scanned 60 Hz in two interlaced fields, giving a frame rate of 30 Hz, two fields constituting one frame.

**field period** The time required to transmit one TV field, equal to 1/60 s in the US.

**field phasing** Action of setting the phase of a picture frame with respect to a synchronizing source so that, on genlocking, a frame or picture roll does not occur.

**field pickup** See *Remote*.

**field producer** A person who works outside the headquarters TV studio—in the field—to supervise the production of programs or segments, as of a news program.

**field rate** Field frequency.

**field repetition rate** Field frequency.

**field sawtooth** Waveform which rises at a constant rate and then falls rapidly, at the frequency of field deflection.

**field scanning** A process designed to obtain noiseless special effects with a VCR. When certain effects such as slow motion or freeze frame appear on the screen, they are usually accompanied by video noise in the form of horizontal noise bars, etc. To minimize or eliminate this type of interference, some VCR manufacturers have found that by reproducing two fields instead of one complete picture or frame of a video signal, the final TV picture is cleaner and steadier. A picture is composed of one frame of 525 lines or two fields of 262.5 lines each, one containing the



odd-number lines, the other the even. Although the field, therefore, contains only half the information, it is easier to produce an interference-free picture by using this procedure of field scanning.

**field-sequential color television** A color TV system whose individual red, green and blue primary colors are associated with successive fields. It was the first broadcast color TV system, approved by the FCC in 1950. It was later changed to the NTSC standard for color broadcasting.

**field strength meter** An instrument used in the field by CATV service technicians to test the signal strength in various locations where subscribers complain of weak reception.

**field suppression** Period between successive fields which is blanked or suppressed to allow the scanning spot to return to the start of the picture. Also called field blanking.

**field sync signal** In TV, the signal transmitted at the end of each field to initiate vertical flyback of the scanning beam in receivers so keeping field scanning at the receiver in step with that at the transmitter. In most TV systems the field sync signal consists of one or more pulses (each longer than the line sync pulse) and so arranged that the continuity of the line sync pulses is not interrupted.

**field tilt** A form of TV picture distortion, also known as frame tilt. Normally, reference points on the syncs of the correct TV waveform bear a constant relation to earth potential, but this relationship may be destroyed, e.g., by hum or when the signal is passed through an AC coupling. After the sync signals are removed from the waveform in a sync separator stage, the distortion of the video signal remains as a gradual brightness increase or decrease over the frame period, and the result on the waveform is similar to the addition of a frame-shading signal. The introduction of a line-by-line clamping circuit removes such effects from the signal, provided that the signal has not been modulated by them. Usually the response of an amplifier is checked for field tilt by applying a 50-Hz square wave to the input. When measured at the output, a typical response is residual tilt less than 5% of the output level. Field tilt is sometimes deliberately introduced in the form of frame shading to remove spurious shading signals from the output of a camera tube.

**field time base** 1. The circuits responsible for generating the signals causing vertical deflection of the scanning beam. 2. The pattern of and points at which a field changes; 60 Hz is the field time base of the American TV system; the field time base must be kept as steady and regular as possible to ensure the best possible picture. A time base corrector maintains this stability and is part of most professional editing and recording systems.

**field track** A diagonal line of information or program-

ming placed down on moving videotape by one videohead during recording. Since two fields make up one frame, 60 field tracks comprise the 30 fr/s required for the NTSC standard.

**fifth estate** Radio broadcasting and, by extension, TV. In ancient times, there were four traditional "estates" in society. The first was the clergy, the second the nobility, the third the commons, and the fourth, the public press. To distinguish the new, powerful radio medium from the printed page, the term fifth estate was coined in the 1930s.

**fifty-fifty** In film and TV, a shot of two people, each occupying half of the field of view; more commonly called a two-shot.

**figure of merit** A quality factor used to compare dish gain to system noise and written as G/S, where S is the system noise in Kelvins and G is the gain of the dish in dB. Also, a figure used in electronics that compares specific quantities to that of a reference value, or is used as a comparison between various circuits.

**file film** Stock footage from the library or file of a TV station or other source. When used as background material in a TV newscast, file film generally is identified by a line at the top or bottom of the screen with the date on which it was originally taken.

**filler** Fill light.

**fill-in light** Fill light.

**fill light** The addition of lighting in shadowy areas within a scene to help balance the proper brightness and contrast. In studio lighting, light directed into the shadows to prevent excessive contrast. Also called filler and fill-in light. See *Lighting*.

**fill signal** That signal, or portion of a signal, used in keying, wiping, or inserting to replace portions of the primary signal; any video signal used to replace another video signal in a special effects application.

**film** A motion picture; the action recorded on film. A motion picture or TV program that is taped often is incorrectly called a film.

**film camera** See *Camera categories*.

**film chain** A special motion picture projector combined with a video camera to transfer movies to video.

**film clip** A bit of film footage, known familiarly as a clip, that is often used as an insert in a TV production. The brief film can be introduced into a live studio program to take the viewer outside the studio. In the early days of TV, all such footage was shot on 16-mm film or sections were physically clipped out of longer films. Scenes were also cut from theatrical films. Today, such segments are usually shot on videotape rather than film, and the clips from motion pictures are also transferred to tape, before they are used. Although the videos are not cut from the original, the term clip is still used, but without the prefix "film."

**film island** A slide and film projector group, as in a TV studio.

## film pickup

**film pickup** Transmission of film to a TV station; now commonly replaced by videotape.

**film rundown** A list of films, such as a log of films shown on a TV news program.

**film scanner** Telecine.

**film-to-tape transfer** A technique of placing films or slides onto videotape. The image from a standard movie projector (or slide projector) is projected onto a telecine adapter and recorded with a video camera. Sound can be added later with the Audio Dub mode or the VCR. Another method employs a special sheeting called Polacoat, which is mounted on a homemade wooden frame and used as a projection screen. As the movie or slide projector image is projected on the screen, a video camera placed behind the screen records the projected image. One disadvantage of this procedure is that titles and printing come out reversed. Professional film-to-tape transfer—converting theatrical releases to the home video rental market—presents certain problems that render only a fairly reasonable facsimile of the original film rather than the more desirable true replica. First, the aspect ratio of the TV screen differs from that of the theatrical wide-screen, resulting either in part of the image not appearing on the TV screen or a further-reduced image if letterboxing is used. Second, producers of videocassettes may not always be fortunate enough to obtain the master positive of the film. Second or third-generation film prints often suffer in contrast, detail and sharpness. Film enthusiasts and those who work with film-to-tape transfer hope that HDTV will solve these problems.

**film transfer** High-quality motion picture film made from an original, usually digital, videotape. Also called tape-to-film transfer.

**film transmission** In TV, the transmission of a motion picture.

**filter** (color) Transparent material having the characteristic of absorbing certain wavelengths of light in the visible spectrum and transmitting others more or less undiminished. A narrow-cut filter transmits a limited group of wavelengths only, absorbing all others, and thus gives a pure or saturated color of light, while a wide-cut filter transmits a much more extensive spectral band and the resultant color of light is less saturated. Sometimes needed for color and black and white recording.

**filter** (electrical) An electrical network that will transmit signals with frequencies within certain designated ranges (pass band) and suppress signals of other frequencies (attenuation bands). The frequencies that separate the pass and attenuation bands are the cut-off frequencies, which have the symbols  $f_c$  if there is only one cut-off frequency or  $f_1$  and  $f_2$  if more than one. Filters are classified according to the ranges of their pass or attenuation bands as low-pass, high-pass, bandpass and bandstop filters. The components of a practical filter may be arranged to

give the desired output curve. For example, Chebyshev and Butterworth filters have a flat response in the pass band whereas Chebyshev filters have some variation of the residual response in the pass band but have a more rapid increase of attenuation giving a sharper cutoff profile.

**filter factor** Numerical factor by which the length of an exposure must be increased to compensate for the light absorption of an optical filter through which the exposure is made.

**filter kit** A package containing various filters to be used with a video camera. Video filter kits can range from 5 to 75 filters. Some special effects filters include a fog filter; a multiple image filter; a prism filter which distorts the light for surrealistic effects; a star filter to turn conventional lights into “starry” images; a sepia filter for an old-fashioned look. There are also color correction filters. Besides balancing light sources, these can be used to create particular moods: an orange filter can add a feeling of warmth to a scene while a blue filter can create a cool effect.

**filter mike** A microphone modified to produce sound effects, such as an echo or the simulated sound of a voice on a telephone.

**filterplexer** Device incorporating vestigial sideband filter and vision and sound combining unit. All TV transmissions use vestigial sideband transmission for the vision transmission in order to reduce the large bandwidth required. To achieve a vestigial sideband signal, a filter is necessary to remove the unwanted portions of the lower sideband. This can be done in the earlier stages of a transmitter, but more usually after the final output stages.

**filter wheel** A built-in device, found in most cameras, that allows you to place one of several filters between the lens of the camera and the beam splitter. Most cameras are set up to operate with TV studio lights, which have a color temperature of 3,200 K. If you go outdoors to shoot, you would change the filter wheel to compensate for the change of color temperature.

**final character** In videotex, the last character of a management command of presentation protocol control information.

**final cut** See *Keeper*.

**final mile** In satellite communications, the electronic equipment that connects the downlink to the receiving site. Also called last mile.

**finder** An optical or electronic device that shows the field of action covered by a TV camera.

**fine chrominance primary** The chrominance primary that is associated with the greater transmission bandwidth in the two-primary US system of color TV. The fine chrominance primary is the I signal, and has frequency components up to 1.5 MHz. The coarse chrominance primary is the Q signal, and has a typical bandwidth of only 0.5 MHz.

**fine tuning control** A control that makes small changes in the frequency of the RF oscillator in a TV tuner, usually with an adjustable capacitor, after switching to a desired channel.

**finished art** Material ready to be produced.

**finite impulse response filter** Also FIR filter. A type of digital filter. Can be any type, such as lowpass, highpass or bandpass.

**Firewire** The original name of IEEE 1394, developed by Apple Computer.

**FIR filter** Finite impulse response filter, a type of digital filter. Digital filters in general are much better than analog filters. Sometimes the only way to design a very high-quality filter is with an FIR—it would be impossible to design using analog components.

**first generation** The original recording of a tape segment. The first time the signal is recorded on tape, that tape is called first generation. Every subsequent recording of the already recorded segment will be a generation removed.

**first mile** In satellite communications, the electronic equipment that connects the point of origin to the uplink.

**First National Kidisc** An LV interactive videodisc released in 1981 offering multiple games, activities, puzzles and educational programs in which a child from 6 to 12 can participate. It was one of the first to venture into nonlinear programming (NFL's "How to Watch Pro Football" was the first interactive videodisc). Produced by Optical Programming Associates, the Kidisc contains 24 chapters, each a complete unit that can be located quickly on a videodisc player. The disc is designed to make use of the many special effects of the VDP.

**fishbowl** A booth in a TV studio for observers, such as sponsors and VIPs.

**fishpole** Light pole resembling a fishing rod on which a microphone is slung, the whole being projected out over a scene when dialogue is being recorded. Fishpoles are often used in confined spaces where a boom would be inconvenient.

**fitting** An adjustment. A TV fitting is a type of rehearsal, generally of a forthcoming live news event such as a political convention, in which stand-ins are used to test camera angles and other technical details.

**five and under** A TV role in which a performer has a maximum of five lines. A larger number requires a higher payment.

**Five-Channel System** Early CATV system that used TV channels 2 through 6. TV stations received on UHF or on channels 7 to 13 were converted to channels in the band 2 to 6 at the head-end site. At that time, the early 1950s, five channels were a lot and subscribers were more tolerant of system outages and technical problems than they are today.

**fix** To determine audio or video. A fix is a correction.

**fixed focus lens** In video, a lens of one size, called a

fixed focal length, usually listed in mm, such as 16-mm. The fixed focus lens is often called the "normal" lens if it is in the 16-mm range. Other basic types of fixed lenses are the wide angle and telephoto. The shorter the focal length, the wider the area the lens encompasses. Most video cameras come equipped with a zoom lens for more versatility rather than with a fixed focus type that has a limited angle of view.

**fixed satellite service (FSS)** A radiocommunication service between earth stations as specified fixed points when one or more satellites are used; in some cases this service includes satellite-to-satellite links, which may also be effected in the inter-satellite service; the FSS may also include feeder links for other space radiocommunication services.

**FL** Filter.

**flag** Small rectangle of wood or card mounted on a stand in the studio to keep direct light off the camera lens or shade some part of the set. Also called French flag.

**flagging** A defective image characterized by a bent, pulled or slanted picture at the top of the TV screen. It is usually a result of too little or too much tape tension, a problem known as skew error; an old model TV set; or a tracking control problem resulting from tape that has been stretched. Also caused by copy protection on commercial videocassette tapes.

**flagwaving** This is the term used to describe a TV set's ability to accept unstable playback pictures from a VCR. All home VCRs have some degree of playback instability before the active picture is scanned. This can cause a bending or flapping from side to side of the top inch or so of the screen. This movement is called flagwaving.

**flare** In an optical or TV image, spurious areas caused by scattering of light in the camera or picture tube. Also undesired light arriving at the image plane in an optical system. This light may be uniformly distributed over the image, resulting in a reduction of image contrast, or it may be concentrated in specific areas of the image. Usually the result of reflections from surfaces within the optical system. In a TV tube, flare is light produced by excitation of the phosphor outside the area in nominal use and falling on that area.

**flash** 1. In film and TV, a brief disruption of the picture. 2. In videotex, to vary in color at regular intervals. In normal flash the characters are displayed alternately in the prevailing foreground color and in the prevailing background color. In inverted flash the colors are changed on the inverted phase of the flashing clock. In reduced intensity flash the characters are displayed alternately in the prevailing foreground color and the equivalent color of the next color table: table A colors adopt table B colors.

**flash A/D** A fast method for digitizing something. The

## flashback

signal to be digitized is provided as the source for one input of a whole bank of comparators. The other input is tied to a tap of a resistor ladder, with each comparator tied to its own tap. This way, when the input voltage is somewhere between the top and bottom voltages connected to the ladder, the comparators output a thermometer code: a “yes” up to the input voltage and a “no” above that. The ADC then takes this string of Yes’s and No’s and converts them into a binary number which tells where the Yes’s turned into No’s.

**flashback** See *Channel flashback*.

**flash cutting** In film and TV, the use of a series of very brief shots.

**flashing** The blinking on and off of characters, used to call attention to something on the screen.

**flash memory** A special type of EEPROM that can be erased and reprogrammed inside a device. Can be used as consumer-camcorder medium instead of moving tape. In 1994 Hitachi demonstrated an early prototype, which played back full-motion color and stereo sound. The camcorder provides 30 minutes of color recording using as the storage device a 400-megabit multilayered flash memory about the size of a sugar cube, uses a single-chip MPEG-1 encoder/decoder and has an electronic zoom system, further eliminating moving parts.

**flashover** Discharge caused by an excessively high voltage breaking down air or surface insulation.

**flash pan** See *Swish pan*.

**flat** Large flat mobile piece of plywood or other material usually of a standard size in a studio complex. Basic unit of TV studio set building. A unit of scenery, essentially the same as used in a stage setting. A movable wall.

**flat light** Lighting a scene or setting with overall brightness without noticeable modeling or highlights.

**flat-square** Refers to CRTs that are both full-square and have relatively flat screen surfaces.

**flat television receiver** A TV receiver whose picture-forming device is thin enough so the entire receiver can be hung on the wall like a picture. Experimental CRTs, and experimental flat panels that use thin-film integrated-circuit technology based on electroluminescence, ferroelectric ceramics, liquid crystals, or other optoelectronic techniques have been tried in an effort to obtain a commercial product. See also *Wall-ready display*.

**flesh tone corrector** Device that restores the original colors of an image; the human eye is most sensitive to the color accuracy of skin tones.

**flesh tone reference chart** See *Video test chart*.

**flicker** In TV, unwanted regular variation in the brightness of the reproduced picture. Flicker can be annoying when the field frequency is low and, in fact, this consideration sets a lower limit to the field frequency that can be used. It was for this reason that interlaced scanning was adopted because this per-

mits a high field frequency (minimizing flicker) while allowing a low picture frequency (minimizing bandwidth). Two types of flicker are encountered in TV systems that employ interlaced scanning. Large-area flicker occurs at the field rate, 60 fields/s in the NTSC system and 50 fields/s for PAL. Small-area flicker affects only vertical detail. It occurs at the frame rate, 30 per second for NTSC and 25 for PAL. Large-area flicker involves the entire image area and is the most troublesome. The magnitude of the flicker effect depends on two parameters, the field repetition rate and the illumination of the retina by the image. Flicker can be reduced and ultimately made unnoticeable by increasing the field repetition or reducing the retinal illumination.

**flickering** An effect resulting from copying a projected movie image with a video camera. Flickering is caused by the difference in frames-per-second. Silent films travel through the projector at approximately 18 fps, sound movies at 24 fps—both different from video, which is synchronized at 30 fps. The discrepancy between the two systems causes flickering. Professional equipment has variable speed controls, which can remove this problem.

**flick pan** See *Swish pan*.

**flip** In video, digital special effect. There are several types of flips. In a page flip the picture rotates around one edge of the screen as if you were turning the page of a book. Other flips can rotate around a central vertical or horizontal axis. See *Flipover*.

**flip ability** Feature found on some laser disc players. These will play both sides of a videodisc without having to turn the disc over. This is convenient, especially for CAV discs, which are limited to only 30 minutes per side.

**flip card** A board or card with a title, name, or message, used on TV or in a show or presentation; also called cue card.

**flip frame** Flipover.

**flipover** Also Flip-over. In film, TV, a transitional optical effect, akin to turning over a page; also called flip, flip frame, flip wipe, flipover wipe, flopper, optical flop, or turnaround.

**flipover wipe** Flipover.

**flippers** Flaps or binders on a spotlight; commonly called barn doors.

**flip time** A videodisc player (with the flip ability) specification that indicates how long the machine takes to change from side 1 to side 2.

**flip wipe** Flipover.

**floor** 1. The sales-display area of a store. 2. The performance area of a studio.

**floor manager (FM)** The production coordinator in charge of all floor operations not involving engineering. He or she supervises the erection of sets, placement of props, live sound effects, talent, cueing and the like. The floor manager is the director’s representative in the TV studio or on the floor.

**floor plan** Plan of TV studio with set or sets indicated on it for use by the director in planning camera positions and actions. It shows the position of set pieces, objects, talent, cameras, and other production gear.

**flopover** Flipover.

**fluid head tripod** A tripod whose camera mount consists of two metal plates. The upper, rotating plate rests on a bed of fluid, and the movement provided is very smooth. Necessary for professional pans, tilts and other camera moves.

**flutter** 1. In video, an effect with VCRs that is caused by very brief and rapid tape speed variations. 2. Distortion that occurs in sound reproduction as a result of undesired speed variations during the recording, duplicating, or reproducing process. The variations in speed and hence pitch occur at a much higher rate than for wow.

**flyback** In CRTs, the rapid return of the electron beam to its starting point at the end of each trace. In TV there is a horizontal flyback at the end of each scanning line and a vertical flyback at the end of each field. Also called retrace.

**flyback power supply** A high-voltage power supply that produces the DC voltage of about 10 to 25 kV required for the second anode of a CRT in a TV receiver or oscilloscope. The sudden reversal of horizontal deflection-coil current in the horizontal output transformer during each flyback induces a voltage pulse that is increased to the required higher value by autotransformer action, then rectified and filtered. Also called kickback power supply.

**flyback transformer** Another name for horizontal output transformer. The flyback transformer takes the sweep signal from the horizontal output transistor and builds up the high voltage to be rectified for the HV of CRT. The flyback provides horizontal sweep for the yoke circuits.

**flying head** A device that erases—a flying erase head—or reproduces—a flying reproduce head—only one track of a tape instead of the entire tape.

**flying-spot scanner** An imager that produces a video signal from an object, such as a film, by scanning the object with a spot of light, which is then focused on a photocell to produce corresponding electrical signals. The moving (or “flying”) spot of light is normally produced on the screen of a high-intensity CRT used as a light source. Mechanical scanning of the object has also been employed, using a single point source of light, with a suitably perforated rotating disc between it and the object.

**fly’s eye lens** See “*Eyes of a fly*” lens.

**flyway** A very small satellite newsgathering (SNG) earth station. The extremely portable unit can enable a live satellite feed from previously inaccessible places within hours.

**flywheel circuit** Tuned circuit of high Q (figure of merit) which maintains oscillations for a relatively long pe-

riod analogous to the effect of a rotating flywheel in a machine.

**FM** 1. Frequency modulation, frequency modulated; side-band FM. Descriptive of a signal that has been impressed onto a radio carrier wave in such a manner that the carrier frequency changes as the original signal does. 2. Floor manager.

**FMATV** Frequency-modulated amateur TV.

**FM improvement** The potential noise reduction in a FM signal due to the demodulation process. In a satellite TV receiver this figure is at most 38.6 dB, and is attained above the FM threshold. Below this point, it rapidly drops from 38.6 dB. Above threshold:  $S/N = CN + 38.6$  dB.

**FM luminance signal** The luminance portion of the video signal used to control the frequency of an astable multivibrator in a VCR. The output of this multivibrator is a FM signal, shifting from 3.4 to 4.4 MHz (VHS) and from 3.5 to 4.8 MHz (Beta). In this FM conversion, the sync tips are the “at rest frequency” of the 4-MHz carrier and the peak white video signals are maximum deviation. This FM signal is recorded directly onto the magnetic tape. Though slightly different FM frequencies are used in VHS and Beta, frequencies around 4 MHz were selected as the best compromise between head gap size, writing speed, and bandwidth. During playback, the FM signal is converted back to a standard video signal.

**FM microphone** A wireless microphone designed to transmit its signal through the air and extend the range between the subject and the video camera. The signal of an FM mike is picked up by an FM radio or receiver which is connected to the audio of a VCR. Because it is wireless, the microphone allows the subject to wander within telephoto range of the camera and still be recorded.

**FM receiver** A radio or TV receiver that detects FM signals.

**FM signal, VCR** See *FM luminance signal*.

**FM threshold** An input signal level which is just enough to enable the demodulator circuits to extract a good picture from the carrier. With test equipment, the static threshold is the point at which  $S/N$  drops more than 1 dB from the straight graph line;  $S/N = CN + 38.6$  dB. Typically, the FM threshold is 8 dB in a satellite TV.

**FMV** Full-motion video.

**f number** A lens rating obtained by dividing the focal length of the lens by the effective maximum diameter of the lens. The lower the  $f$  number, the shorter the exposure required, or the lower the illumination needed for satisfactory results with a TV or ordinary camera. An  $f$  number of 3.5, e.g., is usually expressed as  $f/3.5$ .

**FO** Fiber optics.

**focal length** 1. Distance between the optical center of a lens and the image plane, which, in the case of

## focal point

the video camera, is the pickup tube's target area. The distance is measured in mm and determines the angle of view of the lens. The smaller the focal length, the more area that can be viewed at any given distance. The larger the focal length, the smaller the field that can be viewed by the lens at that distance. 2. Distance from the center of the dish to its focal point.

**focal point** The point at which all the signals reflected by a dish join or cross.

**focal range** A measurement in mm that describes the parameters of a zoom lens. For example, the average video camera has a zoom lens with a focal range of from 12.5 to 75 mm. This lens is also referred to as having a 6:1 zoom ratio.

**focus** 1. The point of convergence for rays of light or electrons of a beam that converge to form a minimum-diameter spot. Some picture tubes are constructed internally with self-focusing elements, while in other TV sets, a focus control varies the voltage applied to the picture tube focus element. This voltage may vary from 4 to 5.3 kV. 2. To move a lens or adjust a voltage or current to obtain a focus.

**focus control** A control that adjusts spot size at the screen of a CRT to give the sharpest possible image.

**focusing** 1. The process of controlling convergence or divergence of the electron paths within one or more beams to obtain a desired image or current density distribution in the beam. 2. The process of moving an optical lens toward or away from a screen or film to obtain the sharpest possible image of a desired object.

**focusing anode** An anode in a CRT that changes the size of the electron beam at the screen. Varying the voltage on this anode alters the paths of electrons in the beam and changes the position at which they cross or focus.

**focus-mask tube** Lawrence tube.

**focus modulation** Variation of the focusing of a cathode ray beam as it is deflected, to compensate for the difference in distance from the scanning position to the point where the beam strikes the screen of the CRT or the target of a camera tube.

**focus puller** Member of a video/film crew who is responsible for controlling focus of the lens while the camera or talent is moving.

**focus servo system** System for remote adjustment of the focus of a TV camera. A small handgrip controls a feed to the motor, which adjusts the focus movement of the lens mount.

**fog filter** A lens filter that lends the effect of fog to a scene in increments of density from .05 to 3.

**foldback** A type of small loudspeaker commonly used in a TV studio or on a stage so that performers can hear music or other sound; also called playback.

**folded-dipole antenna** A dipole antenna whose outer ends are folded back and joined together at the center. The impedance is about 300 ohms, as compared

to 70 ohms for a single-wire dipole. It is popular with TV and FM receivers.

**Folding, Interpolating A/Ds** This term describes the unique technology used in Philips's family of high-speed analog-to-digital converters. Designers are usually forced to choose between the high performance and high power consumption of bipolar flash A/Ds or the low performance and low power consumption of CMOS A/Ds. By folding comparator inputs and interpolating the outputs, Philips is able to realize an A/D with one quarter the circuitry of a conventional flash converter. That means high performance A/Ds with power consumption as low as 250 mW. In addition to video, these parts are enabling new test and medical imaging applications.

**foldover** Picture distortion seen as a white line on either side, top, or bottom of a TV picture. Generally caused by nonlinear operation in either the horizontal or vertical deflection circuits of a receiver.

**follow focus** The continual adjustment of the lens to keep an object in focus while either object, camera, or both are moving.

**follow shot** See *Moving shot*.

**footcandle** Ft-c, fc. A unit which measures the amount of light on an object emitted from one candle at a distance of one foot. 100 fc, therefore, would equal the amount of light 100 candles would cast on an object from a distance of 1 foot. In video, usually 10 fc are required for a clear black and white picture and 20 for color. However, black and white cameras can operate with as little as 1/2 fc. It is the former unit of illumination, now replaced by lumens per square foot. The SI (International System of Units) unit of illumination, the lux, is preferred.

**footlambert** fL. A unit of luminance. A measurement of reflected brightness; used to describe light output of projection TV screens. 70 and above is considered very good for these screens. A movie theater screen has a rating of approximately 15 fL. The SI (International System of Units) unit of luminance, the candela per square meter, is preferred.

**footprint** A signal pattern by a satellite or the area of the earth that a signal from a satellite can be received from. Each satellite has its own footprint. If a satellite TV system owner expects good reception from a particular satellite, he/she has to be in its footprint.

**forced oscillations** Oscillations produced in a circuit (for example, in vertical or horizontal oscillators of TV sets) that is acted upon by an external driving force, such as sync pulses.

**foreground color** In videotext, the color of the graphics shape that is being displayed in a character cell. It may be any color from the available color tables or be transparent. In the latter case the full screen background color, the cumulative result of all picture elements previously set, or the video picture is seen.



**format** As in video recording formats, which are many and varied. 3/4" U-Matic and 1/2" VHS are two formats commonly used. Some formats are used in production and broadcasting while others are for home video use.

**format effectors** In videotex, control functions that influence the positioning of text and pictorial images within the defined display area on a presentation device. Characters may be positioned within the defined display area by means of format effectors controls, which move the active position, usually in units of one character position.

**form-wound coil** A coil that is formed or bent into an irregular shape, as in a CRT deflection yoke.

**forward automatic gain control** An AGC system in which the gain of transistors is reduced by use of forward control bias. The transistors used for this application are so designed that their collector characteristics become more crowded at low collector voltages, thus decreasing gain. Used in TV tuners.

**forward compatibility** See *Compatibility*.

**forward error correction** In DTV and DBS, a correction used to minimize the effects of transmission-channel errors on the integrity of the received signal. This helps to eliminate car-ignition and other impulse noise pulses with up to three microseconds duration.

**forward prediction** A technique used in video compression, specifically compression techniques based on motion compensation, where a compressed frame of video is reconstructed by working with the differences between successive video frames.

**fourth utility** The non-vendor specific communications premise wiring system used for integrated information distribution (voice, data, video, etc.). Leviton in Bothel, Washington has trademarked the term fourth utility. They make a broad range of premise wiring products.

**four-tube color camera** An early color camera system using one tube to sense each of the primary colors (R,G,B) and a fourth to sense black and white values (luminance). Required more exact adjustment because four signals had to be coordinated to produce one picture, and was a larger unit than the later 3-, 2-, and 1-tube color cameras.

**fps** Also f.p.s. 1. Feet per second. 2. Frames per second.

**fr** Frame.

**+f<sub>R</sub>** See *Maximum frequency red*.

**-f<sub>R</sub>** See *Minimum frequency red*.

**f<sub>OR</sub>** See *Center frequency red, SECAM*.

**fractal compression** A developing technology for image compression based on principles of fractal geometry. It promises high-resolution and impressive compression ratios—i.e., substantially reduced storage of images.

**fractal geometry** The underlying mathematics behind fractal image compression.

**fractional T-1** Refers to any data transmission rate between 56 Kbps (DSO rate) and 1.544 Mbps (megabit/s), which is a full T-1. Fractional T-1 is simply a digital line that's not as fast as a T-1. Fractional T-1 is popular because it's typically provided by a phone company (local or long distance) at less money than a full T-1. Fractional T-1 is typically used for LAN interconnection, video conferencing, high-speed mainframe connection and computer imaging. Fractional T-1 is typically provided on 4-wire (2-pair) copper circuits.

**frame** 1. The result of a complete scanning of one image. In motion video, the image is scanned repeatedly, making a series of frames. In NTSC TV transmission, a frame consists of two fields, each consisting of 262.5 lines, one made up of the odd-number, the other of the even-number lines. 2. A single complete picture on motion-picture film. For 35-mm film the standard rate of projection is 24 fps. This means that a special projector is required to convert this to 30 fps for US TV. 3. A group of data bits in a specific format, with a flag at each end to indicate the beginning and the end of the frame. The defined format enables network equipment to recognize the meaning and purpose of specific bits. The groups of bits are sent serially (one after another). Generally a frame is a logical transmission unit. A frame usually contains its own control information for addressing and error checking. A frame is the basic data transmission unit employed in bit-oriented protocols. In this way, a frame is similar to a block. 4. In videotex, the basic unit of information storage and display, a discrete amount of material that can be accommodated at one time within the viewing area of a user terminal—generally 24 lines of 40 characters each; also called a page or screen.

**frame accurate** This refers to the level of accuracy in video- or audio tape editing. An edit is considered frame accurate if you can record audio or video material at the exact frame that you specified in your edit.

**frame buffer** A section of memory used to store an image to be displayed on-screen as well as parts of the image that lie outside the limits of the display. Let's assume a horizontal resolution of 640 pixels and 480 scan lines, and we'll use the RGB color space. This works out to be: 640 x 480 x 3 = 921,600 bytes or 900 KB. So, 900 KB are needed to store one frame of video at that resolution. Some systems have frame buffers that will hold several frames.

**frame-by-frame recording** An editing feature, found chiefly on more advanced VCRs, that permits the user to record specific frames in a range of increments. These may vary from as few as three to as many as 33 frames at any one time. This feature introduces animation, frame-by-frame editing and other sophisticated editing techniques to the home enthusiast.

## frame creation

**frame creation** In videotex, the process of assembling the elements of a single frame.

**frame datum** A reference time moment given by the line datum coincident with the beginning of the first equalizing pulse (525 lines standard) or with the beginning of the first broad pulse in the vertical sync group (625 lines standard). Commonly accepted as a timing reference point for color framing and SCH determination in 625 lines standard. Syn.: 0v.

**frame/field transfer device (FFTD)** One of the three basic architectures for obtaining the video signal in solid state cameras. In FFTD a set of charge-transfer devices—the integrated array—is arranged in the vertical (field) direction and exposed to the optical image. During the vertical retrace interval of the TV display system, the charge pattern that has accumulated is clocked at high speed into the storage area. During the normal horizontal (line) blanking periods the pattern of charges in the storage area is moved downwards by one line into the bottom horizontal register and clocked horizontally to the output to form the video signal. Frame transfer architecture suffers from an inherent problem of overload of the pixel's storage units in excessively bright sections of the image. This results in vertical smear and blooming, which can be reduced by the use of frame interline transfer.

**frame frequency** The number of times per second that the frame is completely scanned in TV; usually 30 (25) frames per second, or one half the field frequency of 60 (50) Hz. Also called picture frequency.

**frame grab** To capture a video frame and temporarily store it for later manipulation by a graphics input device.

**frame grabber** 1. A device (e.g., PC board) for capturing a single frame of full-motion video and storing the image in memory. Used to capture and digitize a single frame of video and store it on a hard disk. See *Video capture board*. 2. A device on a TV set to select still pictures—frames—or blocks of text from a bank of such materials for cable-TV subscribers.

**frame identification (SECAM)** V-identification.

**frame interline transfer device (FITD)** One of the three basic architectures for obtaining the video signal in solid state cameras. FITD was developed to provide the advantages of frame transfer, but with resistance to smearing and blooming from excessive highlights. The unique feature of FITD is a row of selection gates between the image and storage areas. The gates are biased so that charges in excess of a predetermined level are drained from the system before being transferred to the storage area.

**frame lock** A method of stabilizing videotape playback that tries to match an even field to an even field and an odd field to an odd field of the playback signal to that of the signal coming from the sync generator. With vertical lock, the system was

trying to match just one vertical sync pulse from the control track for each vertical sync pulse coming in from the sync generator. There was no attempt to match an even field pulse with an even field pulse or an odd field pulse with an odd field pulse. That's what the frame lock circuitry does. It determines whether the vertical sync pulse coming from the sync generator is for an odd or an even field. Then it speeds up or slows down the tape machine until the pulses off the control track match: odd for odd and even for even. This makes the tape playback just a little more precise. We now have the fields matched, but each field has 262.5 lines, and each line has a horizontal sync pulse. This leads to the next level of lock up, horizontal lock. The horizontal lock circuitry compares the number of incoming horizontal sync pulses with the number of played back horizontal sync pulses. The VTR then speeds up or slows down the tape in an attempt to match the two horizontal pulses. See *Lockup*.

**frame period** A time interval equal to the reciprocal of the frame frequency. In US TV the frame period is 1/30 s.

**frame rate** The rate at which entire pictures are transmitted. The frame rate of a video source is how fast the source repaints the screen with a new frame. For example, with the NTSC system, the screen is repainted about once every 30th of a second for a frame rate of about 30 frames per second. For PAL, the frame rate is 25 frames per second. For computer displays, the frame rate is usually 72-100 frames per second.

**frame rate conversion** The act of converting one frame rate to another. One real example that poses a difficult problem is that the frame rate of NTSC, 30 fr/s, is different from a typical computer's display, which may be anywhere from 70 to 75 fr/s.

**frame scanning** A process used in a VCR to produce special effects such as slow motion and freeze frame. For example, a freeze frame is created by stopping the tape while the video heads continue to reproduce the same frame of a video signal. This technique, however, often produces video noise in the form of horizontal noise bars along with the picture. To eliminate this type of interference, VCR manufacturers have come up with various innovations. Some Beta-format machines, for example, utilize four video heads, one pair for producing special effects, the other set for the tape speeds. Some VHS machines, on the other hand, use field scanning to produce noiseless special effects.

**frame sequential** A method of color SSTV transmission which sent complete, sequential frames of red, then green and blue. Now obsolete.

**frame set** In videotex, a group of frames in sequential order identified by a number.

**frame-stopping terminal** A device that isolates a single photo or frame of a film for viewing as a still

picture on a TV screen; also called frame grabber and single-frame terminal.

**framestore** A digital process designed to hold a video image in memory. For instance, professionally designed videowalls use semiconductor memory to store digital video signals. Each TV monitor in a videowall contains its own framestore, which can be a separate image or part of a larger image.

**frame store** Electronic memory used to store an entire picture (called frame).

**frame store synchronizer (FSS)** A device used to lock up nonsynchronous video signals to the main system.

**frame/time search** A VDP feature that permits the viewer to shift to any point on a laser videodisc. The feature is often accompanied by an on-screen display that reveals the exact location on the disc and length of time it took to reach that point. Some frame/time search modes offer frame counts with the CAV format while others provide real-time display with the CLV format.

**frame tilt** Field tilt.

**framing** 1. Adjusting a TV picture to a desired position on the screen of the picture tube. 2. In video reception, the process of adjusting the timing of the receiver to coincide with the received video sync pulse.

**framing control** A control that adjusts the centering, width, or height of the image on a TV receiver screen.

**free oscillations** Oscillations arising in a circuit (for example, in vertical or horizontal oscillators in TV sets) under the influence of internal force, such as a capacitor discharging through a resistor.

**freeze** 1. The technique often used at the end of a TV film as a final scene that remains motionless for a short period. 2. The period of time (1948 to 1952) during which no new TV stations were licensed.

**freeze field** A special effect, similar to that of freeze frame, found on some VCRs. A TV picture consists of 525 line scans, composing one frame. Each frame is made up of two fields. Many machines in the "freeze" position provide a "still" of two fields or one frame, each video head of a pair recording one frame. This is known as a freeze frame. Some VCRs, however, freeze only one field; this tends to present a clearer, steadier picture with fewer noise bars. The freeze field is also known as still field.

**freeze frame** Also still frame. A special effect, found on VCRs, that locks one frame onto the TV screen. If the Pause mode (sometimes called Still) is pressed while the VCR is in Play, the tape "freezes" or becomes motionless and a frame or field appears on the screen. Because some VCRs do not scan an entire frame, noise bars and jitter often accompany the frozen image. Digital technology, introduced into VCRs in 1986, offers noise-free freeze frames. The technique operates by storing a single frame from the otherwise moving tape sequence in a comput-

erized memory bank in the form of digital numbers, which are not affected by video noise. Digital freeze frame can also work with images from a live broadcast or CATV. Keeping the VCR in the Freeze Frame mode for long periods of time may damage the video heads or the tape since the tape is stationary and pressing against the rotating heads.

**freeze frame television** The transmission of discrete video picture frames at a data rate which is too slow to provide the perception of natural motion, referred to as "full-motion." The transmission of the image is typically performed every 30 s from a processing unit's memory where the image is fixed prior to its transmission. An uncompressed, digitized full-motion video signal is typically transmitted at a rate of 90 Mbps. Freeze frame can be carried on anything from a simple voice grade phone line operating at 9.6 Kbps or a DDS (Digital Data System) channel at 64 Kbps.

**frequency band** A specified and continuous range of frequencies. Different types of transmission require different frequency bands.

**frequency control** See *Automatic frequency control*.

**frequency discriminator** A discriminator that selects input signals of constant amplitude and produces an output voltage proportional to the amount that the input frequency differs from a fixed frequency. Frequency discriminators are used in FM systems to convert the FM signals to AM signals. The design of frequency discriminators is such that noise due to amplitude variations in the received signal is almost completely eliminated.

**frequency distortion** Syn.: attenuation distortion. See *Distortion*.

**frequency-division multiplexing** 1. The transmission of a single signal, with different information sent at different frequencies. 2. A form of multiplex operation in which each user of the system is assigned a different frequency band.

**frequency interlace** Interlace of interfering signal frequencies with the spectrum of harmonics of scanning frequencies in TV, to minimize the effect of interfering signals by altering the appearance of their pattern on successive scans.

**frequency interleaving** In the composite TV systems, the technique of choosing the color subcarrier frequency so that the chrominance frequency components of the signal fall between the luminance frequency components of the signal.

**frequency-modulated amateur television (FMATV)** Fast-scan TV. In the US, used above 420 MHz, with majority of activity found in the 1240-1260 MHz segment of the 24-cm band. There are two basic techniques for generating a 24-cm FMATV signal. One method is to use a varactor to triple the amplified signal from a voltage-controlled 416-433 MHz oscillator that has been video modulated. The other approach is to simply amplify the output from a

## frequency modulation

video-modulated 24-cm VCO. The operation of the FMATV receiver is almost identical to that used for home satellite TV reception except for the lower microwave carrier frequency and lower FM deviation levels typically used by amateurs operating in the 24-cm band.

**frequency modulation (FM)** A type of modulation in which the frequency of the carrier wave is varied above and below its unmodulated value by an amount proportional to the amplitude of the signal wave and at the frequency of the modulating signal, the amplitude of the carrier wave remaining constant. FM has several advantages over AM, the most important being the improved signal-to-noise ratio. Commercial TV and FM radio use this technique, which is much less sensitive to noise and interference.

**frequency modulator** An electronic circuit that produces a carrier wave signal on which the audio or video signal is impressed.

**frequency overlap** The portion of a 6-MHz TV channel that is common to both the black and white and chrominance signals in a color TV system. Frequency overlap is a form of bandsharing. See also *Color television*.

**frequency range** The useful range of frequencies over which a transmission system or device may operate when combined with different circuits under a variety of operating conditions. In contrast, bandwidth is a measure of useful frequency range with fixed circuits and fixed operating conditions. See also *TV channels assignments*.

**frequency response** In video, a term which describes the capacity of a system to produce detail or resolution in its picture. Technically, video frequency response refers to the number of times electron beams can turn on and off during one full scan from left to right on a TV screen. These beams scan the raster, or face, of the picture tube in an exact amount of time, shut off and return to the left side of the screen. This procedure recurs until a complete image appears on screen from top to bottom. The greater the frequency response, the better the detail in the picture. Frequency response is expressed as a range; e.g., 50-9,000 Hz. VCR manufacturers claim a frequency response of up to 12 kHz.

**frequency reuse** A method that allows two different TV channels to be broadcast simultaneously on the same transponder by vertically polarizing one channel and horizontally polarizing the other. Another method of frequency reuse is to space satellites about 4 degrees apart. A TVRO pointed at one satellite will not detect any signal from the other satellite, even if it is operating at the same frequency.

**frequency-shift keying (FSK)** A form of frequency modulation in which the modulating wave shifts the output frequency between predetermined values corresponding to the frequencies of correlated

sources. When FSK is used for code transmission, operation of the keyer shifts the carrier frequency back and forth between two distinct frequencies to designate mark and space. Used in digital TV transmission; transmission speed: 0.8 bits/Hz.

**frequency-synthesis tuner** A special feature built into many cable-ready TV sets designed to receive as many channels as CATV carries. Unlike the analog tuning system, the TV receiver with frequency synthesis is pretuned to all the anticipated channels, disregarding the frequencies without channels. With the frequency-synthesis tuner, fine tuning is unnecessary but, like many other automatic features which allow no leeway, the tuner presents difficulties with channels of minimally different frequencies. Also known as electronic frequency synthesizing tuner.

**frequency translation** In re-radiating or distributing a radio signal (e.g., by a relay station), it is usually convenient to change frequency in the device so that the amplified signal from the transmitter does not feed back into the receiver and so cause instability. Such devices are often called translators or frequency translators.

**frequency translator** See *Frequency translation*.

**Fresnel lens** Fresnel spot. A specially constructed lens that produces a softedged concentration of light; used as a lens in a spotlight lamp housing. In some 3D-image display systems, the Fresnel lens of a fixed magnification is used in place of the enlarging section, driver, and controller. The Fresnel lens has a function of a flat convex lens to slightly enlarge the size of a stereoscopic image. Other devices utilize a Fresnel lens in front of a CRT display as the substantial part of 3D viewing. Utilizing a Fresnel lens or lenticular lens between the CRT display and the viewer is a popular scheme in attempting to present 3D viewing of a TV CRT.

**Fresnel zone plate** A zone plate pattern (circular or elliptical) with lowest spatial frequency in the center and uniform rise of spatial frequency along any radius, so that the spatial frequency is directly proportional to the distance from the center. Syn.: bull's eye pattern; circular zone plate.

**friction head tripod** A tripod whose camera mount consists of two metal plates, the lower stationary, the upper rotating; generally does not provide smooth camera movement: more expensive models utilize ball bearings to offset this problem.

**fringe area** The region just beyond the limits reached by a TV transmitter. Reception in fringe areas usually results in weak and unreliable signals that need additional boosting from such devices as a high-gain directional antenna or more sensitive receivers.

**fringe time** A transitional period of a broadcast schedule, immediately before or after the peak period—prime time.

**fringing** In a color display, the effect caused by incorrect superimposition of the R, G, and B images. In-

correct colors appear at the edges of objects in the image. In a TV set, the convergence alignment would need adjusting; in projection TV, it would be the convergence controls which require resetting. In video, excessive chrominance/luminance delay inequality would cause color fringing.

**front end** Tuner.

**front loading** A VCR system to allow loading the videocassette from the front, thus minimizing the space required for the placement. To load a tape, insert it into the loading slot (also called dock). When the cassette has been inserted about midway, it triggers a leaf switch, telling the VCR that a tape is inserted. The VCR then latches onto the tape and pulls it all the way into the cassette lift mechanism (also called the elevator or basket). After the cartridge is in the VCR, the cassette-lift mechanism drops down. When loaded, the reels of the cassette rest over the supply and take-up spindles inside the VCR. As with the top-loading units, front-load Beta decks automatically thread the tape immediately after loading. The tape remains threaded until the cassette is ejected. Also, a number of front-loading VHS decks use a half-loading tape system where the tape is threaded partially around the inside of the deck. This minimizes tape warping.

**front porch** In a TV signal, the area of the video waveform that sits between the start of horizontal blank and the leading edge of (start of) horizontal sync. Its purpose is to provide time for a high video signal amplitude (i.e., a white object) at the right-hand side of the picture to drop down to black level and thence to blanking level before the start of the line-sync pulse. The duration of the front porch is  $1.27 \mu\text{s}$  in the standard US TV NTSC-signal.

**front projection LCD TV** A technology applied to front projection TV which uses crystal display panels instead of conventional image tubes for projecting a large screen image. This system offers several advantages over conventional front projection TV. First, it is more compact and portable. Second, a screen or TV monitor is not essential since the picture can be projected onto any wall. Finally, the LCD system can accommodate special anamorphic lenses that can convert images into wide-screen pictures similar to those seen on theatrical screens. Some models provide a zoom lens that allows the user to adjust the size of the image to fit a given wall space or special screen.

**front projection TV** A projection TV system in which light is projected onto a high gain, silver-like screen and reflected back to the audience. The system contains a TV set/projector, a 1- or 3-lens format and a special screen which reflects light much like a mirror. The process is similar to that which is used in a movie theater. Early front projection TV systems were often cumbersome and difficult to operate. Two-piece systems, for example, required that the pro-

jector be stationed on the floor in the middle of the room while the projection screen reclined near an opposite wall. Some manufacturers, however, disguise the projector within a coffee table and the obtrusive screen is concealed behind curtains. Front projection LCD TV systems, which use LCD panels instead of conventional tubes, are more compact, easier to handle and lighter in weight than those models using image tubes. The rear projection TV system has virtually captured the entire market for projection TV systems. Both front and rear systems have certain drawbacks. Aside from generally costing more than conventional TV systems, they project an image that lacks the subtle details and contrast/sharpness, qualities that have become standard in direct TV.

**fr/s** Frames per second.

**FS** Frequency synthesis. The frequency synthesis tuning system for a TV set includes a PLL for synthesizing local VHF/UHF oscillator signals. When the RF input receives standard TV frequency carriers, the mixer combines them with local oscillator signals to form IF signals having a picture carrier equal to the nominal IF picture carrier frequency.

**FSK** Frequency-shift keying.

**FSS** Frame store synchronizer.

**FST** Flat square tube.

**f-stop** Also stop. A calibrated control that indicates the amount of light passing through a lens to the target area. The "*f*" stands for fixed. All lenses used on video cameras have *f*-stops such as *f*/1.4, *f*/1.8, *f*/2, etc. Numbers are etched on the iris ring on the front of the lens, denoting the extent to which the iris is closed or opened. *F*-stop numbers are the product of a mathematical formula where *f* is equal to the focal length of the lens divided by the diameter of the lens. The *f*-stop can be changed, depending on the lighting conditions. The smaller the *f* number, the greater the amount of light entering the camera. Most low-light video cameras feature an *f*/1.4 lens. *F*-stop is a linear, theoretical index, not related to the actual amount of light transmitted by the lens. Actual transmission is measured in "*T*-stops," which are determined on an optical bench.

**FSTV** Fast-scan TV. Same as common, full-color, motion commercial broadcast TV.

**FT-C** Footcandle.

**F-type connector** Also F connector. A low-cost connector used by the TV industry to connect coaxial cable to equipment. See also *Connector*.

**full-color transform** Refers to a special visual effect that produces a combination of 2-D animation and 3-D space. Full color transform is usually one of many sophisticated features of a professional/industrial character generator unit.

**Full Field Teletext** In this mode, teletext information is transmitted over, virtually, all available TV lines.

**full field test signal** Test signal in active parts of all active lines of the TV frame (as opposite to VITS).

## full function wireless remote control

**full function wireless remote control** See *Remote control*.

**full load** A VCR videotape transport system that wraps the tape against the video head drum and places the medium tautly around the appropriate rollers and capstans. The full-load technique allows for quicker playing and recording since the tape is in proper position for either function. In addition, full load permits the use of Real-Time Counter, a feature that accurately measures tape usage in hours, minutes and seconds. Full load differs from the half-load method, which slows down the initial playing and recording procedures. The original Beta machines utilized full load whereas VHS units used M-load, a system that drew tape from the cassette only in play and record modes.

**full-motion video** 1. TV transmission where images are sent and displayed in real-time and motion is continuous. Cf. Freeze frame. 2. Video reproduction at 30 frames per second for NTSC-original signals or 25 frames per second for PAL- or SECAM-original signals.

**full radiator** An ideal radiator and absorber of radiation. Its radiation in any part of the spectrum is the maximum obtainable from any radiator at the same temperature. The nearest practical form of full radiator is a cavity with opaque walls maintained at a constant temperature and with a small opening for observation. It was formerly known as a black body radiator.

**full scan** NEC's term for overscan.

**full-square** This refers to sharply rectangular CRTs; they come in sizes of 14, 20, 26, and 27 inches.

**full tape interchange** The capability of a tape recorded on one machine to play back properly on another unit. Videotapes, especially those recorded at the slowest speed, occasionally encounter problems when they are played back on other VCRs. The picture breaks up, rolls, or contains line or noise bars. Adjusting the tracking control frequently corrects the anomaly. Tapes recorded at slow speeds tend to be more sensitive to the slight differences in the posi-

tion of the video heads in other machines. Some video technicians attribute the inability of a tape to play accurately on other units to such additional causes as variations in the tape transport and width of the video heads of both units.

**functional integrated circuit** Electronic circuitry that compensates for discrepancies between otherwise similar components. Functional integrated circuit, introduced into such video equipment as portable VCRs, eliminates the need for the conventional adjustable resistors normally employed for this task.

**fuzzy** Audio or video that is unclear or indistinct.

**fuzzy logic** 1. A new wrinkle in the ancient science of controlling processes that involve constantly changing variables. Contrary to its name, fuzzy logic is a very precise subdiscipline in mathematics. It was invented in the 1960s by University of California at Berkeley's Russian-born Iranian computer science professor Lotfi Zadeh. It enables mathematicians and engineers to simulate human thinking by quantifying concepts such as hot, cold, very far, pretty close, quite true, most usually, almost impossible, etc. It does this by recognizing that measurements are much more useful when they are characterized in linguistic terms than when taken to the fourth decimal place. Fuzzy logic reduces a spectrum of numbers into a few categories called membership groups. Now many consumer goods come with fuzzy logic; for example, it is used inside camcorders to reduce the motion of the camera. Fuzzy logic chips are made by companies such as InfraLogic Inc. of Irvine, CA. 2. In video, a term applied to a camcorder feature designed to provide better automatic lighting control, especially under difficult conditions. Fuzzy logic uses a special IC to "read" the light intensity of more than one area of a scene to be recorded and calculate the average light value. The technique, introduced early in 1990, is said to offer more accuracy and adjust the lens aperture more quickly.

**Fv** Frame frequency.

**FX** 1. Extraneous effects. 2. Film and video special effects.



# G

**G** 1. Green. 2. CATV midband channel, 156-162 MHz. 3. TV standard: Austria, Finland, Germany, Italy, Monaco, Netherlands, Portugal, Spain, Sweden, Switzerland, Yugoslavia. Characteristics: 625 lines/frame, 50 fields/s, interlace-2:1, 25 fr/s, 15,625 lines/s, aspect ratio-4:3, video band-5 MHz, RF band-8 MHz, visual polarity-negative, sound modulation-F3, pre-emphasis-50  $\mu$ s, deviation-50 kHz, gamma of picture signal-0.5, used band-UHF. 4. General audience—see *Movie rating systems*.

**gaffer** The foreman of a stage crew. In film or TV, the gaffer is the head electrician.

**gaffer's tape** A unique and ubiquitous tape used in TV and film production. It is 2" wide and made of vinyl-coated cotton cloth with an adhesive backing of synthetic rubber-based resin. It is available in 12 colors and has a tensile strength of 50 pounds per inch. Because of its stubborn strength and versatility, it is used for everything in a TV studio.

**gain** Video contrast, audio volume. The term used for contrast in video and volume in audio. Also, the whiteness or luminance level of an image. Also, the degree to which a signal is amplified. RF signals are increased by RF amplifiers while video signals are augmented by video distribution amplifiers. The gain of an antenna or of a low noise amplifier is usually a manufacturer specification, and is referred to a reference antenna (usually a dipole or isotropic radiator). In projection TV screens, gain refers to the measured quantity of light reflected by a screen compared to that reflected by a white matte surface. Therefore, a gain of five translates generally to a screen five times as bright as a flat white surface.

**gain control** See *Automatic gain control*.

**gain insurance** The idea of having a little more signal than the minimal acceptable level. In satellite TV, a slightly larger antenna or a lower-noise LNA gives some gain insurance.

**gain unity** A control on some process amplifiers and refers to a neutral position. For example, if the chroma gain control knob or dial is positioned at gain unity, then there is no increase or decrease in the intensity of the color signal. Gain unity applies not only to chroma control, but to luminance level

as well. Therefore, if the luminance gain control is set at gain unity, there is neither gain nor attenuation in the brightness level of the signal.

**gain-up** A camcorder feature using digital circuitry to increase sensitivity to light so that the camera can be used in low-light surroundings measuring only 1 lux. However, gain-up also has its drawbacks: it is accompanied by an increase in video noise and, often, lag or image retention. Gain-up, which is sometimes used deliberately to create special visual effects, such as streaking, is accomplished by digitally boosting the brightness of the picture.

**gallery** In the UK, the production control room overlooking a TV studio.

**gallium arsenide** Symbol: GaAs. High-mobility semiconductor material used in low-noise microwave devices—e.g., in satellite TV.

**galvanometric mirror (GM)** In 3D image display apparatus, a device which serves as the vertical scanning system.

**game show** A radio or TV program in which contestants are asked questions or participate in contests to win prizes.

**games on demand** In-store recording and delivery of video games. A data storage server of the system contains the games and an encoder that burns them into a blank cartridge. The prospective renter chooses his or her game, and it is instantly recorded on the blank cartridge. The system eliminates the necessity of storing hundreds or thousands of titles.

**gamma** 1. Measure of the contrast of an image reproduction process. The characteristics of most displays are nonlinear. A small change in amplitude when the signal level is small produces a change in the display brightness level, but the same change in amplitude at a high level will not produce the same magnitude of brightness change. This effect, or actually the difference between what you should have and what you actually measured, is known as gamma. High gamma indicates high contrast; low gamma indicates low contrast. In TV, this characteristic is given by the relation between the luminance increment on the receiver screen and the luminance increment in the original scene. In general, this relationship is not uniform over the whole

## gamma correction

tonal scale and the gamma value or contrast gradient at a given point is of importance. For camera tubes and similar transmission devices, point gamma is defined as the instantaneous slope of a curve relating the logarithms of the incident light and the resultant output voltage, while for receivers and display devices, it is the instantaneous slope of a curve relating the logarithms of the input voltage and of the intensity of the resultant light output. 2. The third in a series, such as a gamma generation. See *Genealogy*.

**gamma correction** Process of modifying the linearity of the amplitude of a video signal in such a way that deficiencies in the gamma law of an associated light-sensitive or picture-display device are corrected. Unless the overall gamma of a system approaches unity, the gray scale suffers distortion. In black and white TV the eye is relatively tolerant of errors, but in color TV the greatest care is necessary to match gamma laws in the color channels and produce an overall gamma close to unity. Before being displayed, linear RGB data must be processed (gamma corrected) to compensate for the nonlinearity of the display.

**gamma corrector, TV camera** A typical receiver display tube has a power law relating the light output to the signal input of between  $\gamma=2$  and  $\gamma=3$ . It is therefore necessary to provide complementary gamma correction to the transmitted signal. In practice, an adequate degree of performance can be obtained using a characteristic with three linear portions each of different gain, both the gain of each section and the level of the change-over or break points being adjustable. The sense of the correction is to stretch the black parts of the picture, and the degree of correction which can be tolerated is often governed by the exaggeration of the noise in the dark areas. It is normal to provide for a gain in the lowest portion of the characteristic of up to 16 dB above that of the average slope.

**gamma generation** See *Genealogy*.

**gap** 1. The tiny space in an audio or video head across which the magnetic field is produced during recording and activated during playback. The head is a U-shaped electromagnet and it is that opening which the videotape must pass and make contact with for quality recording and playback. Video head gap size depends on the speed mode of the VCR. Some VHS machines have four heads, two with a specific micron size for standard speed and the other pair designed for the slowest speed (EP or SLP). 2. An interruption in continuity, such as a blank area on a recorded tape.

**gap effect, video heads** The most important limitation on the range of video frequencies that can be recorded and played back. The narrower the gap is, the higher the frequency will be for maximum out-

put. But a very narrow gap restricts the output at the low frequencies.

**gas panel** See *Plasma panel*.

**gas tube** See *Plasma panel*.

**gated sync** A scrambling method that operates by upsetting the sync-pulse amplitude in relation to the video signal. It has the effect of making the picture tear and roll.

**gating** Operation of an electronic device acting as a gate to select a portion of a current signal for examination or storage, or to activate another circuit.

**gating pulse** Pulse designed to operate a system for a specified period to enable some other action to take place during the interval. Employed in color TV transmitters and receivers.

**Gaussian filter** A low-pass filter used for bandwidth limitation and pulse shaping as well as to remove unwanted distortions such as noise, preshoot, overshoot and ringing. Its name derives from the approximation of its amplitude/frequency response to Gaussian distribution or shape. One application of the filter concerns the extraction of "spikes" or ringing in video line sync pulses that may be caused by high frequency components. Another use of the Gaussian filter is in the field blanking period of TV signals. The filter usually comes in modular form for relatively simple insertion into electronic equipment.

**GCR** Ghost cancellation reference signal. A reference signal on (M) NTSC scan lines 19 and 282 and (B, D, G, H, I) PAL scan line 318 that allows the removal of ghosting from TVs. Filtering is employed to process the transmitted GCR signal and determine how to filter the entire video signal to remove the ghosting. ITU-R BT.1124 defines the standard each country uses.

**GDI-11** CD-I player; Goldstar. Has two ports: one for a mic, and one for a pointing device that lets on-screen images be manipulated. Like other CD-I machines, it hooks up to a TV and uses interactive educational and entertainment CD-I discs. Not available in the US.

**gel** Short form of "gelatin," a translucent filter material used with lighting instruments to change the color, the quality, or the amount of light on a scene in the theater or in TV or film production. Sometimes called a media, this fade-resistant, cellophane-like material comes in various colors and is mounted in a frame that is attached to the front of the lighting instrument.

**gel cell** A gelled lead acid battery (used for powering portable video equipment).

**Gemini** A type of combined film and TV camera distinguished from most others of its kind by the fact that the primary unit is the TV camera.

**genealogy** In film and TV, a numerical history of duplicates made from the master film or original videotape, the first generation. The first print of

duplicate tape is the second in the genealogy; the next set of copies is the gamma generation or third generation.

**General Purpose Interface Bus (GPIB)** A special feature, usually built into some industrial/professional instruments such as color video noise meters, designed to test various signals automatically.

**generating element** The component that enables the sound waves entering the head of a microphone to be used to produce an electronic signal composed of voltage variations corresponding to the sound wave; some of the most common generating elements are ribbon, condenser, crystal, and dynamic elements.

**generation** In videotaping, one copy or duplicate removed from another tape. The original or master program is known as a first generation. A duplicate from this master is called a second generation tape, etc. In video production and postproduction, many generations may be required, causing concern for accumulated distortions because of the repeated recording and replay steps.

**generation loss** The loss of detail or resolution in a video tape that is duplicated. The master tape is called a first generation tape. A copy from the master is called the second generation tape. Each generation away from the original or master produces increased degradation in the image quality.

**genlock** GENerator LOCKing device. A device (e.g., special effects generator) that enables a composite video machine, such as a TV, to simultaneously accept two signals. A genlock locks one set of signals while it processes the second set. This enables you to combine graphics from a computer with video signals from a second source such as a video camera. Genlock determines the exact moment at which a video frame begins and allows multiple devices (video recorders, cameras, etc.) to be used together with precise timing so that they capture a scene in unison.

**genny** An electricity generator, particularly a portable generator on a film or television set.

**geostationary orbit** A circular satellite orbit that is 35,000 km (22,300 mi) above the equator. The satellite revolves around the earth in exactly the same time it takes the earth to rotate on its axis; thus the satellite appears stationary over one location near the equator. The satellite moves from west to east, and makes one rotation every 24 h in synchronism with the earth's rotation. It is also known as geosynchronous orbit and as Clarke belt.

**geosynchronous orbit** Geostationary orbit.

**GG** CATV hyperband channel, 336-342 MHz.

**ghost** Vision signal received with a delay, as compared to the direct signal, usually caused by reflection from aircraft or prominent objects. The result is a fainter signal (ghost) displaced from the main signal. In the VHF and UHF wavebands used for TV transmission,

the reflection of signals from tall buildings and other objects can present a serious problem at a receiver. This is due to the time difference between the arrival at a receiver aerial of the direct signal and the arrival of a reflection or echo. Assuming that the direct signal is appreciably the stronger of the two, the synchronizing circuits of the receiver lock on to it and disregard the weaker signal. But the video section of the receiver is unable to ignore the picture information contained in the reflected signal, with the result that it appears on the screen as a ghost image. This is displaced to the right of the primary image by an amount corresponding to the difference in time taken by the direct and reflected signals in travelling from transmitter to receiver and may be anything up to the full picture width. Ghost images resulting from reflections may be reduced or even eliminated by using either a more directional and properly orientated aerial at the receiver or a device known as an echo equalizer.

**ghost canceling** A reference signal to allow specially equipped TV sets to get rid of picture ghosts that result from poor reception of local stations. Developed by Philips Electronics.

**ghost cancellation reference (GCR)** A reference signal on (M) NTSC scan lines 19 and 282 and (B, D, G, H, I) PAL scan line 318 that allows the removal of ghosting from TVs. Filtering is employed to process the transmitted GCR signal and determine how to filter the entire video signal to remove the ghosting. ITU-R BT.1124 and ETSI ETS 300 732 define the standard each country uses. ATSC A/49 also defines the standard for NTSC. See *Ghost canceling*.

**GIF** Graphics interchange format, a computer graphics file format developed by CompuServe for use in compressing graphic images, now commonly used on the Internet. GIF compression is lossless, supports transparency, but allows a maximum of only 256 colors.

**Ginsburg, Charles** Engineer who, with Ray Dolby, developed the first prototype for the video recorder. Ampex demonstrated the model in 1956.

**glass delay line** One of the two kinds of comb filter systems (the other uses a CCD). The glass delay line technique is less sophisticated, more economical and more popular. Both types perform the same functions. They improve detail and resolution in the TV picture by separating the black and white from the color information and thereby preventing video moire or a rainbow effect. However, it is generally agreed that the CCD filter is more efficient.

**glitch** 1. An undesired transient voltage spike, occurring on a signal being processed. In a digital-to-analog converter, a glitch can occur at a major carry, such as when switching from 0111111111 to 1000000000 because there is an interim condition in which all bits are 0. 2. The term given to any type of video distortion such as picture break-up, etc.

## glitch-free editing

Also, variations of video noise, etc. Glitch usually occurs each time a VCR stops and starts to record. It is less prevalent when going from the Pause mode to record. Some VCRs provide practically glitch-free editing. In professional video editing, glitch is an unstable, broken picture in the final product. The best way to avoid glitches in the videotape is to pre-black all of the videotape stock with a blank video screen. Professional video studios use a black-burst generator for this purpose. 3. A minor technical problem arising in electronic equipment.

**glitch-free editing** In video, any method or procedure that transfers or duplicates selected recorded segments of tape onto another tape without picture breakup or the familiar "rainbow" effect that appears where two images are joined. Unlike movie film, videotape is difficult to edit because each frame or segment is a diagonal magnetic signal that cannot be seen by the human eye. Precise physical splicing is virtually impossible. Therefore, other methods have had to be devised to accomplish exact editing. At first, home VCRs performed the task rather clumsily, adding picture breakup, a rainbow effect, or more, wherever edits began. Later, some VCR manufacturers introduced improved editing techniques by backing up the tape a few frames each time the Pause and Record modes were pressed. This eliminated much of the visual interference. The flying erase head was another innovation that helped to produce glitch-free edits. Another, known as synchro edit, synchronizes the start/pause modes of both the recording and playback machines during the editing process, thereby eliminating glitches. Other technological advances for glitch-free editing include the use of electronics, digital memory and computers.

**G-matrix** In CCD still video cameras, a circuit to form the high-resolution green signal from the weighted differences of the wideband luminance and low resolution R and B signals.

**GOP** See *Group of pictures*.

**Gorizont** The Russian geostationary telecommunications satellite.

**go-to** A VCR feature that, when activated, can automatically locate any point on a videotape. Go-To usually operates with either digital tape counters, which require entering a specific 4-digit number, or real-time function in which the hours, minutes and seconds are entered. The latter usually can be activated by using the remote control.

**go to black** To let the image fade out entirely.

**GPIB** See *General Purpose Interface Bus*.

**grabber** 1. A device for capturing data—for example, a video digitizer. 2. A computer program that takes a "snapshot" of the currently displayed screen image by transferring a portion of video memory to a file on disc. 3. The fixture on the end of a test equipment lead wire with a spring-actuated hook and claw

designed to connect the measuring instrument to a pin of an IC, socket, transistor, and so forth.

**gradation** Accuracy with which a process in a TV chain renders a series of incremental steps of gray scale.

**graduated matte** Variant of background with a gradual change from one color to another across the picture. Syn.: wash.

**Grand Alliance** 1. Digital HDTV Grand Alliance, a group that represents the merger of three formerly competing groups—AT&T and Zenith, General Instruments and MIT, and a group consisting of Thomson Consumer Electronics, Philips Consumer Electronics, and the David Sarnoff Research Center—to collaborate on designing a prototype all-digital advanced television system. 2. The US Digital HDTV system. The selected digital video-compression technology is based on international standard MPEG-2. It includes the use of B-frames, a bi-directional frame-motion compensation technique that improves picture quality. A packetized data-transport system permits most combinations of video, audio, and data to be transmitted in packets similar to those formed for advanced telecommunications networks. Known as the ATSC format.

**granularity** The density with which a viewing surface is divided into physical sensors, such as pixels in an image or grains of emulsion in film.

**graphic equalizer** See *Equalizer*.

**graphics** In video, a technique involving a computer, a monitor and certain software to create designs, drawing and other graphics on a TV screen. Through the use of computer keyboards and video terminals, the electron beam is guided around the screen to produce drawings that can be videotaped. Graphics programs are available for different systems. They can create elaborate graphic designs, abstract art, random patterns; they can change screen color, form block letters, create a figure and move it anywhere on the screen.

**graphics decoder** An electronic accessory, usually built into certain CD players, that adds graphics displays to music. Such machines are known as CD+G (for graphics) players. The visuals produced by the graphics decoder are still pictures; the system is not capable of producing continuous motion images. See *CD+G*.

**graticule** The pattern imprinted on the face of the CRT of a color vectorscope for measurement purposes. The graticule consists of a 360-degree circle, a B-Y horizontal axis line, an R-Y vertical axis line, two other lines labeled "I" and "Q" axis and little boxes representing the six colors (blue, red, magenta, green, cyan and yellow). On some graticules, the circle is divided into 5-degree segments. Signals from cameras, VCRs and other pieces of electronic equipment are superimposed over the graticule to help determine the quality of the color signal and where any problems may lie. For example, if no "I" signal

appears, then no red will be visible in the TV image; if there is no "Q" signal, then no green will show up on the TV screen.

**gray scale** A series of achromatic tones with varying proportions of white and black, to give a full range of grays between white and black. A gray scale is usually divided into 10 steps.

**gray-scale chart** See *Video test chart*.

**gray-scale transfer function** A plot of image brightness as a function of scene brightness. It is the TV equivalent of the H&D (Hurter and Driffield) curves that specify film density as a function of exposure for photographic negatives. Because the eye perceives brightness differences in terms of ratios rather than numerical differences, a logarithmic scale is used for both scene and image brightness.

**grazing** A term used by advertisers, producers and others in the TV industry to refer to the practice by viewers of randomly searching through the channels for an interesting program. This practice has alerted the networks, TV producers and programmers to seek new ways to hold the attention of their viewers.

**Great Time Machine** Quasar's first (now defunct) VCR, model VR-1000, which was incompatible with its two contemporary formats, VHS and Beta. The GTM was introduced in 1976 and used a cassette format called VX200. The machine was eventually replaced in 1978 by Quasar's second VCR, model VH-5000, a more conventional VHS machine. The original recorder had one unique feature for its day—its clock/timer could be set to record more than one event or program during a 24-hour period.

**Green Book** The formal standards document for CD-i.

**green gain control** An adjustment used in the matrix of a 3-gun color TV receiver to adjust the intensity of the green primary signal.

**green gun** The electron gun whose beams strikes phosphor dots emitting the green primary color in a 3-gun color TV picture.

**green restorer** The DC restorer for the green channel of a 3-gun color TV picture tube.

**green video voltage** The signal voltage output from the green section of a color TV camera, or the signal voltage between the receiver matrix and the green-gun grid of a 3-gun color TV picture tube.

**grid card** A tabulated rate card of a radio or TV station with rates for various time periods.

**grid log** A schedule, as of TV programs, printed in a set format, such as the charts now used by many newspapers instead of or in addition to a running log, or sequential list of programs. In a grid log, the TV channels appear vertically in the first column, while their programs are listed horizontally in the time-period columns.

**ground-loop hum** Refers to the large horizontal bars that occasionally roll up or down on the screen image. This video hum appears as a result of differ-

ences in the grounding of house currents from that of the broadcasting station or TV cable system. Ground-loop hum is sometimes referred to simply as hum.

**ground station** Earth station.

**group** Several stations or other media, generally under common ownership, such as by Group W, the Westinghouse radio and TV stations, or affiliated for shared programming or to provide quantity of group discounts.

**group of pictures** In an MPEG bitstream, the GOP is a group of frames between successive I frames, the others being P and/or B frames. In the widest used application, television transmission, the GOP is typically 12 frames but this can vary; a new sequence starting with an I frame may be generated if there is a big change at the input, such as a cut. If desired, SMPTE time code data can be added to this layer for the first picture in a GOP.

**GSR** Ghost-Cancellation Reference.

**G/T** A figure of merit that describes the capability of a TVRO system to receive a signal from a satellite. The ratio (in dB) of the gain of a receiving system to the noise temperature of the system.

**guard band** A space between video tracks on the video tape when in the SP mode to eliminate "crosstalk" between tracks. Guard band contains no information. The introduction of the azimuth process of electronically printing video tracks diagonally, each with a different pattern, has largely discontinued the need for guard bands. 2. A frequency band left empty between two channels to protect against interference from either channel. See also *Broadband*.

**guard circuit** In TV receivers, a device in integrated vertical deflection circuit with flyback generator. When there is no deflection current and the flyback generator is not activated, the guard circuit produces a DC voltage to blank the picture tube and thus prevent screen damage.

**gun killer** An adapter that can be inserted between the socket and base of a color picture tube, to permit turning off independently any one or all of the three guns (red, green, and blue) in the tube during repair or adjustment procedures.

**guy** A rope, cable, or wire—guy wire—to hold or steady something, such as to support a TV antenna tower.

**G-Y matrix** A circuit to construct color difference signal G-Y according to the equation  $G-Y = -0.51(R-Y) - 0.19(B-Y)$  by means of an addition/subtraction process using color difference signals R-Y and B-Y (SECAM). The G-Y is composed of  $-0.27(R-Y) - 0.22(B-Y)$  (NTSC).

**gyrator delay cell** See *Luminance delay line in gyrator technique*.

**gyroscopic time base error** Time base error that is created when a VTR is moved perpendicular to the plane of the head drum's rotation. It is a very common occurrence given today's highly portable video

## G-Y signal

equipment. Gyroscopic error occurs because the spinning head drum in the VTR acts like a gyroscope. As the VTR is moved against the plane of rotation of the head drum, the spinning drum resists and slows down a little. When it slows down, the information will not be recorded at the proper speed. How much time base error you might expect on tape playback

depends on all of these factors. It could be less than a line in a studio machine, or could add up to 20 or 30 lines or more on a field recorder.

**G-Y signal** The green-minus-luminance color-difference signal used in color TV. It is combined with the luminance signal in a receiver to give the green color-primary signal.



# H

- H** 1. CATV midband channel, 162-168 MHz. 2. TV standard; Belgium. Characteristics: 625 lines/frame, 50 fields/s, interlace—2:1, 25 fr/s, 15,625 lines/s, aspect ratio—4:3, video band—5 MHz, RF band—8 MHz, visual polarity—negative, sound modulation—F3, pre-emphasis—50  $\mu$ s, deviation—50 kHz, gamma of picture signal—0.5.
- h** Hour. Also hr. The plural is hrs.
- H0** See *H-channel*.
- H11** See *H-channel*.
- H12** See *H-channel*.
- H.221** A framing recommendation that is part of the ITU's H.320 family of video interoperability Recommendations. The Recommendation specifies synchronous operation where the coder and decoder handshake and agree upon timing. Synchronization is arranged for individual B channels or bonded 384 Kbps (HO) connections.
- H.230** A multiplexing recommendation that is part of the ITU's H.320 family of video interoperability recommendations. The recommendation specifies how individual frames of audiovisual information are to be multiplexed onto a digital channel.
- H.231** A recommendation, formally added to the ITU's H.320 family of recommendations in March, 1993, which specifies the multipoint control unit used to bridge three or more H.320-compliant codecs together in a multipoint conference.
- H.233** A recommendation, part of the ITU's H.320 family, which specifies the encryption method to be used for protecting the confidentiality of video data in H.320-compliant exchanges. Also called H. key.
- H.242** Part of the ITU's H.320 family of video interoperability recommendations. This recommendation specifies the protocol for establishing an audio session and taking it down after the communication has terminated.
- H.261, H.263** The ITU-T H.261 and H.263 video compression standards were developed to implement video conferencing over ISDN, LANs, regular phone lines, etc. H.261 supports video resolutions of 352 x 288 and 176 x 144 at up to 29.97 frames per second. H.263 supports video resolutions of 1408 x 1152, 704 x 576, 352 x 288, 176 x 144, and 128 x 96 at up to 29.97 frames per second.
- H.26L** Emerging video coding standard for next-generation compression technology. (To be part 10 of MPEG-4.)
- H.320** International standard for video conferencing.
- H.324** Videoconferencing standard for public switched telephone networks.
- hacker** A slang term for a computer enthusiast. Depending on how it is used, the term can be either complimentary or derogatory. The pejorative sense of "hacker" is becoming more prominent largely because the popular press has coopted the term to refer to individuals who gain unauthorized access to systems for the purpose of stealing and corrupting data. The term is sometimes used in other fields as well, such as a video hacker.
- Hadamard transform** A video compression technique.
- HAD** (Hole Accumulated Diode) **sensor** A component of some top-of-the-line professional/industrial video cameras that increases horizontal resolution and enhances color quality. The special sensor can produce 700 lines of horizontal resolution.
- hair-pin** Connector encased in a small block of plastic. Used in patch panels.
- halation** In a CRT, degradation of the image caused by an area of light surrounding the spot where the electron beam strikes the screen. This unwanted area is caused by light from the spot reaching the screen by reflection at the front and rear surface of the faceplate of the tube. Also called halo.
- half-inch format** Refers to the most commonly used tape size for home video. VHS machines use 1/2" videotape while professional/industrial/institutional equipment uses other widths such as 3/4" and 1" tape. Newer, smaller VCRs for home use have introduced 1/4" videotape, particularly with camcorders.
- half-lap** In film and TV, a split screen in which two images appear simultaneously on the screen—a side-by-side shot.
- half loading system** In the FF and REW modes of a VTR the system keeps the tape half-loaded to allow a sensor to detect tape movement by reading the tape's control track and display the lap time in hours, minutes and seconds. Also see *Front loading*.
- half-transponder** A method of transmitting two TV signals through a single transponder, by reducing

## Hall effect

the deviation and power allocated to each. Half-tranponder TV carriers each operate typically 4 dB below single-carrier saturation power.

**Hall effect** An audio technique that is not affected by tape speed in the playback mode. Since tape speed influences the quality of audio reproduction, the slow speeds of videotape produce far from good sound. But videotape must use these relatively slow speeds to accommodate the video signals and to offer reasonable maximum playing time. If a process, such as the Hall effect, can be developed to be used with recording as well as playback, audio quality will greatly improve.

**Hall-effect sensor** A set of Hall-effect ICs to provide precise timing of head switching. It is accomplished by a feedback mechanism provided by the set of Hall-effect ICs, which are the electronic equivalent of reed switches. In older Beta and VHS models, coils and magnets were used instead of Hall-effect sensors.

**Hall-effect IC** A magnetically sensitive integrated circuit that can detect the presence or absence of a magnetic field. In VCRs, Hall-effect ICs generate two types of pulses: PG and FG. PG stands for pulse generator; FG stands for frequency generator. The PG signal, typically at 30 Hz, identifies the position of the drum as it spins. The rate of the FG signal, most often 180 Hz, indicates the speed of the video-head drum.

**halo** 1. An undesirable bright or dark ring surrounding a spot on the fluorescent screen of a TV CRT. Generally due to overloading or maladjustment of the camera tube. 2. The black area around a very intense source of light, as seen by the camera and monitor. When a match is struck and held in front of the camera, a halo is visible around the flame; a halo visible through the viewfinder of a vidicon camera may mean that the light source is bright enough to burn the target area.

**Hamming code** In digital transmission, a code so designed that errors in signals can be detected and corrected. The code has four information bits and three check bits per character. See *Parity check*. Named after R. W. Hamming of Bell Labs.

**hammocking** The practice of scheduling a weak TV program between two strong ones—suspended the way a canvas hammock hangs between two supports. The popular programs are in the tent-pole positions and the weak one is settled in the saddle position.

**handbasher** In film and TV, a hand-held lamp, usually about 800 watts.

**hand-held television** A small, light-weight, portable TV unit, usually applying LCD technology and other electronic refinements to the video portion. Some manufacturers concentrate on increasing the number of pixels per square inch to ensure accurate color separation. Others focus on resolution to produce a

clear, sharp image. Sony's compact Video Walkman combines an 8mm video recorder with a 3" LCD color TV.

**handshaking** An exchange of predetermined signals for the purpose of control when a connection is established between two data sets.

**Handycam** The camcorder that integrated the camera and recorder.

**hangers** Lighting accessories formally known as "antigravity hangers." They are used to hang lights on a pipe grid above a TV studio. The devices are accordion-like mechanisms that are counterbalanced with springs and thus allow the easy raising and lowering of a light to any height.

**happy talk** A format of TV news programs, featuring light banter among an ensemble of newscasters.

**hard copy** Output onto permanent media such as paper or film as opposed to a CRT screen.

**hard-edge wipe** In film and TV, a wipe (an optical effect between two succeeding shots) in which the border between the two images is sharply defined; the opposite of soft-edge wipe.

**hardline** A low-loss coaxial cable that has a continuous hard metal shield instead of a conductive braid around the outer perimeter. This type of cable was used in the pioneer days of satellite TV. Syn.: Heliax.

**hard scrambling** An encryption method that uses proprietary, highly secure technology (digital).

**hardware** In video, equipment such as VCRs, VDPs, video games, video cameras, portable VCRs, TV sets, etc. Videotapes, discs and game cartridges are considered software.

**harmonic distortion** See *Distortion*.

**harmonic related carrier (HRC)** Refers to cable-TV systems having a coherent head end and visual carriers located at multiples of 6 MHz starting at 54 MHz. All visual carriers in the system are phase locked to a 6-MHz master oscillator. This ensures that all the carriers are harmonically related to 6 MHz and no matter what shift occurs to the master oscillator, all carriers maintain the same relative frequency separation. The second- and third-order intermodulation products resulting from any two carriers, therefore, always fall exactly on the visual carrier frequencies, and their undesirable effects on TV pictures will be reduced or eliminated. When compared with the broadcast or standard plan, HRC channels are frequency displaced by  $-1.25$  MHz on all standard and cable supplementary channels (midband, etc.) except channels 5 and 6, where the displacement is  $+0.75$  MHz.

**harry system** In film and TV, a digital animating machine that stacks computerized graphics and other images on top of each other to create the illusion of three-dimensionality.

**H-channel** The packet-switched channel on an ISDN BRI (Basic Rate Interface) which is designed to carry user information streams at varying rates, depend-

ing on type: HO—384 Kbps; H11—1,536 Kbps; and H12—1920 Kbps.

**HD-0** A set of formats based partially on the ATSC Table 3, suggested by The DTV Team as the initial stage of the digital television rollout. Pixel values represent full aperture for ITU-R 601.

**HD-1** A set of formats partially based on the ATSC Table 3, suggested by The DTV Team as the second stage of the digital television rollout. Pixel values represent full aperture for ITU-R 601.

**HD-2** A set of formats partially based on the ATSC Table 3, suggested by The DTV Team as the third stage of the digital television rollout contingent on some extreme advances in video compression over the next five years. Pixel values represent full aperture for ITU-R 601.

**HDB-MAC** (High-Definition B-MAC) **system** (also Scientific Atlanta HDB-MAC System) It was a noncompatible service intended for direct-broadcast and fixed satellite use. It was based on the B-MAC service now standardized in Australia and widely used for business applications of TV. It was closely related to the D2-MAC system used for DBS service in Europe. The HDB-MAC signal was transmitted at 525 lines interlaced, permitting simple conversion to the NTSC service. In the HDTV receiver a field-store was used to convert to 525/59.94/1:1/16:9 progressive scan. When so converted the vertical resolution was 480 lines per picture height for static areas of the image, 320 lines for moving areas. The horizontal resolutions were stated to be 950 lines per picture width for static areas, 320 lines for moving areas. The total number of picture elements for static images was  $950 \times 480 = 456,000$  per frame. When the 16:9 aspect ratio was used at the source, the portion intended for 4:3 displays was under pan-and-scan control. The line signal frequency modulated the up-link signal on the 24- or 27-MHz transponder channel. This signal permitted display at 525 lines sequentially scanned at 16:9 aspect ratio, with a luminance baseband of 18 MHz. Although not designed for cable service, it was pointed out that the up-link signal could be accommodated on two contiguous cable channels. The source baseband was reduced to 10.7 MHz by the spectrum folding. The source baseband was recovered at the HDTV receiver by a field-store line doubler that provided 18 MHz of luminance bandwidth and 5 MHz for chrominance.

**HDCAM** Sometimes called HD Betacam, this is a means of recording compressed high-definition video on a tape format (1/2-inch) that uses the same cassette shell as Digital Betacam, although with a different tape formulation. The technology is aimed specifically at the USA and Japanese 1125/60 markets and supports both 1080 and 1035 active line standards. Quantization from 10 bits to 8 bits and DCT intra-frame compression are used to reduce the data rate.

Four uncompressed audio channels sampled at 48 kHz, 20 bits per sample, are also supported.

**HD-CIF** See *CIF*.

**HD D5** A compressed recording system developed by Panasonic that uses compression at about 4:1 to record HD material on standard D5 cassettes. HD D5 supports the 1080 and the 1035 interlaced line standards at both 60 Hz and 59.94 Hz field rates, all 720 progressive line standards and the 1080 progressive line standard at 24, 25 and 30 frame rates. Four uncompressed audio channels sampled at 40 kHz, 20 bits per sample, are also supported.

**HD Digital VCR Conference** A group of major manufacturers dedicated to setting standards for HDTV VCRs. The Conference defined the specs for standard definition (SD) and high definition (HD) VCRs. The SD VCR records at a data rate of 25 megabits per second. It is used for digital recording of NTSC, PAL, SECAM and the Grand Alliance HDTV format. The HD VCR records at 50 megabits per second. It is intended for recording Japan's MUSE HDTV satellite broadcasts, which have a much higher bandwidth than the Grand Alliance format. Unlike SD decks, HD decks may use four heads. Although the MUSE signal is analog, HD decks record it digitally. They are compatible, so that HD decks will play SD tapes.

**HDMAC** (High-Definition MAC) A European DBS HDTV system. It was spawned by Britain's Independent Broadcasting Authority. Unlike Japan's HiVision, HDMAC has the attraction of being compatible with existing TV sets—i.e., those in Europe. Employs twice the line rate of the 625-line MAC system at an aspect ratio of 16:9, interlaced, i.e., 1250/50/2:1/16:9. The luminance and chrominance basebands are, respectively, 21 MHz and 10.5 MHz. By 3:2 and 3:1 compressions, respectively, a common sampling frequency of 20.5 MHz is achieved and this imposes a maximum modulation bandwidth of 10.125 MHz. This is the up-link frequency modulation of the satellite signal, using the 27-MHz bandwidth available in Europe. Additional information (sound/data/DATV) is carried by multiplex in the vertical and horizontal blanking intervals.

**HD-NTSC system** (also Del Rey HD-NTSC system), Del Rey Group. It was a single-channel NTSC-compatible HDTV system, operating on the 6-MHz channel at 59.94 fields per second. This system differed from conventional practice in two major respects: an aspect ratio of 14:9 and double-trace scanning at the camera and the HD-NTSC receiver, which spread the scanning sequence over three frames. The number of active lines was reduced from the NTSC value of 484 to 414, and the 70 additional blank lines were disposed above (35 lines) and below (35 lines) the display. The additional vertical blanking time provided a channel for digital transmission of stereo sound.

**HD-SIF** High Definition—Common Image Format.

## HDS-NA

HDTV system. This system has a set of parameter values which use 1080 active lines, whether the field rate is 50 Hz or 60 Hz. The same sampling frequencies for interlace (74.25 MHz) and progressive (148.5 MHz) scanning are used in the 50-Hz and 60-Hz versions of the format.

**HDS-NA** High-Definition System—North America; N. A. Philips Corporation. A wide-channel 525/59.94/1:1(NTSC) 1050/59.94/ 2:1(HDTV) system. Aspect ratios were 4:3 (NTSC), 16:9(HDTV). The HDS-NA system employed two principal signals. The first, HD-MAC, was a satellite-transmitted multiplexed analog component signal from the program origination point to other transmission media, i.e., terrestrial broadcast and cable systems. It could also serve in the direct-broadcast service. The second signal, named ND-NTSC by Philips, was intended for the terrestrial and cable services. It comprised the NTSC-compatible 6-MHz channel and an augmentation channel. The augmentation information was proposed for transmission either in digital or analog form. Also called *Philips HDS-NA*.

**HDS-NA "6+3"** A "6+3" version of the HD-NTSC, which consisted of an NTSC-compatible 6-MHz channel and a 3-MHz augmentation channel. The HD-MAC output contained the following components, which had to be accommodated in the HD-NTSC encoder: (1) the line-difference signals for the central and sidepanel areas of the 16:9 image; (2) the standard 4.2-MHz luminance signal; (3) the higher-frequency portion, Y, of the luminance content as separated from the low-frequency portion in the HD-MAC encoder; (4) the sidepanel I and Q chrominance signals; (5) the right and left sidepanel luminance contents of the 16:9 display; and (6) the digital data and audio signals decoded from the HD-MAC transmission. In one version of the "6+3" system, these components were accommodated in the 6-MHz and 3-MHz channels.

**HDS-NA "6+4"** This high-definition system developed by Philips Corp. was never introduced commercially. A more advanced "6+3" by the same company made it obsolete.

**HD-SDTI** High Data-Rate Serial Data Transport Interface, defined by SMPTE 348M.

**HDTV** High-Definition TV. The 1,080-line interlace and 720 and 1,080-line progressive formats in a 16:9 aspect ratio. HDTV thus means a completely new TV system with substantially high resolution, a wider aspect ratio, and improved sound. The U.S. FCC has adopted (1996) the major elements of the ATSC Digital Television (DTV) Standard, mandating its use for digital terrestrial television broadcasts in the U.S. The specific HDTV and SDTV video formats contained in the ATSC standard were not mandated, but many of these have been uniformly adopted on a voluntary basis by broadcasters and receiver manufacturers. HDTV is a subset of DTV and work is ongoing to

develop international standards to make HDTV a reality. In 2002, HDTV equipment is on the market and some broadcasting has begun. See *ATSC, high-definition television*.

**HDTV-ready set** A 16:9 TV receiver with RGB YPbPr input, which can accommodate an HDTV decoder.

**HD VCR** See *HD Digital VCR Conference*.

**HD VTR** See *High definition VTR*.

**HE** Head End.

**head** 1. A device which records information on a storage medium, reproduces the information or erases it. The storage medium may be tape, film or disc and the information may be in digital form as in data-processing equipment or may be in analog form as in audio and TV (conventional) recording. 2. The top portion of the tripod to which the camera is attached. Allows for camera motion. Also called pan head.

**head amplifier** An audio or video amp incorporated in a microphone, TV camera or motion picture projector to raise the level of the output signal before it is sent along a cable. This technique is used as a means of improving the signal-to-noise ratio.

**head crossover** See *Search-forward (cue), Search-reverse (review)*.

**head cylinder** Syn.: head drum.

**head drum** In VCRs, polished metal cylinder with video heads. Also called scanner; head cylinder; head wheel. The video-head drum spins under propulsion from a direct-drive motor (in some early VCRs, the drum was operated by an ac or dc servo-controlled motor). This direct-drive motor contains no brushes, just coils and magnets. The coils in the motor (usually three) are switched on and off via a servo circuit.

**head drum rotation detector, VCR** When any of the function buttons are pressed, the system control circuit detects the head drum rotation by detecting the 30 PG pulses. If for any reason the head drum rotation should stop, the auto-stop circuit is energized.

**head drum servo** One method, now largely obsolete, of controlling the video tape during playback so that the video heads contact the tape with the proper timing (sync) to retrieve the information on the tape. The control track pulses are used to control the rotation of the video heads. See *Capstan servo*, which is the far more common tape control setup.

**head drum servo editing** An editing method that is an inferior variation on capstan servo editing. Instead of the tape being slowed down or speeded up to maintain sync, the speed of the video heads is varied by the use of the head drum servo controls.

**head end (HE)** The portion of an SMATV system where all desired signals are received and processed for subsequent distribution; the originated point of a signal in cable TV systems. At the head end, you'll often find large, tall TV and dish satellite receiving antennae.

**head override editing** Capstan servo editing.

**headphone** An electroacoustic transducer designed to be held against an ear by a clamp passing over the head, for private listening to the audio output of a communication, radio, or TV receiver or other source of AF signals. Usually used in pairs, one for each ear, with the clamping strap holding both in position. Also called *headset* and *phone*.

**head position detecting unit** In autostereoscopic 3D-image display systems, a device to detect the head position of the viewer: it generates a display control command to the computer when the head position of the viewer has moved by only the distance between the right and left eyes.

**headroom** In film, TV, the field of vision between the top of a performer in a film or TV program and the top of the motion picture or TV screen. In a close-up, the headroom is diminished.

**headset** Headphone.

**head shot** A close-up view of a subject, encompassing the subject from top of head to top of shoulders.

**heads out** A reel of tape wound so that the beginning of the program is at the beginning of the tape; a rewind tape. See *Tails out*.

**head-switching interval** A sometimes-visible line on the TV screen indicating the completed function of one video head and the start of the second head. If the line appears on the screen, it can be removed in one of two ways. The head switch can be set lower or the vertical size control can be adjusted until the line disappears from the bottom of the image. Head-switching interval is inherent in home video units.

**head-switching noise** A line of interference that occasionally appears at the bottom of a picture as a result of video heads being switched on and off. A peculiarity chiefly inherent with helical scan VTRs, such as U-Matic units, head-switching noise occurs as a result of the different positions that each format records information on tape. Since the problem is one of recording, not playback, these industrial recorders can be adjusted to produce invisible head-switching.

**head-to-tape contact** In video, the extent to which the magnetic coating surface of the videotape comes near the surface of the video heads during normal operations of the VCR. High resolution and minimal separation loss occur with proper head-to-tape contact.

**head unit** In microwave transmission, the collection of apparatus housed in the head or unit fixed to the receiving or transmitting parabola or aerial.

**headwheel** The rotating disc on which the video heads are mounted.

**height control** The TV receiver control that adjusts picture height.

**helix** A thick low-loss cable used at high frequencies; also known as *hardline*.

**helical** Describes a general type of VCR in which the tape wraps around the video head cylinder in the shape of a 3-dimensional spiral, or helix. The video tracks are recorded as a series of slanted lines.

**helical antenna** The radiating elements are two helices, one above the other, wrapped around but separated from a supporting pole. The two are wrapped in opposite directions, with the result that the vertical components of the radiation from the two halves cancel each other while the horizontal components are reinforced. Used in TV transmitting systems.

**helical scan** Storage method that increases media capacity by laying data out in diagonal strips. Used in VCRs.

**helical scan processor** See *Processing amplifier*.

**helical spiral** The standard method of scanning videotape (helical scanning), in which the tape moves from the supply reel in a helical, or spiral, path around one or more recording or replay heads. In helical videotape recording systems, the heads are angled and the tape has a slanting path, so helical scanning also is called *slant-track scanning*.

**helical wind** The screwlike configuration of the tape across the video heads, from the plane of the supply reel, through the plane on which the heads are rotating, to the plane of the take-up reel.

**helium-neon (H-N) laser** A component for the optics of many early-model CDV players instead of the solid-state laser diodes now in common use.

**helper signal** See *ACTV-1*.

**hemispheric satellite** See *Satellite focus*.

**herringbone** See *Moire*.

**herringbone pattern** An interference pattern sometimes seen on TV receiver screens, consisting of a horizontal band of closely spaced V- or S-shaped lines.

**heterodyne** The process of combining two signals of different frequencies so as to produce an output at the sum or difference frequency. The process is thus equivalent to nonlinear additive mixing or multiplicative mixing. The process is extensively used in sound and TV receivers where the received signal is combined with the output of the local oscillator to produce a difference term at the IF. Because the difference frequency is above audibility this type of receiver is known as a *supersonic heterodyne*, abbreviated to *superheterodyne* or *superhet*.

**heterodyne color process** A technique that reduces the color frequency from its normally high requirement of 3.58 MHz to the kHz range. Larger format video recorders have no problems processing the high color subcarrier that the color signal needs. The heterodyne process allows smaller format VCRs, such as the 1/2-inch type, to accept the reduced color frequency which is boosted during playback to its original 3.58 MHz. Larger formats process the full color signal directly, which is required to meet the broadcast standards of the FCC, whereas smaller recorders process the color indirectly.

## HF

**HF** High Frequency, 3-30 MHz.

**HFC** Hybrid fiber coax. A type of network that contains both fiber-optic cables and copper coaxial cables. The fiber-optic cables carry TV signals from the head-end office to the neighborhood. The signals are then converted to electrical signals and then go to coaxial cables to the homes.

**HG** A term given to high grade or premium quality videotape. High grade actually refers to the quality of a ferric-oxide particle used in the production of this upgraded tape. According to some manufacturers, HG tape provides an improved signal-to-noise ratio, which translates into a picture with less video noise, especially at slower tape speeds. In technical jargon, the gain comes to about 3 dB. HG tapes offer fewer overall dropouts.

**HH** CATV hyperband channel, 342-348 MHz.

**Hi8** A high-band 8mm video recording format that generates 400 lines of horizontal resolution, improves signal-to-noise ratio and permits up to 2 hours of broadcast-quality recording on one compact cassette. The format of these VCRs and camcorders raises the luminance carrier from 5 to 7 MHz and expands the frequency deviation from 1.2 to 2 MHz. Hi8, equivalent in many areas to Super-VHS, features separate S-video luminance and chrominance inputs and outputs for excellent video quality with compatible components. The format also offers less generation loss when making duplicate tapes, improved color accuracy, flying erase heads for glitch-free edits and light-weight compact camcorders. However, Hi8 tapes cost more, and the format is incompatible with most existing VCRs.

**Hi8 MovieBoy E1** Eye-controlled camcorder, having a tiny diode that shines IR light on an eye peeping into the viewfinder; Canon. The pattern of reflections is caught by a sensor and analyzed to determine where the eye is focused. The technology first controlled the autofocus in Canon's EOS 5 still camera.

**Hi-band** A standard recording format for still video that allows resolutions of up to 500 horizontal TV lines from the original format of 360 lines. Special recording heads and processing circuits are used to improve the luminance frequency response.

**H-identification** Using the burst signal at the back porch of the line sync to recognize SECAM signals. With H-identification, only the normal carrier signal during the back porch is available for identification.

**hi-fi** A general term used to denote the capability of reasonably high fidelity audio playback; an electronic system for reproducing sound with high fidelity. Hi-fi VCRs are equipped with separate rotating audio heads (VHS), or they mix sound and picture in one signal and record both simultaneously on tape (Beta).

**hi-fi tracking meter** A VCR feature designed to maximize the tracking of tapes encoded with hi-fi signals.

**high band** The TV band extending from 174 to 216 MHz, which includes channels 7 to 13.

**high-band** A description used for some camera pickup tubes that denotes a very high frequency response.

**high-band tape** Videotape with superior resolution, or pictorial clarity, and of better quality than low-band tape.

**high definition** The TV equivalent of hi-fi, in which the reproduced image contains such a large number of accurately reproduced elements that the picture details approximate those of the original scene.

**high-definition broadcasting** The transmission of a broadcast signal that has much higher resolution than the standard NTSC and PAL pictures. MPEG-2 is used to transmit the high-definition signal in the same bandwidth as a standard NTSC or PAL signal.

**high-definition system—North America (HDS-NA).** A DBS HDTV system. Uses a bandwidth compression. In the US this system offers a 1080-line, 59.94-field interlaced DBS service in which no time-delay of the detailed information is involved, so no deterioration of the display of moving objects occurs.

**high-definition television (HDTV)** A TV format having approximately twice the number of scan lines as do 525-line NTSC system and 625-line PAL and SECAM systems (the "conventional systems") to improve picture resolution and viewing quality. The total number of luminance picture elements (pixels) in the image is therefore four times as great, and the wider screen adds one quarter more. The increased vertical definition is achieved by employing 720 or 1080 lines in the scanning pattern. In 1987, the U.S. FCC established the Advisory Committee on Advanced Television Service to advise them on technical and public policy issues regarding advanced television. After rounds of intense competitive testing and evaluation of different systems proposed, the FCC in 1996 adopted the major elements of the ATSC Digital Television (DTV) standard. The HDTV video formats contained in that standard have been uniformly adopted voluntarily by broadcasters and receiver manufacturers. HDTV equipment is currently on the market and some HDTV broadcasts have commenced. See *HDTV*, *ATSC*.

**high-definition VTR** A professional/industrial VTR that makes use of a wideband 30-MHz luminance and 15-MHz chrominance recording system. HD VTRs can record 1080 horizontal lines as produced by HDTV color video cameras. In addition, the HD tape recorders usually allow multi-generation recordings with a 56-dB signal-to-noise ratio, provide internal editing features and a built-in time code reader/generator.

**high-density videotape** Tape that packs a higher number of magnetic particles per square inch onto the coating. Some high density tapes claim 230 million particles per square mm. The greater the particle density, the better the video image.



**high electron mobility transistor (HEMT)** A type of gallium arsenide field-effect transistor. It is a low noise semiconductor device for satellite broadcast receiving amplifier.

**high-electron-velocity camera tube** Syn.: anode-voltage-stabilized camera tube. See *Camera tube*; *Iconoscope*.

**high end** The highest frequency portion of a video or audio signal; in audible audio signals, the high end is the treble portion of the signal.

**high-end noise** Any spurious noise occurring in the high frequencies of a signal.

**high fidelity** Fidelity of audio reproduction of such high quality that listeners hear almost exactly what they would have heard if they had been present at the original performance. Also called *hi-fi*.

**high-fidelity video component** An electronic unit or part of a video system which is designed to reproduce a wider range of picture detail than ordinary video equipment. A major determinant in producing hi-fi video is the frequency range—or bandwidth—of the component. The wider the bandwidth, the greater the image detail. A better-than-average broadcast signal extends over a bandwidth of 4 million cycles per second, or 4 MHz. Since all TV receivers reproduce this range of frequencies, picture resolution often suffers. Indeed, some mediocre TV sets can barely cover a bandwidth of 2 MHz while hi-fi video units come very close to reaching the entire 4 MHz, producing excellent picture detail.

**high frequency boost** Top boost.

**high gain** In front projection TV systems, a specially designed screen that increases perceived brightness. High gain helps to alleviate one of the drawbacks of front projection TV, illumination loss.

**high gamma** See *Gamma*.

**high-gamma tube** 1. A TV camera tube whose voltage output increases uniformly with the intensity of the light on the image. 2. A TV picture tube whose light intensity on the screen is directly proportional to the control-grid voltage.

**high grade videotape** See *HG*.

**high key** Style of tonal rendering of a scene which emphasizes the middle and lighter tones at the expense of the darker ones. Best suited to subjects that convey a light and cheerful impression. High key lighting avoids strong shadows and makes use of plentiful front light.

**highlight** 1. An area of great brightness on a TV display; a very bright portion of a picture. 2. Area of excessive brilliance in a scene, which exceeds the permissible range of lighting contrast.

**high-pass filter** 1. A filter that transmits all frequencies above a given cutoff frequency and substantially attenuates all others. 2. In video, an electronic circuit that reduces interference on all channels. The filter, sometimes written as hi-pass filter, accom-

plishes this by allowing passage of frequency components above a predetermined limited frequency while rejecting components below that parameter.

**high-peaker** In a TV camera, a circuit that equalizes the high-frequency response of a pickup device or sensor.

**high power amplifier (HPA), satellite TV** An amp used to amplify the uplink signal.

**high power satellite** Satellite with transponder RF power in excess of about 100 watts.

**high power satellite TV** Refers to DBS, which transmits its signals at 12.2 to 12.7 GHz within the Ku-Band of the electromagnetic spectrum and uses 18-inch antennas. High power satellite TV differs from conventional satellite TV, which utilizes C-band, a 3.7–4.2 GHz low-power bandwidth and uses the large antenna dishes that range from 10 to 15 feet in a diameter. Channels broadcast by DBS cannot be received by these large antenna systems. In 2002, there are two Ku-Band DBS providers, DirecTV and Dish Network. Both offer more than 200 channels of digital quality picture and sound.

**high priority** See *Advanced Digital Television*.

**high-quality film-to-video transfer** A very expensive transfer device that produces an outstanding image. These devices are generally found in the major production centers, such as New York and Los Angeles. They will almost never be found in local TV stations. The most common of these high-quality devices use a flying spot scanner. That means that, rather than using a projector, they use a CRT to illuminate the film. The only lens in the system is between the CRT and the film. The electron beam scanning the blank CRT provides the illumination that is first picked up by the beam splitter and is then divided into its component colors. This is a much more efficient way to transfer film to tape and gives excellent results.

**high resolution** The display of a larger-than-usual number of scanning lines, perhaps 1,000 or more. In HDTV, the number of lines is typically 720 or 1080. Video cameras for home use often have an average of 240 horizontal lines. The higher the number, the better the detail, sharpness and definition.

**High Resolution Sciences CCF System** See *CCF system*.

**high resolution TV** TV with over 720 lines per screen, about double the resolution of present systems. Also called HDTV. See *HDTV, high-definition television*.

**high-speed picture search** See *Visual scan*.

**high-speed search mode** A VCR feature that presents the picture on screen while the tape moves rapidly to a desired point. This is made possible by keeping the tape in contact with the video heads during the fast search. Conventional FF mode disengages the tape from its contact with the video heads. One shortcoming of this high-speed search mode is that the fast-moving tape, as it passes over

## high-speed shutter

the heads, builds up friction and heat, both of which may be harmful to the tape and heads. The high-speed function can usually be adjusted from about 5 to 20 times on some machines and from 10 to 30 times on others in the standard playing speed.

**high-speed shutter** A video camera feature that uses electronics in the lens shutter to produce slow motion or freeze frame of action scenes without the usual blurring effect that accompanies subject motion during playback of the tape. The high-speed electronic shutter allows exposures as fast as 1/10,000 of a second to “stop” or freeze action. Most camcorders, however, provide shutter speeds of 1/1000 or 1/2000 of a second, which should be sufficient for users to capture major sports activities.

**high tension** High voltage measured in thousands of volts.

**high-velocity scanning** See *Scanning*.

**high voltage** Generally refers to the multithousand picture tube voltage, but it can be used to mean any potential of a few hundred volts or more.

**high-voltage probe** A test instrument that will check the anode and focus high voltage at the CRT.

**hi-pass filter** High-pass filter.

**HIPPI** High-performance parallel interface. A parallel data channel used in mainframe computers that supports data transfer rates of 100 Mbps.

**hiss** The continuous audio noise which emanates from tape playback on the upper end of the frequency band.

**histogram** An imaging term. A display plotting the density of the various colors and/or values in an image.

**HiVision** Analog HDTV system; Japan. The system broadcasts an analog signal, but uses digital technology everywhere else.

**Hi-Z** See *Impedance*.

**hold control** In a TV receiver, the controls which determine the free-running frequency of the line and field time bases. The controls are adjusted to bring the time-base frequencies into the range at which the time bases will lock at the frequencies of the line and field synchronizing signals. Hence, the receiver has two hold controls: line or horizontal hold, field or vertical hold.

**hold-down capacitor** The hold-down or tuning capacitor is found from collector terminal of horizontal output transistor to common ground. When this capacitor opens or dries up, the high voltage will increase, causing HV shut-down in TV chassis.

**hold frame** A single frame of a moving shot arrested for as long as required. After the hold frame, the action is resumed. Also called freeze frame or stop frame.

**holdover audience** See *Inherited audience*.

**holography system** One of the 3D-image display systems that doesn't need the use of special glasses.

**homes passed** The number of dwellings that a CATV

provider's distribution facilities pass by in a given cable service area, and an expression of the market potential of the area.

**home theater** The electronic buzz word of the 1990s. By linking a large-screen TV to video sources and a surround-sound system, a cinematic experience can be created in homes. Other essential components in the home-theater setup include a VCR, a DVD player, speakers, amps to power the speakers and a surround-sound audio/video receiver.

**home video** A concept of home entertainment in which a TV set is only one of the components and over which the viewer has some control. Home video provides the viewer with (1) controlled viewing (he or she can slow down, speed up or stop the program with the functions on a VCR or VDP); (2) altered programs (the viewer can edit, dub in a new audio track, etc.); (3) the capability of storing and collecting material; and (4) the freedom to watch a program at any time other than the regularly scheduled one.

**home videotex** The use of videotex in the home environment. It can be helped by home computers. Early examples include such applications as TV games and chess.

**hook** A recognizable distortion at the top of the TV picture which bends vertical lines sideways, causing them to look rather like a hook. Hooking can also occur at the originating source of the signal owing to a similar fault, or from phase modulation of the TV signal.

**hook routine** In DVI runtime software, a routine intended to be run at specific times during the execution of AVSS.

**hopping patch** In a telecine (film scanner), to produce an interlaced picture, the raster on the face of a flying spot tube can be displaced between alternate fields, so that the film frame may be scanned twice. Since the patch of light on the face of the tube changes position, it is called a hopping patch.

**horizontal blanking** During the horizontal blanking interval, the video signal is at the blank level so as not to display the electron beam when it sweeps back from the right to the left side of the CRT screen.

**horizontal blanking interval** The period of time when a scanning process is moving from the end of one horizontal line to the start of the next line.

**horizontal blanking pulse** The rectangular pulse that forms the pedestal of the composite TV signal between active horizontal lines. This pulse causes the beam current of the picture tube to be cut off during retrace. It is also called line-frequency blanking pulse.

**horizontal centering control** The centering control provided in a TV receiver to shift the position of the entire image horizontally in either direction on the screen.

**horizontal convergence control** The control that

adjusts the amplitude of the horizontal dynamic convergence voltage in a color TV receiver.

**horizontal definition** Horizontal resolution.

**horizontal deflection oscillator** The oscillator that produces, under control of the horizontal synchronizing signals, the sawtooth voltage waveform that is amplified to feed the horizontal deflection coils on the picture tube of a TV receiver. It is also called horizontal oscillator.

**horizontal drive control** The control in a TV receiver, sometimes at the rear of the set, which adjusts the output of the horizontal oscillator. Also called drive control.

**horizontal flyback** Flyback of the electron beam of a TV picture tube that returns from the end of one scanning line to the beginning of the next line. It is also called horizontal retrace and line flyback.

**horizontal frequency** Line frequency.

**horizontal hold control** The hold control that changes the free-running period of the horizontal deflection oscillator in a TV receiver so that the picture remains steady in the horizontal direction.

**horizontal hum bar** A wide stationary or moving strip, usually occurring in a series, that appears on the TV screen. These alternating light and dark bars usually are the result of interference at about 60 Hz or a harmonic (multiple wave) of 60 Hz.

**horizontal image delineation** An electronic process designed to increase picture contrast and detail at the edges of a TV screen. Horizontal image delineation accomplishes this during the electron beam's horizontal scanning across the screen. The signal level is immediately shortened prior to its reaching a dark-to-light boundary and instantaneously increased before it reaches a light-to-dark border. Horizontal image delineation, sometimes listed as dynamic picture control or contour control, is similar in some respects to delay line aperture control.

**horizontal linearity control** A linearity control that permits narrowing or expanding the width of the left-hand half of a TV receiver image to give linearity in the horizontal direction so circular objects appear as true circles.

**horizontal line frequency** *Line frequency.*

**horizontal lines** The TV lines that make up the picture height. The greater the number of lines, the better the vertical resolution or sharpness and detail. For NTSC, 480-486 lines of active video are always present; for PAL, 576 lines are used. HDTV uses 720 or 1080 active lines.

**horizontal lock** A method of stabilizing videotape playback that tries to match a horizontal sync pulse of the playback signal to each horizontal sync pulse coming from the sync generator. See also *Frame lock.*

**horizontal oscillator** Horizontal deflection oscillator.

**horizontal output stage** The TV receiver stage that feeds the horizontal deflection coils of the picture tube through the horizontal output transformer. It

can also include a part of the second-anode power supply for the picture tube.

**horizontal output transformer (H.O.T.)** A transformer in a TV receiver that provides the horizontal deflection voltage, the high voltage for the second-anode power supply of the picture tube, and the filament voltage for the high-voltage rectifier. It is also called a flyback transformer and horizontal sweep transformer.

**horizontal polarization** Property of electromagnetic wave in which the plane of polarization of the electric field is horizontal and the magnetic field is vertical. With this polarization, transmitting and receiving dipole antennas are placed in a horizontal plane. The US TV system favors horizontal polarization, whereas the British TV system favors vertical polarization.

**horizontal resolution** The number of individual picture elements or dots that can be distinguished in a horizontal scanning line of a TV image. They are determined by observing the wedge of fine vertical lines on a test pattern. Also called horizontal definition.

**horizontal retrace** Horizontal flyback.

**horizontal scan rate** This is how fast the scanning beam in a display or a camera is swept from side to side. In the NTSC system this rate is 15.734 kHz (63.556 ms).

**horizontal sweep** The sweep of the electron beam from left to right across the screen of a CRT.

**horizontal sweep transformer** Horizontal output transformer.

**horizontal sync** This is the portion of the video signal that tells the display where to place the image in the left-to-right dimension. The horizontal sync pulse tells the receiving system where the beginning of the new scan line is.

**horizontal synchronizing pulse** The 5.08 (4.7 in the PAL system) microsecond rectangular pulse transmitted at the end of each line in a TV system to keep the receiver in line-by-line synchronism with the transmitter. It is called a line synchronizing pulse.

**horizontal time base** In a CRT, the circuits generating the signals which give horizontal deflection of the beam. In TV, this is usually termed the line time base. See also *Time base corrector*, *Time base instability*, *Time base stability.*

**H.O.T.** Horizontal Output Transformer.

**hot-pressed ferrite** A video head (core) material: permeability 300-500; resistivity 100,000 ohm/cm. The use of this material in the VHS recorder helps improve the characteristics of the heads.

**hot spot** An area of intense heat or light, which produces a washed-out area on the camera pickup tube. Some lights (such as common incandescent bulbs) produce uneven floods of light with some areas brighter (hotter) than others; this results in hot spots appearing in the TV picture.

## house drop

**house drop** Cable drop.

**house sync** This is another name for black burst.

**howl** Positive feedback; in video, the wild swirling effect that results when a camera is pointed into a monitor displaying the picture that camera is producing; in audio, any high-frequency feedback caused by a microphone being too near the speaker reproducing the sound picked up by the mike.

**howl round** Natural frequency output or howl caused by a connection leading to a loop with greater than unity gain—i.e., positive feedback. Term originally applied to sound and also called acoustic feedback, but used for video also. When a camera sees its own picture in a monitor, part of the picture is likely to go above peak white and out of control, by the effect of positive feedback.

**HP 89400** Signal analyzer. The first commercial unit to characterize advanced-digital-TV signals; Hewlett-Packard Co. The analyzer down-converts and digitizes input signals to 2.65 GHz. Built-in routines automatically extract carrier and symbol clock frequencies, synthesize user-specified baseband filtering and display the recovered data and waveforms. The demodulator can be key-stroke-configured for the 16-, 32-, 64-, 256-QAM formats employed in US and European cable systems. Also handled are the 8VSB (broadcast) and 16VSB (cable) formats proposed by the Grand Alliance. Part of the HP 89400 vector-signal-analyzer family, the AYH option allows the analyzer to characterize digital RF modulation. The tool verifies that the high-speed data streams containing the digital video have been transferred accurately onto the RF transport carriers.

**HPA** High Power Amplifier.

**HQ** High Quality. A technology developed by JVC for VHS VCRs. It is a collection of video signal-enhancement circuits that operate separately on various parts of the signal. The HQ circuits are designed to reduce luminance- and chrominance-signal noise (and thereby reduce “snow” or graininess), and color patching and streaking, respectively. White-clip level inadequacies are also reduced with a consequent improvement in image-edge sharpness. Because different HQ circuits operate during recording and playback, some of the improved quality of HQ-recorded tapes will show up during playback on non-HQ machine will also be improved, but to a lesser degree.

**hr** Hour. Also h.

**HRC** Harmonic Related Carrier.

**hrs** Hours.

**HSI** Hue, Saturation, Intensity. A color space used to represent images. HSI is based on polar coordinates, while the RGB color space is based on a 3D Cartesian coordinate system. The intensity, analogous to luminance, is the vertical axis of the polar system. The hue is the angle and the saturation is the distance out from the axis. HSI is more intuitive to ma-

nipulate colors as opposed to the RGB space. For example, in the HSI space, if you want to change red to pink, you simply decrease the saturation. If you want to change the color from purple to green, you adjust the hue. The key thing to remember, as with all color spaces, is that it is simply a way to represent a color—nothing more, nothing less.

**HSL** A computer imaging term. A color model based on hue, saturation, and luminance. Hue is the attribute that gives a color its name (e.g., red, blue, yellow, or green). In this model, saturation refers to the strength, or purity, of the color. If you mix watercolors, saturation would specify how much pigment you added to a given amount of water. Luminance identifies the brightness of a color. For example, full luminance yields white, while no luminance yields black. See also *HSV*.

**HSV** A computer imaging term. A color model based on hue, saturation, and value. Hue specifies the color, as in the HSL model. In this model, saturation specifies the amount of black pigment added to or subtracted from the hue. Value identifies the addition or subtraction of white pigment from the hue.

**HSYNC** See *horizontal sync*.

**HT** High Tension.

**hub** The hole in the middle of a reel of magnetic tape, which fits over the capstan when the reel is mounted on a tape deck.

**hue** The “color” of a colored point, as red, green, yellow, violet. In technical terms, hue refers to the wavelength of the color. The term is used for the base color—red, green, yellow, etc. Hue is completely separate from the intensity or the saturation of the color. For example, a red hue could look brown at low saturation, bright red at a higher level of saturation, or pink at a high brightness level. All three “colors” have the same hue. Also called color phase or tint.

**hue control (for NTSC decoder)** An adjustment that is obtained by changing the phase of the input signal of the burst phase detector with respect to the chrominance signal applied to the demodulators. Also called tint control. Sometimes confusingly called color control.

**Huffman coding** A popular lossless data compression algorithm that replaces frequently occurring data strings with shorter codes. Some implementations include tables that predetermine what codes will be generated for a particular string. Other versions of the algorithm build the code table from the data stream during processing. Huffman coding is often used in image compression. In general, it doesn't matter what the data is—it could be image data, audio data, etc. It just so happens that Huffman coding is one of the techniques used in JPEG, MPEG, H.261, and H.263 to help with the compression. This is how it works. First, take a look at the data that needs to be compressed and create a table that lists

how many times each piece of unique data occurs. Now assign a very small code word to the piece of data that occurs most frequently. The next largest code word is assigned to the piece of data that occurs next most frequently. This continues until all of the unique pieces of data are assigned unique code words of varying lengths. The idea is that data that occurs most frequently is assigned a small code word, and data that rarely occurs is assigned a long code word, resulting in space savings.

**hum** Audio noise in the low frequency range. Hum can result from the AGC of a VCR or TV. It is simply picking up and amplifying extraneous sound. Hum can also stem from faulty "ground" connections, from defective internal mics on a camera, etc.

**hum bar** A form of interference seen as dark or light lines on the screen of a TV receiver due to components at mains frequency (50 or 60 Hz) in the DC supply circuits. Usually produced by poor smoothing of the high-tension supply and is 50 (60) Hz in the case of half-wave rectification and 100 (120) Hz for full wave rectification. Also called video hum.

**hum displacement** Cyclic positional shift in a CRT picture display, normally at mains frequency. When mains-locked, the picture suffers distortion of vertical lines; when unlocked, it acquires a disturbing wobble.

**humidity eliminator unit** A built-in feature found on some VCRs and videocassette players designed to keep metal surfaces dry when humidity is high. Problems arise when the location of a machine is changed from a cold environment to a warm one. In this situation, the dew indicator will light and the machine will not function as a safety precaution. The user must wait for the dew light to go off before playing or recording. This type of device helps to prevent damage to the videotape. See *Dew indicator*.

**H.V.** Home Video.

**(H+V)-identification** Using the burst signal during the back porch of the line blanking period and the spe-

cial signals in each field blanking period to recognize SECAM signals.

**HVQ** Hierarchical Vector Quantization. A method of video compression introduced by PictureTel in 1988 which reduced the bandwidth necessary to transmit acceptable color video picture quality to 112 Kbps.

**hyperband** Those frequencies located immediately above the superband channels. At 300 to 402 MHz, the hyperband range covers channels W+1 to W+17 and is reserved for such special services as aero navigation, the Coast Guard, etc. Other ranges include subband, midband and superband CATV.

**hypermedia** 1. A way of delivering information that provides multiple connected pathways through a body of information. Hypermedia allows the user to jump easily from one topic to related or supplementary material found in various forms, such as text, graphics, audio, or video. 2. Nonlinear media, of which multimedia can be a form. Just as hypertext is a non-sequential, random-access arrangement of text, hypermedia is a non-sequential, random-access arrangement of multiple media such as video, sound, and computer data. 3. Hypermedia is a type of authoring and playback software through which you can access multiple layers of multimedia information related to a specific topic. The information can be in the form of text, graphics, images, audio, or video. For example, suppose you received a hypermedia document about the Sun file system. You could click on a hotspot (such as the words "file system") and then read a description. You could then click an icon to see an illustration of a file structure, and then click the file icon to see and hear information in a video explaining the file system.

**hypertext** Also called hypermedia; software that allows users to explore and create their own paths through written, visual, and audio information. Capabilities include being able to jump from topic to topic at any time and follow cross-reference easily. Hypertext is often used for Help files.

**I** 1. CATV midband channel, 168-174 MHz. 2. TV standard; Hong Kong, South Africa, UK. Characteristics: 625 lines/frame, 50 fields/s, interlace-2:1, 25 fr/s, 15,625 lines/s, aspect ratio-4:3, video band-5.5 MHz, RF band-8 MHz, visual polarity-negative, sound modulation-F3, pre-emphasis-50  $\mu$ s, deviation-50 kHz, gamma of picture signal-0.5.

**I2C bus** A two-line, multi-master bus developed by Philips to provide cost-effective control of analog and digital functions among ICs. I2C can simplify the manufacturing process by enabling complete calibration and test under computer control. Many companies offer a large family of I2C-capable ICs, including microcontrollers, microprocessors, and audio, video, and telephony ICs.

**IARC** Internal Anti-Reflective Coating.

**IAV** In (2+3)D-image display systems, data indicative of an analog image signal from a TV camera unit.

**IBO** Integrated Broadcast Operation.

**IBM Power Visualization System (PVS)** A computer that merges high-resolution color displays and animation with supercomputer-based simulation. The parallelized, multiuser visualization supercomputer permits scientists to gain insights into complex problems by presenting them in 2- or 3-dimensional visual formats.

**I channel** The 1.5-MHz-wide channel used in the American (NTSC) color TV system for transmitting cyan-orange color information. The signals in this channel are known as I signals.

**icon** In desktop computing and editing, a graphic symbol that represents a file, a tool, or a function.

**iconoscope** The earliest (1923; no longer used) form of TV camera tube in which the optical image of the scene to be televised is focused on a photoemissive target mosaic that is obliquely scanned by a high-velocity electron beam. The mosaic is deposited on the face of a mica sheet that is backed by a conductive signal plate from which the output of the tube is taken. When the optical image is focused on the mosaic, photo-electrons are released from each element in proportion to the light falling on it. Thus, a positive charge image is built up on the mosaic surface and this grows with time as the capacitance between element and signal plate is charged. The

charge image is discharged by the scanning beam and the resulting voltage change is transferred to the signal plate via the capacitive coupling to the mosaic. In spite of the charge storage thus achieved, the tube is not very sensitive and requires high scene illumination for a satisfactory signal-to-noise ratio. Moreover, secondary emission from the target as a result of bombardment by the high-velocity scanning beam results in spurious signals in the tube output that produce undesirable shading effects in reproduced images. These effects are minimized by mixing with the tube output, sawtooth and parabolic waveforms at line and field frequencies. One example of an iconoscope is the standard emitron tube.

**ideal bunching** A theoretical condition in the bunching of electrons in a velocity-modulation tube. All electrons in a bunch would have the same velocity and phase, corresponding to an infinitely large current peak.

**I demodulator** The demodulator whose chrominance signal and the color-burst oscillator signal are combined to recover the I signal in a color TV set.

**identification frequency blue**  $f_{id-B} = 3,900.000$  kHz, vertical identification (SECAM). It is also the minimum frequency of the color signals.

**identification frequency red**  $f_{id-R} = 4,756.000$  kHz, vertical identification (SECAM). It is also the maximum frequency of the color signals.

**identification hole** In Super-VHS cassette, a hole at the bottom that functions to place the recorder in the S-VHS mode. In this manner, it will record and play S-VHS tapes and will also accept standard VHS tapes for record or playback.

**identification signal** Field identification signal.

**idiot box** Derogatory slang for TV.

**idiot card** Cue card.

**idiot sheet** Cue card.

**idler** A wheel most often used to drive the supply and take-up tape reel spindles. The idler is powered by a separate motor (rarely) or driven by a belt connected to the capstan motor.

**IDTV** Improved-Definition TV.

**IDV** In (2+3)D-image display systems, data indicative of the display of a digital signal from the storage unit.



- IEC 461** Defines the longitudinal (LTC) and vertical interval (VITC) timecode for NTSC and PAL video systems. LTC requires an entire field time to store timecode information, using a separate track. VITC uses one scan line each field during the vertical blanking interval.
- IEC 60461** Defines the longitudinal (LTC) and vertical interval (VITC) timecode for NTSC and PAL video systems. LTC requires an entire field time to transfer timecode information, using a separate track. VITC uses one scan line each field during the vertical blanking interval. Also see *SMPTE 12M*.
- IEC 60958** Defines a serial digital audio interface for consumer (SPDIF) and professional applications.
- IEC 61834** Defines the DV (originally the “Blue Book”) standard. Also see *SMPTE 314M*.
- IEC 61880** Defines the widescreen signaling (WSS) information for NTSC video signals. WSS may be present on lines 20 and 283.
- IEC 61883** Defines the methods for transferring data, audio, DV and MPEG-2 data over IEEE 1394.
- IEC 62107** Defines the Super VideoCD standard.
- IEEE** Institute of Electrical and Electronic Engineers.
- IEEE 1394 (FireWire)** A low-cost digital interface originated by Apple Computer as a desktop LAN and developed by the IEEE 1394 working group. Can transport data at up to 1.6 Gps. One of the solutions to connect digital television devices together at 400 Mbps. In addition to an architecture that scales with silicon technology, IEEE 1394 features a unique isochronous data channel interface. Isochronous data channels provide guaranteed bandwidth for data transport at a pre-determined rate. This is especially important for time-critical multimedia data where just-in-time delivery eliminates the need for costly buffering.
- IEEE scale** A waveform monitor scale in keeping with other IEEE standards and recommendations of video broadcasters and manufacturers.
- IF** Intermediate Frequency. Most TV receivers have the following IFs: 38 MHz (SECAM), 38.9 MHz (PAL), 47.75 MHz (NTSC), 70 MHz (satellite TV)—for a TV receiver picture channel; 6.5 (SECAM), 5.5 (PAL), 4.5 MHz (NTSC)—for a TV receiver sound channel.
- IF amplifier** That component of a TV receiver that strengthens the RF carrier signal fed to it. The signal is a combination of the audio and video signals that the IF amplifier increases before it is sent to a video detector for separation.
- IF harmonic interference** Interference due to acceptance of harmonics of an IF signal by RF circuits in a superheterodyne receiver.
- I frames** One of the three types of frames used in MPEG coded signals. These contain data to construct a whole picture as they are composed of information from only one frame (intraframe). The original information is compressed using DCT. See also *B frames*, *P frames*, *MPEG*.
- IHVT** The integrated horizontal or high-voltage output transformer that has HV diodes and capacitors molded inside the flyback winding area. IHVT transformers may also provide several different voltage sources for the TV circuits.
- II** CATV hyperband channel, 348-354 MHz.
- iLink** Sony's name for their IEEE 1394 interface.
- illegal color** Any color that is too saturated for the limited color range of video. Computer monitors versus video monitors are capable of showing more colors at one time. To fit within the required bandwidth for broadcasting, RGB signals that are encoded into the video signal have a limited range of colors. For example, highly saturated colors on a computer screen, such as bright red or green, are considered illegal colors in video.
- illegal video** Some colors that exist in the RGB color space can't be represented in the video domain. For example, 100% saturated red in RGB space (which is the red color on full strength and the blue and green colors turned off) can't exist in the NTSC video signal, due to color bandwidth limitations. The NTSC encoder must be able to determine that an illegal color is being generated and stop that from occurring, since it may cause over-saturation and blooming.
- illuminance** A measure of the illumination of a scene—e.g., a TV studio set—by external light source. Care should be exercised to avoid confusing luminance and illuminance. Luminance is a measure of the brightness of an area of an image.
- illuminant C** The reference white of color TV. It closely matches average daylight.
- image** 1. The scene reproduced by a TV receiver. 2. A still picture, or one frame of a motion sequence.
- image archiving** Refers to electronically storing video images, frames or stills for future reference or use.
- image buffer** Electronic circuitry capable of modifying a 625-line 50-Hz video signal to the 525-line 60-Hz standard (or the reverse).
- image burn** A temporary loss of picture in an isolated area of the TV image caused by bright lights or reflection; also, possible permanent damage to the video camera tube as a result of excessive exposure to bright lights such as the sun or studio lighting units. All cameras using vacuum-type tubes are susceptible to image burn.
- image compression** Image compression is used to reduce the amount of memory required to store an image. For example, an image that has a resolution of 640 x 480 and is in the RGB color space at 8 bits per color, requiring 900 KB of storage. If this image can be compressed at a compression ratio of 20:1, then the amount of storage required is only 45 KB. There are several methods of image compression, but the most popular are JPEG and MPEG. H.261 and H.263 are the video compression standards used for video conferencing.

## image detail

**image detail** The amount of information and sharpness displayed on a TV screen. With VCRs, image detail can be measured by its response to a 2-MHz signal. Some machines may lose as much as 4 dB of the video signal while other models give up as little as 0.13 dB at the 2-MHz frequency. Often, image detail is subjective, although manufacturers keep coming up with various techniques and electronic circuitry, including filters and digital video noise reduction systems, to improve it.

**image detailer** See *Image enhancer*.

**image diagonal** Measurement taken across opposite corners of the optical image formed on the faceplate of a camera or receiver tube.

**image dissector** An early (invented in 1927 by Philo Farnsworth, no longer used) TV camera tube that focuses the scene to be transmitted on a light-sensitive surface; each point emits electrons in proportion to incident light. The resulting broad beam of electrons is drawn down the tube by a positive anode. Magnetic fields produced by coils keep the electron image in focus as they sweep it in a scanning motion past an aperture opening into an electron multiplier. The output voltage of the electron multiplier is proportional at each instant to the brightness of an elemental area of the scene being scanned in orderly sequence. It is also called a dissector tube.

**image enhancement** 1. Any improvement of detail, sharpness, color accuracy or reduction of video noise in a TV screen picture. Several techniques have been developed to enhance the screen image, or definition, including HQ circuitry, digital effects, special comb filters, line-doubling and non-interlaced display. Some processes involve increasing the number of horizontal lines. Others use special electronic circuitry to reduce video noise. 2. A method of improving color TV pictures by comparing each video line, element by element, with the preceding and following lines. Any differences between vertically aligned elements are added to the middle-line element in the proper phase to enhance picture outlines and contrast.

**image enhancer** 1. A device that improves the sharpness of a video image by adding dark lines around the edges of objects and figures in the scene. 2. A signal processing device designed to restore some of the detail that is lost when duplicating a video image. An enhancer operates by increasing or cutting the highest video frequencies. Since this can also increase noise, the unit often has a Response control to restrict this interference. Like most processors, the enhancer works only with a video signal, not with RF signals such as those broadcast directly to the TV receiver. The unit can be connected between two VCRs as when making a copy of a tape or between a video camera and a VCR. Some enhancers have a selector dial that permits a comparison between the enhanced and unenhanced

image. However, the final results of most enhancers are often subjective. Some VCRs feature a built-in enhancer, a control dial or knob simply called Picture.

**image file** A file of data that represents an image.

**image frequency** In superheterodyne reception, a frequency as much above (or below) the oscillator frequency as the wanted signal frequency is below (or above) it and that is therefore accepted with the wanted signal by the IF amp so causing interference.

**image iconoscope** An early form of TV camera tube consisting of an iconoscope with an image section.

**image interference** In superheterodyne reception, interference from signals on the image frequency. The frequency of such interfering signals differs from that of the wanted signal by twice the intermediate frequency and, to minimize image interference, the signal-frequency circuits of a superheterodyne receiver are designed to give great attenuation at the image frequency.

**image isocon** A camera tube similar to an image orthicon but responsive to much lower light levels, including near darkness.

**image jitter** See *Jitter*.

**image lag** See *Image retention*.

**image mix** A digital camcorder function that creates a variety of effects by joining live recorded images with a stored still picture. The combinations made by the image mix feature produce a series of special effects, such as simulated dissolves, split-screens or PIP.

**image orientation** For special effects purposes, the TV image can be rotated about its center.

**image orthicon** A low-electron velocity orthicon TV camera tube with an image section and in which the output signal is obtained from an electron multiplier into which the return scanning beam is directed. An optical image of the scene to be televised is focused on the photo-cathode, and photo-electrons so released are focused by a combination of electrostatic and magnetic electron lenses on the image-section face of the target where they give rise to secondary emission that is collected by the nearby positively charged mesh. Thus, a positive charge image is established on the face of the target. If the tube is directed at a very bright light, causing the target potential to exceed that of the mesh, the excess secondary electrons are returned to the target; in this way the mesh keeps the tube stable for all light inputs. The target is very thin and the charge image is rapidly transferred to the opposite face that is scanned by the low-velocity beam. The beam lands on the target to neutralize the positive charge image and thus the return scanning beam is amplitude modulated by the required picture signal. The return beam is directed into the input of a multi-stage electron multiplier that surrounds the electron gun. The tube is extremely sensitive and is

capable of high-quality pictures. It is, however, complex and too bulky (typically 15" long and 3" or 4.5" in diameter) to be used in color cameras where three or four tubes are necessary. Image orthicon developed prior to the vidicon, the first really reliable and sensitive camera pickup tube. See *Orthicon*, *Persuader*.

**image pickup device** Image sensor.

**image pickup tube** Camera tube.

**image plane** 1. In digital video, display hardware that has more than one video memory array contributing to the displayed image in real time, each memory array is called an image plane. See also *Bit plane*. 2. The point behind the lens on which the image collected by the lens is cast. 3. The surface of the video tube target area.

**image processing** 1. Techniques that manipulate the pixel values of an image for some particular purpose. Examples are: brightness or contrast correction, color correction, changing shape of the image (warping). 2. The use of computers and mathematical algorithms to analyze, enhance, and interpret digitized TV images.

**image processor** Special circuitry, usually found in higher-priced TV sets or TV monitor/receivers, designed to retain natural colors while continuously adjusting the light and dark values of each scene. The image-processing circuits constantly modify the dynamic range of the CRT to correspond to the light-to-dark values of consecutive scenes. The image processor is also a general term for one of the many "black boxes" or devices available that can be connected to a VCR, such as an image stabilizer, image enhancer and fader. Some of the more recent image or video processors can accommodate both S-VHS and Hi8 video signals, offer several audio fade controls and provide a power distribution amp that permits the user to duplicate several copies of a videotape simultaneously with little or no loss of signal strength.

**imager** A device that converts an optical image into an electrical signal. Imagers were originally vacuum tubes—image orthicons, vidicons, and plumbicons—but more recently tubes are being supplanted by solid-state sensors such as charge-coupled devices (CCDs).

**image retention** Unwanted lagging or trailing of previous images or pictures. This effect is usually caused by rapid movements of the subject, quick panning of the video camera or the quality of the camera tube. The anomaly often occurs more frequently during low lighting sequences. The term is often confused with burn or image burn. Also known as image lag or cometing.

**image reversal** A process of reversing black and white images (dark-to-light, light-to-dark) and inverting color images. The conversion of black and white images is called luminance reversal while that per-

taining to color requires both luminance and chrominance reversal. Some high-priced video cameras are capable of performing both of these reversal processes by way of a negative/positive image switch.

**image scanner** A device, supplied with some VCRs, designed to "read" text or a drawing and then superimpose it over a video image. The scanned image can be copied in different colors and sizes.

**image section** An electron-optical stage included in some TV camera tubes to increase sensitivity. The optical image is focused on the photo-cathode in the image stage and the liberated photo-electrons are focused on the target to form a charge image by secondary emission from the target. The use of an image section thus separates the functions of photo-emission (now carried out by the photo-cathode) and secondary emission (carried out by the target). In the iconoscope the target is required to carry out both functions.

**image sensor** The image pickup device used in a video camera to capture the picture. The design may be a CCD or MOS, both of which have virtually replaced the conventional image pickup tube. The MOS chip is a 3/4" square solid-state sensor containing numerous rows of light-sensing cells upon which the camera lens projects its image. The black and white and color patterns of the image activate electrical impulses within each cell that are then generated into a video signal. Although more costly than standard camera tubes, image sensors are not only smaller and lighter, but they minimize image burn and image retention. Some professional camcorder image sensors are composed of two CCDs—one for brightness and the other for color. The two signals are processed separately to produce better resolution and color. Still other, more costly professional/industrial components feature an image sensor that utilizes three CCDs, one for each of the primary colors.

**image sharpness** In video, a subjective measurement of the amount of detail in a TV screen image. Image sharpness depends upon such factors as resolution (picture detail as measured by the number of horizontal lines), contrast (the relationship between the white and dark portions of an image) and the amount of video noise (unwanted signal interference) present in the screen image. Many TV sets, VCRs, monitors and monitor/receivers have a sharpness control feature designed to reduce noise and minimize contrast. The control, however, does not basically alter the resolution or number of horizontal lines in the image.

**image shift** A digital TV or VCR feature that allows the viewer to exchange the main image and the inset image of the PIP function. Part of the digital effects process, shift permits swapping pictures while retaining the audio with the main screen image.

**image smear** Image burn.

## image stabilization

**image stabilization** The elimination of jitter and vertical rolling of the screen picture. Some Super-VHS camcorders have developed techniques to improve image stabilization. They include electronic and mechanical improvements. Additional electronic correction circuitry ensures stable pictures at all camera speeds while changes in the way tape is transported across the video head drum rectify some types of instability.

**image stabilizer** A device designed to override some anti-piracy signals of prerecorded tapes and restore the stability of the signal to the TV image. The electronic coding, deliberately placed on tapes to prevent their being copied, changes and weakens the vertical sync signal so that when it is fed into a VCR, the machine cannot usually lock onto it. The stabilizer, therefore, either re-forms the vertical sync pulses or corrects any altered horizontal sync pulses. Some models completely strip the vertical blanking signal (which contains the anti-copying white pulses) and then proceed to re-build the sync signals to broadcast standards. Without a stabilizer, the picture often rolls and breaks up. However, most late model VCRs have advanced circuitry that defeats this signal without the use of this device. Some image stabilizers have different features, such as loop-through outputs, lock control signal lights and switchable inputs. Other models, such as the copy-protection removers, or digital video stabilizers, use digital filters in their process.

**image swap** A feature, found on TV receivers equipped with PIP and split screen capability, that allows the viewer to exchange left and right pictures or main and inset images.

**image transceiver** An accessory unit, used in conjunction with still video cameras, that permits color photos to be transmitted by way of ordinary telephone lines. Some image transceivers accept a still video floppy disk (VF), that is used in still cameras. However, the loss of image quality produced by this procedure limits its usefulness for professional/industrial purposes despite its several conveniences.

**image transfer converter** Picture standards converter that displays a picture image at one standard on a suitable monitor and re-photographs it at another standard with a TV camera.

**image transform** Proprietary computerized HQ videotape-to-film transfer system.

**image translator** A conversion kit or VCR designed to modify some VHS recorders, using the standard NTSC, to accept European PAL-recorded 625-line color tapes. Developed by Instant Replay, the VCR plays back the North American conventional 525-line color tapes as well as PAL and SECAM tapes. Instant Replay claims that their VHS VCR can play and record in 16 world standards.

**immersion lens** In a CRT, an electrostatic electron lens designed to concentrate the electrons liberated from

the cathode into a beam. Because these electrons have very low velocities the lens is situated very close to the cathode, so close in fact that the cathode may be regarded as immersed in the lens. The lens usually consists of two plates containing apertures and that may have cylindrical extensions.

**impedance** The resistance characteristics of any electronic circuit. The connection of one electronic component to another requires matching their impedances. Video games, VCRs and other units must have the same impedance level as the TV set. Impedance is measured in ohms—a standard unit of electronic resistance. Video involves only two ratings—75 and 300 ohms. An impedance adapter, such as a balun or small transformer, is used to convert 300 ohms to 75. Audio units such as speakers, when working as a set, should have matched impedances, usually 4 or 8 ohms. High and low impedances are expressed as hi-Z and low-Z.

**impedance adapter** A device that matches up the output of one unit with the input of another. For example, to connect the audio from a TV set (one that has an earphone jack, for instance) to the “aux” input of a stereo system, one should purchase the appropriate impedance adapter. This will depend upon the input of the stereo amplifier. Although the connection will work without the adapter, the sound will appear distorted. Also known as matching transformer.

**impedance matching** Back matching.

**impedance roller** Metal or plastic rollers used in most VCRs to provide an even and steady flow of tape through the transport mechanism.

**implosion** The inward collapse of an evacuated container, such as the glass envelope of a CRT.

**improved-definition systems** See *System terminology*.

**improved-definition TV (IDTV)** TV that includes improvements to the standard NTSC TV system, which improvements remain within the general parameters of NTSC TV emission standards. These improvements may be made at the transmitter and/or receiver and may include enhancements in parameters such as encoding, digital filtering, scan interpolation, interlaced scan lines, and ghost cancellation. Such improvements must permit the signal to be transmitted and received in the historical 4:3 aspect ratio. Syn.: (in CCITT usage) enhanced-quality TV. See *Advanced television, System terminology*.

**impulse pay-per-view (IPPV)** It is a feature of a decoder that allows an authorized subscriber to purchase a one-time scrambled program at will.

**impulsive noise** Undesired signal on a video system that consists of a series of pulses

**in-between** Jargon term to designate frames computed by a computer animation workstation or DVE to fill the time intervals between actual defined or selected keyframes. In the case of a DVE, trajectory

settings are used to enable the calculation of in-betweens. Syn.: tweens.

**in-camera recording system** A unit in which the video camera houses the recording components so that a separate VCR/VTR becomes unnecessary. See *Camcorder*.

**incandescence** The emission of visible light from a substance at a high temperature. The term is also used to describe the radiation itself. Syn.: luminescence.

**increment** A small change in the value of a variable.

**incremental tuner** A TV tuner with its antenna, RF amp, and RF oscillator tuning coils continuous or in small sections connected in series. Rotary switches make connections to the required portions of the total inductance necessary for a given channel, or short-circuit all of an inductance except that required for a given channel.

**Indeo® video** Originally called DVI (Digital Video Interactive), this is a digital video recording and playing format created by Intel, using a lossy compression/decompression algorithm. It turns a PC into a video recorder and player. It uses a card or special electronics inside a PC to turn the incoming NTSC analog video into digital signals, which it then compresses in real time and stores on the computer's hard disc. A one-minute small-screen video file is typically 50 megabytes. But Indeo video reduces this 50 megabytes to a much smaller size. Indeo is similar to motion JPEG. The Indeo algorithm was used by Microsoft in its Video for Windows, IBM in their OS/2 and Apple in their QuickTime.

**index counter** A VCR feature with three or four digits that rotate with the motion of the tape. The odometer-type mechanical counter, now all but defunct, helped to locate different portions of tape once the numbers were noted down. The numbers are arbitrary, representing neither inches nor time, simply registering rotation. A counter on one machine, in fact, may not match that of another. VCR owners whose machines had mechanical index counters often had to compose their own reference charts, with a list of numbers and matching times; i.e., every five digits equaled 15 or 30 minutes. Today, virtually all VCRs have electronic counters or read-outs, many of which measure real time.

**index mark** Cue mark.

**index search** A VCR feature that helps the viewer find the beginning of a program automatically and quickly. With the index search method, also known as VISS or VHS Index Search System, an electronic mark is automatically placed on the videotape each time the Record mode is activated. Later, the viewer engages the index search to find the beginning of each program until the right one is found. Some machines can mark up to 19 indexes. Index search, which differs from the more sophisticated intro search, can be performed manually as well. However, the VISS system performs indexing only during

recording whereas VASS (VHS Address Search System) permits marking scenes during playback. See also *Program start locator*.

**indirect scanning** Scanning in which a narrow beam of light is moved across the area being televised. Indirect scanning was employed in early TV, which was heavily dependent on mechanics. It is currently used in flying-spot scanning of films where the light transmitted by each illuminated elemental area is picked up in turn by one or more phototubes.

**industrial VCR** A video cassette recorder (VCR) that is externally similar to a home VCR, but is different in many ways. An industrial machine, whether a 3/4" U-Matic model or a 1/2" Beta or VHS deck, usually has a rectangular multi-pin jack for use with a TV monitor. The machine often plays at only one speed (the fastest) to retain high image resolution. It has special features such as random access and automatic transition editing. Many of these features, with modifications, eventually find their way into home VCRs. The costlier industrial machines are more sturdily built for heavier duty and are used more in business and institutional environments than in homes.

**infill** In TV, to change tone or color, a common procedure done electronically.

**infinity** An indefinitely large number or an unbounded space. In photography, objects at a few hundred feet are considered to be at infinity; in TV, the camera setting for infinity may be at 74 feet.

**infomercial** A video segment or program purporting to be informational/newsy and educational, but, in fact, the segment is a commercial paid for by the company whose products and/or services are featured.

**information provider** An organization that provides information for storage on a view database. Typically, information providers are companies that rent space on the public utility system that can be called up by videotex subscribers and for which a charge is made by the organization running the videotex service. After deduction of operating costs, the resulting revenue is passed on to the information providers concerned.

**information superhighway** A vague concept that Senator Al Gore may have created in the early 1990s, that gained great popularity when he became vice president, and the Clinton/Gore administration started pushing the term. It can refer to a gigantic Internet reaching everybody in North America or the entire world. It can just as easily mean a combination 500-channel interactive cable TV system with full video on demand to every household in North America. Somewhere in all this is the idea that easy access to large amounts of information will enrich our lives immeasurably. Who's going to get first access to it all, what the precise technical details will be, and who's going to pay for it are, naturally, minor details to be worked out.

## infotainment

**infotainment** A combination of information and entertainment, such as that provided by some of the videotex and CATV services.

**infrared** See *IR*.

**infrared remote control** On video cameras, a feature that starts and stops the camera recording and controls the zoom lens. This allows the camera user to set up his equipment and operate it from a limited distance without his direct presence affecting the subject. This is a useful feature in capturing shots of animals in the field or children at home or in a studio, subjects that sometimes appear shy before a camera. Also used on most other consumer devices, such as TVs, DVD players, etc., to allow remote control of their operation.

**infrared sensor** An element on TV receivers and VCRs and other equipment that permits wireless remote control to operate various functions from a limited distance. This feature is sometimes called remote control receiver.

**infrared transmitter** See *Remote control, Remote control panel*.

**inherited audience** The segment of the audience of a radio or TV program that stays tuned and is carried over to the next program; also called holdover audience. The inheriting program thus benefits from the preceding program.

**in-house system** A videotex system operated by a single information provider (IP) on which to display his own text, data, and images. (Nothing prevents the IP from also renting space on his in-house system.) An in-house system can be supported in one location or, in long haul, by leased or public telephone lines.

**injection laser** Another name for a semiconductor or diode laser.

**injection locking** Low-cost technique for phase-locking a cavity or resonator oscillator to a crystal source, to improve its frequency stability.

**INL** Integral nonlinearity.

**inlay** 1. Mortise-keyed insert; static matte insert. An insertion effect in which the fill signal is static and of a predetermined shape. Cf. overlay. 2. Keying mode when a key signal of the mixer (e.g., a diamond-shaped wipe pattern) comes from a source other than the video that will eventually fill the hole. The key source, in this case, may be either internal or external. Syn.: zonal mixing.

**in-line coaxial amplifier** An amp to boost the signal when it must pass long distance to a remote TV or VCR. It can be placed anywhere in the system and is powered in a similar fashion to mast-mount amps.

**in-line color picture tube** Precision-in-line color picture tube.

**in-line electron guns** An arrangement of three electron guns in a horizontal line. Used in color picture tubes that have a slot mask in front of vertical color phosphor stripes. In the Sony Trinitron tube, a single

gun produces three similarly positioned electron beams.

**in-line switching** The special circuitry in VCRs that automatically disconnects the tuner signal during the copying process. This entails duplicating by means of audio/video cables hooked up to the VCR.

**INMARSAT** International MARitime SATellite organization. Uses Marisat, MARECS, and Intelsat V MCS satellites.

**in-phase** In NTSC video, refers to being at 0 degrees with respect to the color subcarrier.

**input level** For ADCs, the input level is the voltage range required of the input for proper operation of the part. For example, if the required input level for an 8-bit ADC is 0 to 10 V, then an input voltage level of 0 V is assigned the code 0 and an input voltage level of 10 V is assigned the code 255.

**in-room video** A TV service in hotel guest rooms, including pay-per-view movies and free programming.

**insert** A general term used in special effects in which a secondary signal is introduced into an already existing, primary image. The insert can be made to appear in any portion of the TV screen. Accomplished by keying, wiping or crossfeeding.

**insert edit** The insertion of a segment into an already recorded series of segments on a videotape; the inserted segment replaces one that must be the same length. Insert edits demand that the segment be cut in precisely, since already recorded information exists following the insert edit on the original tape.

**insertion loss** Signal loss caused by such items as cables, connectors, baluns and splitters that connect to or pass through the RF switcher. Insertion loss is expressed in dB. The lower the dB number, the better the signal. Insertion loss is usually corrected by adding an amplifier.

**insertion signal** In TV, a signal inserted into one of the line periods during the field blanking period. The signal is not seen on the screens of viewers' receivers and is used by the transmitting authority to transmit information such as the source of program or control data. The signal is also used for test purposes to give information on the performance of the TV links.

**insert set** Detail set.

**insert stage** Small studio for minor tabletop or closeup videotaping.

**instant-on switch** A switch that applies a reduced filament voltage to all tubes in a TV set continuously, so the picture appears almost instantaneously after the set is turned on. The switch inserts a voltage-reducing choke in series with the primary of the power transformer and opens the high-voltage secondary winding, to reduce filament voltage to about half the normal value.

**instant record** One-touch recording.

**instant replay** A repetition of the action in a televised football game or other type of program, achieved



with a slow-motion video disk recorder or ordinary video recorder. The replay can show the action previously picked up or action from one or more other cameras.

**instant review** A feature found on some video cameras that permits the operator to inspect a portion of the previously recorded material. For example, some cameras with instant review automatically rewind the tape 3" while others have a review button on the handgrip. In the latter case, the last few moments of the recording are played back in the viewfinder, first in reverse, then in forward; finally, the VCR is returned to Record/Pause position. Many cameras without this feature permit reviewing what has been shot, but these models use different approaches. In some, the Camera/VCR switch must first be set. This shifts the recorder from Record to Play mode. The Search function is then utilized (in reverse) to rewind the tape. The Play/Pause control is then pressed to activate tape playback through the electronic viewfinder.

**instant viewing** The ability to produce on a TV screen any "frame" of a videodisc by using the random access feature of an LV VDP. Since the LaserVision system provides a contactless or laser beam stylus, one frame or revolution can be played continuously, offering a steady freeze frame. A typical disc contains as many as 54,000 pictures on each side, with each image having its own designated number. By pressing the numbered keypad, the viewer can locate any one of these frames or pictures. Instant viewing is possible, however, only in the standard play mode (CAV) or 30-minutes-per-side and not in long-play (CLV) or 60-minutes-per-side.

**Institute of Electrical and Engineers (IEEE)** A non-profit, technical professional association tasked with overseeing consensus standards development in the areas of electrical equipment, electronics, telecommunications and other areas.

**insurance** In TV, the technique of framing a scene wider than needed, to allow for movement.

**integral nonlinearity (INL)** A measure of the deviation of the analog-to-digital converter transfer function from the ideal.

**integral photography system** One of the 3D-image display systems that doesn't require special glasses.

**integrated broadcast operation** Refers to a fully automated, digital TV station. As a result of rapid advances in digital technology and electronics in general, major manufacturers of professional/industrial audio and video equipment, including Sony and Chyron, have developed an array of sophisticated units. These include graphics and effects devices, editors and complete digital multi-effects systems.

**integrated messaging** Also called unified messaging. It is one of many benefits of running telephony via a local area network. Voice, fax, electronic mail, image and video are all on one screen.

**integrated receiver/descrambler (IRD)** An enhanced satellite receiver that applies advanced technology to improve video and audio quality as well as to decode scrambled channels. IRDs, with built-in VideoCipher II circuitry, are capable of unscrambling a high percentage of the coded channels that TV satellite system owners receive. About 57 of the more than 200 available satellite channels are scrambled. Subscribers who want to receive these channels can register for those they prefer. The IRD then automatically opens the signals that have been purchased. Some of these IRD units include additional features, such as menu-based on-screen controls, digital sound, programmable tuners and video noise reduction.

**integrating array** See *Solid-state camera*.

**intelligence** Data, information, or messages that are to be transmitted.

**intelligence signal** Any signal that conveys information, such as code, facsimile diagrams and photographs, music, TV scenes, and spoken words.

**intelligent agent** Software that has been taught something of the user's desires or preferences and acts on their behalf to do things. It might, for example, search through incoming material on networks (e-mail and news) and find material of interest. It might also monitor TV viewing habits, accept general instructions about preferences and then, on its own, browse through huge databases of available videos and make recommendations about programs of possible interest.

**intelligent interface** A sophisticated microprocessor-based controller of VTRs and ATRs and switchers.

**intelligent phone** A "vision of the future" for phone networks, including: Selecting entertainment on demand (movies, music, video); recording customized news and sports programming; enrolling and participating in education programs from the convenience of subscribers' living rooms; finding up-to-the-minute medical, legal and encyclopedic information.

**INTELSAT** International TELEcommunications SATellite. A satellite network under international control for global communication by more than 80 countries. The system requires stationary satellites over the Atlantic, Pacific, and Indian Oceans and highly directional antennas at earth stations.

**intensify** To increase the brilliance of an image on the screen of a CRT.

**intensity** This is the same thing as brightness.

**intensity control** Brightness control.

**intensity modulation** Variation of the density of an electron beam in accordance with the instantaneous value of the modulating signal. An obvious example of intensity modulation occurs in the reproduction of TV images by a picture tube in which the electron-beam density is controlled by the video signal so as to produce the variations of light intensity on

## intensity signal

the screen necessary to make up the picture. Also called Z-axis modulation.

**intensity signal** Luminance signal.

**interactive CATV** A two-way cable system from which subscribers can receive and send signals, probably by punching buttons on their cable TV's remote control, which may look more like a computer keyboard than a traditional CATV handheld remote signaling device.

**interactive multimedia** An electronic system through which an individual can retrieve data from various media. It is also referred to as interactive video.

**interactive television** A combination of television with interactive content and enhancements. Interactive television blends traditional TV-watching with the interactivity of a personal computer. Programming can include richer graphics, one-click access to Web sites through TV Crossover Links, electronic mail and chats, and online commerce through a back channel.

**interactive video** A video system, typically computer-based, that permits the user to communicate with the video system to select material to be viewed and the method of viewing.

**interactive videodisc (IV)** A prerecorded LaserVision disc divided into chapters and/or frames for easy reference. The disc uses two audio channels and permits viewer participation in basic games. The player can locate chapters (segments of a program such as musical numbers) for perusal. IVs allow the user to rapidly locate a single frame (one picture such as a page of a book or catalogue or a painting or photograph). The two audio channels can present different sound tracks, such as a foreign language and a translation for home study or alternate narration. "How to Watch Pro Football," produced by NFL Films, was the first IV presented for home viewing. It contained 15 chapters, individual frame material, diagrams and a fast-paced football game. IVs have not become widely used due to the advent of multimedia CDROMs used with personal computers, which do a similar job.

**interactivity** Control by the user, but in a much more significant sense than control of a TV set, that consists primarily of selection from a limited number of predetermined choices (channels). This is a satisfactory mode for entertainment, but it becomes seriously limiting if trying to use the TV for other purposes such as teaching, training, or selling. Interactivity is the ability of a user (or a computer) to control the presentation by a multimedia system, not only for material selection, but for the way in which material is presented.

**intercarrier beat** An interference pattern that appears on TV pictures when 4.5-MHz beat frequency of an intercarrier sound system gets through the video amp to the video input circuit of the picture tube.

**intercarrier buzz** See *Buzz*.

**intercarrier interference** Refers to the buzzing noise that is sometimes heard when white titles appear on the TV screen. Intercarrier interference results when TV cable company amplifiers are incorrectly adjusted. Channels 2 to 13 (the low band channels) tend to be affected more than others.

**intercarrier reception** In a TV receiver, a method of sound reception in which the FM sound signal is derived from the vision detector or a post-detector stage as an FM signal on a carrier frequency equal to the difference between the vision and sound carrier frequencies. The method has the advantage that the center frequency of the sound signal is unaffected by drift of the local oscillator.

**intercarrier sound system** A TV receiver arrangement in which the TV picture carrier and the associated sound carrier are amplified together by the video IF amp and passed through the second detector, to give the conventional video signal plus a FM sound signal whose center frequency is 4.5-MHz difference between the two carrier frequencies. The new 4.5-MHz sound signal is then separated from the video signal for further amplification before going to the FM detector stage.

**Intercast** A method developed by Intel for transmitting web pages during the vertical blanking interval of a video signal. It is based on NABTS for (M) NTSC systems.

**interchangeability** A term used to describe how well a particular VCR can play back a tape recorded on another VCR of the same type.

**intercom line** Usually the audio connection between the video director and the members of the crew.

**intercutting** A production technique in which a cut is made from a scene (long shot) to a detail of that scene (close-up) to clarify or emphasize a point.

**interface** 1. A device that allows devices to communicate with each other. For example, an interactive interface translates the language of a computer into signals a videodisc player can interpret. 2. To connect two or more components to each other so that the signal from one is supplied to the other(s). Feeding a signal between units that run on different standards is the most frequent form of interfacing, as in connecting a 1/2" helical scan VTR to a 2" Quadraplex machine.

**interference** 1. In radio or TV reception, any unwanted signal, natural or manmade, that adversely affects reception of the wanted signal. Natural interference signals can arise from lightning flashes, and manmade interference from signals on nearby frequency channels or image channels, from electrical equipment and from car ignition systems (TV signals frequently suffer serious interference from motor-vehicle ignition systems). Interference signals can be picked up on the receiving antenna or can reach the receiver via the supply mains. Some reduction in interference may be possible by using a directive an-

tenna, by siting the antenna in an “electrically-quiet” spot, or by the use of RF filters in the receiver mains supply. The best method is to prevent the radiation of interfering signals by fitting suppressors to the offending equipment. 2. In optics, the effects observed when two sources of light of the same frequency are superimposed. Areas where the two waves are in phase are illuminated more brightly than those where the waves are in phase opposition and thus one of the most familiar effects is the formation of interference bands or rings.

**interference fading** See *Fading*.

**interference suppressor** A device designed to reduce or eliminate distortion of a TV picture usually caused by household appliances. A suppressor is installed into the wall socket and has apertures for 3-prong or 2-prong plugs.

**interfield cut** Cutting or switching from one source to another during the vertical or field sync period. With random switching a good deal of picture disturbance is obtained, but in an interfield cut, the signal to cut is stored and a switch is made electrically or by relay only during the blanking interval. This gives no video disturbance, but if the syncs are too badly damaged and are not properly restored in the interfield cut, frame roll may be obtained on a flywheel sync receiver. Also called cut in blanking.

**inter-frame coding** Coding over a sequence of frames. Used in MPEG systems. The quality of a compression system doesn’t just depend on the compression ratio but on the type of compression used. Inter-frame coding allows higher compression factors by virtue of the fact that movement between successive images is normally relatively small and hence coding efficiency increases.

**inter-frame encoding** A way of video compression that transmits only changed information between successive frames. This saves bandwidth.

**interlace** In scanning, the technique of using more than one vertical scan to reproduce a complete image. In TV, 2:1 interlace is used, giving two vertical scans (fields) per frame; one field scans odd lines, and one field scans the even lines of the frame.

**interlacing** Regular TV signals are interlaced. In the US there are 525 scanning lines on the regular TV screen, the NTSC standard. Interlaced means the signal refreshes every second line 60 times a second and then jumps to the top and refreshes the other set of lines also 60 times a second. Non-interlaced signals, used in the computer industry and HDTV, means each line on the entire screen is refreshed X times, depending on what the video card is outputting to the color monitor. The more the monitor is refreshed, the better and more stable it looks—the less perceived flicker. For example, text on an NTSC US TV set tends to flicker. It doesn’t on a non-interlaced monitor. Typical non-interlaced computer monitors refresh at 60 to 72 times a second, but

good ones refresh at higher rates. Progressive HDTV refreshes at 50 or 60 times a second. Generally, anything over 70 Hz is considered to be flicker-free and therefore preferred, when affordable.

**interleaved projection optical system** A 4-million-pixel, 110" projection display system that creates “virtual presence” effects in applications such as videoconferencing; NTT, Japan. The resolution achieved by the system, according to company officials, is four times that of current high-definition TV standards. The high resolution is attained by an interleaved projection technique that places four pixels in the same area that would normally be occupied by one. The four pixels are shifted slightly in position with respect to one another and then interleaved to deliver a fourfold improvement in both resolution and brightness over conventional HDTV displays.

**interleaved projection** See *Interleaved projection optical system*.

**interleaving** A term used to indicate that the harmonics of the chrominance signal lie between the harmonics of the luminance portion of the video signal as it is viewed on a spectrum analyzer. This indicates that the color information of a video signal does not interfere with, although it is broadcast at the same time as, the luminance information. Signals that have this interleaving property are not readily seen on a TV screen because of their virtual cancellation characteristics.

**interline transfer device (ITD)** One of the three basic architectures for obtaining the video signal in solid-state cameras. In ITD the storage arrays are arranged alternately with the photosensitive arrays and are connected to them by a transfer gate. During the vertical retrace period the information is transferred horizontally from the photosensitive electrodes to the storage electrodes by means of the transfer gates and then read out line by line in a similar manner to the FFTD.

**interlock** To run sound and picture together in perfect sync from separate film and/or tape transports.

**interlock wire** See *AC interlock*.

**intermediate character** In videotex, a character used preceding a final character to increase the number of possible management commands.

**intermediate frequency (IF)** A middle range frequency generated after downconversion in any electronic circuitry including a TV set. The majority of all signal amplification, processing and filtering in a receiver occurs in the IF range.

**intermodulation** Distortion and unwanted signal energy caused by signals being transmitted in other channels. Intermodulation is one of several forms of degradation that affect NTSC picture quality.

**intermodulation distortion** Syn.: combination-tone distortion. See *Distortion*.

**internal anti-reflective coating (IARC)** A process developed for use with projection TV systems, designed

## internal keying

to increase brightness, resolution and contrast, three acknowledged problem areas inherent to conventional projection TV.

**internal keying** A method of keying in which the key signal can be sent through the SEG from any one of the cameras already in use. See *External keying*.

**International Radio Consultative Committee (CCIR)** An international organization concerned with the establishment of radio and TV broadcasting standards throughout the world.

**International Tape Association** See *International Tape/Disc Association*.

**International Telecommunications Union (ITU)** An organization that designates locations for satellites. With the increase of communications satellites, some order was required to prevent them from interfering with each other or, worse, colliding. The positions extend from 150 degrees to 70 degrees west longitude. It also sets many standards for transmission.

**interocular separation** Distance between the right and left eyes (between the pupils).

**interpolation** A video technique used in motion compensation where a current frame of video is reconstructed by using the differences between it and past and future frames. This technique is also known as forward and backward prediction. Interpolation is also used to correct errors in video and audio by using the nearby "good" data.

**intervalometer** A special timing device attached to a camera for automatic single-frame exposure in animation (time-lapse) photography. It releases the camera shutter at predetermined intervals to condense large portions of time into smaller ones. For example, hours of cloud movements can be recorded to play back with a running time of a few seconds, thus dramatically speeding up the motion. With limitations, the accessory can be used in time-lapse video when connected to a home video camera. Keeping a portable VCR in Pause mode for an extended length of time may cause damage to the tape or video heads. When this function is built into a camera, it is usually referred to as an interval timer.

**interval related carrier (IRC)** Refers to cable-TV channels on frequencies starting at 55.25 MHz with increments of 6 MHz (6N + 1.25 MHz). These channels are the same as standard frequencies except for channels between 67.25 and 91.25 MHz.

**interval timer** A built-in video camera feature designed for time-lapse or animation effects. See *Intervalometer*.

**intra-field coding** Coding contained within one field.

**intra-frame encoding** Coding contained within one frame.

**intro search** A VCR feature that automatically locates all indexed material on a prerecorded videotape and plays back the opening portion of each section for a few seconds in fast motion. Intro search helps a viewer quickly find a selection on a tape that he or

she is looking for. This feature, sometimes referred to as Intro Scan, differs from index search, which simply locates the beginning of programs that have been automatically marked electronically each time the Record button is pressed.

**inverse transform** See *Transformation*.

**inverted image** A condition occurring when a small TV set is employed in a budget projection TV system and no mirror is used. The special lens that projects the image onto the screen also creates an inverted image. This can be corrected in one of two ways: A service person can reverse the vertical connection wires on the yoke of the TV picture tube, or he or she can add a picture tube inversion switch that permits either a normal or inverted picture for projection use.

**inverter** Circuitry to convert DC to AC; see *DC-to-AC inverter*.

**invert operation** In videotex, a display of characters such that foreground and background colors appear to have been exchanged. If flash is applied, the polarity of the flashing clock also is inverted.

**ion burn** An area of reduced luminosity on the screen of a CRT caused by partial destruction of the phosphor by bombardment by heavy negative ions that are liberated from the cathode or are formed by ionization of the residual gas. The area is usually at the center of the screen because the heavy ions are not deflected to the same extent as electrons by the deflecting fields.

**ion trap** Method of avoiding ion burn of the screen of a CRT. In one method the electron gun is aimed at the neck of the tube and an external permanent magnet is used to deflect the electron beam to the axis of the tube. Heavy negative ions liberated from the cathode or by ionization of the residual gas that are responsible for ion burn are deflected to a smaller extent than the electrons and continue to bombard the tube neck. The use of an aluminized screen has now rendered the use of ion traps unnecessary.

**IP** Internet Protocol. See *TCP/IP*.

**IPPV** Impulse Pay-Per-View.

**ips** Inches per second; the customary unit of measurement of tape speed on an audio or video tape recorder.

**IR** Infrared. The band of electromagnetic wavelengths between the extreme of the visible part of the spectrum (about 0.75  $\mu\text{m}$ ) and the shortest microwaves (about 100  $\mu\text{m}$ ). This portion of the electromagnetic spectrum is used for fiber-optical transmission and also for short-haul through-the-air data transmission.

**IRC** Interval Related Carrier.

**IRD, satellite TV** Integrated Receiver/Decoder. A device (set-top box) that not only receives the signals, but also deciphers them into a viewable picture.

**IRE** Institute of Radio Engineers. A system of measurement used in audio and video. Besides representing the professional organization, IRE is a term used for

measuring such items as frequencies and video lines. For example, white balance (the amount of color that can be viewed on a neutral object) is measured in IRE. The lower the IRE number, the better the white balance. The figure of 0 IRE indicates perfect white balance, a goal all TV manufacturers aim at but seldom attain. IRE plays an important role in waveform monitors, or oscilloscopes, professional instruments that feature switchable on/off IRE filters.

**IRE units** A relative scale for measurement of analog video signal levels where blanking level is 0 IRE units and peak white level is 100 IRE units. (IRE is an acronym for Institute of Radio Engineers, one of the forerunners of today's worldwide electrical engineer's professional society, the Institute of Electrical and Electronics Engineers.) See *Measuring the video*.

**iris** Means of controlling the amount of light that is allowed to pass through an optical system. It is an adjustable set of metal leaves over the aperture of a lens, used to control the amount of light passing through the lens. Iris openings are measured in f-stops. Also called Iris diaphragm; diaphragm.

**iris control button** A feature that closes down the iris or aperture of the lens to protect the sensitive video camera tube when the camera is not in operation. Camera tubes that are exposed to overly bright light or sun develop a "burn" that may become permanent.

**iris diaphragm** Iris.

**iris in** To begin a scene in a TV program by opening the camera from a completely closed position, so that the scene appears within an expanding circle. The opposite is iris out. See also *Circle in* and *Circle out*.

**iris out** See *Iris in*.

**iris wipe** Printing effect providing a transition from one scene to another at the boundary of an enlarging or diminishing circle. When using a TV flying spot system, the generation of a circular wipe can be accomplished by means of a simple mechanical iris similar to that used in a camera lens. Electronic generation is usually by a combined line and field parabolic waveform switching signal.

**iron oxide** A particle combined with other metallic oxides and ferrite to form a coating on magnetic tape.

**ISDB** Integrated Services Digital Broadcasting. Japan's transmission specification for digital broadcasting. ISDB uses a transmission scheme called BST-OFDM that ensures the flexible use of transmission capacity and service expandability in addition to the benefits of OFDM. Since OFDM uses a large number of carriers that are digitally modulated, it provides sufficient transmission quality under multipath interference. The basic approach of BST-OFDM is that a transmitting signal consists of the required number of narrow-band OFDM blocks called BST-segments, each with a bandwidth of 100 kHz.

**ISDN** Integrated Services Digital Network. An international communications standard for sending voice, video, and data over telephone lines. ISDN requires special metal wires and supports data transfer rates of 64,000 bps. The original version of ISDN employs baseband transmission. B-ISDN uses broadband transmission and can support transmission rates of 1,500,000 bps. B-ISDN requires fiber optic cables (has not been widely implemented).

**I signal** In NTSC video, I is one of the two color difference signals, I and Q. The letter I stands for in-phase. I signal consists of  $+0.74(R-Y)$  and  $-0.27(B-Y)$ , where Y is the luminance signal, R is the red camera signal, and B is the blue camera signal. I signal has a bandwidth of 0 to 1.5 MHz. It represents the colors ranging from reddish orange to cyan. Modern systems use U and V instead of I and Q.

**ISMA** Abbreviation for the Internet Streaming Media Alliance. ISMA is a group of industry leaders in content management, distribution infrastructure and media streaming working together to promote open standards for developing end-to-end media streaming solutions. The ISMA specification defines the exact features of the MPEG-4 standard that have to be implemented on the server, client and intermediate components to ensure interoperability between the entire streaming workflow. Similarly, it also defines the exact features and the selected formats of the RTP, RTSP, and SDP standards that have to be implemented.

The ISMA v1.0 specification defines two hierarchical profiles. Profile 0 is aimed to stream audio/video content on wireless and narrowband networks to low-complexity devices, such as cell phones or PDAs, that have limited viewing and audio capabilities. Profile 1 is aimed to stream content over broadband-quality networks to provide the end user with a richer viewing experience. Profile 1 is targeted to more powerful devices, such as set-top boxes and personal computers.

**ISO** 1. International Standards Organization. An international agency responsible for developing standards for information exchange. Has a function similar to that of ANSI in the US. 2. Slang for isolated. For example, a TV camera may be isolated (iso'd) from others being used in a production (an ISO camera) so that its tape can be used as a backup or replacement.

**ISO camera** See *ISO*.

**isochronous** Data transmission where timing is derived from the signal carrying the data. No timing or clock lead is provided at the customer interface. In isochronous data transmission, data has no embedded timing—send it slower and it is still valid, just late. Voice and video are intimately tied to timing. Send voice slower and it sounds very different.

**IsoENET** Networking standard for multimedia applications from Santa Clara, Calif.-based National Semiconductor Corp. Isoenet is an interface between local

## isolation

and wide area networks and has one 10-Mbit Ethernet channel for digital data, plus 96 ISDN-B channels for voice and video. The normal Ethernet data channel is not impacted by the added service. The system dedicates an additional 6 Mbits to isochronous services, enabling it to handle high-quality video traffic. The isochronous channels are divided into 64-Kb/s segments to match ISDN WAN standards.

**isolation** The absence of interference in video components. Isolation is measured in dB. The higher the number, the better the isolation. For example, a video switcher should provide approximately 40 dB of isolation. If the number falls lower than this, interference as well as image degradation are likely to occur. In devices like switchers, isolation refers to the ability of the unit to block signal leakage and interference from disturbing the different signals. Again, the higher the dB number, the better the isolation.

**isolation transformer** A transformer inserted into a circuit to separate one section of the circuit from undesired influences of other sections. It is usually made with a 1:1 ratio of primary turns to secondary turns to eliminate a direct connection without changing voltages. The isolation transformer is used to prevent blowing fuses and chassis damage when connecting test equipment to the AC TV chassis. The TV chassis that works directly from the power line, without power transformer, may have a hot chassis and should be protected with the isolation transformer. Besides isolation of the power line, the transformer may have adjustable taps to raise or lower the power line. Raising and lowering the power line in the AC TV chassis may be required to service chassis or high-voltage shut-down. Slowly raising the power line may prevent damaging another horizontal output transistor. See also *Isolator*.

**isolator** A device designed to prevent electrical interference between units in a video system. The isolator accomplishes this by filtering the line current. The isolator eliminates such problems as hum, crosstalk and voltage differences. Some units permit hooking up any three components to its AC outlets. More sophisticated models, called isolation transformers, offer additional features and uses, such as ensuring signal transmission with more than 120 dB attenuation of interference and applying it to ultra-wide bandwidths and broadcast or remote TV lines.

**iso reels** Multiple reels of tape on which the same subject has been recorded simultaneously by different VTRs through different cameras (iso for equal).

**ISO standards** Standards published by the International Standards Organization, the body coordinating the work of various national associations. They include a number of standards in the field of motion pictures and TV.

**isotropic** The property possessed by a hypothetical omni-directional point-source antenna, the reference for antenna gain measurement.

**ITCA** International Teleconferencing Association, a professional association organized to promote the use of teleconferencing (audio and videoconferencing). Located in Washington, DC.

**ITFS** Instructional Television Fixed Service. Group of TV channels in the UHF frequency range set aside for educational use.

**ITU** International Telecommunications Union, a broadcast standards committee that replaced the CCIR.

**ITV** Industrial TV

**-IWQ** A waveform used in NTSC color-bar pattern: black with 40 IEEE units chroma at -I phase, 100% W (white), black with 40 IEEE units chroma at Q phase.



**J** CATV superband channel, 216-222 MHz.

**jack** 1. The opening or receptacle on a VCR, TV monitor or other component that accepts a male plug. Features like audio-in and video-out on VCRs and other equipment are also referred to as audio and video jacks while the cables with matching connectors are called audio and video plugs. The terms “jacks” and “plugs” are often interchangeably. 2. Male cable connector, or plug, as in phono, mini, phone plug.

**jacket** The protective and insulating housing of a cable.

**jaggies** Professional jargon for spatial aliasing on near-horizontal lines in a TV picture. Caused by lack of pre-filtering. Syn.: stair-stepping.

**jam** See *Salad*.

**jam sync** The ability of a SMPTE time code generator to feed or “jam” a particular time code address from the time code generator to a master VTR. Jam sync is used when editing material from more than one video tape into a single master, so that the master tape will have continuous, unbroken time code.

**Java** A general-purpose programming language developed by Sun Microsystems and best known for its widespread use on the World Wide Web. Unlike other software, programs written in Java can run on any platform type (including set-top boxes), as long as they contain a Java Virtual Machine.

**JBIG** Joint Bi-level Image Experts Group. Losslessly compresses binary (one bit per pixel) images. The intent of JBIG is to replace the group 3 and 4 fax algorithms. JBIG can be used on grey-scale or color images by applying the algorithm one bit-plane at a time.

**jeep** To convert a TV receiver into a TV monitor or monitor/receiver by rewiring the internal circuitry and adding input and output jacks for video and audio.

**jenny** A portable electric generator, as used in film and TV.

**jerkiness** Term to describe temporal aliasing. An artifact due to deficiency of temporal filtering, for example in the process of linear standards conversion (as opposed to motion compensated standards conversion). It is for this reason that 4-field converters have less judder than 2-field converters. Syn.: judder.

**jitter** Short-term variations in the characteristics (such as frequency, amplitude, etc.) of a signal. General

term for sudden irregular departures from the ideal value of a parameter such as the phase, amplitude or pulse duration of a signal. In TV signals jitter can cause errors in synchronizing and these can lead to erratic movements in the displayed picture.

**JJ** CATV hyperband channel, 354-360 MHz.

**jog/shuttle control** A wheel-and-dial combination, usually found on the front of more costly VCRs, designed to move the video picture one frame at a time and assist in a manual bi-directional search for a particular segment. Used chiefly for editing, the jog/shuttle control, or jog dial shuttle ring as it is sometimes called, allows the user to turn the outer ring for moving the tape from slow motion to search speeds. The inner jog wheel or dial moves the tape frame by frame, helping the user to choose the exact edit point. Some VCR models provide a single control to accomplish both tasks. The feature on these machines does not work as fast or accurately as that of the two-part design. Some VDPs have a similar jog dial shuttle ring. Located on the remote control, the ring allows the user to view a program on the disc forward or backward and at a variety of speeds, from one frame at a time to 10 times standard play speed.

**Joint Photographic Experts Group standard (JPEG)**

A standard adopted by the International Standards Organization (ISO) for compressing still images with little or no data loss. It can be used for moving images only if it treats each field or frame as a separate entity.

**joy stick** In video games, a lever which controls the movements of the game action on the TV screen. In relation to a VTR, a joy stick regulates a special effect on the screen or tape movement during editing.

**JPEG** Joint Photographic Experts Group. A still image compression system that reduces the size of a digital image file by using an intraframe compression scheme, where redundant information (that is, most of the blue colors in a blue sky) is thrown away. When used in conjunction with hardware, JPEG can compress and decompress images fast enough to display 30-frames-per-second video. This is why JPEG is used as the main compression algorithm on most nonlinear editing systems.

## JPEG++

**JPEG++** Storm Technology's proprietary extension of the JPEG algorithm. It lets users determine the degree of compression that the foreground and background of an image receive; for example, in a portrait, you could compress the face in the foreground only slightly, while you could compress it in the background to a much higher degree.

**judder** See *Jerkiness*.

**jukebox** A piece of hardware that holds storage media, such as optical discs or cartridge tapes. Jukeboxes are typically designed to hold as few as five and as many as 120 devices. Like old-fashioned record playing jukeboxes, media is moved by a robot-like device from the storage slot to the drive reading it. This lets the user share one drive among several cartridges or discs. Video jukebox can contain everything broadcast on TV, etc. See *Oracle Media Server*.

**Jumbotron** A giant presentation TV unit that measures 23.5 x 32 feet and is used for outdoor display. Developed by the Sony Corporation, the jumbotron is used to screen travelogues, commercials, public service announcements (PCAs), videos, and headline news to thousands of passersby from

buildings in New York's Times Square and in Tokyo and other cities.

**jump cut** An undesirable cut in TV and film production that occurs when a director or editor makes an abrupt transition from one camera angle or scene to another. The effect is to make it look like the picture has "jumped" from one shot to another.

**jumping out** The process of removing individual frames from a film or a video tape.

**junction box** A connector accessory with two wired female connectors and designed so that two male plugs can be joined together. The junction box is most often used by professionals. See also *Spider box*.

**Jungle** Multipin, multifunction chip, e.g., Y/C Jungle CX20193 IC in Sony 19" TV.

**JVC** A Japanese electronics firm (Victor Company of Japan) that introduced the first VHS system portable VCR in 1978. The HR 4100 was a one-speed VCR, which could record for up to three hours on a battery charge as well as on house current. With its built-in RF adapter it could also record and play back through a conventional TV receiver. Including battery pack, it weighed 21 pounds. See also *Matsushita*.

# K

**K** 1. Short for kilo or kilobyte. In decimal systems, kilo stands for 1,000, but in binary systems, a kilo is 1,024 (2 to the 10th power). Technically, therefore, a kilobyte is 1,024 bytes, but it is often used loosely as a synonym for 1,000 bytes. For example, a computer that has 256K main memory can store approximately 256,000 bytes (or characters) in memory at one time. To distinguish between a decimal K (1,000) and a binary K (1,024), the IEEE has suggested following the convention of using a small k for a decimal kilo and a capital K for a binary kilo, but this convention is by no means strictly followed. 2. When used to describe memory chips, K stands for kilobit (1,024 bits). This is equivalent to 128 bytes. Most memory chips come in increments of either 256 kilobits (64K bytes) or 1 megabit (256K bytes). 3. Abbreviation for kelvin (plural kelvins); here K is used without the degree sign and is separated by a space from the temperature value, as in 273.16 K. 4. Unofficial abbreviation for kilohm; here the k follows the value, with no space between, as in 10k. 5. CATV superband channel, 222-228 MHz. 6. TV standard. Characteristics: see D, except used band—K uses UHF. 6. Abbreviation for black. 7. Frequency band 18-27 GHz.

**Ka-band** 27-40 GHz.

**karaoke** A multimedia entertainment and educational system invented in Japan for night club entertainment. The basic system consists of a microphone and audio system, source of background music (typically CDs or CD-ROMs), and closed-circuit TV. Patrons can sing or perform to recorded music, and the composite performance can be recorded on videotape. It is also used for educational and training purposes.

**K-band** The range of frequencies from 11 to 36 GHz used by radio and TV stations for satellite transmission.

**keeper** In film and TV, a segment of film or tape that is to be retained and is likely to be used, or kept, in the final cut (edited version).

**Kell factor** In TV, a factor expressing the ratio of horizontal to vertical definition. Suppose each of the  $n$  lines of a TV picture is made up of alternate black and white elements. If these elements are assumed

to be square—equivalent to regarding horizontal definition as equal to vertical definition—then there are  $4n/3$  elements in each line, the aspect ratio being 4:3. The lowest video frequency that will enable such a row of elements to be resolved is one in which one half-cycle represents a white element and the other half-cycle a black element. This is the upper video-frequency limit for the system and it gives values appreciably higher than are used in practice. The lower practical values are justified by the assumption that the horizontal definition need only be, say, 0.7 times the vertical definition: in other words they are based on a Kell factor of 0.7.

**Kelvin** A term used in video lighting to measure color temperature of a given light source, usually with a degree symbol. For example, an ordinary household light bulb of 100 W is rated 2900 degrees K, stage lighting is based around 3200, sunlight is approximately 5800, while high-overcast, bright days are close to 6000 degrees K. If Kelvin temperatures are changed in a scene, the whites must be re-balanced (camera's white balance control button) for accurate rendition of color. The lower the Kelvin, the warmer the light color.

**Kerr cell** A light modulator consisting of a liquid cell containing two parallel plane electrodes and situated between two crossed polaroids. Normally no light emerges because the polaroids are crossed. Signals applied between the electrodes cause the plane of polarization of the light to rotate (Kerr effect) so allowing light to pass. Used in projection-type TV receivers to modulate a beam of light or serve as a high-speed camera shutter. Also called electro-optical shutter.

**Kerr effects** Two effects in which the optical properties of transparent material are affected by electric or magnetic fields. The *electro-optical effect* is the effect whereby the direction of polarization of plane-polarized light through a refractive medium is rotated by an electric field applied perpendicularly to the direction of propagation of the light. The Kerr cell utilizes this effect. Pockel's effect is the Kerr effect when it occurs in a piezoelectric material. Pockel's effect can be used for measurement of distance by a mekometer. Such an instrument can

## key

measure distance to an accuracy of 0.05 mm in 50 m. The *magneto-optical effect* occurs when plane-polarized light is reflected from a highly polished pole face of a strong electromagnet. Slight elliptical polarization of the light beam is produced.

**key** A special effect whereby the signal from one video source cuts a hole into another video source. A feature on some video switchers, which permits creating electronically the illusion of placing one image over another without getting rid of the second image. There are four basic types of keys: external key, chroma key, matte key, and self key, each capable of providing a different special effect. For example, a chroma key substitutes a particular color with an image from a different source. A matte key, on the other hand, consists of only one color for keying.

**keyed automatic frequency control** An AFC method employed in the frequency modulator for MUSE signals. This method is as follows: The input MUSE signal takes the specified mid-level every 1/60 second. At that time, the frequency of the modulated output signal takes the center frequency (140 MHz).

**keyed rainbow generator** A rainbow generator that has facilities for generating 3.58-MHz colorburst pulses, for making crossover adjustments and for general color TV receiver troubleshooting.

**keyed insert** Keying.

**keyframe** A set of parameters defining a point in a transition, such as a DVE effect. For example, a keyframe may define a picture size, position and rotation. Any digital effect must have a minimum of two keyframes, start and finish, although more complex moves will use more, even as many as 100. Increasingly, more parameters are becoming "keyframeable," meaning they can be programmed to transition between two or more states.

**keying** 1. Keyed insert, inlay insert. In a video system, the process of inserting one picture into another picture under spatial control of another signal, called keying signal. 2. In digital TV transmission, the forming of the signal by modulating a carrier between discrete values of some characteristic. See *FSK*, *QAM*, *QPSK*.

**keying signal** Signal that actuates an electronic switch in the production of special effects. It can be generated electronically, or obtained from a video signal by passing the signal through a special effects amplifier.

**key light** In video, the main light source of a scene, which emphasizes the important objects in that scene. The key light is usually located near the video camera and above the subject to minimize shadows. This light works best in conjunction with fill lights, etc. The key light can work with available light, the latter acting as the fill. See *Lighting*.

**keypad** 1. That portion of a remote control designed to operate specific functions of a VCR, TV set or VDP. See *Numeric keypad*. 2. A limited keyboard with

one or a few buttons or keys, used, for example, to make selections from a videotex system.

**keystone distortion** 1. In TV, geometric distortion of the image causing a rectangle to be reproduced as a trapezium or keystone. The effect can be caused by interaction between line-scanning and field-scanning circuits but occurred in the early days of TV as a result of oblique scanning of the target by the electron beam in iconoscope tubes. It was necessary to introduce correction to obtain an accurately rectangular image. 2. Camera-tube distortion evident because the length of a horizontal scan line is linearly related to its vertical displacement. It occurs when the electron beam in the camera tube scans the image plate at an acute angle. A system that has keystone distortion distorts a rectangular pattern into a trapezoidal pattern. The distortion is normally corrected by special transmitter circuits.

**keystoning** An effect which results in a narrower or wider projected image at the top of the screen than at the bottom. This is caused when the slide or movie projector is not properly aligned with the screen. In those movie houses where keystoning occurs, the sides of the screen are usually darkened to conceal the effect. Keystoning is also a problem in projection TV systems using mirrors.

**kickback power supply** Flyback power supply.

**kicker** 1. On a TV or broadcast, an inconsequential, humorous, or even zany final item; also called zipper. 2. A light to the side or rear of a subject; also called kicker light, kick light, stringer light, cross backlight, or side backlight.

**kideo** Home video for children.

**kidvid** Refers to TV and video aimed at children.

**kilroy** The defective framing of a TV picture in which the lower portion of the heads of performers or others is cut off. The origin is a cartoon character in the World War II made famous by the motto scribbled on thousands of walls, "Kilroy was here."

**kinescope** 1. Picture tube in a TV receiver (US). 2. An early and imperfect video storage and reproduction technique (before the introduction of videotape) in which a film of a TV program is made by placing a movie camera in front of a TV screen displaying that program. In Britain, called a telerecording.

**kinnie** A name often applied to the picture tube.

**kk** CATV hyperband channel, 360-366. See *TV channel assignments*.

**klieg light** A powerful, wide-angle carbon arc lamp used in motion-picture, theatrical, and TV production; pronounced "kleeg" and sometimes misspelled Kleig.

**klystrode** A hybrid tube that employs both a control grid and velocity modulation. This has extended the use of the klystron principle into VHF TV transmitters.

**klystron** An electron tube in which the electron beam is velocity modulated to generate or amplify microwaves. The electron beam from the cathode passes

between the grids of a cavity resonator known as a buncher. The input signal is applied to this resonator and the resulting potentials between the grids cause velocity modulation of the beam. Bunching occurs in the drift space, and the bunches, in passing through the catcher grids, induce an amplified output signal in the catcher resonator. The beam is finally collected at the anode (or collector). Used in TV transmitters. See *Applegate diagram*.

**knee** In the graphical representation of a tonal reproduction process, such as photography or TV, a point or region of inflection on the characteristic curve, where the slope representing the rate of change alters, usually from a higher to a lower value.

**koch resistance** The resistance of a photocell when light is incident on the active surface of the tube.

**Kodak still-picture process** A hybrid technique of traditional and electronic photography. It uses the traditional photographic method but also permits pictures to be manipulated and viewed electronically. The system is called Photo CD; developed by Kodak and Philips. A consumer receives 35-mm negatives and prints from the photo finisher in the traditional manner. However, the images can also be converted to digital data and recorded on a CD and then played back on a TV screen by using a special player. Each disc can contain as many as 100 pictures from either slides or negatives. Photo CD is now targeted towards professionals, and the Picture CD is targeted towards consumers.

**KoyCrypt** A scrambling system by Hi Tech Xtravision. A VideoCrypt clone, it is claimed to be harder to hack than the original. Not used by broadcasters because of copyright issues.

**k rating** Method of stating the subjective effect of linear amplitude and phase distortions on a TV signal. Sine-squared pulse and bar signals and field-frequency square wave signals are passed through the system. The output waveforms are compared with special oscilloscope graticules marked with limits for various k ratings, and the k rating of the system is stated as the largest value found—i.e., the worst rating.

**kroma glass** Colored mirrored glass that reflects and transmits light. It is used in video and photography for special effects.

**ktp/shg blue laser** A laser that reads a high-density optical disc at room temperature; Pioneer Electronic Corp., Tokyo. Previous attempts have only been successful at low temperatures. Development of a room-temperature, solid-state, blue laser was a key to optical disc systems capable of recording multiple hours of high-resolution video on a CD-sized disc.

**Ku-band** Frequencies in the 12-18 GHz range. It is used by radio and TV stations for satellite transmission.

**Ku-band satellite** Communication satellite that contains transponders on frequencies in the Ku-band from 11.7 to 12.2 GHz. Signals of these frequencies can be received by relatively small TVRO dishes, thus making DBS services possible. Ku-band transmission is sensitive to atmospheric changes, however, and satellites using that band cover only a small portion of the US, in contrast to C-band satellites, which cover most of the country.

**Ku-track** TV news truck, a mobile unit for satellite transmission. The vehicle is sometimes called a 12-14 truck or 12-14 unit, after the GHz range.

**L** 1. CATV superband channel, 228-234 MHz. 2. TV standard; France, Korea. Characteristics: 625 lines/frame, 50 fields/s, interlace—2:1, 25 fr/s, 15,625 lines/s, aspect ratio—4:3, video band—6 MHz, RF band—8 MHz, visual polarity—positive, sound modulation—F3, gamma of picture signal—0.5.

**LAC** Live Action Camera.

**LADT** Local Area Data Transport.

**lag** 1. In photocells and camera tubes, the time that elapses between a change in light input and the corresponding change in electrical output. Lag in camera tubes tends to produce blurred images of objects that move rapidly across the field of view. Keeping lag to an acceptable level is one of the difficulties in the design of photoconductive targets. 2. The temporary retaining of the electrically charged image of a TV camera tube. See also *Image retention*. 3. Time constant of many phosphors and targets in TV sufficient to cause smear and persistence on a moving object. 4. In photoconductive tubes, the rate of decay of the video signal when illumination is changed abruptly or cut off. See also *Photoconductive lag*.

**lambert (L)** A CGS unit of luminance or brightness, defined as brightness of a perfectly diffusing surface, when the total flux radiated is 1 lumen per square cm. The SI unit of luminance, the candela per square meter, is preferred.

**LAN** Local Area Network.

**lands** In optical recording, refers to the areas of the data tracks which are between the pits. These are typically the areas not touched by the recording laser beam during mastering.

**lap dissolve** A film and video transition and special effect in which one scene is faded out while the next scene is faded in, both occurring simultaneously.

**lapel mike** A small microphone clipped to a lapel, necktie, shirt, or elsewhere, or worn hanging around the neck; also called *lavaliere*, *lavaliere microphone*.

**large-area flicker** See *Flicker*.

**large screen TV** Images bigger than those that can be formed on a directly viewed CRT. See also *Projection television*.

**laser** Light Amplification by Stimulated Emission of Radiation. A device for light amplification which re-

lies for its action on the radiation emitted by certain atoms when transitions occur between discrete energy levels. In practice, positive feedback is usually applied to the amplifiers (by use of mirrors at the input and the output) to make them oscillate. They then become generators of coherent light in the form of a narrow and sharply defined beam of good spectral purity and frequency stability. The four basic types of laser are gas, liquid, semiconductor, and solid. Laser technology has been successfully applied to such video equipment as VDPs and projection systems. Lasers are also used in CATV in combination with fiber optics technology.

**laser-based projection system** An experimental projection TV system that features a low dispersion of the beam so that focus is not greatly affected by the angle of the screen. First demonstrated in 1988 at a National Association of Broadcasters convention, the laser-based system, despite some interesting advantages over conventional systems, has suffered several setbacks—chiefly financial.

**laser beam** That part of an optical disc player or system that carries the video signal without making physical contact with the disc. Using only a beam of light, the laser beam stores more video information on the disc than can be packed onto videotape. This results in a clear, more detailed screen image. Since the laser beam head or arm never touches the laserdisc, the disc is virtually free from deterioration. In addition, the sound from VDP equals that produced by a CD system.

**laser communication** Optical communication based on a laser beam that is modulated for voice, video, or data communication over information bandwidths up to 1 GHz.

**laserdisc** In video, prerecorded software that resembles a long-playing record and is used in conjunction with a videodisc player. Unlike videocassettes that can both record and play back, laserdiscs can only play back prerecorded programs. Laserdiscs are read by a laser beam that never makes physical contact with the disc, thereby preserving the disc from wear and tear almost indefinitely. CAV laserdiscs, which offer special effects, have a maximum playing time of 30 minutes while CLV discs contain 60 minutes of pro-



gramming. LV discs come in two sizes, 8 and 12 inches, both using analog video and analog/digital audio.

**laserdisc player** See *CLV, Double-side videodisc player, Laserdisc, LV videodisc system, Videodisc player.*

**laser-lock** With an LV videodisc player, a malfunction in which the laser arbitrarily locks into a single frame. This may sometimes be caused by fingerprints on the disc.

**laser optical media** Any hard plastic disc of information that has been recorded and can be read by a laser light beam. Discs include a variety of types: the 3- and 5-inch CD, CD-I, 5-inch CD-ROM, 5-inch CD-V, DVD, 5-inch CD-Write Once, 5-inch DVI and 8- and 12-inch LV (laser videodisc).

**laser projector** Source of a laser beam. Used in 3D TV camera systems; it emits a very narrow beam of light or other radiant energy along a path in accordance with information received from a raster scan generator.

**laser TV image** A TV image displayed by laser beam. The system, developed by Schneider Rundfunkwerke AG (Germany), uses a giant rear-screen projector containing a laser. The laser beam is deflected by a scanner that separates picture information into R, G, B constituents, with no need for a CRT. Due to the highly focused laser light, the resulting picture is bright and comparable to images viewed on conventional TVs, yet the screen requires no depth, just surface.

**Laser VideoDisc (LV)** An optical videodisc, made by Philips of Holland.

**LaserVision (LV)** Electronic optical machine introduced in 1978 and containing a low-power laser that reflects off the surface of the videodisc and creates electronic signals that can be seen on a TV screen. See also *CAV, CLV.*

**last channel function** Last memory function.

**last memory function** A feature, sometimes found on videodisc or CD video players, that resumes playing a disc at the same point at which the machine was shut off. This function is sometimes listed as last channel memory.

**last telecast (LTC)** A term used at a TV station to indicate the last program of the broadcast day.

**latency** The factor of data access time due to disk rotation. The faster a disk spins the quicker it will be at the position where the required data can begin to be read. As disk diameters have decreased, rotational speeds have tended to increase, but there is still much variation. Modern 3-1/2-inch drives typically have spindle speeds of between 3,600 and 7,200 revolutions per minute, so one revolution is completed in 16 or 8 milliseconds (ms) respectively. This is represented in the disk specification as average latency of 8 or 4 ms.

**latent image** A stored image, as in the form of charges on a mosaic of small capacitances. In video, an im-

age stored in the charged capacitance in an iconoscope. In photography, the latent image remains on the exposed film, invisible to the naked eye, until it is processed or developed.

**laugh track** The audio component of a TV situation comedy or other program on which audience laughter is inserted, from tape cassettes with various types of actual or artificial laughter.

**lav** Lavaliere microphone.

**lavaliere microphone (LAV)** A miniature condenser-type microphone which is designed to pin or clip on the clothing of the subject being interviewed and videotaped. The lavaliere microphone is omnidirectional. This unobstructed mic is inexpensive, provides good fidelity and rejects echoes and other incidental surrounding noises. It is very popular for talk shows and interviews and is named after Madame de La Valliere, a onetime mistress of Louis XIV, who always wore a jewel suspended on a chain above her bosom. Also called lapel mike.

**Lawrence tube** Color display tube, named after the American physicist who first suggested the principle of operation; also known as chromatron, focus-mask and post-deflection focus tubes. It is an attempt to reduce the complexity of color TV receivers, by removing the need for static and dynamic convergence.

**layered embedded encoding** The process of compressing data in layers so successive layers provide more information and thus higher quality reconstruction of the original. That is, a single stream of data can supply a range of compression and, thus, in the case of video, a scalable range of video resolution and picture quality. This is particularly useful for a multicast where a single stream is sent out and people are connecting over varying bandwidths. The low bandwidth connection can take just the lower layers while the high-bandwidth connection can take all of the layers for the highest quality.

**layering** In music or sound production, the technique of combining many sound generators to create a richer sound.

**LCD** Liquid Crystal Display. An alphanumeric display using liquid crystal sealed between two pieces of glass. The display is divided into hundreds or thousands of individual dots, which are charged or not charged, reflecting or not reflecting external light to form characters, letters and numbers. LCD displays have certain advantages. They use little electricity and react reasonably quickly, though not nearly as quickly as a glass CRT. They are reasonably legible. They require external light to reflect their information to the user. The so-called "supertwist" LCDs are more readable. In active matrix displays, the circuit board contains individual transistors for each pixel, or dot on the screen: the crystals can shift quickly, resulting in a higher quality image and ability to display full-motion video.

## LCD counter

**LCD counter** In video, a feature employing liquid crystal display for digital readouts on more recent VCR timers. LCD provides dark digits against a light background, in contrast to LED, which features red or green digits against a dark background.

**LCD digital scanner programming system** A device of some VCRs for simple and accurate timer recording. The basic elements of the system are LCD digital scanner and programming sheet. LCD digital scanner programming procedure:

1. Trace the digital scanner across the bar codes.
2. Confirm the scanned programming information on the built-in LCD.
3. Transmit the programming information.
4. Double-check programming information on the multi-function display.

**LCD panel** A VCR remote control panel using an LCD to program in recording information, which is then transmitted to the VCR. Normally, with recent VCR models, such information as program number, day of week, start time, stop time, channel and recording speed has to be programmed on screen using the TV set. Remote controls with LCD displays bypass this step; programming can be done away from the TV set without the set having to be turned on, and the data sent to the recorder by way of a transmit button on the remote panel.

**LCD projection TV** A large-screen TV system that uses liquid display panels from 1 to 3" thick. The LCD projection TV is much lighter than conventional CRT-based projection systems—thus more portable. In addition, it offers screen sizes from 35 to 120" with about 350 lines of horizontal resolution. The light source of the LCD projector is projected through a matrix of tiny, semiconductor shutters, whose positions determine the light value of that pixel. Some advanced models feature a single beam unit, a relatively light 30-pound projector, exceptionally bright picture quality and improved definition. LCD video projectors usually do not provide any audio circuitry or tuner; these components must be supplied by the user.

**LCD status panel** A video camera feature that is designed to inform the user about the position of various camera operations. The LCD status panel is usually built into the camera body.

**LCD television** The use of LCD panels instead of conventional image tubes in TV sets. LCD TV, although not presently available in all its varieties, promises certain advantages over the ordinary CRT in every TV set—it is lighter, thinner and uses less power. However, LCDs need their own light source. LCDs, essential for the much-touted flat-panel wall TV, are also currently employed in front and rear projection TV systems. The first LCD TV appeared early in 1981 in an experimental model by Toshiba and featured a 2" black and white image. See *LCD projection TV*.

**LDS** Local distribution service station, a fixed cable tele-

vision relay service (CARS) station used within a cable television system or systems for the transmission of television signals and related audio signals, signals of standard and FM broadcast station, signals of instructional television fixed stations, and cablecasting from a local transmission point to one or more receiving points, from which the communications are distributed to the public.

**LDTV** Low Definition TV (e.g., VHS).

**lead-acid battery** A less expensive battery than the nickel cadmium type. The lead-acid battery has to charge overnight whereas the NiCad can be charged in less than 2 hours. Found in portable video systems.

**leader** 1. The blank segment found at the beginning of a videotape. A leader is used to feed the magnetic tape through the tape mechanism and secure it onto the roll. 2. A short piece of film or videotape that is placed on the front of a videotape recording or film used in TV. The practice was originally developed and encouraged by the SMPTE for film and today both film and videotape leaders are known more formally as society leader or SMPTE leader. The film leader consists of some 30 s of film that contains 15 or 20 s of black blank film (for threading the projector) and 10 s of timing numerals. In addition to the timing function, an SMPTE leader on a videotape provides electronic test signals to allow technicians to adjust the settings on the VTR before a full playback or dubbing operation. It is 45 s in length.

**lead-in** Refers to the antenna cable that is connected to the TV receiver. Also called down-lead.

**leading ghost** A ghost displaced to the left of the image on a TV receiver screen.

**leading/lagging chrominance effect** A technical aberration in a TV picture. This effect occurs when the chrominance portion of the video signal leads or lags behind the luminance signal. The result is an undesired effect in which the colors appear to the left (leading) or to the right (lagging) of the image.

**lead-in insulator** A tubular insulator inserted into a hole drilled through a wall, through which the lead-in wire can be brought into a building.

**leakage current test, VCR** A test to determine if any part of the AC line has come in contact with metal cabinet or base. It is a safety check to prevent a potential shock hazard. A volt-ohmmeter is needed to perform the test. With the VCR unplugged, short the two flat prongs on the end of the AC cord with a jumper wire. Connect one test lead from the meter to the jumper on the AC cord. Connect the other test lead to any and all bare (not painted) metal parts of the deck. For a typical VCR, the meter should read about 50 kohm to 100 kohm—if you get any reading at all. Not all exposed metal parts of the VCR will return a high value. Touching the center conductor of one of the audio output connectors

could yield a very low resistance, say from 1 kohm to 50 kohm.

**leapfrogging** The technique of bringing in distant signals on a CATV system.

**leddicon** A camera tube with a photoconductive target of lead oxide.

**legend** Titles or information keyed, or superimposed, on a TV picture.

**leko** See *Lekolite*.

**lekolite** An ellipsoidal spotlight with individual push-shutters for focusing the light, used in TV to create background effects and also used in film and theater. Commonly called leko, it is made by Strand Lighting, Compton, California.

**lens** 1. (a) A piece of glass, or other transparent substance, with two curved surfaces, or one plane and one curved, regularly bringing together or spreading rays of light passing through it: a lens or combination of lenses is used in optical instruments to form an image. (b) A combination of two or more such pieces. 2. Any of various devices used to focus microwaves, electrons, or sound waves. 3. An arrangement of CRT-electrodes that produces an electric field that focuses electrons into a beam. 4. A series of optical elements, contained within a video camera, which collect and focus light. Several lenses may be attached to a lens turret, or revolving mount. There are two major types of lenses found on video cameras: the fixed focal length and the zoom. The latter is the more popular and more expensive. It has variable focal lengths. For example, it can be used as a wide angle, normal or telephoto lens with a simple adjustment or can zoom in or out during the recording of a subject or scene. The zoom lens often has a macro feature, which allows the lens to focus on objects as close as an inch or two from the lens barrel. Another feature of a lens is its maximum opening or aperture. The larger the opening, the more light it admits; also, the more expensive the lens. Lens openings are calibrated in f-stops, such as  $f/11$ ,  $f/16$ , etc. Earlier camera models had a fixed or stationary lens. Many of today's cameras have lenses that are interchangeable through the use of a standard C-mount. However, the zoom lens has eliminated the need for changing lenses, at least for most home video users. Sometimes "lenses" may consist of simply an open optical aperture, e.g. in some 3D TV camera systems, using laser projectors and laser sensors. 5. Anat. A transparent, biconvex body situated between the iris and the vitreous humor of the eye: it focuses upon the retina light rays entering the pupil.

**lens clearing brush** A very fine brush specially made for cleaning a lens.

**lens line** A teleprompting system that shows one line at a time at the center of the TV camera lens, visible to the performance but not televised.

**lens mount** The assembly on the front of the camera

to which the lens is attached. See also *C-mount*, *Universal lens mount*.

**lens paper** A paper specially made for cleaning lenses.

**lens speed** Parameter defining the ability of a particular lens to collect light and work at different light levels; usually expressed by its lowest f-stop number.

**lens stabilization** A unique video camera feature that produces a relatively stable picture by physically adjusting the lens assembly to compensate for camera movement. This is accomplished by the use of sensing devices that scan horizontal and vertical movement. A tiny computer receives these signals and sends them to two miniaturized motors that control the horizontal and vertical motion of the lens, thereby correcting much of the camera movement. Not all cameras offer this feature that provides a steadier image than that usually produced by the conventional video camera. Also known as auto image stabilization.

**lens turret** Sometimes called rack. See *Lens*.

**lenticular lens** See *Fresnel lens*.

**lenticular system** One of the 3D-image display systems which doesn't need to use special glasses.

**letter box** See *MIT-CC system*.

**letterboxing** Refers to the wide aspect ratio or dimensions of theatrical films and their presentation on conventional TV screens. Some telecasts, determined not to cut parts of the original film, present the entire wide-screen view, resulting in black borders on the top and bottom of the TV screen. Sometimes TV stations add a decorative bezel to these unattractive black borders. The term stems from the shape of the slot in mailboxes.

**level** 1. In video, a specified position on an amplitude scale applied to a signal waveform, such as reference white level and reference black level in a standard TV signal. 2. The strength of the audio signal, usually designated in dB. MIC level designates a low-impedance line on VCR, suited for a mike input. LINE level, AUX, and AUDIO IN designate a high-impedance line suited for audio mixers, tape recorders, or other VCRs.

**level-dependent gain** Variation of gain of an amp with variation of input signal level.

**level-dependent phase** Variation of phase shift through an amp with variation of input signal level.

**lhc** Left-hand circular (polarization).

**lift** 1. In a TV, a pedestal of adjustable height. 2. Control associated with each picture-generated apparatus such as a camera, telecine machine, etc., whereby the operator can lift the picture signal bodily up or down in potential with respect to blanking level and so set the darker tones of the picture for optimum contrast in relation to black. This is achieved by altering the DC level of that portion of the generated video waveform containing the picture signal without affecting the blanking level, and is most conve-

## light

niently carried out by modifying the DC conditions associated with the blanking pulse insertion circuit. Because the lift control operates equally on all signal levels comprising the picture information, any adjustment of this control usually needs to be accompanied by an adjustment of picture amplitude to establish the highlights of the picture in relation to peak white level. 3. The process of increasing the number of subscribers at a CATV system. 4. A portion of a radio or TV commercial for use as a shorter, separate commercial. For example, to save on production costs, a 30-second commercial can be produced with a 10-second lift within it, for use as a separate 10-second identification.

**light** Technically, light is electromagnetic radiation visible to the human eye. The term is also applied to electromagnetic radiation with properties similar to visible light, including the invisible near-infrared "light" (or more technically correct, radiation) that carries signals in most fiber optic communication systems. Light consists of electromagnetic waves ordinarily applied to those having a wave length of from .000075 cm (the red ray) to .000038 cm (the violet ray).

**light application bar** During its TV transmission, a film frame may be illuminated for only a part of each field scanning interval; whether or not this matters depends on the amount of storage, or memory, in the telecine pick-up tube. The ratio of illuminated to unilluminated time is called the light application ratio or time, and is often expressed in angular degrees, 360 degrees representing lit frame. If the film projection rate is not synchronized to the TV picture frequency, and if there is insufficient storage in the telecine, it is possible for a horizontal black bar to float up or down the TV picture. This light application bar is caused by the film frame not being illuminated during part of the active TV field scanning intervals.

**light application time** Time during which light is allowed to fall on a frame of film in a vidicon type of film scanner.

**light biasing** A technique employed in some video cameras using a saticon tube to compensate for image retention. The saticon, claiming improved picture resolution over the vidicon tube, tends to suffer from lag when the camera pans. Light biasing attempts to correct this by directing a light at the back of the sensitive faceplate.

**Lightgate® Service** A BellSouth optical fiber-based private line service that allows high-volume customers integrated voice, data and video transmission. Lightgate Service is the equivalent of 672 voice or data, private line or dial up circuits.

**lighting** In video, any available, natural or artificial illumination. Standard indoor lighting includes a base light, a key light, a fill light, a back light and an eye light. The base light, usually located over the sub-

ject, provides general illumination to the scene area, assuring that the scene is bright enough not to cause any video noise. The key light is the brightest and is aimed at the subject. It may be a spotlight or a floodlight. It accentuates the subject, casting a definite shadow. It is usually positioned 45 degrees from the camera and higher than the subject. The fill light, often the same as the base light, is soft and lights up the dark areas of the scene. It is not as bright as the key light. The back light, usually a rear spotlight, provides definition when aimed at the subject. It separates the subject from the background. The eye light is a tiny spotlight which, when aimed at the subject's eyes, causes highlights in them, making them appear more lifelike.

**lighting arrester (LA)** A commercial protective device designed to reduce the danger of damage to TV and related units caused by lightning. The accessory provides a bypass directly to the ground for lightning discharges that reach the antenna. LAs are usually installed in conjunction with outdoor antennas mounted on the roofs of homes.

**lighting plot** A diagram showing the position of all lighting instruments in the TV production.

**lighting ratio** The brightness level of the fill-light compared to the brightness level of the key-light, or the shadowy areas compared to the brightly lit areas; measured as a ratio determined by the f-stop of the lens; a 1:2 ratio means that key is 1 f-stop brighter than fill; 1:3, a stop and a half; and 1:4, 2 stops.

**lighting supervisor** Controls and adjusts the lighting in a TV studio. He/she assists the designers in drawing up the lighting plan for a production (i.e., a plan showing the type and position of the lamps) and oversees their setting by the studio electricians. He sets the brightness to an approximately correct value using a lightmeter and his monitor. The final adjustments of brightness are done during rehearsal.

**light level meter** An indicator on some video cameras that indicates whether the subject has too little or too much light.

**lightness of the color** See *Variables of perceived color*.

**light spot scanner** Flying spot scanner.

**light-transfer characteristics** Relationship between light input and voltage output.

**light valve projection system** A projection TV system that operates by scanning a beam of electrons across reflectors or mirrors coated with an oil film. The electrons distort the surface of the oil, thereby altering how the light reacts when it reflects off the mirrors. The result of this action determines whether the light reaches the screen directly or is transmitted through a diffraction grating.

**limited-play videocassette** A type of videocassette that can be rented and watched for a limited number of times before automatically erasing itself. It has a built-in counter that notes how many times it has been viewed and an internal magnet that erases

the tape after 25 screenings. The consumer must pay for each viewing in a PPV type of strategy for home video. When the tape is returned, the counter shows if the tape has been played more than once, and thus if any further charge is due.

**limiter** Clipper, peak limiter. A circuit that limits the amplitude of its output signal to some predetermined threshold level. It can act on positive or negative swings or on both.

**limiting resolution** In video, the measurement of the resolution as determined by the maximum number of lines per picture height as registered on a test chart. The limiting resolution of a TV picture is one of its fundamental properties.

**line** 1. The path covered by the electron beam of a TV picture tube in one sweep from left to right across the screen. 2. Transmission line. 3. Trace. 4. See *Time base error*. 5. In film and TV, the area on a set within which action occurs; also called action line, imaginary line, or axis of action. The camera generally is supposed to focus on the action and not cross the line. To down the line is to transmit a radio or TV program to a station for internal use prior to broadcast.

**line amplifier** In CATV, refers to amps inserted in the cable at intervals to compensate for its attenuation. Their specifications are a key element in determining the performance of the system. Each amp includes an equalizer that compensates for the increase in cable attenuation with frequency.

**linear actuator** A TVRO antenna positioner. It consists of a motor, a set of reduction gears and a sliding jack driven by either a reciprocating ball or an acme screw. The motor is generally mounted onto the polar mount and one end of the jackscrew is secured to the dish. The jackscrew can be mounted on either side of the antenna. This is determined by the geographic location of the satellite system. When most satellites are in the western portion of the sky, the jack is attached to the right rear of the antenna as viewed from behind and vice versa.

**linear audio** A method of placing the sound track on videotape. Linear audio may be mono or stereo. Another method of recording sound on videotape is diagonal recording—placing the audio track along with the diagonal video track for better quality. See *Linear stereo*.

**linear editing** Refers to a restrictive process of editing tape by recording predetermined scenes in sequence on another tape. This meant that after the second tape was completed, any additional editing required a third tape, and another generation loss of detail. This method has been replaced by nonlinear editing, in which information about different sequences is stored in memory until the final tape is made. If additional changes are required, another tape can be produced without any generation loss by referring to the stored memory rather than the edited tape.

**linearity** 1. In TV, usually refers to the geometric accuracy of scanning. However, linearity is also sometimes used to refer to the accuracy of gray scale reproduction (linearity of the amplitude transfer characteristic), but it is less confusing to use the word “gamma” for the gray scale characteristic. 2. A testing procedure that measures the ability of a video source to reproduce a series of gray in a uniform (linear) pattern. The more linear the pattern of shades, which range from black to white, the better the source’s ability to reproduce the original picture. 3. Linearity refers to the horizontal and vertical controls that affect the “size” of TV image. For example, the picture is enlarged so that it fills the screen without exhibiting lines above or below the image. 4. In A/D (Analog to Digital) or D/A (Digital to Analog), linearity measures the precision with which the digital output/input tracks the analog input/output. Linearity is typically measured by making the ADC or DAC attempt to generate a linearly increasing signal. The actual output is compared to the ideal the output. The difference is a measure of the linearity. The smaller the number, the better. Linearity is typically specified as a range or percentage of LSBs (Least Significant Bits).

**linearity chart** See *Video test chart*.

**linearity control** A TV receiver control that varies the amount of correction applied to the sawtooth scanning wave to provide the desired linear scanning of lines; lines appear straight, and round objects appear as true circles. Separate linearity controls, known as the horizontal linearity and the vertical linearity controls, are usually provided for the horizontal and vertical sweep oscillators. It is also called distribution control.

**linear matrix transformation** The process of transformation of a group of  $n$  signals by combining the signals through addition or subtraction. It can be used, for example, to convert RGB into YUV. See also *Luminance/chrominance principle*.

**linear play** Playback of a recorded sequence from start to finish without interactivity.

**linear program** Program material on tape or disc that the viewer plays through from beginning to end. Linear programming, such as films, plays, etc., is usually contrasted with interactive TV or interactive videodisc in which segments of a program are encoded with a signal for easy access.

**linear quantization** Audio sampling format used in digital audio processors. Usually 14 or 16 bits.

**linear recording** Magnetic recording that uses biasing to restrict operation to the linear portion of the demagnetization curve. It is required for recording analog data, sound signals, and video signals.

**linear scan** A sweep of the electron beam in a CRT in which the beam scans the screen with constant velocity, usually by application of a sawtooth waveform to the deflection plates or coils.

## linear stereo

**linear stereo** The use of conventional, low-quality mono audio tracks, located near the edge of the tape, for the stereo audio signal. Linear stereo splits the audio track into two, separating the pair with a narrow guard band. In contrast to linear stereo, or linear track stereo as it is sometimes called, the superior Beta or VHS Hi-Fi technique records the audio signal along with the diagonal video signal tracks for better sound reproduction.

**linear time-base oscillator** A relaxation oscillator that is used to generate a sawtooth waveform for use as a time base.

**linear time counter** A device to calculate tape run time in VTRs. Since the counter works by detecting a control signal, accurate time display is maintained even through FF or REW operations. See *Real-time counter*.

**linear time readout (LTR)** Real-time counter.

**line-balanced converter** Balun.

**linebeat** See *Meshbeat*.

**line blanking** Refers to the period of time that the scanning dot or spot takes to return from the end of one line scan to the beginning of the next. The dot moves from left to right as it scans each of 525 lines, which form the NTSC standard. As it moves from right to left, the video camera emits no signal. This line blanking, or horizontal blanking as it is often called (since the scanning dot moves in a horizontal direction), permits only the left-to-right scanned information to be traced for a clear video image. The line-blanking period in the NTSC 525-line system is 10.8  $\mu$ s, and in the PAL 625-line system 12  $\mu$ s.

**line count** The number of active scanning lines actually used to carry the video picture signal; always less than total number of lines.

**line datum** A reference time moment at the mid-level crossing point of the leading edge of the line sync pulse. This is the default timing reference in the TV environment (as opposed to the active line start which is commonly used in computing environments). Syn.: 0 h; line start [moment]; time datum.

**line dicing** A scrambling technique, whereby lines are broken into pieces and sent to TV sets in random sequence.

**line diffuser** An oscillator within a TV monitor or receiver that produces small vertical oscillations of the spot on the screen to make the line structure of the image less noticeable at short viewing distances.

**line doubling** An image enhancement technique, used in video recording and applied to broadcasting, that improves picture quality. When projected, the image almost equals that of 35mm film projection. Developed by French engineer Yves Faroudja, who calls this technique Super-NTSC, the line doubling system was intended to be a strong competitor of HDTV. The former does not make present TV receive

ers obsolete, whereas the latter does. The line doubling process, which doubles the number of active line scans on the screen, results in an image of higher density and greater stability.

**line drive pulse** The signal generated to control the horizontal blanking circuits.

**line filter** In video, an electronic component, containing one or more inductors and capacitors, that is placed between a transmitter or receiver and the power line to prevent noise signals and other interferences.

**line flyback** Horizontal flyback.

**line frequency** In TV, the number of horizontal sweeps made by the scanning beam in 1 s. It is equal to the product of the number of lines per picture and the picture frequency. In a twin-interlaced system such as used by most TV services the picture frequency is one half the field frequency. For example, in the PAL 625-line system there are 50 fields per second and thus the line frequency is  $625 \times 50/2 = 15.625$  kHz; in the NTSC 525-line system there are 59.94 fields per second and thus the line frequency is  $525 \times 59.94/2 = 15.734$  kHz.

**line-frequency blanking pulse** Horizontal blanking pulse.

**line input terminals** The audio/video input and output jacks, usually found on the rear of VCRs, that are used for copying and editing. The direct line input terminals are preferred for these operations over the antenna connections, which may produce grain and color changes to the copied or edited videotape.

**line interlace** Interlaced scanning.

**line level impedance** A low impedance signal of 600 ohms. Line matching transformers are used for matching the impedances of various components, such as a microphone to the input of a mixer.

**line-locked clock** A design that ensures that there is always a constant number of video samples per scan line, even if the timing of the line changes.

**line microphone** A directional mic with an acoustical transmission line in front of the transducer, often with a pole at least 2 feet long. Commonly used in film and TV studios, it sometimes is called a shotgun microphone.

**line pairs** A measure of resolution often used in film and print media. In TV, lines are used instead, creating confusion when comparing film and video.

**line scan** The rapid movement of the electron beam across the TV screen of the CRT. Different TV broadcasting systems have different numbers of line scans per picture frame. The NTSC (American) standard requires one frame of 525 lines (actually two fields of 262.5 lines each). These line scans are not to be confused with the lines of horizontal resolution.

**line-scan pickup device** A type of solid-state video pickup device which electronically scans only in one direction. Scanning in the other direction is accom-



plished mechanically by relative motion between the pickup device and the image.

**line-sequential color television** A color TV system in which each of the video signals (R,G, and B) is transmitted in turn for the duration of one entire scanning line. Used in SSTV.

**line shuffling** 1. A TV scrambling technique in which individual lines are sent in random order. 2. See *Bandwidth reduction (EUREKA-95 HDMAC system)*.

**line start [moment]** A reference time moment at the mid-level crossing point of the leading edge of the line sync pulse. This is the default timing reference in the TV environment (as opposed to the active line start which is commonly used in computing environments). Syn.: 0 h; line datum; time datum.

**line store** A memory buffer used to hold one line of video. If the horizontal resolution of the screen is 640 pixels and RGB is used as the color space, the line store would have to be 640 locations long by 3 bytes wide. This amounts to one location for each pixel and each color plane. Line stores are typically used in filtering algorithms. For example, a comb filter is made up of two or more line stores. The DCT used in the JPEG and MPEG compression algorithms could use eight line stores since processing is done on blocks of 8x8 pixels.

**line sync signal** In TV, the signal transmitted at the end of each scanning line to initiate horizontal flyback of the scanning beam in receivers, so keeping the scanning at the receiver in step with that at the transmitter. In most TV systems the signal consists of a single pulse from blanking level to sync level, the leading edge of which locks the receiver line time base. Also called horizontal synchronizing pulse.

**line tilt** A TV picture distortion. Comparable with field tilt, line tilt is a gradual increase or decrease in the DC component over the course of the line waveform, owing to AC coupling or the addition of hum or other spurious low-frequency signals. Usually the amplitude is less than that caused by frame tilt, as there is less time for the line waveform to take up the new potential. The effect can be reduced by passing the signal through a keyed, or line-by-line clamping circuit, thus restoring the beginning of each line to the same potential with respect to earth. The visual effect is that of a gradual increase or decrease in brightness from left to right of the viewed TV image.

**line time base** 1. The circuits responsible for generating the signals causing horizontal deflection of the scanning beam. In modern TV receivers the line output stage generates, in addition to the line scanning current, a direct voltage to boost the supply to the output stage, the heater supply for the picture tube, the EHT supply for the picture tube and possibly a low-voltage supply for early stages in the receiver. 2. The control of the horizontal deflection of

the scanning spot so that it starts to scan each new line at exactly the right moment.

**lining** In videotex, a display of alphanumeric characters with an underline that is considered to be part of the shape of the characters. Mosaic characters and line drawing characters are displayed in separated fonts.

**lip sync** Lip synchronization.

**lip synchronization** A technique used in TV and film production, that matches the voices of performers speaking or singing with their lip movements. Also called lip sync. See also *Mime*.

**liquid crystal** An organic compound that has a liquid phase and a molecular structure similar to that of a solid crystal. The liquid is normally transparent, but it becomes translucent (almost opaque) in localized areas in which the alignment of the molecules is distributed by applying an electric field with shaped electrodes. Liquid crystals have three phases: nematic, smectic, and cholesteric; the nematic phase, in which the elongated molecules are lined up in one direction but are not in layers, is most commonly used in LCDs.

**liquid crystal display** See *LCD*.

**live** 1. Broadcast directly at the time of production, instead of from recorded or filmed program material. 2. Syn.: alive. See *Dead*.

**live camera** See *Camera categories*.

**live chassis** A radio, TV, or other chassis that has a direct chassis connection to one side of the AC line. For safety, a live chassis must be completely enclosed by an insulating cabinet.

**live-streaming** Streaming media that is broadcast real-time to many people at a set time.

**LL** CATV hyperband channel, 366-372 MHz. See *TV channel assignments*.

**LNA** Low Noise Amplifier. In satellite TV, a device that receives and amplifies the weak satellite signal reflected by an antenna via a feedhorn. C-band LNAs typically have their noise characteristics quoted as noise temperatures rated in degrees Kelvin. K-band LNA noise characteristics are usually expressed as a noise figure in dB.

**LNB** Low Noise Block downconverter. In satellite TV, a low noise microwave amp and converter which downconverts a block or range of frequencies at once to an IF range, typically 950 to 1450 MHz or 950 to 1750 MHz.

**LNC** Low Noise Converter. In satellite TV, an LNA and a conventional downconverter housed in one weatherproof box. This device converts one channel at a time. Channel selection is controlled by the satellite receiver. The typical IF for LNCs is 70 MHz.

**LO** 1. Local Oscillator. 2. Local Origination.

**load** 1. To place a reel, disc, cartridge, or some other type of recording media into a machine that extracts the stored data or the audio or video content. 2. To place a termination across a video or audio line.

## local area data transport

**local area data transport (LADT)** An electronic network for data delivery among videotex systems.

**local area network (LAN)** A network designed to provide facilities for inter-user communication within a single geographical location. Contrasted with wide area network (WAN).

**local color** The normal or true color of an object, in ordinary daylight.

**local origination (LO)** One of the main attractions of CATV systems is locally originated programming. These channels can only be obtained by cable subscribers and not from any system satellite or otherwise. Earlier cable systems usually designated one channel containing programming from a cable operator's own studio facility. That was simply known as local origination and programs consisted of local interest subjects. Later cable operators added alphanumeric channels containing printed messages of community interest and/or classified ads.

**local oscillator (LO)** The oscillator in a superheterodyne receiver; its output is mixed with the incoming modulated RF carrier signal in the mixer to give the lower frequency needed to produce the IF signal.

**local pickup** A condition in a TV receiver or a VCR in which the internal tuner substitutes as an antenna, producing ghosts on the TV screen. Good shielding of the tuner minimizes local pickup. VCRs are usually free from this anomaly.

**location** An actual setting, as distinct from a studio, used for a film or TV show. The location manager is the person who finds sites for shooting outside the studio, with the assistance of location scouts, and who then makes arrangements for the use of these sites.

**location manager** A member of a film or TV production staff in charge of the logistics of a shooting outside the studio. The location manager sometimes also serves as a location scout.

**location scout** In film and TV, a member of the production staff who finds off-studio sites and arranges for accommodations, permits, and other arrangements prior to the shooting.

**lockbox** A device that allows cable subscribers to block out reception of a particular channel at any given time. It is installed at the back of a TV set and contains a trap that can be activated by a key. Such a box protects those who do not want to receive what they consider to be objectionable, obscene, or indecent programming.

**locked** When a phase lock loop (PLL) is accurately producing horizontal syncs that are precisely lined up with the horizontal syncs of the incoming video source, the PLL is said to be "locked." When a PLL is locked, the PLL is stable and there is minimum jitter in the generated sample clock.

**locked-oscillator quadrature-grid FM detector** An FM detector that functions as a directly driven

quadrature-grid detector for strong signals and as a locked-oscillator detector for relatively weak signals. Some TV sets include it.

**locking** The process by which an oscillator can be synchronized at the frequency of a signal applied to it.

**locking up** The brief period when a videocassette wobbles as it starts to play, before it is stabilized and runs smoothly.

**lockup** The more precise we can make the VTR's playback speed, the less time base error will be created. When the machine gets up to full speed and everything is as stable as it is going to get, we say the machine is "locked up." There are several degrees of lockup (capstan lock, vertical lock or capstan servo, frame lock, horizontal lock) and each additional step adds a little more stability.

**log** A written record of radio and TV station operating data, required by law.

**logarithmic amplifier** Used in 3D TV systems to form the depth video signal.

**logging** The initial stage in video editing in which all raw footage is listed by time code location, shot duration, and the quality of the scene.

**long form** A TV station with a format of mostly movies and other long programs.

**Longitudinal Videotape Recording (LVR)** A pioneer reel-to-reel videotape format; Bing Crosby Enterprises, 1951. It operated on the principle of recording electrical signals on narrow magnetic tape, which moved rapidly over stationary recording heads. The tape had to move 100 ips over the heads, however, and the resulting black and white image had poor resolution and produced jitter. The LVR-type of recording/playback was bypassed for professional use by the quadruplex (quad) videotape recording system in 1956.

**Longitudinal Time Code (LTC)** SMPTE/ANSI time code format that is recorded into an audio track or separate track (such as the cue or address track) on a videotape. Time codes are digital addresses that distinguish each frame, thus permitting access to it. LTCs are written longitudinally, as opposed to video information and some audio information, which are recorded diagonally. See *SMPTE/ANSI frame coding*.

**longitudinal video recording** See *LVR video recording system*.

**long lens** A high focal length lens with a long barrel; performs function similar to the telephoto lens without the advantage of that lens' shorter barrel.

**long shot** A camera angle of view taken at a distance and including a great deal of the scene area.

**long take** A film or TV camera shot maintained for an extended period.

**look-up table (LUT)** Same as color table.

**loop** A closed path or circuit over which a signal can circulate, as in a feedback control system. See *PLL*. See also *Processor loop*.

**loop filter** A filter used in a PLL design to smooth out

tiny bumps in the output of the phase comparator that might drive the loop out of lock. The loop filter helps to determine how well the loop locks, how long it takes to lock and how easy it is to knock the loop out of lock.

**loop-through connection, satellite TV** A connection to enable a satellite receiver to accept a video source other than the output of its own demodulator. The alternative video source is then routed to the satellite TV receiver's demodulator. It is also possible to route the audio in this fashion. The source selection is determined by pin 8 on the SCART connector. The voltage on this connector is high, 12 Vdc, when the descrambler is in operation. When it is low, the receiver selects internal video. For Sakura receiver, the reverse of the normal situation applies. For decoder video to be selected, pin 8 must be low. Many of the recent descramblers have provisions for such receivers. In cases where there is no provision for such reverse switching, a separate lead must be connected.

**loop-through jack** A feature found in TV monitors that permits several monitors and VCRs to be hooked up to the same signal source. A panel switch on the rear of the monitor selects either high input impedance or 75-ohm impedance. The first is used when the set transmits its signal to other units while the 75-ohm setting is used when the monitor is the final set in the series. Some more expensive industrial-model character generators offer this feature.

**lo-pass filter** Low-pass filter.

**lossless** A term used with image compression. Lossless image compression means the decompressed image is exactly the same as the original image.

**lossy** A method of image compression, such as JPEG, in which some image information is lost each time the file is compressed.

**louma** A crane, with a camera mounted on it, that can be controlled from a distance (with a TV camera and a monitor to enable the camera operator to see what the mounted camera is filming); also called Loume crane. The device was developed in France in the 1970s by Jean-Marie Lavalou and Alain Masseron; the name comes from syllables in their last names, lou and ma.

**low-angle shot** A shot in which the camera points upward toward the subject.

**low band** The band that includes TV channels 2 to 6, extending from 54 to 88 MHz.

**low-band tape** Videotape with inferior resolution to that of high-band tape.

**low-electron-velocity camera tube** Syn.: cathode-voltage-stabilized camera tube. See *Camera tube*; *Image orthicon*; *Vidicon*.

**Lowell light** A small, lightweight, portable lighting unit made by the Lowell Company.

**lower sideband** See *Carrier wave*.

**lower third** The bottom third of the TV screen, on

which identifications and other captions generally are displayed.

**lower-third ids** Names, titles, and station logos, used on TV news programs and talk shows to identify on-air personalities, their guests, programs, and stations.

**lower-third super** Refers to text superimposed on the lower third of the video screen, the most common place for titles.

**low gamma** See *Gamma*.

**low-level lighting** A scene illuminated with under 50 ft-c of light; often results in a poor signature-to-noise ratio and/or poor contrast ratio in the recorded picture.

**low light lag** A blurring, image-retention effect, which occurs when a vidicon tube is operating in insufficient light.

**low light sensitivity** A video camera feature that helps to produce clear, detailed images. The lux rating affects the low light sensitivity of a camera. The lower the number, the less light that is needed. Advanced video cameras with high-speed shutters require low lux numbers or low light sensitivity to ensure good screen pictures.

**low noise amplifier (LNA)** The component of a satellite TV system that is mounted inside the feeder horn assembly of an antenna and is designed to amplify the signal it receives from the dish before it reaches the satellite receiver. The effectiveness of an LNA is measured by how much gain it gives to the incoming signal and by its noise-temperature rating. Although the antenna itself increases the signal sent to it, the LNA should boost it more by 50 dB of gain. A lower noise-temperature rating means less noise; some amplifiers provide a number of 120 degrees, which is considered good.

**low noise block (downconverter)** A device to amplify and downconvert microwaves from the parabolic antenna to the UHF band (in satellite receivers).

**low-pass filter** 1. A filter that transmits alternating currents below a given cutoff frequency and substantially attenuates all other currents. 2. A device often employed on two-way cable systems to restrict the flow of high frequency information while permitting the passage of low frequency information. Also written as lo-pass filter. See *Filter*.

**low power satellite** Satellite with transponder RF power below about 30 W.

**low power satellite TV** Refers to satellite TV systems which broadcast within the 4-6 GHz C-band. To receive this low power signal, the earth station, or receiving base, requires a large dish (a parabolic or spherical antenna) usually 10 to 15 feet in diameter.

**low power television (LPTV)** A system of broadcasting that permits thousands of local stations to broadcast within a radius of 10 to 20 miles. LPTV is accomplished by limiting VHF stations to 10 W of power output and UHF stations to 1,000 W. These

## lows

channels are subject to fewer regulations than conventional ones and in part serve local communities, minority groups, colleges, etc. Basically a line-of-sight medium (the flatter the terrain, the larger the radius of the low power signal), LPTV was given a boost in March of 1982 when the FCC approved a set of final rules governing the 4,000 anticipated new stations.

**lows** The deeper sound tones, such as bass, or the less assertive colors, such as whitish-gray.

**low-velocity scanning** See *Scanning*.

**low-z** See *Impedance*.

**loyalty index** A measure of the frequency of listenership or viewing of a radio or TV station.

**LP-speed** The middle speed (Long Play) of a three-speed VHS format VCR. With a standard T-120 videocassette, LP records and plays back for four hours. The other two speeds are SP (Standard Play), which records for 2 hours and EP (Extended Play) or SLP (Super Long Play), which provides up to six hours of recording time. Some machines no longer record in the LP mode but do offer it in playback only. These VCRs, usually containing four heads, optimize two for SP speed and the remaining two heads for EP mode.

**LPTV** Low power television.

**L-R signal** See *Multichannel television sound*.

**L+R signal** See *Multichannel television sound*.

**LSB** Least significant bit. The bit that has the least value in a binary number or data byte. In written form, this is typically the right-most bit.

**LTC** Longitudinal Time Code.

**LTR** Linear Time Readout.

**luma** The brightness signal in a video transmission.

**lumen** (lm) Unit of luminous flux. Quantity of light emitted per second in unit solid angle, by a uniform point source of light of 1 candle intensity. Used chiefly in reference to the light output of front projection TV systems. For instance, front projection TVs whose light output measures 300 lm or better are considered excellent. Rear projection TV uses the term "peak brightness level" instead of "light output" and it is measured in footlamberts, the number based on a surface that emits one lm per square foot.

**luminaire** A floodlight fixture, including the lamp, reflector, support, housing, and cable.

**luminance** In an image, refers to the brightness values of all the points in the image. A luminance-only reproduction is a black-and-white representation of the image. Luminance is important in judging projection TV systems, TV receivers, etc.

**luminance carrier** Picture carrier.

**luminance channel** A path intended primarily for the luminance signal in a color TV system.

**luminance/chrominance principle** This principle says that any color signal may be broken into two parts—luminance, which is a monochrome video signal that controls only brightness or (luminance) of the image, and chrominance, which contains only the col-

oring information for the image. However, because a tri-stimulus color system requires three independent signals for complete representation of all colors, the chrominance signal is actually two signals—called color differences. Luminance and chrominance are just one of the many possible combinations of three signals which could be used to transmit color information. They are obtained by a linear matrix transformation of the RGB signals created in the camera. The matrix transformation simply means that each of the luminance and chrominance signals is an additive (sometimes with negative coefficients) combination of the original RGB signals. In a linear transmission system there are an infinity of possible matrix transformations that might be used; the correct inverse transformation must be used when RGB signals are recovered to display on a color monitor.

**luminance delay line in gyrator technique** An IC which substitutes the conventional Y-delay line in older color TV receivers. It consists of gyrator delay cells. Some cells are switchable to vary delay times.

**luminance flicker** Flicker that results from fluctuation of luminance only.

**luminance key** A key whereby the hole being cut is determined by brightness of the video source.

**luminance noise** Refers to a type of video interference which influences both black and white and color signals. Luminance noise is listed as a number in specification sheets of components and in test reports. It differs from chrominance noise, which affects only color.

**luminance noise reduction** A special electronic circuit designed to reduce unwanted noise or interference in the brightness signals, thereby producing brighter whites and more intense blacks. Luminance noise reduction usually is part of the circuitry of many video processing chips.

**luminance reversal** See *Image reversal*.

**luminance signal** The color TV signal that has exclusive control of the luminance of the picture. For SDTV, it is made up of 0.299 red, 0.587 green, and 0.114 blue and is capable of producing a complete black and white picture. It is also called the Y signal.

**luminant** A light source.

**luminary** A lighting source or instrument, including the bulb and other parts.

**luminescence** The emission of electromagnetic radiation from a substance due to a nonthermal process.

**luminescent panel** Display device. A flat luminescent surface is divided into a multitude of individual cells, which become the pixels. Each cell emits light as the result of electrical or optical excitation.

**luminophore** Syn.: phosphor.

**luminosity of the color** See *Variables of perceived color*.

**LUT** Look-up table.

**lux (x)** A measurement of light used in relation to the sensitivity of video cameras. 1 footcandle (fc) equals 10 lux. Thus the sensitivity (the minimum amount of light needed to produce a usable image) of a camera may be rated at 50 lux (5 fc). The lower the lux number, the lower the lighting conditions the camera can handle. Lux is the measurement recommended by the International System of Standards.

**LV** 1. Laser-optical disc system. The Magnavox video disc. 2. LaserVision. An optical videodisc, made by Philips, of Holland.

**LVR** Longitudinal Video Recording.

**LVR video recording system** A now-defunct video recording system which passed tape at a high speed over a fixed recording/playback head. Introduced in 1979 by Toshiba and BASF, the Longitudinal Video Recording (LVR) process played 220 parallel tracks of audio and video signals on tape that was magnetized along its length, hence its name. Because of its stationary head design, the machine was less

costly. It accommodated 1/2-inch tape in a special cartridge. The LVR system, the first attempt at video recording, was simply an accelerated version of an audio recorder.

**LV videodisc system (LaserVision)** One of two major types of machines that play back records containing pictures as well as sound on a standard TV receiver. The LaserVision player uses a highly reflective grooveless disc which is "read" by a small laser beam. In its standard speed (30 minutes per side) the player provides such various sophisticated functions as random access to chapters and frames, freeze frame, visual scan, etc. Because the system employs a laser, the disc is virtually indestructible. The laser tracks from the inside of the disc to the outside, but never makes contact with the surface of the disc. The LV player has two speed modes: CAV, which is its standard speed (30 minutes), and CLV with an extended play of one hour.

**lx** Abbreviation for lux.

# M

**M** 1. Magenta (also m). 2. CATV superband channel, 234-240 MHz. 3. TV standard; Brazil, Canada, Chile, Columbia, Cuba, Japan, Mexico, Netherlands Antilles, Panama, Peru, Philippines, US. Characteristics: 525 lines/frame, 60 fields/s, interlace—2:1, 30 fr/s, 15,750 lines/s, aspect ratio—4:3, video band—4.2 MHz, RF band—6 MHz, visual polarity—negative, sound modulation—F3, pre-emphasis—75  $\mu$ s, deviation—25 kHz, gamma of picture signal—0.45. 4. Recording method—see *M format*. 5. Mature—see *Movie rating systems*.

**MII component system** A professional/industrial 1/2" tape-recording format that provides full NTSC bandwidth. Features include 90-minute recording time, field color playback, a built-in digital time base corrector, time-code reader/generators, four audio channels, composite and component video inputs and outputs, and several advanced editing capabilities. The MII VTR can be integrated with other formats, including S-VHS, 1", U-Matic, Beta and Beta-SP. Working in conjunction with a professional digital video camera, the MII system permits the 1/2" cassette recorded in the field to be loaded directly into a studio recorder for studio-level results that compete favorably with the 1" C format.

**MAC** (A-, B-, C-, D-, E-, F-) Multiplexed Analog Components color system, where the video signal is divided into three components: luminance signal, R-Y signal and B-Y signal, which are compressed for sequential relay over one TV scan line.

**MacBeth color checker** A color rendition chart used by film and broadcast engineers to help determine the color accuracy of film and video images. It has become the industry standard for checking color accuracy in film, video, and graphics.

**macroblock** In the typical picture representation used by MPEG, a macroblock consists of four 8 x 8 blocks of luminance data (arranged in a 16 x 16 sample array) and two 8 x 8 blocks of color difference data (assuming 4:2:0 format), which correspond to the area covered by the 16 x 16 section luminance component of the picture. The macroblock is the basic unit used for motion-compensated prediction.

**macro close-up** A mode that is used for close-up shots of small objects or photos.

**macro focus** Extremely close focus—e.g., 4 mm from the front lens of a video camera.

**macro lens** A magnifying lens designed to focus very close to the subject. Macro lenses are particularly helpful in nature work and hobbies involving stamps, coins, models, etc. The lens for close-up focusing is found on most video cameras. Most macro lenses also serve as a normal lens when not in the macro mode.

**macro mode** An alternate function of a dual-purpose lens that can take extreme close-ups of different tiny objects.

**macro video** The use of extreme close-ups with the macro part of a video camera's zoom lens. Standard on most new quality video cameras, the macro feature permits focusing as close as an inch or two from the subject which fills the TV screen. Macro shooting provides a very narrow depth of field (that which is in focus in front of and behind the subject) so that focusing becomes extremely critical. Also, any slight movement becomes highly visible on the screen. Therefore, a good tripod is recommended. If a camera is not equipped with a macro lens or the zoom feature (which disengages in the macro position) is desired, the video camera user may add a special series of close-up lenses. These are measured in diopters, such as +1, +2, etc. Kits are available with various diopter lenses.

**Macrovision** A system designed to prevent casual copying of prerecorded tapes and DVDs in the home. The concept of the Macrovision anticopy process is relatively simple. Electrical pulses of specific strength and duration are added during selected portions of the video signal. The Macrovision pulses are placed in the vertical blanking interval (VBI) and designed to upset the AGC in a recording VCR.

**made-for** Referring to a production created for a specific medium, such as a made-for-TV movie or a made-for-home-video movie.

**mag** Short for magnetic, referring specially to cards, tapes, disks, or any recording and storage medium—e.g., mag card or mag track.

**magenta** (M or m) A red-blue color obtained by mixing equal intensities of R and B light. It is also the correct name for the subtractive primary color usually called "red."



- magic hour** A time of day, particularly dawn or dusk, that is the ideal period to photograph a scene on a TV remote or on a film location. There is little need to adjust the lighting or camera f-stops at that time because the color temperature is nearly perfect for the conditions of the shoot. It is the brief period when sunlight produces a special quality—magical, surrealistic, poetic.
- magnetic coercivity** Coercivity.
- magnetic deflection** Deflection of an electron beam by a magnetic field, as in a TV picture tube.
- magnetic focusing** Focusing an electron beam through the action of a magnetic field.
- magnetic head** The electromagnet for reading, recording, or erasing signals on a magnetic disc or tape.
- magnetic lens** A lens that has an arrangement of electromagnets or permanent magnets to produce magnetic fields that focus a beam of charged particles.
- magnetic recording** Capturing audio and video frequencies by magnetizing areas of tape that can be played back by moving them past a head where the magnetized areas are reconverted into electrical energy.
- magnetic tape** The medium used for recording and playback on tape recorders. The most popular width of consumer tape is 1/4" while industrial tape may be 1/2", 3/4", 1" or 2".
- magnetic tape developer** A special chemical solution applied to the control track edge of video tape to make control pulses visible to the eye and thereby allow precise cutting of the tape between pulses; necessary for physical tape editing.
- magneto-optical effect** See *Kerr effects*.
- magnification change command** In 3D-image display systems, an instruction that provides for control of a special driver so that the image can be stereoscopically observed from a position of the designated distance.
- main title** Title which gives the name of a TV program.
- makeup** The command "makeup!" on a television set is a request to apply cosmetics, generally a touchup of powder by the makeup department (headed by the makeup artist).
- MAMA** The Media Asset Management Association. MAMA serves as an advanced user group and independent international industry consortium, created by and for media producers, content publishers, technology providers, and value-chain partners to develop open content and metadata exchange protocols for digital media creation and asset management.
- MAN** Metropolitan Area Network. High speed intra-city data network. Typically extends as far as 50 km, operates at speeds from 1 Mbit/s to 200 Mbps and provides an integrated set of services for real-time data, voice and image transmission. Two standards are involved with MANs: IEEE 802.3 and ANSI X3T9.5.
- management command** In videotex, a parameter value P followed by a command identifier C that represent a presentation level management action, such as a change from one data syntax to another.
- manual editing** Editing that is completely done by a person without using an electronic editing controller.
- manual focus** A video camera function that allows the user to override the autofocus feature. Manual focus provides several uses. Camera owners may prefer this mode as a means of extending battery life, which is affected by continuous use of autofocus and other automated features. In addition, manual focus permits the user to add individual creativity to his or her work by producing special effects, such as out-of-focus fades or scene transitions.
- manual interval time lapse mode** A video camera feature that permits the camera user to add animation effects. The operator accomplishes this by pressing the pause mode, then slightly moving the object that is being recorded, and finally pressing the record button. The process is repeated until the entire cycle of desired movement has been completed. Many video cameras provide an automatic time lapse feature.
- manual iris control** A video camera function that permits the user to manually control the amount of light that enters the camera lens. Manual iris control is sometimes described as exposure control.
- manual white balance** A video camera function that permits the user to control the way the camera views different colors. This is important in maintaining correct color when various light sources produce changes in the color mix, or color temperature.
- marker generator** An RF generator that injects one or more frequency-identifying pips on the pattern produced by a sweep generator on a cathode-ray oscilloscope screen. It is used for adjusting response curves of tuned circuits, as when aligning FM and TV receivers.
- marker pip** An identifying mark on a CRT display.
- markers** In videotex, flags in a memory to show where attribute controls have been set. They are associated with the leading edge of the character position.
- Martin** A family of amateur SSTV transmission modes developed by Martin Emmerson, G3OQD, in England.
- mash** See *Multi-stage noise shaping*.
- mask** In video, refers to the device mounted in front of a TV picture tube to limit the viewing area of the screen. The mask is sometimes referred to as a frame.
- masking** A term employed in the Dynamic Noise Reduction system referring to the capability of a program to conceal its background noise. DNR utilizes a special dynamic filter which eliminates high frequencies (mostly in the form of hiss or noise) whenever the signal is not strong enough to cover the

## mass media

hiss. But when the signal does “mask” or cover this noise, the filter permits the high frequencies to pass through.

**mass media** Forms of communication that reach large audiences, such as newspapers, magazines, radio, and TV, in contrast to newsletters or other media that are more specialized. Media is the plural of medium.

**master** 1. In video, an original recording on disc or tape from which copies may be made. See also *Slave*. 2. In I2C-bus system, the device which initiates a transfer, generates clock signals and terminates a transfer.

**master-antenna television** (MATV) An antenna system that consists of an antenna array capable of receiving available broadcast signals and amplifying them as required for distribution over coaxial cables to a number of individual TV receivers that are normally within a single home, apartment, hotel, motel, or other other building.

**master brightness control** A variable resistor that simultaneously adjusts the grid bias on all guns of a 3-gun color picture tube.

**master control operator** (MCO) Operator of the controls that switch inputs from studios, videotape reproducers, telecines, etc., to one or more outputs. He/she not only has to switch the signals correctly, but must maintain levels of picture and sound, and also the quality of sync pulses, black/peak-white level, etc. In some set-ups, the switching function is taken away to a separate presentation control or is automated, leaving the MCOs with a supervisory function. These operators have roughly the same knowledge and skills as camera control operators, who do a very similar job.

**master gain control** 1. A variable resistor or potentiometer on a stereo amp that controls the gain of both audio channels simultaneously. 2. A control in a radio, TV, or recording studio that changes the overall audio output level without affecting the mixer controls that determine the balance of the microphones and other sound sources. It can fade out or fade in the sound volume.

**mastering** In optical recording, the original optical recording process.

**master monitor** High-quality monitor equipped with such facilities as picture focus, internal and external sync, and horizontal and vertical scanning controls.

**master picture monitor** A precision monitor placed at a key point in the control system and providing the operator with his main source of information. Generally the monitor can be switched to several points in the circuit to check the functioning of the apparatus. Both picture and waveform monitors are used in this role.

**master VCR** The VCR deck or machine which plays the tape during the duplicating process onto one or more slave machines (or VCRs doing the recording).

**master volume control** An audio term, most often used with mixers and amps to denote the final overall volume control of signal level.

**match cut** A quick transition, or cut, from one film or TV camera to another, or a smooth transition from one shot to another, with the action appearing to continue seamlessly.

**match dissolve** (MD) A film and TV technique in which a shot fades, or dissolves, into another of similar form or action, often to suggest the passage of time.

**matching transformer** A transformer used between unequal impedances for matching purposes, to give maximum transfer of energy. In video, a circuit that changes the impedance of a TV signal, often from 75 ohms to 300 ohms and vice versa. See also *Impedance adapter*, *Balun*.

**matrix** 1. The section of a color video encoder that transforms the R,G, and B camera signals into color-difference signals and combines them with the chrominance subcarrier. It is also called a color coder, color encoder, or encoder. 2. The section of a color video decoder that joins the color-difference (NTSC — I,Q; PAL — V,U; SECAM — R-Y,B-Y) and Y signals and converts them into R,G, and B signals needed to drive the color picture tube. It is also called a color decoder or decoder.

**matrixing** 1. The process of performing a code conversion with a matrix, as in converting color video signal components from one form to another. 2. The conversion of a master videotape into a glass laser videodisc master. A heavy-duty laser beam etches microscopic pits into the surface of the disc, which is then used as a master to produce the videodisc stamper.

**matrix surround** A surround-sound system similar to, but not as sophisticated as, Dolby Surround.

**matrix transformation** In analog color video, the process of converting the color signals from one tristimulus format to another, as, for example, RGB to YUV.

**matrix wipe** A special effect designed to tessellate a video image. A mix/effects switcher is used to produce this effect as well as to change the picture in each square in a seemingly random pattern.

**Matsushita** A Japanese company that is one of the world's largest manufacturers of industrial and consumer electric and electronic products. It produces some of the most familiar audio and video gear under the brand names Technics, Quasar, Panasonic, and JVC.

**matte** A film term sometimes used in video production work to denote a keyed effect, an insert of video signal information keyed from one source into a second video signal.

**matte key** A luminance key where the hole created by the key is filled with artificially created color from the switcher. For example, using a matte key, the hole in camera 1 could be filled with blue, even if

the original key source was black and white. The hole can also be filled with a third source — video from a third camera, for example.

**mature audience** In film and TV, an audience for which sexual, violent, or other adult material is considered appropriate.

**MATV** Master-Antenna Television, or private cable. See also *SMATV*.

**maximum frequency blue**  $+f_b = 4\,480.000$  kHz (SECAM).

**maximum frequency red**  $+f_r = 4\,686.000$  kHz (SECAM).

**maximum usable luminance** This measures, in footlamberts, the amount of brightness a TV monitor can produce before picture distortion, or “blooming,” appears. Direct-view sets typically measure between 75 and 100 footlamberts. Because of their size, projection sets usually need to exceed 100 footlamberts for a good picture.

**Mbone** Multicast backbone, a virtual network made up of portions of the Internet in which multicasting has been enabled. The Mbone originated from IEFT, in which live audio and video were transmitted around the world. The Mbone is a network of hosts connected to the Internet communicating through IP multicast protocols, multicast-enabled routers, and the point-to-point tunnels that interconnect them.

**MCA/Disney vs. Sony lawsuit** The famous case in which Universal City and Walt Disney filed suit in 1976, charging that Sony and others, by selling VCRs, damaged the studios financially and infringed upon copyright laws. The first major decision concerning this case occurred on October 1, 1979, ruling in favor of Sony. Then, in October of 1981, an appellate court reversed the decision in favor of the plaintiffs. The Supreme Court heard the case and in 1984 overruled the reversal and ruled in favor of Sony. The suit has many ramifications for studios, equipment and tape manufacturers as well as the general public.

**MCT algorithm** A compression algorithm introduced in 1986 by PictureTel. MCT reduced the bandwidth necessary to transmit acceptable picture quality from 768 to 224 Kbps making two-way video-conferencing convenient and economical at relatively low data rates (for those times).

**MCU** Multipoint Control Unit. A PBX-like device for switching and conferencing video calls, announced by AT&T on 22 March, 1993.

**MD** Match Dissolve.

**MDS** Multipoint Distribution Service.

**mean picture level** The mean (d.c.) level of the video signal.

**measuring the video** NTSC video is commonly measured by a system designed by the IRE (Institute of Radio Engineers). In this system, a 1-Vpp video signal is divided into 140 IRE units. The 140 IRE units are broken down into 40 units of horizontal blank-

ing, and 100 units of picture information above the horizontal blanking level. In a properly setup NTSC receiver, the video output should look as follows: The horizontal sync extends from -40 IRE to 0 IRE. The color burst extends equally above and below the 0 reference blanking line +20 and -20 IRE. The white level is at 100 IRE. This signal level equals 1-Vpp into a 75-ohm load. In PAL and SECAM systems, the corresponding levels are 0.3 V sync and 0.7 V white level.

**mechanical laser projector** A projector using vibrating or rotating mirror assemblies. Used in 3D TV systems; to synchronize the rotational rate of each of the mirrors, the horizontal scan voltage and the vertical scan voltage from the raster scan generator of the TV camera are input to the laser projector.

**mechanical television** The primary technique used in TV experimentation until the 1930s. It was first developed in the 1800s. Based on the principle used in the Nipkow disc. The images produced by mechanical television systems usually only contained 30 to 60 scanning lines and were therefore dim and blurred. In the 1930s, a hybrid mechanical-electronic system and later an all-electronic system replaced mechanical television.

**mecomete** See *Kerr effects*.

**media** It is the plural of medium, though increasingly the popular usage is only of the collective noun. 1. In the context of telecommunications, media is most often the conduit or link that carries transmissions. Cable and home video are often referred to as the “electronic media.” Transport media include copper wire, radio waves and fiber. Media such as broadcast TV that are designed to reach the maximum number of people are called mass media. When more than one medium is used to simultaneously reach an audience, the term multimedia is used. 2. Gel.

**media engine** The CPU or DSP processor that coordinates all of the video and audio activities in a multimedia platform. The media engine is used to coordinate the audio with the video, control multiple inputs, and control the compression and decompression hardware. The media engine is most likely not the host CPU—for example, not the 80486 processor on the PC motherboard.

**media server** A new term for a file server on a local area network that contains files with voice, images, pictures, video, etc. In short, a media server is a repository for media of all types.

**medium** See *Media*.

**medium-close shot** (MCS) A picture or scene with the camera between a position close to the subject (close shot) and a middle position (medium shot).

**medium power satellite** Satellite with transponder RF power in the region of 30 to 100 W.

**medium power satellite TV** Refers to a bandwidth of 11.7-12.2 GHz and requires a 4-foot wide an-

## medium shot

tenna. Although this system is less costly than low-power satellite TV, it is severely limited as to the number of channels it can handle (currently, about four). Medium power satellite TV is similar to direct broadcast satellite that uses a different bandwidth and a smaller-diameter antenna.

**medium shot** Camera angle of view between close-up and long shot; a view of the head and shoulders of a subject, as opposed to head only (close-up) or full body (long shot).

**megabyte** (Mbyte) One million bytes (actually 1,048,576); one thousand kilobytes.

**membrane keyboard** A keyboard constructed of two thin plastic sheets (called membranes) that are coated with a circuit made of electrically conductive ink. The keyboard is sensitive to touch. It is an economical, flat type used in several early microcomputers. Today, such keyboards are also used on TVs and VCRs.

**memory** In video, a digital VCR feature that permits the viewer to lock in a still picture from a TV broadcast. In addition, the picture, which usually appears in a corner of the TV screen, can be stored in memory until the VCR power is turned off. This feature is sometimes listed as TV memory or TV memo.

**memory backup** Refers to the capability of a VCR, TV, or other equipment, to retain its programmed instructions and other timer functions in the event of a power failure. The first technique manufacturers employed for this purpose was a built-in nickel cadmium battery that lasted a relatively long time (several hours), covering the length of most electrical outages. The battery has been replaced by a smaller and less costly super capacitor, a device that can store an electrical charge powerful enough to keep a VCR timer active long enough to cover some power failures. However, the average capacitor has only enough storage to last from about 5 s to approximately 30 minutes. For those users who intend to be away from home for long periods of time and want a stronger assurance that their machine will record an important program, an external accessory, known as an uninterruptible power supply (UPS) unit, is available. This item comes in several models, depending upon the number of watts. Many DVD players and TVs now use flash memory to retain settings, eliminating the need for UPS devices.

**memory bank** A VCR feature designed to permanently store such programming information as day, time, channel and an identifying code, all of which can be recalled later for future scheduling without re-entering each item separately. The short code may consist of a few recognizable letters, such as "six" for Sixty Minutes. This will help the user to recall the data when he or she wants to repeat the recording process at a future date.

**memory controlled effects** A special feature usually built into a professional production switcher and de-

signed to store dozens of complete set-ups. In addition, the memory controlled effects remembers transitions previously put into production.

**memory pause** Refers to a videodisc player that has the capability of stopping a program at an exact point and then continuing to play the disc from that same point. This feature is helpful to those viewers who are often interrupted by telephone calls and other similar disturbances.

**memory rewind** A feature on some older-model VCRs, which, when pressed, stops the tape during Rewind or FF when the index counter reaches 000 (or 0000 on some machines). Memory rewind works in conjunction with the tape counter and is useful in locating a pre-selected portion of the tape for replay. This feature is different from electronic program indexing.

**menu** A feature, usually found on consumer equipment, that displays on screen a vast choice of operating options that the viewer activates by way of the remote control. There are programming menus to make it easier for the user to set the time, day and channel of programs to be recorded. Setup menus help the new owner of a TV set make the proper wire and cable connections. Other menus include audio functions, such as adjusting bass and treble, and video functions, such as controlling sharpness, contrast and color.

**MESECAM** A technique of recording SECAM video. Instead of dividing the FM color subcarrier by four and then multiplying back up on playback, MESECAM uses the same heterodyne conversion as PAL.

**meshbeat** A TV distortion of wavy lines; also called linebeat or moire.

**metadata (side information)** Informational data about the data itself. Typically information about the audio and video data included in the signal's data stream.

**metal-backed screen** Aluminized screen.

**metal evaporative tape** See *Vapor deposition*.

**metallized screen** Aluminized screen.

**metal oxide semiconductor chip** See *MOS*.

**metal-particle tape** A high-grade videotape composed of needle-like metal particles and a roughly textured base to hold the particles. The tape, which differs from standard tape that uses metal oxide instead of metal particles, reportedly is free of drop-outs while producing a higher frequency response than other high-grade tapes. By replacing the oxide with metal, manufacturers have more than doubled the strength of the magnetic field.

**metamorphosing animation** A special effect that creates changing shapes and color for specific needs. The technique is particularly useful for TV meteorologists who preprogram much of their weather animation. By incorporating metamorphosing animation, they can show the movements both of numbers and storm fronts across the TV screen.

**metering system** Refers to the technique used by a video camera or camcorder to measure the light necessary for the proper exposure of a scene or subject. One simple system produces a simple value, with the emphasis placed on the center portion of a given scene. Another, sometimes referred to as the two-field metering system, takes one reading of the entire field and another reading of the central zone, thereby assuring a correct exposure.

**metropolitan area network (MAN)** A loosely defined term generally understood to describe a broadband network covering an area larger than a local area network (LAN). It typically interconnects two or more LANs, may operate at a higher speed, may cross administrative boundaries, and may use multiple access methods. It may carry data, voice, video and image.

**mezzanine compression** Contribution level quality encoded high-definition television signals. Typically split into two levels: High Level at approximately 140 Mbps and Low Level at approximately 39 Mbps (for high definition within the studio, 270Mbps is being considered). These levels of compression are necessary for signal routing and are easily re-encoded without additional compression artifacts (concatenation) to allow for picture manipulation after decoding. DS3 at 44.736 will be used in both terrestrial and satellite program distribution.

**M format** A recording method that is now considered obsolete. It was used for professional ENG and EFP production. Like the Betacam format, the two M format types could record for 20 minutes in the field. The units used regular VHS videocassettes but normally required separate playback/editing devices in the studio. The videocassettes could not be played back on regular VHS format units.

**MH** Modified Huffman data compression method.

**MHEG** Multi- and Hypermedia coding Experts Group. A standardized language for the description of interactive multimedia applications. It is currently applied to multimedia presentations and as a kind of multimedia successor to teletext in Digital Video Broadcasting. Since MHEG is already supported in these applications, it can be expected that a large number of such broadcast services will become available. MHEG standardizes a multimedia information interchange format called "Coded Representation of Multimedia and Hypermedia Information Objects" (ISO/IEC 13522).

**MHP** See *Multimedia Home Platform*.

**mic** Microphone.

**microchannel plate** A plate that consists of extremely small cylinder-shaped electron multipliers mounted side by side, to provide high image intensification factors. Applications include night-viewing binoculars, telescopes, and TV camera tubes.

**micro-monitor** A small TV monitor with a 1.5" screen and 1" speaker designed to be used in the field.

The micro-monitor also permits the viewing of a tape while recording.

**microphone (mic)** Also called mike (slang). A device used with video cameras, portable VCRs and home models to record sound onto videotape. A microphone converts sound to electrical energy. Microphones have different response patterns. Some basic types are the omnidirectional, bidirectional, directional and cardioid. There are also microphones for different purposes such as the lavalier, boom, etc. Other types are the condenser and dynamic microphones. All microphones have some degree of coloration, which alters its flat response. Basically, the less the coloration, the better the microphone.

**microphone boom** An overhead extension arm that supports a microphone within range of the sound to be picked up but outside the range of a TV camera.

**microphone combiner** Microphone mixer.

**microphone frequency response** The measurement of the amount of coloration in a microphone. Since virtually all VCRs have a response that is less than that of hi-fi quality, it is easier to match a microphone to the machine. Many recorders register an audio frequency response of up to 9 through 12,000 Hz. Therefore, a microphone with a range of 80 to 12,000 Hz will provide a smooth response.

**microphone impedance** The resistance a microphone offers to the sound signal it is picking up. Each microphone has its own impedance, which must be matched to the input impedance of the VCR or other similar unit. This is a relatively simple task involving a matching transformer, available at most electronic stores. The addition of this accessory will assure that the microphone will operate at its peak frequency response.

**microphone jack** A receptacle or opening that permits the connection of a microphone plug to the video camera or VCR. There are only three kinds of basic microphone jacks: the RCA phono jack, the 1/4" jack and the most frequently used with home video components, the 1/8" mini-jack. Appropriate adapters are readily available for connecting any microphone jack with any other unit.

**microphone mixer** An accessory that accepts several microphones and controls the volume of each microphone separately. They are usually limited to four inputs and offer some degree of portability. The microphone mixer permits the use of only one microphone when required, even while three other microphones are connected to the console. The other major purpose of the mixer is to blend the sounds of several microphones into one signal while balancing the output of each in relation to the others. There are active and passive mixers.

**microphone mixing** A video camera feature that can combine the sound track of the tape with an external source. The process can occur either during recording or editing.

## microphone pickup response

**microphone pickup response** Polar response.

**microphone shadow** In film, TV, a shadow of a microphone visible to the camera; also called mike shadow.

**microphone splitter** An accessory designed to split a single microphone line into multiple outputs. The microphone splitter allows the divided microphone level signals to feed various microphone inputs on such components as VCRs (both VCR/VTR formats), audio recorders, monitors, speakers, etc. This device provides proper isolation between outputs. The number of outputs depends on the particular splitter. There are basic units described as 1x3 microphone splitters, which split one line into three outputs, while more complex models can divide each of four microphone lines into three outputs. There are also more sophisticated types such as the microphone splitter/combiner which splits and/or mixes microphone signals in a variety of combinations. Microphone splitters and splitter/combiners can be either passive or active. Active units provide a gain of +/-6dB maximum and are designed for use with equipment which does not have its own output transformer. Passive splitters are usually of low impedance to match that of the microphone inputs while active ones are of line level.

**microphonics** Interference in the form of a series of horizontal lines on a TV screen caused by extreme surges from loudspeakers, applause or certain musical instruments. These loud bursts affect the picture tube in the video camera but cause no permanent damage to the equipment. This effect can be avoided or minimized by keeping the video camera out of direct range of these instruments and not standing too close to the loudspeakers.

**microreflection** In video, one of several forms of degradation that affects NTSC picture quality. Microreflections are caused by waves that strike a medium of different characteristics and are then returned to the original medium.

**microsegmenting** The process of configuring Ethernet and other LANs with a single workstation per segment. The objective is to remove contention from Ethernet segments. With each segment having access to a full 10 Mbps of Ethernet bandwidth, users can do things involving significant bandwidth, such as imaging, video and multimedia.

**microwave** A very high frequency range (1-100 GHz) in which the transmitted wave lengths are extremely small (30-0.3 cm). Some people say microwave refers to frequencies between 890 MHz and 20 GHz. Microwave is a common form of transmitting telephone, fax, video and data conversations used by common carriers as well as by private networks. Its lower portion, between 3.7 and 4.2 GHz, contains the band of satellite channels. Other segments of the band are allocated to amateur radio operators, police radar, telephone companies, etc. DBS systems operate

in the 12-GHz range of the microwave band. Microwave signals only travel in straight lines. In terrestrial microwave systems, they're typically good for 30 miles, at which point you need another repeater tower.

**microwave interference** In satellite TV, interference from generators, transformers and other like devices, usually installed by utility companies in the vicinity of a parabolic antenna. If these objects fall in the line of view between the antenna and the transmitting satellite, they can adversely affect reception. The owner of a satellite TV system can obtain an FCC license that will assure him or her of interference-free reception.

**microwave relay** An electronic system of point-to-point communication. The technology allows for the interconnection of radio, TV, and cable systems. Because they operate through the air at high frequencies, all microwave systems are licensed by the FCC. A signal, focused into a narrow beam, can travel some 30 miles without a great deal of attenuation. In a point-to-point relay system, towers with amps and small receiving and retransmitting antennas are set up and the signal passes from tower to tower. This type of relay system made transcontinental TV possible in 1951. Microwave relay systems are now used to transmit signals from a news site back to the studio or from a studio to a transmitting tower and antenna for rebroadcast. When a microwave relay system is used to connect the studio to the transmitter site, it is called a studio-transmitter link (STL). A microwave relay system used by cable systems to pick up stations that are too far away for off-the-air reception is licensed by the FCC as a Community Antenna Relay Service (CARS).

**microwave transmission** A method used by some pay TV systems to transmit over-the-air, point-to-point video signals. The encoded programs are beamed to subscribers who are equipped with decoders. Besides microwave, pay TV can also transmit programs by way of telephone wires and cable.

**midband cable tv** Channels that occupy frequencies not used for TV broadcasting. Midband channels, like superband CATV channels, are channels A through I. Channels A-I are called midband because they fall between channels 6 and 7 (which is the lower end of what is known as the high band). There are also subband channels which fall below channel 2: these are used for special transmissions. See also *TV channel assignments*.

**middle break** A station identification in the middle of a radio or TV program.

**mid-range switcher** A video switching device, falling somewhere between a low-cost consumer switcher and an expensive professional/industrial digital or production switcher. Mid-range switchers may provide up to eight primary inputs, black and color backgrounds, all-linear keying, and a variety of wipe effects.



**mid-side principle** A technique employed in stereo microphones (especially single-point stereo microphones) in which a single internal component “listens” to both its right and left while another element picks up information from a forward position. Many recording patterns are possible by electronically mixing the various combinations of outputs of the two components. This technique is also known as the MS principle.

**mike** Slang for microphone.

**mike shadow** See *Microphone shadow*.

**mil** 1/1,000 inch. The mil is used in measuring the thickness of a videotape.

**Miller integrator** An integrator that contains an active device, such as a transistor, in order to improve the linearity of the output from a pulse generator. Miller integrators are used particularly with sawtooth pulse generators, such as those used to generate a time base.

**Miller sweep generator** See *Time base*.

**mime** The representation of an action without using words, as by a mimic, mime, or pantomimist. In film and TV post-production, miming is the synchronization of sound and action, as in lip-sync.

**miming** See *Mime*.

**minicable system** A small CATV system, such as SMATV, a system within a building that receives its signal from a satellite; also spelled mini-cable.

**minicam** A small, self-contained portable TV camera, for videotaping on-site news events. When linked to a mobile transmission unit (minicam van), the minicam can provide live coverage at relatively low cost. It has tremendously changed TV news programs at all types of stations. See also *Creepy peepy*, *Shaky cam*.

**mini-enhancer** A device designed to improve the video signal of portable VCRs, video cameras, etc. The mini-enhancer attaches between camera and recorder and is meant to be used in the field. It is also useful when camera extension cables are used. The accessory usually contains a bypass switch that allows a comparison of enhanced and unenhanced image.

**mini-jack** A phone jack or plug used in the audio inputs and outputs of Beta VCR. The 1/8" jack is smaller than the more popular RCA jack generally used in the VHS format. Sony uses the RCA-type in its video input and output together with the mini-jack in its audio lines. The size of the jacks becomes important when copying tapes from one machine to another and using the audio/video rather than the RF connections.

**minimicrowave** In TV, referring to the transmission of a video signal from a nonstudio site—such as a news event—to a mobile unit or a transmitter on a nearby roof. The transmitter then sends the signal directly to the station or possibly to one or more intermediate points, such as atop a tall building or other high point.

**minimum frequency blue**  $-f_b$  4,020.000 kHz (SECAM).

**minimum frequency red**  $-f_r$  4,126.250 kHz (SECAM).

**minimum illumination** The least amount of light necessary to produce a viewable (not necessarily vivid) picture with a camcorder. Minimum illumination is expressed in lux—the lower, the better. Very sensitive camcorders measure 3 lux or below, though the average is still about 7 lux.

**minimum sampling frequency** See *Pulse modulation*.

**mini plug** Similar to a phone plug in design but much smaller; a plug introduced by Japanese electronic firms for use on miniaturized pieces of equipment.

**Minitel** French name for videotex. Commonly called Teletel.

**mini-VCR** Refers to 1/4"-size videotape in a compact cassette which operates inside a smaller than usual portable VCR. The first such mini-VCR was Technicolor's model 212 which weighed 7 pounds, measured 10" square and 3" deep and used a cassette just slightly larger than an audiocassette. The mini-VCR format is incompatible with others such as Beta and VHS in terms of videocassettes. But the machine can be connected to any model for duplicating tapes and can be hooked up with any camera and other components as long as the proper cables are obtained.

**mini video** An alternate VCR format using 1/4" tape. The 8-mm video system is designed mainly for a one-piece video camera/recorder with 1- or 2-hour maximum recording time. The advantages of mini video include lighter equipment, smaller components and relatively less expensive tape.

**mips** Million instructions per second.

**mired** Micro-Reciprocal-Degree. Unit used for the measurement of color temperature, corresponding to the value in the degrees Kelvin divided into 1 million.

**mirror-backed screen** Aluminized screen.

**mirror reflection** Direct reflection.

**misalignment** A condition in which one of the primary colors in video (R,G,B) appears on the side of a subject, as if that particular color is “bleeding” or not registering properly. Misalignment, sometimes referred to as misregistration, is the result of improper convergence—the inability of electron beams to strike the face of the picture tube precisely. With a video camera, the problem stems from a faulty camera pickup tube.

**miscellaneous common carrier** A communications common carrier (typically one using microwave) which is not offering switched service to the public or to companies. A miscellaneous common carrier usually provides video and radio leased line transmission services to TV and radio networks.

**misregistration** See *Misalignment*.

**mistracking** See *Tracking*, *Tracking control*.

**MIT-CC (Channel-Compatible) system** A proposed

## MIT channel-compatible system

single-channel noncompatible simulcast HDTV system. It employed double-sideband quadrature-modulation of a carrier in the center of the 6-MHz channel. This signal was not intended for NTSC receivers, i.e., the system is noncompatible. The preferred originating signal was produced by a camera operating at 16:9 aspect ratio and 1200 lines, progressively scanned. The preferred frame rates were either 60 or 72 fr/s, these being multiples of a basic picture repetition rate of 12 per second. This signal source, feeding the NTSC-compatible simulcast channel, would produce a display of the letter-box type, with blank bars above and below the 16:9 area displayed on the 4:3 conventional display. The RGB output of the camera was scanned at resolutions of 240 pixels per picture height, 400 pixels per picture width, scanned progressively at 12 fr/s. The luminance resolution for stationary portions of the images was 762 x 1200 at 12 frames per second and 508 x 800 at 36 fr/s. The chrominance resolutions for static portions were 400 pixels per picture width, 254 elements for portions in motion. The analog output of the camera was digitized in a transmitter converter operating at 8.4 or 12 Mbytes/s. The MIT-CC receiver had a display of 1200 lines, 16:9 aspect ratio. The MIT-CC system was initially designed for distribution over 6-MHz cable channels, but it could be transmitted on the DBS service, and on terrestrial 6-MHz channels.

**MIT channel-compatible system** See *MIT-CC system*.

**MIT-RC** (Receiver-Compatible) **system, Schreiber** A single-channel NTSC-compatible proposed advanced TV system, occupying the standard 6-MHz channel, with a transmitted signal of 525 lines, 59.94-Hz field rate, interlaced 2:1 with 16:9 aspect ratio. The display on a conventional receiver had 60 blank lines above and below the 16:9 outline, minus those hidden by overscan. The chrominance information was transmitted at 14.985 fr/s, half the NTSC rate. The extra time of the blank lines and the frames free of chrominance were used to carry ancillary information sufficient to produce a 1050-line luminance display with a resolution of 535 lines horizontally and 600 lines vertically for a stationary image. This was reduced to 315 and 360 lines, respectively, for objects in motion. The chrominance resolutions were 180 (I), 130 (Q), lines (stationary), and 180 (I), 65 (Q), lines (in motion), respectively. The RC system was designed to be used cooperatively with a simulcast channel-compatible (CC) system (MIT-CC).

**MIT receiver-compatible system** See *MIT-RC system*.

**MITV** Microsoft Interactive TV. Blends TV with elements of the Internet for a more interactive viewing experience. Microsoft TV is an open software platform technology sold to other network operators and broadcasters globally.

**mix** The superimposition of one image over another. With the use of a mixer/fader device, the image of

one source can increase or decrease on the screen by the movement of a simple control. A mix differs from an effect that keeps the entire image even during superimposition.

**mixed highs** The high-frequency signal components that are intended to be reproduced achromatically (without color) in a color TV picture.

**mixed mode** An imprecise term that suggests that one digital bit stream can carry voice, data, fax and video signals.

**mixed syncs** A synchronizing signal consisting of line sync pulses and field sync pulses but containing no other information.

**mix/effects switcher** A multi-buttoned, box-like electronic console used by professionals to create a variety of special video effects. The instrument can produce a number of preset patterns, including wipes, keys and digital effects. Each row of buttons is called a "bus."

**mixer** 1. A device that has two or more inputs, usually adjustable, and a common output. It combines separate audio or video signals linearly in desired proportions, to produce an output signal. 2. The stage in a superheterodyne receiver where the incoming modulated RF signal is combined with the signal of a local RF oscillator to produce a modulated IF signal. The mixer and oscillator together form the converter. See also *Microphone mixer*.

**M-JPEG** Motion JPEG.

**M-load** The loading system used by VHS VCRs and first invented by Sony. The machine wraps the tape around the head drum in an "M" design, hence the name. To do this, 13" of tape are removed from the cassette, in contrast to the Beta system in which 24" are taken out. Two twist pins angle the tape to its path around the video head drum. Each time the VCR enters the Stop mode, the tape is loaded back into the cassette.

**M-loop** The shape in which videotape is laced around the heads in a VHS VCR.

**MM** CATV hyperband channel, 372-378 MHz.

**MMCD** Multimedia CD.

**MMCD-R/E** A recordable version of MMCD (R/E for record/erase) using phase-change recording technology, with magneto-optical recording as an optional method.

**MMDS** Multichannel Multipoint Distribution Service.

**mobile unit** A truck or other vehicle equipped with TV studio equipment for TV pickups at remote locations. Picture and sound signals are usually sent back to the main transmitter by microwave transmitter on the truck.

**mode** A type of ham radio communications; examples are FM, SSTV and packet radio (a computer-to-computer communications mode in which information is broken into short bursts).

**modem** Modulator/demodulator, a device that transforms a typical two-level computer signal into a form

suitable for transmission over a telephone line. Also does the reverse—it transforms an encoded signal on a telephone line into a two-level computer signal.

**mode switch** A feature on some VCRs for selecting Mono, Stereo or SAP broadcast mode. Some TV receivers have these modes on the remote control unit.

**modified horizontal sweep signal** Nonlinear sawtooth signal (H') as is usual horizontal scan signal (H). See *Depth matrix*.

**modified NTSC** See *CCF system*.

**modular chassis** A TV chassis that is made up entirely of separate modules for each circuit in the TV set.

**modulation** 1. In general, the alteration or modification of any electronic parameter by another. The reverse process is demodulation, by which an output wave is obtained having the characteristics of the original modulating wave or signal. Intermodulation is the modulation of the components of a complex wave by each other in a nonlinear system, producing waves having frequencies, among others, equal to the sums and differences of those of the components of the original wave. In NTSC and PAL TV, the picture portion of the program is AM, and the sound portion is FM. 2. A technique that adds audio or video signals to a preselected carrier signal.

**modulation index** The ratio of the frequency deviation to the frequency of the modulating wave in a FM system when a sinusoidal modulating wave is applied.

**modulation transfer function (MTF)** The curve that expresses the luminance contrast between black and white lines on a graphic-alphanumeric display screen as the number of lines increases. See *Depth of modulation chart*. See also *Aperture response*.

**modulator** A miniature transmitter whose circuitry carries the raw audio and video signals from microphones and video cameras and puts them in a designated bandwidth channel or range of frequencies. TV modulators register the video and audio signals into separate carriers. A demodulator, or tuner, then strips the video signal from its carrier to reproduce the original video signal.

**moire** 1. In TV, a wavelike distortion, an effect caused by the combination of excessively high frequency signals. Mixing of these signals causes a visible low frequency that looks a bit like French watered silk, after which it is named. For example, a moire effect can be caused by beats between a pattern in the original scene (say a checked suit) and the line structure of the reproduced picture. Moire or "color-crawl" can occur if the color-burst signal is present during a black and white transmission. Also called meshbeat, linebeat, herringbone, or crawling dot pattern. 2. A tremulous spectrum of color caused during editing when a VCR is backspaced and the beginning of a new scene is superimposed over the end of another scene. The wavy, satin-like optical

effect occurs when converging lines in the picture are nearly parallel to the scanning lines. Video moire, sometimes called a rainbow effect, occurs also when the VCR is in Record mode and Pause is pressed. Recent machines have introduced special circuitry that all but eliminates moire caused by the record/pause functions.

**Mole technology** A seamless MPEG-2 concatenation technology developed by the ATLANTIC project (BBC [U.K.], Centro Studi e Laboratori telecomunicazione [Italy], Ecole Nationale Supérieure des Telecommunications [France], Ecole Polytechnique Fédérale de Lausanne [Switzerland], Electrocraft [U.K.], Fraunhofer-Institut für Integrierte Schaltungen [Germany], Instituto de Engenharia de Sistemas e Computadores [Portugal], Snell & Wilcox [U.K.]) in which an MPEG-2 bit stream enters a Mole-equipped decoder, and the decoder not only decodes the video, but the information on how that video was first encoded (motion vectors and coding mode decisions). This "side information" or "metadata" in an information bus is synchronized to the video and sent to the Mole-equipped encoder. The encoder looks at the metadata and knows exactly how to encode the video. The video is encoded in exactly the same way (so theoretically it has only been encoded once) and maintains quality.

**mom-and-pop store** A small, family-operated shop. In CATV and other fields, a small, single-ownership local system.

**monaural** Monophonic.

**monitor** 1. A TV set minus receiving circuitry. Monitors have no VHF/UHF tuners, IF amps or video detectors. Some monitors do not have any audio system. A monitor is used basically to directly display the composite video signal from a camera, VTR, or SEG. Often more costly than a TV receiver, the monitor, with its more advanced and sophisticated circuitry, produces a superior picture. It also contains audio/video input jacks as well as other features such as picture focus, internal and external sync and horizontal and vertical scanning. The major advantage of the monitor over the TV set is that the composite video signal travels directly to the audio amps. These direct processes retain the original quality of the signals. A monitor differs from a monitor/receiver. One of the more recent developments in monitors is the auto-setup monitor that can line itself up automatically. 2. An instrument that measures continuously or at intervals a condition which must be kept within prescribed limits, such as the image picked up by a microphone at a radio or TV studio, a variable quantity in an automatic process control system, the transmission in a communication channel or band, or the position of an aircraft in flight. 3. A person who watches a monitor. 4. A high-quality CRT used to display video signals (requires an outboard tuner in order to receive TV signals). 5. To record, verify, or

## monitor analyzer

check a radio or TV program, or to supervise, verify, or check any operation, such as an event, sales campaign, or computer program.

**monitor analyzer** A device, introduced in 1978 to the home video field, which helped adjust the brightness and color of a TV set. The plastic monitor analyzer, which came with a ready-reference chart, sold for about \$25 and worked only with color bar test patterns on the TV screen.

**monitor camcorder, Sharp** Combination of camcorder with video monitor for quick viewing of "rushes," prerecorded cassettes, or even TV (with an optional tuner). Sharp's success inspired somewhat similar models by Sony, Fuji Photo, JVC, and RCA.

**monitoring** Using a monitor. In broadcasting, checking a sound or TV program for technical quality. High grade equipment is used for reproducing sound programs and for displaying TV pictures while they are being recorded or transmitted so that any technical faults are detected and can be put right at the earliest opportunity.

**monitor/receiver** A monitor with a built-in TV tuner; a component that looks like a conventional TV set but has direct audio and video inputs as well as additional features usually not found on TV receivers. Like all monitors, these sets accept direct hook-ups of VCRs, VDPs, video games, etc. By avoiding RF inputs, the monitor/receiver can retain the original signal strength. More expensive than ordinary TV receivers, monitor/receivers are often sold by audio/video dealers rather than conventional retail stores.

**monitor/receiver reference tape** A specially prepared videocassette of the tape containing miscellaneous video test patterns for the proper adjustment of monitor/receivers. Often as short as 10 minutes, the tape features tests for convergence, flesh tones, color bars, gray scale, etc. The reference tape permits adjusting equipment for color purity, alignment, tint, brightness, contrast, chrominance, etc. Also known as setup tape.

**monitor speaker** Refers to a small built-in video camera speaker that permits the user to check the soundtrack. The monitor speaker eliminates the need for headphones.

**monochromatic** Consisting of one color or wavelength. Although light in practice is never perfectly monochromatic, it can have a narrow region of the spectrum.

**monochrome** In TV, a system in which the transmitted information is confined to the luminance of the scene. No color information is transmitted. A monochrome system is therefore a black and white system. The term is unfortunate because monochrome means literally light of a single wavelength whereas white light contains a range of wavelengths. The term "black-and-white" is correct.

**monopod** In video, a one-legged support for a video

camera. It is a temporary or limited alternative to a video tripod. Although monopods are less costly, lighter in weight and easier to carry than tripods, they require continuous handling to maintain steadiness.

**monoscope** An electron tube containing a target on which a pattern or photograph is printed and which, by scanning the target by an electron beam, generates a picture signal corresponding to the printed image. The tube is generally a high-velocity type and the pattern is printed in a pigment that modifies the secondary-emission ratio of the target. Such tubes are useful in TV services because they can replace a complete camera channel when a stationary pattern is to be transmitted.

**monotonic** A term that is used to describe ADCs and DACs. An ADC or DAC is said to be monotonic if for every increase in input signal, the output increases also. The output should not decrease.

**Montreux International Television Symposium & Technical Exhibition (TV Montreux)** A bi-annual international conference for the television broadcast industry.

**Moore's Law** A prediction for the rate of development of modern electronics. It has been expressed in a number of ways but in general states that the density of information storable in silicon roughly doubles every year. Or, the performance of silicon will double every eighteen months. For more than two decades this prediction has held true. Named after Gordon E. Moore, physicist, co-founder and chairman emeritus of Intel Corporation.

**mopic** Military word for motion picture.

**MOPS** Millions of operations per second. Refers to a processor's performance. In the case of DVI technology, more MOPS translates to better video quality.

**MOS** A metal oxide semiconductor chip that replaces the conventional saticon and vidicon camera tube. While the horizontal resolution of the MOS chip doesn't match other HQ cameras, the advantages of this technology include a lighter and smaller camera, no waiting for tube warmup, less power consumption and no image burn or drag. Hitachi, with its model VK-C1000, was the first company to feature a camera using the MOS image sensor.

**mosaic** 1. Short for photomosaic. In a camera tube, an electrode consisting of a very large number of individually insulated, photo-emissive globules on which the optical image is focused. Photo electrons released from the globules in accordance with the amount of light falling on them leave a charge image on the mosaic surface. See *Iconoscope*. 2. A special-effects feature that breaks up a video image into hundreds of little squares or rectangles. The effect is often used in commercial broadcasting to hide the face of witnesses during interviews and hearings or to prevent nudity from appearing on TV

- screens. This feature is usually found on certain digitally equipped units such as editing consoles.
- mosaic electrode** The light-sensitive electrode of a TV camera tube on which the image is formed.
- MOS image sensor** Solid-state device used in place of a video tube.
- motion adaptive** A design that senses motion in order to alter the way it functions, for the purpose of avoiding or reducing some motion-related artifacts.
- motion adaptive interpolation circuit** An advanced electronic technique used in large-screen Improved Definition TV to improve deinterlacing quality or comb filtering. Motion adaptive comb filters, first utilize inter-line and inter-field information and then process it by applying two separate types of digital memory buffers.
- motion analysis camera** A professional/industrial video camera designed for stop-motion videotaping. Used for industrial, medical, laboratory and military applications, the cameras usually contain a variable speed shutter with speeds capable of from 1/500 to 1/10,000 of a second. Motion analysis cameras perform such highly technical tasks as color spectral analysis, spray-flow study, high-speed microscopy, speeding-bullet analysis, etc. Many models are compatible with Beta, VHS, 3/4" and 1" formats.
- motion blur** 1. Generally, motion blur is an effect caused by integration. Put more simply, it is normally caused by the image being composed from a sum of the latest image plus a smaller portion of the previous sum and so on. The result of this is that moving objects leave a trail behind them, giving rise to a blurred appearance. Such an artifact is normally associated with two-field standards conversion or tube cameras. 2. As a digital video effect, the above artifact may be generated deliberately.
- motion compensation** 1. A video compression technique that makes use of the redundancy between adjacent frames of motion video. 2. Scheme of video signal processing (e.g., standards conversion), involving the use of motion vectors to skew the filtering axis (e.g., the interpolation axis) by correspondingly shifting parts of the source TV fields.
- motion detection** Operation of video signal processing aimed to produce an output indicating the pixels or groups of pixels which belong to moving objects as opposed to static portions of the picture. Syn.: motion recognition.
- motion detector** See *MUSE-6 system*.
- motion estimation** A calculation to figure out where an object has moved to from one video field or frame to the other; operation of video signal processing designed to produce a motion vector signal. Motion estimation is an integral part of MPEG.
- Motion JPEG** JPEG compression or decompression is applied real-time to video at up to 50 or 60 fields per second. Each field or frame of video is individually processed.
- motion portrayal** Ability of TV system or device to reproduce the moving objects in a TV picture without visible artifacts.
- motion processor**, HDMAC. See *Bandwidth reduction, EU-95*.
- motion recognition** See *Motion detection*.
- motion resolution** Resolution when there is a movement in the TV picture, for example, when the camera is zooming or panning. Syn.: dynamic resolution.
- motion vector** A two-component signal showing the magnitude and direction of moving object displacement over a given time interval—for example, between two TV fields. Usually represented in Cartesian coordinates, but could equally well be represented in polar notation.
- motion video** Video which displays real motion. It is accomplished by displaying a sequence of images (frames) rapidly enough that the eye sees the image as a continuously moving picture.
- mousey** See *Mousy*.
- mousey** Also mousey. Pale in color, weak.
- MOV** The file extension used by MooV format video files on Windows. These MOV files are generated with Apple Computer's QuickTime and played on Windows systems via QuickTime for Windows.
- movie** A film, a moving picture, shown in a movie theater, on TV, or elsewhere.
- movie of the week (MOW)** A theatrical film or a made-for-TV film shown weekly on TV.
- movieola** See *Moviola*.
- movie rating systems** Organized procedures for classifying motion pictures according to content. The ratings (according to the MPAA — Motion Picture Association of America) are: G (General audience—all are admitted); PG (Parental Guidance suggested—some material may not be suitable for children); PG-13 (Parental Guidance suggested—no one under 13 admitted); R (Restricted—youth under 17 must be accompanied by a parent or adult guardian); and X—no one under 17 admitted. The ratings are often published in TV and cable program guides and are usually placed on videocassette boxes and on advertising and POP (point of purchase) displays. Another rating system has been developed by the Film Advisory Board (FAB), a Los-Angeles-based group of producers and interested citizens. Its system has been adopted by those who believe the MPAA ratings do not go far enough in describing a film. The FAB has six major designations: C—Children through age 7; F—Family; M—Mature; VM—Very Mature; EM—Extremely Mature; and AO—Adults 18 and Older. In addition the FAB-printed labels on cassettes boxes add descriptions such as "frontal nudity," "extreme language," "substance abuse," "violence," and "erotica."
- moving dots** See *Cross-luminance*.
- moving matte insert** Overlay.
- moving shot** A filming or videotaping technique in

## Moviola

which the camera follows the action; also called action shot, follow shot, or running shot.

**Moviola** The trade name for an upright film-editing machine that reproduces film in miniature. The generic spelling for this type of machine—which also reproduces sound—is movieola. Though once ubiquitous in film-editing rooms, the Moviola has been replaced by flatbed editing machines, or horizontal tables, and also by videotape editing processes.

**mozaic** Alternate spelling of mosaic.

**MPEG** Motion Picture Experts Group. A moving image compression standard that can compress video better than JPEG and still maintain a high image quality. MPEG uses an interframe compression scheme, where only one frame every half second is fully recorded; only the changes between frames are then noted. MPEG is designed to be a distribution format and is not designed for use in video editing systems.

**MPEG++** See *Advanced digital television*.

**MPEG-1** Standard for compressing TV pictures into digital code which runs at up to 1.5 megabits/s. Used in video CD players. MPEG-1 was a transitional specification to be replaced by MPEG-2.

**MPEG-2** Digital video compression standard using similar coding techniques (as MPEG-1) to handle data rates of between 4 and 8 megabits/s. MPEG-2 extends the MPEG-1 standard to cover a wider range of applications. This standard, established by the ISO's Motion Picture Experts Group, is currently favored for international use in pay-TV, domestic digital video recording, video mail, digital video editing and computer-based video. Used in VCRs and, since 1994, in DVD players, digital cable, satellite, and over-the-air (OTA) standards.

**MPEG-3** MPEG-3 was originally targeted for HDTV applications. This was incorporated into MPEG-2.

**MPEG-4** Object-based audiovisual coding. This standard is expected to serve as an enabling technology for the convergence of broadcast and interactivity. Previous MPEG standards had an obvious application; MPEG-1 was for video CDs and MPEG-2 for digital TVs. There is interest in using MPEG-4 for digital cable and satellite applications since it uses about one-half the bit rate of MPEG-2 for similar video quality. See *MSDL*.

**MPEG 4:2:2** Also referred to as Studio MPEG, Professional MPEG and 442P@ML. Sony's Betacam SX is based on MPEG 4:2:2. See *MPEG-2*.

**MPEG-7** MPEG-7 standardizes the description of multimedia material (referred to as metadata), such as still pictures, audio, and video, regardless if locally stored, in a remote database, or broadcast. Examples are finding a scene in a movie, finding a song in a database, or selecting a broadcast channel. The searcher for an image can use a sketch or a general description. Music can be found using a "query by humming" format.

**MPEG-21** The Motion Picture Experts Group's attempt to get a handle on the overall topic of content delivery. By defining a Multimedia Framework from the viewpoint of the consumer, they hope to understand how various components relate to each other and where gaps in the infrastructure might benefit from new standards.

**MPEG IMX** Sony's trademark for a family of devices, such as DVTRs, that are I frame-only 50 Mbps MPEG-2 streams using Betacam style cassettes. Plays Digital Betacam, Betacam SX, Betacam SP, Betacam, and, MPEG IMX, outputting 50 Mbps MPEG I-frame on SDTI-CP regardless of the tape being played. It can also handle other (lower) input and output data rates, but the recordings are 50 Mbps I-frame in any case.

**MPEG splicing** The ability to cut into an MPEG bit stream for switching and editing, regardless of type of frames (I, B, P).

**MPX** 1. Multiplex. 2. Jacks on TVs and VCRs that allow connection of an optional MTS adapter.

**MRFA** Broadband RF amp for TV applications in the 470- to 860-MHz range; Motorola, Phoenix, Arizona. The amp module is specified at 26.5 V with an output power of 25 W minimum at 1-dB compression and a 10.5-dB minimum small signal gain. However, it can operate at 28 V.

**MSB** Most significant bit, or the bit that has the most value in a binary number or data byte. In written form, this is the bit on the left.

**MSD** Multistandard color decoder.

**MSDL** MPEG-4 Syntactic Descriptive Language. The language of the MPEG-4 standard. A set of tools used in the MSDL includes not just motion compensation but contour representation and other techniques that allow scalable bit rates and hierarchical decoding and display of objects.

**MSO** The abbreviation for Multiple System Operator (also Multi-Station Operator) or CATV owner. Larger cable companies like Teleprompter, Warner Amex and ATC actually own and control many cable systems. Cf. *SSO*.

**MS Principle** Mid-Side Principle.

**MSPS** Megasample per second.

**MTF** Modulation transfer function.

**MTS** Multichannel Television Sound. Implemented EIA standard for stereo TV reception in the US comprised of a decoding system developed by Zenith and DBX noise reduction. MTS-equipped TVs and VCRs receive both stereo TV broadcasts and second audio programs (SAP), which feature an additional audio track for simultaneous second-language translations.

**MTS decoder** That part of a VCR or stereo TV receiver that produces stereo separation, measured in dB. In addition, the quality of a decoder depends on its S/N ratio and frequency response. Because they are difficult to align at the factory, many MTS decoders leave something to be desired in stereo separation.



Separate units, sometimes called MTS/SAP decoders, are available for TV sets and monitor/receivers not equipped to receive stereo broadcasts.

**multibox** An electrical device that combines and regulates the flow of electricity and distributes a regulated or consistent audio feed. It is used by radio and TV crews, particularly at events with considerable equipment tapping into the speaker's lectern or other site.

**Multi- and Hypermedia Coding Experts Group (MHEG)** A standardized language for the description of interactive multimedia applications. As for WWW services, a protocol is needed for embedding the MHEG applications into a DVB or DAB datastream. For DVB, the Digital Storage Media Command Control (DSM-CC) protocol is used.

**multi-brand remote control** Multi-purpose remote control.

**multiburst** A test pattern for testing horizontal resolution of a video system. It consists of sets of vertical lines with closer and closer spacing.

**multi-burst chart** See *Video test chart*.

**multiburst waveform—NTSC VITS** This portion of the VITS, usually transmitted on line 17, field 1 in the vertical blanking interval, is composed of a series of six equal amplitude bursts covering a range of frequencies at typically 0.5, 1.5, 2.0, 3.0, 3.58 and 4.2 MHz. If signal amplitude varies across the frequency spectrum, this will be seen in the height of the bursts. A burst of peak white, known as the "white flag," is also transmitted as a white reference level.

**multicam** 1. The use of two or more cameras simultaneously to shoot a scene from more than one angle. 2. An early method of recording TV shows. Three film cameras were positioned in the studio and shot the show from different angles. They could be turned off or on at will but in many cases were simply kept running for the entire show. The resulting films were then edited, using three moviola machines. The quality of the finished film was vastly superior to the kinescope process.

**Multicast** 1. Data flow from single source to multiple destinations; a multicast may be distinguished from a broadcast in that the number of destinations may be limited. 2. A term often used incorrectly to describe digital television program multiplexing.

**multichannel multipoint distribution service (MMDS), CATV** See *Auxiliary Radio Services*. MMDS is allocated 48 MHz (eight amplitude-modulated TV channels), from 2596 to 2644 MHz, to transmit TV programs and data to customer-selected locations. It is used for the distribution of TV programs in sparsely populated areas where cable is uneconomical.

**multichannel television sound (MTS)** A system to transmit stereo, bilingual, and voice/data signals. The MTS system is compatible with current transmissions and mono receivers. The L+R portion or main chan-

nel of the MTS signal is identical to the current mono signal. The L+R signal has 75 ms pre-emphasis and deviates the aural carrier 25 kHz. The next component of the MTS signal is the 15.734-kHz stereo pilot carrier. The pilot carrier deviates the aural carrier 5 kHz and is used in the receiver to detect the L-R stereo sub-channel. The L-R sub-channel is an AM modulated double side band suppressed carrier signal and deviates the aural carrier 50 kHz. The SAP subcarrier is an FM-modulated, 10-kHz deviated signal centered at 78.670 kHz. The SAP subcarrier deviates the aural carrier 15 kHz. Both the L-R and SAP audio signals are DBX-encoded to reduce buzz and noise.

**multidimensional autofocus** A camcorder feature that provides uninterrupted focus from lens surface to infinity. This does away with the necessity for the conventional macro setting for extreme close-ups.

**multi-eye system** An autostereoscopic 3D-image system based on the number of observers. See *double-eye system*.

**multiformat** In video, a VCR that can play back videotapes recorded in foreign countries that have different broadcast signals from those in the US. Usually, such machines, which compensate for American and foreign differences in the number of scan lines and house-current cycles, can process signals from PAL or SECAM tapes.

**multiframe edit viewer** A method of showing a series of frames in sequence. The unit displays fixed multiple images, which can then be considered as edit points according to their sequence. The major benefit of multi-frame edit viewing is its doing away with the need to continually move the tape.

**multifunction display** Whenever an operation button is pressed, the activated function is immediately indicated on this easy-to-see display. It shows at a glance in what operation mode the VTR is functioning.

**multigrab** A very common budget digital video effect where the image is merely frozen for a determined period and then instantly updated at the beginning of the next period. Live images may sometimes be used in-between freezes. Syn.: skip-field; strobe; stroboscope.

**multigun tube** A CRT containing more than one electron gun. Color TV receivers use M-GTs, as do multiple-presentation oscilloscopes.

**multilevel chroma bar** Test signal in a form of color subcarrier modulated by staircase signal—i.e., the chroma amplitude rises in discrete steps along the TV line. This signal is usually on a gray level pedestal. Syn.: chrominance staircase.

**multimaster** In I2C-bus systems, more than one master can attempt to control the bus at the same time without corrupting the message.

**multimedia** The combination of multiple forms of media in the communication of information. Multi-

## Multimedia CD

media enables people to communicate using integrated media: audio, video, text, graphics, fax, and telephony. Multimedia communication formats vary, but they usually include voice communications (vocoding, speech recognition, speaker verification and text-to-speech), audio processing (music synthesis, CD-ROMs), data communications, image processing and telecommunications using LANs, MANs and WANs in ISDN and POTS networks. Two hot multimedia buzzwords are convergence, which tells you that TV sets, cable services, and telephones are getting more like PCs and vice versa, and nonlinear editing, which means that you'll no longer have to edit materials in their traditional a/b roll order.

**Multimedia CD (MMCD)** DVD system; Sony/Phillips.

**multimedia computer** A product that combines PC with digital video and audio.

**multimedia kit** A collection of items, such as filmstrips, posters, and videotapes, in one package, used in schools and elsewhere.

**multipass encoding** True multipass encoding is currently available only for WM8 and MPEG-2. An encoder supporting multipass will, in a first pass, analyze the video stream to be encoded and write down a log about everything it encounters. Let's assume we have a short clip that starts out in a dialog scene where we have few cuts and the camera remains static. Then it leads over to a karate fight with lots of fast cuts and a lot of action (people flying through the air, kicking, punching, etc.). In regular CBR, encoding every second gets more or less bitrate (it's hard to stay 100% CBR but that's a detail) whereas in multipass VBR mode the encoder will use the bitrate according to his knowledge about the video stream, i.e. the dialog part gets the available bitrate and the fighting scene gets allotted more bitrate. The more passes, the more refined the bitrate distribution will be. In single pass VBR, the encoder has to base his decisions on where to use how much bitrate solely on the knowledge of the stuff it previously has encoded.

**multipath** Multipath transmission.

**multipath reception** Reception in which the transmitter signals arrive at a receiving antenna over two or more paths, one direct and the others reflected from buildings or other obstacles. One result is ghosts in the TV picture.

**multipath transmission** The propagation phenomenon that results in signals reaching a receiving antenna by two or more paths, causing distortion in radio and ghost images in TV. At least one of the paths involves reflection from some object. It is also called multipath. Also multipath interference.

**multi-pin connector** A component with a predetermined number of metal pins attached between a video camera and a VCR. Each pin is assigned a special function—e.g., audio output, video ground, video signal input, etc. Early Beta recorders first used

a 10-pin connector but soon switched to and presently use a 14-pin system while VHS adopted the 10-pin configuration. Akai, although a VHS system, developed its own 7-pin connector. Not only are these systems incompatible, but all the pin functions of one 10-pin VHS camera connector do not necessarily match a VHS recorder. (Beta 14-pin connectors are standardized.) Some VCR manufacturers and independent companies sell adapters that permit attaching 14-pin connectors of Beta cameras to VHS recorders, which of course accept only 10-pin connectors.

**multiple-effects generator** An editing unit for post-production work that provides an array of professional functions. The machine features a special-effects generator for fades and wipes in dozens of patterns, a colorizer, an audio/video processor, a color processor and a genlock/power supply. The last item permits the user to dissolve from one video source to another.

**multiple-player video game system** A process using telephone lines or CATV systems to permit 2 to 10 players to participate in one video game.

**multiplex** To transmit two or more signals simultaneously on a single wire, bus, or channel. See also *Stereo adaptable*.

**Multiplexed Analog Component (MAC)** European analog standard for HDTV.

**multiplexed TV signal** In 3D-image display systems, picture/sound information + identification data. The multiplexed TV signal received by antenna is separated into an analog picture/sound signal and a data signal by a separating circuit.

**multiplexer (MUX, MXR)** 1. Electronic equipment that allows two or more signals to pass over one communications circuit. That "circuit" may be a phone line, a microwave circuit, or a through-the-air TV signal. That circuit may be analog or digital. There are many multiplexing techniques to accommodate both. 2. A multimedia device which permits dissolving or cutting from films to slides or any combination of these. Utilizing various lenses, prisms, beam splitters and mirrors, the multiplexer can handle many input sources simultaneously. 3. An optical system allowing a number of film and slide projectors to feed video information into the same TV camera.

**multiplexing** The combining of two or more independent signals into one transmission channel.

**multiplex output** A TV or monitor/receiver connector that permits adding a special audio adapter unit for receiving stereo TV programs.

**multiplier** Electron multiplier.

**multiplier focus** See *Persuader*.

**multi-point distribution service (MDS), CATV** The utilization of a microwave system of over-the-air, line-of-sight broadcasting of video programs over a single channel. MDS is allocated 10 MHz of spectrum space, from 2150 to 2160 MHz. It is a point-to-

multipoint service authorized to transmit single-channel video and data signals to customer-selected locations within a metropolitan area. Subscribers use specially equipped receivers to pick up MDS programs. This system differs from that of CATV or subscription TV. CATV uses coaxial cable while STV makes use of conventional VHF and UHF channels. MDS also differs from other microwave systems in that it transmits weaker signals in all different directions. The service is regulated by the FCC. See *Auxiliary Radio Services*.

**multipurpose remote control** A preprogrammed remote control pad that can "communicate" with a large variety of VCRs, DVD players, cable converter boxes and TV sets. Unlike other advanced remote controls, such as universal remotes, these multi-brand units, as they are sometimes called, cannot be "taught" the codes of other machines. Instead, they have been preprogrammed to work with many devices.

**multipurpose zoom lens** A video camera lens that offers several sophisticated features along with the conventional zoom function. Multi-purpose zoom lens provides automation for previously manual functions. For example, focus memory maintains the sharpness of the subject as it moves toward or away from the camera. Other features may include zoom memory, autofocus macro and auto framing.

**multiscreen digital freeze** A digital VCR feature that allows the viewer to fill the TV screen with several stationary images simultaneously. Bringing up this feature on the TV set does not affect the audio portion of the broadcast.

**multistage LNA** Three or more transistor amp stages placed end to end (cascaded) so that the gain contribution of each will add up to total gain of approximately 50 dB. In most LNAs, the first stage (closest to the antenna feed probe) has the best noise characteristics needed to minimize the noise propagated along through the remaining stages.

**multistage noise shaping** An enhancement built into some audio clips that transfers unwanted noise into inaudible portions of the frequency spectrum. This is accomplished by a digital-to-analog conversion process, sometimes referred to by its acronym, MASH.

**multistandard color decoder** A circuit to automatically select the standard of the received signal and decode it.

**multistandard switchable encoder** A feature generally found on a high-priced professional video camera designed with special outputs to accommodate other formats, such as Beta, S-VHS and MII.

**multistandard TV** A digitally equipped TV receiver capable of handling any video standard. Some of the lower-end NTSC/PAL TV sets have reduced all of the complex, sophisticated electronic circuitry to one chip.

**multistrobe** A digital VCR feature that continually and successively updates a series of strobes or still pictures generated on the TV screen by the strobe function.

**multitap** A device used in cable systems to select portions of the signal from the feeder cables to serve more than one subscriber from a single location. This electronic component is usually mounted at a telephone pole location and can provide service to two, four, or eight subscribers. It taps signals from the feeder cable that are then sent to each subscriber's home by cable drop lines.

**multivision** A system designed to feature simultaneously more than one image on the TV screen. Early experiments in the 1960s with multivision TV made no impact on the public. Sony offered a model with three black and white 9" picture tubes placed side by side; RCA followed with a 25" color set and three 10" black and white tubes in one cabinet. The concept was dropped until 1979, when Sharp introduced dualvision, a TV set which presented a second, smaller black and white image within its regular picture. In 1980 Sharp introduced a model in which nine different color channels could be viewed simultaneously, rotated or placed into Freeze Frame. See *PIP*.

**municipal cable TV** A CATV station owned by a local government. Fewer than three dozen exist of the more than 4,000 cable systems in the US. MCATV differs from CATV cooperatives, which are subscriber-owned.

**Munsell (also Munsel) chroma** See *Chroma*.

**Munsell color chip chart** A video test chart used to check the color-producing ability of a video camera. Used more frequently by professionals, the Munsell chart contains specially prepared strips of color similar to the familiar color bar signal that is generated electronically. The chart can be used in conjunction with a color vectorscope. The user first points the camera at the vectorscope, then aims it at the chart, noting any differences.

**Munsell color scale** A set of charts used in color TV to verify hue, brilliance, and chroma.

**Munsell value** The dimension, in the Munsell system of object-color specification, that indicates the apparent luminous transmittance or reflectance of the object on a scale which has approximately equal perceptual steps under the usual conditions of observation.

**MUSE** Multiple Sub-Nyquist Sampling Encoding. The Japanese bandwidth compression system to accommodate HDTV transmission within an existing satellite channel. This system was an adaptation of the NHK HDTV system for the DBS service in the 12-GHz band. It is known that the wide base bandwidth of the 1125-line NHK system (more than 20 MHz) cannot be accommodated by the satellite transponders unless the signal is compressed. The MUSE

## MUSE-6

system reduced the total video baseband requirement to 8.15 MHz, suitable for the DBS service. This conversion retained the full detail of the 1125-line image, but only when the scene was stationary. When motion occurred, the definition was reduced by about 50%. If a moving object appeared against a stationary background, this loss was often not too evident. But if the whole scene was in motion, as when the camera moves ("pans") to follow action, the whole image suffered a 50% loss of detail.

**MUSE-6** Also NHK MUSE-6. A single-channel NTSC-compatible EDTV system (6-MHz band). The MUSE-6 signal originated at the NHK standard of 1125 lines, interlaced 2:1 at 60 fields. For NTSC compatibility, the 60-Hz rate was transcoded to 59.94 Hz, and this rate was maintained throughout the remainder of the MUSE-6 system to the display. The parent MUSE system used time compression over three fields to reduce the baseband to 8.15 MHz. Since this exceeded the bandwidth available in the NTSC channel, an intermediate change of scanning from the total 1125 lines to 750 lines was encoded at the transmitter and reverse decoded at the receiver. The display on conventional receivers offered a 16:9 aspect ratio centered on the 4:3 frame, with 345 active lines. As in the parent system, the time compression used in MUSE-6 introduced a 2:1 loss in the horizontal resolution of moving objects. To control the transcoding when motion was present, a motion detector based on comparison of three successive fields generated a signal that disabled the high-frequency processing of moving objects. The motion detector was also used to control the 1125- to 750-line converter and the 60- to 59.94-Hz field converter. The sound signal was digitized at 32 Kb/s in 15-bit words, with redundant bits to bring the data rate to 585 Kb/s. After compression, the digital audio was inserted in the video waveform after the color burst. Overscan in conventional receivers was assumed to hide any evidence of the sound burst during active scanning. One stereo-pair sound channel was offered at 15 kHz upper limit. The receiver decoding was the inverse of the transmitter encoding, with the exception of the field-rate conversion, which was omitted since the MUSE-6 display operated at 59.94 fields. The display therefore offered only 999 frames for each 1000 frames scanned by the camera, and one frame in 1000 was discarded in the transmitter processing. This "frame-cut" operation took place under the control of the motion detector when there was a switch between cameras or when the scene was stationary or slowly mov-

ing. The omission of the frame was then not evident to the viewer. The MUSE-6 system was designed to operate as a part of the MUSE-9 system.

**MUSE-9** Also NHK MUSE-9. A wide-channel NTSC-compatible system. Two channel arrangements were proposed, the first with the 6-MHz and 3-MHz contiguous, the second with the two channels separate. In common with all the MUSE systems, the MUSE-9 system signal originated in the 1125/60/2:1 format (SMPTE 240M standard). In the MUSE-6 system, two audio channels of baseband 15 kHz were digitized at 32 Kb/s in 15-bit words that were compressed to an 8-bit pulse train. This is the A-MODE of sound transmission. The MUSE-9 augmentation channel provided two additional sound channels at a wider baseband of 20 kHz, sampled at 48 Kb/s into 16-bit words. This is the B-MODE. The augmentation channel transmitted the higher frequencies, so that two channels of B-MODE quality were available in the MUSE-9 receiver, or four channels of A-MODE quality. The MUSE-9 receiver display operated at the same rates as the MUSE-6 receiver (1125/59.94/2:1), with the additional moving-area horizontal resolution.

**music cues** Directions that indicate the volume, level, starting and stopping time, and other changes for music used in films or TV. Music down is an instruction to reduce the volume; music fade, to reduce it slowly until inaudible; music in, to start; music in and under, to start and then reduce (also called music up and under); music out, to stop; and music up and out, to increase and then stop.

**music/voice switch** A tone control feature on some TV monitor/receivers. The music/voice switch is designed to provide the full frequency range of the audio system in the Music mode. When the switch is placed in the Voice or Speech position, the bass and treble responses are modified to minimize hiss and sharpen voices.

**muting circuit** An electronic feature built into virtually all VCRs to minimize instability or noise in the video signal. Some older model machines go to a blank screen rather than display signal deterioration such as picture break-up. However, in newer VCRs, this muting lasts for a fraction of a second.

**mux** Multiplexer.

**M VTS** Marconi Video Telephone Standard sends color pictures over regular phone lines at up to 10 frames per second at 14.4 Kbps. The MCI Video Phone, which conforms to this standard, has a resolution of 128 by 96 pixels.

**MXR** Multiplexer.

**N** 1. CATV superband channel, 240-246 MHz. 2. TV standard; Argentina, Uruguay. Characteristics: 625 lines/frame, 50 fields/s, interlace-2:1, video band-4.2 MHz, RF band-MHz.

**NABTS** North American Basic Teletext Specification; North American Broadcast Teletext Specification (EIA-516). This is also ITU-R BT.653 525-line system C teletext; however, the NABTS specification goes into much more detail. This document specifies both the acquisition protocol and the display format. The display format is NAPLS.

**Nagra Syster** Encryption system in European satellite TV, the only one that is still relatively secure from signal hackers.

**NAM** Non-additive mix. A type of mix where the output at any point in the picture consists exclusively of which input signal had the greater amplitude. This is in contrast to a normal mix, which produces a linear sum of the inputs.

**NAPLS** ANSI X3.110-1983 Videotex/Teletext Presentation Level protocol syntax. This is not a display standard. It applies to both TT and Videotex services.

**narration microphone** A second microphone built into a video camera. This auxiliary mic allows the videographer to record narration while shooting on location.

**narrow-band axis** The direction of the phasor that represents the coarse chrominance primary (the Q signal) in NTSC color TV; it has a bandwidth extending from 0 to 0.5 MHz.

**narrow bandwidth optical filter** A filter to pass only reflected light signals having the wavelength of the laser energy. Used in 3D TV systems with laser projectors.

**narrowcasting** A term applied to special- or limited-interest programming targeted at a small portion of viewers. For example, the Christian Network and other religious channels engage in narrowcasting, as opposed to broadcasting as carried by the major networks, ABC, CBS and NBC.

**Narrow-Muse system** Also NHK Narrow-Muse system. A single-channel noncompatible simulcast HDTV system. The NHK Muse family of systems contains two proposals intended for 6-MHz channels. The Muse-6 system is an NTSC-compatible system

that meets the requirements of the compatible service. The Narrow-Muse system, being a simulcast noncompatible proposal, uses more fully the resources of the 6-MHz HDTV channel. It was designed primarily for the terrestrial service, simulcast with a standard NTSC signal. Scanning (lines/field rate/fields per frame)-1125/60/2:1; aspect ratio-16:9. Dropped from consideration in the U.S. in 1993.

**National Electrical Code (NEC)** A comprehensive document detailing safety requirements for all types of electrical installations. In addition to setting safety standards for building wiring and associated grounding, the Code also contains a section on Radio and TV equipment—Article 810.

**National Television Standards Committee (NTSC)** The group originally responsible for setting standards for commercial TV broadcasting in the U.S., Canada, and Japan. Organized in the US in 1940, the NTSC in 1941 conceived the black and white TV standards and by 1953 the color TV standards. It decided upon 525 line scans made up of two fields of 262.5 lines each and at the rate of one frame (two fields) every 1/30 per second or 30 frames/s.

**navigation** The movement within a videotex system, such as from frame to frame, subject to subject, or database to database, based on menu choices.

**N connector** A device to connect coaxial cable that is commonly used in the TV industry, including a large screw-in N connector and a smaller twist-lock type—a baby N connector or BNC.

**NCTA** National Cable Television Association. A trade organization representing US cable-television carriers.

**NEC** National Electrical Code.

**neck** The narrow cylindrical section of the CRT used in TV sets and monitor/receivers. The neck extends from the funnel part of the tube to its base and contains the electron gun.

**negative booster** See *Booster*.

**negative image** An image in which white areas are reproduced as black and black areas as white as in negative photographic film. The effect can occur in TV images when, for example, the picture tube has low emission.

**negative match back** A phrase used in TV produc-

## negative modulation

tion editing, when the original footage was shot on film. The edge numbers on the film are transferred to the video time code on the videotape. Rough editing is completed on film. The matching numbers make the process easy.

**negative modulation** (US: downward modulation) In TV, transmission amplitude modulation in which increased picture brightness results in decreased carrier amplitude. This technique is employed to attenuate the energy transmission or bright images. Overly bright scenes, otherwise, tend to cause buzzing. Negative modulation is the system of modulation used in the American 525-line, in the British 625-line and in most of the world's TV systems. Also called negative transmission.

**negative picture phase** The video signal phase in which the signal voltage swings in a negative direction for an increase in brilliance.

**negative/positive image switch** See *Image reversal*.

**negative transmission** Negative modulation.

**nematic liquid crystal** A liquid-crystal material whose elongated molecules are parallel to each other but are not in layers. Used in pocket TV sets. See also *Smectic Crystal*, *Supertwisted nematic* and *Twisted-nematic liquid-crystal display*.

**Nesmith, Michael** Creator of the first prerecorded stereo videocassette. Produced by Pacific Art, it was released in 1981.

**network** 1. A group of radio and TV stations that are interconnected by cable or microwave link so that they can broadcast the same program simultaneously. 2. A group of devices such as radio transceivers that are organized to form a large system. 3. A group of computers or terminals coupled together to form a system such as a local area network (LAN) or wide area network (WAN).

**network identification** The name of identification of a radio or TV network, made at the beginning of each hour and/or the beginning and end of network programs.

**neutral angle** A camera angle with the action directly in front of the camera at about eye level.

**neutral color** A color without hue, matching other colors well, as gray does. A neutral-density filter is a gray filter that reduces exposure.

**neutral-density faceplate** A TV picture-tube faceplate into which a neutral-density filter has been incorporated to increase picture contrast by attenuating external light reflected from the screen. Reflected light must pass through the filter twice and be doubly attenuated, whereas the desired light from the screen passes through only once.

**neutral-density filter** (NDF) An optical filter that reduces the intensity of light without appreciably changing its color. Also called a gray filter. 2. A transparent piece of smoked glass (or similar substance) placed on the front of the lens to restrict the amount of light entering it, thus affecting the sensitivity range

of the video camera. For instance, without an NDF, the sensitivity range may be from 5 to 6500 fc; with the filter in place, the range may drop to 40-50,000 fc. A NDF is sometimes built into a camera, in which case it is activated by a switch. It is used in very bright light such as snow scenes to give more flexibility to the iris, which otherwise would be almost closed. Another use of the filter is to shorten the depth of field. Since the iris must be opened wider when the filter is in place, only the subject focused upon will be sharp while objects in the foreground and background will be deliberately thrown out of focus. NDFs are sold in a variety of ranges that require the lens to increase its F-stop one or more openings. See also *Neutral-density faceplate*.

**neutral gray** Any level of gray with no color or hue.

**New Chroma Set** See *SMPTE [color] bars*.

**new edge** An all-encompassing term describing the new technology and movement that promises to revolutionize communications and entertainment in the 21st century.

**Newvicon** An image pickup tube designed by RCA and manufactured by Matsushita known for its low-light capabilities and its resistance to burn. It helps to reduce smear, blooming and image retention. In home camcorders, camera tubes are replaced with CCDs.

**next function** A feature, found on some VCRs, that allows the user to switch directly from Rewind to another mode. When Rewind is pressed, followed by another selected mode such as Eject or Play, the "next memory function," as it is sometimes called, will activate the unit to rewind the tape and then proceed to automatically execute the second function.

**NexTVview** An electronic program guide (EPG) based on ETSI ETS 300 707.

**NF** Noise Figure.

**NHK** Nippon Hoso Kyokai. Japan Broadcasting Company.

**NHK Muse-6 System** See *MUSE-6 system*.

**NHK Muse-9 System** See *MUSE-9 system*.

**NHK Narrow-Muse System** See *Narrow-Muse system*.

**NICAM 728** A technique of implementing digital stereo audio for PAL video using another audio subcarrier. The bit rate is 728 kbps. It is discussed in BS.707 and ETSI EN 300 163. NICAM 728 is also used to transmit non-audio digital data in China.

**nickel-cadmium battery** A battery used with portable VCRs and most camcorders that can be charged in less than two hours. The NiCad battery is more expensive than the alternative battery, the lead acid type, also found in portable systems.

**nicol prism** A prism made by cementing together two pieces of transparent crystalline Iceland spar with Canada balsam. It produces plane-polarized light from ordinary unpolarized light by eliminating the



ordinary component of the original light by total reflection at the cementing layer. Only the extraordinary component passes.

**Nipkow disc** Mechanical scanning device used in early experiments in TV. It consists of a disc containing a number of apertures arranged on a spiral path. The scene to be televised is illuminated by light which passes through these apertures so that, as the disc revolves, the scene is scanned. Light reflected from the scene is picked up by photocells, the output of which is the required picture signal. The system was used in the BBC 30-line TV experiments in the late 1920s.

**NN** CATV hyperband channel, 378-384 MHz.

**Noctovision** A TV system that views an infrared (IR) image rather than a visible light image and is sometimes used at night. A specially designed IR-sensitive camera tube produces a video signal that can be detected by a standard receiver.

**noise** In general any unwanted signals within the useful frequency band of a communications system that tend to obscure the wanted signal. This is a wide definition and embraces a variety of man-made noises such as mains hum, signals from other channels arising from inadequate selectivity or poor image rejection, cross modulation, etc.; it also includes naturally generated signals arising from lightning flashes. Signals from such causes are better termed interference so that the term noise is reserved for signals which arise in components and active devices and are known as random noise. Such signals are termed noise because they are heard as undesired sound when reproduced by an acoustic transducer but the term is retained for signals which cause spurious detail on the screen of a CRT. Random noise from components is known as thermal noise or Johnson noise and from active devices is known as shot noise or partition noise. Even if all sources of man-made noise can be eliminated there still remains random noise and the level of this noise determines the amplitude of the weakest signal which can be successfully transmitted through a communications system. Wanted signals must exceed the noise level by a margin that ensures that the noise does not impair the intelligibility of the signal unduly or the enjoyment of the program. Thus the noise level and the signal-to-noise ratio are two important properties of a communications system. In TV, noise usually means random or thermal noise of a type that produces "snow" in a TV image. See *Video noise*.

**noise bar** A horizontal line across the TV screen, usually caused by misalignment of video heads and tape. Noise bars often occur in special effects mode such as fast search or freeze frame. Some VCRs are relatively free from these noise bars, also known as interference, noise or video noise. These machines accomplish this in one of two ways. Some have four video heads, two for recording and playing back a

program in one of the normal tape speeds and the other two heads for playing back special effects. Other VCRs have adopted digital recording, as opposed to analog recording, to eliminate the annoying noise bars and produce a better image generally.

**noise figure** Measurement of noise contribution of an amplifier relative to a noise-free amp at a reference temperature; dB.

**noise limiter** In a radio or TV receiver, a circuit used to reduce the effect of impulsive noise signals on the sound or picture output. Typically the circuit includes a series diode situated at the output of the detector and is so biased that it remains conductive for all normal amplitudes of sound or video signal but becomes nonconductive so interrupting the wanted signal for the duration of any noise pulse exceeding a pre-determined amplitude. The resulting interruptions are normally so brief that their subjective effect is negligible.

**noise reduction system (NRS)** A system designed to improve the sound quality of an audio or video unit by cutting down on the amount of hiss, thereby removing most of the noise without affecting high frequency response. There are various kinds of audio NRSs: Dolby, CX, dbx, Dynamic Noise Filter (DNF), Dynamic Noise Reduction (DNR), etc. Most NRSs operate on a compression/expansion principle. Each system, however, goes about this in a different way. DNR and DNF are unlike the others listed above, which mainly expand audio signals during recording and condense them during playback. Instead, these two systems employ a dynamic filter which eliminates high frequencies (mostly noise or hiss) whenever the signal is not strong enough to cover this noise; but when the signal does cover the hiss, the filter lets the high frequencies through. Another way in which DNR and DNF differ is that they function only in playback to minimize existing noise while Dolby and most of the other cannot reduce noise already in the signal. They have to be utilized during recording and playback, encoding and decoding the signal.

**noise temperature** Noise measurement of a system, as the absolute temperature of a resistive source delivering equal noise power; degrees K.

**nominal viewing distance** Distance between viewer and TV picture at which the TV raster line structure becomes invisible. E.g., for 625-line systems the recommended viewing distance is from five to seven times screen height.

**nominal white level** Level of video signal corresponding to the white areas of a TV picture with nominal brightness. It depends on the color TV system and usually serves as a 100% reference level to calibrate the gains and settings of measurement devices. Syn.: reference white level; white level.

**non-additive mix (NAM)** A type of mix where the output at any point in the picture consists exclu-

## noncomposite color-picture signal

sively of whichever input signal had the greater amplitude. This is in contrast to a normal mix which, produces a linear sum of the inputs.

**noncomposite color-picture signal** (US) In TV, the signal that comprises full color-picture information, including the color burst and blanking information but excluding the synchronizing signals. When TV pictures are generated and processed within the technical area of a studio, it is not always necessary for the picture signal to be accompanied by synchronizing signals. Where a number of picture sources have to be handled within a studio area, an economy can be made by providing comp sync signals only at the final processing point. This non-composite mode of operation has the advantage that sync distribution requirements are reduced to a minimum, with resultant installation economy. Also, when the comp sync is finally added to the picture waveform, no stripping of existing sync is required. This process of sync stripping always gives rise to some degree of picture distortion, and the fewer times it is performed, the better is the resultant picture quality. On the other hand, preview monitoring of the various picture sources within the studio complex demands either comp sync feeds to the monitors, or comp video signals from the picture sources. Owing to the number of monitors involved, the composite video mode of operation is usually adopted.

**nondrop** SMPTE time code format for black and white video signal (30 fr/s). See also *Drop frame*.

**noninterlaced** 1. Refers to displays and video standards that do not use interlacing techniques to improve resolution. This is the standard system used in computer monitor displays. 2. An enhanced scanning system utilized by some manufacturers of IDTV. This system doubles the number of scan lines (from 262.5 to 525 every 1/60 s for NTSC). The result reportedly improves vertical resolution by eliminating the visible spaces between scan lines. Viewers of conventional TV images are often distracted by the horizontal lines that make up a screen image, particularly on larger sets. Instead of presenting two separate groups of lines (each composed of 262.5 lines for NTSC), one following the other, noninterlaced display produces both sets of lines at one time. This creates a picture of greater density. See *Progressive scanning*.

**nonlinear** A term used to refer to both editing and storage of video, audio, and data. Information (footage, data, etc.) is available anywhere on the media immediately, with no waiting to locate the desired information as in a time linear format.

**nonlinear distortion** See *Distortion*.

**nonlinear electronic editing** A process that does not limit the editor to follow a particular order or length of events in assembling a finished tape. Advanced editing techniques and digital editing consoles allow designated sequences to be stored in memory

until the final sequence is ready. The editing console then reproduces the selected sequence from the original material onto a different tape on another deck. An early nonlinear editing system used a computer disc that stored the scenes to be edited. The disk provided almost instant access to any point. These systems are both time-savers and creative devices. Some nonlinear editing systems, sometimes referred to as tape-free editing systems, use a storage system of several laserdiscs. Selected dialogue, effects and music can be recorded directly onto the discs from videotape without external facilities. Each video frame and sound bite is then instantly available to the editor by way of a keyboard and a control wheel.

**non-return-to-zero** (NRZ) A binary encoding scheme in which ones and zeroes are represented by opposite and alternating high and low voltages and where there is no return to a zero (reference) voltage between encoded bits.

**non-return-to-zero-inverted** (NRZI) A binary encoding scheme that inverts the signal on a "one" and leaves the signal unchanged for a "zero," where a change in the voltage signals a "one" bit, and the absence of a change denotes a "zero" bit value. Also called transition coding.

**nonstorage camera tube** A TV camera tube whose picture signal is at each instant proportional to the intensity of the illumination on the corresponding elemental area of the scene at that instant.

**nontransitional digital video effects** Refers to correcting visual errors that appear on original videotape by using special equipment such as a digital video effects system during post-production editing. A video camera operator may inadvertently pick up on tape an unwanted shadow, window glare or part of an overhead microphone. The DVE system allows the editor to eliminate these intrusions by enlarging the picture until the intrusive image is no longer in view. This type of function differs from transitional digital video effects.

**normal lens** A subjective evaluation of the angle of view of a lens; a normal lens is one that is neither wide angle nor telephoto. See *Fixed focus lens*.

**North American Basic Teletext Specification** (NABTS) A standard that specifies the coding system for services. It is based on the videotex standard developed by the ANSI and CSA.

**notch filter** 1. A band-rejection filter that produces a sharp notch in its frequency response curve of a system. In TV transmitters it provides attenuation at the low-frequency end of the channel to prevent possible interference with the sound carrier of the next lower channel. 2. A TV monitor/receiver circuit that helps to eliminate horizontal interference of video noise that occasionally shows up on the edge of the screen. The notch filter suppresses an annoying frequency segment of the chrominance signal

- that often affects color contrast. Since these filters may also affect the sharpness of the screen image, some manufacturers add a manual notch filter switch to the monitor. See also *Op amp active notch filter*.
- NRZ** Non-return to zero. A coding scheme that is polarity sensitive; usually a low signal level means logical "0" and high level means logical "1." This coding scheme suffers the disadvantage that it contains frequency components from D.C. and is thus unsuitable for many applications. An example of NRZ is a simple RS232 serial data link.
- NRZI** Non-return to zero inverse. A scrambling scheme that is polarity insensitive; usually a low signal level means no change in logical values and high level means transition from one logical value to another, for example, from "0" to "1" or from "1" to "0." This coding scheme has the advantage that it contains no D.C. component, which makes it more suitable for the majority of applications.
- NTC-7 combination** Vertical interval test signal specified by NTC (a US body) for the NTSC system. It combines the feature of VITS test lines CCIR-18 and CCIR-331. Syn.: NTC combination.
- NTC-7 composite** Vertical interval test signal specified by NTC (a US body) for the NTSC system. Similar to VITS test line CCIR-330. Syn.: NTC composite.
- NTC combination** See *NTC-7 combination*.
- NTC composite** See *NTC-7 composite*.
- NTSC** National Television Systems Committee, the standardizing body that in 1953 created the color TV standards for the USA. This system is called the NTSC color TV system.
- NTSC-4.43** Nonbroadcast color TV system primarily used when certain PAL equipment is used for playing back consumer NTSC tapes with the color-under subcarrier heterodyning to 4.43 MHz instead of 3.58 MHz.
- NTSC-7** See *VITS*.
- NTSC, basic TV receiver** A signal enters via either the VHF or UHF terminals and is connected to the appropriate tuner. This circuit component is responsible for selecting one channel or frequency band. An NTSC VHF tuner must be capable of spanning the range from 54 to 216 MHz or from 54 to 456 MHz for cable-ready receivers. A UHF tuner accepts frequencies ranging from 470 to 806 MHz. The output of either the VHF or UHF tuner is a common IF of 45.75 MHz centered on any selected 6 MHz channel. This IF is bandpass filtered to remove any unwanted signals from adjacent channels. The signal is fed to a detector which extracts the composite baseband signal. The signal is then filtered to remove the 4.5 MHz audio subcarrier. Prior to filtering, a portion of this video signal is tapped off and sent to the audio detection circuitry. Once the 4.5 MHz subcarrier is isolated and demodulated, it is filtered and amplified and fed to a speaker. The "clean" composite video baseband signal then enters a chroma demodulator that separates the difference signals into the three basic color signal components. These RGB signals drive the TV tube electron beams and display the picture. A sample of this video signal is also fed to the synchronizing circuits. The timing pulses, which are an integral part of the signal, are stripped away in the sync separator. These send correct voltages to the deflection circuitry to produce the organized picture scanning.
- NTSC, color TV signal** The three raw color signals (RGB) from a TV camera are combined to create the luminance signal (Y) and two difference signals (I and Q or U and V). The luminance information is sufficient to recreate a black and white picture. The difference signals are modulated onto two 3.58-MHz carriers having phases differing by 90 degrees and then are combined to form the color signal (C). The Y and C signals are mixed together into the baseband composite video signal for modulation onto an RF subcarrier. The 3.58 MHz subcarrier must be relayed along with the composite signal so that the raw color signals can be properly extracted from the difference signals.
- NTSC compatible** Any HDTV system that will operate with NTSC signals.
- numeric keypad** That pad of a remote control containing the 10 numeric keys designed to operate various functions. With a VCR or TV set, for example, the chief function of the numeric keypad is to change channels. With a VDP, on the other hand, the keypad serves to control direct chapter and track search.
- nut** The total cost of a radio or TV program, production, or sponsorship.
- NVOD** Near video on demand. Rapid access to program material on demand handled by providing the same program material on several channels with staggered start times.
- Nx384** N-by 384. The CCITT's approach to creating a standard algorithm for video codec interoperability. It is based on the CCITT's HO switched digital network standard, which was expanded into the Px64 or H.261 standard, approved in 1990.
- NYIT** New York Institute of Technology.
- NYIT/Glenn vista system** See *Vista system*.
- Nyquist frequency** The minimum sampling frequency for correct digital reproduction of a given signal (twice the signal bandwidth). Also Nyquist rate.
- Nyquist limit** In sampling, the highest frequency of input signal that can be correctly sampled. The Nyquist limit is less than one-half of the sampling frequency. A definite rule must be observed in sampling an analog signal if it is to be reproduced without spurious effects, known as aliasing. That rule is that the time between samples must be short compared to the rates of change of the analog waveform. Nyquist first stated this rule in 1924. In video terms, the sampling rate in megasamples/s must be

## Nyquist theorem

at least twice the maximum frequency in MHz of the analog signal. Thus, the 4.2 MHz maximum in the luminance spectrum of the NTSC baseband requires that the NTSC signal be sampled at least at 8.4 megasamples/s. Conversely, the 13.5 megasamples/s rate specified in the CCIR studio digital standard can be applied to a signal having no higher frequency component than 6.75 MHz. If studio equipment does exceed this limit, and many cameras and associated amps can do so, a low-pass filter must be inserted in the signal path before the conversion from analog to digital form takes place. A similar band limit must be met at 3.375 MHz in the chrominance channels before they are digitized. If the sampling occurs at a rate lower than the Nyquist limit, the spectrum of the output analog signal contains spurious components, which are actually

higher-frequency copies of the input spectrum that have been moved down so that they overlap the desired output spectrum. When this output analog signal is displayed, the spurious information shows up in a variety of forms, depending on the subject matter and its motions. Moire patterns are typical, as are distorted and randomly moving diagonal edges of objects. These aliasing effects often cover large areas and are visible at normal viewing distances, so care must be taken to meet or exceed the Nyquist limit in all analog-to-digital conversions.

**Nyquist theorem** In communication theory, a formula stating that two samples per cycle is sufficient to characterize an analog signal. In other words, the sampling rate must be twice the highest frequency component of the signal. See *Nyquist limit*.

**Nyquist volume** See *Spatiotemporal analysis*.

# O

**O** CATV superband channel, 246-252 MHz.

**OAB** Office Automation Board.

**objective lens** The first lens through which rays pass in an optical or electronic lens system.

**O.C.** Also OC. On Camera. Action in front of a TV camera, visible to the audience. In a TV script, a direction indicating on which person or scene the camera is focused.

**OC3** Optical Carrier Level 3, a 155-Mbps ATM SONET signal stream that can carry three DS3 signals.

**OCS** Osborne Compression System.

**octal code** A base-8 number system, which uses just eight unique symbols: 0,1,2,3,4,5,6,7. In the octal system, the binary numbers are defined in groups of three and assigned decimal numbers in sequence (8 and 9 are omitted). Most digital TV systems use 8-bit words that can identify 256 values. This is usually adequate for the video signal itself, but it is sometimes desirable to go to 10-bit words for the transmission of data or auxiliary functions, as 10-bit words can identify 1024 values.

**octave** A doubling of the frequency; for example, the audio frequency range is about 10 octaves (20 Hz to 20 kHz), and the approximate range of video frequencies to be recorded and played back for TV video is 30 Hz to 4.5 MHz, or 18 octaves.

**octopus cable** Any cable with a number of different jacks at one or both ends; a cable that allows two pieces of video equipment with dissimilar jacks to be interfaced.

**odd field** Field with odd number in the interlaced field sequence.

**odd-line interlace** Interlace in which each field contains an extra half-line. Thus, in the standard 525-line TV picture, each field contains 262.5 lines.

**oe** See *Oersted*.

**o/e** Optic-to-electric conversion.

**OEM** Original equipment manufacturer. A company that produces units for other companies. For example, Hitachi supplies Pioneer with its VCRs, whereas Matsushita makes VCRs for General Electric, Magnavox, Panasonic and other companies.

**oersted** (Oe) The unit of magnetic field strength H in the CGS system until 1930, when it was replaced by ampere/m as the SI unit.

**oersteds of coercivity** Refers to the density of particles of a videotape; thus it is a method of measuring the ability of tape to store information.

**off air** A program received via conventional radio or TV and not via cable. "Off the air" refers to the ending of the transmission of a program or the termination of a program.

**off-air video recording** The practice and the right of the public to record TV programs off the air from broadcast stations for later viewing in the home.

**office automation board** (OAB) See *Electronic blackboard*.

**off-line editing** Refers to the reorganizing of material on a videotape in preparation for editing but without actually recording the new arrangement. This may be done by electronically marking different segments of the tape or by composing a list of them. Usually a rough cut is produced which can be referred to in a high-quality on-line suite, reducing decision-making time in the more expensive on-line environment. See *On-line editing*.

**offset binary code** A code that can express negative numbers in a digital format. This is achieved by adding a fixed amount to the analog signal before it is sampled and quantized so that the sum is always positive. In the CCIR-601 standard, for example, the blanking level for the analog color difference signals is set at the quantum level 128, and signal excursion is from 16 to 240. The corresponding binary numbers are 00010000 and 11110000 in the offset binary code. The offset binary code is also used for composite signals and to avoid clipping.

**offset-fed antenna** An antenna with a reflector that forms only part of a paraboloid of revolution, usually excluding the pole or apex, such that a front feed causes no aperture blockage. Used in satellite TV.

**offset signal** Signal sometimes encountered with CATV converters, MATV systems, home video games, and video recorders that falls in a range  $\pm 2$  MHz around the FCC assigned VHF broadcast channel frequencies.

**off-tape monitoring** A technique used in some professional video machines that permits viewing the videotape as it is being recorded. This is accomplished

## off the air

by employing two additional video heads utilized expressly for playing back the information as it is recorded. In copying tapes on home VCRs using two monitors, the picture played back from the set connected to the recording VCR is not the one being recorded, but the signals the VCR is receiving and transmitting to the TV set. Conventional home video recorders have two or four heads that either record or play back; they cannot do both simultaneously.

**off the air** 1. Refers to broadcasting through the airwaves and is used in radio and TV. TV viewers may pick up signals off the air instead of by coaxial cable through a cable system. 2. See *Off air*.

**off timer** A built-in clocktimer which may be set to turn off the TV after a preset time interval has elapsed.

**OIRT** French acronym for International Radio and Television Organization, headquartered in Prague. This was the Eastern Europe regional broadcasters' union. In 1993 it merged with EBU.

**omni** Short form for omnidirectional microphone.

**omnidirectional microphone** A microphone designed to respond to sound from all directions. It is particularly effective when recording more than one person in a scene. Used by most video cameras, the omnidirectional microphone is recommended for close recording.

**OMT** Orthogonal-Mode Transducer or ortho-coupler: waveguide component that separates or combines two orthogonally polarized signals. Used in satellite TV.

**on-air** An indication that a particular device is "on-line"—that is, its signal is being transmitted, it is monitoring an active signal, etc. This indication, usually a lamp or LED, can 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 mixer's program bus. Syn.: on-line.

**on-air switcher** The switcher used to determine what goes to the transmitter. It generally coordinates sources of finished production and sends output directly to the transmitter. The on-air switcher switches between various videotape machines, film chains, network feeds, satellite feeds, and the studio. These switchers are almost always audio-follows-video switchers. That means that when the technical director pushes a button on the switcher, it changes both the picture and the sound. On-air switchers usually have limited special effects capabilities; anything going to the transmitter is usually a finished product—there's little need for special effects at this stage.

**on-camera remote control** A feature on or added to a video camera for starting or stopping the VCR, switching between Record and Playback modes, using Forward and Reverse Visual Scan and operating Freeze Frame and Single-Frame Advance. Some

video cameras offer this unit as optional, in which case it is usually connected to the bottom of the camera or to a removable shoulder pod.

**on-deck** In TV, to be ready.

**on-deck camera** A TV camera whose picture is currently not being transmitted despite its readiness to become an on-air camera.

**on-demand streaming** Streaming media content transmitted to a client upon request.

**one-and-one-half heads principle** A system with a separate head that records the vertical information near the lower edge of the tape, used in teletext and systems with special signals inserted outside the regular picture area. The 1.5-heads system thus retains such special signals as VIR signals and VITs.

**one-inch** A helical scan VTR format that uses 1"-wide tape in an open-reel configuration and is close to 2" Quadraplex in broadcast quality.

**one-inch vidicon** A vidicon tube with a target area 1" in diameter.

**one-touch recording (OTR)** A convenience feature on many VCRs designed to provide a simple procedure for instant recording without the normal programming steps. With either the ordinary power or the timer on and the proper channel tuned in, each touch of the OTR button activates the Record mode for either 15 or 30 minutes. With some VCRs, the first touch of the OTR button activates the Record mode while each successive touch gives 30 minutes of recording time up to a total of 4 or 5 hours. These times vary, depending on the VCR. When OTR is pressed, all other functions cease to operate, as in the typical timer position of other machines.

**one-tube color camera** A color-capable video camera, which produces a color signal through the use of only one pickup tube.

**one up/many down** A TV or teleconference format with a single origination site and many receiving sites.

**on-lay** Keying mode when the mixer creates a key signal from the video that will itself eventually fill the hole. A common example is simple insertion of captions (generated with a black background) over the desired program output. In this case any luminance value above black can be easily detected to make a key signal for the captions. Syn.: self key.

**on-line** An indication that a particular device is active. This indication, usually a lamp or LED, can 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 mixer's program bus. Syn.: on-air.

**on-line editing** The final recording onto a videotape at full program quality based on rearranged material from an original tape. See *Off-line editing*.

**on-off keying (OOK)** A form of ASK, modulation mode used in digital TV transmission. Transmission speed: 0.8 bits/Hz.

**on-screen clock** A feature, found on some TV sets



and virtually all TV monitor/receivers, that presents the time and day in large figures, usually operated by a remote control button.

**on-screen display** A menu or set of menus of a TV or other component that appears on the screen and is designed to help perform certain operations. A TV monitor/receiver, for example, may include menus for current time set, on/off timer; video adjustments of hue, color, brightness and sharpness; or audio adjustments of treble, bass and balance—all tuned by remote control. A VCR display may include prompts for programming the timer or checking the day and time functions. These items and more are usually found on the remote control. Some of these menus have submenus for even more subtle adjustments.

**on-screen graphics** A picture-in-picture (PIP) display menu for the adjustment of the inset picture in addition to other on-screens displays.

**on-screen programming** A VCR feature that permits the machine to be set up for recording by menu displays on the TV screen. Usually operated by remote control, on-screen programming provides either summary-style menus or individual program menus. Other special features include flashing prompts that ask for the next item to be entered or a changing line that lists the possible options. Once a feature only of the more costly VCRs, the on-screen programming function has trickled down to less expensive models.

**on-screen prompt** A flashing or blinking sign or word that appears on the TV screen and is designed to cue the viewer to enter information. Usually part of a VCR's on-screen programming feature, the prompt shows up in conjunction with certain menus that make programming easier and virtually error-proof. Information may be entered from the remote control buttons.

**on the line** A term used in video production with a special effects generator (SEG) to identify the signal that is leaving the SEG for broadcast or recording; the camera signal being fed out of the SEG to VTR is said to be on the line.

**OO** CATV hyperband channel, 384-390 MHz. See TV channel assignments.

**O&O** Initials for a TV station that is "Owned and Operated" by one of the networks.

**OOK** On-off keying.

**op amp** Operational amplifier; a differential amplifier with very high gain, used in many circuits such as amplifiers, filters, etc.

**op amp active notch filter** A circuit that rejects all signals in a very narrow range, while passing all others, resulting in a sharp "notch" in the frequency response curve. This type of filter is found in TV circuitry, where it is used to sharply attenuate levels at one end of a channel's signal to prevent interference with the next channel.

**opaque projector** A projector that telecasts an enlarged image of flat material, such as printed pages of an open book, by using a light source that shines directly on the object; also called a balopticon. It is not the same as an overhead projector, which shines light through a transparency rather than an opaque object.

**opaque screen** A nontransparent—opaque—material on which an image is produced by reflected light from a projector in front of the screen (not rear projection screen).

**op-com** Optical communication.

**open architecture receiver** See *MIT-RC system*.

**open architecture television** A concept designed to do away with or limit TV obsolescence by allowing new circuit modules to replace old ones. The idea is to make the TV receiver so accessible that further advances in technology and equipment can be assigned to plug-in boards. These accessories, when inserted into TV sets, provide the receivers with the necessary improvements so that they do not have to be discarded.

**OpenCable** A project to make available a new generation of set-top boxes that are interoperable and enable a new range of interactive services to be provided to cable customers.

**open channel** A channel on a TV receiver or a VCR that is not occupied by a local broadcaster. In most communities channel 3 or 4 is considered an open channel and can be used for transmitting a signal from a VCR without interference or bleed through. Virtually all VCRs have a switch in the rear for selecting either of the two open channels.

**open information** Text, data, and images accessible to all videotex subscribers; hence, public information is open information. Examples are train and airline timetables, restaurant guides, and general news.

**open subtitles** See *subtitles*.

**OpenTV™** Digital interactive TV "operating environment" jointly developed by Sun Microsystems and Thomson Consumer Electronics. It provides "open interfaces" based on industry standards and protocols.

**open up** See *Stop down*.

**operating system (OS)** The underlying program that manages a computer or set-top box and designates control of the various functions for general-purpose use. Common examples of operating systems are Windows, Mac OS, Unix, and Linux.

**Optest** A computer-operated test and measurement system for devices such as video cameras and monitors; Genop, Ramat Gan, Israel. Optest reduces optical hardware use, operating via Windows.

**optic** 1. Pertaining to the eye. 2. Pertaining to the lenses, prisms, and mirrors of a camera, microscope, or other conventional optical instrument.

**optical** A reference to visible or near-visible light.

**optical amplifier** An optoelectronic amp whose elec-

## optical animation

tric input signal is converted to light, amplified as light, then converted back to an electric signal for the output.

**optical animation** A professional video technique using image processing and computer-generated programs to create animated screen images. The process usually provides sophisticated swooping and spinning enhancements along complex motion paths that provide professional results.

**optical axis** 1. The straight line that passes through the centers of curvature of the surfaces of a lens. Light rays passing along this direction are neither refracted nor reflected. 2. In a quartz crystal, the Z axis is the optical axis that runs lengthwise through the mother crystal from apex to apex.

**optical center** The point in a lens at which the image is collected to be focused on the image plane. The distance between the optical center of a lens and the image plane is described as the focal length.

**optical communication** (op-com) Communication over short distances with beams of visible, IR, or ultraviolet radiation, or over much longer distances with laser beams modulated by the information signals (speech, pictures, data pulses, etc.).

**optical disc or disk** A digital medium, also called an optical memory disc or optical storage disc, in which lasers are used to record and replay the datatext, graphics, images, or sound.

**optical flop** Flopover.

**optical illusion** A visually perceived image that is deceptive or misleading.

**optical memory disc** See *Optical disc*.

**optical recording** Refers to a device in which audio and video information is encoded by a laser beam onto a rotating disk and whose signal is read by a beam of laser light. Information is recorded on the media as a change in the material characteristics. The compact disk (CD) format and digital video disk (DVD) format are two examples.

**optical scanner** In video, a pen-like device used in conjunction with a programming card to transmit information to a VCR. Part of the bar code programming process, the optical scanner is used by the VCR owner to mark the day, time and channel to be recorded. The information is then sent by IR beam to the VCR and can be confirmed on the TV screen.

**optical stabilization**, camcorder. Compensates for the shake that is inevitable in hand-held shooting. Uses vari-angle prism and motion sensors. Unlike electronic image stabilizers, optical stabilization does not require a higher grade of image sensor to deliver the same resolution as nonstabilized cameras, and the image does not have the jittery pixel-movement artifacts often seen with electronic systems.

**optical storage disc** See *Optical disc*.

**optical viewfinder** A mechanical device on a video camera that gives an approximation of what the lens sees without any playback or review capabilities (as

compared to an electronic viewfinder). Similar to the viewfinder on less costly still cameras, it is usually found on the more inexpensive cameras. It provides no data about focusing or lighting. It can be supplemented by a TV monitor connected to the camera; however, this procedure limits mobility. Rarely used now. Other types of finders include the through-the-lens and electronic viewfinder, the latter being the most prevalent.

**optics** 1. The branch of science concerned with the phenomena of light and vision, involving the portion of the electromagnetic spectrum between microwaves and X-rays. This range includes ultraviolet, visible, and IR. 2. In film, TV, visual techniques to produce optical illusions; also called effects.

**opt out** The moment during a network news transmission or other live feed when a local radio or TV station has the option of discontinuing and returning to its own programming.

**Oracle** Optical Reception and Announcements by Coded Line Electronics, the teletext service of the Independent Broadcasting Authority in UK, replaced by Teletext Ltd.

**Oracle Media Net™** Software that distributes interactive multimedia services over the different wiring connecting to users, including twisted pair wires using asymmetrical digital subscriber line compression; coaxial and fiber-optic cable using ATM; and wireless connections.

**orbital arc** See *Orbital slot*.

**orbital slot** A fixed position of a satellite on the geosynchronous orbit identified by its longitude. By international agreement, each country is allocated an arc of the geosynchronous orbit for its satellites, and the slots within this arc are assigned to individual licensees by the country's regulatory authority, the FCC for the US. The US is allocated the arcs 62-103 and 120-146 degrees west longitude for C-band satellites and 62-105 and 120-136 degrees west longitude for the Ku band. The slots allocated to Canada are in the gaps in the US arcs.

**ordinary component** The component of light that is totally reflected at the cementing layer of a Nicol prism. Only the extraordinary component, which is plane-polarized, passes through the prism.

**orthicon** A camera tube whose low-velocity electron beam scans a photoemissive mosaic that is capable of storing a pattern of electric charges. It is an early camera tube of the 1930s. The orthicon improved upon the primitive iconoscope and image dissector tubes, both of which required extremely bright scenes to reproduce an image. The orthicon was replaced by the image orthicon tube in 1945 and was considered the first dependable and sensitive pickup tube. By 1952 it, too, succumbed to an improved version, the vidicon, a smaller and less bulky tube.

**ortho-coupler** See *OMT*.

**orthogonal-mode transducer** See *OMT*.

- orthogonal sampling** Sampling with orthogonal structure—i.e., in such a way that corresponding samples in each TV line align vertically.
- orthogonal scanning** Scanning in which the electron beam always approaches the target at normal incidence. This is necessary in low-velocity camera tubes such as orthicons to achieve cathode-potential stabilization of the whole area of the scanned face of the target.
- OS-9** Real-time operating system that directs operation of some home TV set-top boxes; Microwave Systems Corp., now owned by Radisys. Used to make online interactive entertainment available via TV set-top boxes.
- oscillator** 1. A circuit that generates AC at a frequency determined by the values of its components. For stable frequency characteristics, the circuit can include a crystal: PAL-, NTSC-decoders in TVs, VCRs, etc. 2. The stage of a superheterodyne receiver that generates an RF signal of the correct frequency to mix with the incoming signal and produce the IF value of the receiver: TV/VCR tuners. 3. The stage of a transmitter that generates the carrier frequency of the station or some fraction of the carrier frequency: TV transmitters.
- oscillator radiation** The field strength produced at a distance by the local oscillator of a TV or radio receiver.
- oscilloscope** A testing instrument that measures electronic signals. It is used to align video components. The oscilloscope, also known as a waveform monitor by video professionals, may be a portable field model that offers limited features such as vertical centering for adjusting blanking to zero IRE, rotation, sweep rate, IRE filter and gain boost. The fully featured studio waveform monitor is designed to provide more sophisticated signal analysis.
- OTR** One touch recording.
- outband system** Scrambling system, used on CATV, in which the premium video channel is sent with either suppressed or missing sync pulses. Another channel is used on the cable as the “carrier.” This (sync) channel is placed usually somewhere around 50 MHz (below Ch 2), or in the 90- to 110-MHz range (in FM broadcasting).
- out-of-band signaling** Signaling that is separated from the channel and carrying primary information—the voice, data, video, etc. Typically the separation is accomplished by a separate tuner and filter. The signaling includes dialing and other supervisory signals.
- out of phase** When cameras show different colors during a transition because their color bursts are not matched.
- outs** See *Outtake*.
- outside broadcast** A TV broadcast that originates from a source other than a TV studio. An outside broadcast uses mobile cameras and transmitting or recording apparatus. A live outside broadcast uses a portable transmitter to relay the broadcast signal to the main control center where it is broadcast from the main transmitters. If the broadcast is not live it is usually recorded on film; VTRs are now also used. See also *Electronic news gathering*, *Remote*.
- outtake** Also out-take, out take, outs. Unused videotape; a section or scene that is taped but not used in the final version for editing or other reasons.
- overenhancement** A result of rotating the enhance control of an image enhancer too far. Overenhancement causes thin outlines to appear around the edges of the TV picture. The ideal adjustment involves moving the control to a point where the picture appears sharp but slightly grainy. Then the response control takes over, reducing the noise as much as possible without affecting the sharpness or detail in the picture.
- overlap** The running of two VTRs in synchronization so that a changeover can be made from one to the other; a segment of a dissolve in which the images are superimposed and the shooting of scenes longer than necessary to provide leeway in editing.
- overlay** Self-keyed insert; moving matte insert. An insertion effect in which the fill signal is a moving object, which determines its own parameters as it moves.
- Oversampled VBI Data** See *Raw VBI Data*.
- oversampling** A digital video feature that uses a frequency several times higher than the standard rate for filtering purposes. Oversampling transfers the noise band to a higher frequency, allowing a simpler analog output filter to eliminate much of the higher frequency distortion. The standard oversampling rate is 44.1 kHz. The higher the oversampling number, the more desirable the result. Some CD players include an 8x oversampling digital filter, which places these units far above other models, generally rated at 4x oversampling.
- overscan** A term used in reference to a video camera's optical viewfinder that usually views more than the lens captures on the tape. Also the scanning of a greater area of the camera target than is normally used, effected by increasing the scanning currents, and hence the magnetic fields. In TV, overscan refers to a larger image, of approximately 10-15%, projected by the electron gun than the one seen on the face of the TV tube. Manufacturers of TV receivers deliberately employ overscan, since a TV image shrinks as the set ages and varies with tolerances and power supply. NEC's term for overscan is “full scan.” Some professional devices, such as standards converters, perform the overscan and crop (re-blanking) operations to avoid the visibility of unstable blanking edges, head switch effects, etc.
- overshoot** Artifact caused by imperfection of system frequency response. Looks like excursions beyond the steady state either before (pre-shoot) or after (after-shoot, post-shoot) of the signal edge. Usually

## oxidation

expressed as a percentage of step signal amplitude above the steady state level. In the process of aperture correction pre- and post-shoots may be deliberately added to improve the apparent picture sharpness.

**oxidation** A defect, chiefly associated with videodiscs, that shows up on a screen image as colored drop-outs. Oxidation, sometimes called color flash, has been attributed to various factors, including a chemical reaction between the glue that binds the two sides of a videodisc and the reflective aluminum layer.

One unfortunate characteristic of oxidation is its rapid acceleration, resulting in the eventual loss of a large part of the video signal.

**oxide** A general term used to describe the accumulation of magnetic particles that form the coating of videotape. Audio and video signals are electronically printed on the oxide coating. The term "oxide" also applies to the flaking particles which eventually fall from the tape and clog the video heads, causing white specks to flash on the screen during playback. This problem is known as dropout.

# P

**P** CATV superband channel, 252-258 MHz.

**P7 monitor** SSTV display using a CRT having a very-long-persistence phosphor.

**P frames** One of the three types of frames used in the coded MPEG signal. They contain only predictive information and are therefore much smaller than I frames, helping to achieve the low data rates associated with MPEG.

**Pacman** Originally a successful arcade video game consisting of a disc-eating creature that travels through a maze. Atari adapted its coin-operated game for its VCS home system in 1982 but with some modifications. Some of the graphics were missing, as was the original sound track.

**padding** In AVSS files, an additional stream of dummy bits interleaved with the others to control the average byte rate.

**page** In videotex, the basic unit of information storage and display, a discrete amount of material that can be accommodated at one time within the viewing area of a user terminal—generally 24 lines of 40 characters each; also called a frame or screen. Syn.: frame.

**Page Burn** A proprietary Snell & Wilcox digital video effect combining a pseudo-random wipe shape with a pseudo-random color edge.

**page creation** In videotex, the process of assembling the elements of a single page.

**page set** In videotex, a group of pages in sequential order identified by a number.

**page split** A digital video effect where the displayed picture appears as though it is put on the surface of a page that is then split into several rectangular sections and made to fly apart.

**page turn** A 2- or 3-D digital video effect where the displayed picture appears to be put on the surface of a page, the corner of which is slowly pulled up and back to reveal the other side. If the other side contains a different live picture it is known as a double-sided page turn.

**paint** In digital TV, a special effect that is similar to an oil painting and is also called posterization.

**painting** An adjustment of the TV camera controls by the appearance of the picture rather than by objective test procedures.

**paint time** In videotex, the number of seconds required to display a frame with graphics, measured from when the frame begins to appear until it is completed.

**pairing** A fault occurring in TV picture tubes that employ interlaced scanning. Lines of alternate fields tend to coincide instead of interlacing with each other and the vertical resolution is halved.

**PAL** 1. PAL stands for Phase Alternation (or Alternate) Line, Picture Always Lousy, or Perfect At Last, depending on your viewpoint. It is a system of TV broadcasting used in the UK and many other countries in Europe. Developed in Germany, 1961. Not compatible with the North American NTSC system, PAL has a 625-line scan picture delivered at 25 frames/s. Besides providing a better image generally, PAL has improved color transmission over NTSC. This discrepancy is due to America's entry into commercial TV in 1948 while Europe's PAL system, having the advantage of technological advancements, entered TV broadcasting in the 1950s. SECAM, another system used in Europe, is incompatible with either PAL or NTSC. 2. Programmable Array Logic.

**PAL 60** This is a NTSC video signal that uses the PAL color subcarrier frequency (about 4.43 MHz) and PAL-type color modulation. It is a further adaptation of NTSC 4.43, modifying the color modulation in addition to changing the color subcarrier frequency. It was developed by JVC in the 1980s for use with their video disc players, hence the early name of "Disk-PAL."

There is a little-used variation, also called PAL 60, which is a PAL video signal that uses the NTSC color subcarrier frequency (about 3.58 MHz), and PAL-type color modulation.

**PAL-B/G** A version of PAL used in Australia and other countries.

**PAL-D** TV color system. Used in China.

**PAL flip-flop** A bistable circuit that produces H/2-pulses in PAL decoders.

**PAL-M** A version of PAL, used in Brazil.

**PAL-N** TV color system; Argentina, Paraguay, Uruguay.

**PAL-NTSC encoder** A device to encode two color difference signals R-Y and B-Y onto one subcarrier.

## PALplus

Quadrature modulation allows the coding to be in accordance with either the PAL or NTSC system.

**PALplus** A compatible wide-screen version of the existing PAL system, Germany. It was an intermediate step to digital TV. In normal PAL 625-line transmissions, 576 lines are visible in the picture (the remaining lines in the vertical blanking area between pictures). However, when a letterboxed widescreen picture is transmitted, there are only 432 lines of vertical resolution because the picture doesn't fill the entire screen vertically. In PALplus, the vertical information normally lost is filtered from the picture before transmission and then transmitted invisibly in the black area above and below the wide-screen image. A separate signal is transmitted during the vertical blanking interval to tell the receiver PALplus is being transmitted. A wide-screen PALplus receiver displays the wide-screen picture in full fidelity, occupying the full screen, while a conventional 4:3 ratio set shows the standard letterbox image with black bands above and below.

**palette** In 8-bit displays or images, only 256 colors can be displayed at a time. This collection of 256 colors is called the *palette*.

**PAL switch** Sync pulse with period of two lines, the rising edge of which marks the start of a line with positive polarity of V component in PAL chrominance signal or the start of a Dr line in Dr/Db sequence in SECAM chrominance signal. Syn.: 2H; 7.8 kHz; Dr/Db switch; PAL switching signal; SECAM switch.

**pan** 1. Pivotal movement of the camera in a horizontal plane. Sometimes the term is used generally to describe movements of the camera in any plane. 2. In computer graphics, to move (while viewing) to a different part of an image.

**pan and scan** A technique for changing the aspect ratio of the frame of a wide-screen film so that it can be transmitted for TV.

**Panasonic** See *Matsushita*.

**panel antenna** An antenna with the dipole mounted in front of a reflector and a dipole/reflector assembly on each face of a tower that can be either 4- or 3-sided. Panel antennas are used for both high- and low-band VHF TV stations.

**pan head** See *Head*.

**panic freeze** A momentary repeat of one TV frame or field from the live video sequence, usually caused by temporary loss of synchronization.

**panning** 1. Moving a TV camera across a field of view. 2. The movement of displayed graphic data across a visual display screen; moving a graphic image inside a frame to see its various sections.

**panning and scanning** Panning is the act of moving a camera slowly from one side of a scene toward the other; scanning captures the scene electronically, after panning towards the subject. This technique is used to crop a widescreen picture to conventional

4:3 TV ratio, while panning the original image to follow the on-screen action.

**paper cut** A detailed plan for editing a video tape, keyed to time codes or cues, prepared prior to the actual editing.

**paper edit** Preliminary editing of a videotape in which notations are made—on paper—but the actual editing is not done; also called dry edit.

**parabola** A shape that can focus a microwave signal into one narrow beam. All satellite and microwave antennae are parabolic, not spherical.

**parabolic antenna** A dish antenna at whose focal point is a permanently attached feed horn. The antenna, usually made of aluminum or fiberglass, is mounted on a swivel base so that it can be realigned for each satellite. The antenna receives the microwave signals from the satellite and changes them to electrical impulses. Next, it increases the signals so that they can operate a TV set. Finally, it transmits these modified signals through an RF converter that uses any open channel on the TV receiver.

**parabolic reflector** The technical name for a dish antenna shaped like a perfect parabola.

**parade** A convenient mode for displaying component video signals on a waveform monitor. The three signals (R, G, B or Y, Pr, Pb) are shown multiplexed with the horizontal deflection rate being one third of line rate (or field rate). The disadvantage of parade mode is that each of R, G, B (Y, Pr, Pb) are from successive lines and thus only one line in three is shown for any single component.

**parallax** The apparent difference in direction to an object seen from two different points, as in a TV camera's viewfinder and the lens of the camera. The slight angle of divergence between the two can create framing problems in closeups as well as keystone distortions.

**parallax barrier system** See *Parallel Stereogram*.

**parallax panoramagram** A method of displaying a 3D-image. In parallax panoramagram, an aperture ratio of the aperture slit is reduced to a value within, for example, a range from about 1/6 to 1/10 and images that have been photographed from many different directions are sequentially arranged like vertical stripes onto the stereogram display surface in units of elements of the images. At this time, a 3D-image of the directional resolution within a range from 6 to 10 is obtained.

**parallax stereogram** A technique used in 3-D TV in which vertical slats are employed to enhance the 3-D effect. An amount of information recorded in the parallax stereogram is merely equal to the amount that corresponds to the right and left eyes—in other words, the amount that is twice as much as the information of a plane image. Although no special glasses are required by the viewer, the process is not compatible with 2-D (conventional TV).

**parallel attribute** A videotex and teletext standard



whereby an attribute defining the characteristics of a particular character cell is encoded as part of the character code and does not occupy a separate cell. Cf. serial attribute.

**parallel cable** A multiconductor cable carrying simultaneous transmission of digital data bits.

**parallel digital** A professional digital video interface using twisted-pair wiring and 25-pin D connectors to carry the bits of a digital video signal in parallel.

**parallel recording** Technology that permits hundreds of hours of video recording to be compressed on one videotape; Thomson CSF, Paris. Key to the technology are components that allow hundreds of tracks to be recorded and played simultaneously. The technology replaces traditional rotating writing and reading heads with static heads. This allows video recorder size and cost to be cut to those of a Walkman®. Flat, thin magnetic heads are used to record. Multiplexing enables an almost unlimited number of TV programs to be recorded concurrently as a prerecorded program is played.

**parental lock** A VCR or TV set feature that allows the owner to prohibit one or more channels from appearing on screen. A boon for parents who want to prevent their children from seeing certain objectionable programs or channels, the parental lock is sometimes known as lock down or parental channel lockout.

**parity check** In digital transmission, a technique for detecting that an error has occurred in code groups by use of a parity bit. The binary digits in each code group (including the parity bit) are added to check if the sum is odd or even.

**Pasokon TV** Commercial slowscan TV (SSTV) product. Interface to send and receive SSTV fits inside expansion slot of computer. Software supports all popular modes, automatic receive mode selection from VIS code, up to 32K simultaneous colors on screen, and graphical user interface with mouse support. Used in computer-based SSTV systems.

**passive mixer** An accessory used with audio to combine and control the level of various signals, without the addition of electronic circuitry or components. Since signals entering this mixer are not amplified, they undergo some loss in strength. Passive mixers do not affect the nature or quality of the signal other than its level of attenuation or boost. In addition, they do not need any electrical power.

**passive phase direction autofocus** An alternative focusing system found on some camcorders. The system, which operates through the lens, does not use any conventional IR transmitter, thereby eliminating possible focusing problems if an object passes between the lens and the subject being shot.

**passive satellite** See *Communications satellite*.

**passive switcher** See *Switcher*.

**patch** A temporary connection between jacks or other terminations on a patchboard.

**patchboard** A board or panel that has many jacks at which circuits are terminated. Short cables called patch cords are plugged into the jacks to connect various circuits temporarily as required in broadcast, communication, and computers.

**patch box (PB)** An accessory unit designed to accept different video components into its inputs, simplifying the selection of these sources to be played on the TV receiver. A PB is a relatively inexpensive method of interconnecting antenna, cable, pay TV and VCR inputs and directing them through TV sets, a VCR, etc. It is not as permanent a connection as that of a switcher, but it is not as costly. Also known as a patch panel.

**patch cable** A wire (usually in pairs) with the proper connections used to hook up one VCR to another for copying or editing purposes. One cable connects from the video output of the machine to the video input of the other, while the second cable plugs into the audio output of one VCR to the input of the second machine. VCRs of different formats may require special connections such as RCA phono plugs or mini-plugs.

**patch cord** A cord terminated with plugs at each end, to connect two jacks on a patchboard. Any cable with a jack at each end used to connect audio or video components to each other; in audio, from which the term originates, the traditional patch cord is a cable with a phone plug at each end.

**patching** The act of connecting two components to each other with a patch cord and/or patch panel.

**patch panel** See *Patch box*.

**pattern generator** A signal generator that produces on the screen of a TV receiver a regular geometric pattern that can be used to facilitate the adjustment of linearity and convergence, or to trigger electronic special effects.

**pause** A feature on all VCRs that stops the movement of videotape for a short time during the recording process while holding the tape against the video heads. The Pause mode is used instead of Stop to produce less picture breakup when the machine finally returns to Record. Virtually all VCRs warn against extended use of Pause. As a safety precaution, machines provide an automatic shut-off if the Pause mode is activated for more than 5 or 6 minutes. Pause circuits differ from one VCR to another. Some machines use a high/low sensor while others employ a pulse on/pulse off circuit. In the Pause mode the pressure roller that normally holds the tape firmly against the capstan becomes disengaged so that the tape stops and remains pressed against the video heads. Pause differs from Still or Freeze Frame, a mode that operates by freezing a picture on screen during playback, but not during record.

**pause/still** A VTR button to temporarily stop the tape during recording in order to avoid recording un-

## PAV

wanted material, or to view a paused picture during playback.

**PAV** Public Access Videotex. An interactive electronic service for information and transactions at user-controlled terminals in public locations, such as shopping malls and airline terminals.

**pay-cable** Cable TV with one or more pay channels that show new movies and sometimes special programs not available on ordinary TV. It is provided for an additional monthly fee beyond the basic cable service fee.

**pay-per-view** (PPV) A cable TV/pay TV service that allows viewers to pay for special programs of their choice. A special box, called an addressable decoder, supplied by a local cable company is attached to the TV set and releases access to paying customers. The viewer is then billed for the service, along with the regular monthly cable TV fee. PPV programs are transmitted to cable companies by way of satellite on scrambled channels.

**pay television** A TV system in which special programs are provided only to subscribers who make regular payments for the service. The programs can be broadcast in coded or scrambled form requiring a decoding or unscrambling device at the receiver. The service can be carried by microwave, as part of a cable TV system or by telephone wire. It can be supplied independently or as part of a larger system, in which case the service is called a tier.

**Pb** Blue color-difference signal, (B-Y).

**PBS** Public Broadcasting Service.

**PCM** Pulse code modulation.

**PCS** Personal Communications Services.

**PC SSTV 5** Commercial slowscan TV (SSTV) product. Compact separate send and receive interfaces plug into a serial port. Software supports the most popular modes, reads/writes popular image file formats, built-in text-generating capability. Used in computer-based SSTV systems.

**PC-tuner** A device that allows PCs to receive and display signals from broadcasts, cable TV, VCRs or laser discs.

**PC-TV** Matsushita, Japan. A multimedia model; a computer with a hard drive, a CD-ROM drive and a TV. Users can watch TV through an application window and download TV graphics to other programs.

**PC-TV hybrid**, First International Computer Inc. (FIC). A PC that has a TV signal converter for watching regular TV on the monitor. It also includes an MPEG audio/video card that allows users to view laser disks.

**PC-TV tuner** Front-end unit that allows PCs to receive and display signals from broadcasts, CATV, VCRs or laser discs.

**PDC** Program Delivery Control, a system that controls suitably equipped video recorders using hidden codes in the teletext service. If a TV show scheduled to be videotaped is delayed or re-scheduled, the recording is automatically rescheduled as well.

**PDI** Picture Description Instruction.

**PDM** Pulse-duration modulation.

**peak** In video, a signal strength's highest point. Peaks can be measured with video level or VU meters.

**peak brightness** Brightness of a small portion of a CRT phosphor when excited by a peak white signal.

**peak brightness level** A light output measurement used with rear projection TV systems. Peak brightness, or relative brilliance, is measured in footlamberts. Many rear projection TVs produce enough brightness to compete with conventional, direct-view TV sets. Peak brightness level differs from light output, the latter used in reference to front projection TV systems and measured in lumens.

**peaking** Increasing the response of a circuit at a desired frequency or band of frequencies.

**peaking circuit** A circuit that improves the high-frequency response of a signal. In shunt peaking, a small coil is placed in series with the collector load. In series peaking, the coil is placed in series with the base of the following stage. It is present in video amps, often with both types of peaking in the same stage. The circuit converts an input signal to a more peaked waveform. Also done digitally in video processing chips.

**peaking coil** A small coil placed in a circuit to resonate with the distributed capacitance of the circuit at a frequency for which peak response is desired. A video amp near the cutoff frequency is an example.

**peak level meter** A feature found on some VCRs designed to indicate the peak volume level of the recording and playback. Similar in function to a VU meter, the level meter displays a string of horizontal lights instead of the conventional dial and indicator.

**peak limiter** Syn.: clipper. See  *Limiter*.

**peak white** (US: white peak) 1. A peak excursion of the picture signal in the white direction. 2. Potential at a point in the signal path that the brightest parts of the transmitted scene are allowed to attain. Other tonal values lie somewhere between peak white level and black level, that represent the two extreme values between which the picture signal can vary. At those points where the DC component is present, the peak white level has a fixed value in the same way as black level is fixed, but at other points where the DC component is absent the potential corresponding to peak white is variable, depending on the mean value of the picture signal.

**pedestal** 1. An offset to separate the active video from the blanking level. When a video system uses a pedestal, the black level is above the blanking level by a small amount. When a video system doesn't use a pedestal, the black and blanking levels are the same. NTSC uses a pedestal (except in Japan), PAL and SECAM do not. 2. A flat-topped pulse that elevates the base level for another pulse (e.g., in TV sets, SSC pulse has a pedestal that is the difference between black level and blanking level). 3. Black level.

The minimum level the blackest portions of the displayed signal are allowed to reach.

**pedestal level** Blanking level.

**pedestal level control (PLC)** A function of industrial-type video cameras that affects the contrast levels as well as the shades of gray of the screen image. The PLC is also designed to balance the images of multiple cameras used simultaneously.

**pedestal tripod** A professional tripod, often with a hydraulic shaft.

**pel** Pixel, picture element.

**Pepper's ghost** A procedure in which a camera shoots through an angled glass or mirror, so that a reflected scene—suggesting the ghost of the subject—can be picked up. The technique, developed by John Henry Pepper, a British scientist, is used for various special effects in TV.

**perceived color** See *Variables of perceived colors*.

**Peritel** An audiovisual connector standard for European TV receivers. Serves the same purpose as AV connector on some American TV sets. Also SCART connector.

**permanent binary zeros** See *Time code word*.

**permanent magnet (PM)** A piece of hardened steel or other magnetic material that has been strongly magnetized and retains its magnetism indefinitely.

**permanent-magnet centering** Centering of the image on the screen of a TV picture tube by magnetic fields produced by permanent magnets mounted around the neck of the tube.

**permanent-magnet focusing** Focusing of the electron beam in a TV picture tube by the magnetic field produced by one or more permanent magnets mounted around the neck of the tube.

**permeability** A measure of the ability of any given material to act as a path for magnetic lines of force, compared with air. It is the ratio of the magnetization flux density  $B$  to the magnetizing force  $H$ . The permeability of air is assumed as 1. The video head material must have high permeability so that a satisfactory flux density is induced with a modest magnetizing force.

**permeability tuner** A TV or radio tuner with a tuning dial that moves the powdered iron cores of coils in the tuning circuits.

**permeability tuning** The tuning of a resonant circuit by moving a ferrite core in or out of a coil, thereby changing the effective permeability of the core and the inductance of the circuit.

**permutation** See *Encryption*.

**persistence** Syn.: afterglow. In a CRT, the time a phosphor dot remains illuminated after being energized. The persistence depends on the nature of the phosphor and for luminescent screens is commonly chosen to be less than the persistence of the image on the human retina (about 0.1 s). Long-persistent phosphors reduce flicker, but generate ghostlike images that linger on screen for a fraction of a second.

**persistence characteristic** The relation between luminance and time after excitation of a luminescent screen. It is also called the decay characteristic.

**persistence of vision** The ability of the brain in conjunction with the eyes to retain the impression of an image for a short time after the image has disappeared. This characteristic enables the eye to fill in the dark intervals between successive images in movies and TV and give the illusion of motion.

**persistent phosphor** Phosphor in which the image persists after excitation and whose decay law is such that a usable or viewable image remains for TV purposes over the intervals commonly encountered.

**personal communications services (PCS)** Wireless and cellular telephone, videophone, fax, and computing services available to private persons with pocket-size, microprocessor-based radio telephones provided by local telephone companies.

**personal video** See *Portable video*.

**personal videoconferencing** Syn.: desktop videoconferencing.

**perspective** The angle at which we see things; our viewpoint. A lens produces its own perspective of the scene it is viewing, which may or may not agree with our sense of perspective.

**persuader** An electrode in an image orthicon tube biased so as to direct the return scanning beam into the electron multiplier that surrounds the electron gun. The persuader is in the form of a short cylinder and is given a positive bias (with respect to the electron-gun-cathode potential) that is adjusted to give the best uniformity of illumination over the area of the reproduced image: the adjustment is usually labeled "multiplier focus."

**perveance** A factor expressing the ability of an electron gun to provide an electron stream under the stimulus of a given accelerating voltage. It is equal to the space-charge-limited current divided by the three-halves power of the accelerating voltage.

**PG** 1. A pulse generator used in VCR servo circuits to create PG pulses that are directly related to the speed of the head rotation. 2. Parental Guidance suggested—some material may not be suitable for children; see *Movie rating systems*.

**PG-13** Parental Guidance suggested—no one under 13 admitted; see *Movie rating systems*.

**phase adjust** A term used to describe a method of adjusting the color in a NTSC video signal. The phase of the color subcarrier is moved, or adjusted, relative to the color burst. This adjustment affects the hue of the picture.

**Phase Alternating Line** PAL. Popular TV standard used in Europe and Asia. See *PAL*.

**phase cancellation** See *Phasing*.

**phase comparator** A circuit used in a phase-locked loop (PLL) to tell how well two signals line up with each other. For example, there are two signals, A and B, with signal A connected to the positive (+)

## phase correlation

input of the phase comparator and signal B connected to the minus (–) input. If both signals are exactly the same, the output of the phase comparator is 0; they are perfectly aligned. If signal A is just a little faster than signal B, then the output of the phase comparator is a 1, showing that A is faster than B. If signal A is slower than B, then the output of the phase comparator is a –1, designating that B is faster.

**phase correlation** Method of motion estimation based on the measured position of the peaks on a phase correlation surface derived using a fast Fourier transform (FFT), spectrum normalization and inverse fast fourier transform (IFFT).

**phase distortion** See *Distortion*.

**phase inversion** See SECAM chrominance phase switching.

**phase locked loop** (PLL) A circuit that consists essentially of a phase detector that compares the frequency of a voltage-controlled oscillator (VCO) with that of an incoming carrier signal or reference-frequency generator. The output of the phase detector, after passing through a low-pass filter, is fed back to the VCO to keep it exactly in phase with the incoming or reference frequency. Color TV includes a PLL, for example, in color decoders and tuners (AFT).

**phase noise** Refers to the random phase instability of a signal. Phase noise is one of several types of degradation that affects the NTSC picture quality. Continuous research and studies have been made to correct these influences so that transmission signals can be improved to match the improved quality TV monitors and TV in general.

**phase quadrature** See *Quadrature*.

**phase reference switch** On a color vectorscope, a control designed to bring two video signals “in phase” or together simultaneously at the same point. For example, the switch is activated to test whether the signals from two video cameras are in phase when using a genlocked system with an external sync generator. The two vectors produced by the cameras will appear superimposed on the graticule of the vectorscope if they are in phase. If they are not, the signals are out of phase and the phase adjustment of the cameras or the cable lengths should be checked.

**phasing** In general, the adjustment of an oscillating system to establish a desired phase relationship with another system with the same frequency. In color TV, the process of ensuring that the time of arrival of video or synchronizing signals at a particular point are within the tolerances for the system. In sound reproduction, means connecting a (monophonic) audio signal to the terminals of the individual units of a multi-unit loudspeaker or of the reproducers of a stereo system so that all the diaphragms move in phase.

**Philips HDS-NA system** See *HDS-NA system*.

**Philips VCR format** A 1/2" cassette format (1961) not compatible with either Beta or VHS. The Philips VCR used a rotating transformer instead of slip rings to couple the rotating head signal to the preamplifier. The Philips V-2000 VCR, marketed by Germany's Grundig company, had one speed and could record for 4 hours on each side of its videocassette for a total of 8 hours. The cassette size was similar to that of the VHS. Although the tape was 1/2", two 1/4" tracks were recorded on it. This permitted the cassette to be flipped over for extended play without lowering tape speed, which usually reduces picture quality. Other features included noise-free automatic scanning, freeze frame and slow motion, an exceptionally fast forward and rewind and programmability for 100 days and 5 different events.

**phone plug** Variety of jack often used as a microphone connector.

**phono jack** (PJ) A popular-size receptacle on VCRs, DVD players, TVs, and other audio and video components. Known as the RCA phono jack, it accepts the RCA phono plug. On VHS machines PJs are used for both audio and video inputs and outputs.

**phono plug** Variety of jack most often used with audio amps. Also known as RCA plug.

**phosphor** A material capable of luminescence and therefore used as a coating for the screens of CRTs, such as TV picture tubes. A number of different materials are used depending on the color and the persistence required. Phosphor glows when struck by an electron beam; thus, pictures can be constructed by selectively directing a beam at the phosphor coating on the back side of the tube's viewing surface. Syn.: luminophor.

**phosphor color** In projection TV, the precise color at which the material at the front of the screen glows when it is struck by the electron scanning beam. CRT projectors often use phosphors that fall between high light output and exact color rendition. Other projection TV systems face the same dilemma as a result of trying to produce maximum light output while competing with ambient light usually present when projection TV is operating.

**phosphor dot** One of the tiny dots of phosphor material that are used in groups of three, one for each primary color, on the screen of a color TV picture tube.

**phosphor-dot faceplate** The glass faceplate on which the trios of color phosphor dots are mounted in a shadow-mask three-gun color TV picture tube.

**phosphor grain** Granular structure of the phosphor of a CRT, visible as a disturbance of the resolution of a picture.

**phosphor saturation** State where further excitation of a phosphor produces no increase of light output.

**phosphor screen** Coating of chemical substances de-

posited on the face of a CRT. When bombarded by electrons, the substances emit light.

**photoboard** A set of still photographs, made from a film or videotape, or recorded on a TV screen, with accompanying script, usually produced on a 8.5 x 11" sheet of paper so that it is a transcript of a commercial or a segment of a TV program.

**photocathode** Electrode in a camera tube that emits photoelectrons when irradiated by light. In a camera tube, an optical image of the scene to be televised is focused on the face of the photocathode which is transparent so that photoelectrons are liberated from the opposite face. The liberated photoelectrons are focused by an electron lens to form a corresponding charge image on the target of the camera tube.

**photocell** Light sensitive element.

**photoconductive camera tube** A camera tube in which the photosensitive electrode is photoconductive. Such tubes are known as vidicons and are used in color TV cameras.

**photoconductive lag** In photoconductive tubes, a charge remaining at the next scan and subsequent scans after removal of the light. A measure of lag is the rate of decay of the video signal appearing as tailing on moving objects, or as an image retention after the cutoff of the light of an image. If the exposure to light is short, the lag will be low and will be determined primarily by the time-constant of the beam resistance multiplied by photoconductor capacitance. Furthermore, if the exposure to light is longer, the lag will be greater because of a combination of photoconductive lag and the significant addition of trapping effects. Blooming and comet tails are defects related to lag in that they are spurious signals that result from the transducer's response to changes in light level. They are caused by overloading of photosensitive surface with extremely bright highlights.

**photoconductive tube** A device that makes use of changes in the apparent electrical resistance of a photoconductor when exposed to light. The first commercial photoconductive tube was the vidicon.

**photoconductivity** Variation of the electrical conductivity of a material when it is irradiated by electromagnetic waves within a particular frequency range. Examples of materials that exhibit photoconductivity are selenium, antimony trisulphide and copper oxide, all of which have been used in the targets of vidicon camera tubes.

**photodiode** A semiconductor diode in which the reverse current varies with illumination. In a laser-optical video disc player, the component that conducts electricity proportional to the amount of light that strikes its surface. The signal formed by this process carries two audio tracks as well as the video material. LaserVision players do not use a stylus that physically touches the videodisc. Instead, a beam of light "reads" the information encoded as microscopic pits

on the disc. The fluctuations in the light intensity reflected from these pits are focused on the light-sensitive surface of the photodiode.

**photoflood** A self-contained light bulb, that gives a very bright, intense light without the use of external lenses or lamp housings.

**photopic luminosity function** The response of the eye with normal level of brightness.

**PIC** Picture image compression.

**pickup** 1. In general, a transducer that converts signals in a nonelectrical form of energy into corresponding electrical signals. Thus, a TV camera tube was at one time termed a vision pickup tube, but this term is no longer used. 2. See *Remote*.

**pickup device** See *Image sensor*.

**pickup pattern** A determination of the directions from which a microphone is sensitive to sound waves; varies with the mic element and mic design. The two most common pickup patterns are omni- and unidirectional.

**pickup response** The tendency of a microphone to receive or reject sound coming from different directions; the sensitivity of the mic to various frequencies. See *Polar response*.

**pickup tube** A camera or TV's imaging device. See *CRT*.

**picture** The image on the screen of a TV receiver. A source image for a simple frame or two interlaced fields.

**picture area** The area of a TV screen containing the video picture.

**picture brightness** The brightness of the highlights of a TV picture, usually expressed in candelas per square meter.

**picture carrier** A carrier frequency located 1.25 MHz above the lower frequency limit of a standard NTSC TV signal. In color TV, this carrier transmits luminance information; the chrominance subcarrier, which is 3.579545 MHz higher, transmits the color information. The sound carrier, 5.75 MHz above the picture carrier, transmits the sound information. It is also called luminance carrier. PAL also uses a similar scheme. See also *TV channel assignments*.

**picture description instruction (PDI)** A form of code used to describe the formation of an image by means of a combination of elements such as dots, lines, polygons, arcs, etc. PDIs are used, for example, in alpheageometric videotex coding standards.

**picture detail** The total number of lines or elements that make up a picture on the screen of a TV receiver.

**picture element** (US: dot); pel, pixel. The smallest subdivision of a TV image. In a color TV set it is one color phosphor dot. In a black-and-white TV set it is a square segment of a scanning line whose dimension is equal to the nominal line width. Resolution (crispness and clarity of images) improves as the number of pixels displayed increases.

## picture equalization

**picture equalization** A camcorder feature allowing manual adjustment of color, tint and sharpness during shooting.

**picture flutter** Irregular bouncing or flapping of the picture on a TV screen. See *Flutter*.

**picture frequency** (frame frequency) In TV, the number of times the whole picture is scanned in a second. In the British TV system the picture frequency is 25 Hz and in the USA the frame frequency is 30 Hz.

**picture if** (PIF) See *VIF*.

**picture indexing** See *Electronic program indexing*, *Index search*.

**picture-in-picture** (PIP, P.I.P., PinP) A TV receiver feature that sequentially scans several channels and displays their programs in the form of insert pictures in the main screen image. This permits the viewer to survey the contents of other programs while simultaneously watching a main program. PIP, which depends on digital circuitry for its special effects, allows the main picture to be swapped for the insert. In addition, stereo sound can be exchanged between the two pictures. Some TV monitor/receivers can display up to nine images at a time, freeze the PIP image, store the main image for later recall or view a strobe effect of nine images simultaneously. The first viable use of PIP appeared in 1979 with Sharp's DualVision TV set that was capable of producing a 4" black and white picture within a 17" color image.

**picture-in-shuttle** In professional video recorders, mode for rapid search of picture content for the location of a particular frame at 20 or 30 times its normal forward speed.

**picture line-amplifier output** The junction between the TV studio facility and the line feeding a relay transmitter, a visual transmitter, or a network.

**picture line standard** The number of horizontal lines in a complete TV image. The NTSC standard is 525 lines, for PAL 625 lines. HDTV uses 720 and 1135 lines.

**picture locking** Synchronizing the picture signal; the sync controls on a picture.

**picture monitor** A CRT and associated circuits, arranged to view a TV picture or its signal characteristics at station facilities.

**Picturephone®** AT&T's trademark for a video telephone that permitted the user to see as well as talk with the person at the distant end. AT&T introduced it at the 1964 World's Fair in Flushing Meadow, Queens, NYC. The device had a camera mounted on the top and a 5.25" x 4.75" screen. Audio signals were transmitted separately from video signals and the system could not use the public switched telephone network. It needed a transmission bandwidth of 6.3 Mbps and no one wanted to pay the price for the service, so it never got off the ground. AT&T picked up on the name Picturephone and came

out with an offering called Picturephone Meeting Service that provided full video teleconferencing. It was available through rented rooms or through equipment sold or rented to corporations. It also didn't do well since the service was expensive and no one wanted to spend the time traveling to the conferencing rooms. In 1992 AT&T introduced a product called Videophone 2500, that transmitted moving (albeit slowly-moving) color pictures over normal analog phone lines.

**Picturephone Meeting Service** (PMS) An AT&T service once provided under experimental tariff. It combined TV techniques with voice transmission. PMS was usually only available between telephone company-located Picturephone centers.

**picture search/lock** A VCR feature that permits the user to view the contents of a videotape in forward or backward mode at up to about seven times the normal speed in Standard Play mode or about 21 times normal speed in Extended Play. See *Search mode*.

**picture signal** (US: noncomposite signal) In TV, the signal that results from the scanning process and which, when combined with the synchronizing signal, forms the video signal; the portion of the video signal above the pedestal.

**picture-signal amplitude** The difference between the white peak and the blanking level of a video signal.

**picture-signal polarity** The polarity of the signal voltage that represents a dark area of a scene with respect to the signal voltage representing a light area. It is expressed as black negative or black positive.

**picture size** The useful viewing area on the screen of a TV receiver, in square inches.

**picture synchronizing pulse** Vertical synchronizing pulse.

**picture/sync ratio** In video, the ratio of the maximum picture signal amplitude to the amplitude of the synchronizing signals, i.e. (white level-blanking level): (blanking level-sync level). The ratio must be chosen with care. If it is too large, the sync signals will be too small to hold pictures steady at the receiver, and if it is too small the pictures may be too noisy to view, even though synchronization may be perfect.

**picture transmission** The transmission, over wires or by radio, of a picture that has a gradation of shade values.

**picture transmitter** Visual transmitter.

**picture tube** A CRT used to display pictures in a TV receiver or monitor. Usually has electrostatic focusing and is designed for wide angle magnetic deflection to give a short tube suitable for mounting in a cabinet. Tubes for displaying black and white pictures have a single electron gun and a screen made of a continuous layer of phosphor giving an approximation to white light. For displaying color TV pictures three guns are necessary (or a single gun firing three beams) and the screen is made up of dots or



- strips of phosphors giving red, green and blue light. Also called a TV picture tube.
- picture tube booster** A device that provides an over-voltage to reactivate the ineffective electron emitter of a TV picture tube. There are two types of boosters. One is for parallel (transformer-type) tube hookups and the other is for series tube hookups (transformerless).
- picture-tube brightener** A small step-up transformer that can be connected between the socket and base of a picture tube to increase the heater voltage. It increases picture brightness to compensate for normal aging of the tube.
- PictureTel** One of the two largest manufacturers of videoconferencing equipment (both desktop systems and room-based systems) in the world.
- PID** Packet identifier for transport packets in MPEG-2 Transport Streams.
- piezoelectric** The property of a material to generate a voltage when mechanical force is applied, or to produce a mechanical force when a voltage is applied, as in piezoelectric crystal.
- piezoelectric crystal** A crystal that has piezoelectric properties. Crystal loudspeakers and crystal microphones are made from this material.
- piezoelectric microphone** A microphone containing a ceramic or crystal element that produces a signal voltage whenever the movement of the diaphragm puts stress on the element. These inexpensive mics, also known as ceramic or crystal mics, have a limited frequency range and are easily affected by changes in temperature.
- pif** Picture IF. See *VIF*.
- pillarbox** A frame that the image does not completely fill horizontally (i.e., a 4:3 image on a 16:9 screen), in the same way that a letterbox describes a frame that the image does not fill vertically.
- pilot** See *Stereo pilot*.
- pilot light** Refers to a special light that indicates whether a unit or one of its parts is functioning. The pilot light usually maintains a particular position or color to differentiate it from other similar lights. Some VCRs, for example, may have a yellow light to signify that the machine is in Record mode, an amber light for the Pause mode and a green light that designates that the power is on.
- pilot tone** A videotape technique to monitor and correct color.
- pinch roller** A part of a VCR designed, along with the capstan, to help control the tape as it moves along its path. Usually composed of rubber, it presses the videotape to the capstan.
- pincushion corrector** A TV circuit that compensates for pincushion distortion. The horizontal pincushion corrector uses the vertical sawtooth voltage to vary the load on the horizontal sweep system at the vertical rate and thereby straighten the sides of the picture. The vertical corrector circuit uses a parabolic voltage at the horizontal sweep rate to make the picture straight at the top and bottom of the screen.
- pincushion distortion** Distortion of a picture tube in which the sides of a reproduced square bulge inwards. When a video screen is distorted—with the top, bottom and sides pushing in—the screen is said to be suffering pincushion distortion. Usually caused by nonuniformity of the field produced by the scanning coils. It is the opposite of barrel distortion.
- pin-p diode** A diode having a thin layer of intrinsic (undoped) silicon between the p and n regions. With no bias applied, the intrinsic (i) region is empty of free charges. In the forward-biased condition, electrons from the n region flow into the i region and lower its AC resistance. The greater the DC current, the lower the AC resistance is. This particular phenomenon finds application in RF modulators circuits.
- PinP** Picture-in-picture.
- PIP** Also P.I.P. and Picture-in-picture.
- PIP accessory** A video unit that takes advantage of digital technology by providing insert pictures so that the viewer can watch two live broadcasts at the same time. VCRs, VDPs or video cameras can be connected to provide the second source image. The accessory, which may come equipped with one or two built-in tuners, produces pictures instantaneously. In addition, the insert can be changed in size and positioned anywhere on the screen. Other features include freezing the action of the insert, exchanging the main picture with the insert and monitoring another location through the use of a video camera.
- piped program** A radio or TV program sent over commercial transmission lines.
- pipeline architecture** A special hardware process, used with some character generators, designed to regenerate an entire video display for each video field. This technique adds flexibility when animating characters in real time. Pipeline architecture differs from the conventional frame-buffer method used with many character generators.
- pipelined operations** A mode of operation for displays when a stream of data such as pixels passes through a set of processing circuits.
- PIP source mode** A feature, appearing only on some TV sets, that allows the viewer to select the source, such as another TV channel or a VCR, for a PIP. The PIP source mode usually is displayed as one of the features of a special screen menu and is activated from a remote control.
- piracy** The unauthorized use of copyrighted material. There are two types of piracy in the electronic communications world, signal theft and replication. The largest unauthorized use occurs in three areas: cable systems, satellite-delivered program networks (signal theft), and home video (replication).
- pirate box** A picturesque term for an illegal decoding device that allows unauthorized viewers to watch

## PI sequence

otherwise scrambled satellite transmissions of cable services. These “black boxes,” chiefly interest the more than 2 million owners of satellite TV systems. Title 47, Section 605, of the U.S. Code, warns that the penalty for unauthorized interception of satellite signals is two years in prison and a \$50,000 fine. Various agencies, including the F.B.I. and the Motion Picture Association of America, have vowed to go after and prosecute the manufacturers and distributors of these decoders.

**PI sequence** See *SECAM chrominance phase switching*.

**pit** In optical recording, a microscopic depression made on the disc surface by the recording laser beam. Recorded information is contained in the pits and the spaces between pits—lands.

**pitch black** Extremely dark, as pitch (tar).

**pix** 1. Picture. 2. Show-business jargon for motion pictures or pictures in general.

**pixel** Picture element or picture cell. The smallest resolvable and addressable segment (in terms of X and Y coordinates) on a video display screen. It can be the pattern made by the RGB electron guns on a color TV or computer screen, or the smallest electrode on a LCD panel. The number of pixels helps to determine the sharpness of the picture. In HDTV, with its 1080 horizontal scanning lines, the pixel number is said to be five times greater than that of the NTSC, 525-line system, resulting in a sharper picture than that of 35-mm movie film.

**pixel array** A collection of pixels that cumulatively represent the color and form of an image.

**pixel clock** A generator to divide the incoming horizontal line of video into pixels. This pixel clock has to be stable (a very small amount of jitter) relative to the incoming video or the picture will not be stored correctly. The higher the frequency of the pixel clock, the more pixels that will appear across the screen.

**pixel drop out** In some instances, a pixel drop out looks like black spots on the screen, either stationary or moving around. Several things can cause pixel drop out, such as the a-to-d converter not digitizing the video correctly. Also, the timing between the ADC and the frame buffer might not be correct, causing the wrong number to be stored in the buffer. For that matter, the timing anywhere in the video stream might cause a pixel drop out.

**pixellation** In a digital image, a subjective impairment where the pixels are large enough to become individually visible.

**pixel operation** The process of modifying a pixel value for some specific purpose.

**pixel pitch** A central distance between the pixels on the image display surface.

**pixel value** A number or series of numbers that represent the color and luminance of a single pixel. See also *Color value*.

**pixilation** A rudimentary method of creating video

animation. The Record mode is pressed to record a subject, then stopped. The subject is moved slightly while the camera is in off position. The Record-Stop cycle is then repeated to create the animated effect.

**plaintext** A message that is not encrypted.

**Plan 9** Experimental operating system treating all resources as files (named after a 1950s science fiction B movie); AT&T Bell Laboratories in Murray Hill, N.J. The operating system needs no technical sophistication to handle graphics, since the images are produced at the application software level. However, to manage video, the operating system must comprehend realtime, where a data stream representing many frames of video must move to the display in a prescribed period of time.

**plano-concave** A lens configuration in which the element has an inward curve on one side and a flat surface on the other.

**plano-convex** A lens configuration in which the element has an outward curve on one side and a flat surface on the other.

**plant** The physical components of a cable-TV system. The term is applied specifically to the headend equipment but it is sometimes used to refer to all technical aspects of the operation, including trunk lines, feeder cables, drop lines, amps, and all other electronic gear. The equivalent of a plant in the TV broadcasting industries is facilities.

**plant native format** The highest video resolution of which a particular physical plant is capable.

**plasma** An ionized gas containing an approximately equal number of positive and negative charges. The gas emits light when subjected to a sufficiently high voltage.

**plasma panel** The part of a video display tube or other display device that consists of a grid of electrodes in a flat, gas-filled area (a panel) in which the energizing of the electrodes causes the gas to be ionized (the ionized gaseous discharge is called plasma) and light to be emitted; also called gas panel or gas tube.

**plasma technology** A technology that is the most promising for flat, wall-mounted TV applications because it combines wide viewing angle, fast response and ease of fabrication.

**Plasmavision TV** Full-color flat-panel gas-plasma TV; Fujitsu. The screen is slender enough for mounting on a wall. The flat-panel technology became available in Japan in 1994. In this technology, a gas held in tiny cells is excited by an electrical charge. The excited gas—or plasma—causes phosphor dots on the viewing screen to glow.

**plastic effect** In TV, an effect of relief in reproduced images caused by exaggeration of the tonal transitions. The effect can be caused by a poor low-frequency response in the video amplifier. It can also be caused in images reproduced from an image orthicon tube because this type of tube tends to provide black borders around image highlights.

**play** A control button on all VCRs and DVD players that brings the information on the videotape or DVD to the TV screen in the form of a picture.

**playback** 1. Reproduction of a recording. A function that permits a VCR or DVD player to convert the recorded information into a signal for display on a TV screen. 2. A multimedia term. Playback is the process of viewing multimedia materials created by an author. Playback can include a range of activities, from viewing a single video clip to participating in a series of interactive multimedia training modules. Some playback applications (e.g., many training and presentation applications) are sold separately from their authoring applications. However, many developers are selling authoring and playback capabilities in a single product. 3. See *Foldback*.

**playback amplifier** In video, a circuit that increases the video signal before it is supplied to a TV receiver. In audio, a circuit that amplifies the audio signal prior to its being reproduced through a speaker.

**playback head** Syn.: read head. The part that converts the magnetic information on the tape or disc into an electrical signal. Moving the magnetic fields on the medium (tape or disc) past the playback head generates a tiny voltage, which is picked up in a conductor (a coil) in the playback head and sent onto the electronic equipment where it is amplified or transmitted.

**play speed indicator** A feature on many VCRs that tells the tape speed mode when the machine is in Play. Most VCRs simply play back a cassette automatically in the speed in which it is recorded, regardless of the selector button. The indicator presents no problem in Record or Stop mode, since the machine will operate in the function that it is set for. But since the VCR speed is activated automatically by electronics when it is in Playback, it is difficult to determine the mode without the play speed indicator.

**PLL** Phase locked loop.

**pluge pulse** A signal, found on some color bars, that helps in adjusting TV black level. The best luminance occurs when the brightness control is turned so that the pluge pulse is barely visible.

**plug** 1. The male connector or counterpart to the jack. The audio and video inputs and outputs on components are also called audio and video jacks into which compatible plugs are connected. However, plugs are often referred to as jacks and vice versa. The plug, such as the RCA phono plug, is usually the end part of a cable or wire. 2. The process of promoting a product or service on a TV program. Guests on a talk show often discuss their recent books or new movies in a seemingly casual way and thus "plug" the product. This form of advertising differs from a commercial in that the personalities or the companies they represent are not charged a fee by the station, network, or cable system.

**plugumentary** Informal. A film or TV program that purports to be disinterested factual documentary but contains publicity material. A blend of plug and documentary.

**plumbicon** A high-quality, low-velocity TV camera tube used in professional broadcasting video cameras. The plumbicon tube was partially responsible for the development of color TV broadcasting in 1964. The tube is alleged to feature greater sensitivity, higher resolution and less lag characteristics than the saticon camera tube.

**plus diopter** A special lens accessory that fits over a camera lens to make that lens capable of extreme close-ups.

**PLV** 1. Presentation-level video. 2. Production level video, DVI Technology's highest quality motion video compression algorithm. It is about 120-1 compression. Compression is done "off-line,"—i.e., non-real time—and playback (decompression) is real time. Independent of the technology in use, off-line compression will produce a better image quality than real time since more time and processing power is used per frame.

**PM** 1. Permanent magnet. 2. Phase modulation.

**PMS** Picturephone Meeting Service.

**Pockel's effect** See *Kerr effect*.

**point gamma** In TV, the slope of the curve relating the logarithm of the output of a device, equipment or system to the logarithm of the input. The input or output may be light or an electrical signal and thus there can be a point gamma for a camera tube or the overall system.

**point of purchase** See *POP*.

**point-to-multipoint** A circuit by which a single signal goes from one origination point to many destination points. The classic example is a TV signal being broadcast from one satellite to many CATV subscribers all around the country. Not to be confused with a multi-drop circuit.

**point-to-point** A private circuit, conversation or teleconference in which there is one person at each end, usually connected by some dedicated transmission line.

**point-to-point communication** Radio communication between two fixed stations.

**point-to-point connection** An uninterrupted connection between one piece of equipment and another.

**point-to-point topology** A network topology where one node connects directly to another node.

**polacoat** A special material used in making rear projection screens for film-to-videotape transfers. A sheet of polacoat is usually stapled to a homemade wooden frame and a projected image is cast on the rear of the screen. A video camera captures the bright image from the front. Polacoat is preferred over front projection beaded screening that diffuses the light instead of concentrating it.

**polarity** 1. The positive or negative orientation of a

## polarity of picture signal

signal; in video, the polarity of the picture is black/negative, white/positive; reversed polarity would result in a negative picture. 2. The form in which light waves vibrate.

**polarity of picture signal** The polarity of the black portion of a picture signal with respect to the white portion. In a black-negative picture, the potential corresponding to the black areas of the picture is negative with respect to the potential corresponding to the white areas of the picture. In a black-positive picture the potential corresponding to the black areas of the picture is positive.

**polarization** A characteristic of the electromagnetic radiation (e.g., lightwave, radio, or microwave) where the electric-field vector of the wave energy is perpendicular to the main direction, or vector, of the electromagnetic beam. The direction of the electric field, as radiated from a transmitting antenna. Horizontal polarization is standard for TV in the US, and vertical polarization is standard in the UK. Four senses of polarization are used in satellite transmission: horizontal, vertical, right-hand circular, and left-hand circular. See also *Posterization*.

**polarization rot(at)or** A device that permits selection of one or two orthogonal polarizations, or of any polarization angle. Not a polarizer.

**polarizer** (also depolarizer) 1. A bi-refrigent component in a waveguide or antenna system, that converts between linear (plane) and circular polarizations. Not a polarization rotor. 2. A Nicol prism or other device for polarizing light.

**polarizing filter** A special filter with polarizing properties; a filter which, when placed over the lens, can be rotated so that it cuts down the amount of reflected light coming into the lens.

**polar mount** In satellite TV systems, the base of an antenna designed to be aligned on true north. The polar mount permits steering in hour angle (i.e., along the geo arc) by remote to the appropriate angle by rotation about a single axis so that it can receive signals from any satellite. A classical polar mount has its axis parallel to that of the earth. TVROs use modified polar mount geometry, incorporating a declination offset. Also called equatorial mount.

**Polaroid** Trademark of Polaroid Corp. for a plastic sheet material that produces plane-polarized light.

**Polarotor** A proprietary name for a type of polarization rotor, a transition with a remotely rotatable probe.

**polar response** The pattern that illustrates the direction from which sound waves reach a microphone. Polar response patterns are usually circular. For instance, an omnidirectional microphone responds to sound from all directions. Also known as microphone pickup response, pickup response, and polar response pattern.

**polymethyl methacrylate substrate** A support layer of plastic material used to make optical video discs.

**polymorphic tweening** A dramatic effect used by professional videographers that changes the shape of a screen object into another shape by controlling motion, timing and perspective. This special effect is accomplished by blending image processing and animation with the help of a computer-generated program.

**polysilicon** Colloq. Polycrystalline silicon. Silicon in polycrystalline form is most often used to form the gate electrodes in silicon-gate MOS ICs and CCDs. In this application the silicon is doped with a sufficiently high doping concentration so that it becomes degenerate and exhibits metallic properties.

**polyvinyl chloride (PVC)** Durable polymer that has great physical strength and is capable of withstanding a great deal of abuse before serious damage or deformation results. Often used as the base material of magnetic tapes for audio and video recording.

**Pong** The first successful electronic video game. Invented by Nolan Bushnell and introduced by Atari in 1972, Pong now seems primitive when contrasted with today's sophisticated visual and audio effects. Although it was a simple black-and-white nonprogrammable game, its success led to other companies invading the video game field with similar products.

**POP** 1. Initials that stand for "point of purchase" promotional materials in a retail setting. In home video stores, the materials consist of free-standing cardboard floor displays, sell sheets and brochures, tent cards, banners, mobiles, and posters touting new title releases, or counter standups that promote a star. The POP materials are created by the program suppliers and are distributed by them and their wholesalers to encourage impulse sales on the premises of a video store. 2. Picture-out-of-picture.

**pop filter** A sponge-rubber or plastic foam cap placed over the end of a microphone to reduce sibilance, breathy sounds, popping p's and b's, and other unwanted vocal effects.

**porch** The brief interval that occurs between the commencement of line blanking and the leading edge of line sync and the somewhat longer interval separating the trailing edge of line sync and the end of line blanking. These two very important features of a video signal waveform are correctly described as the pre-sync line blanking period and the post-sync line blanking period, respectively. More succinctly, they are commonly known as the front porch and the back porch. The purpose of the front porch is to allow a sufficient interval of time at the end of each line scan prior to the commencement of line sync, during which the signal is free to return to black level from whatever tonal value corresponds with the extreme end of the line; this latter may of course be any level in the range from black to peak white. The back porch is simply what is left of line blanking after the front porch and the line sync pulse have

been accounted for. However, it also serves as a convenient part of the waveform for certain ancillary functions, notably dc restoration and, in the case of certain systems of color TV, it serves to contain a reference burst of color subcarrier.

**portable VCR** A small and light version of a table-top or home model VCR. The portable can be taken into the field and operates on batteries as well as with AC power. First introduced in 1978 (a VHS model by JVC and a Beta by Sony), the portable, designed for the consumer, climbed in popularity in the early 1980s.

**portable video** A hand-held portable TV or VCR unit. The flat screen LCD measures about 3" diagonally. Portable video is sometimes described as personal video.

**Portapack** The early versions of portable cameras and videotape recording equipment, manufactured by Sony in 1970. The gear consisted of a small camera and a battery power pack that was worn around the waist, along with a half-inch reel-to-reel recording unit that was often carried in a backpack. The gear was heavy and cumbersome, however, and was eventually replaced by the smaller camcorder units, but many people continue to call the modern portable assemblages by their original name.

**portholing** An effect created by using lenses at full wide angle or keeping the iris open to its maximum. Either of these conditions may cause the video image to "roll off" at the corners, resulting in a distorted background. Portholing, especially critical when doing chromakeying, can be avoided by checking the video signal in a waveform monitor.

**portrait mode** In camcorders, a mode to get Portrait effect (the subject is in focus and the background is out of focus). Shooting situations: a still subject such as a person or a flower; zooming in on a subject in the telephoto mode; a subject behind an obstacle such as a net.

**ports** Air ducts built into microphones to control the pickup pattern and frequency response characteristics.

**position** A place in relation to other objects or individuals. It is a part in relation to the configuration of the whole. The position of the image formed by a lens from an object is fixed in relation to the lens and object.

**position identification** A professional tape-editing procedure that first uses a cue tone, then a time code. Considered an early version of virtual editing, position identification editing made edit reviewing possible for the first time.

**positive booster** See *Booster*.

**positive ghost** A ghost signal displayed on a TV screen and containing the same tonal variations as those of the original image.

**positive image** A picture as normally seen on a TV picture tube; it has the same rendition of light and shade as in the original scene being televised.

**positive interlace** An interlace method where the position of each line is the same in every frame of video. Line 1 is in the exact same position in every frame, as are line 2, line 3, and so on. In positive interlace scanning, each line will always be exactly centered between the lines that precede and follow it. All professional broadcast equipment uses positive interlace scanning. You might wonder if you can see the difference between random and positive interlace. If you were to put the two systems next to each other on home TV systems, you probably wouldn't see any difference. The difference is important when you begin building a system and hooking various components together and trying to use sophisticated production techniques.

**positive modulation** (US: upward modulation) Also called positive transmission. In TV transmission, amplitude modulation in which increased picture brightness results in increased carrier amplitude. This is the system used in the original British 405-line TV system.

**positive/negative switch** See *Image reversal*.

**positive transmission** Positive modulation.

**positive trapping system** A technique employed by some CATV operators to prevent nonsubscribers from receiving a pay TV service. A signal is transmitted in the center of a pay TV channel such as Showtime, causing picture break-up and sound instability for unauthorized receivers. The interfering signal is eliminated for subscribers by the use of a special "trap."

**postdeflection focus tube** Lawrence tube.

**posterization** 1. See *Paint*. 2. A VCR feature that permits changing the gradation of images during the editing process. Posterization, sometimes known as polarization, often provides several gradations as it exaggerates colors for a cosmic sunspot effect. This feature appears only with digital VCRs. Professional editing consoles also offer this capability among their many special effects.

**posted** See *Postproduction*.

**posting** See *Postproduction*.

**postproduction** In video (and audio), the process of merging original video and audio from tape or film into a finished program. Postproduction includes editing, special effects, dubbing, titling, and many other video and audio techniques. During the postproduction process, personnel are said to be posting and after the job is completed, the program is said to have been posted.

**poststripe** The process of adding time code to a master videotape after footage has been recorded. This is generally done by dubbing the time code onto a free audio channel.

**pot** Audio term for a volume control knob.

**power adapter** See *AC adapter*.

**power belt** A portable power source for a video recorder. Worn around the waist like a belt, the acces-

## power fluctuation

sory is usually made of leather, contains nickel-cadmium cell pockets and includes a built-in overnight charger. The power belt is basically used in industrial/educational applications with broadcast-type cameras.

**power fluctuation** A condition in video caused by a VCR or TV set connected to the same AC line as a major appliance such as a refrigerator or air conditioner. Power fluctuation can cause vertical distortion on the top third of a TV picture.

**power/intensity** A control usually found on the front panel of a vectorscope. This knob functions both as on/off switch and as a brightness control for the vectors that are displayed on the CRT screen.

**power-off eject** See *Auto operation*.

**power saver** A video camera feature that automatically shuts off the power of the camera after a certain time to preserve battery life.

**power zoom** An electronic trigger-type control that permits the video camera lens to be moved in and out, thereby increasing or decreasing the screen image size of the subject. It is the most sophisticated of zoom controls, the others being the mechanical zoom ring and the zoom ring lever.

**power zoom ratio** A camcorder's parameter that indicates the difference between the widest wide-angle setting of a lens and the tightest telephoto shot.

**PP** CATV hyperband channel, 390-396 MHz. See *TV channel assignments*.

**PPI** Pixels per inch.

**PPV** 1. Peak-to-peak voltage. 2. Pay-per-view.

**Pr** Red color-difference signal, (R-Y).

**pre-amp** Amplifier fed from a source of very low output such as a photocell, capacitor microphone or video camera, that boosts a signal before further transmission in order to reduce capacity and other losses with consequent impairment of the signal-to-noise ratio. For this reason, pre-amps are mounted very close to the signal source, and often in the same enclosure.

**precision-guided munitions** Bombs that employ TV, laser, or electrooptical guidance with or without microwave remote control links between the bomb and its launching aircraft. It is also called a smart bomb.

**precision-in-line picture tube** A shadow-mask picture tube in which three electron guns (or three beams from a single gun) are arranged in a horizontal plane and the screen consists of vertical stripes of red, green and blue phosphors. The mask has vertical slits, one for each group of three phosphor strips, so arranged that each strip is masked from two of the beams. The convergence for such tubes is considerably simpler than for delta-array picture tubes.

**prediction** In digital TV, the technique based on the fact that the difference in signal levels between adjacent pixels is usually small. If this is the case, the

difference can be represented by a smaller number of bits per word, say four instead of eight. This technique is called differential pulse code modulation (DPCM). A DPCM system is overloaded when there is an occasional large difference between adjacent pixels, as at a very sharp edge. This is called slope overload and results in a smeared edge. DPCM also has the problem that the amplitude of each pixel signal is the sum of the amplitude of the adjacent pixel signal and the difference. If an error creeps into one of the pixels, it will be repeated until the level is reset. As the result of these problems, DPCM is not widely used by itself, but it is a useful technique when combined with others.

**predistortion** Preemphasis.

**pre-echo effect** Print-through.

**preemphasis** The first part of a process for increasing the strength of some frequency components with respect to others, to help these components override noise or reduce distortion. It emphasizes the higher audio/video frequencies in frequency- and phase-modulated transmitters and in sound/video recording systems. It is also called accentuation, emphasis, predistortion, and preequalization. The original relations are restored by the complementary process of deemphasis before reproduction of the sounds/images.

**preemphasis network** A filter inserted in a system to emphasize one range of frequencies with respect to another. It is also called an emphasisizer.

**preequalization** Preemphasis.

**premium channel** A TV channel for which viewers pay an extra charge, such as Home Box Office (HBO).

**preproduction** The preparations required before the actual shooting begins. This may include script writing, rehearsing, lighting, etc.

**preroll** 1. A VCR feature, found chiefly on S-VHS decks, that runs the playback video for a few seconds—to attain the appropriate head and tape velocity and sync—before entering the recording mode. The purpose of this procedure is to provide greater accuracy in recording and editing while reducing picture breakup. 2. The wobbly warmup period from when a video camera starts until it is stabilized in the roll mode.

**prescaler** Frequency divider. Used in TV tuners, where the normal VHF and UHF oscillator frequencies for each channel are much too high to be used as a comparison in the PLL integrated circuit. The prescaler drives the oscillator signal down.

**presence** In reproduced sound the illusion of closeness to the performer or instrument. Presence can be improved by applying a lift to frequencies in the range 3 to 5 kHz and this is commonly done in hi-fi reproduction.

**presentation entity** The active element of a terminal that is concerned with presentation. It interacts directly only with elements in the next higher



division and the next lower division within a host or terminal.

**presentation level protocol** A set of rules, or protocol, for the encoding of videotext and teletext.

**presentation-level video (PLV)** In DVI technology, the highest-quality video compression process, PLV requires the use of a large computer for compression.

**presentation protocol control information (PPCI)** In videotex, a header for a presentation protocol data unit (PPDU) that serves to delimit the PPDU from preceding and following PPDU.

**presentation protocol data unit (PPDU)** A unit of data consisting of presentation protocol information (PPCI) followed by a presentation service data unit (PSDU).

**presentation service data unit (PSDU)** The portion of a PPDU that contains either management commands or a particular data syntax as indicated in its PPCI.

**pressure roller** A flat, horizontal metal arm with a small vertical rubber cylinder at the end to hold the videotape firmly against the capstan that controls the speed of the videotape. The pressure roller is disengaged when the VCR is in Pause mode, causing the tape to remain stationary but in contact with the video heads.

**Prestel** Short for Press and tell. Videotex system, Great Britain. Prestel was the world's first operational videotex service, and it was launched in 1980 after extensive trials.

**preview** 1. To view a vision signal on a monitor before selecting it for transmission or similar application. 2. The monitoring of a video signal prior to its being processed through a special effects generator. 3. In digital TVs, a mode that displays the still picture of nine channels in sequence, arranged in three rows and three columns on the screen. At predetermined times, the display is changed so that all channels programmed into the tuning-system memory are scanned.

**preview monitor (PV)** A TV screen used by the director to monitor and select a picture to be used from among shots by various cameras and other sources.

**previsualization** A relatively recent technique used in filmmaking to transfer and assemble still images of scenes and artists' conceptions onto videotape accompanied by the appropriate sound effects and dialogue. Previsualization gives the director a better opportunity to perceive an early version of this film.

**prevue** Preview.

**primaries** The colors of constant chromaticity and variable amount that, when mixed in proper proportions, produce or specify other colors.

**primary color** A color that cannot be matched by any combination of other primary colors. In color TV, the three primary colors emitted by the phosphors in the color picture tube are red, green, and blue.

**primary colors** A set of colors that can be combined

to produce any desired set of intermediate colors, within a limitation called the "gamut." The primary colors for color television are red, green, and blue.

**primary-color unit** The area within a color cell in a color picture tube that is occupied by one primary color.

**prime focus** The focal point of a paraboloid reflector. A feed system placed at that point.

**prime time** The hours between 7 and 11 P.M., when the largest TV audience is available.

**print-through** The superimposing of the audio and video signals of one part of the tape onto another. This problem may arise if the tape is very tightly wound and stored for long periods of time. This causes one layer to "print through" part of its signals onto adjacent layers of tape. However, this appears to be a minimal problem with videotape. Also known as pre-echo effect.

**proc amp** A processing amplifier that permits individual control of certain aspects of a video signal, such as color hue and saturation as well as fading to and from black. Sometimes mistaken for a color processor, the proc amp increases the number of corrections and special effects of the processor. A proc amp can be used between VCRs to correct color or prevent color-fringing during black and white dubbing. Professional proc amp units stabilize the picture by eliminating the old synchronizing pulses and creating new ones. Sync pulses control the precise timing of video signals inside a VCR or video camera. Some proc amps employ a joy stick to control overall color. Most models incorporate a distribution amp as part of the unit.

**processing amplifier** Proc amp, proc amplifier, signal processor, video processor, helical scan processor. A unit inserted on the line between any two components through which a composite video signal travels; serves to stabilize the composite signal, regenerate the control pulses, and in certain models, change the gain and pedestal to improve contrast.

**processor loop** An electronic connection on various units designed to link up other units such as a color corrector or special effects generator. A processor loop (sometime referred to as "loop through") can accommodate several video signals, including terminals for audio, composite video and S-Video signals. In addition, the connection can increase the number of components attached to an audio/video switcher.

**procr** Processor.

**Prodigy** A subscription videotex service launched in 1988 by IBM and Sears, that operates via PCs. Served as a bridge from videotex to the new media projects of the 1990s. Prodigy evolved from an unsuccessful videotex program called Trintex, which started in 1984. Now a major internet service provider.

**product cipher** See *Encryption*.

## production

**production** In video, refers to the process of creating programs. In more specific usage, production is the process of getting original video onto tape or film, ready for postproduction.

**production master** A final videotape that contains a continuous program consisting of quality video from beginning to end. Original program material is rerecorded onto the production master from various sources, in piece-by-piece fashion, until the final edited video program has been assembled. Also called edited master.

**production switcher** A professional switcher/fader used chiefly in broadcast, production and post-production work. The sophisticated unit offers such features as 24 video inputs, a control panel divided into groups, informative displays, dual generators capable of producing scores of transition wipes, and pattern keys for masking, etc. In addition, the production switcher usually provides fade-to-black, a split-screen generator, a memory-controlled effects function that can store up to 64 predetermined set-ups and full event auto-sequencing. Other models may offer a range of digital effects, including image compression and rotation, creation of 3-D effects and modification of screen image perspectives. See *Switcher*.

**production systems** See *System terminology*.

**professional-level monitoring equipment** See *Video monitoring equipment*.

**program** A sequence of audio signals alone, or audio and video signals, transmitted for entertainment or information.

**program AE** In camcorders, a function to select modes to suit your shooting situation—for example, portrait mode, sports mode, high-speed shutter mode, twilight mode. AE stands for Auto Exposure.

**Program Delivery Control (PDC)** Information sent during the vertical blanking interval using teletext to control VCRs in Europe. The specification is ITU-R BT.809.

**programmable remote control** In addition to controlling all major VCR functions, this IR remote controller also allows programming timer recordings remotely.

**programmable scan** Automatic channel scan.

**programmable speed** A VCR feature that permits the presetting of the videotape speed in which a program is to be recorded when the viewer is not present. Since TV programs to be set for recording may differ in content (talk shows, dramas, musicals), the viewer may wish to use a different speed for each show. Talk shows, for example, do not need standard play (SP mode), so the viewer can set the 6-hour SLP mode while using the SP mode for musicals to ensure the best audio reproduction capable on the VCR.

**programmable timer** A VCR feature that permits setting the timer (automatic timing) to record more than

one event on different days and on various channels. The timer consists of a digital clock, control panel, indicator lights and a microprocessor capable of programming the VCR. The original timers on early machines could program only one event in a 24-hour time period. The serial timer could activate the VCR every 24 hours, but the channel remained the same. The programmable timer, introduced in 1978 by RCA, allows programming multiple events on different channels for several weeks in advance.

**programming card** A chart containing bar-line patterns that are “read” by a pen-like optical scanner to transmit information to a VCR. Part of the bar code programming process featured on several VCR models, the programming card lists days of the week, along with a full range of time slots and numbers for channel selection. Along with this data are corresponding bar-line patterns. The VCR owner can set up the machine for recording by using the scanner to mark the appropriate information on the card. An IR beam transmits the data to the VCR that then can display the recording information on the TV screen for confirmation.

**program overlap warning** A VCR feature that automatically detects overlapping conflicts in programming times. If one selected time range spills over into another time span already preset, the program overlap warning mode blinks an alert so that an adjustment can be made.

**program start locator** A VCR feature that is part of the index search. Usually operating from a jog/shuttle dial, the program start locator is activated by moving the dial or search function to a desired starting point of an edit and pressing a button to store the location. VCRs that offer this feature often provide for up to 99 individual index searches.

**program timer** A feature that allows the TV set to be programmed to automatically turn on at a predetermined time.

**progressive scan** See *noninterlaced*.

**progressive scanning** A type of scanning, used in computer monitors and DTV, in which every line is scanned on every field. The penalty, of course, is that twice the bandwidth is required over interlaced scanning. Digital televisions, as mandated by the FCC, can receive either progressive or interlaced format. As the technology improves, DTV broadcasts in progressive scanning format will dominate. The HDTV standard specifies active vertical scanning lines of 720 progressive (720p) or 1080 interlaced (1080i) or higher. SDTV allows 480p and 576p formats. Also called sequential scanning; noninterlaced scanning.

**projection** In video, the production of a video picture signal as a strong light image that can be cast on a screen to attain a display area larger than a CRT is capable of giving.

**projection cathode-ray tube** A TV CRT that produces an intensely bright but relatively small image that

can be projected onto a large viewing screen by an optical system.

**projection optics** A system of mirrors and lenses that projects the image onto a screen in projection TV. The Schmidt system is an example. It is also called reflective optics.

**projection tab** Record-protect tab.

**projection television** System for reproducing TV pictures in which the image formed on the screen of a small picture tube is optically projected onto a larger viewing screen. In domestic projection receivers, the screen is of ground glass and the optical image is focused on the rear by an optical system incorporating a concave mirror, a plane mirror and a correcting lens designed to minimize optical distortion. The system is folded to occupy minimum space and is a version of the system originated by Schmidt for use in astronomical telescopes. For larger installations—in cinemas, for example—the optical image is projected onto the front surface of a reflecting screen.

**projection TV remote control panel** An accessory that permits the user to perform an array of functions while remaining away from the projector. Features available on the remote control pad include the usual registration and alignment and automatic test sequences.

**Pro Logic** In audio, a Dolby term that refers to the directing of Surround Sound signals to different channels with greater effectiveness. Used widely on home video system receivers.

**ProShare** Personal videoconferencing system; Intel. Works strictly over ISDN lines, not computer networks, and the resulting video is only 15 frames/s. But the system can reach many more people than a network-based product such as C-Phone.

**prosumers** Consumers who seek to use video equipment in a professional manner or professionals who purchase high-end consumer video equipment for use in their small business operations. Many manufacturers offer equipment with professional video production features at prices slightly higher than consumer gear. Their prosumer camcorders, small videotape formats, sound and lighting equipment, and accessories straddle the fence between the low end of industrial and professional lines and high-end consumer equipment.

**protocol** A set of syntax rules that define the exchange of data, including timing, sequencing, error checking, format, etc.

**proximity effect** Associated with certain types of microphones; the closer the sound is to the mic, the more the bass frequencies are exaggerated.

**PSC** Pulse swallow control.

**PSC system** A system having a high-speed prescaler with variable-division ratio. The variable-division ratio depends on the PSC signal from the PLL integrated circuit. As the number of PSC pulses increase,

the division ratio increases. A specific number of PSC pulses are produced by the PLL IC in response to channel-selection commands. Most PLL tuning systems found in TV sets use some form of PSC.

**pseudo color** Also pseudocolor. Refers to computer color display technique in which the pixel value in a frame buffer selects an entry in a color table that contains the intensities of the three primaries, red, green, and blue. Each color table entry typically has 8 bits for each component, giving 256 levels of red, 256 of green, etc. At any one time up to 256 colors out of a palette of  $10^{24}$  can be displayed.

**PSIP** Program and System Information Protocol, a part of the U.S. ATSC digital TV specification that enables a DTV receiver to identify program information and use it to create electronic program guides for home viewers. Cable systems routinely ignore the information, inserting their own data.

**PTSN** Public Service Telephone Network.

**psychoacoustics** The study of how the human brain records and deciphers the signals that indicate the direction from which a sound originates. This science has been helpful in producing audio/video equipment that attempts to duplicate the sound often heard in movie theaters. Recently known as Surround Sound, home systems employing this technique can simulate sound sources that may not actually exist. Special speakers built into a TV set, although installed close to each other, can give the impression of multiple speakers in several locations.

**PTV** Portable TV.

**public access TV** A local channel (or part of one) of CATV that is free to individuals or groups of a local community, based on a first-come, first-served schedule. Whether as a result of pressure from commercial TV to frustrate cable growth and competition, from political activists seeking an outlet for their voices or from idealistic or socially motivated governmental agencies, the FCC passed its first public access regulations in 1972. Originally ordering four stations (public access, government, education and leased access), the regulations over the years were eventually eased to one channel. Even this ruling was overturned in 1979 by the Supreme Court that claimed that, since these channels were operating locally, the FCC was overstepping its authority. The court did, however, note that local authorities as well as states can require public access channels. Despite the above decision, many cable companies, aware either of their civic responsibilities or the public relations benefits, still provide some public access time. Of the more than 4,300 cable systems in the US, approximately 30 of these are CATV cooperatives and municipal CATV stations.

**Public Broadcasting Service (PBS)** The national network of public TV stations.

**public room** A videoconferencing center that is arranged with transmission services. Public rooms can

## public television

be rented by business customers who wish to have a videoconference but do not have a facility available at their own offices.

**public television** Broadcasting by noncommercial TV stations, supported mainly by viewers, foundation grants and government funds. Commercials are not allowed, but large corporations can be credited for underwriting production costs of special programs.

**Pulfrich illusion** A process that is part of a 3-dimensional TV system. Utilized in Japan but originally developed in California, the technique employs a gray filter over one eye to create an illusion that objects moving sideways are coming toward or moving away from the viewer. The Pulfrich illusion process is compatible with 2-D, conventional TV.

**pulling** Caused by part of the input RF signal affecting the horizontal oscillator. The top of the picture "pulls" or "tears" to one side.

**pulse and bar signal** In TV, a test signal used for k-rating measurements. The signal has a duration of one line and includes, in addition to a line sync signal, a sine-squared pulse and a rectangular pulse.

**pulse-code modulation (PCM)** A technique for converting analog signals into a digital form. In PCM, the amplitude (voltage) of an analog signal is periodically sampled. In video, PCM divides the light and dark portions of an image and reassembles them into a flow of data or digital information. In audio, it is a digital technique that converts VCRs into hi-fi audio recorders. PCM uses digital encoding in place of the conventional analog technique to reproduce music on tape, presenting a distortion-free, truer and cleaner sound whose dynamic range is extended 20 dB. In addition, PCM provides stereo recording capability on 8mm videotape. Although the recording (limited to a frequency response of only 15 kHz) does not capture the full range of human hearing, it can capture the full range of all sounds broadcast over the air; it produces more dynamic range capacity than is otherwise available from either FM or TV audio transmissions.

**pulse-code modulation recording** Format for digital audio recording used by digital audio processors and some 8mm VCR decks.

**pulse cross** A special TV monitor mode for testing; the display is synchronized so that the synchronizing pulse portion of the video signal shows in the center of the display. See also *Video monitoring equipment*.

**pulse cross display** An electronic unit that repositions a monitor picture so that sync and blanking pulses become visible. This permits VTRs to be adjusted for proper skew, tension and tracking. The pulse cross display also checks vertical test signals and VCR/VTR head switching transients. Other applications of the device include monitoring servo lock, take tension and proper sync of editing decks

as well as testing edits before the actual dubbing and distribution.

**pulse distribution amplifier** An amp designed to boost the strength of the sync as well as other controls to the proper level for distribution to a number of cameras, special effects generators, and the like.

**pulse-duration modulation (PDM)** See *Pulse-width modulation*.

**pulse modulation** A form of modulation in which pulses are used to modulate the carrier wave or, more commonly, in which a pulse train is used as the carrier (the pulse carrier). Information is conveyed by modulating some parameter of the pulses with a set of discrete instantaneous samples of the message signal. The minimum sampling frequency is the minimum frequency at which the modulating waveform can be sampled to provide the set of discrete values without a significant loss of information. There are different forms of pulse modulation. In pulse-code modulation only certain discrete values are allowed for the modulating signals. The modulating signal is sampled, as in other forms of pulse modulation, but any sample falling within a specified range of values is assigned a pattern of pulses and the signal transmitted by means of this code. The electronic circuit or device that produces the coded pulse train from the modulating waveform is termed a coder (or pulse coder). A suitable decoder must be used at the receiver in order to extract the original information from the transmitted pulse train. Pulse modulation is commonly used for time-division multiplexing.

**pulse on/pulse off** One of the methods employed to activate the Pause circuitry of a VCR.

**pulse swallow control** See *PSC system*.

**pulse-width modulation (PWM)** 1. A form of modulation in which the time of occurrence of the leading edge or trailing edge is varied from its unmodulated position. 2. A form of analog control in which the duration of the conduction time of the output transistor or transistors in a switching-regulated power supply is varied by modulating the bias on the gate or base of the transistors in response to changes in the load. See *Chopper power supply*.

**punch up** To engage a function button, as in punching up an effect on a special effects generator.

**pupil** The dark circular opening in the center of the iris of the eye.

**purity** 1. In color TV, the degree to which a display in one of the primary colors is free from contamination by the other primary colors. 2. A ratio of distances on the CIA chromaticity diagram that compares a sample color with a reference standard light.

**purity coil** A coil mounted on the neck of a color picture tube, to produce the magnetic field needed for adjusting color purity. The direct current through the coil is adjusted to a value that makes the magnetic field orient the three individual electron beams

so each strikes only its assigned color of phosphor dots.

**purity control** A potentiometer or rheostat that adjusts the direct current through the purity coil.

**purple boundary** A straight line drawn between the ends of the spectrum locus on the CIE chromaticity diagram.

**push** A video effect where one image replaces another by pushing it across the screen.

**PV** Preview monitor.

**PVC** Polyvinyl chloride.

**PWM** Pulse-width modulation.

**Px64** This is basically the same as the H.261 ISDN-based videoconferencing ITU standard. The term is starting to fade into disuse since H.261 is used in applications other than ISDN video conferencing. A newer version of the worldwide standard for videoconferencing is ITU H.263.

# Q

- Q** 1. In NTSC video, Q refers to the quadrature color difference signal. It is 90 degrees out of phase with the color subcarrier. 2. CATV superband channel, 258-264 MHz.
- QAM** Quadrature amplitude modulation, a downstream digital modulation technique conforming to ITU standard ITU-T J.83 Annex B, calling for 64 and 256 QAM with concatenated trellis coded modulation. Commonly used in digital cable systems.
- Q channel** The 0.5-MHz-wide band used in the American NTSC color TV system for transmitting green-magenta color information.
- QCIF** Quarter Common Intermediate Format, a mandatory part of the CCITT's H.261 standard, which requires that noninterlaced video frames be sent with 144 luminance lines and 176 pixels. Also, Quarter Common Interface Format. This video format was developed to allow the implementation of cheaper video phones. The QCIF format has a resolution of 176 x 144 active pixels and a refresh rate of 29.97 frames per second.
- QDBS** (or Q-DBS) Quasi-DBS.
- Q demodulator** The demodulator that combines the chrominance signal and 90 degrees phase-shifted signal of the color-burst oscillator to recover the Q signal in a NTSC video decoder.
- Q-Phase** A color TV signal carrier that has a phase difference of 147 degrees from the color subcarrier. The Q-Phase is sometimes referred to as the quadrature carrier.
- QPSK** Quadrature phase-shift keying, a digital frequency modulation technique used to send data over coaxial cable networks. Used primarily for sending data from the cable subscriber upstream to the head-end.
- QQ** CATV hyperband channel, 396-402 MHz.
- QSIF** Quarter size image format. The computer industry, which uses square pixels, has defined QSIF to be 160 x 120 active pixels, with a refresh rate of whatever the computer is capable of supporting.
- Q signal** The quadrature component of the chrominance signal in NTSC color TV; it has a bandwidth of 0.5 MHz. It consists of  $+0.48(R-Y)$  and  $+0.41(B-Y)$ , where Y is the luminance signal, R is the red signal, and B is the blue signal.
- Q.T.R.** Quick timer recording.
- quad chroma** Refers to a technique where the pixel clock is four times the frequency of the chroma burst. For NTSC this means that the pixel clock is 14.31818 MHz ( $4 \times 3.57955$ ), while for PAL pixel clock is 17.73444 MHz ( $4 \times 4.43361$ ). The reason these are popular sample clock frequencies is that, depending on the method chosen, they make the chrominance (color) decoding easier.
- quad-head recorder** VTR using transverse recording.
- Quadraplex** A system of videotape recording using four rotating heads on a drum perpendicular to the tape. Original experiments in videotape recording used stationary heads similar to audio tape recording, but since this method required an unusually high tape speed of approximately 100" per s, it took thousands of feet of tape to record only a few minutes of video information. Obviously, this was impractical as well as too costly. Quadraplex, with its rotating heads, was developed by Ampex in the 1950s. Using 2" tape traveling at only 15" per second, the improved technique increased the quality of the video signal placed on the tape and enabled an hour of information to be stored on convenient-sized reels. Quadraplex is still used today in broadcasting studios.
- Quadrascan** A technique used in arcade video games permitting high resolution images to enter the screen at different speeds and from all directions. The images, appearing as targets, reveal exceptional detail in their drawings. Quadrascan was developed by Electrohome Electronics for Atari's arcade video game, "Asteroids."
- quadrature** Separated in phase by 90 degrees or one quarter-cycle. Two periodic quantities that have the same frequency and waveform are in quadrature when the phase difference between them is 90 degrees. They therefore differ by 1/4 of a period, one wave reaching its peak value when the other passes through zero. Also called phase quadrature.
- quadrature amplifier** An amp that shifts the phase of a signal 90 degrees. Used in older color TV sets to amplify the signal 3.58-MHz chrominance subcarrier and shift its phase 90 degrees for use in the Q demodulator.
- quadrature amplitude modulation (QAM)** Quadrature modulation in which some form of AM is used



- for both digital inputs. Used in digital TV transmission; transmission speed: 3.1 bits/Hz. QAM is often used in microwave and digital cable TV systems.
- quadrature carrier** See *Q-Phase*.
- quadrature filter** A filter that eliminates the quadrature components of signals in systems where information is contained in the quadrature modulation components of the carrier.
- quadrature modulation** Method of transmitting two modulating signals independently on one carrier by splitting the carrier into two components in quadrature and using each signal to modulate one of the components. This method is used in the NTSC and PAL color TV systems to transmit the two color-difference signals. They are transmitted by suppressed-carrier AM of the two quadrature components of the color subcarrier.
- quadrature phase shift keying** See *QPSK*.
- quadrature-phase subcarrier signal** The portion of the chrominance signal that leads or lags the in-phase portion by 90 degrees.
- quadratorrelator** Quadrature information correlator. A circuit sometimes added to the automatic phase control loop in a NTSC/PAL video decoder to obtain improved performance under severe interference conditions.
- quad split** A TV switching effect to produce four different images on the screen at the same TV.
- quantization** The process of converting a continuous analog signal into a set of discrete levels (digitizing).
- quantization noise** Also called quantization distortion. This is the inherent uncertainty introduced during quantization since only discrete, rather than continuous, levels are generated.
- quantizing error** Inaccuracies in the digital representation of an analog signal due to limitations in the resolution of the digitizing process.
- quantum efficiency** See *Sensitivity*.
- quarter size** A special feature, usually found on professional/industrial equipment such as time base correctors, that uses digital circuitry to produce an image one quarter the size of the TV screen. The quarter-size picture can usually be made to appear in any corner of the screen.
- quartz** A mineral found in nature and whose crystals are highly useful in radio and carrier communication. Quartz crystals that are electrically charged vibrate and keep extremely accurate and stable frequencies.
- quartz bulb** A small lighting element which produces a great deal of light for a long period of time.
- quartz halogen light** The lighting source closest to natural sunlight; yields a white color temperature and offers a very bright lighting source.
- quartz light** A special source of illumination for use with video cameras. Preferred in low light situations, the quartz light is balanced for the proper color temperature. Although more costly, quartz is preferred over the incandescent light because it produces a bluer light that is closer to daylight, gives more light and throws off less heat. Some models feature an air-cooled housing and a distinct reflector for maximum efficiency. The light can often be handheld as well as attached to the video camera.
- quartz-synthesized tuning** One of several AFT methods designed to capture a strong broadcast signal and keep it in phase. Quartz tuning utilizes the dependability of the constant vibration of a quartz crystal as its reference point. The crystal, which vibrates at the exact frequency of the selected channel, attains very precise tuning regardless of frequency vibrations that may occur between channels and broadcast signals. PLL is another method used in TV monitor/receivers for AFT.
- Quasar** See *Alpha wrap*.
- Quasi-DBS (Q-DBS)** The use of FSS satellites to provide a broadcasting service.
- Quasi-PAL** A color signal with alternate line, sequential modulation.
- quaternary phase-shift keying (QPSK)** Modulation of a carrier with two parallel streams of non-return-to-zero data in such a way that the data is transmitted as 90-degree phase shifts of the carrier. This gives twice the message channel capacity of binary phase-shift keying in the same bandwidth. Used in digital TV transmission; transmission speed: 1.9 bits/Hz. Frequently used in satellite systems.
- QUBE** A two-way cable system based in Columbus, Ohio, that started operations in 1977. QUBE allowed subscribers to reply to video events via a small computerized console. Warner-Amex's QUBE cable system, introduced in Columbus, was the first major experiment in interactive TV. Viewers have judged talent shows, given their opinions on political issues, voted, decided the fate of characters in soap operas, etc. Other QUBE systems sprang up across the country, but they all eventually ceased operations for one or more reasons, including high expenses and poor marketing of the service.
- quick-start** A VCR mechanism that brings the picture on the screen the moment you pop in the tape. A mechanical procedure incorporated into some VCRs designed to speed up such functions as play, FF and REW. To perform some of these commands, several seconds are normally required as the videotape engages or disengages itself around the rotary head drum of conventional VCRs, particularly those of the VHS format. Some machines have modified the internal mechanism so that the tape can be wound or unwound in less than two seconds.
- Quicktime** The system software developed by Apple that can serve as a container for many types of media, such as video, audio, and animation. Quicktime contains compression systems for different types of media. Decompression can be ac-

## quick timer recording

accomplished using standard Macintosh hardware although QuickTime accelerator cards with hardware decompression chips give much better results.

**quick timer recording** (QTR) A VCR function that enables the device to do impromptu recordings at any time in the next 23 hours. Just select the channel, set the recording start time, and the recording duration.

**Quick View** (QV) A feature found on some TV sets to switch between the current channel and the last one viewed. QV is available from the remote control transmitter only.

**Quincunx scanning** See *Bandwidth reduction (EU-REKA-95 HDMAC system)*.

**QV** See *Quick View*.

# R

**R** 1. Red. 2. CATV superband channel, 264-270 MHz. 3. Reset. 4. Restricted; see *Movie rating systems*.

**rabbit ears** A V-shaped indoor dipole TV antenna whose arms are adjustable in angle and usually in length. The antenna can be attached to the TV set or mounted on a base for use on top of the set.

**rack** 1. A cabinet or its vertical support or frame. In TV, the lens turret sometimes is called a rack. 2. To set up on a rack or to set up generally. To rack a tape is to put it on the tape player.

**rack mounting** Metal racks to which electronic equipment is attached in TV control or editing rooms. The EIA devised a standard size for the racks to enable most electronic gear to fit into them. The racks are slightly more than 19" wide, and all engineering equipment of that size (or smaller) can be easily placed in them. Electronic units that are designed to be rack-mounted have screw-mouths so they can be secured to the racks.

**radial acceleration** The rate at which a track on an optical disc accelerates toward and away from the center, because it is not perfectly aligned or perfectly round.

**radiated interference** TV picture disturbance, often from such sources as automotive ignitions, power transmitter lines and radio stations. Radiated interference is usually the result of a poorly shielded TV tuner.

**radio** The use of electromagnetic waves to transmit and receive electrical signals over a distance without connecting wires. Thus radio, quite properly, embraces TV. However, the term radio is often restricted to the transmission and reception of sound signals. For example, receiver manufacturers commonly divide their catalogues into two parts, one describing radio (i.e., sound) receivers and the other TV receivers.

**radio frequency interference shield** RFI Shield. A metal shield enclosing the printed circuit boards of the printer or computer to prevent radio and TV interference.

**radio microphone** A microphone, the audio output of which is used to modulate a low-power transmitter, the output of which is picked up by a nearby receiver. Radio microphone is often used where it would be inconvenient to use a cable to carry the

microphone output—for example, in TV production where an actor has a part requiring great mobility. The use of a boom mic or a trailing mic lead would restrict his movements but a radio microphone gives the required freedom.

**radio spectrum** The range of electromagnetic frequencies used for radio, radar, and other communication, including TV, from about 10 kHz to about 300 GHz. AM radio operates in the middle of the spectrum—medium frequency—and FM radio and TV operate at higher frequencies.

**radio window** The range of radiofrequencies that are not reflected by the ionosphere but pass straight through it. The radio window extends from about 50 GHz to about 15 MHz (approximate wavelength range: 6 mm to 20 m). The effect of the ionosphere is still noticeable up to 100 MHz but decreases as the radiofrequency is increased. At frequencies above 10 GHz, rain can severely affect transmission. High-frequency TV broadcasts fall within the radio window and long-distance TV communication therefore requires the use of communications satellites as reflectors. See *Communications satellite*.

**RAID** Redundant array of independent disks, a grouping of hard disk drives together with a RAID controller to create storage that behaves as a single disk.

**rainbow effect** See *Moire*.

**rainbow generator** A signal generator that generates a signal which, when fed into a color TV set, produces the entire color spectrum on the screen, with the colors merging together.

**raised-cosine pulse** See *Sine-squared pulse*. Because the square of a quantity is always positive regardless of the sign of the quantity, a sine-squared pulse is positive for both half-cycles of the sine wave. Each sine wave thus gives rise to two line-squared pulses and these pulses are positive; that is, they stand above the zero axis and are thus raised. The identity  $\sin^2 A = (1 - \cos 2A)/2$  shows that the sine-squared pulse is of cosine form and that its frequency is double that of the sine wave.

**RAM** Random access memory, a temporary, volatile computer memory for storing data.

**RAMDAC** Random access memory digital-to-analog converter. The chip on a VGA board that translates

## random access

the digital representation of a pixel into the analog information needed for display on the monitor.

**random access** In viewing and editing, the automatic, rapid cuing to any point, particularly with laserdiscs, digital discs or solid-state memory components. On a VDP, random access permits the viewer to locate instantly any frame on the disc. The frame number usually is displayed digitally on the screen by punching in the number of the frame on a keypad.

**random access tuning** A feature on TV sets, VCRs or VDPs permitting the selection of any programmed channel by means of touch sensor buttons. This is in contrast to older rotary tuners in which other numbers must first be passed by. On a remote control, random access is achieved by a set of separate keys for each number from 0 to 9. Random access channel selection is sometimes referred to as direct access.

**random interlace** Interlace based on less precise timing of sweep frequencies than is required for TV broadcasts. In random interlace the exact position of each line varies with each frame scanned. Certainly line 5 will be between lines 4 and 6, but it may not be exactly centered between the two lines and its position may vary a little with each frame. This is the system used with home video cameras.

**range** The maximum distance from a TV transmitter at which reception of the signal is possible.

**rapid access** A feature on VDPs designed to locate a desired scene or segment on the disc. The picture is not visible during the rapid access search, but the time delay, operating in conjunction with the stylus, acts as a cue to help find the particular excerpt on the disc.

**rapid picture search** See *Visual scan*.

**raster** 1. Essentially, a raster is the series of scan lines that make up a picture. It is the random pattern of illumination seen on a TV screen when no video signal is present. You may from time to time hear the term raster line, which is the same as scan line. All of the scan lines that make up a frame of video form a raster. 2. The pattern described by the scanning spot of the electron beam as it scans the target area of a camera cathode ray pickup tube.

**raster burn** A change in the characteristics of the scanned area on the target of a camera tube, resulting in a spurious signal when a larger or tilted raster is scanned.

**RasterOp** Abbreviation for raster operation, or another term for bit-block-transfer (BitBlT), a technique for image handling in graphics systems. The same term also is used to refer to the boolean operation that can be performed as part of the BitBlT. See *BitBlT*.

**raster operation** See *RasterOp*.

**rated frequency deviation** The maximum value of the frequency deviation permitted in a FM system. For FM broadcasting in Band II the rated frequency

deviation is  $\pm 75$  kHz and for the sound channel in 625-line TV systems it is  $\pm 50$  kHz.

**rated transmitted power** In TV transmitting systems, power at the peak of sync. Cf. average transmitted power.

**raw VBI data** A technique where VBI data (such as teletext and captioning data) is sampled by a fast sample clock (i.e., 27 MHz), and output. This technique allows software decoding of the VBI data.

**ray** Beam.

**RC-5** Remote control protocol. In the past, insufficient command capacity of remote controllers and nonstandardization of commands and protocols made it impossible to operate all remotely controlled equipment from a single remote control handset. To solve this problem, Philips developed a remote control (RC) protocol (RC-5) and the ICs to support it. The RC-5 protocol provides unified remote control of consumer equipment.

**RCA** Radio Corporation of America. Developed and presented the first color video tape when it showed a two-minute experimental demonstration on October 2, 1955 on NBC's "Jonathan Winters Show." The company, of course, pioneered in video by presenting the first public demonstration of the present TV color format in 1953.

**RCA DSS** All-digital, direct satellite broadcast system delivering high quality TV signals to satellite dishes only 18" in diameter. Modern data-compression technology allows a pair of geostationary satellites co-located above the equator at 101 degrees West longitude to transmit hundreds of high-fidelity programs to the continental US. Introduced in 1994.

**RCA format** This video format used four video heads, a 90-degree tape wrap of the head drum, and a 3/4"-wide tape cartridge. The head wheel extended into the inserted cartridge to push against the tape, permitting the head-to-head contact. One significant result of RCA's investigation of video tape recording at the time was a customer survey that determined a 2-hour uninterrupted playing time was desired by the TV viewers.

**RCA jack** A popular phono jack (sometimes called plug) used in consumer equipment for both audio and video inputs and outputs. The RCA phono type plug has become the industry standard for home video systems. RF connections use the F-type connector.

**RCA plug** Phono plug.

**RC Time Code** Rewritable time code, used in consumer video products.

**reactance control circuit** A color TV receiver circuit that converts the DC correction voltage from the phase detector into a capacitive reactance change that maintains the 3.58-MHz oscillator at the correct frequency and phase. Modern TVs use digital techniques.

**reactivation** Process of reviving the thermionic emission of the cathode of CRT. One method is to apply

an abnormally-high voltage to the heater for a few minutes, a process known as flashing. An alternative approach is to increase the heater voltage permanently by, say, 10%. Both methods have the effect of “boiling off” the original emitting surface of the cathode to expose a new surface.

**read before write** A feature of some videotape recorders that plays back the video or audio signal from tape before it reaches the record heads, sends the signal to an external device for modification, and then applies the modified signal to the record heads for re-recording in its original position on the tape.

**read/write head** In video, the part of a VCR that reads and writes information on tape.

**RealAudio®** The file format developed by RealNetworks that is used to stream audio over the Internet.

**real image** An image captured originally from nature, usually by photography, cinematography, or videography. Video refers to a system for electronic representation of images, whether real or computer generated. Also called realistic image.

**Real-Time Control Protocol** See *RTCP*.

**real time** If a system incorporating a computer operates fast enough that it seems like there isn't a computer in the loop, then that computer system is operating in real time. For NTSC video, that's 30 frames/s, with each frame made up of 525 individual scan lines. That's roughly equivalent to 60 Mbytes of data per second to be processed.

**real-time counter** A VCR feature that reveals tape time precisely in hours, minutes and seconds. This is accomplished by keeping the tape in contact with the control head. Thus, the counter can calculate the control pulses. This handy feature, sometimes called real-time tape counter, linear time counter, or linear time readout, can measure accurately the length of programs and can help the viewer to locate any point in a tape by simply entering how far along in “time” that point is.

**real-time digital storage system** Professional/industrial equipment, designed chiefly for post-production work, that uses RAM. These systems can store several seconds of digital video information and play it back instantly as a digital videotape recording. Graphics can be added to any portion of the image, and the color composition of the frame can be changed. Film can be transferred to digital videotape, after which shadows can be added or deleted, lettering enhanced, colors manipulated and objects highlighted and textures recreated. All changes are stored in memory and can be transferred back onto videotape, which can then be edited with a conventional editor. One of the major benefits of using these professional workstations is that scenes do not have to be reshot.

**Real-time Streaming Protocol** See *RTSP*.

**real-time tape counter** Real-time counter.

**Real-time Transport Protocol** See *RTP*.

**Real-time Video (RTV)** In DVI technology, the video compression/decompression technique that operates in real time using the DVI system itself. It provides picture quality suitable for application development purposes, but it is normally replaced by Presentation Level Video for the final application.

**RealVideo®** The file format developed by RealNetworks that is used to stream video over the Internet.

**rear projection screen** In video, a screen used for projection from behind the screen with a video camera in front to make film-to-tape transfers. Rear projection screens are recommended over conventional ones which diffuse the light instead of concentrating it. A rear projection screen can be made at home by constructing a wooden frame and stapling onto it a special screening material called polacoat.

**rear projection TV** A one-piece console TV system that produces a large projected image on the rear portion of a special screen. Rear projection TVs usually consist of three color tubes (R,G,B) and a highly reflective mirror within the projector-cabinet. The picture is projected onto a plastic screen containing a series of etched concentric rings. This specially constructed screen helps to deliver evenly distributed light over its entire surface as well as a sharp picture. The screen also provides an image bright enough to be viewed with ordinary room light. Rear projection TV systems have been gaining in popularity because they are better suited than two-piece front projection TVs where space is limited. Some rear TV systems utilize a black matrix lenticular screen or black stripe projection TV process to increase picture contrast.

**rebuild** The physical improvements made in a cable system by the replacement of various electronic components and wiring. In the process, power supplies, amps and other electronic gear are replaced with state-of-the-art technology, and coaxial cables (along with feeder and drop lines) are replaced with a fiber optic system to increase channel capacity.

**rebroadcast** Repetition of a radio or TV program at a later time.

**receiver** 1. A component of a communications system that converts electrical waves into audible and visible forms. Digital TV receivers, integrated receiver/descramblers, monitor/receivers, satellite receivers, transmitter/receivers and TV receivers are some of the units that play important roles in video. 2. In a system, the integrated circuit which receives the data from the bus.

**receiver-generated interference** A number of spurious signals that can be generated by receiving systems. Two of these, local oscillator radiation and IF images, result from the use of the superheterodyne principle in receivers. A third, intermodulation interference, may result when strong signals are received

## receiver primaries

from two stations having carriers separated by the IF of the receiver. These problems are particularly troublesome for UHF stations, but they are mitigated by the FCC's policy of channel assignments, which reduces the possibility of receiver-generated interference from the use of the superheterodyne principle. Another potential source of interference is intrachannel beat frequencies between the sound and picture carriers.

**receiver primaries** Display color primaries.

**reclocking** The technique of clocking digital data with a regenerated clock.

**reconnaissance satellite** An earth satellite that provides strategic information, as by TV, photography, or radio link.

**record** A control button on all VCRs which, when pressed, permits the machine to record information onto videotape. The VCR can record off the air, from CATV, from a video camera or from another VCR in duplicating or copying a tape. Some machines provide a safety feature to prevent accidental recording: two buttons, Play and Record, must be engaged simultaneously to activate the Record mode. If Pause is pressed while the VCR is in Record, the machine will stop taping until either Stop is engaged or Pause is disengaged, in which case the machine will continue to record.

**record deck** Also called the "Target" deck, this is the deck that source video footage is recorded onto.

**recorded program** A radio or TV program that depends on CDs, electric transcriptions, magnetic tapes, or other means of reproduction.

**recorded tape** 1. A recording that is commercially available on magnetic tape, also called prerecorded tape.  
2. Any magnetic tape that has been recorded.

**recorded wavelength** A distance on the tape required to record one full AC signal cycle.

**recorder** An instrument that makes a permanent record of varying electrical quantities or signals. A common industrial version records one or more quantities as a function of another variable, usually time. Other types include the cathode-ray oscilloscope, fax recorder, kinescope recorder, magnetic-tape recorder, and VTR.

**record gap** A gap that indicates the end of a record on magnetic tape.

**recording** Process of impressing an audio or video signal on a medium in such a way that it can be reproduced whenever required. The impression can take the form of mechanical deformation of the medium as in the lateral sound recording of gramophone records, it can be magnetic as in the audio and video recording on magnetic tape, or it can be photographic on film. In all examples there is relative movement between the medium and the recording or reproducing head. See also *Copying*.

**recording amplifier** Amp used in a VTR to set the level of the video signal prior to its being supplied to the video heads.

**record lock** A feature found on some portable VCRs designed to keep the tape wrapped around the drum when the machine is shut off. By not having to be unthreaded and threaded again, the tape remains accurately in position, ready for the next glitch-free recording. Record lock puts the VCR into Record mode when the machine is turned on. In addition, the VCR uses no power in Off while the camera still receives power, thereby preserving the battery. If record lock is pressed down after Off is pressed, the VCR will enter Pause when the machine is turned on. In both cases, by having the machine begin in either Record or Pause, it provides for glitch-free edits between scenes.

**record-protect tab** The small square tab on a videocassette that, when removed, prevents accidental erasure of the recorded material on the tape. Placing a piece of vinyl tape over the opening once again prepares the tape for recording. Virtually all VCRs have a mechanical sensor that detects the obstruction and treats the videocassette as though it has the protection tab in place. Also called projection tab.

**record review** A feature on a video camera permitting automatic playback of the last few seconds of a recorded tape. The tape is then placed in position for the next scene. With some cameras, this feature works only when they are connected to certain VCRs.

**rectangular picture tube** A TV picture tube that has an essentially rectangular faceplate and screen. The typical aspect ratio is 3:5.

**rectangular pixel** A pixel that has different vertical and horizontal sample spacing. Rectangular pixels are usually used by consumer video equipment and video conferencing. Typical rectangular pixel video resolutions are 720 x 480, 720 x 576, 352 x 240, and 352 x 288.

**rectangular scanning** A 2-D TV sector scan in which a slow sector scan in one direction is superimposed on a rapid sector scan in a perpendicular direction.

**rectilinear scanning** See *Scanning*.

**red/blue balance control** A feature on a video camera to permit adjusting for maximum blue and red reproduction. The effect is either read on an accompanying meter or judged on a nearby color monitor or receiver. The balance control may also be part of a separate accessory, the color control unit or, in more sophisticated camera models, may work automatically through special circuitry.

**red difference** Syn.: red color difference (R-Y) signal.

**red eye** A term used by professionals to describe the red recording light on the front of video cameras. The light goes on when the camera is in operation as a cue to the actor or subject. Several home video cameras provide this feature.

**red gun** The electron gun whose beam strikes phosphor dots emitting the red primary color in a three-gun color TV picture tube.



**redistribution** The alteration of charges on an area of a storage surface in a charge-storage tube or TV camera tube by secondary electrons from any other area of the surface.

**red light** The warning light over a door of a studio indicating that it is in use; a light on a TV camera indicating that it is in use.

**red restorer** The DC restorer for the red channel of a three-gun color TV picture tube circuit.

**reduction** A zoom effect with objects being decreased in size. Syn.: compression; zoom out.

**red video voltage** The signal voltage output from the red section of a color TV camera, or the signal voltage grid of the red gun in a three-gun color TV picture tube.

**red zone** The flashing red lights outside a TV or film studio that indicate a production in progress.

**reed switch, satellite TV** A mechanical switch that uses two thin slivers of metal in a glass tube to make and break electrical contact and thus to count pulses, which are sent to the antenna actuator controller. The position of the slivers of metal is governed by a magnetic field applied by a bar or other type of magnet.

**reel** A container that consists of a core and flanged ends (a kind of spool) for winding on magnetic tape.

**reel number** The number assigned by the operator to an audio or video reel or cassette to be used in an edit session; used for the purpose of identifying each reel or cassette on the edit list for the final assembly or for future revisions.

**reel rocking** Refers to finding an exact editing point by physically moving back and forth the two reels of an open-reel tape recorder. By listening or looking carefully for the cue, one can find the edit point. This method was introduced to professional tape editors in 1974 by TV Research International (TVI). Prior to reel rocking, technicians used a more cumbersome numerical procedure for editing. Today's more sophisticated professional editing techniques include, among others, magneto-optical nonlinear disc-based systems or nonlinear editing used in conjunction with solid-state video recorders.

**reel-to-reel format** A format of the early VTRs with manual tape "threading" from a supply reel, past the heads, to the take-up reel.

**reference black level** The picture signal level that corresponds to a specified maximum limit for black peaks.

**reference disc, CD and CDV players** Test disc.

**reference oscillator** In a color TV set (NTSC, PAL), an oscillator which is synchronized in frequency and in phase with the color burst and is used to operate the synchronous detectors that decode the chrominance signal.

**reference phase** The phase of the color-burst signal voltage in a color TV receiver, or the phase of the master-oscillator voltage in a color TV transmitter.

**reference recording** A recording of a radio or TV program for future reference.

**reference white** 1. The light from a nonselective diffuse reflector that receives the normal illumination of a scene. 2. The standard white color reference for specifying all other colors. The reference white in color TV approximates direct sunlight or sky light that has a color temperature of 6500 K. Primary colors are specified in units such that one unit of each primary will combine to produce reference white.

**reference white level** The picture signal level that corresponds to a specified maximum limit for white peaks. It depends on the color TV system and usually serves as a 100% reference level to calibrate the gains and settings of measurement devices. Syn.: nominal white level; white level.

**reflection** The return or change in direction of light, sound, or radio waves striking a surface or traveling from one medium into another.

**reflections** Radio waves that have been reflected from a building, hill, or other conductive or semiconductive surface during their travel to a TV receiving antenna. The resulting longer travel time causes ghost images on the screen.

**refractive projection TV** A simple one-tube, two-piece projection TV system consisting of a TV set, a special magnifying lens and a large projection screen. The small TV receiver (usually 12 or 13" measured diagonally) is often enclosed in some type of box or cabinet with the lens at the opposite end. The enclosure prevents ambient light from dimming the image. If the system is the result of a do-it-yourself project, the projected image will be backward, upside down and rather washed out because of the nature and quality of the magnifying lens. To correct these shortcomings, manufacturers have produced systems with special TVs that have inverted images and high quality lenses. However, these refractive projection TVs cannot compete with the image quality and brightness of the more costly three-gun projection TV systems. These limitations no doubt have accounted for the general demise of the refractive system and the success of other large-screen techniques.

**refresh rate** The number of times each second that the information displayed on a nonpermanent display is rewritten. An example is the number of times a CRT image must be rewritten or reenergized to remain visible and flicker-free.

**register** In TV sets, the accurate superimposition of images from the three-color electron guns in a color TV tube. Also called registration.

**registration** In video cameras or video displays, the process of causing the three color images to exactly coincide in space. If a camera is not in exact registration, there will be color fringes around sharp edges in the reproduced picture. In spite of these difficul-

## registration chart

ties, three-sensor cameras produce the highest quality images, and this approach is used for all the highest performance cameras. Also called register.

**registration chart** See *Video test chart*.

**regular reflection** Direct reflection.

**reinsserter** DC restorer.

**reinsertion of carrier** Combining a locally generated carrier signal with an incoming suppressed-carrier signal.

**rejector** Trap.

**relative time delay** The difference in time delay encountered by the audio signal and the video signal or between the components of the picture signal traveling over a TV relay system.

**relay** A microwave or other radio system that passes a signal from one radio communication link to another. See also *Communications satellite*.

**relay channel** The band of frequencies for transmitting a single TV relay signal, including the guard bands.

**relay receiver** A receiver that accepts a TV or microwave relay input and delivers a TV or microwave relay output signal to the transmitter portion of a repeater station.

**remo** See *Remote*.

**remote** Programs produced or recorded live at a distance from the TV studio. Also called remote pickup, pickup, field pickup, outside broadcast, or emo.

**remote channel change** A feature found on the remote control panel of most VCRs that permits changing the channel number of the recorder's tuner. It also converts the TV receiver into a remote control set by using the VCR's tuner and the TV's open channel (3 or 4). Older VCRs equipped with a mechanical rotary tuner were incapable of utilizing the remote channel change.

**remote control** Means of controlling an equipment from a distance. The link between the remote control unit and the equipment may be a cable, an ultrasonic wave or infrared. Many VCRs, DVD players, TV receivers, VDPs, etc. have facilities for changing channel, adjustment of different parameters, etc. by remote control.

**remote control directivity** Refers to the useful angle range of a remote control pad in relation to the receiver. The effective angle of remote control directivity depends on the distance between the control pad and the unit. In other words, the farther away from the sensor on the unit, the greater the angle or degrees. Directivity to some extent depends on the condition of the batteries in the remote control pad.

**remote control panel** An electronic component containing all the function buttons necessary to operate a VCR, DVD, VDP and similar units that are some distance away from the viewer. Remote control panels can be portable, fitting into the palm of a hand, or can be desktop or console models.

**remote control range** Refers to the effective distance between a remote control pad and a VCR, DVD, TV or VDP. The range varies with different units and often depends on the freshness of the batteries in the remote control pad.

**remote control unit** See *Remote control, Remote control panel*.

**remote pause button** A control on a video camera that permits operating the Pause mode of a VCR from the camera. This feature, which gained prevalence in 1979, gives the camera operator more flexibility by centralizing more functions on the camera. However, some older VCRs are not designed to operate in conjunction with this feature.

**remote pause/still** A button on a VCR remote control panel which (1) stops the tape in Record mode to eliminate undesired material, such as commercials, from being recorded and (2) stops the tape in Play mode to provide a still picture, or freeze frame, on the screen. This feature was first introduced by JVC.

**remote pickup** Picking up a radio or TV program at a remote location and transmitting it to the studio or transmitter over wire lines or a shortwave or microwave radio link. Also called remote.

**remote sensor** A feature on all remote-controlled VCRs, DVD players and TVs that senses the IR signal transmitted from the remote control pad. To operate correctly, the remote sensor depends chiefly on two factors. First, the sensor, located on the front, should not be blocked by external objects. Second, the batteries in the remote control panel should be in good condition.

**remote telephone programming** A VCR feature that permits the owner to program the unit by telephoning in the required instructions. A conventional modular connector links the VCR to the telephone. When the phone rings, the machine, which contains a blank videocassette, answers with a beep, signaling that it is ready to receive instructions. One enhancement to remote telephone programming is the electronic voice which responds to the telephone call and asks, in sequence, for information concerning the day, time and channel for the intended recording.

**remote VCR on/off switch** A function on the remote panel that controls the VCR button on the VCR. In the VCR position, the tuner of the machine supplies the channel to the TV set, which now acts as a monitor. In the TV position, the tuner of the TV set becomes the source for the screen image, and the VCR remains inactive unless it is recording another program from a different channel.

**rendering** Process of non-realtime drawing of a picture relying on computer processing speed for graphics and compositing.

**repeat play** A VCR feature that instructs the machine to play a videotape up to an index signal, stop and

rewind to a previous index signal and continue to play that portion of the tape indefinitely until the repeat play mode is pressed again. The length of the section to be replayed depends upon the minimum time between two indexes. The Repeat feature also appears on several VDPs. Some offer two Repeat modes—one that replays the present chapter or track, and another, sometimes called Repeat All, that plays back the entire disc. Repeat play differs from Auto Repeat, a feature on some VCRs and VCPs that replays the entire videotape.

**ReplayTV™** One brand of Personal Video Recorder (PVR), also called a digital video recorder (DVR). An intelligent “black box” that records TV shows to an internal hard drive, allowing live TV to be paused, rewound, played in slo-mo, etc.

**residual elongation** Refers to the capabilities of a videotape to return to its original length after it has undergone tension for a long period of time. Most tapes tend to stretch to some degree. However, beyond a certain point, usually listed at about 5%, elongated tapes become unplayable. Residual elongation is only one of many factors that determine the overall quality of a tape. Manufacturers rarely list this measurement on their packages

**residual subcarrier** The amount of color subcarrier information in the color data after decoding a NTSC or PAL video signal. The number usually appears as -n dB. The larger “n” is, the better.

**resistor ladder** A string of resistors used for defining voltage references. In the case of 8-bit flash ADCs, the resistor ladder is made up of 256 individual resistors, each having the same resistance. If a voltage representing the number 1 is attached to one end of the ladder and the other end is attached to 0, each junction between resistors is different from the other by 1/256. So, if we start at the top of the ladder, the value is 1. If we move down one rung, the value is 0.99609, the next rung’s value is 0.99219, the next rung’s is 0.98828 and so on down the ladder until we reach 0 (the other end of the ladder). A resistor ladder is an important part of a flash ADC because each rung of the ladder, or tap, is connected to one side of a comparator, in effect providing 256 references. See *Flash A/D*.

**res-line** Resolution line. A line used to make up the image on a TV screen.

**resolution** The ability of an image reproducing system to reproduce fine detail. In TV, resolution is a measure of sharpness of a TV image in both vertical and horizontal axes. TV resolution measurements are usually made with a test pattern that includes test wedges (a collection of black and white lines that converge at the center of the pattern), calibrated in lines per picture height. Horizontal resolution is measured in lines. For NTSC and PAL, the number of lines results from multiplying 80 by the peak video frequency of the VCR. For instance, if a VCR can

record and play back 3 MHz, then that machine is listed at 240 lines. Black and white and color resolution are usually listed separately in specifications. With a video camera, resolution refers to the maximum number of clear lines discernible on a resolution or video test chart. Resolution depends on several factors. Industrial or commercial equipment, for example, generally produces higher resolution. Different consumer formats yield disparate ratings. The ED-Beta format can generate more than 500 lines of horizontal resolution; laserdisc players, 425 lines; S-VHS format (both camcorders and VCRs), more than 400 lines; broadcast TV, between 300-330 lines.

**resolution chart** Test pattern. See also *Video test chart*.

**resolution independent** Describes equipment that can operate at more than one resolution. Some modern TV equipment, especially that designed by the ITU-R BT.601 standard, can switch between specific formats and aspect ratios of 525/60 and 625/50.

**resolution line** See *Res-line*.

**resolution wedge** A test pattern for resolution of a video camera system consisting of a group of lines angled so that they come closer together as you move across the pattern.

**resonant-line tuner** A TV tuner in which resonant lines are used to tune the antenna, RF amp, and RF oscillator circuits. Tuning is achieved by moving shorting contacts that change the electrical lengths of the lines.

**Resource Reservation Protocol** See *RSVP*.

**response control** A function on an image enhancer (or mini-enhancer) designed to cut the high-frequency noise of a video signal. The response control usually works in conjunction with an enhance control. First, the enhance (sharpness) button or dial is adjusted to a point where the picture appears sharp, but slightly grainy. Then the response control is used to reduce the noise as much as possible without affecting the sharpness or detail in the picture. The control can often decrease 3-MHz signals, composed mostly of noise, from zero to almost half their enhancement.

**retentivity** In videotape, the ability of the particles that form the magnetic medium to keep their magnetic charge. A tape with high retentivity characteristics demonstrates high quality.

**retina** A delicate, multilayered, light-sensitive membrane lining the inner eyeball and connected by the optic nerve to the brain. The retina of the human eye is covered with cones and rods, cells that absorb light and send electrical signals to the brain to form visual images. In 1995, for the first time, it became possible to see individual cones—the cells that allow us to detect color.

**retinal illumination** Illumination that is determined by the image brightness and the size of the pupil’s aperture. The latter, in turn, depends on the bright-

## retinal image

ness of the surroundings as well as that of the image itself. In a darkened motion picture theater, the surround brightness is low, the pupil aperture is relatively large as the eye automatically adjusts to the low light level, and the retinal illumination is high in relation to the screen brightness. In a typical home environment, the surround brightness is higher, the pupil aperture is smaller, and the retinal illumination is lower in relation to the image brightness. As a result, the image brightness can be greater without causing visible flicker in a home TV set than with motion pictures in a theater. The difference is increased still further by the use of the lower field rate of 48 per second in motion picture systems.

**retinal image** In the human eye, the retinal image received by one's left eye and one's right eye are slightly different due to the eye separation (each eye sees the scene at a slightly different angle), which differences the brain processes to produce neural depth information to give the perception of stereo depth. The same concept is realized electronically in some 3D TV systems. How the brain knows which points in the retinal image corresponds to given points in the right one is a mystery. In 3D TV systems, this information can be obtained by each point being tagged in turn with the laser beam.

**retrace** The return of the electron beam to its starting point in a CRT after a sweep. It is also called flyback.

**retrace blanking** Blanking a TV picture tube during vertical retrace intervals to prevent retrace lines from showing on the screen. Voltage pulses for blanking are derived from a vertical sweep oscillator or vertical deflection circuits, and are applied to the control grid of the picture tube.

**retrace ghost** A ghost image produced on a TV receiver screen during retrace periods. Generally caused by insufficient blanking of the camera tube at the transmitter.

**retrace interval** The interval of time for the return of the blanked scanning beam of a TV picture tube or camera tube to the starting point of a line or field. It is about 7  $\mu$ s for horizontal retrace and 500 to 750  $\mu$ s for vertical retrace in NTSC and PAL TV. It is also called retrace period, retrace time, retrace interval, return period, or return time.

**retrace line** The line traced by the electron beam in a CRT in going from the end of one line or field to the start of the next line or field. It is also called return line.

**retrace period** Retrace interval.

**retrace time** Retrace interval.

**return-beam mode** A camera-tube operating mode in which the output current is derived from that portion of the scanning beam not accepted by the target.

**return-beam vidicon** A vidicon whose electron beam that scans the target is bent back from the target to an electron multiplier and anode which surround

the electron gun. Light falling on the target surface changes the resistance of the surface, and thereby modulates the energy in the return beam.

**return interval** Retrace interval.

**return line** Retrace line.

**return loss** A measure of the ratio of signal power transmitted into a system to the power reflected or returned.

**return monitor** A TV screen linked to a TV camera, so that an interviewee or broadcaster in one studio, for example, can see the interviewer or anchor in another studio. Ordinarily in such situations, the interviewee only can hear the interviewer.

**return period** Retrace interval.

**return time** Retrace interval.

**return-to-zero code** (RZ code) A communication code in which a binary 0 is represented by one bit time at the 0 level, and a binary 1 is pulsed so that it reaches the 1 level for only half a bit time. The signal therefore returns to 0 (or stays at 0) after each bit. With this code, only half as much data can be stored in a given area or distance as with NRZ code.

**reveal** 1. To disclose; to bring to view; to make known: The person's brain would interpret the two displays to reveal its three-dimensional aspects. 2. In film, TV, a shot in which the camera is pulled away or the lens zoomed or focused outward to enlarge the scene. In TV, a reveal is a succession of computer-generated lines of text that give the impression of one line at a time being added to the screen, a common technique in newscasts such as weather, sports scores, and other lists.

**reverb** Reverberation.

**reverberation** The persistent repetition of a sound after the original sound has ceased: Hello-hello-ello-ello; caused by sound waves bouncing off objects and surfaces and thus reaching the ear or microphone later than the original sound. Reverberation is characterized by a gradual cessation of sound, not to be confused with echo.

**reverberation time** Of a room, hall or studio, the time taken for the intensity of a sound to fall by 60 dB. It is an important parameter because if speech is to be clear in a small room, the reverberation time should be about 0.3 s over the audible spectrum. Similarly good acoustics in an orchestral hall require a reverberation time of about 2 s and independent of frequency.

**reverse compatibility** Of a color TV system, a property that permits a color TV receiver to reproduce a normal black and white picture.

**reverse image switch** A home video camera feature that permits changing the image from positive to negative. This switch may be used to reverse photographic negatives to positive pictures on the TV screen.

**reverse polarity adapter** An accessory cable which restores the original functions of a video camera that

is used with an incompatible portable VCR. For example, although both units may be VHS in format, the multi-pin connectors may not match. A green light in the camera viewfinder may go on when the VCR is off and may go out when the machine is operating. To reverse these functions, some video supply houses sell reverse polarity adapters.

**reverse polarity control** Reverse image switch.

**reverse scan** See *Visual scan*.

**review** To scan the playback picture at a faster-than-normal speed in the reverse direction. Syn.: search-reverse.

**review button** On some cameras, a control which plays back, both in reverse and forward, the last few seconds of a tape through the electronic viewfinder before the recorder reverts to Record/Pause mode. The button is usually located on the handgrip of some cameras.

**rew** Rewind.

**rewind** A control button on all VCRs to rewind the videotape in the cassette either partially or fully. On top-of-the-line machines, the rewind solenoid control has an additional function. When pressed halfway while the VCR is in Play mode, the reverse visual scan feature is activated and the picture appears on the TV screen in reverse without sound.

**rewind auto shut off** A function of some VTRs. When the power button is pressed during the rewind mode, including auto rewind, these VTRs will eject the cassette and turn themselves off when rewinding is completed.

**rewinder** An accessory for rewinding videotape. The use of a rewinder keeps the tape away from the video and audio heads in this mode, thereby prolonging their life to some degree. The rewinder is also useful for uninterrupted use of the VCR. Since the accessory is a separate unit, it can rewind one tape while another is playing or recording in the VCR. In addition, the rewinder, which is a relatively inexpensive item, saves on the wear and tear of the rewinding mechanism of a VCR. Repairing or replacing these parts can result in a relatively expensive repair bill. Also called auto-winder, videocassette rewinder.

**rewind/review** A button to rewind the tape. When this button is pressed during playback, the picture can be scanned in reverse at five times normal speed.

**RF** Radio frequency.

**RF adapter** A unit which accepts the composite video signal and modulates a carrier frequency to produce a predetermined TV bandwidth, thus producing a broadcast signal. See *RF converter*.

**RF amplifier** A device designed to maintain RF signal strength, especially when that signal is split. For instance, an amplifier may be necessary when an antenna signal is divided between two or more TV receivers with exceptionally long wires separating them; or when a VCR is feeding a few TV receivers. The RF amp is connected between the antenna line

and the splitter in the first example above and between the VCR and the splitter in the second example. An RF amp differs from a video distribution amp in that the former produces RF signals that can be fed directly to TV receivers.

**RF converter** An accessory which converts or changes any video source such as a portable VCR or a video camera to an RF signal for direct hook-up to a receiver's input. The alteration is necessary since a video signal is different from and not compatible with an RF signal. RF converters are sold separately or as combinations with image stabilizers.

**RF copying** See *Copying*.

**RF modulator** An accessory designed to combine separate audio and video signals from VCRs, image enhancers, video cameras and other image processors into an RF signal which can then be played through a TV set. In a VCR, the RF modulator places a low-power RF signal over the audio/video signals to trigger the TV into accepting the transmission as a normal TV signal.

**RF signal** The signal that mixes together audio and carrier signals; also, audio and video signals that can be transmitted. RF refers to the range of frequencies used to transmit electric waves. RF, audio and video signals are different in nature. For example, image processors accept video signals but do not accept RF signals.

**RF switcher** See *Switcher*.

**RG-6** See *Coaxial*.

**RG-11/u** A coaxial cable cable that is electrically similar to RG-59/U coax, but with larger conductors for less signal loss over long distances.

**RG-58A/u** 50-ohm coaxial cable. Used in TVs to take IF signals from a tuner; the low-impedance output circuit of the tuner is interfaced with the input of the IF amp.

**RG-59/u** A type of coaxial cable characterized by an impedance of 75 ohms, which is commonly used for the transmission of video signals. See also *Coaxial*.

**RGB** A color model based on the mixing of red, green, and blue—the primary additive colors used by color monitor displays and TVs. The combination and intensities of these three colors can represent the whole spectrum. Color TV signals are oriented as three separate pictures: R,G and B. Typically, they are merged together as a composite signal but for maximum quality and for computer applications the signals are segregated.

**RGB input** A feature on some monitors and TVs that feeds the individual red, green and blue signals and a sync signal directly to a picture display.

**RHC** Right-hand circular (polarization).

**ribbon** In TV, the horizontal crawl superimposed at the bottom of the screen, such as for news bulleting or promotional announcements.

**ribbon microphone** A velocity microphone whose

## rim light

moving element is a thin corrugated metal ribbon mounted between the poles of permanent magnets. The ribbon cuts magnetic lines of force as it is moved back and forth in proportion to the velocity of air particles in a sound wave, so an AF output voltage is induced in the ribbon. It is an old-fashioned and not very durable mic since the "ribbon" tends to fray at the edges. Used in TV.

**rim light** Kicker.

**rim magnet** Field-neutralizing magnet.

**ringing** 1. An oscillatory transient that occurs in the output of a system as a result of a sudden change in input. In TV it might produce a series of closely spaced images or a black line immediately to the right of a white object. Ringing in the video amp gives rise to regularly spaced vertical stripes to the right of each vertical line in the picture. 2. Refers to a series of ripple-like effects that appear at the edge of a high-contrast object. Ringing tends to be a peculiarity more of tube-type than solid-state video cameras. The problem results from random capacitance within the circuitry. A video test chart can determine whether a camera produces ringing in its image.

**ripple effect** 1. A condition of videotape that is stored and not played for long periods of time. Because of this inactivity, the tape may develop wrinkles during recording. These wrinkles tend to develop the ripple effect. Tape technicians usually recommend running tapes through VCRs once in a while so they don't "memorize" particular patterns during their setting period. 2. A phenomenon occurring in videotape time-code AB roll editing. When the position or length of an edit is changed from the original master list, the starting times and positions of all of the following scheduled edits must also be changed.

**RLE** Run length encoding, a compression scheme.

**RO** Receive only.

**Robot** 1. Abbreviation for Robot 1200C scan converter, pioneering a device that converted images in one TV standard to another, in this case between slow-scan TV (SSTV) and NTSC/PAL, so camcorders, TV monitors, etc., could be used for creating and displaying SSTV images. The Robot 1200C was discontinued in 1992. 2. A family of SSTV transmission modes introduced with the 1200C.

**Robot 1200c scan converter** See *Robot*.

**robotic television cameras** Cameras without operators. Mounted on tracks, they can be manipulated from the control room by a single operator seated at a computer panel.

**roll** 1. A reel or spool of tape, film, paper, or other material. 2. Loss of vertical sync causing the picture to move up or down the screen. Roll may result from anti-copying devices placed on commercial prerecorded videotapes.

**roll about** A totally self-contained videoconferencing system consisting of the codec, video monitor, au-

dio system, network interfaces and other components. These roll about systems can, in theory, be moved from room-to-room but in fact are not, because they are electronic equipment that does not benefit from jostling and are also heavy.

**roller** A rubber tire or wheel.

**rolling dropouts** Horizontal lines, resembling scratches, that move rapidly through the screen image. The problem is associated chiefly with videodiscs. Occasionally appearing in clusters, these rolling dropouts are often the result of a faulty aluminum coating or a defective videodisc stamper.

**roll off** The preset attenuation of a predetermined range of bass frequencies, used by some microphone manufacturers on their mics to reduce the proximity effect.

**ROM** Read only memory, a computer memory device that is programmed once with a permanent program or data that cannot be erased.

**rooster amplifier** A nonlinear amp whose negative feedback makes the output voltage vary as the square root or some other root of the input voltage. It is used in TV transmitter video amps for gamma correction to compensate for camera-tube characteristics.

**rostrum camera** An adjustable camera commonly used in TV and film animation to shoot artwork or other graphics on a table or other horizontal surface.

**rotary chroma** The name of the process used in VHS to change the phase of the chrominance signal at a rate of 15,734 Hz (same as the TV horizontal sync frequency).

**rotary erase head** A set of heads on the rotating video-head assembly which erases the video signal during recording and editing; usually positioned one scan line in front of the video heads; produces cleaner edits than a stationary erase head.

**rotary idler** Stationary guide along the tape path.

**rotary wipe** A special effect produced by a mix/effects switcher in which a rotating radial line replaces one video image with another. The result is similar to that of a clock hand rapidly moving around the dial.

**rotation** Refers to a waveform monitor function designed to adjust the instrument to the magnetic field at a shooting site. Rotation control is one of several basic features found on such units as portable waveform monitors, or oscilloscopes.

**rough edit** A rapid assembly of various segments in the order they will appear in the final program; not a finished master tape; not a clean edit.

**route** To direct, send, forward, or transport by a specified route: the second camera display is *routed* through a separate prism to the viewer's right eye.

**routing switcher** An accessory unit that directs several audio and video connections into one box so that signals can be matched with various destinations. Routing switchers often incorporate a distri-



bution amp that splits one input into more than one output for purposes of copying with little signal loss. Some switchers handle six VCRs, an auxiliary source, an external processor and a TV monitor/receiver. These units offer more flexibility, including mixing a VCR picture with the audio of a CD and taping the result on a separate VCR. Professional routers may feature HDTV compatibility at 30 MHz, remote control and more than one level of switching.

**rover** A portable TV camera, particularly the Sony Portpack.

**RP-125** A SMPTE parallel component digital video recommended practice. Now *SMPTE 125M*.

**RPM** Revolutions per minute.

**RR** CATV hyperband channel, 402-408 MHz.

**RS-170** The U.S. standard that was used for black and white TV, and defines voltage levels, blanking times, the width of the sync pulses, and so forth. The specification spells out everything required for a receiver to display a black and white picture. The output of the small black and white security cameras hanging from ceilings conforms to the RS170 specification.

**RS-170A** RS-170, modified for color TV by adding the color components. When NTSC decided on the color broadcast standard, they modified RS-170 just a little bit so that color could be added, with the result being called RS-170A. This change was so small that existing black and white TVs didn't even notice it.

**RS-232** A standard, single-ended interconnection scheme for serial data communications.

**RS-343** RS-343 does the same thing as RS-170, defining a specification for video, but the difference is that RS-343 is for higher-resolution video (computers) while RS-170 is for lower-resolution video (TV-resolution video).

**RS-422** A medium-range balanced serial data transmission standard. Widely used for control links around production and post areas for a range of equipment.

**RSDL** RSDL stands for Reverse Spiral Dual Layer. It is a storage method that uses two layers of information on one side of a DVD. For movies that are longer than can be recorded on one layer, the disc stops spinning, reverses direction, and begins playing from the next layer.

**RSVP** RSVP (Resource Reservation Protocol) is a control protocol that allows a receiver to request a specific quality of service level over an IP network. Real-time applications, such as streaming video, use RSVP to reserve necessary resources at routers along the transmission paths so that the requested bandwidth can be available when the transmission actually occurs.

**RTCP** RTCP (Real-Time Control Protocol) is a control protocol designed to work in conjunction with RTP. During a RTP session, participants periodically send RTCP packets to convey status on quality of service and membership management. RTCP also uses RSVP

to reserve resources to guarantee a given quality of service.

**RTP** RTP (Real-Time Transport Protocol) is a packet format and protocol for the transport of real-time audio and video data over an IP network. The data may be any file format, including MPEG-2, MPEG-4, ASF, QuickTime, etc. Implementing time reconstruction, loss detection, security and content identification, it also supports multicasting (one source to many receivers) and unicasting (one source to one receiver) of real-time audio and video. One-way transport (such as video-on-demand) as well as interactive services (such as Internet telephony) are supported. RTP is designed to work in conjunction with RTCP.

**RTSP** RTSP (Real-Time Streaming Protocol) is a client-server protocol to enable controlled delivery of streaming audio and video over an IP network. It provides "VCR-style" remote control capabilities such as play, pause, fast forward, and reverse. The actual data delivery is done using RTP.

**RTV** Real-time video.

**RTX** Real-time executive. A subsystem module, DVI. It is a form of multitasking which runs inside of a DVI application. The basic working unit of RTX is a task; the interrupt structure of the PC is set up so that a number of RTX tasks can operate "simultaneously." This is accomplished by interrupting the CPU 30 times per second (not synchronized with the video frame rate, however). When AVSS is running it activates three high-priority RTX tasks: a server task, a decode task, and a display task. These three tasks do all the detail work of playing video and audio.

**rule of thirds** A TV production guideline stating that the center of attention of a picture should be one third of the way from the top of the screen or one third of the way from the bottom, or one third from either edge of the screen. It should never be in the dead center of the picture.

**rule of thumb** This rule says that you should be seated at least 7 feet from a 31" screen, 15 feet from a 52" screen and 17 feet from a screen that is 100" or larger.

**run length coding** A type of data compression. Let's say that this page is wide enough to hold a line of 80 characters. Now, imagine a line that is almost blank except for a few words. It's 80 characters long, but it's just about all blanks—let's say 50 blanks between the words "coding" and "medium." These 50 blanks could be stored as 50 individual codes, but that would take up 50 bytes of storage. An alternative would be to define a special code that said a string of blanks is coming and the next number is the amount of blanks in the string. So, using our example, we would need only 2 bytes to store the string of 50 blanks, the first special code byte followed by the number 50. We compressed the data; 50 bytes down to 2. This is a compression ratio of 25:1. Not bad, except that we only compressed one

## running log

line out of the entire document, so we should expect that the total compression ratio would be much less. Run length coding all by itself as applied to images is not as efficient as using a DCT for compression, since long runs of the same "number" rarely exist in real-world images. The only advantage of run length coding over the DCT is that it is easier to implement. Even though run length coding by itself is not efficient for compressing images, it is used as part of the JPEG, MPEG, H.261, and H.263 compression schemes.

**running log** A sequential listing, such as the log of TV programs by time period. See also *Grid log*.

**running shot** See *Moving shot*.

**R-Y matrix** A circuit to construct color difference signal R-Y according to the equation  $R-Y = 0.7R - 0.59G - 0.11B$ .

**R-Y signal** The red-minus-luminance color-difference signal used in color TV. It is combined with the luminance signal in a receiver to give the red color-primary signal.

**RZ code** Return-to-zero code.

# S

**S** CATV superband channel, 270-276 MHz.

**SABC** South Africa Broadcasting Corporation.

**saddle coils** Coils for magnetic deflection, usually of rectangular form and shaped so as to fit the neck of a CRT.

**safe-action area** See *Safe area, Safety*.

**safe area** 90% of the TV screen, measured from the center of the screen; that area of the display screen (and therefore of the camera scanning area) which will reproduce on every TV screen, no matter how the set is adjusted. Also called safe-action area.

**safe title area** 80% of the TV screen, measured 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 the set is adjusted.

**safety** 1. Extra copy of a video tape kept in case something happens to the original copy; usually a second generation copy, although on special effects generators with two program outputs it's possible to record two master tapes, one to be set aside as the safety tape. 2. The outer area, or safety area, of a TV film or tape, often eliminated and not seen on the screen of a TV set. Broadcasters therefore confine text and action to the centered area—about 90%—called the safe-action area.

**safety-action area** See *Safety*.

**safety area** See *Safety*.

**salad** A pileup, such as the wedging or jamming of film or tape in a camera, printer, or projector; also called jam.

**sample** To obtain values of a signal at periodic intervals. Also the value of a signal at a given moment in time.

**sample and hold** A circuit that samples a signal and holds the value until the next sample is taken.

**sample rate** Sample rate is how often a sample of a signal is taken. The sample rate is determined by the sample clock.

**sampling** 1. Converting continuous signals, like voice or video, into discrete values—for example, digital signals. In order that the output values represent the input signal without significant loss of information the rate of sampling of a periodic quantity must be at least twice the frequency of the signal, called the Nyquist rate. 2. Scanning is a form of sampling,

a process in which the value of a continuously varying signal is measured at regular time or distance intervals. The values of the samples are reconverted to a continuous function, either electronically or by the retentivity of the eye. Two sampling procedures are employed in TV scanning. Variations in vertical brightness are sampled by the scanning lines, and the positions of objects in motion are sampled by scanning the entire raster.

**sampling rate** The number of times per second that an analog signal is measured and converted to a binary number, the purpose being to convert the analog signal to a digital signal.

**sand bags** Canvas sacks filled with sand used to provide stability and ballast to light stands, tripods, and other portable equipment.

**sandcastle pulse (SC)** A pulse used in older color TV receivers. It has two levels (SSC has three levels): burst gating level (required input more than 7 V) and line-blanking level (required input voltage 4 to 5 V, typ. 4.5 V).

**Sanyo V Cord Two format** The first consumer video machine to offer two recording speeds, freeze-frame and slow motion. Introduced in 1976. No longer manufactured.

**SAP** Separate (also Second, Secondary, Special) Audio Program. A monaural channel provided for by the EIA's BTSC (Broadcast Television Systems Committee) standard. SAP was designed as an additional soundtrack for bilingual programs or other such purpose without interfering with monaural reception of current TV receivers. Used in some multichannel TV sound (MTS) broadcasts. The SAP feature usually can be controlled from the remote control of a monitor/receiver or TV set. Transmission of the SAP channel is at the option of the local broadcast station and may not be present along with the stereo broadcast signal.

**SAP indicator** A feature, located on the front panel of some VCRs, that lights up when a second, or separate, audio program broadcast is received.

**SAS-AD1** Digital satellite system hardware introduced in 1995 providing home reception of up to 175 channels via high-powered satellite and requiring a dish only 18" in diameter; Sony.

## SATCOM

**SATCOM** The name of satellites built by RCA Astro-Electronics and operated by RCA Americom. SATCOM I was the second commercial satellite in the U.S., launched in 1975. These satellites distribute programming to cable-TV systems and provide network radio transmissions, as well as commercial and government voice, data, and video services.

**SATCOM F1** American TV satellite (operated by RCA) used to supply most of the cable-TV programming on 24 transponders (12 are vertically and 12 are horizontally polarized). It is located at 135 degrees west longitude. Also referred to as F1.

**SATCOM F2** American TV satellite (operated by RCA) used to supply assorted video and data programming to Alaska and other points in the US. Like its sister, F1, it too has 24 transponders. It is located at 119 degrees west longitude. Also referred to as F2.

**satellite** A manmade object orbiting the earth which has revolutionized all aspects of telecommunications and brought the concept of a “global village” into the realm of possibility. Television became a major user of communications satellites in the 1970s. A satellite is placed in orbit 22,300 miles above the earth’s equator so that it travels at the same speed as that of the earth’s rotation (geosynchronous). Onboard transponders receive the signals and transmit them back to earth after converting them to a frequency that can be received by a ground-based antenna. Among those who have placed communications satellites in orbit are AT&T, the Canadian government, General Electric, RCA, and Western Union. Also called artificial satellite.

**Satellite Broadcasting and Communications Association (SBCA)** Formed in 1986 from the merger of SPACE and the Direct Broadcast Satellite Association (DBSA) to represent all segments of the satellite consumer services industry. ([www.sbca.org](http://www.sbca.org))

**satellite channels** The two bands allocated for TV satellite broadcast are the C-band (4 to 6 GHz) and the Ku-band (10–17 GHz). The downlink spectrum for the C-band satellite system consists of 24 channels, each having 40-MHz bandwidth, in the 3.7- to 4.2-GHz frequency band. Each channel overlaps its adjacent channel by 20 MHz. Even-numbered channels are horizontally polarized to give a minimum of 30-dB separation. Satellite transponder power output is 5 to 10 W. The Ku-band has been split by the FCC into two segments: the 11.7–12.2 GHz band known as FSS (Fixed Satellite Service), and the 12.2–12.7 GHz segment known as BSS (Broadcast Satellite Service). The number of channels that Ku-band satellites are capable of delivering is rapidly increasing due to improved technology.

**satellite communication** Communication with an active or passive satellite to extend the range of a radio, TV, or other transmitter by returning signals to earth from an orbiting satellite. An active satellite

with a solar-cell power supply can produce about 500 W of output power.

**satellite dish** A special antenna used in conjunction with a TV satellite system. The dish shape collects and concentrates signals from the satellite. Fixed dishes are targeted for reception of a single satellite, while rotating dish antennas are aimed at several satellites. C-band antennas range from 5–12 ft. in diameter, while Ku-band antennas range from 18 inches to 6 ft.

**satellite focus** The area on earth covered or focused upon by a particular satellite’s transmission. The satellite signal may vary from narrow to broad in the zone or land area it reaches. For example, one type, the domestic satellite, transmits its signal to a confined area, such as one country. It is also known as a spotbeam satellite. A second kind, the hemispheric satellite, transmits to an individual hemisphere. It, too, has another name: zone satellite. The global or international satellite transmits to large areas of earth. Some satellites may have signals that cover two or all of the areas above.

**satellite location** The position of a communications satellite in orbit for the purpose of receiving and transmitting various signals. There are various sources of information for owners of satellite TV systems that reveal where satellites are and which programs appear on each. Home satellite handbooks list the locations of satellites and how they operate. Wall charts position the many satellites and their footprints. Monthly magazines provide a program guide to all the US satellites.

**Satellite Master Antenna Television (SMATV)** An alternative over-the-air system of delivering satellite-transmitted channels. SMATV entails communal use of a dish, receiving and distribution unit, and cable network. The system offers clear reception via cable to the TV receivers of apartment or hotel dwellers. Also called private cable.

**satellite modulator** Satellite TV modulator.

**satellite newsgathering** See *SNG*.

**satellite news vehicle (SNV)** See *SNG*.

**satellite programmer** A company that produces, packages, or distributes video, audio, and/or data services for distribution to the home satellite dish and cable markets.

**satellite receiver** The component of a satellite TV system designed to convert the microwave signal to VHF and modulate it for acceptance by the antenna input of the TV receiver. A satellite receiver may be built into the horn assembly of the dish just as the LNA is, or attached to the base of the dish or kept indoors. Those built into the antenna allegedly minimize signal loss by the absence of cables and additional circuitry. The more sophisticated table-model receivers, also known as integrated receiver/descramblers (IRDs), have a host of special features, including integrated descramblers, on-screen menus

for various controls, programmable tuners, digital stereo sound and video noise reduction for clearer images.

**satellite signal** An FM signal carrying both audio and video information transmitted from an earth station (uplink) to a satellite which converts the signal before returning it (downlink) to a ground station antenna. The International Telecommunications Union (ITU) has set aside space in the super high frequency (SHF) bands located between 2.5 and 22 GHz for satellite transmissions (microwave frequencies).

**satellite transponder** See *Transponder*.

**satellite TV** Refers to any of the satellites in orbit (22,300 miles above the equator), each of which can collect signals from broadcasters and amplify them before sending them back to earth via the microwave band. The three basic units of a satellite TV system include a special antenna, a low-noise amplifier (LNA) and a satellite receiver. The antenna may be either a parabolic or spherical type. The LNA amplifies the signal from the antenna while the receiver converts the signal to VHF and modulates it for the TV set.

**satellite TV modulator** In a satellite TV system, that part that permits the output to go directly to the antenna input of a TV receiver. A modulator converts the audio and video signals to an RF signal. Most satellite receivers have a modulator built in.

**saticon camera tube** (High-band, mixed-field). A tube used in broadcast TV and some consumer videocameras; constructed from arsenic and tellurium by Hitachi and RCA. It provides higher resolution than the vidicon, and has the ability to produce less noise under high illumination, but the saticon is more susceptible to image retention or lag. To compensate for this, different techniques are employed in the design of the tube.

**saturated color** A pure color, not contaminated by white.

**saturation** 1. In color perception, the degree to which the light energy is confined to a narrow frequency band. It is thus the converse of the extent to which the color is diluted with white light. The difference between pink and red is one of saturation. Also called color saturation. See also *Variables of perceived color*. 2. In satellite transponders, a power level above which an increase in input causes no further increase in output. The output of the receiver should drive the transponder to saturation.

**saturation control** Achieved by varying the amount of color information with respect to the luminance information.

**SAV** Start of active video, a synchronizing code word used in component digital video.

**SAW** Surface acoustic wave.

**SAW filter** An acoustic wave filter that utilizes the surface wave of a piezoelectric element of very compact design to allow a sharp transition between re-

gions of allowed and attenuated frequencies. Used in TV sets and VCRs to assure the desired IF response. Usually the SAW filter is located between the tuner and IF amp.

**sawtooth** A periodic signal, named for its shape, in which each cycle consists of a linear change followed by a rapid return to the value at the beginning of the linear change. Such signals are used extensively for feeding the deflecting systems in TV picture tubes and camera tubes, and also in the conversion between analog and digital signals. The linear rise is known as the working stroke (active interval) and the rapid collapse as the flyback or retrace. In most generators a sawtooth voltage is developed across a capacitor by passing a constant current through it, flyback being achieved by discharging the capacitor. Such circuits may be free-running, in which case they are usually synchronized by external signals or they may be driven types, in which case external triggering signals are essential to drive them.

**sawtooth current** A current that has a sawtooth waveform (in horizontal and vertical deflection systems of TVs).

**sawtooth generator** A relaxation oscillator that produces a sawtooth waveform—for example, horizontal or vertical generator in TV receivers.

**sawtooth voltage** A voltage that has a sawtooth waveform (in vertical deflection systems of TVs).

**sawtooth waveform** A waveform characterized by a slow rise time and a sharp fall, resembling the tooth of a saw.

**SBCA** See *Satellite Broadcasting and Communications Association*.

**SC** 1. Suppressed carrier. 2. SandCastle pulse.

**SCA** Subsidiary Communication Authority or Authorization, an awkward FCC term for a relatively new audio channel. The FCC later changed the nomenclature to Subsidiary Communication Service (SCS), but the broadcasting industry continues to use the original term. It is the second audio, or subcarrier, channel used for stereo broadcasting and other purposes in the US. The signal is multiplexed on the FM band by a modulator. See also *SAP*.

**scalable coding** Encoding a visual sequence so as to enable the decoding of the digital data stream at different spatial and/or temporal resolutions. Typically, scalable compression techniques filter the image into separate bands of spatial and/or temporal data. Data reduction techniques are applied to match human vision response characteristics.

**scaling** The act of changing the effective resolution of the image. For example, say we need to display an image at a resolution of 640 x 480 as a smaller picture on the same screen, so that multiple pictures can be shown simultaneously. We could scale the original image down to a resolution of 320 x 240, which is one fourth of the original size. Now, four pictures can be shown at the same time. That is an

## scallop

example of “scaling down.” Scaling up is what occurs when a snapshot is enlarged into an 8" x 10" glossy. There are many different methods for image scaling, and some “look” better than others. In general, though, the better the algorithm “looks,” the harder or more expensive it is to implement.

**scallop** In TV, a wavy picture.

**scan** To examine an area or a region in space point by point in an ordered sequence, as when converting a scene or image to an electrical signal.

**scan converter** 1. A device that converts one TV standard to another. 2. A CRT that is capable of storing radar, TV, and data displays for nondestructive read-out over prolonged periods of time. Applications include buildup of repetitive signals submerged in noise, conversion of video displays from one scan mode to another, and special overlay and merging effects for TV and radar displays.

**scan line** An individual sweep across the face of the display by the electron beam that makes the picture. An electron beam “scans” the screen to produce the image on the display. It takes 525 of these scan lines to make up a NTSC TV picture and 625 scan lines to make up a PAL TV picture.

**scanner** The center portion of a three-part video head drum. The scanner, which contains the video heads, rotates against the videotape while the upper and lower parts of the drum remain stationary. See also *Flying-spot scanner*.

**scanning** 1. In TV, the process of analyzing or synthesizing the light content of the elements constituting the scene. In practice this is achieved by an electron beam which moves over the target of the camera tube or the screen of the picture tube in a series of lines which embrace every element of the image. 2. In film-to-video transfer, scanning refers to the horizontal movement of the video camera across the film image projected on a screen. To capture wide-screen films on tape, a blank space would have to appear across the top and bottom of the TV screen. Therefore, to fill the screen, some of the film image is deleted by scanning. The best possible smaller image is selected from the wider film image based on esthetics, information (which actor is speaking at the moment), the avoidance of head chopping and other considerations. A professionally scanned TV broadcast appears unobtrusive and gives the viewer the feeling that nothing has been removed. However, no matter how carefully the film has been scanned, there have been voices of criticism from those involved in the creative process of filmmaking who believe that the scanning process compromises the artistic integrity of the original wide-screen work. Digital transfer, an alternative to scanning, offers a more sophisticated technique of converting theatrical films to video.

**scanning area** The part of a picture that the camera actually sees. It is larger than the essential area, or

safe-action area, which is the central part of the picture received and seen on the TV set.

**scanning disk** A rotating metal disk that has one or more spirals of holes near its circumference. It was used in early mechanical TV systems to break up a scene into elemental areas at a TV camera or to reconstruct a scene in a TV receiver.

**scanning line** (US: strip) In TV, one of the horizontal rows of elements of which the image is assumed to be composed and which is explored by the scanning beam during transmission and reception. The elements in each line are scanned in order from left to right with a rapid return to the left to start the next line below, and a rapid return to the top of the image when the bottom line has been completed. The motion of the scanning beam is, in fact, similar to that of the eye in reading. The definition of a TV system is primarily determined by the number of scanning lines chosen and most conventional systems use 525 or 625, HDTV 750 progressive or 1125 interlaced. Not all the lines are reproduced on receivers because a number are lost during the vertical flyback.

**scanning method** The video scanning method can be either interlaced or progressive. Interlaced scanning, used in today's analog TV, fills in the odd-numbered lines (1, 3, 5, 7, ... ) and then fills in the even-numbered lines (2, 4, 6, 8, ... ) until the frame is complete. Progressive scanning fills in each line consecutively, as a computer display does.

**scanning rate** The rate of displacement of the scanning spot along the scanning line.

**scanning spot** In TV, the small area of the target of a camera tube or screen of a picture tube that is affected by the scanning beam at any instant during the scanning process.

**scanning yoke** Syn.: deflecting yoke, deflection yoke, yoke. See *Cathode-ray tube*.

**Scan Velocity Modulation** See *velocity scan modulation*.

**SCART** Syndicat des Constructeurs d'Appareils Radio recepteurs et Televiseurs). A 21-pin connector used extensively in Europe to connect and interface audio and video components. The SCART connector is now the standard component for audio, video and RGB purposes in Europe. The standard version carries stereo audio, composite video, S-video, RGB video and blanking signals. The pin signal allocation for the standard SCART connector is listed in Table 1. There are some differences between the pin allocation on the standard SCART connector and that used to connect satellite decoders.

**Table 1. Standard SCART socket connections**

Pin Number	Specification	Signal
1	Right CH Audio Out	0.5 V
2	Right CH Audio In	0.5 V



3	Left CH Audio Out	0.5 V
4	Audio	Ground
5	Blue	Ground
6	Left CH Audio In	0.5 V
7	Blue In	0.7 V
8	Source Switching	Max 12 V
9	Green	Ground
10	Intercommunication Line	
11	Green In	0.7 V
12	Intercommunication Line	
13	Red	Ground
14	Intercommunication Line	Ground
15	Red In	0.7 V
16	Fast RGB Blanking	variable
17	Composite Video	Ground
18	Fast Blanking	Ground
19	Composite Video Out	1 V
20	Composite Video In	1 V
21	Socket	Ground

**scatterwind** The uneven winding of tape, usually resulting in damage to its edges, which hold the audio and control tracks. In a videocassette, reel spindles control the tape so that it is packed evenly. Scatterwind is usually caused by defective spindles or other similar faulty parts of a cassette.

**scene transition stabilizing** Automatic transition editing.

**Sceptre** AT&T. A consumer videotex interactive terminal introduced in 1983 which, when used with a TV set and a phone line, allowed the consumer to interact with a videotex data base service. Withdrawn from the market in 1986.

**SC-HDTV system** Zenith and AT&T. Spectrum-compatible HDTV system employing progressive scanning, digital DCT compression, and four-level vestigial sideband modulation. Features of this system were adopted in the final HDTV standard adopted by the FCC.

**Schlieren** Regions in a translucent medium that have a different density and index of refraction than the rest of the medium. A Schlieren lens is used for video production.

**Schmidt optical system** An arrangement of lenses and mirrors in combination with a very bright CRT; used in video projection systems. The first successful method of producing large screen TV pictures using a CRT, mirrors and a set of reflectors. Developed in the 1940s, this system was employed at first to increase the screen size of small CRT TV sets and was later used in theaters for special sports events.

**scoop** A large bowl-shaped unit—often made of aluminum—into which a lightsource is placed so that it will reflect light over a wide area.

**scophony** An abortive attempt to eliminate the CRT as the display method of large screen TV. Developed in England in the 1940s, scophony employed a composite of electronic and mechanics in its process.

**scophony system** System of projection TV in which a beam of light is modulated by a Kerr cell and then projected on to a screen after reflection at a rotating system of mirrors (known as a mirror screw), which gives the required scanning pattern.

**scotopic luminosity function** The response of the eye with normal levels of brightness. The peak of the scotopic function occurs at a shorter wavelength, approximately 510 nm.

**Scottie** A family of amateur slow-scan TV (SSTV) transmission modes developed by Eddie Murphy, GM3BSC, in Scotland.

**SCPC** Single channel per carrier.

**SCR** Silicon-controlled rectifier.

**scrambled channel** A cable or satellite system channel that is unviewable unless a decoder is used. Scrambled channels, of course, are usually premium channels that require an additional monthly fee from the subscriber who receives a special decoder for unscrambling the channel's programs.

**scrambler** A circuit or device that is used in communication systems to produce an unintelligible version of the signal to be transmitted, in a predetermined manner. The received signal is rendered intelligible by an unscrambling circuit used at the receiver, in sympathy with the scrambler.

**scrambling** A method of altering the identity of a video or audio signal in order to prevent a reception by persons not having authorized decoders.

**SCR dimmer** A silicon-controlled rectifier used in lighting control in TV.

**screen** 1. The viewing surface of a CRT. In projection TV, the surface upon which the projected image is cast. A special aluminum screen gives optimum performance. The beaded-type screen is barely acceptable since it scatters the light and the flat matte screen gives a washed-out picture under normal lighting conditions. The surfaces of these screens need special care. To decrease bright spots in the picture area and to maximize the reflected light, projection TV screens are often curved. 2. Screen grid. 3. Syn.: shield. Material that is suitably arranged so as to prevent or reduce the penetration of an electric or magnetic field into a particular region. 4. See *Frame*.

**screen gain** See *Brightness, Projection screens*.

**screen saturation** Limitation of the brightness of a CRT fluorescent screen by the rate at which energy from the electron beam can be transformed into light. Usually accompanied by burning.

**screen size** Normally, the diagonal measurement of a TV screen in inches. A 19" screen measures that distance from one corner to the opposite corner.

**SCS** Subsidiary Communication Service. See *SCA*.

**SCSA** Signal Computing System Architecture. An architecture that describes how both hardware and software building blocks work together. It focuses on "signal computing" devices, which refers to any

devices that are required to transmit information over the telephone network. Information can be transmitted via data modems, fax, voice or even video. SCSA defines how all these devices work together. Signal computing systems combine three major elements for call processing. Network interfaces provide for the input and output of signals transmitted and switched in telecommunications networks. Digital signal processors and software algorithms transform the signals through low-level manipulation. Application programs provide computer control of the processed signals to bring value to the end user. ([www.scsa.org](http://www.scsa.org))

**SCSI** Small computer systems interface, a popular high-data-rate, general-purpose parallel interface.

**SD** 1. Super density. 2. Standard definition television. See *SDTV*.

**SDDI** Serial digital data interface.

**SDI** Serial Digital [Video] Interface; Serial Digital I/O. Another name for the 270 Mbps or 360 Mbps serial interface defined by BT.656. It is used primarily on professional and studio video equipment.

**SDL-VCR** Standard definition-long VCR. An IEC digital video (DV) format standard (525/60, 625/50) for consumer market devices.

**SD-Ready** A TV set that can display a 480p-format standard-definition digital TV signal as well as VGA and SVGA signals from a computer.

**SDTI** Serial data transport interface.

**SDTI-CP** Serial digital transport interface-content package. Sony's method for formatting MPEG IMX (50 Mbps, I Frame MPEG-2 streams) for transporting on a serial digital transport interface.

**SDTV** Standard Definition TV. SDTV and high definition TV (HDTV) are the two categories of display formats for digital television (DTV) transmissions, which are becoming the standard. Both SDTV and HDTV are supported by the Digital Video Broadcasting (DVB) and ATSC standards.

**SD-VCR** Standard definition VCR, an IEC digital video format standard (525/60, 625/50) for consumer market devices.

**search-forward (cue), search-reverse (review)** In order to quickly find a particular segment on the tape during playback, the user can speed up the capstan and reel tables to nine times the normal speed, either forward or reverse, by pressing Cue or Review buttons. At this time, noise bars will appear in the picture because of head crossover. This is normal on some model VHS and Betamax machines. For example, some show four noise bars in cue and five noise bars in the review mode.

**search mode** A function employed by VCRs, video cameras or VDPs to locate a desired point in a videotape or disc, in the case of a VDP, for viewing or editing. These three types of units provide a variety of search modes and procedures. The search mode is sometimes referred to as cue/review or cue and review.

**search-tuning** A VTR system to select one out of four tuners, each representing a particular band.

**SECAM** Systeme en Couleurs a Memoire. A compatible color TV system originated in France in which the luminance signal is transmitted by amplitude modulation of the vision carrier and color information is transmitted by frequency modulation of the vision subcarrier, the two chrominance signals being sent separately on alternate lines. The total bandwidth is the same as that of a black and white system using the same line standards. A line-period delay line and an electronic switch are needed at the receiver to ensure use of both chrominance signals on each displayed line. The system is used in France, Russia and a number of other countries.

**SECAM chrominance phase switching** The line-by-line and field-by-field variation of initial phase of the SECAM chrominance signal following the specified pattern (in degrees): from line to line: 0, 0, 180, 0, 0, 180, ... or 0, 0, 0, 180, 0, 0, 0, 180, ...; from field to field: 0, 180, 0, 180, ... Syn.: chrominance phase switching; phase inversion; PI sequence.

**SECAM encoder** A device (YCbCr or RGB) to convert signals into a signal according to the SECAM system.

**SECAM-H** Modern variant of the SECAM system without vertical color identification signals ("bottles"); H stands for horizontal color sync, the bursts of unmodulated chrominance on the line back porch that are used as a Dr/Db color sequence sync reference. If in any doubt, signals produced in SECAM-V with "bottles" will always be usable on SECAM-H equipment, but not vice versa. This should not be confused with the two different VHS recording methods for SECAM known as SECAM-L and SECAM-ME.

**SECAM-L** 1. Broadcast TV standard used in France. 2. Common label on multi-standard VHS machines to denote operation in a VHS tape format unique to France whereby frequency-modulated SECAM chrominance is down-converted utilizing frequency division by a factor of four. The usual chroma processing method in consumer VCRs is heterodyning. Cassettes recorded on SECAM-L machines will not play back in color on any other type of SECAM VCR.

**SECAM-M** 1. Common label on multi-standard VHS machines to denote operation in a VHS tape format similar to that used for PAL, hence its common inclusion in low-cost multi-standard VCRs. This format is in fact used throughout the SECAM world except in France, where a VHS system commonly known as SECAM-L, is in use. SECAM-L is actually the description of the French Broadcast TV standard. 2. Sometimes incorrectly used to describe SECAM-H without "bottles" as opposed to SECAM-V.

**SECAM-V** Older variant of SECAM system where the color identification signal should be present on the nine lines in the vertical blanking interval. If in any doubt, signals produced in SECAM-V will always be usable on SECAM-H equipment, but not vice versa.

This should not be confused with the two different VHS recording methods for SECAM known as SECAM-L and SECAM-M.

**SECAM switch** Sync pulse with period of two lines, the rising edge of which marks the start of a line with positive polarity of the V component in the PAL chrominance signal or the start of a Dr line in Dr/Db sequence in SECAM chrominance signal. Syn.: 2H; 7.8 kHz; Dr/Db switch; PAL switch; PAL switching signal.

**Secondary Audio Program** See *SAP*.

**secondary electron** An electron emitted from a material as a result of secondary emission.

**secondary emission** The emission of electrons from the surface of a material, usually a metal, as the result of bombardment by high-velocity electrons or positive ions.

**secondary-electron multiplier** Electron multiplier, device used in the image-orthicon tube.

**Second Audio Program** See *SAP*.

**Second Audio Program (SAP) signal** See *Multichannel television sound*.

**second generation** See *Generation*.

**see-through mode** A video camera feature that makes the background image visible through the use of superposition.

**SEG** 1. Special effects generator. 2. See *Segue*.

**segment recording** One-touch recording.

**segue** From the Italian *sequire*, to follow. The smooth transition from one sound to another, often by the use of a crossfade. Often shortened to "seg" in everyday use. Used primarily in TV audio production: it characterizes a production technique in which one sound fades out while another fades in. The term is less frequently used to describe visual transitions such as a change of a mood or scene, usually through a dissolve.

**selective fading** See *Fading*.

**selective focus** The adjustment of the lens so that a particular object in a scene is in perfect focus. When a telephoto lens is used, all but that object will be out of focus, creating the familiar effect of an object surrounded by blur.

**selenicon** Specialized camera pick-up tube of vidicon type using selenium as the active material. Used as a luminance tube in some color telecines.

**self-fill key** A luminance key whereby the hole cut is filled by the video that cut the hole.

**self-focused picture tube** A TV picture tube that has automatic electrostatic focus incorporated into the design of the electron gun.

**self key** Keying mode when the mixer creates a key signal from the video that will itself eventually fill the hole. A common example is simple insertion of captions (generated with a black background) over the desired program output. In this case any luminance value above black can be easily detected to make a key signal for the captions. Syn.: on-lay.

**self-keyed insert** See *Overlay*.

**self-timer** A video camera feature that, when activated, delays recording operation for several seconds so that the camera user can enter the scene.

**semitransparent cathode** A photocathode that exhibits photoemission from both surfaces in response to electromagnetic radiation incident on one of the surfaces. This type of photocathode has the advantage that electron emission occurs on the opposite side to the incident radiation and it is often used in TV camera tubes.

**sendust** Iron/silicon/aluminum alloy. Used as a video head (pole-tip) material.

**sensitivity** A figure of merit that expresses the ability of a circuit or device to respond to an input quantity. Expressed as divisions per volt or ohms per volt for a measuring instrument, as spot displacement per volt of deflection voltage or ampere of deflection current for a CRT, as output current per unit incident radiation density for a camera tube or other photoelectric device, and as microvolts of input signal when specifying minimum signal strength to which a receiver will respond. The definition of the sensitivity of TV imagers of greatest interest to scientists is their quantum efficiency, the percent of incident light quanta that create electron-hole pairs in the photoconductor. For plumbicons and saticons, the quantum efficiency is approximately 85% at the peak of their spectral response curves. Recent improvements in charge-coupled device (CCD) technology have increased the sensitivity of CCD images to the point that it is comparable to or greater than that of plumbicons and saticons.

**sensitivity range** The difference between the least and the greatest amount of light to which a video camera responds while still maintaining good picture resolution. The sensitivity range of a typical camera is 10-10,000 fc. Some cameras feature a sensitivity switch to increase response to light, but this often causes the resolution to suffer, resulting in a noisier picture. A neutral density filter may be attached to the front of the lens to decrease the sensitivity range.

**sensitivity switch** A video camera feature which permits the electronic increase of the camera's sensitivity to light. The switch extends the general amplification of the video signal so that the camera can produce a picture even in poor light, although the image will be noisier. Each camera has its own sensitivity range. For example, one camera may list its range as 5 to 6500 fc. Most video cameras average about 10-10,000 fc. This range can be decreased if desired by adding a neutral density filter to the front of the lens. On cameras without a sensitivity switch, low light problems are handled by the automatic gain control (AGC), which otherwise differs in its functions from that of the switch.

**sensor** A device for converting sounds or images to

## Separate Audio Program

electrical signals, such as a microphone or video camera. Also called transducer. The eye is a sensor, too.

**Separate Audio Program** See *SAP*.

**separate mesh** A mesh screen located in vidicon cameras, which helps control the path of the electron beam from cathode to target area, thus improving the scanning process and the resulting picture.

**separate mesh vidicon** Improved form of vidicon which contains an extra electrode in the form of a wire mesh. The result is to improve the resolution of the tube.

**sequence** A coded video segment that begins with a sequence header followed by one or more groups of pictures, and ends with a sequence end code.

**sequence edit mode** A digital VCR edit feature that can handle several assemble edits automatically. Sequence edit is usually part of a bevy of edit functions, including edit start and preview and assemble edit.

**sequential color television** A color TV system in which the primary color components of a picture are transmitted one after the other. The three basic types are the line-, dot-, and field-sequential color TV systems. It is also called a sequential system.

**sequential interlace** TV interlace in which the lines of one field fall directly under the corresponding lines of the preceding field.

**sequential scanning** Also called progressive scanning. Scanning system in which all the lines composing the image are scanned in succession during each vertical downward sweep of the scanning agent. It is therefore noninterlaced scanning.

**sequential system** Sequential color television.

**serial** One bit at a time, on a single transmission path.

**serial attribute** A coding system common in videotex and teletext systems, where the attributes of a character (e.g., color, size) are represented by a code within the coding scheme, which is transmitted and stored but not displayed or printed (unless a special command is effected). The attribute code precedes the character(s) having the required attribute, and appears on a display or printout as a space. Cf. parallel attribute.

**serial digital** Often used informally to refer to serial digital television signals.

**Serial Digital [Video] Interface (SDI)** 1. Format in which 10-bit serialized video data are transmitted via BNC type connector or fiber-optical connector with clock rate:  $10 \times 4 \times 3.579 = 143$  MHz (digital composite NTSC and PAL-M),  $10 \times 4 \times 4.433 = 177$  MHz (digital composite PAL),  $10 \times 27 = 270$  MHz (digital component 4:2:2) or  $10 \times 36 = 360$  MHz (Rec.601 Part B, digital component). 2. An input/output capability built into advanced professional/industrial VTR machines such as Sony's D-2 videotape recording system. SDI, a marked improvement over parallel inputs and outputs, can handle signals with up to 10-bits resolution for the video signal,

with 20-bits resolution four-channel audio. In addition, integrating the model D-1 component digital VTR with the D-2 composite equipment becomes much simpler, since only one cable is required.

**serial digital transport interface (SDTI)** SMPTE 305M. Allows faster-than-realtime transfers between various servers and between acquisition types, disk-based editing systems and servers, with both 270 Mbps and 360 Mbps supported.

**serial storage architecture (SSA)** A high-speed data interface used to connect storage devices with systems.

**series peaking** The use of a peaking coil and resistor in series as the load for a video amp to produce peaking at some desired frequency in the passband. It can compensate for previous loss of gain at the high-frequency end of the passband.

**serrated vertical pulse** A vertical sync pulse that is broken up by five notches that extend down to the black level of a TV signal. It gives six component pulses, each lasting about 0.4 line, to keep the horizontal sweep circuits in step during the vertical sync pulse interval.

**serration pulses** Pulses that occur during the vertical sync interval, at twice the normal horizontal scan rate. These exist to ensure correct 2:1 interlacing (in early TVs) and eliminate DC offset buildup.

**server** A computer or device on a network that manages network resources.

**server (video)** Storage system that provides audio and video storage for a network of clients. Most used in professional and broadcast applications are based on digital disk storage. In addition to those used for video on demand (VOD), other applications include transmission, post production, and news. Store sizes are large, up to 500 gigabytes or more.

**service area** The area that is effectively served by a given radio or TV transmitter, navigation aid, or other type of transmitter. Also called coverage.

**servo** Short for servo mechanism. An electromechanical device whose mechanical operation (e.g., motor speed) is constantly being measured and regulated so that it closely matches or follows an external reference. The servo circuitry of a VCR compares the phase of the 30-PG signal to that of the vertical sync separated from the video input signal in the record mode so as to control the drum rotation and keep its phase constant. A signal twice as long as the cycle of the VD signal (vertical sync) is fed to the CTL (control) head as the servo reference signal during playback and is recorded onto the tape.

**servo hunting** In satellite TV, an oscillatory searching of the feedhorn probe when use of inadequate gauge control cables results in insufficient voltage at the feedhorn.

**set** 1. A radio or TV receiver. 2. The decor of a stage play or the location of a film, TV, or other production. A set designer or set decorator creates the de-

cor of a play, movie, or show. An abstract set has a neutral background, as on a TV news program.

**set day** Build day for the set.

**set-top box (STB)** The electronic device that sits on top of a TV, connecting it to an incoming cable/satellite signal, digital TV signal, or internet functions. Set-tops vary greatly in their complexity, with older models merely translating the frequency received off the cable into a frequency suitable for the TV receiver while current models are addressable with a unique identity much like a telephone. Also called set-top converter.

**set-top converter** In cable TV, a device that heterodynes all incoming channels to a single output channel, usually channel 3 or 4. Also called set-top box.

**setup** 1. The ratio between reference black level and reference white level in TV, both measured from blanking level. It is expressed as a percentage. 2. Setup is the same thing as pedestal. 3. The position of the camera, microphones and artists at the commencement of a shot or scene.

**setup day** Build day.

**setup menu** A remote control feature found on some TV sets that displays a set of color diagrams of installation connections. The menu, designed chiefly for new owners of the unit, includes color-coded jacks, located on the rear of the TV system, that match the different connections appearing on screen. Setup menus also provide automatic channel search, allow setting of time displays and permit popular channels to be arranged in tuning sequence.

**setup tape** Monitor/receiver reference tape.

**SFX** Refers to the special effects of a VCR, VDP, video camera, camcorder, etc. The two main types are conventional and digital special effects.

**shader** 1. A special feature, found chiefly on professional/industrial workstations, that produces various textures, such as marble, wood, glass, etc. These workstations usually incorporate the use of a computer and special software. 2. A nickname for a video control engineer, who is in charge of video but not audio.

**shading** 1. A variation in brightness over the area of a reproduced TV picture, caused by spurious signals generated in a TV camera tube during the retrace intervals. Those spurious signals are generally due to redistribution of secondary electrons over the mosaic in a storage-type camera tube, and vary from scene to scene as background illumination changes. 2. Compensation for the spurious signals generated by a TV camera tube during the flyback interval.

**shading generator** One of the signal generators in a TV transmitter that generates waveforms 180 degrees out of phase with the undesired shading signals produced by a TV camera in order to provide uniform scene brightness.

**shading signals** In TV, components in the output of a camera tube which give rise to undesired shading

effects in reproduced images. High-velocity camera tubes generate such signals and, in the early days of TV, these signals were neutralized by adding to the camera output specially generated waveforms at line and field frequencies (known as tilt and bend waveforms).

**shadow mask** A perforated metal screen containing hundreds of thousands of small apertures and positioned between the neck or yoke of a TV picture tube and just before the face or raster of the CRT. Three electron guns, one for each of the primary colors, are stationed at the rear of the tube. When the electrons leave each of the three color guns, they pass through the shadow mask and affect only the color of their origin. For example, if a red beam is reproduced, only the electrons from the red electron gun pass through the mask to activate the red phosphor dots on the face of the picture screen. The function of the mask, therefore, is to focus the proper electron beam to the correct phosphor color. Sony's fine-pitch picture tube, known as Fine-Pitch Aperture Grille, was a variation of the shadow mask. It utilizes a series of unbroken vertical slits or stripes to produce more and tinier pixels. With the addition of a dark, tinted screen, these TV monitor/receivers offer improved picture definition (as much as 600 lines of horizontal resolution with direct video input) and a higher contrast ratio.

**shadow-mask picture tube** RCA-developed standard color picture tube with three electron guns (or a single gun firing three beams) in which the screen is composed of dots or stripes of red, green and blue phosphors, a shadow mask near the screen ensuring that each beam always strikes the same color phosphor. In some tubes the phosphor dots are arranged in groups of three in a triangular pattern known as a triad (delta-array color tube) and in others as vertical stripes (precision-in-line color tube).

**shaft encoder** In VCRs, a sensor module to drive an electronic tape counter. When the encoder turns, an IR LED and sensor detect movement and direction. This information is supplied to the counter electronics.

**shake absorber** Optical image stabilization system. Used in Canon's camcorders (UCS5, E700); has a specially designed vari-angle prism. The prism optically compensates for hand tremors and external vibrations to ensure that perfectly steady video images are achieved, especially in telephoto situations.

**shaky cam** Slang for a film or TV segment made by a hand-held (hence, shaky) camera such as a minicam.

**sharpness** Image sharpness.

**sharpness control** A feature, found on many TV receivers, VCRs, monitors, component TV systems, image enhancers and other image processors, that allows the viewer to artificially vary the bandwidth, thereby affecting the horizontal resolution. The sharpness control can soften as well as bring more

## shield

detail to a screen image. With some units such as component TVs (capable of covering a wider bandwidth and thereby producing an image of high resolution), a sharper picture may also mean more detailed video noise. To minimize this interference, the sharpness control can be turned down, which slightly softens the image detail, but also decreases the unwanted video noise.

**shield** Screen.

**shift** A function of a VCR clock display designed to select a programmed instruction. When a particular button is pressed, another program item will appear on-screen ready to be set. For example, when time is set on some machines, the shift button is pressed to prepare the clock display for the next entry, which may be day of week, date of month, month and year. Also, the term "shift" applies to a digital TV or VCR feature that allows the viewer to exchange the main image and the inset image of the PIP function.

**SHL** Studio-headend link, a fixed cable television relay service (CARS) station used for transmitting television program material and related communications from a cable TV studio to the headend of a cable TV system.

**shooting ratio** The amount of tape recorded as compared to the amount of tape actually used in the final, edited program. Expressed as a ratio—3:1 means three times as much tape was recorded as eventually comprised the finished program.

**shot box** An instrument panel attached to or part of a TV camera with control push buttons for zoom or other lens changes.

**shotgun microphone** A microphone with long, acoustical barrels to narrow its response into a beam pointed at the subject. A shotgun microphone (named for its appearance) is effective in picking up sound from some moderate distance or in noise-filled situations. It is a supersensitive, unidirectional microphone, rejecting most sound emanating from the sides. Often used in remote TV production, in outdoor scenes or large sets.

**shot/reverse shot** In film and TV, the cross-cutting of alternate direct and reverse shots, as in conversations in which the camera shows one person and then the other.

**show business** Also [colloq.] "show biz." The theater, motion pictures, TV, etc. as a business or industry.

**shrink-wrap** The tight cellophane wrapping around a blank or prerecorded commercial videocassette or DVD.

**shunted black and white** A color TV technique in which the luminance or black and white signal is shunted around the chrominance modulator or chrominance demodulator.

**shutter** A device that prevents light from reaching the light-sensitive surface of a TV camera except during the desired period of exposure.

**shuttle search** The standard method of speeding the videotape back and forth through a VCR to find a specific point. More advanced VCRs provide multiple speed search in forward and reverse. With older machines, FF and REW do not display any images on the TV screen, whereas the newer models, with their high-speed search feature, show a picture, albeit a fast-moving one, on the screen.

**shuttle speed** The rapidity at which a video deck can get from one end of a videotape to the other. The speed factor, in relation to access time, is considered a limiting component, especially in the editing process.

**side backlight** Kicker.

**sideband** See *Carrier wave*.

**sidecar** 1. In CATV, a small module attached to the converter terminal of the subscriber's TV set to enable the subscriber to order items such as PPV films. 2. Slang for adapter.

**side converting** Process that changes the number of pixels and/or frame rate and/or scanning format used to represent an image by interpolating existing pixels to create new ones at closer spacing or by removing pixels.

**side frequency** See *Carrier wave*.

**side lobe** A parameter used to describe an antenna's ability to detect off-axis signals. The larger the side lobes, the more noise and interference an antenna can detect.

**side panels** When a standard 4:3 picture is displayed on a widescreen 16:9 aspect ratio television screen, typically with black bars on the side. Used to maintain the original aspect ratio of the source material. See also *Letterbox*.

**SIF** 1. Sound intermediate frequency. 2. Standard (or Source) Input Format. This video format was developed to allow the storage and transmission of digital video. The 625/50 SIF format has a resolution of 352 x 288 active pixels and a refresh rate of 25 frames per second. The 525/60 SIF format has a resolution of 352 x 240 active pixels and a refresh rate of 30 frames per second. MPEG-1 allows resolutions up to 4095 x 4095 active pixels; however, there is a "constrained subset" of parameters defined as SIF. The computer industry, which uses square pixels, has defined SIF to be 320 x 240 active pixels, with a refresh rate of whatever the computer is capable of supporting.

**SIGGRAPH** The Association of Computing Machinery (ACM)'s Special Interest Group on Computer Graphics (SIGGRAPH). Internet: [www.siggraph.org](http://www.siggraph.org).

**signal** Information converted into electrical impulses. There are RF, audio and video signals, all different in nature. For instance, a video signal is not recorded directly on tape, as is an audio signal. Audio and video signals can be directly fed into audio/video inputs for better signal reproduction. But on units without these inputs, such as TV sets, these signals



must be converted to RF signals, which are accepted into these conventional receivers.

**signal amplifier** An amp used when the signal coming from the antenna must be boosted. This amp is especially useful when the antenna is more than 100 feet from the VCR and TV. One type of amp attaches to the antenna mast and is powered by a small ac adapter connected into the coaxial cable leading to the VCR. The amp receives DC power through the center conductor of the cable. When using such an amp, care must be taken to make sure that there are no baluns between the amp and the power source. Most baluns block DC electricity, which would render the amp useless. It is always better (and usually cheaper) to replace the antenna with a better model than trying to improve reception by adding an amp.

**signal channel per carrier** (SCPC) In satellite TV, a transmission system that employs a separate carrier for each channel, as opposed to frequency division multiplexing, which combines many channels on a single carrier.

**signal computing** Refers to computer telephony, the processing of analog signals for transmission over the worldwide telephone system. The signal computing model gives nontraditional audio, video, speech, and communications technology providers opportunities to embrace PC channels. The term signal computing picked up steam with the announcement of SCSA (Signal Computing System Architecture) in 1993.

**signal generator** A professional/industrial multi-signal-generating instrument designed to produce all the standard video signals used in broadcasting, cable TV and TV set production. These include color bar, cross-hatch, flat-field and gray step signals. The generator helps in the testing of TV receivers, monitors, broadcast studios, closed circuit TV studios and similar setups. More specifically, the color bar signal, consisting of the standard six color bars, is used by TV manufacturers to check the color portions of their sets; the cross-hatch signal aids in aligning convergence and horizontal and vertical linearity; the flat-field signal is used to check color balance; gray step helps to check color tracking.

**signaling rate** In a digital transmission system, the maximum number of bits that can be transported over a given period of time. The signaling rate is typically much higher than the average data transfer rate for the system due to software overhead for network control, packet overhead, etc.

**signal insertion** A circuit for data insertion, analog as well as digital, which can be used for text display systems (e.g., teletext), channel number display, etc.

**signal plate** The metal plate that backs up the mica sheet that contains the mosaic in one type of cathode-ray TV camera tube. The capacitance that exists between this plate and each globule of the mosaic is acted on by the electron beam to produce

the TV signal. That is, the signal plate is the electrode of a camera tube from which the output signal is taken.

**signal processor** (SP) A device designed to stabilize, enhance or control the degree of fading of a video signal. The three major video signal processors are fade control, a stabilizer and an enhancer. These may be purchased separately, although some manufacturers have combined these three functions into one accessory. However, some of these controls may already be built into certain components. Many video cameras have the fade control feature while newer model VCRs have circuitry that overrides anti-piracy signals that destabilize the picture. See also *Processing amplifier*.

**signal splitter** An accessory often used to split an input signal from a conventional 75-ohm cable so that it feeds more than one output. For example, a two-way splitter is used to split an incoming signal from an antenna or VCR to two TV sets. If the wires run more than a few feet, an amplifier is sometimes added to minimize signal loss, which causes a snowy image. Another type of signal splitter is the VHF/UHF splitter in which the VHF signal goes to one source while the UHF signal goes to another.

**signal-to-noise ratio** (S/N or SNR) In general, the ratio of the power in the wanted signal to that of the noise that tends to interfere with it or mask it. It is usually expressed in dB. The precise way in which the signal and noise are measured depends on the nature of the signal and the noise. For example, root-mean-square (RMS) measurements are used for sound signals and random noise, peak-to-peak measurements for TV signals and impulsive noise. SNR is a very important parameter of a communications system because system efficiency depends, in the final analysis, on the SNR obtainable. Systems differ considerably in SNR. For example, amplitude limiting in FM systems permits a better SNR than AM systems. In systems using pulse code modulation the ability to regenerate clean pulses from received pulses that are only marginally above the noise level makes possible very good SNRs. See also *video signal-to-noise ratio*.

**signal-to-weighted-noise ratio** A measure of the significance of noise on an audio or video signal. The audibility of noise on sound or the visibility of noise on a TV picture depends on the frequency band in which the noise falls. Weighting networks can be constructed so that when they are connected to the output of a system in the absence of signal, and root-mean-square (RMS) meters are connected to them, the readings of the meters indicate the subjective amplitude of the noise. In the case of audio signals, the signal with which this is compared to find the signal-to-weighted-noise ratio is the normal RMS output signal of the system; in the case of video signals, the signal with which it is compared is

## silence suppression

peak-to-peak amplitude of the video output signal, usually excluding the sync signals.

**silence suppression** A term used in voice compression for transmission whereby silence in the voice conversation is filled with other transmissions — data, video, imaging, etc. According to AT&T, the average voice conversation is 62% quiet and 38% not quiet (i.e. actual conversation).

**silicon-controlled rectifier** Unidirectional thyristor, a four-layer, three-terminal (anode, cathode, and gate) PNP semiconductor device that is normally an open switch in both directions. When a pulse is applied to the gate electrode, anode-to-cathode current is initiated as in a conventional rectifier. Once turned on, it cannot be turned off by removing the gate voltage. But it can be turned off by removing the anode voltage or waiting until the waveform across the device passes the zero level. The silicon controlled rectifier is used in the low- and high-voltage regulator power supply circuits. In some TV chassis a silicon controlled rectifier can be used as the horizontal output device.

**silicon image sensor** A solid-state TV camera in which a charge-coupled device (CCD) semiconductor chip replaces a vidicon or other camera tube. The image is focused on an array that can consist of 163,840 pixels, charging each element in proportion to the light falling on it. The charges are removed from the elements electronically and passed on to the camera output as standard TV signals.

**silicon imaging device** A solid-state industrial TV camera that uses CCD technology to form individual light-sensitive elements. One version has an array of 512x320 elements (a total of 163,840 elements) producing standard 525-line video output within a 3-MHz bandwidth.

**simple editing** A term used by some manufacturers to indicate that the VTRs do not have capstan servo or head drum servo editing facilities; an imprecise method of electronic editing, which does not guarantee clean edits.

**simple profile** MPEG image streams using only I and P frames. This profile is less efficient than coding with B frames but requires less buffer memory for decoding.

**simulated stereo** A process employed on some TV receivers and accessories to give the effect of stereo sound. Some frequencies are distributed to the right speaker while others are directed to the left, giving a fuller sound, although not true stereo, since both speakers are producing the identical sound. The technique is similar to that used in audio when mono recordings are electronically rechanneled.

**simulcast** Simultaneous broadcast. 1. To broadcast simultaneously by FM and AM radio or by radio and TV. See also *Stereo/TV simulcast*. 2. Refers to U.S. television stations simultaneously broadcasting DTV and NTSC signals. Required toward the end of the DTV

transition period in the U.S. to protect the public interest. 3. VCR mode. Selects the video signal coming from the built-in tuner (TV programs) and the audio signal coming from the unit that is connected to the rear panel Audio Input L and R terminals.

**simulcast HDTV** In the U.S., the FCC requires broadcasters to simultaneously broadcast the new high-definition TV (HDTV) signals and the analog NTSC signals for a period, enabling users to continue to use their analog TVs.

**simultaneous color television** A color TV system in which the phosphors for the three primary colors are excited at the same time, not one after another. The shadow-mask color picture tube gives a simultaneous display.

**sine-squared pulse** A single unidirectional pulse equal to the square of a sine wave and used for testing in TV. This signal can be used to determine phase and gain between the luminance or detail information and the chrominance or color information. It is also part of the VITS. Such a pulse has a limited spectrum and the pulse duration can be so chosen that it is well suited for testing TV circuits. It is used in k-rating determinations. See *Raised-cosine pulse*.

**sine-wave scrambling** A scrambling method that uses the addition of a 15.75-kHz (or other frequency) sine wave to the video signal. If the negative peak of the sine wave corresponds to the positive peak of the signal (sync pulse) or vice versa, the sync signal is suppressed below the peak video level. This “confuses” the sync separator circuits in the TV set and they cease to function properly.

**single-channel system** An approach to HDTV system design conforming to MPEG-2 single-channel compressed digital TV standard. At 60 Hz, HDTV signals require about 19 Mbits per second, achieved by MPEG-2 and Dolby's AC-3 compression schemes. This fits into a standard 6-MHz frequency band used for analog NTSC over-the-air TV signals—hence, a single channel of ultra-high-quality HDTV. However, this single channel could instead be used for several SDTV signals—a matter of some controversy at this point. See *HDTV*.

**single conversion block converter** A device utilized by some cable TV systems to transmit midband channels so that the picture has a higher frequency than the sound, a reversal from the normal broadcasting procedure. This prevents VCRs and TV sets with varactor tuners from picking up both of these signals simultaneously. However, authorized subscribers to the cable system are able to receive these stations.

**single-crystal ferrite** A video head (core) material: permeability 300-500; resistivity 100,000 ohm/cm. Single-crystal ferrites can be machined or otherwise shaped more accurately than hot-pressed ferrites, but the crystallographic orientation must be carefully controlled.

**single-D** A type of ported microphone with reduced proximity effect.

**single echo** Echo occurs on video signals as it does on sound signals, and a single echo is a sample of the original signal that arrives later than the original does, owing to a reflection. It may be reversed in phase.

**single-frame terminal** Frame-stopping terminal.

**single gun color tube** A specially designed TV tube with three separate cathodes, each producing a green, blue or red electron beam, each contained in a single control grid. An electrostatic focusing system interacts with all three beams. Each color beam must pass through a respective channel. The three channels make up an electrostatic convergence technique that functions similarly to the three-gun systems of conventional TV sets. The most popular application of the single-gun picture tube is Sony's Trinitron system.

**single-in-line package (SIP)** An electronic component package with a thin rectangular case and a row of leads for mounting and connecting projecting from one of its edges. A SIP package saves circuit board space because it is mounted vertically in a row of holes in the circuit board.

**single-point stereo microphone (S-PSM)** A small, single-unit microphone with two enclosed components, one to pick up sound on the left, the other to record sound on its right. Employing electret-type condensers, these stereo mics provide clear, well-balanced sound although they lack the high specifications of the more costly studio models. Some manufacturers offer S-PSMs but use a different approach. One internal component is aimed forward while the second is capable of picking up sound on both its left and right. This is sometimes known as MS principle.

**single-sensor color camera** A camera using a system of filtering that splits the incoming light into spots of colored light appearing side by side on the surface of the sensor. When the sensor is scanned in the normal way, the electrical output for each spot in the image consists of three values coming in sequence, representing the R, G, and B values for that point. Because of the critical relationship required between the sensor and the color filter, it is customary to build the color filter on top of the sensor's storage layer. Electronic circuits are then used to separate the sequential output from the sensor as it is scanned, into the required three separate signals. This approach is effective if the three spots of color can be small enough that they do not reduce the resolution of the final reproduction. Because that requires a threefold increase in the resolution of the sensor used (and that is difficult to come by), single-sensor cameras often are a compromise with respect to resolution. However, they are still the simplest, lowest cost, and most reliable cameras, and therefore single-sensor color cameras are widely used.

Solid-state sensors are particularly suited to making single-sensor cameras. Because the resolution capability of solid-state sensors is steadily improving, single-sensor cameras are also improving.

**single sideband** The technique of reducing the signal bandwidth by entirely suppressing the frequencies produced by modulation on one side of the carrier, and leaving information to reconstitute the signal.

**SIP** Single in-line package.

**sister station** Radio or TV stations owned by the same company.

**sizing** See *Character sizing*.

**skew** 1. Another term for tension error. Skew is actually the change of size or shape of the video tracks on the tape from the time of recording to the time of playback. This can occur as a result of poor tension regulation by the VCR or by ambient conditions that affect the tape. 2. A term used to describe the adjustment necessary to fine tune the feedhorn polarity detector when scanning between satellites. 3. The tape tension between supply reel and first rotary idler or tape path around head assembly of a VTR; skew must be maintained properly or picture instability will result.

**skew correction** 1. Correction of a skew parallelogram-shaped TV scan to a true rectangle. Skew error may be due to off-center placing of a large-screen TV projector. 2. The various VHS machines have speeds that are referred to as SP, LP and SLP. In the SLP mode and with the proper VHS cassette the playing time is 6 hours. Horizontal sync alignment on the tape occurs in the SP and SLP modes, but not in the LP mode. Thus, when using cue or review on LP recording, severe skew or picture bending will occur at the top portion of the screen. Also, the color AFC will malfunction for this same reason. To correct this, the playback video is delayed by 0.5 H to compensate for skew, and the AFC frequency is shifted to maintain color lock.

**skew error** A term that describes the differences in the angles or lengths of the diagonal tracks placed on videotape by two different machines. These discrepancies may lead to flagging or bending in the upper portion of a TV picture. If the tracks are slightly longer, the image tends to pull to the left; if shorter, it may pull to the right.

**skewing** A slanted or zigzag pattern on the TV screen.

**skip-field** A very common budget digital video effect where the image is merely frozen for a determined period and then instantly updated at the beginning of the next period. Live images may sometimes be used in-between freezes. Syn.: multi-grab; strobe; stroboscope.

**skip field recording** A technique used in video recording to reproduce one field twice instead of normally reproducing two fields that compose one frame. A similar technique is employed in playback with the freeze frame mode in which the heads pick

## skip memory

up one field twice instead of a frame (consisting of two fields).

**skip memory** A TV or VCR feature that permits the viewer to eliminate unused or unwanted channels during the scanning process so that only desired channels appear. The chief advantage of skip memory is that it removes the static and interference displayed on screen by inactive channels during the selection process.

**skip scan** A feature, first introduced by Sony on its Beta VCRs, that slows down the FF or REW mode so that the viewer can see a portion of the tape on the screen. Other VCR formats have since adopted the function.

**skip search** A VCR feature that slows down the videotape in FF or REW mode when it senses an electronic index previously placed on the tape automatically or manually. In addition, skip search displays the beginning of the scene for several seconds before continuing on its search. The viewer can activate the Play mode whenever a desired scene is reached. At this point, the VCR returns to the beginning of that scene and plays it back in its entirety.

**sky** In TV, an overbright area. Streaks in the sky are called comet tails.

**Sky Cable** A direct broadcast satellite service proposed in 1990, a joint venture of NBC, Cablevision Systems, Rupert Murdoch's News Corp. and Hughes Communications. The partnership was dissolved, but Hughes continued the venture, which became DirecTV.

**skycam** A production device in which a camera is suspended on wires over an area or stadium. The wires are connected to small winches, which are computer-controlled. By adjusting the wires, the unmanned camera can be made to move and zoom from ground level to 150 feet at a maximum speed of 20 miles per h.

**slant range** The distance that a signal travels from satellite to a TVRO.

**slant track** The original, now rarely heard, term for helical scan.

**slave** When two devices are coupled together in such a way that one device is controlled by the other, the controlled device is called the slave, and the controlling device the master.

**slavelock** British term to describe a number of remote TV stations running synchronously with a main station by means of radiated signals from the main station, the main station being the master and the remote stations the slaves.

**slave VCR** In video, that VCR which is used as the recording half of the duplicating process. The playback unit is called the master VCR. The use of the wrong slave units may cause problems in prerecorded tapes. Some VCRs are optimized for the slowest speed. When these machines are used as slaves at

standard speed (for prerecorded tapes), the tapes they produce may have noise or snow on the screen. These machines have heads with a narrower gap while the other machines used for playback may have heads with a wider gap. Therefore, the wider heads are picking up more than the narrow diagonal track laid down by the narrow-gapped heads.

**slaving** The operation of making a local synchronizing pulse generator operate in lock with an incoming video signal in both line and field.

**sleep timer** A feature built into some TV sets allowing them to be programmed to turn off the unit at a certain time.

**slice** A contiguous sequence of macroblocks was first designated in MPEG-1. A slice is the basic synchronizing unit for reconstructing image data and typically consists of all the blocks in one horizontal picture interval. The sequence may represent only one macroblock up to all macroblocks in a field or frame.

**sliced VBI data** A technique where a vertical blanking interval (VBI) decoder samples the VBI data (such as teletext and captioning data), locks to the timing information, and converts it to binary 0's and 1's. DC offsets, amplitude variations, and ghosting must be compensated for by the VBI decoder to accurately recover the data.

**slow-mo** Also slo-mo. Informal. Slowed-down action on film or videotape; slow motion.

**slope overload** See *Prediction*.

**slot mask** A color picture tube mask that has vertical slots positioned in front of a screen on which color phosphors are arranged in vertical strips. It is in the Trinitron and other picture tubes that have in-line electron guns. It is also called an aperture grille.

**slot matrix tube** See *Color picture tube*.

**slow motion** One of the special effects of a VCR and designed to slow down the tape speed to permit a closer look at a scene. Some VCRs provide variable slow motion, a control which adjusts the rate of slow motion. At its slowest speed, this feature is difficult to watch, since the movement loses a sense of continuity. A speed one half to one quarter that of normal retains movement and is the most popular range of this special effect. The slow motion mode, like other special effects, is usually accompanied by video noise, such as horizontal bars of snow, on many machines. The newer digital VCRs have corrected this defect. If VCRs are kept in the slow motion mode for long periods of time, the video heads or the tape may be damaged.

**slow-scan TV** See *SSTV*. The idea of SSTV was to reduce the bandwidth of a TV signal so that it could be transmitted on the MF/HF amateur radio bands. Originally, all SSTV was 8-s black and white frames. The received picture appeared on a long-persistence CRT monitor one line at a time—like a window shade being pulled down—and it faded away quickly. The

next advance was a digital scan converter that displayed the image on a TV monitor. An SSTV scan converter translates the analog SSTV tones to digital data (originally 128 pixels per line), and stores the data in RAM. The converter then translates the digital data back to an analog signal suitable for display on a TV monitor. Color SSTV pictures were first achieved by using digital scan converters with three RAM banks. Color images are now the norm using PCs and a radio interface. Software is available for various formats. SSTV has been accepted for installation on board the International Space Station and will be used by ISS crews for image communications with amateur radio operators worldwide.

**slow tracking control** A feature on a VCR designed to improve the image quality produced by the slow motion mode. It is sometimes located only on the remote control panel. The feature, which adjusts tape speed only during slow-motion playback, is also known as slow motion tracking control.

**SLP** Extended play.

**SM81** Universal stereo monitor to test stereo TV systems; Sencore.

**small-area flicker** See *Flicker*.

**Smartpark®** GTE's registered trademark for a fiber-optic wired industrial park offering a wide variety of voice, data and switching services.

**SMATV** Satellite Master Antenna TV. A distribution system that feeds satellite signals to hotels, apartments, etc. Often associated with pay-per-view. See *MATV*.

**smear** 1. An analog artifact where vertical edges in the picture display a spreading to the left or right. Typically caused by midfrequency distortions in an analog system. 2. A video image which displays blurred objects, especially at their edges and beyond. Smear is usually the result of insufficient lighting combined with the idiosyncrasies of the vidicon camera tube. Also known as streaking. 3. The undesirable blurring of edges in a compressed image, often caused by the compression algorithm, which tends to eliminate the high-frequency portions of an image that represent sharp edges.

**smearing** In TV, blurring of the verticals in a reproduced image.

**smectic crystal** A type of liquid crystal material. Unlike the nematic liquid crystal used in LCDs for portable computers, calculators and pocket TV sets, smectic liquid crystal is bistable. It remains set as either transparent or opaque until it is deliberately changed from one state to the other with the application of a voltage across its electrodes. Nematic crystals, on the other hand, will relax to their initial state when a sustaining voltage is removed. Smectic liquid crystals are capable of faster switching. They also have higher contrast and lower power consumption than nematic types.

**SMPTE** 1. Society of Motion Picture and Television

Engineers, a professional organization that sets standards for U.S. television. ([www.smpte.org](http://www.smpte.org)) 2. An informal name for a color difference video format that uses a variation of the Y, R-Y, and B-Y signal set.

**SMPTE 12M** Defines the longitudinal (LTC) and vertical interval (VITC) timecode for NTSC and PAL video systems. LTC requires an entire field time to store timecode information, using a separate track. VITC uses one scan line each field during the vertical blanking interval.

**SMPTE 125M** SMPTE document equivalent to ITU-R BT.656, which defines the standard for a bit parallel digital interface for 55-line interlaced component video signals. Defines parameters needed to generate and distribute component video signals on a parallel interface.

**SMPTE 170M** NTSC video specification for the United States. See *RS-170A* and *BT.470*.

**SMPTE 240M** 1920 x 1035 pro-video interlaced standard (29.97 or 30 Hz). Covers the analog RGB and YPbPr representation. The digital parallel interface is defined by SMPTE 260M. The digital serial interface is defined by SMPTE 292M. Also defines color temperature, color space, and gamma as well as other parameters.

**SMPTE 244M** 768 x 486 pro-video interlaced standard (29.97 Hz). Covers the digital representation (composite NTSC video sampled at 4x Fsc) and the digital parallel interface. The digital serial interface is defined by SMPTE 259M.

**SMPTE 253M** Analog RGB video interface specification for pro-video SDTV systems.

**SMPTE 259M** Pro-video serial digital interface for SMPTE 244M.

**SMPTE 260M** Digital representation and parallel interface for SMPTE 240M video.

**SMPTE 266M** Defines the digital vertical interval timecode (DVITC). Also see *BT.1366*.

**SMPTE 267M** 960 x 480 pro-video interlaced standard (29.97 Hz). Covers the digital representation and the digital parallel interface. Also see *BT.601* and *BT.1302*.

**SMPTE 272M** Formatting AES/EBU digital audio and auxiliary data into the digital blanking intervals. Also see *BT.1305*.

**SMPTE 274M** 1920 x 1080 pro-video interlaced and progressive standards. Covers the digital representation, the analog RGB and YPbPr interfaces, and the digital parallel interface. The digital serial interface is defined by SMPTE 292M.

**SMPTE 276M** Transmission of AES/EBU digital audio and auxiliary data over coaxial cable.

**SMPTE 291M** Ancillary data packet and space formatting for pro-video digital interfaces. Also see *BT.1364*.

**SMPTE 292M** 1.485 Gbps pro-video HDTV serial interfaces.

**SMPTE 293M** 720 x 480 pro-video progressive stan-

## SMPTE 294M

dards (59.94 Hz). Covers the digital representation, the analog RGB and YPbPr interfaces, and the digital parallel interface. The digital serial interface is defined by SMPTE 294M. Also see BT.1358 and BT.1362.

**SMPTE 294M** Pro-video serial digital interface for SMPTE 293M.

**SMPTE 296M** 1280 x 720 pro-video progressive standards. Covers the digital representation and the analog RGB and YPbPr interfaces. The digital parallel interface uses SMPTE 274M. The digital serial interface is defined by SMPTE 292M.

**SMPTE 299M** 24-bit digital audio format for pro-video HDTV serial interfaces. Also see *BT.1365*.

**SMPTE 305M** Serial data transport interface (SDTI). This is a 270 or 360 Mbps serial interface based on BT.656 that can be used to transfer almost any type of digital data, including MPEG-2 program streams, MPEG-2 transport streams, DV bit streams, etc. You cannot exchange material between devices that use different data types. Material that is created in one data type can only be transported to other devices that support the same data type. There are separate map documents that format each data type into the 305M transport.

**SMPTE 308M** MPEG-2 4:2:2 profile at high level.

**SMPTE 314M** Data structure for DV-based audio, data and compressed video at 25 and 50 Mbps. Also see IEC 61834.

**SMPTE 322M** Data stream format for the exchange of DV-based audio, data and compressed video over a Serial Data Transport Interface (SDTI or SMPTE 305M).

**SMPTE 344M** Defines a 540 Mbps serial digital interface for pro-video applications.

**SMPTE 348M** High data-rate serial data transport interface (HD-SDTI). This is a 1.485 Gbps serial interface based on SMPTE 292M that can be used to transfer almost any type of digital data, including MPEG-2 program streams, MPEG-2 transport streams, DV bit streams, etc. You cannot exchange material between devices that use different data types. Material that is created in one data type can only be transported to other devices that support the same data type. There are separate map documents that format each data type into the 348M transport.

**SMPTE/ANSI frame coding** A method of structuring and editing video material. To create a program by combining material from several sources, it is important that individual frames in each source be identified by a unique code so that they can be quickly located and addressed. The SMPTE/ANSI time code was developed for this purpose. It has two formats, the longitudinal time code (LTC) and the vertical interval time code (VITC). Both have a bit rate of 2400 bits/s and thus can be recorded on an audio track. Each block in the LTC code has 80 bits: 26 for iden-

tifying hours, minutes, seconds, and frame number; one for identifying color phase; one for identifying dropped frames (108 frames are dropped every hour to convert 30 frames/s to 29.97 frames/s); 32 for user identification; 16 for sync; and 4 undefined. The VITC has an additional 10 bits per block, for a total of 90. The additional bits are used for a redundancy check and to identify individual fields (rather than frames). See also *Time code*.

**SMPTE [color] bars** A test matrix pattern that consists of the following (from top to bottom): 67% of the field is occupied by 75% color bars with bar eight missing (i.e., without Black); next 8% is the so-called "New Chroma Set" bars (Blue/Black/Magenta/Black/White); the remaining 25% shows a sequence of -I, White, Q, Black, and the "Black Set" signal (version of pluge).

**SMPTE leader** See *Leader*.

**SMPTE RP160** Analog RGB and YPbPr video interface specification for pro-video HDTV systems.

**SMPTE time code** A standard for a signal recorded on videotape to uniquely identify each frame of the video signal. This digital code, laid down on tape, gives each frame of video a unique and unchanging address (03:38:52:04 would equal 3 h, 38 minutes, 52 s, and 4 frames). It is used for control of editing operations. Also called *Time code*.

**SMT** See *Surface-mount technology*.

**S/N** Signal-to-noise ratio.

**snake** A cable that combines several cables, as on a stage or in a studio.

**snow** Random noise or interference appearing in a picture as white specs and caused by an insufficient S/N input ratio to a TV set or monitor. Often resulting from dirty VCR heads.

**SNG** Satellite newsgathering. A rapid news sending-and-receiving process. SNG became practical in the 1980s with electronic improvements and less expensive equipment. News events can be covered with trucks equipped with satellite uplinks to send the information to stations with TVRO dishes. Many TV stations purchased satellite news vehicles (sometimes called SNVs or "live eyes") to transmit breaking news to their own stations or others in the region or around the nation.

**SNR** Signal-to-noise ratio.

**SNV** Satellite news vehicle. See *SNG*.

**Society For Private And Commercial Earth Stations** (SPACE) An organization devoted to protecting and promoting the rights of home satellite TV owners and manufacturers. In 1986 merged with the Direct Broadcast Satellite Association to form the SBCA (Satellite Broadcasting and Communications Association).

**society leader** See *Leader*.

**Society Of Motion Picture and Television Engineers** (SMPTE) An organization established for the advancement of theory and practice related to the produc-



tion and utilization of motion pictures and TV programs. The society frequently sets standards in its related field. For example, it issues an official color bar to adjust, test or measure various aspects of a TV picture or individual equipment. ([www.smpte.org](http://www.smpte.org))

**soft-edge wipe** In film and TV, a wipe (an optical effect between two succeeding shots) in which the border between the two images is blurred or softened, such as by shooting out of focus.

**Soft RAID** A RAID system implemented by low-level software in the host system instead of a dedicated RAID controller. While saving on hardware, operation consumes some of the host's power. See *RAID*.

**software-only video playback** A multimedia term. Video software playback displays a stream of video without any specialized chips or boards. The playback is done through a software application. The video is usually compressed to minimize the storage space required.

**solar cell** A device that uses the photovoltaic effect in order to convert radiation from the sun directly into electrical energy. Solar cells are the most important long-duration power supply for satellites and space vehicles.

**solarization** See *Posterization*.

**solar outage** The loss of reception that occurs when the sun is positioned directly behind a target satellite. When this occurs, solar noise drowns out the satellite signal and reception is lost.

**solenoid control** An electromagnetic circuit system that uses relays in conjunction with the tape motion buttons to operate various functions on a VCR. Solenoid controls offer distinct advantages over older, conventional keys, among them (1) the convenience of a light touch to change functions, (2) the ability to switch functions without going through the Stop mode, and (3) quieter operation in contrast to the clunking piano-type keys previously provided. A machine equipped with solenoid controls, for example, can go from Reverse to FF mode without first going into the Stop mode.

**solid-state** Referring to the use of semiconductor technology in electronic devices.

**solid-state camera** A TV camera in which the light-sensitive target area consists of an array of charge-coupled devices (CCDs). Exposure to light energy results in the generation of electron-hole pairs in the semiconductor substrate; the number of electron-hole pairs generated is a function of the light intensity. The majority carriers migrate into the bulk material and the minority carriers accumulate in the potential wells at the electrodes of the CCDs. The accumulated charge is transferred into other nonphotosensitive CCD storage sites during the retrace intervals of the TV display system and is then transferred to the output device while further signals are being generated. Three basic architectures for obtaining the video signal are used, a frame/field

transfer device (FFTD), interline transfer device (ITD), and frame interline transfer device (FITD).

**solid-state image sensor** Charge-coupled image sensor. See also *Image sensor*.

**solid-state memory** Electronic digital memory that contains no moving parts. In editing, sequences marked for placement elsewhere used to be stored on a separate videotape. When all the necessary copying was completed, the editor would assemble the completed, revised tape from the different segments. Solid-state memory permits the editor to store the coded segments in memory, which is then called upon to automatically reassemble the final version more rapidly and accurately.

**solid-state TV camera** A TV camera based on solid-state charge-coupled devices (CCDs) for the image sensor as well as all circuits. Also called solid-state camera.

**Sonet** Synchronous optical network, a set of standards for the digital transmission of information over fiber optics, based on increments of 51 Mbps. It was developed to cost-effectively support broadband services and multi-vendor internetworking.

**sonic delay line** Acoustic delay line.

**Sony** The Japanese firm that started home video. The first home video machine from the company was the Betamax SL-7200. It used a 1/2" Beta cassette that played in only one speed, Beta I, with a maximum playing time of one hour. It offered no timer features, no remote control, etc. The second VCR, the SL-8200, offered two speeds, Beta I and II, for 1- or 2-hour playtime. These two machines were discontinued with the introduction of the SL-8600, a single-speed, Beta II, with remote pause control, built-in electronic 24-hour timer and 3-hour record and play capability with the L-750 tape. Later VCRs by Sony featured the slower Beta III speed, electronic tuner, etc. When Beta lost the VCR wars to VHS, Sony switched to VHS equipment in 1988. Sony also introduced the first portable VCR (SL-3000) in 1978.

**sound** The sensation of hearing, produced when sound waves act on the brain through the auditory organs of the ears. The extreme frequency limits for human hearing are from about 15 to 20,000 Hz. Also called audio (slang) and sound sensation.

**sound balancer** Operator who controls the level and quality of TV sound and puts the sound program together. Also known as sound mixer.

**sound bar** One of the two or more alternate dark and bright horizontal bars that appear in a TV picture when audio frequency voltage reaches the video input circuit of the picture tube.

**sound carrier** The TV carrier that is frequency-modulated by the sound portion of a TV program. The unmodulated center frequency of the sound carrier is 4.5, 5.5, or 6.5 MHz higher than the video carrier frequency for the same channel. See also *TV channel assignments*.

## sound channel

**sound channel** The series of stages that handles only the sound signal in a TV receiver.

**sound mixer** Sound balancer.

**sound on sound** An audio dubbing technique found on some VCRs that permits recording a second soundtrack over an existing one without erasing the original. Conventional audio dubbing automatically erases the previous audio track. Sound on sound can be particularly useful in adding narration to a scene while keeping the natural sounds of the background or the music.

**sound on vision** A fault condition (due to mistuning or maladjustment) in which the sound signal appears as a cross-modulation of picture information, or causes break-up of the synchronization. At least 40 dB of sound signal rejection is required if sound on vision is to be avoided. In receiver design, therefore, one or more trap circuits is provided before the video IF amp to produce maximum attenuation at the adjacent sound channel frequency and zero attenuation at the video carrier frequency.

**Sound Retrieval System® (SRS)** Refers to a TV set that utilizes electronics to manipulate the audio signal for the purpose of widening the stereo effect. Introduced by Sony, the Sound Retrieval System provides a stereo effect through a room without the viewer having to sit between the two basic speakers. This is accomplished by special circuits that first blend left and right signals and then create "difference" signals. Each set produces distinct spatial and sound characteristics before they are once again combined. Ordinarily, TV sets and monitor/receivers with stereo and built-in speakers are limited in producing stereo separation since the speakers are restricted to the width of the TV unit.

**sound sensation** Sound.

**sound wave** The traveling wave produced in an elastic medium by vibrations in the frequency range of sound. See also *Acoustic wave*.

**source deck** The videotape deck that plays back raw footage in an edit system.

**SPACE** Society for Private and Commercial Earth Stations; merged in 1986 with the Direct Broadcast Satellite Association (DBSA) to form the Satellite Broadcasting and Communication Association (SBCA).

**space pattern** A geometric pattern on a test chart, used to measure geometric distortion in TV equipment.

**space wave** A radiowave that travels between a transmitting and a receiving aerial situated above the ground, which includes the direct wave and the ground-reflected wave. It is the component of the ground wave that does not travel along the surface of the earth. If the two aerials are placed at a sufficient height above the ground, the surface wave is negligible and only the space wave needs to be considered.

**sparklies** Popular term for impulse noise spikes visible as black and/or white spots, or streaks in the TV picture, as insufficient signal-to-noise ratio.

**spatial frequency** The number of black and white line pairs displayed on a screen per degree of visual angle. Spatial frequency is expressed as cycles per degree or as lines per inch for a given viewing distance.

**spatial resolution** The number of pixels horizontally and vertically in a digital image.

**spatiotemporal analysis** The images picked up by a TV camera are sampled in space and in time. The line structure represents sampling in the vertical axis. In digital processing, each line is sampled by the analog-to-digital converter, thereby producing samples in the horizontal axis of the image. These perpendicular sampling processes provide the spatial analysis. The field and frame repetitions provide the temporal sampling of the image. The signal content of all three dimensions must be exploited by the system designer to take full advantage of the channel's capacity to carry information. This approach, spatiotemporal analysis, has become an essential tool in advanced TV system development. Two of the dimensions are divided into specific intervals: the vertical distance between the centers of the scanning lines and the time occupied by each field scan. The third dimension, in the analog operation of the system, is not so divided since scanning the picture elements is then a continuous process. The intervals in the vertical and field-time dimensions result from sampling of distance and time, respectively. The Nyquist limit applicable to sampled quantities imposes limits on their rates of change and these limits must be observed in processing the signals resulting from the repetition of the scanned lines and fields. The 3D nature of the video signal requires that it be represented as a solid figure, known as a Nyquist volume. The cross-section of this volume is bounded by the maximum frequencies at which the vertical and time information may be transmitted, while its long dimension is bounded by the maximum frequency at which the picture elements may be scanned. Study of the volume's contents thus reveals which frequencies are occupied by a given signal format, where additional signal information might be added, the extent of the interference ("crosstalk") thereby created, by filtering to reduce or eliminate the crosstalk. The spatiotemporal analysis of signal content has been particularly valuable in the design of the single-channel advanced TV systems, such as the ACTV-1 system.

**SPDIF** Short for Sony/Philips Digital InterFace. This is a consumer interface used to transfer digital audio. A serial, self-clocking scheme is used, based on a coax or fiber interconnect. The audio samples may be 16-24 bits each. 16 different sampling rates are supported, with 32, 44.1, and 48 kHz being the most

common. Compressed Dolby Digital and DTS may also be transferred over this interface. IEC 60958 now fully defines this interface for consumer and professional applications.

**Special Audio Program** See *SAP*.

**special bits** See *Time code word*.

**special effects** 1. Refers to the various features on virtually all VCRs, with the top-of-the-line models providing the most sophisticated. By changing the speed of the tape, a variety of special effects are possible. Visual scan permits skipping over unwanted portions of recorded material. Slow motion provides the viewer with the opportunity to study a particular segment of a tape with greater scrutiny. Freeze frame locks in a single picture so that the image appears as though it were a slide. Double-speed play allows viewing material at twice the normal speed but with intelligible sound. Frame advance moves the recorded information along at one frame at a time. Not all effects work in all speed modes. Some VCRs offer several features in slow speed while other models provide the same effects in more than one speed mode. 2. A video manipulation technique used to enhance or smooth a transition between camera shots or to create an usual appearance. Typical transition effects are wipes, fades, or dissolves.

**special effects editing** A general term applied to a group of video camera features designed to enhance the editing process. For example, wipe, fade, a character generator for titling and date/time insert are some of special effects editing functions that can be used with the camera in the field.

**special effects generator (SEG)** A unit used in video production to mix, switch, and otherwise process various video signals to create a final signal known as the program signal. The SEG is usually combined with a switcher/fader, which permits connecting two video cameras to one sync source.

**specific lighting** Lighting used to illuminate an object in order to create a desired effect on the display screen; any lighting units that are set up especially for recording an event.

**spectral response** Spectral sensitivity characteristic.

**spectral sensitivity characteristic** The relation between the radiant sensitivity and the wavelength of the incident radiation of a camera tube or phototube, under specified conditions of irradiation. It is also called spectral response.

**spectral space** The measurement between frequencies of a signal. For instance, a VHS VCR produces a brightness signal on tape, occupying 1 MHz of spectral space between 3.4 and 4.4 MHz. On the other hand, S-VHS machines provide more picture detail as a result of increased spectral space. The brightness signal recorded on tape with the V-VHS format extends to 1.6 MHz—the difference between 5.4 and 7 MHz.

**spectrum analyzer mainframe** A professional/indus-

trial unit designed to measure signal drift, draw low-level signals from noise, check signal changes, close in on the frequency span for closer investigation, read amplitude, etc. A highly technical and costly piece of equipment.

**spectrum-compatible HDTV system** See *SC-HDTV*.

**spectrum locus** The locus of points representing the chromaticities of spectrally pure stimuli in a chromaticity diagram.

**speech recognition** A voice-controlled method designed to turn the power on and off, change channels, switch modes and perform other similar functions on VCRs, TV sets and related units.

**speed control** A control that changes the speed of a motor or other drive mechanism, as for a VCR or magnetic-tape recorder.

**speed selector switch** A feature on most VCRs that permits the choice of a tape speed mode for recording. The Play mode usually operates automatically through electronic circuitry that selects the proper playing speed. VHS machines usually feature three speeds, SP, LP and SLP (or EP). However, on some VHS models the LP mode functions only as a playback feature, since these machines optimize the video head gaps for either the SP or the SLP speeds.

**spherical aberration** An image defect caused by the spherical form of an optical or electron lens or mirror, resulting in blurred focus and image distortion.

**spherical antenna** 1. An antenna that has the shape of a sphere, used chiefly in theoretical studies. 2. An almost flat, rigidly mounted antenna dish used in satellite TV systems. Because of its shape, it can pick up more than one satellite without being moved. Instead, one or more feed horns designed to collect signals are placed in front of the antenna and moved accordingly.

**spherical faceplate** A TV picture tube faceplate that is a portion of a spherical surface.

**spider box** A small, portable receptacle for several electrical outlets, such as for lighting units; also called (in the case of two connectors) junction box. It is commonly used in the film, theater, TV, and exhibitions.

**spike suppressor** A device designed to filter electrical lines to prevent fluctuations or "spikes" in the current. These variations may result in motor speed discrepancies as well as picture breakup.

**spin** A special case of the rotation effect that causes the displayed picture to appear as spinning (in the screen plane) around the Z-axis (perpendicular to the screen plane).

**spinwheel** In digital video, it describes a single coordinate control used for changing effects parameters in the Z-axis (perpendicular to the screen plane). Syn.: Z-wheel.

**splice** Tape splice.

**splicing** The physical cutting and rejoining of recording tape; the joint of the two ends of the video or

## split frame

audio tape is secured by tape coated with an adhesive substance on the side.

**split frame** See *Split screen*.

**split image** See *Split screen*.

**split screen** Also called split frame, split image. A technique in video permitting the viewer to watch two images simultaneously. Used primarily in sports and news programs, in the past the split screen has been controlled by the studio or station, not the viewer. However, this situation has changed with the development of picture-in-picture on TVs. See *Multivision, PIP*.

**split sync scrambling** A video scrambling technique, usually used with either horizontal blanking inversion, active video inversion, or both. In split sync, the horizontal sync pulse is "split," with the second half of the pulse at +100 IRE instead of the standard -40 IRE. Depending on the scrambling mode, either the entire horizontal blanking interval is inverted about the +30 IRE axis, the active video is inverted about the +30 IRE axis, both are inverted, or neither is inverted. By splitting the horizontal sync pulse, a reference of both -40 IRE and +100 IRE is available to the descrambler. Since a portion of the horizontal sync is still at -40 IRE, some sync separators may still lock on the shortened horizontal sync pulses. However, the timing circuits that look for color burst a fixed interval after the beginning of horizontal sync may be confused. In addition, if the active video is inverted, some video information may fall below 0 IRE, possibly confusing sync detector circuits. The burst is always present at the correct frequency and timing; however, the phase is shifted 180 degrees when the horizontal blanking interval is inverted.

**splitter** Signal splitter.

**spool** A cylinder or roller on which tape, wire, or other material is wound.

**sports mode** In camcorders, a mode to capture high-speed action. Shooting situations: outdoor sport scenes such as football, tennis, golf or skiing; a landscape from a moving car.

**spot** 1. In CRTs, the small area of luminescence on the screen where the electron beam strikes it. Efforts are made in the design of CRTs and associated circuitry to keep the spot area as small as possible in order to improve the definition of the display. 2. A commercial announcement of short duration, inserted in programs or broadcast between programs.

**spot beam** A radio-frequency beam from a satellite that has a narrow aperture angle to cover a relatively small geographic area.

**spotbeam satellite** See *Satellite focus*.

**spotlight** A lighting unit whose light can be focused into a beam and directed at a particular object or part of the scene.

**spot-optimizer magnet** A permanent magnet that resembles that of an ion trap, placed on the neck of some color picture tubes to provide an adjustment for optimum picture detail.

**spot size** The cross-section of an electron beam at the screen of a CRT.

**spot wobble** A technique used in black and white TV receivers to make the line structure of the displayed image less obvious by superimposing a vertical oscillation of very small amplitude on the scanning spot of an oscillator working at a frequency well above the video band.

**sprite** In computer graphics and video games, a movable object or figure on a video screen. 2. In MPEG-4, static background scenes. A coordinate system is provided to locate objects in relation to each other and the sprites.

**SP speed** The fastest speed on three-speed VHS-format VCRs. With a basic T-120 videocassette, standard play speed can record and play back for two hours. SP has several advantages over the other two speeds of the VHS format. It provides less video noise than the LP (4-hour) and SLP (6-hour) modes. Copies made from tapes recorded in SP offer better picture resolution. All VCRs are equipped with this speed, whereas some machines may not have the LP or SLP mode. Finally, when a tape recorded in SP is played on machines by other manufacturers, fewer tracking and other related problems arise. SP is standard for industrial and professional VHS equipment. This speed is recognized as the mode that provides the best audio and video reproduction in the VHS format and is used almost universally by the pre-recorded tape industry.

**spurious shading** An unwanted signal that gives the effect of brightness changes over the line or frame period of the TV picture. The term is usually reserved for the description of signals generated in the camera tube, although it is sometimes used to describe spurious signals due to poor frequency response of amps.

**spurious signal** An unwanted signal generated in the equipment itself, such as spurious radiation or undesired shading signals generated in a TV camera tube.

**Sputnik** The world's first artificial satellite. It was launched by the Russians on October 4, 1957.

**squaerial** A flat diamond-shaped aerial for receiving satellite TV broadcasts. This form of aerial (its name is a blend of square and aerial) is compact in size and contains an array of small antennae set on a flat surface. It can be fixed to the wall of a house.

**square pixels** Pixels having the same horizontal and vertical sampling grid. There is some evidence that a large mismatch between horizontal and vertical resolution prevents the higher resolution from being fully perceived by the human visual system.

**squeeze** In TV, slang for a visual inserted in a window or on the screen, generally to the right of a newscaster to identify the subject of a news report. It is more commonly called a topic box. Also called a box, frame, theme identifier.

**SRAM** Static RAM, a type of computer memory that behaves in general like dynamic RAM (DRAM) except that static RAMs retain data in a six-transistor cell needing only power to operate (DRAMs require clocks as well). Because of this, current available capacity is 4 Mbits—lower than DRAM—and costs are higher, but speed is greater.

**SRP board, VCR** System control, DC power supply, and pause control circuits.

**SS** In VCRs, Slow and Still picture modes.

**SSAVI™** Sync Suppression And Active Video Inversion, scrambling/descrambling system using a dynamic scrambling algorithm trademarked by Zenith. This system has four modes of operation: (1) Suppressed sync and inverted video; (2) Suppressed sync and normal video; (3) Normal sync and inverted video; (4) Unscrambled operation.

**SSC** Super sandcastle. Three-level pulse used in older TV sets.

**SSO** Single-system operator. A CATV company with only one system; not an MSO, or multi-station operator.

**SST** Single-sideband transmission.

**SSTV** Slow-scan TV used in amateur radio. Sending still images by means of audio tones on the MF/HF bands using transmission times of a few seconds to a few minutes.

**stabamp** Stabilizing amplifier. A video amp designed to remove transient disturbances and bring a TV signal into a standard condition suitable for transmission or recording. Applications are at the termination of a cable or link circuit and following vision-switching equipment. Controls, manual or automatic, typically include picture amplitude, sync pulse amplitude, peak white clipper, clamping and set-up.

**stabilizer** Image stabilizer.

**stabilizing mesh** (US: barrier grid) The mesh situated near the target of a low-velocity TV camera tube and biased positively with respect to it to prevent instability of the target potential by effectively limiting the maximum potential that it can develop. For small light inputs to the camera, the mesh collects the secondary electrons emitted from the target with the result that the target develops a positive charge image. If, however, any area of the target tends to become more positive than the mesh potential, then the electric field between mesh and target returns the secondary electrons to the target until the target potential equals the mesh potential. Thus, no area of the target can develop a potential exceeding that of the mesh.

**stage plug** An electric connector that can handle more power than a conventional plug, used in film, stage, and TV for distributing electricity to lighting equipment.

**stagger-through** A first TV rehearsal with cameras.

**stagger tuning** The process of obtaining a level response over a desired bandwidth by tuning the reso-

nant circuits to particular frequencies within the pass-band. This technique is used in the IF amps of TV sets and in multicavity klystrons in TV transmitters.

**staircase composite test signal, NTSC** The test signal, a component of the vertical interval timing sequence, that is usually transmitted on both fields of line 18 in the vertical blanking interval. It has a number of components. The first square wave is called the line bar, window test signal or white flag at 100 IRE. Any tilting of the top portion indicates poor low-frequency response visible as picture streaking. The spike which follows, the sine squared pulse or 2-T signal, is a good indicator of phase distortion. The next wider pulse is referred to the chrominance pulse test signal and provides an accurate method to determine gain and delay difference between the chroma and luminance signals. The final staircase waveform can be used to measure the amounts of differential gain, or variations in gain across the frequency spectrum.

**staircase signal** In video, a test signal incorporating several steps at increasing luminance levels. The sub-carrier frequency normally amplitude-modulates the staircase waveform, which helps to check the amplitude and phase linearities in video systems. The staircase signal is one of the many test patterns produced by such components as the video test generator.

**stair-stepping** Professional jargon for spatial aliasing on near-horizontal lines in a TV picture. Caused by lack of prefiltering. Syn.: jaggies. In addition, stairstepping applies to lines drawn at angles other than 45 degrees that appear on raster (picture-tube face) displays.

**stairstep linearity** The ability of a VCR to accurately reproduce the shades of grade between black and white.

**stand-alone** An early CATV term that described cable systems that were not part of any cable network. While the systems carried local and distant signals, they secured videotapes directly from distributor and other program suppliers, often via a bicycling method, and ran their own pay (premium) cable services. Lower-cost TVRO dishes made interconnection via satellite feasible, and by the early 1980s nearly all stand-alone operations had been replaced by the programming services from satellite cable networks.

**stand-alone service** TV programming provided by individual videotapes rather than transmitted via satellite or cable.

**Standard-Definition Television (SDTV)** A subset of the digital TV (DTV) standard that includes DTV signals with picture quality at least as good as that of conventional analog TV. Typical SDTV resolutions are defined by ATSC and DVB to be 704 x 480 or 720 x 576 interlaced.

**standard focusing** Optical nomenclature used to de-

## standard-grade videotape

scribe a lens that can be focused by moving a section of the other barrel of the lens backward or forward until the image passing through the lens is shown in sharp detail on the image plane.

**standard-grade videotape** The basic tape that many VCR owners use for time-shifting, copying or other uses. Manufacturers usually recommend their higher-grade tapes for preserving more important material. The term "standard grade" has a specific meaning, whereas other grades of tape, such as high grade and super high grade, tend to be more nebulous. However, many professionals in the video field have narrowed down all these terms to four basic types of videotape: standard grade, high grade, Hi-Fi or stereo, and professional grade.

**standardized time code** See *Time code*.

**standard (minimum) signal** The peak-to-peak voltage of a signal whose amplitude is sufficient for its use within a system.

**standards converter** A professional/industrial unit designed to adapt one video or broadcast standard to another. The basic converter can usually handle NTSC, PAL, PAL-M, SECAM and other standards. Some models offer other features as well, such as a built-in proc amp, noise reduction, automatic input selection and image enhancement.

**standard-TV specifications** In 1995, the Technical Sub-Group of the ACATS—advisor to the FCC—accepted video scanning parameters that were recommended by its Expert Group on Scanning Formats and Compression. These parameters are to be used for Standard-Definition TV (SDTV) transmission within a digital HDTV broadcast system. The HDTV system was developed by the Grand Alliance, the combination of the four joint-venture contestants whose proposed systems were tested in 1992 without any one system emerging a clear winner over the others. The SDTV scanning parameters are: 480 lines by 704 pixels; aspect ratios 4:3 and 16:9; picture rates 60 per s (interlaced) and 24, 30 and 60 (progressive). (Also  $60/1.001$ ,  $24/1.001$ ,  $30/1.001$  for compatibility with NTSC refresh rates.) Also: 480 lines by 640 pixels; aspect ratio 4:3; picture rates the same as above. The Technical Sub-Group also accepted the recommendation to eliminate all of the 360- (the broadcast industry) and 240-line (the TV manufacturing industry) progressive-scanning schemes that had earlier been considered for inclusion. In 1996, the U.S. FCC adopted the major elements of the ATSC DTV standard, mandating its use for digital terrestrial TV broadcasts in the U.S. The FCC did not mandate use of the specific HDTV and SDTV video formats contained in the ATSC standard, but these have since been uniformly adopted on a voluntary basis by broadcasters and receiver manufacturers. DVB set the other world-wide standards for SDTV, including additional resolutions of 576 lines by 720 pixels and picture rates of 50 per s. See *SDTV*.

**Starsight®** A national electronic television guide subscriber service. It allows you to sort the guide by your order of preference and delete stations you never watch.

**start/stop** In camcorders, a button to start/stop recording.

**static** Static electrical charges; random noise or specks on a TV screen produced by atmospheric disturbance.

**static convergence** Convergence of the three electron beams at an opening in the center of the shadow mask in a color picture tube. This is called static convergence because the beams must meet at this point when there are no scanning forces.

**static focus** The focus of the undeflected electron beam in a CRT.

**static matte insert** Inlay.

**station** 1. A location where TV or other electronic equipment is installed. 2. Broadcast station.

**station timing** Refers to a synchronizing pulse generator that is used by TV stations to lock together different picture sources both at field and line frequencies. This makes it possible for cuts and mixes between these sources to be carried out without disturbance of synchronization at the receiving end, thus avoiding picture roll-over and other undesirable effects.

**statistical coding** In video compression, a coding technique that makes use of the fact that all pixel values are not equally probable. Shorter words are used to define the more frequently encountered values, with a reduction in the total number of bits. This technique requires the transmission of a code such as the Huffman code so that the length of each byte can be identified at the receiving end.

**statistical multiplexing** A technique for increasing the overall efficiency of a multichannel digital television transmission multiplex by varying the bit-rate of each of its channels to take only that share of the total multiplex bit-rate it needs at any one time. The share apportioned to each channel is predicted statistically with reference to its current and recent-past demands.

**step picture** A videodisc or VCR feature that permits the viewer to display one video frame at a time. "Stepping," which works only with CAV discs, can operate in both forward and reverse. Some VCRs permit bi-directional stepping at various speeds, including sound.

**steps** Term used to describe the number of controls on a colorizer; the control for each color is called a step.

**stereo** Refers simply to the use of two separate audio channels, one left and one right. A stereo system built into a VCR or camera does not necessarily mean that the unit is capable of producing hi-fi, which implies other parameters and standards, such as offering frequency response over the entire audible



range and producing a quiet background free from tape hiss.

**stereo adaptable** Means that the VCR can be connected to a decoder that includes the circuitry necessary to receive and process the stereo sound. Without the box, the TV processes monaural sound only. A VCR that is stereo adaptable has an MPX, or multiplex, jack for connection to the decoder.

**stereo audio output** The jacks on some DVD players, VCRs and TV monitor/receivers that are used to connect cables to the left- and right-channel audio inputs of an external stereo amplifier. This connection produces stereo sound through an external stereo hi-fi system.

**stereo decoder** An accessory unit designed to bring MTS (multichannel TV sound) stereo to monaural TV sets or VCRs. A relatively inexpensive way of capturing MTS stereo broadcasts with mono units, stereo decoders may be used with self-powered speakers or a home stereo system. These units usually have dual stereo audio line outputs for playing back a program through a stereo system while recording on a stereo VCR.

**stereo pilot** A component of the MTS (multichannel TV sound) signal that deviates the aural carrier 5 kHz and is used in the TV receiver to detect the L-R stereo subchannel. Generated at 15.734 kHz.

**stereo-ready** 1. It means that the VCR has an MTS (multichannel TV sound) tuner built into it, so that without extra circuitry, the deck can receive and process programs broadcast in stereo. 2. Refers to a VCR that can record in stereo and one that has a jack to connect to an external stereo-TV decoder. The term "stereo-ready" may be misleading since it does ensure that the VCR is prepared to receive stereo TV broadcasts. For a VCR to receive and decode stereo TV sound, the unit often displays either the abbreviation MTS or BTSC (Broadcast TV Sound Committee).

**stereo-ready camera** A video camera capable of producing stereophonic videotapes by means of two microphone inputs. This does away with the need to connect two microphones to the stereo VCR. Different connections are required to obtain stereo with conventional video cameras. An AC adapter is necessary when using a one-microphone video camera with a table-model stereo VCR. The camera is connected to the adapter, which is then hooked up to the recorder's video input. By connecting two mics to the mic inputs of the stereo machine, all is ready for stereo recording. In some cases, the stereo VCR has a built-in camera jack, thereby eliminating the need for an AC adapter.

**stereoscope** An instrument with two eyepieces through which a pair of photographs of the same scene or subject, taken at slightly different angles, are viewed side by side: the two photographs are seen as a single picture apparently having depth,

or three dimensions. Used in 3D TV systems to watch two images of the same scene as a single 3D picture.

**stereoscopic** A reference to a 3D visual image.

**stereoscopic perception** The perception of a 3D-image to a human observer by displaying a number of 2D-images.

**stereoscopic image** See *Three-dimensional picture image*.

**stereoscopic television** TV that imparts a 3D appearance to viewed images.

**stereo separation** The ratio of the electric signal in the right stereo channel to the signal in the left stereo channel when only a right signal is transmitted, or vice versa. The greater this ratio, which is measured in dB, the better the stereo effect.

**stereo simulator** Circuitry using simulated stereo.

**stereo synthesis** The presentation of a stereo effect by artificial methods. There are various means of producing stereo. One of these processes, for example, transmits many of the low sounds to one channel while much of the high frequency is directed to a second. A truer stereo effect may be achieved by utilizing a "phasing" process that directs related sounds to a particular speaker. The most advanced technique, however, separates the audio signal into multiple frequency bands, sending different segments of each band into each of the speakers. The last two of the above processes are more sophisticated than the first but tend to exhibit problems with certain instruments "drifting" from one side to the other. Several accessories, under names such as stereo simulator and stereo synthesizer, are available for use with VCRs and TV sets. Some of these devices have controls which compensate for instrument drift or movement.

**stereo TV** A TV receiver capable of reproducing two audio channels, usually through the use of its special tuner or tuners, and playing the discrete channels through dual speakers. Since manufacturers of TV sets as well as TV broadcasting companies emphasized the picture half of TV over the sound portion, the potential of audio remained a low priority for decades. Motorola in 1958 developed a stereo TV broadcast system but with very limited frequency response. Its narrow-band FM frequency proved that the main obstructions to stereo TV in the US were the limitations of audio and telephone transmission. The 1960s witnessed stereo simulcasts of concerts using one channel via TV and the other over an FM monaural station. In the 1970s two events moved stereo TV closer to reality. First, the Japanese dominated TV set production and studio equipment with their sophisticated audio technology. Second, the technique of duplexing, or carrying two audio channels on video circuits, made quality stereo transmission feasible. On multichannel TV sound (MTS) in the U.S., one channel provides stereo sound using

## stereo/TV simulcast

left/right channel difference signals relative to transmitted mono audio track.

**stereo/TV simulcast** Outstanding musical programs on TV, such as concerts and operas, are often broadcast at the same time in stereo sound by an FM radio station. These dual broadcasts are called stereo/TV simulcasts.

**stereo VCR** A VCR capable of recording and playing back two discrete audio channels. Stereo was first introduced into VCRs by Akai in 1981 in its portable model 7350. JVC followed its VHS competitor with its own stereo VCR in 1982. To obtain stereo, the longitudinal audio track on a videotape is divided into two parts, one for each channel. Because the regular mono sound of VCRs is only adequate due to the slow tape speeds inherent in the video process, an even poorer signal-to-noise ratio results when prerecorded tapes are played back on the smaller audio tracks of stereo VCRs. VHS machines therefore incorporate a noise reduction system such as Dolby B to help compensate for this. Marantz was first with a Beta stereo recorder. Sony soon followed with its own unique stereo process called Beta Hi-Fi. Instead of using conventional stereo tape heads which produce longitudinal tracks, Sony first FM-modulates the audio signal, combines it with the video and finally the video heads place the audio signal on the tape. The FM modulation retains the audio quality and the use of the video heads sharply increases the dynamic range. In VDPs the laser formats sold by Magnavox and Pioneer were the first to offer stereo, with RCA's CED format following in 1982.

**STG2000** See *NV1*.

**sticking** An effect in a TV camera tube that has been subjected to a stationary optical image for a long period whereby the tube continues to give a picture signal of the image after the image has been removed. In image orthicon tubes, the effect occurs immediately after switching on because the target resistance is too high and the charge image persists longer than in normal operation.

**sticking potential** See *Cathode-ray tube*.

**stiction** 1. Static friction. Friction that tends to prevent relative motion between two movable parts at their null position. It is often seen in moving-coil meters. 2. VCRs that have logged many hours of use might begin to exhibit a condition described as stiction. The word, a combination of the words sticking and friction, indicates a condition of the video head drum assembly that causes the tape to stop moving during record or playback. If this occurs, severe clogging of the video heads and tape damage could result. The apparent cause of stiction is the loss of an air "cushion" between the tape and the record drum head. As the VCR is used, friction from tape travel polishes the drum surface smooth. This prevents the required air buildup, and the tape

adheres to the drum. 3. Surface friction, as between parts of a TV camera or other mechanisms.

**still adjustment control** A control knob found on some VCRs designed to stabilize an image that has been locked in by pressing the Pause mode. This control usually is used only if the on-screen picture wiggles.

**still field** Freeze field.

**still frame** Freeze frame.

**still mode** See *Freeze frame*, *Pause*.

**still store** A device that converts an image from analog format to digital and holds the image until it is needed for editing, etc. Used in professional/industrial processing, still store images are often used as backgrounds while foreground images are then placed over the former to produce composites. The results, after going through a variety of changes, including color-correcting, appear as one image.

**still video camera** A camera that takes individual images or pictures on an electronic disc rather than on film. The forerunner of present-day digital cameras, it was introduced by Sony in 1980. The Mavica (MAGnetic VIdeo CAmera) was a revolutionary innovation employing a miniature video floppy disc, but the images were only 640 x 480 resolution, much lower quality than film. Digital technology has overtaken analog still video imaging.

**still video floppy disk** The medium used in still video cameras. The video floppy, or VF, as it sometimes referred to, contains a coating of metal particles, is slightly less than 2" in diameter and enclosed in a sealed hard plastic cartridge that measures 2.4" x 2.1" x 0.14". The VF can record 25 video frames of full resolution or 50 fields (half-resolution).

**still video printer** A machine that makes a photographic print from a still video floppy disc. Designed to accompany still video cameras, these devices provide a way in which the images from a still video camera that are normally seen only on a TV set can also be turned into a physical print. See *Kodak still-picture process*, *Still video camera*.

**still video recorder/player** An electronic unit that can record, play back and store in memory video signals from several video sources. These include still video images, video camera frames, images from video scanners and computer graphics. The unit, which uses a 2" floppy disk with rapid random access and is similar to a VCR in appearance, is designed for professional use in broadcasting, video productions, trade shows, etc.

**stimulus** A signal that affects the controlled variable in a control system.

**STL** Studio transmitter link.

**STN** Supertwisted nematic.

**(The) Stockholm Agreement, (1961)** The "Regional Agreement for the European Broadcasting Area Concerning the Use of Frequencies by the Broadcasting Service in the VHF and UHF Bands" adopted by the

- European VHF/UHF Broadcasting Conference (Stockholm, 1961).
- stop** Also *f*-stop. The aperture or useful opening of a lens, usually adjustable by a diaphragm.
- stop action** A still or freeze-frame technique that was adapted from motion picture film production to the TV medium. It is used in televised football games, in which a playback of the action is stopped at a given point.
- stop down** To close down a lens; to adjust the iris/aperture of the lens so that less light passes through the lens. A lens set at  $f2$  which is then adjusted to  $f4.5$  is said to be stopped down two steps; to stop a lens down all the way is to set it at its highest *f*-stop number. Contrasted with open up.
- storage camera tube** A camera tube in which a charge image corresponding to the optical image input grows in magnitude on the target until neutralized by the scanning beam. This occurs in all the camera tubes, such as the iconoscope, image iconoscope, orthicon, image orthicon and vidicon, which have been successfully used in TV. Storage occurs by virtue of the capacitance of the target and it brings about a considerable increase in the sensitivity of the tube. In fact it was not until the advantage of the storage principle was appreciated that tubes sensitive enough for use in TV became possible. See also *CCD*.
- store and forward** In communications systems, when a message is transmitted to some intermediate relay point and stored temporarily. Later the message is sent the rest of the way. Useful for transmission of slow scan TV.
- striking** A TV picture condition indicated by white or black horizontal streaks or smudges that appear to follow images across the screen. The effect is more apparent at vertical edges of objects where there is an abrupt transition from black to white or white to black. It can be caused by excessive low-frequency response.
- stream** 1. To transmit multimedia files that begin playing upon arrival of the first packets, without needing to wait for all the data to arrive. 2. To send data in such a way as to simulate real-time delivery of multimedia.
- streaming media** Multimedia content—such as video, audio, text, or animation—that is displayed by a client as it is received from the Internet, broadcast network, or local storage.
- streaming video** Compressed audio and video that is transmitted over the Internet or other network in real time. Typical compression techniques are MPEG-2, MPEG-4, Microsoft WMT, RealNetworks, and Apple's QuickTime. It usually offers "VCR-style" remote control capabilities such as play, pause, fast forward, and reverse.
- stringer light** Kicker.
- strip** (US) Scanning line.
- stripe filter** A chrominance tube system in which the target area of the tube is divided into sequential stripes for R,G,B and Y, and can therefore derive a color signal by using only one pickup tube.
- strobe** 1. In digital TVs, a mode to display eight time-sequenced still pictures at once, while showing the real-time picture in the lower corner of the screen. The editing mode allows the user to change the still pictures displayed in the strobe mode. 2. A very common budget digital video effect where the image is merely frozen for a determined period and then instantly updated at the beginning of the next period. Live images may sometimes be used in-between freezes. Syn.: multi-grab; skip-field; stroboscope.
- strobe display** A digital VCR feature that unfolds a quick sequence of still images in electronic slow motion rather than continuous motion. The audio track continues in real time while strobe display is on. Some VCRs can adjust the strobe display rate to present from 1.5 to 8 fr/s. Because of the digital process built into these units, the images contain no noise bars or other video interferences. When in strobe mode, the VCR records one frame at a time and stores the frames in digital memory for predetermined lengths of time prior to capturing more frames.
- stroboscope** See *Strobe*.
- studio** A room in which TV or radio programs are produced.
- studio camera** Normal camera system made up of two separate units: the camera head and the camera control unit (CCU). The camera head actually changes the light images into electrical signals. The CCU allows the engineer to make adjustments and control the quality of the picture while the camera is in operation. See *Field camera*.
- studio headend link** (SHL) See *Studio transmitter link*.
- studio transmitter link** (STL) A specific application of a microwave relay system that connects the studio of a TV station to its transmitter site. The STL transmits a signal point-to-point from the studio to the transmitter where it is retransmitted on the station's assigned channel. In CATV a similar electronic configuration is called a studio headend link (SHL). See also *AML frequencies*.
- subaudio** A frequency below the normal audio range. The lower audio limit cannot be accurately defined but a subaudio frequency can be taken as one below 15 Hz.
- subband channels** Special TV channels, 11-41 MHz (below channel 2).
- subcarrier** A secondary signal containing information that is added to a main signal.
- subcarrier band** A band associated with a given subcarrier and specified in terms of maximum subcarrier deviation.
- subcarrier drive** Sine wave signal at subcarrier reference frequency.

## subcarrier oscillator

**subcarrier oscillator** The crystal oscillator that operates at the chrominance subcarrier or burst frequency of 3.579545 (or 4.433618) MHz in a color TV receiver. This oscillator, synchronized in frequency and phase with the transmitter master oscillator, furnishes the continuous subcarrier frequency required for demodulators in the receiver.

**subcarrier pass filter** A particular bandpass filter whose function it is to restrict the luminance information in color TV signals. Subcarrier pass filters are used when it is necessary to separate color information. Another application of these filters is in measuring differential gain distortion. The filter can be connected directly to the signal paths.

**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. A phase shifter allows the user to change the timing of the signals involved so that they occur at the correct time and are thus said to be in phase.

**subcarrier rejection filter** A bandstop filter that minimizes the level of subcarrier color signals, either NTSC or PAL (3.58 or 4.43 MHz). To reduce the distortion of the luminance signal, these filters utilize phase equalization. The rejection filters are used to prevent flashes of color on the TV screen when black and white information is broadcast on a color system. The filter is simply inserted in the video line. It may also be used in conjunction with black and white monitors to prevent interference from the color signal.

**subjective grading** Of the performance of an equipment or system, a method of grading in which a panel of observers records their assessments according to a scale. For example, interference to a sound or TV program can be classified as negligible, slightly distracting, distracting, very distracting or completely distracting.

**subliminal** Below the threshold of conscious responsiveness to a stimulus. Applications include behavior modification that involves audio or video motivational stimuli.

**subpixel** A subdivision of each pixel (picture element). Although digital images are made up of pixels, it can be useful to resolve image detail to smaller than pixel size. For example, in order for a curve to appear smooth on television, the data used to generate it must be created to a finer accuracy than the pixel grid in order not to appear jagged.

**subsampling** Subsampled means that a signal has been sampled at a lower rate than some other signal in the system. A prime example of this is the YCbCr color space used in ITU-R BT.601. For every two luminance (Y) samples, only one Cr and Cb sample is taken. The Cr and Cb signals are subsampled.

**subsampling** A method of reducing the bandwidth required to transmit a signal. Subsampling and in-

terpolation are widely used in digital TV for video compression.

**Subsidiary Communication Authorization** See *SCA*.  
**Subsidiary Communication Service (SCS)** See *SCA*.

**subsonic filter** Special VCR electronic circuitry that operates below 20 Hz to eliminate undesirable subsonic signals by accurately tracking the noise reduction system. These filters that work within the VCR's audio system correct any mistracking resulting from inappropriate audio circuitry that is incapable of tracking a wideband signal.

**substitution** See *Encryption*.

**substrate** A material whose surface contains an adhesive chemical for bonding or coating purposes. Videotape, for example, has a substrate designed to hold oxide or other magnetic particles necessary for recording information.

**subtitle** Superimposed caption at the bottom of the TV screen; a translation of dialogue in a foreign movie shown at the bottom of the screen.

**sun outage** A natural phenomenon that occurs when the orbital positions are such that a satellite and the sun are in one line. As a result, the earth station receives signals from both, with the more powerful sun suppressing the preferred signal. This results in a sun outage.

**sun shade** A metal cylinder attached to the end of a lens to keep light from entering the lens from the periphery of the angle of view.

**super** The superimposition of one video signal on another using the fader controls of the special effects generator.

**super band** A range of radio frequencies from 216 to 600 MHz, used for citizen's band (CB) and CATV.

**superband cable TV** TV channels that occupy frequencies not used for TV broadcasting. Superband channels, which start just above channel 13, usually range from channel J, operating at 216 to 222 MHz, to wherever the cable operators want to take them. See also *TV channel assignments*.

**Super Beta** A VCR and camcorder enhancement introduced by Sony and designed to improve the quality of the video image.

**Super Beta Hi-Fi.** A system that overcame the limited resolution of not only Beta Hi-Fi but also of conventional Betamax units. The increased resolution was achieved by using narrower gap heads that resulted in an improved high frequency response, and a 0.8-MHz upward shift of the FM luminance carrier results in a larger lower sideband.

**Superbit DVD** See *DVD-Video*.

**Super Black** A keying signal embedded within the composite video signal as a level between black and sync. It is usually used to improve luma self-keying because the video signal contains black, making a good luma self-key hard to implement. When a downstream keyer detects the super black level, it inserts the second composite video signal.

**supercapacitor** In video, the memory backup method employed by many VCRs in the event of a power failure. The supercapacitor stores an electrical charge that is activated whenever an external electrical outage occurs. This smaller element, which retains VCR program instructions and keeps the clock functioning from about 5 seconds to about 30 minutes, has generally replaced the more costly nickel cadmium battery cells, which were known to last for several hours. A handful of VCR manufacturers utilize a large supercapacitor to provide extended protection against power failure.

**super-cardioid** Variable-D. A microphone with a very directional pickup pattern, allowing sound to affect the element only if it is coming toward the front of the mic.

**Super Density (SD)** One of the first versions of DVD systems; Toshiba/Time Warner. Competed with Multimedia Compact Disc (MMCD). In 1995, all companies agreed to the single DVD standard.

**super emitron** Image iconoscope.

**superhigh frequency (SHF)** A frequency range in the electromagnetic frequency spectrum measured in GHz rather than in the conventional MHz of the lower spectrum. Used primarily for high-data-rate LOS microwave, multichannel radio relay, troposcatter, and satellite systems.

**super iconoscope** Syn.: emitron.

**superimposition** The overlapping of one image onto another. In video, a character or special effects generator is used to create this effect. Some video cameras permit electronic superimposition as well as titling. One of the shortcomings of early generators was that one of the cameras (the one supplying the special effect) had to be a black and white model. Superimpositions can be tinted any color.

**super in sync** A direction to superimpose words or an image on a TV screen while an off-camera voice reads the text.

**Super-NTSC** Also Faroudja Super-NTSC; see also *Line doubling*. A proposed modification to NTSC that improved the signal to near analog HDTV quality. A single-channel NTSC-compatible EDTV system operating on a 6-MHz channel with a 525-line, 59.94-fields/s, 2-to-1 interlaced signal. The aspect ratio was 4:3 initially, with 29:18 (=1.61) as a later objective. Progressive scanning was used in the camera and advanced receiver display. Camera scanning was at 525 lines for initial low-cast production, with a subsequent preferred value of 1050 lines, 59.94 frames/s. The progressive scan was converted to interlaced for compatible service in a scan converter that stored the progressive lines and read them out at the interlaced intervals. Included in the converter were Nyquist prefilters that reduced aliasing from vertical, temporal, and interlaced sampling.

**super sandcastle pulse** Three-level sandcastle pulse.

**superstation** A local TV station that is picked up by

an intermediate "carrier" and transmitted by satellite to cable systems throughout the nation. Basically, it is a local station with typical local programming of sports, films and other features, tuned in by residents of the city in which the superstation is based. But because of its national exposure, the station can raise its advertising rates. Ted Turner's Atlanta TV station, WTBS-Channel 17, was the first superstation to appear on cable TV. Other superstations include WGN-TV, which began broadcasting in Chicago in 1948 and went on satellite in 1978; WOR-TV in New York; and KUTV in Oakland.

**supersync signal** A combination vertical and horizontal sync signal transmitted at the end of each TV scanning line to synchronize the operation of a TV receiver with that of the transmitter.

**supertrunk** A cable that carries several video channels between facilities of a cable TV company. A trunk between the master and the hub headends in a hub CATV system.

**supertrunking** Method used by CATV systems to transport signals from hub to hub, where the hub site is the center of a distribution center for a given community. Unlike conventional TV system trunk lines, the supertrunking usually contains no bridging amps and no signal splits; generally it just connects hub to hub points.

**superturnstile antenna** The superturnstile antenna was one of the first to be introduced in the early years of TV broadcasting, and it is still in wide use for VHF stations. The dipole is a pair of radiators, sometimes called bat wings because of their shape, mounted on opposite sides of a supporting pole. The radiator consists of two dipoles mounted at right angles, and the antenna consists of two to twelve layers of dipoles.

**supertwisted nematic (STN)** A reference to an advanced form of liquid crystal that is used in active-matrix liquid-crystal video displays.

**Super VGA** See *SVGA*.

**Super-VHS** A VHS format that delivers a sharper picture, produces 400 lines of horizontal resolution and can play back standard videotapes recorded on conventional machines. Although present American analog broadcast and cable programs produce a maximum of about 330 lines, S-VHS recorders provide better quality reproductions than standard VHS machines that can capture only 230 to 240 lines. Technically, S-VHS accomplishes its improvements by increasing the Y signal range, reducing the Y and C (chrominance) signal crosstalk, using a better grade of tape and narrowing the video head gap. In addition, the format has increased its frequency bandwidth from 3.4 to 5.4 MHz, thereby expanding the amount of information that can be recorded. This results in better detail in the final screen image. To carry the increased data, a high-grade tape capable

## Super-VHS-C

of holding the finer and more densely distributed particles is required. To fully enjoy the benefits of the S-VHS format, which was introduced in 1987, a high-resolution monitor equipped with separate Y/C video inputs is essential.

**Super-VHS-C** A VHS video recording format that produces 400 or more lines of resolution with a special, higher-priced compact videocassette. These mini-cassettes are compatible with full-sized Super-VHS recorders by way of an adapter cassette. S-VHS-C offers certain advantages, including higher resolution, smaller and lighter camcorders, improved copies and editing as a result of reduced signal loss and Y/C video connectors.

**Super-VHS compatibility** The ability of the S-VHS format to play back standard VHS tapes. S-VHS compatibility has its limitations. Although the format can play back standard VHS tapes (without the additional quality), S-VHS videocassettes will not play back on standard VHS machines.

**Super-VHS tape** A videotape capable of recording high-frequency signals without the use of a metallic powder formulation that would make standard VHS taping incompatible. Tape designed for S-VHS machines employs a ferric-oxide compound like that found on regular VHS tape. Super-VHS tapes, however, use smaller particles more densely packed and provide higher frequency output.

**Super Video CD (SVCD)** Next generation video CDs, defined by the China National Technical Committee of Standards on Recording, primarily to sidestep DVD technology royalties and to create pressure for lower DVD player prices in China. SVCDs hold up to about 2 hours of digital audio and video information. MPEG-2 video is used, with a resolution of 480 x 576. MPEG audio layer 2 is used for two-channel audio. Subtitles use overlays rather than subpictures (DVD) or being encoded as video (Video CD). Variable bit-rate encoding is used, with a maximum data bitrate of 2.2 Mbps.

**Super-video input** See *S-video input*.

**Super-video output** See *S-video output*.

**supplementary lens** An accessory lens placed over the regular video camera lens, changing the viewing angle of the original. With a supplementary lens, a normal lens can be temporarily converted to a wide-angle lens; with a different attachment, a lens can be made to function as a telephoto. However, some of these accessory lenses may not fit a lens from another manufacturer.

**suppressed carrier (SC)** A carrier that is suppressed at the transmitter. The chrominance subcarrier in a color TV transmitter is an example.

**suppressed-carrier transmission** A transmission technique in which only the sidebands (one or both) are transmitted and the main carrier is not transmitted and thus not used. NTSC and PAL are examples. Suppressed-carrier transmission requires a local oscilla-

tor at the receiver that regenerates the carrier frequency and mixes it with the received signal in order to detect the modulating wave. This method of detection is termed synchronous detection.

**suppression** Blanking.

**suppressor** Interference suppressor.

**surface acoustic wave** See *Surface acoustic wave (SAW) device*.

**surface acoustic wave (SAW) device** A device which makes use of radio waves in the form of surface deformations on piezoelectric materials. Such waves can be excited by suitable transducers and they have wavelengths about 100,000 times smaller than those in free space. Thus, the wavelength of a 35-MHz wave is less than a millimeter and it is possible by suitably shaping the piezoelectric surface to produce an extremely small filter by techniques similar to those used in microwave filters. Bandpass filters of this type are used in the IF amps in TV sets and VCRs.

**surface acoustic wave (SAW) filter** See *SAW filter*.

**surface integrity** Refers to the face or surface of a parabolic antenna that is part of a satellite TV system. To receive the best possible signal from a satellite, the surface of the antenna dish should be as close to perfect as possible, thereby concentrating the reflected energy into one point. Deviations in the parabolic curve cause this energy to stray or miss the feed horn (or focal point) which is mounted exactly in the center and front of the antenna. Tolerances in this area are rather small. If the surface integrity is off more than about 1/16", reception may be adversely affected. Tolerances can be checked by using a solid parabolic form called a template, sometimes supplied by the antenna company.

**surface-mount technology (SMT)** A manufacturing technology in which leadless components are soldered to leads on the surface of a circuit board without plated-through holes.

**surface wave** A radiowave that travels along the surface separating the transmitting and receiving aerials. The surface wave is affected by the properties of the ground along which it travels.

**surrogate travel** A technique of interactive audio/video applications. With surrogate travel, we can sit in our living room or our office and ask the computer to take us to a distant site and show us the scenes and let us hear the sounds of that locality while we interactively control our position within the site.

**surround brightness** Brightness of the area around the image. See also *Retinal illumination*.

**Surround decoder** A technique designed to decode the rear-channel audio track of theatrical films that have been encoded with Dolby Surround. See *Audio decoder*.

**surround shot** An angle of view peculiar to highly portable recording equipment; the camera can enter into the action and wander through it, giving



the viewer the impression that the camera is part of the event.

**Surround Sound** Circuitry, built into TV monitor/receivers, designed to enhance the stereo audio portion of the system to simulate a theatrical or concert-hall effect. This is usually accomplished with only the two built-in speakers of the TV unit. More than 2,000 theatrical films have been made with Dolby stereo Surround-Sound tracks; many have been transferred to prerecorded tapes with these tracks intact. With the proper components, this surround effect, with its directional and ambient sounds, can be reproduced in the home. Surround Sound gives the effect that the audio is coming from the front, sides and rear of a room. One setup sends the principal left and right audio signals (music and speech, for example) to the two speakers at the sides of the TV screen while another channel with ambient sounds (automobile, airplane, etc.) are sent to a pair of rear speakers. Surround Sound systems often require a decoder and a separate amplifier. Walt Disney's production of "Fantasia" (1940) was one of the earliest theatrical films with multichannel sound. The technique involved two synchronized films running simultaneously, with the second containing four-track sound. The Dolby Surround system currently used in theaters gained its popularity as a result of the successes of the films, *Star Wars* (1975) and *Close Encounters of the Third Kind* (1977).

**surveillance** Systematic observation of air, surface, or subsurface areas or volumes by visual, electronic, photographic, or other means for intelligence gathering.

**surveillance camera** A simplified TV camera, usually black and white, used with closed-circuit video equipment for security systems.

**SVCD** See Super Video CD.

**SVGA** Super VGA. A computer graphics standard designed to offer greater resolution than VGA. Also called extended VGA and VGA Plus.

**S-VHS** Super-VHS. An enhancement to regular VHS video tape decks. S-VHS provides better resolution and less noise than VHS. S-VHS video tape decks support S-video inputs and outputs, although this is not required. It does, however, improve the quality by not having to separate and then merge the luma and chroma signals.

**S-video quasi playback** Playback of S-VHS tapes in VHS.

**S-Video** Separate Video, also called Y/C video. 1. A video format used in S-VHS and Hi-8mm video systems that separates the luminance (Y) and the chrominance (C) of the signal to improve image quality. By simply adding together the Y and C signals, you generate a composite video signal. 2. A video interface standard. On some DVD players, a DC offset of +2.3v or +5v is added to the C output when a

letterbox picture format is being output. The extra DC offset is used to indicate the mode to a 16:9 TV so it can process the image to full screen. A standard 4:3 TV ignores all DC offsets and so displays a typical letterbox picture. Unlike component video, S-Video does not keep each of the three primary color signals separate.

**S-video input** An input for high-resolution video sources such as laser disc players and Super VHS, Beta or Hi-8 VCRs.

**S-video output** A connection on SVHS decks and DVD players that helps to deliver high-resolution Y and C signals to other units such as TVs.

**SVM** See *Velocity scan modulation*.

**sweep** 1. The steady movement of the electron beam across the screen of a CRT, producing a steady bright line when no signal is present. 2. The steady change in the output frequency of a signal generator from one limit of its range to the other.

**sweep amplifier** An amp in a TV receiver that amplifies the sawtooth output voltage of the sweep oscillator and shapes the waveform as required for the deflection circuits.

**sweep circuit** The sweep oscillator, sweep amp, and any other stages that produce the deflection voltage or current for a CRT.

**sweep frequency** The rate at which an electron beam is swept back and forth across the screen of a CRT.

**sweep generator** A test instrument that generates an RF voltage whose frequency varies back and forth through a given frequency range at a rapid constant rate. It produces an input signal for circuits or devices whose frequency response is to be observed on an oscilloscope. It is also called a sweep oscillator.

**sweep oscillator** 1. An oscillator that generates a sawtooth voltage which can be amplified to deflect the electron beam of a CRT. It is also called a time-base generator, a sweep generator, or a timing-axis oscillator.

**sweetening** A technique employed to enhance the audio portion of a TV show. The process can be applied during or after the recording of the program and involves audio control, recording, mixing and post-production work. To sweeten or enrich the audio, highly specialized and complex components are usually required, such as echo-producing units, audio tape recorders, equalizers and audio-mixing consoles as well as high-quality microphones. The term is also occasionally used to describe the improvement of the video image in a production.

**swing** The limits of the values of a varying electrical parameter, such as amplitude or frequency.

**swish pan** A rapid horizontal movement of a movie or TV camera resulting in a blur; also called blur pan, flash pan, flick pan, whip pan, or zip pan. The transitional or blurred scene itself also called a swish pan.

**switchable delay time** Adjustable Y-delay line.

## switcher

**switcher** 1. An accessory that permits routing any of several input signals to any of several outputs. For example, inputs usually include antenna, VCR, video game, pay TV decoder box, etc. Outputs may include main TV, a second TV set, VCR (for duplicating tapes from the input VCR), etc. A simple switcher permits viewing standard TV while recording encoded pay TV or vice versa—at the same time. It also allows monitoring the output of either VCR during the process of duplicating a tape from one machine to the other. A switcher simplifies the complexity of connecting various components and eliminates the entanglement of cables and wires around and behind the TV set. A passive switcher is one that has no amp or other device to change or modify the signals. Switchers are also listed by their number of inputs and outputs. One with four inputs and three outputs, for example, is known as a 4x3 switcher. Switchers, sometimes called video switchers, are generally rated by their isolation, listed in dB. The higher the number, the better the isolation of signals. Production switchers are professional/industrial units that provide a vast array of sophisticated features. See *Digital switcher*, *Mid-range switcher*, *Production switcher*. 2. The term is often used to describe a special effects generator, a unit that allows the operator to switch between video camera signals. Switchers are often used in industrial applications to switch between video cameras monitoring certain areas for display on one monitor; these kinds of switchers do not have sync generators.

**switcher contact** That part of a switcher that activates the changing of signals from one input/output to another. Contacts can be mechanical or electronic. Mechanical contacts may eventually develop dirt build-up, thereby diminishing the resistance-free electrical circuit necessary to avoid noise. Switchers with electronic contacts are considered preferable since this type of contact retains its effective signal-to-noise ratio (measured in dB) indefinitely. See *Switcher*.

**switcher/fader** A device that allows the connection of more than one video camera into a video system. The switcher/fader permits two cameras or more to operate from the same sync source, thereby eliminating a discontinuous signal, which causes picture roll, etc. The fader portion of the accessory permits the slow transition from one camera to the other.

**switching area** Timing window on a specific TV line where vertical interval switching is to be performed. According to the SMPTE RP168 it must occur between the 25<sup>th</sup> and 35<sup>th</sup> microsecond on line 10 for the 525 system and between the 25<sup>th</sup> and 35<sup>th</sup> microsecond on line 6 for the 625 system.

**switching matrix** Refers to the number of inputs and outputs on a switcher. Switchers have various inputs and outputs. A typical model may feature four

inputs (any combination of antenna, VDP, video game, VCR, etc.) and three outputs (two TV receivers and a VCR, for example). This unit would be designated as a 4x3 switching matrix. See *Switcher*.

**SXGA** Super Extended Graphics Array. Computer graphics display standard offering a resolution of 1280 x 1024 pixels.

**symmetry** A digital video effect where the displayed picture appears as though split by an imaginary line, one side having the original image and on the other side of the split is a complementary mirror image. Syn.: double mirror.

**sync** A shortened form used for referring to synchronous, synchronizing, synchronization, synchronize, etc.

**sync data** Information encoded within the time code word. The sync data, found in 16 bits at the end of the time code word, are used to define the end of each frame. Because time code can be read in either direction, the sync data bits also function as a signal to the controlling device as to the direction in which the tape is moving.

**sync generator** A sync generator is a circuit that provides sync signals. A sync generator may have genlock capability, or it may not. A sync generator supplies sync pulses to TV studio and transmitter equipment. It is also employed in all home video cameras to synchronize the pulses required to regulate or control a video system. Also called a sync-signal generator.

**synchro edit** A conventional function of some VHS movie cameras: editing start and stop operation is performed precisely on the desired points by a single push-button control. This feature solves the problem of releasing Pause on two units simultaneously. The synchro edit function may also be found on many VCRs, edit controllers and external editing consoles.

**synchro-edit input** A special VCR jack that permits the VCR to be connected to a camcorder or another VCR of the same format for editing or dubbing purposes. See *Synchro edit*.

**synchronization** 1. The maintenance of one operation in step with another, as in keeping the electron beam of a TV picture tube in step with the electron beam of the TV camera tube at the transmitter. It is also called sync. 2. A multimedia term. A very precise real-time processing, down to the millisecond. Some forms of multimedia, such as audio and video, are time-critical. Time delays that might not be noticeable in text or graphics delivery are unacceptable for audio and video. Workstations and networks must be capable of transmitting this kind of data in a synchronized manner. Where audio and video are combined, they must be time-stamped so that they can both play back at the same time. 3. In the I2C-bus system, procedure to synchronize the clock signals of two or more devices.

**synchronize** To produce synchronization. Also called sync.

**synchroizer** A device performing a variable delay function from minimal up to one whole frame, for the purpose of synchronization. Slight differences between the frame rates of incoming and reference signals can usually be accommodated. If the incoming and reference frame rates are different then occasional fields must be added or dropped, which can cause visible jumps. It is for this reason that VCRs are often field-locked to zero, the long-term frame rate difference. Occasionally the word "synchroizer" is used to describe a line synchronizer, without a framestore.

**synchronized editing** See *Synchro edit*.

**synchronizing pulse** See *Sync pulse*.

**synchronizing signal** In TV, the signals that ensure that the horizontal and vertical scanning circuits in picture-display equipment are synchronized with the picture-generating equipment. In color TV the synchronizing signal includes the color burst, which synchronizes the chrominance decoder. The synchronizing signal is added to the picture signal to form the video signal. Also called sync signal.

**synchroism** 1. Equality of frequencies and phases between two or more scanning processes. 2. Equality of frequencies with fixed phase differences between two or more scanning processes.

**synchronous** Refers to two or more events that happen in a system or circuit at the same time. In digital transmission, a procedure by which the bit and character stream are slaved to accurately synchronized clocks at both the sending and receiving ends.

**synchronous demodulator** See *Synchronous detector*.

**synchronous detection** Syn.: coherent detection. See *Suppressed-carrier transmission*.

**synchronous detector** A detector sensitive to phase and amplitude variations in the modulated signal applied to it. Such detectors are used for independently recovering the two components of the chrominance signal from the quadrature-modulated subcarrier in the NTSC and PAL color TV systems. For successful operation the detector must be synchronized with the reference signal (color burst) contained in the TV color signal. Also called synchronous demodulator.

**synchronous satellite** A satellite that is placed in orbit in a west-to-east direction 22,300 mi (35,880 km) above and parallel to the equator. It completes an orbit of the earth in 24 h and therefore appears to be stationary. When functioning as a communication satellite, it can carry relay transmitters that greatly increase the range of TV and radio transmission. Also called geosynchronous satellite.

**synchronous transmission** A transmission method where the synchronizing of characters is controlled by timing signals generated at the sending and receiving stations (as opposed to start/stop communications). Both stations operate continuously at the

same frequency and are maintained in a desired phase relationship. Any of several data codes may be used for the transmission, as long as the code uses the required line-control characters. Also called bi-sync, or binary synchronous.

**sync level** In TV, the level reached by the peaks of the synchronizing signals.

**sync limiter** A limiter circuit for TV that prevents sync pulses from exceeding a predetermined amplitude.

**sync noise gate** Used to define an area within the video waveform where the video decoder is to look for the sync pulse. Anything outside of this defined window will be rejected. The main purpose of the sync noise gate is to make sure that the output of the video decoder is clean and correct.

**sync processor** A professional/industrial unit designed to reproduce the correct sync, blanking and burst information, including their proper levels. The sync processor can help to correct such problems as those resulting from noisy off-air signals as well as from other video sources. Some models offer additional features, including switchable line bypassing and a locking system that allows the processor to replace any missing sync.

**sync pulse** One of the pulses that make up a sync signal.

**sync separator** A circuit that separates sync pulses from the video signal in a TV receiver.

**sync signal** Synchronizing signal.

**sync-signal generator** Sync generator.

**sync stripper** A video signal contains video information, which is the picture to be displayed, and timing (sync) information that tells the receiver where to put this video information on the display. A sync stripper pulls out the sync information from the video signal and throws the rest away.

**sync/test generator** A professional instrument designed to synchronize with all standard composite video signals so that various aspects of these pulses can be tested and measured. The sync/test generator usually contains a color bar, "staircase," white-on-black window, convergence, alignment and color raster displays. Some versions feature multiburst frequencies while others provide graduated video sweeps. Other functions include variable control of luminance and chroma, interlace and progressive scanning, outputs of composite video, subcarrier, black burst, etc. In addition, many models measure sync amplitude, equalizer width, vertical pulse width, horizontal and vertical blanking widths, burst amplitude and number of cycles in burst.

**sync timing** Relative timing of two sets of horizontal and vertical sync pulses held in synchronism. An error in sync timing results in horizontal and vertical shifts of TV picture. The term is often incorrectly identified with horizontal timing only. Sometimes the words are used to stress the lack of subcarrier timing or non-zero SCH timing.

**synthetic diamond display** A video display for flat-

## synthetic interlace

panel TVs using synthetic diamond film; SI Diamond Technology (SIDT). The synthetic diamond display is an alternative to LCDs and CRTs. When SIDT's diamond film is exposed to an electric field, it emits electrons better than any known material. Each diamond emitter activates a colored phosphor. As in conventional TV tubes, the lit phosphors produce a picture. The technique is known as field emitter display technology.

**synthetic interlace** See *Bandwidth reduction (EU-REKA-95 HDMAC system)*.

**synthetic video** Images constructed by combining a computer three-dimensional model with real video images of surfaces, patterns, and textures. This technique allows a range of applications that create realistic rendering of computer-designed objects, interior designs, landscapes, or architecture.

**system blanking** Combination of horizontal and vertical blanking added to a TV signal to ensure that no picture information is present during the synchronizing and retrace period of a receiver.

**system control and standard scanning** A circuit to provide the information to set the multistandard color decoder into some TV receivers to the desired standard and system (NTSC-3.58, NTSC-4.43, PAL, SECAM, etc.).

**system gamma** The overall light-in/light-out characteristic of a TV system, from camera through receiver.

In an ideal system, the gamma should be 1. In practice, it appears to be about 1.4.

**system terminology** These are the current categories of TV systems:

*Conventional systems.* The NTSC, PAL, and SECAM systems as standardized prior to the development of advanced systems.

*Improved definition systems (IDTV).* Conventional systems modified to offer improved vertical and/or horizontal definition.

*Enhanced definition systems (EDTV).* Progressive scan versions of SDTV.

*Advanced systems.* In the broad sense, all systems other than conventional systems. In the narrow sense, all systems other than conventional and HDTV.

*High-definition systems (HDTV).* Systems having active vertical resolutions of at least 720p.

*Simulcast systems.* Transmission of conventional NTSC, PAL, or SECAM on existing channels and HDTV transmission of the same program on one or more additional channels.

*Production systems.* Systems intended for use in the production of program, but not necessarily in their distribution.

*Distribution systems.* Terrestrial broadcast, cable, satellite, video cassette, and optical disk methods of bringing programs to the viewing audience.

*SDTV.* Digital equivalent of NTSC and PAL standards.

# T

**T** 1. The measurement unit describing the width of sine squared pulses and bar edges with reference to the nominal system bandwidth.  $T = 1/(2 \times B)$ , where  $B$  is assumed bandwidth. For countries using the 625-line standard it was agreed to set  $T = 100$  ns, and for countries using the 525 line standard it was agreed to set  $T = 125$  ns. 2. CATV superband channel, 276-282 MHz.

**T-1** Also spelled T1. A digital transmission link with a capacity of 1.544 Mbps (1,544,000 bits per second). T-1 is a standard for digital transmission in the US, Canada, Hong Kong and Japan. Outside of the US and Canada, the T-1 line bit rate is usually 2,048,000 bits per second. At the higher rate of 2,048,000, 32 time slots are defined at the CEPT (the Conference of European Postal and Telecommunications administrations) interface, but two are used for signalling and other housekeeping chores. Typically 30 channels are left for user information—voice, video, data, etc.

**Table 3 Compression Format Constraints** Refers to the original 18 ATSC voluntary digital video formats. See *ATSC*.

**tabloid television** Populist TV programming designed to appeal to a mass audience by featuring pop music, videos, and news and gossip about celebrities.

**tails out** A tape that has been played but not rewound; a tape whose end is nearest the outside of the rest; the opposite of heads out.

**take** 1. A scene, shot, or other single uninterrupted component. 2. A direction to move from one TV camera or other video source to another. Take camera is an instruction to a performer to turn toward the camera. 3. In a DVE or vision mixer a “take” button (which may be remote controlled) will usually trigger a predefined transition. In this context, “take” is sometimes called “auto-transition.”

**take-bar** In TV, a device that records and stores cuts, mixes, and other effects and then automatically produces them from memory for use in editing when a bar is pressed.

**take camera** See *Take*.

**take-up reel** The reel upon which the tape is wound as it leaves the supply reel during recording or playback on a tape recorder.

**take-up reel spindle** The right spindle in the VCR that drives the take-up tape reel of a cassette.

**talkback** 1. A communications system within an audio or video studio linking the control room with people in the studio. 2. In TV, a brief sequence at the end of a live remote news report in which the anchor asks one or more questions of the reporter.

**talking head** That part of the person seen in the typical business videoconference; the head and shoulders. This type of image is fairly easy to capture with compressed video because there is very little motion in a talking head image.

**tally** A system of audio intercommunication among various members of the video production crew. A tally light is set on top of each camera and glows when that camera is the one on the line as the program signal camera.

**tally light** Also called camera cue. Part of a tally system, standard equipment on some studio cameras; signals which camera of a multi-camera system is in use at any given moment. Light in a TV studio which warns that a particular camera is in operation. In Britain, called a cue light.

**tap** 1. An electrical connection permitting signals to be transmitted onto or off a bus. 2. The link between the bus and the drop cable that connects the workstation to the bus. 3. A device used on CATV cables for matching impedance or connecting subscriber drops.

**tape** 1. A medium capable of storing an electronic signal and consisting of backing, binder, and iron oxide coating. The orientation of the iron oxide determines whether the tape can be used for helical scan video tape recording. 2. Television Audience Program Evaluation, a technique of evaluating viewer reaction.

**tape cassette** A package that holds a length of magnetic tape so that the package can be slipped into a tape recorder or VCR and played without threading the tape. The tape runs back and forth between two reels inside the cassette, called a cartridge.

**tape deck** The basic component of a tape recorder, comprising the tape transport and a head assembly. Some tape decks provide playback-only amplifiers and are usually listed as tape players. See *Videocassette player*.

## tape end sensor, VCR

**tape end sensor, VCR** The metallic foil attached to both the tape start and end are detected. An electrical circuit is closed, driving the auto-stop circuit.

**tape-free editing** Nonlinear electronic editing.

**tape guide** In video, a metal and plastic free-spinning spindle designed to keep the tape aligned with the rotating video heads. Tape guides are sometimes mistakenly identified as twist pins, which serve a similar but different function. A tape guide has a wide base and head, similar to a spool of thread, whereas a twist pin has a tapered top.

**tape-guide spindle** One of several posts used in VCRs to accurately position the tape in the transport mechanism.

**tape length** Videotape length.

**tapeless camcorder** A camcorder using minidisks or DVD discs to store digital video instead of tape. Some cameras can record high-resolution still pictures as well. To reduce the amount of memory needed, the image data is compressed following the MPEG-2 standard.

**tapeless VCR** Also known as a Personal Video Recorder (PVR). Merging with computer technology, this device records TV programs on a computer hard drive instead of videotape. Nonlinear, so portions of a program can be viewed while simultaneously recording another portion.

**tape-load switch** A small leaf switch in some VCRs to detect when the threading mechanism has fully threaded the tape around the video heads.

**tape path** The circuit the tape runs from supply reel to take-up reel past the erase head, video heads, audio/control track head, and between capstan and pinch roller; standardized on 1/2" machines by the EIAJ.

**tape-remaining indicator** A VCR or video camera feature that registers how much recording time is left on a particular videotape. Usually displayed in minutes, the indicator works regardless of the tape speed. This function was first introduced in 1980 by Sharp on its VHS video recorder. The VCR contained a switch which had to be set according to the cassette tape length. Sony further refined the function in 1982 on its SL-2500 model. Also known as tape time remaining indicator.

**tape repair** See *Tape splice*.

**tape slack sensor, VCR** If slack tape is detected in the play or record mode, the tape must be rewind. When the tape slack is detected by the tape slack sensor element, the auto-stop circuit is energized.

**tape speed** The speed at which videotape travels through a VCR. Sony's original 1-hour playing time Betamax had a tape speed of 4 cm/s (Beta I). Its Beta II speed on its next generation of VCRs cut the tape speed in half to 2 cm/s with a 2-hour playing time. Finally, to compete with VHS, Sony once again reduced the tape speed to 1.35 cm/s with its Beta III mode, offering 3-hour maximum with a standard L-

500 cassette. VHS provides 2 hours of playing time in its SP mode with a tape speed of 3.34 cm/s, 4 hours in its LP mode at 1.67 cm/s and 6 hours in EP or SLP with a tape speed of 1.14 cm/s, all with a standard T-120 cassette. In addition, tape speed may vary within a specific format, depending upon the special effects built into the VCR and activated by the user. These include slow motion, double speed play, several visual search mode speeds and full-speed search without picture.

**tape splice** Physically connecting two ends of videotape. Splicing is usually not recommended because of potential damage to video heads, but kits and special splicing tape are available. Videotape cannot be spliced like movie film which, when held up to a light, reveals specific frames. It is almost impossible to locate one frame on tape since images are placed down electronically as a diagonal magnetic signal.

**tape tension guide** The first tape guide near the supply reel of the videocassette. It is designed and adjusted to maintain the appropriate skew of the tape. A faulty tape tension guide can cause video as well as audio distortion during record and playback.

**tape-tension lever** In VCRs, a lever that is used to detect tape supply-reel tension. The lever is connected to a brake; when the tension decreases, the brake tightens to slow the reel. The reverse occurs when the tape tension increases.

**tape threading** A method of pulling the tape out of the cassette and around the head drum.

**tape time remaining indicator** Tape remaining indicator.

**tape transport** Those mechanical components of the VTR that move the tape from supply reel to take-up reel and back.

**tape transport control** A multi-function feature that transfers the forward and reverse visual scan and single frame advance functions from the VCR to the video camera. The built-in control is standard on some cameras and optional on others.

**tape transport system** A system for moving and aligning videotape within a VCR. The individual parts include tape guides, capstan, pins, and tension guides. A faulty transport system results in poor picture reproduction, damaged tape, etc.

**target area** In reference to a video camera, the face of a camera tube. Also, with a CRT, the area on which the image is formed and transformed into an electronic signal. Home video cameras that use a camera tube usually have a target area 2/3" in diameter. The raster differs from the target area in the sense that it (the raster) refers to the pattern formed on the target area (the flat surface area coated with a light-sensitive element).

**target voltage** The potential difference between the cathode and the signal electrode of a low-electron-velocity camera tube. The minimum value that is re-



- quired to produce a discernible video output is the target cut-off voltage.
- tartan [color] bars** A test matrix consisting of several (usually 8) bands, each containing color bars with a different sequence of colors. Together they cover all—or almost all—possible horizontal and vertical color transitions. Useful to test 2D chrominance processing devices—e.g., comb filters.
- TBC** Time Base Corrector.
- TBS** Turner Broadcasting System. See *WTBS*.
- TC** Time code.
- TCI** Time compression integration.
- TCP/IP** Transmission control protocol/Internet protocol. An Internet protocol standard developed by the U.S. Department of Defense in the 1970s. TCP controls the exchange of sequential data. IP handles the routing of outgoing and recognition of incoming messages.
- TDF** Telediffusion de France.
- TDM** 1. Time division multiplexer. 2. Time division multiplexing.
- tearing** A TV picture defect in which groups of horizontal lines are displaced in an irregular manner, caused by inadequate horizontal synchronization. If this occurs in a satellite-TV picture, it is usually an indication that the receiver is operating well below the FM threshold.
- TEL** Trans-Europe Line.
- telco** A telephone company. In broadcasting, a telco line is telephone cable, commonly used to transmit radio and TV broadcasts. The plural is telcos.
- telco line** See *Telco*.
- telcos** See *Telco*.
- tele-** Prefix meaning from a distance.
- telebook** A book published to accompany, and give further background detail relating to, a TV series.
- teletcast** Television broadcast. 1. To broadcast by TV. 2. The transmission of a TV program intended for reception by the general public.
- teletcasting** Broadcasting a TV program.
- telecine** A device for turning motion picture images into TV signals. Performs TV analysis of motion picture films and occasionally diapositive (reversal) stills. Also called film scanner. See *Film chain*.
- telecine adapter** A device usually containing a mirror, a lens and a small screen used for making film-to-tape transfers. A film or slide projector is aimed at a lens and/or angled mirror which transfers the image onto a small screen, which in turn is recorded by a video camera. These adapters vary in complexity and price.
- telecom gold** See *Teletext*.
- telecomms** Informal telecommunications. Cf. *comms*.
- telecommunication facilities** The aggregate of equipment, such as telephones, cables, switches, etc., used for various modes of transmission, such as digital data, audio signals, image and video signals.
- telecommunication** Any transmission, emission, or reception of signals, writing, images, sounds, or intelligence of any nature by wire, radio, visual, or other electromagnetic systems. The terms telecommunication and communication are used interchangeably, but telecommunication is usually the preferred term when long distances are involved.
- telecommunication system** The complete assembly of apparatus and circuits required to effect a desired transfer of information. Systems include TV, radio, and telephony.
- teleconference** A conference whose participants are some distance apart but are able to talk to and see each other because of telephone and/or TV links.
- telematics** A synthesis of functions: the integration of voice communications with text, image, and data communications into a new system. In a broader sense it also includes entertainment and the postal service. "Telematics" is the word commonly used in Europe for the integration of voice communications with text, image, and data communications. In the U.S., "communications" is sometimes used.
- telemedicine** Using videoconferencing to diagnose illness and provide medical treatment over a distance. Used in rural areas where health care is not readily available and to provide medical services to prisoners.
- tele-macro** A video camera feature that allows the user to fill the entire frame of the picture with an object at distances of between 2 and 3.5 feet. Tele-macro virtually closes the gap between the minimum normal focus distance and the maximum macro setting. With a conventional camera in the normal mode, the operator would have to move in to about 4 feet of the subject or object.
- telenovela** A romantic TV soap opera; especially in South and Central America.
- tele-operated** Remote-controlled.
- telephone programming** See *Remote telephone programming*.
- telephoto lens** A lens with a long focal length that permits a TV camera to obtain large images of distant objects.
- telepic** A feature-length motion picture made for TV.
- teleports** Engineering complexes that contain on-line technical capabilities primarily related to satellite communications. Teleports provide uplink and downlink services for audio, video, and data and voice transmission on Ku-band and C-band satellites. They normally have microwave relay and fiber optic capabilities for technical interconnections to and from producers, stations, syndicators, and SNG operations and can provide encryption (scrambling) services. Some teleports also have production and postproduction facilities.
- teleprompter** TV device by which a speaker can read an enlargement of the script in front of him/her, so that he/she seems to speak spontaneously.
- Teletel** A two-way French videotex system that has

## teletext

become a national service. It is sometimes referred to as Minitel. The system received a great deal of attention for its development of an electronic phone book. An individual can query a computer data base for a telephone number, which appears on the TV screen. Other uses involve "smart cards," which allow the user to insert a slim credit card into a home terminal to transfer money or pay bills. In addition, families can shop at home and make hotel reservations, as well as access news and information.

**teletext (TT)** 1. A method of transmitting data with a video signal. ITU-R BT.653 lists the major teletext systems used around the world. North American Broadcast Teletext Specification (NABTS) is 525-line system C. For digital transmissions such as HDTV and SDTV, the teletext characters are multiplexed as a separate stream along with the video and audio data. It is common practice to actually embed this stream in the MPEG video bitstream itself, rather than at the transport layer. Unfortunately, there is no wide-spread standard for this teletext stream—each system (DSS, DVB, ATSC, DVD) has its own solution. The practical place in MPEG to put teletext data is in the `user_data` field, which can be placed at various frequencies within the video stream. For DVD, it is the `group_of_pictures` header, which usually precedes `intra pictures` (this happens about two times a second). For ATSC broadcasts the data is inserted in the `user_data` field of individual picture headers (up to 60 times/sec). 2. An information service in which information can be displayed as pages of text on the screen of a commercial TV receiver. The information may be transmitted as part of the commercial TV broadcast signal or as coded telephone signals. It is in the form of PCM signals that use two of the unused lines in an analog TV video signal transmitted during the normal vertical retrace period. Special decoding circuits are required for the extraction of the TT signals from the normal TV signals or from the telephone line and for decoding them. A typical TT page consists of 24 rows with up to 40 characters in a row. A limited amount of color information can be used and a flashing facility is also provided. The TV systems transmit the coded lines during each field blanking period. TT decoders contain facilities enabling the user to select the page required and to store and display the information. They also have facilities for inserting news flashes into the normal TV picture, or to insert subtitles for people with impaired hearing. Some allow the full text to be superimposed on the normal picture or can store the required information for later display. It is also possible to display the current TV program in much reduced format as a small insert in the TT display. TT is widely used in the UK. The BBC's Ceefax was the world's first teletext service.

The TT information in a telephone system is transmitted as coded telephone signals, on demand from

the user, and is displayed on a TV screen. TV systems are basically sequential transmitting systems and are limited by the time taken for the required information to become available to the user. A telephone system, however, is capable of providing much more information to the user, since any information in the central store may be demanded by the user, and it is limited only by the size of the central store. It also differs from TV systems in that it is an interactive two-way system in which data may be transmitted to the central system by the user employing a suitable interface with the system, such as a microcomputer. With the emergence of digital TV, the future of teletext is in doubt.

**teletext datacasting** Datacasting is the use of lines in the vertical blanking intervals to transmit a data service for commercial purposes. The ordinary TV viewer is generally oblivious to the existence of the service. The datacast service is offered by the BBC in the UK. The first equipment designed to offer the facility commercially was activated in 1986 at the BBC TV center. The datacast line structure differs from the ordinary teletext line structure because it is not page dependent. Thus, only changing data needs to be sent to the receiving decoder. The background image can be generated by a computer program resident in the receiving decoder. This factor improves the overall security of the system. The clock run in and framing code are identical to ordinary teletext line parameters. This is to enable the use of standard transmission techniques.

**teletext decoder** A device that detects teletext signals on a TV broadcast and converts them into a text and graphics image displayed on the TV screen.

**teletext editing terminal** A device for creating the text and graphics codes for teletext transmission.

**teletext line[s]** 1. Line[s] in the vertical blanking interval allocated for teletext service. 2. Coded pulse sequences inserted in one or more lines of the vertical blanking interval and carrying teletext data.

**teletext printer** An accessory used in conjunction with TV sets capable of receiving and saving teletext information for future reference. Teletext printers are usually activated by the remote control that is supplied with the TV receiver.

**teletext standards** The published character codes and transmission standards for a teletext system. The British Ceefax teletext service uses an alphamosaic standard.

**televangelism** The activities of a televangelist.

**televangelist** (especially in the US) A Christian minister, who hosts TV shows in which the church's message is preached with great fervor and donations are sought.

**televise** To pick up a scene with a TV camera and convert it into corresponding electric signals for transmission by a TV station.

**television** A telecommunication system in which both

visual and aural information is transmitted for reproduction at a receiver. The basic elements of the system are:

- TV cameras and microphones that convert the original visual and aural information into electrical signals—i.e., into video signals and audio signals respectively;
- amplifiers and control and transmission circuits that transmit the information along a suitable communication channel: broadcast TV uses a modulated RF carrier wave;
- a TV receiver that detects the signals and produces an image on the screen of a specially designed CRT and a simultaneous sound output from a loudspeaker.

Two men claimed to have coined the word “television.” One was Hugo Gernsback, then the publisher of *Radio News* (he later founded Gernsback Inc., the publisher of *Radio-Electronics*, which was renamed *Electronics Now* in 1993). In the August 1928 issue of *Radio News*, Gernsback wrote: “The word television was first coined by myself in an article entitled ‘Television and the Telephot’ which appeared in the December 1909 issue of *Modern Electrics*.” The other person who claimed to have coined the word in 1900 was a Frenchman named Perskyi.

**television black** See *Black*.

**television broadcast band** The band extending from 54 to 890 MHz. 6-MHz channels are assigned to TV broadcast stations in the US. The frequencies are 54 to 72 MHz (channels 2 through 4), 76 to 88 MHz (channels 5 and 6), 174 to 216 MHz (channels 7 through 13), and 470 to 890 MHz (channels 14 through 83). Many countries use 7 or 8 MHz channels.

**television broadcast translator** Translator.

**television camera** The pickup unit that converts a scene into corresponding electric signals. Optical lenses focus the scene to be televised on the photosensitive surface, typically made up of solid-state receptors called charge-coupled devices (CCDs) in today’s cameras. The target area of the CCD contains from hundreds of thousands to millions of pixel points, each of which responds electrically to the amount of light focused on its surface.

**television camera tube** Pickup device in a television camera.

**television channel** A band of frequencies 6, 7, or 8 MHz wide in the TV broadcast band, available for assignment to a TV broadcast station.

**television engineering** The field of engineering that deals with the design, manufacture, and testing of equipment required for the transmission and reception of TV programs.

**television film scanner** A motion-picture projector adapted for use with a TV camera tube to televise 24 frame/s motion-picture film at the 30 frame/s rate required for TV.

**television frequency spectrum** All TV broadcast

channels fall within 54 to 890 MHz. This comprises all VHF low-band, VHF high-band, UHF (standard), UHF (translator), RCI subchannels, and midband, superband and hyperband cable TV channels. See also *TV channel assignments*.

**television game** Video game.

**television-guided bomb** A bomb that carries a small TV camera in its nose for guidance. The camera system can be locked on the target before the bomb is dropped, for self-guidance, or the pilot can monitor the camera picture over a microwave relay link and adjust the course of the bomb by remote control after dropping the bomb.

**television interference (TVI)** Interference produced in TV receivers by computers, power tools, amateur radio, and other transmitters.

**television line (tvI, TV line)** Commonly used measure of spatial frequency of periodic pattern in a TV picture expressed as a ratio of picture height to the half period of the pattern. For example, for 625/50/2:1 scanning standard, a 1-MHz video signal produces a periodic TV screen pattern with a spatial frequency of about 78 tvI.

**television line number** See *Aperture response*.

**television pickup station** A land mobile station used for the transmission of TV program material and related communications from the scene of an event occurring at a point remote from a TV broadcast station.

**television picture photography** To obtain photographs of the screen of a TV receiver, a speed of 1/30 s (1/25 is closest on most cameras) is required to obtain one complete frame (two fields). The aperture must be set according to the reading of an exposure meter, using the daylight exposure index. Very fast pan film, such as Tri-X with an ASA daylight index of 200, is needed. A tripod is essential. Turn out room lights, and use the maximum brilliance that still gives a clear picture.

**television picture tube** See *picture tube*.

**television receive-only antenna** A parabolic reflector or dish large enough to receive signals intended for cable TV systems from geostationary satellites, together with a feed horn that collects the signals reflected by the dish, a low-noise amplifier (LNA) for preamplification, and a tunable satellite receiver.

**television receiver** Also, television set. A device to convert incoming TV signals into the original scenes along with the associated sounds.

**television reconnaissance** Reconnaissance in which TV transmits a scene from the reconnoitering point to another location on the surface or in the air.

**television relay system** Television repeater.

**television repeat-back guidance** Command guidance in which a TV camera and transmitter are mounted in a guided missile or pilotless vehicle to provide a view ahead for the operator at the remote-control location.

## television repeater

**television repeater** Also called television relay station. A repeater that transmits TV signals from point to point by using radio waves in free space as a medium. This transmission is not intended for direct reception by the public.

**television satellite** An orbiting satellite that relays TV signals between ground stations.

**television screen** The fluorescent screen of the picture tube in a TV set.

**television set** Television receiver.

**television signal** The general term for the audio and visual signals that are broadcast together to provide the sounds and pictures of a TV program.

**television studio-transmitter link** A fixed station that transmits TV program material and related communications from a studio to the transmitter of a TV broadcast station.

**television transmission standards** The standards that specify the characteristics of a TV signals. For NTSC signals in the U.S., channel width is 6 MHz, the visual carrier is 4.5 MHz lower than the audio center frequency, the audio center frequency is 0.25 MHz lower than the upper frequency limit of the channel. There are 525 scanning lines per frame period, and they are interlaced 2-to-1. The frame frequency is 30 per s and the field frequency is 60 per s. The aspect ratio of the transmitted TV picture is 4:3. The scene is scanned from left to right horizontally and from top to bottom vertically at uniform velocities. A decrease in initial light intensity increases the radiated power.

**television transmitter** A visual and an audio transmitter interconnected together for transmitting a complete TV signal.

**television white** Net pure white, having about 60% reflectance (about 60% of light is reflected from the TV screen). The TV camera cannot reproduce pure white or pure black.

**Telidon** Videotex system, Canada, founded in 1978, went offline in 1985.

**telly** Colloq. television (in British usage).

**telop** Telopticon. A device for projecting small cards on TV for announcements. The term is also used to describe the slides used with a balopticon, though these actually are balops.

**Telset** Videotex system, Finland.

**Telstar** Communications satellite used (commercially) for the transmission of telephone messages and TV. Telstar I was launched in 1962.

**temporal aliasing** Video picture defect that occurs when the image being sampled moves too quickly for the sampling rate. A common example is when a wheel appears to rotate backwards because of video scanning that moves more slowly than the wheel.

**temporal coding** Compression achieved by comparing frames of video over time to eliminate redundancies between frames.

**temporal resolution** The capability of a display to reproduce adequate image detail to allow the visual system to distinguish the separate parts or components of an object moving through the display.

**tension** The pull of the capstan assembly on the video tape to keep it against the video head drum assembly; used in conjunction with the skew control to keep tape properly in path.

**tension error** Skew.

**tent card** A point-of-purchase (POP) merchandising device that is a small advertising display for an item in a retail store or home video outlet. It is imprinted on two sides and folded so that it can stand alone and be read from either side.

**tentelometer** An instrument to measure video tape tension anywhere in the tape path and at any diameter of tape pack.

**terminal** A device with which information may be input to or output from a communications system. Visual display units are often known as terminals. In videotex, the presentation entity that exchanges coded bit combinations with the host by means of telecommunications and presents it for human consumption.

**termination** The insertion of a load at the end of a line carrying a signal; a video termination is a 75-ohm resistor placed at the end of a line to keep the signal from bouncing back along the line; 600 ohms is commonly used to terminate an audio line.

**terminating resistor** A resistor (usually 75 ohms) attached to the end of a cable or to an input or output on a piece of video equipment. The resistor restores proper system impedance.

**terminator** A plug connected to unused outputs of distribution amplifiers and other open terminals to prevent power loss. The 75-ohm type is generally used.

**terrain shielding** A broadcasting situation in which mountainous or other irregular terrain blocks or weakens the transmitted signals of a radio or TV facility. Such topographical shielding sometimes prevents interference with the signals of other nearby broadcast operations.

**terrestrial** (of TV transmissions) Carried out from conventional ground stations rather than by satellite.

**terrestrial field** Radio, TV, or other transmission via land lines such as telephone, or direct (without lines); different from satellite field.

**terrestrial HDTV broadcasting** See *HDTV*.

**terrestrial interference** (TI) Interference to satellite reception caused by ground-based microwave transmitting systems, often from telephone companies that transmit in bands similar those of satellites. It can affect one TV channel or more. Sometimes relocating the parabolic antenna minimizes the problem of TI. A special TI filter or circuit helps to eliminate microwave and other unwanted signals.

**tesselated sync** Serrated sync (Europe).

**test disc (TD)** In DVD, CD and CDV players, a standard disc with signals recorded at the factory using very precise test equipment and signal sources. The TD is played on a player being serviced and the response is noted and/or the signals are used to align and adjust the player. Also called alignment disc, check disc, reference disc.

**test monitoring switcher** A professional accessory used in conjunction with video cameras, a video recorder, a waveform monitor, and a color vectorscope. The special switcher permits checking a recoded signal as well as the individual camera signals. The test monitoring switcher differs from, but can be used along with, a production switcher. The cameras are hooked up to the production switcher, which is connected to the test switcher, which in turn is plugged into the vectorscope. Finally, the waveform monitor is connected to the vectorscope.

**test pattern** A signal or pattern used in TV broadcasting that is transmitted at certain times when no program is being transmitted. The patterns are placed in front of a camera, or they may be artificially generated signals which are introduced into the system after the camera. Because a camera has its own kinds of impairment, it usually cannot generate an acceptable signal for testing the rest of the system. Therefore, a camera is tested by itself with test charts, and then the rest of the system is tested with theoretically perfect signals, which are electronically generated by test signal generators. See *Resolution wedge*.

**test signal generator** An industrial video unit that provides dozens of test patterns in composite, S-VHS, RGB and several other output formats, with RF channel coverage of all broadcast and cable channels. Some models have a menu-driven multipurpose LCD readout control panel and storage capability for 100 events. Standard patterns include multiburst, video sweep, SMPTE color bars, modulated/unmodulated staircase, raster convergence and crosshatch. The unit is known also as a video test signal generator.

**text grabber** A telecaption decoder that lets the user capture a transcript of any closed-captioned TV program for the hearing impaired and download it to a PC.

**TFT** Thin film transistor. A display technology which uses active matrix technology that operates by assigning a tiny transistor to each pixel, making it possible to control pixels independently of each other. TFT screens are very fast, have a high contrast ratio and a wide viewing area. TFT screens are sometimes called active-matrix LCDs.

**THD** Total harmonic distortion. Refers to the distortion of the audio part of video equipment such as DVDs, VCRs and VDPs. THD is measured in percent figures, with each play/record speed having its own designated number. For instance, a typical VHS ma-

chine may be rated as follows: THD of 2.9% at SP and 3.1% at LP and EP. The smaller the number, the better the performance.

**thermal protection** A feature found in some TV sets to protect the vertical deflection IC against too high dissipation. The protection is "active" at 175 degrees Celsius (347 degrees Fahrenheit) and reduces the deflection current to such a value that the dissipation cannot increase.

**third generation** Two copies away from the master tape.

**threading** A function of the VCR where tape is withdrawn from the cassette and placed against the rollers and magnetic heads to facilitate recording and playback. Threading is accomplished by the threading mechanism.

**three-dimensional digital video effects system** A sophisticated professional/industrial device designed to simplify the creation of cubes and other solid shapes on screen. The process involves the use of three separate inputs that will map a signal in three dimensions onto a form during one pass on a single channel unit.

**Three-dimensional image perception** The most common example of three-dimensional image perception is a person's vision. When viewing an object, a person's eyes usually are situated at the same vertical height but separated horizontally by 2.5" or so. As each eye sees the same scene, the perspective each eye sees of the scene is slightly different. For example, the left eye, because of its spaced-apart position from the right eye, will see just slightly more or less around a corner or curved surface than the right eye. If the scene viewed by the eyes is broken up into many very small dots of viewing perception, the left retina will receive some dots which are horizontally displaced from dots received by the right eye due to depth difference and due to the fact that the left eye is spaced apart from the right eye. However, no "advantage" is gained vertically since there is no vertical displacement between the eyes and the same vertical component is seen by both eyes. The person's brain receives the images from each eye (processes not yet understood), compares and combines the images to give 3D sense to the scene viewed by the person. The lessons of the eye may be applied to TV camera and receiver systems by utilizing two closely spaced TV cameras viewing the same scene whereupon the video signal output of each camera is directed to a pair of TV receivers. The scene viewed by each camera is repeated on the CRT of a respective receiver. Then, if a party were to view the two receivers stereoscopically—i.e., where a person's left eye could only view the CRT of the TV set receiving the output of the left TV camera and the right eye viewing only the CRT of the TV system receiving the output of the right TV camera, the eyes would then see on the TV CRTs exactly

## three-dimensional picture image

what they would see if they were viewing the scene themselves. The person's brain would interpret the two displays to reveal its three-dimensional aspects.

**three-dimensional picture image** Picture images called three-dimensional picture image or stereoscopic image are classified into the following three types: (1) Two-eye type picture image. From the point of view of an amount of information, such a picture image has an amount of information for the left and right eyes. Also called a stereoscopic picture image. (2) A picture image as a reproduction image of a body which looks afloat at a certain location in a space. Thus, if a visual point moves, then a different side face of the picture image can be seen. Such a picture image has an amount of information equal to or greater than that for a plurality of eyes. Such a picture image is called three-dimensional picture image in a narrow sense. (3) A picture image that makes use of an optical illusion.

**three-dimensional television** After the popular success of 3D films in theaters during the 1950s, several companies made attempts to develop a 3D system for TV. The major setback has been its incompatibility with normal, two-dimensional TV. Mexico experimented with 3D in 1954, but by the following year the process was dropped. Japan and Australia also tried to introduce 3D, but these attempts also failed. All of the above systems used the special two-color glasses familiar to moviegoers in the 1950s. In 1975 a company called Mortek demonstrated a system without the use of glasses. In 1979 an optometrist, Dr. Robert McElveen, presented his glasses-free 3D system, which was compatible with 2D TV. However, the picture flickered unacceptably. James Butterfield, chief scientist of 3D TV Systems, Inc., presented his "3D Video" on subscription TV in Los Angeles in December 1980, but once again viewers needed glasses. New York City had its day when a local channel in the summer of 1982 presented the 1954 movie *Gorilla at Large* in 3D, requiring viewers to purchase glasses at local chain stores. Meanwhile, other systems continue to emerge. The latest systems make use of flat panel LCD and plasma displays fitted with a wavelength optical filter to provide a wide-angle, "no-glasses" 3D display.

**three-gun picture tube** A color TV picture tube with three electron guns that emit three electron beams, one for each primary color. Each beam is directed onto phosphor dots that emit only the corresponding primary color. Each gun is controlled by its appropriate primary color signal. The shadow-mask color picture tube is an example.

**three-gun projection TV** A large-screen TV system using three separate lenses or tubes to project each of the three primary colors (red, green and blue) onto a screen. Since single-gun or single-lens projection systems limit the degree of picture sharpness and

the amount of light reaching the screen, the more costly gun systems are preferred. This process separates the TV signal into basic color elements projected through quality lenses, retaining a sharp and bright image, so essential in projection TV. Each color image is enlarged by a refractive lens system utilizing an F opening of f/1.0 or f/1.3 with 4-element, 5-inch optics. Henry Kloss developed the three-gun technique.

**three-level sandcastle pulse** Syn.: super sandcastle pulse. A pulse used in older color TV sets and consisting of horizontal blanking (required input voltage 4-5 V, typ. 4.5 V), vertical blanking (required input 2-3 V, typ. 2.5 V), and burst gate (more than 7 V) pulses.

**three-point lighting** The standard lighting setup used in most video productions, which consists of a key light, backlight, and fill light. The key light is the main light source; the backlight illuminates the hair and outline of the subject; and the fill light softens the shadows on the face created by the key light.

**three-tube color camera** A color-capable camera that produces a color signal through the use of three pickup tubes, each assigned to one of the primary colors. An early stage in the development of the color video camera, introduced by RCA in 1940.

**threshold** In an FM system, the value of the carrier-to-noise ratio (CNR) at which the linear relationship between CNR and demodulated signal-to-noise ratio (SNR) breaks down. See also *Sparklies*.

**threshold extension** Techniques for reducing the carrier-to-noise ratio (CNR) value at which threshold effects occur.

**threshold of visibility** See *TOV*.

**through-the-lens optical viewfinder** A video camera viewfinder with the advantages of displaying exactly what the lens sees and offering adjustable focus. It is more expensive than the simple optical finder but less costly than the electronic type, which has become the dominant system used on home video cameras.

**THX sound** A consumer sound system designed to provide the best theater-quality sound for DVD, videocassette and laserdisc viewing in the home. The system is designed to bring out the unrealized audio potential of theatrical film sound tracks and to handle soft passages, high trebles, and deep bass tones with superior clarity. Developed in 1990.

**TI** Terrestrial interference.

**TIA** Telecommunications Industries Association.

**tier** A pay TV channel carried by a cable TV service and offered to its subscribers for an additional monthly charge. For example, Home Box Office is one tier commonly carried by many cable TV systems that can offer one or more tiers.

**tiering** Charging a CATV subscriber extra for pay-TV channels and other tiers, often at a package price.

**TI filter** See *Terrestrial interference*.



**tight shot** Close-up.

**tight two shot** A direction to a TV camera operator for a close-up of the heads of two people.

**tilt** 1. To move the camera up or down; pivotal movement of the camera in a vertical plane. 2. The angle that an antenna axis forms with respect to the horizontal.

**time base (TB)** 1. The horizontal line formed by the electron beam driven by the sweep-circuit on the screen of a cathode-ray tube (CRT). 2. A voltage that is a predetermined function of time and that is used to deflect the electron beam of a CRT so that the luminous spot traverses the screen in a desired manner. One complete traverse of the screen, usually in a horizontal direction, is termed a sweep (or TB). The most common type of TB is one that produces a linear sweep: a sawtooth waveform is used to effect this. The circuit that produces the required voltage is a TB generator; it may be free-running, in that a periodic sawtooth waveform is produced, or it may be clocked, when one sweep is produced on application of a trigger pulse to the circuit. The period during which the spot returns to the starting point is the flyback and in TV sets the flyback is suppressed—i.e., no luminous spot is observed on the screen during the return interval. The sweep frequency is the repetition rate of the sweeps across the screen. A Miller sweep generator is a TB generator that contains a Miller integrator in the circuit in order to improve the linearity of the sweep. TV systems employ TBs in the camera tubes and in the receivers to scan the lines and frames. The TB in the receiver is controlled by sync pulses in order to retain the correct relationship to the transmitter. 3. The relative accuracy of any portion of the video scanning process in record and/or reproduction as measured against the theoretical “time” at which a given scan element is supposed to occur. The TB of a field, e.g., is 60 times/s, each of which should occupy no more or less than 1/60 s.

**time base corrector (TBC)** Equipment that corrects for time base errors in VTRs. It is a computer that evaluates the video signal to determine if each scan line, field, and frame is in the correct time position. If any of these elements is occurring too early, the TBC will fill in the space left open by repeating a previous line or field information.

**time base error** The instability of a videotape playback signal created by the machine’s inability to play back at exactly the same speed at which the tape was recorded. Typically visible as a horizontal jitter or instability in the reproduced picture. Time base error is measured in lines. It takes the electron gun 63.5  $\mu$ s to scan a video line. If the playback signal is 63.5  $\mu$ s off from where it should be, there is one line of error.

**time-base generator** Sweep generator. See *Time base*.

**time-base instability** A general term for technical

problems such as faulty tape guides, tape tension discrepancies between VCRs, worn tape heads and defective tape—all leading to an unstable TV picture. Time-base instability, or time base error as it sometimes incorrectly called, also refers to mechanical speed variations or the differences, however minor, in the actual timing of two VCRs. Since no two machines are exactly the same, a dubbed tape may often produce a picture with jitter or vertical roll.

**time-base stability** The control and maintenance of the scanning process to extremely close tolerances.

**time code (TC)** SMPTE standard for encoding time for video or audio in hours:minutes:seconds:frames. It is an electronic or digital address (time code address) that individually identifies each frame and permits random access to each one. Time code is particularly significant in the editing process. Often, professional videographers use portable units hooked up to their camcorders or VCRs to record the time code on a separate address track, thus freeing both audio channels. Amateurs, however, face difficulties in recording the SMPTE time code because the simultaneous recording of the code and microphone signal by way of the Audio Dub mode often causes “bleeding.” The standardized time code made off-line editing efficient and functional for professionals. Also called SMPTE time code. See *VTC*, *LTC*.

**time code address** See *Time code*.

**time code analyzer** An external test instrument used for locating time code errors during editing. In addition, the unit can match color frames, help set tape speed, realign video playback heads and check for “wow” (tape speed variations) on an audio synchronizer. The time code analyzer presents a readout of each time code. The unit, known also as a time code reader/generator, often comes equipped with video key and LED displays.

**time code generator** A module that is either part of a stand-alone device or built into VTRs that outputs a user-definable stream of time code onto a tape.

**time code reader** A counter designed to read and display SMPTE time code.

**time code reader/generator** Time code analyzer.

**time code word** Electronic time-encoded information recorded for each audio or video frame. Each word is divided into 80 segments called bits, which are numbered consecutively from 0 through 79. One word covers an entire audio or video frame, so that for every frame there is a corresponding time code address. In addition to the encoded time code address, two other types of information are represented within the time code word: user information (user bits) and sync information (sync data). The 26 time code address bits, 32 user bits, and 16 sync data bits add up to 74 bits, leaving 6 bits to complete the 80-bit time code word. These were originally unassigned bits intended for use with a future standard mode of operation. Four of these bits are unassigned

## time compression

and are defined as permanent binary zeros. Two bits have a special function (special bits).

**time compression** A process that permits intelligible viewing of and listening to a tape at a faster than normal speed (usually double speed). The technique, using special integrated circuitry, eliminates distorted sound, known as the Donald Duck effect, by dropping the pitch to normal. Time compression is useful in recording odd-length films on standard cassettes. For example, a 128-minute movie can be placed on a 2-hour cassette without editing. In advertising, the process can pack more information than usual into a 30-second commercial. Some VCRs offer a feature called double-speed play that basically performs this function.

**time compression integration (TCI)** A variation of the subsampling and interpolation technology, the basis of the Muse system developed and employed by NHK. The analog signal is sampled and stored, but only a fraction of the samples—e.g., the samples from every third field—are read out. In this example, a point on the raster receives a signal only once every three frames. This causes no problems for stationary objects, but the resolution of moving objects is reduced. This problem can be corrected by motion compensation circuits that interpolate the missing information.

**time compressor/expander** A device, used in video postproduction, film, and broadcasting, to make changes in the running time of a film or video and audio recording while maintaining the original, natural pitch of voices, music, and effects. This device may be used to either shorten or lengthen a TV or radio spot so it will fit into an allotted time slot.

**time constant** 1. The time required for a voltage or current in a circuit to rise to approximately 63% of its steady final value, or to fall to approximately 37% of its initial value. 2. The amount of variation in the rate of sync pulses that automatic circuits of a TV set will accept. The longer the time constant, the slower the TV set can react to a different sync situation, and conversely, the shorter the time constant, the quicker the set's response.

**time/date superimposition** A video camera/VCR feature that automatically records the time and date over an image. With a VCR, the time, date and channel are written at the beginning of any recording.

**time datum** A reference time moment at the mid-level crossing point of the leading edge of the line sync pulse. This is the default timing reference in the TV environment (as opposed to the active line start that is commonly used in computing environments). Syn.: 0h; line datum; line start [moment].

**time-division multiplexing (TDM)** A technique for transmitting a number of separate data, voice and/or video signals simultaneously over one communications medium by quickly interleaving a piece of each signal one after another.

**time-division multiplexer (TDM)** A device that derives multiple channels on a single transmission facility by connecting bit streams one at a time at regular intervals. It interleaves bits or characters from each terminal or device using the time. See *Time-division multiplexing*.

**time lapse** The shrinking of large periods of time into shorter ones. Also called animation.

**time lapse video** Similar to time lapse (animation) photography, time lapse video entails recording action intermittently over an extended range of time (such as sunrise to sunset) so that during playback the action appears speeded up. Used mostly for special effects, the technique is more difficult in video than in photography because keeping the VCR component in pause for longer than 5 minutes may damage the tape or the video heads. A special timing device called an intervalometer may be employed in this process to turn the video camera on and off automatically. The first home video camera with a built-in time lapse feature was distributed by Akai. It had the capability of automatically shooting a subject for up to 11 days at 90-second intervals with a conventional VHS cassette.

**time-lapse VCR** A VCR designed to record the video signal from a surveillance camera either in two hours of real time or up to hundreds of hours in time-lapse recording mode. Some of these professional/industrial time-lapse VCRs use computer software that permits adding on-screen text to the recording.

**time-lapse video recording** A type of video recording that captures images over a very long period of time. Using a special VTR connected to a camera, the process can record anywhere from 8 to 200 hrs of action, depending on the VTR model. Time-lapse recorders are used to capture scientific experiments and for surveillance and security purposes with hidden cameras in malls and banks.

**timeline** In nonlinear editing, the area in which video and audio clips are applied, usually giving duration in frames and seconds. Also used in animation and composition software.

**time phase circuit** See *Automatic transition editing*.

**timer** See *Programmable timer*.

**time search** A VCR feature that permits the locating of any desired point on the tape by designating its time position. It can be operated by the remote control. The time search is performed in cooperation with the linear counter that calculates the tape time by detecting control pulse. Time search is especially helpful when trying to find a scene or program on a commercial prerecorded tape or a tape not made on your machine, two types that may not respond to ordinary index searches.

**time shift** In video, the ability to watch a TV-broadcast program at the viewer's prerogative, not at the officially scheduled time. This is done by setting the VCR to record the program for playback at the

- viewer's discretion. Because of the VCR's recording capabilities, the machine differs from the VDP (which does not record) in that the VCR can play back pre-recorded tapes and time-shift programs whereas the VDP can handle only prerecorded discs. VCRs are often advertised as allowing the viewer to set up his own "prime time." Time shift, therefore, is one of the VCR's strongest features. See *Downloading*.
- time shifting recording** A VCR ability to record programs under timer control.
- timing the system** Ensuring that all of the sync pulses from the various pieces of equipment arrive at the switcher at the same time.
- tint** See *Color tint control*; *Hue*; *Hue control*.
- tint control** Hue control.
- TIROS** Television InfraRed Observation Satellite. One of a series of meteorological satellites carrying IR equipment and TV cameras. It transmits pictures of cloud cover, locations of ice floes, and other weather data.
- Title 17** The Federal Bureau of Investigation warning that precedes or follows commercial prerecorded material on videotapes and videodiscs. Title 17, US Code, Sections 501 and 506, reads as follows: "Federal law provides severe civil and criminal penalties for the unauthorized reproduction, distribution or exhibition of copyrighted motion pictures and videotapes." The FBI has been known to investigate allegations of criminal copyright infringement.
- titler** See *Character generator*, *Superimposition*.
- TiVo™** One brand of Personal Video Recorder (PVR), also called a digital video recorder (DVR). Records and stores TV programs on a computer hard drive, allowing users to pause live TV and instant replay, slo-mo, and rewind live or recorded TV.
- TNLCD** Twisted-nematic LCD.
- Tomahawk** A ship-launched cruise missile that has both a long-range radar terrain-scanning tercom guidance system and near-target video-camera guidance system. Tercom scans terrain features and compares its data with a digitized "map" in its computer memory. The video system takes over near the target and compares its digitized output with a target photograph in the missile.
- tone** 1. In audio, a sinusoidal signal of constant frequency used for test purposes or to identify circuits. 2. In popular speech, the term is used to describe the quality of a musical sound. For example, a cello may be described as having a mellow tone. 3. In photography and TV, the degree of light or shade of an image or an element of an image.
- tone wedge** In TV, a test image consisting of a series of areas of which the tone varies in steps between black and white. Most TV test cards incorporate a tone wedge that can be used for the adjustment of receivers.
- top boost** Another name for high frequency boost, a method of improving the resolution of a picture.

- topcoat** Structural layer of magnetic tape. Used to smooth the surface of video and digital audio magnetic tape.
- topic box** See *Squeeze*.
- top loading** A type of cassette-loading scheme in which the tape is inserted into a lift mechanism on top of the deck. Top-loading VCRs are no longer made (with one exception—the camcorder).
- torque** The tendency of a force to produce rotation about an axis. In VCRs, torque usually relates to the rotational force exerted by the supply and take-up reels.
- total harmonic distortion** See *THD*.
- touch sensor button** A feature found on TV sets and VCRs and utilized in conjunction with electronic tuners and remote control accessories. A slight touch of one of these buttons may change a programmed channel or another function on the VCR. See *Random access*.
- TOV** Threshold of visibility, the impairment level beyond which a source of impairment or interference can introduce visible deficiencies in sensitive program material.
- trace** The image traced out by the luminous spot on the screen of a CRT.
- trace interval** Syn.: active interval. See *Sawtooth waveform*.
- track** The portion of a moving storage medium, such as magnetic tape or disk, that is accessible to a given reading device.
- tracking** 1. The method employed by the video playback head to follow or track exactly the helical signal or path encoded by the recording head; the angle and speed at which the tape passes the video heads. Poor tracking (mistracking) results in video noise while complete tracking loss causes picture break-up. Tracking in a VCR is similar to framing on a movie projector. 2. Maintaining the spot of light from the laser accurately on the track of a CD. 3. Movement of the whole camera when making a shot. Sometimes called dollying. A tracking shot is a shot taken with the camera moving. Sometimes called a dolly shot.
- tracking control** A knob or control, usually on the front of a VCR, used to correct video noise, picture instability, flagging and other video anomalies caused by tracking problems. For example, sometimes a tape recorded on one machine will not play correctly on another of the same format because of the way one VCR records and plays back the diagonal tracks. In other cases, the problem may lie within the tape tensions of the machine, especially at slower speeds, or in a defective cassette, both leading to a tracking error so that an adjustment becomes necessary. The tracking control lifts or lowers the video heads so that they track or "read" the signal recorded on the tape.
- tracking level meter** A VCR feature that displays the

## tracking shot

strength of the recorded control track signal on videotape. Usually, a poor control track affects future editing. For example, a weak tracking level produced by a video camera may result in greater instability and more glitches. Super-VHS camcorders tend to lay down a stronger timing signal than the more compact S-VHS-C models. A tracking level meter may be found on virtually all industrial VCRs designed for editing and some top-of-the-line home models.

**tracking shot** See *Tracking*.

**tracking weight** In the now-defunct CED videodisc system, the weight of the stylus assembly as it tracks the grooves of the disc. The CED player operated much like a phonograph—the stylus made physical contact with the disc. This differed dramatically from the LaserVision (LV) videodisc system in that no contact is made with the disc; instead, a laser beam of light “read” the information implanted into the disc. Although the tracking weight of the CED system was only 65 milligrams, the stylus would eventually have to be replaced while repeated plays would take their toll on both the picture and sound.

**track intro scan** A feature, found on some VDPs, that permits the viewer to retrace the contents of a disc by moving sequentially through each track and chapter. In the case of combination LD/CD players, the track intro scan reviews the contents of CDs. The feature is similar to frame/chapter search.

**trailer** 1. A bright streak at the right of a dark area or dark line in a TV picture, or a dark area or streak at the right of a bright part. It is caused by insufficient gain at low video frequencies. 2. A strip of extra-strong nonmagnetic tape attached to the end of recording tape. Professional/industrial trailers, which come in several colors, often have one surface available for writing.

**trajectory** In general a trajectory is any path between two points although intermediate points should be given to describe complex trajectories. Hence, in the context of a DVE, a trajectory is created by a series of keyframes that have been defined by the operator.

**transaction provider** (TP) A company or organization that provides a service enabling subscribers to make reservations or purchase products and services directly through a videotex and TV stations. Transactional services include banking and shopping.

**transceiver** A component used in electronic still video and designed to send images over telephone lines.

**transcoding** 1. The conversion of video signals with different color systems but with the same scanning standard—e.g., PAL to SECAM or SECAM to PAL. 2. Often used in North America (particularly in Quebec) to mean standards conversion. 3. To convert one version of MPEG to another—i.e., MPEG-2 to MPEG-4.

**transducer** (sensor) Any device that converts a non-electrical parameter, such as sound or light, into electrical signals or vice versa. In TV, a device for

converting sounds or images to electrical signals: microphone or video camera.

**Trans-Europe Line** (TEL) A 140-Mb/s fiber-optic communications system connecting Eastern and Western Europe; Deutsche Bundespost Telecom, Bonn, Germany.

**transfer** Copy recording on one tape to another tape. In video production, a transfer is the process whereby a recording made in one format is played in that format and recorded in another format. Running off a VHS copy from a U-matic master is technically a transfer. But since it is going from a higher to lower quality format, it is usually referred to as “making a VHS copy.” Going the other way, however, is a transfer. The transfer implies the producer is attempting to take a tape of one format and record a copy of that tape in a higher-technology format in a manner that gives the impression that the original recording is of the higher-tech format. Usually some form of electronic processing, such as time-base correction, is necessary to make a transfer, so it is a more involved event, requiring the control room as well as duplication facilities of the house. See also *Film-to-tape transfer*.

**transfer characteristic** 1. Of an active device, the curve obtained by plotting the output current against the input voltage or current. For a field-effect transistor the input is taken as a voltage and for a bipolar transistor as a current. 2. Of a TV camera tube, the curve obtained by plotting the output current against the light input (the relation between the degree of illumination of a TV camera tube and the corresponding output current under specified conditions). 3. Of a magnetic recording system, the curve obtained by plotting the magnetic flux density against the magnetizing force. 4. Of a photocell, graph curves of electrical output vs light (e.g., from laser) energy input.

**transformation** In video compression, a transformation of the values of a group of pixels into another set, which can be transmitted with less data. After transmission, an inverse transform is performed that recovers the original values.

**transient detecting stage** A differentiator that is part of a color transient improvement circuit. The switching stages, which are controlled by transient detecting stages, switch to a value that has been stored at the beginning of the transients. The differentiating stages get their signal from the color difference detecting signal. Used in TVs.

**transient response** The response of a circuit to a sudden change in an input quantity, such as to a step function. In making the transition from black to white, the voltage of the video signal changes value. If the TV set can't handle these changes properly, there is wavering along the edges of certain objects in a picture. For example, a TV set shows the black line of a tree separated from the blue of the sky by a

white line. Such an error, or artifact, is caused by less-than-perfect transient response.

**transition** 1. A vision mixer changeover operation from one source picture to another picture, or from one keyframe to another. 2. An abrupt change of video signal level, e.g., "green-magenta transition" in the center of a color bar pattern.

**transitional digital video effects** Refers to a series of special visual creations that can be generated by certain sophisticated devices such as a digital video effects (DVE) system. Transitional effects like dissolves are used in post-production editing to shift smoothly from one scene to another. Warp, prism, curvilinear, montage, mirror, mosaic, sparkle, trailing, decay, drop shadow, multifreeze and rotation are some of the more popular effects a DVE system can produce. These differ from nontransitional digital video effects.

**transition editing recording** Syn.: add-on recording.

**transition effects** Special effects that occur at the transition between different video camera shots.

**transition status display** A professional/industrial switcher feature that permits keying into any TV monitor and presents on screen the operating status of the switcher. Different windows of the video graphic device report various parameters, including the on-air source, source name, preroll name, position of the automation feature and transition type and duration. Windows can be concealed by the operator. See *Switcher*.

**transit time** In general, the time taken for a charge carrier to cross a given gap. In electron tubes, the time taken by electrons to travel from the cathode to other electrodes.

**translation frequency** The 2.2-GHz frequency difference between an uplink and downlink signal.

**translator station** In TV broadcasting, a repeater station that receives a primary station's signal, amplifies it, shifts it in frequency, and rebroadcasts it, usually on a UHF channel from No.70 to No.83. See also *Booster station*, *Frequency translation*.

**transmission** 1. The process of transferring a signal, message, picture, or other form of intelligence from one location to one or more other locations by fiber-optic cable, wire lines, radio, light or infrared (IR) beams, or other communication systems. 2. A message, signal, or other form of intelligence that is being transmitted. 3. The ratio of the light flux transmitted by a medium to the light flux incident upon it. Transmission can be either diffuse or specular. It is also called transmittance.

**transmission ability** The amount of light that a filter will allow to pass through it, usually expressed as a percentage. A filter with 80% transmission ability, therefore, will admit 80% of the light while rejecting 20%.

**transmission-line trap** An interference trap that can be installed in TV sets to minimize FM and other

kinds of interference picked up by the TV antenna in the range of 40 to 170 MHz. It consists of a 4 3/8-in (11-cm) length of twin-lead-in cable that has a short-circuit at one end and an adjustable ceramic capacitor at the other end, taped to the receiver twin-lead-in cable.

**transmission plane** The plane of vibration of polarized light that will pass through a Nicol prism or other polarizer.

**transmission primaries** The set of three color primaries that correspond to the three independent signals contained in the color TV picture signal. The three receiver primaries in the color picture tube form one set. The luminance primary and the two chrominance primaries, known as the Y, I, and Q primaries, form another possible set of transmission primaries.

**transmit button** A VCR remote control feature designed to send programming information from the remote control to a VCR. Ordinarily, to program VCRs equipped with on-screen displays to record a certain channel at a given time and day, the TV set must be on. However, remote controls with LCD displays can be programmed directly, even while in another room, and sent to the VCR by way of the transmit button without going through the TV set.

**transmittance** Transmission.

**transmitted-carrier transmission** A telecommunication system that uses amplitude modulation of a carrier wave in which the carrier is transmitted. Cf. *suppressed-carrier transmission*.

**transmitter** In television, electronic equipment used to transmit radio-frequency (RF) television signals, modulated by composite video, synchronizing, and audio information.

**transmitter/receiver system** See *VCR transmitter*.

**transparent** 1. Permitting passage of radiation or particles. 2. See *Video monitoring equipment*.

**transponder** Part of a communications satellite. Broadcast signals are transmitted from earth to the satellite where they are then passed through a transponder and sent back to earth. Each satellite may have a number of these transponders. One transponder can transmit thousands of weather messages back to earth—simultaneously. But the same transponder can hold only one or two TV signals because of the wider TV band. See also *Capture ratio*.

**transverse recording** A method of recording that produces tracks across the tape at right angles to the length of the tape. A video head moves across the tape at a relatively high speed, as the tape moves rather slowly past the head mount. This results in a high head-to-tape speed, also called writing speed. This idea of a moving head led to the development of a rotating head mechanism. Two heads are required for this operation. Head A is recording a track on the tape while head B is retracing or returning to the top edge of the tape for its next track. When that position is reached, head A is switched off and

## trap

head B is switched on. Thus, properly timed switching is an important requirement of the rotating head and transverse recording process.

**trap** 1. A tuned circuit in the RF or IF section of a receiver that rejects undesired frequencies. Traps in TV set video circuits keep the sound signal out of the picture channel. It is also called a rejector. 2. Refers to special circuitry used by a cable company to lock out certain channels that customers have not subscribed to. Traps are installed between the multitap on the feeder line and the cable drop line going to the subscriber's home. Because they are usually attached to the feeder line above the ground near a telephone pole, they are a relatively effective antidote to piracy. See also *Scrambling*.

**trapezium distortion** See *Distortion*.

**trapping effect** In photoconductive tubes, a long-term nonlinearly decaying level of charge after each successive scan. The length of time for retention of this residual charge will vary with different photocathode materials.

**traveling shot** Moving the video camera about while it is recording the scene. Professionals use a dolly or tracks to produce smooth traveling shots. Amateurs can get satisfactory results by simply holding the camera firmly while moving forward or by placing the camera on a small cart with wheels.

**traveling-wave tube (TWT)** An electron tube in which a stream of electrons interacts continuously or repeatedly with a guided electromagnetic wave moving substantially in synchronism with it, in such a way that there is a net transfer of energy from the stream to the wave. The tube can function as an amplifier or oscillator at microwave frequencies.

**traveling-wave tube amplifier** A broadband microwave amplifier that includes one or more traveling-wave tubes to provide power output that can exceed 200 W in the frequency range of 1 to 40 GHz. Originally used in satellite transponders, but, as with much of the electronics industry, a transition has been made to solid-state power amplifiers, SSPAs.

**treatment** A narrative writeup, usually nontechnical, that describes a proposed creative work such as a software application or an audio/video production segment.

**tree network** A configuration shaped like a branching tree with one central node. It is characterized by the existence of only one route between any two network nodes. This configuration is presently employed in coaxial CATV systems: distribution amps are installed in multiple stages on trunk lines and signals are distributed through branch points. The design resembles a tree: the signals from the headend (the root) are carried to trunk lines (major limbs) and then through feeder cables (large branches) to cable drops (small branches), and finally to the individual converter (leaf) in the home.

**triad** A triangular group of three small color-sensitive

phosphor dots repeated many thousands of times to form the color-reproducing surface of a shadow mask TV display tube. Each dot emits one of the three primary colors—red, green, or blue—when scanned by the CRT's electron beam. The set of three phosphor dots makes up a pixel, the smallest picture element on the screen.

**triangulation** 1. The process of determining the distance between points or the relative positions of points, by dividing up an area into a series of connected triangles, measuring a base line between two points, and then locating a third point by computing both the size of the angles made by lines from this point to each end of the base line and the lengths of these lines. 2. The triangles thus marked out.

**triangulation comparison circuit** In some 3D TV camera systems with laser projectors, a circuit that compares the electrical signal outputs of left and right triangulation sensors to form the depth video signal.

**triangulation sensor** In 3D TV camera systems with laser projectors, a sensor that is sensitive only to the laser beam, either to the frequency of the laser beam or, if the laser beam is coded, to the coding of the laser beam. Used to generate the depth signal (together with the second sensor).

**triax camera cable** The first color cameras were connected to the control unit with three large, heavy cables. With the smaller size, lower power requirements, and greater stability of solid-state components and the use of photoconductive and charge-coupled device (CCD) imagers, it has been possible to concentrate more of the circuitry in the camera head and to reduce the number of connections between the camera head and the camera control unit (CCU). This made it possible to transmit all the video, control, and power connections in a single small triax cable. The control signals are digitally multiplexed, and the video circuits are transmitted by subcarriers.

**trichlorotrifluoroethane (TF)** A video head cleaning solvent. It evaporates more quickly than alcohol, leaving no residue that attracts dirt. TF is the most popular solvent used in video cleaning kits. It is available in liquid form and spray cans. If the spray is used, it is applied to the swab, not directly to the heads.

**trichromatic camera** Camera using the three-color principle (i.e., employing no separate luminance tube).

**trichromatic coefficient** Chromaticity coordinate.

**tri-electrode tube** A video camera tube that utilizes three internal lenses, instead of the conventional one, to isolate the three primary colors. Sony's Triconic® image pickup tube uses this system. Other types of camera tubes include the most widely used vidicon and the saticon.

**trigger alarm** A video camera feature that alerts the user by means of a beeping sound when a recording begins or ends. This function, sometimes



- listed as beeper feedback, appears on relatively few cameras.
- tri-level sync** A sync signal that has three levels, and is commonly used for analog HDTV signals. See *sync*.
- trim** To add or subtract from an edit duration using a time code address entry.
- Trinicon® camera tube** A video camera tube that allegedly has higher resolution than other tubes. The Trinicon tube is a single tube system comprised of three color filters (primary colors) that separate the incoming light. Used by Sony, it is a modified version of the saticon. The average user, however, would probably not be able to detect any significant advantages in any one tube over the others.
- Trinitron®** Tradename; a Sony color picture tube that has its phosphor screen deposited in narrow vertical stripes instead of dots. The mask in front of the screen is a grille of vertical slots instead of a shadow mask with round holes. A single electron gun emits three beams, one for each primary color, in a horizontal line. The phosphor stripes are very narrow compared to the beams, so each beam spreads across two slots in the mask. The angle at that a beam enters a slot determines which color of phosphor stripe it hits.
- triple beats** In CATV, third order distortion products of the  $f_1 \pm f_2 \pm f_3$  type, where  $f_1$ ,  $f_2$ ,  $f_3$  are video carrier frequencies containing video modulation. These triple beats are caused by the nonlinearities of the amplifier's transfer characteristic. All of these sum and difference frequency components increase with the number of carriers carried on the cable. The greater the bandwidth, the more the channels and the greater the number of beats. When these beats increase in number, amplitude picture impairment is evident. Beats that fall within a channel space are called composite triple beats for fully loaded cable systems.
- tripler** A solid-state component made up of capacitors and diodes to triple the applied RF voltage from the flyback or horizontal output transformer. In the TV chassis the horizontal output transformer and the high-voltage rectifiers can be molded into one component.
- tripod** A three-legged stand on top of which a camera is mounted. Video tripods differ from those designed for film cameras. A good tripod consists of sturdy legs that can contract to a size small enough to be considered portable, a center column that can be raised or lowered, supports that protrude from the base to the legs and a camera mount with pan (left/right) and tilt (up/down) controls. More costly and professional tripods feature fluid heads, instead of the conventional countersprings, for controlling the pan and tilt controls.
- tripod head** The top portion of a tripod where its legs meet and the camera is mounted; friction- or fluid-head tripod designs are available.

**tri-stimulus** In color reproduction, a method that uses three primary colors or three color signals for image transmission and reproduction.

**trolley** See *Crane*.

**tropospheric propagation** Propagation of TV signals by sky way through the troposphere or weather-forming region approximately 1/2 to 10 miles above the earth's surface, instead of close to the surface by ground wave. At distances of more than 50 miles from a transmitter, the sky way becomes of increasing importance because of the marked attenuation of the ground wave. Temperature and pressure variations in the troposphere cause the refractive index of the atmosphere to alter, so that high-frequency waves are reflected back to earth, causing fading and interference.

**trucking** Moving the camera left (truck left) or right (truck right) on a tripod with a dolly, or moving your body while holding a portable camera.

**truck left** See *Crab*; *Trucking*.

**truck right** See *Crab*; *Trucking*.

**true color** True color means that each sample of an image is individually represented using three color components, such as RGB or Y'CbCr. In addition, the color components of each sample may be independently modified. True-color (24-bit) computer images are composed by dedicating 24 bits of memory to each pixel, 8 each for red, green, and blue components.

**truncation** 1. Loss of outermost side frequencies of an FM signal due to filtering. Shows as "tearing" effect of noise on video transients, sharp vertical edges. 2. In video compression, the technique of reducing the number of bits per pixel by throwing away some of the least significant bits from each pixel.

**trunk line (TL)** The main highway of a cable operation in a tree network. The TLs begin the distribution of the electronic signals from the headend to the subscriber's TV set. Consisting of large coaxial cables, 3/4 to 1" in diameter, they carry the signal to smaller feeder cables, that continue the distribution to even smaller cable drop lines, that connect to the subscriber's home. Bridging amplifiers are placed at periodic intervals (every 1/3 to 1/2 mile on TLs) to boost the original signal and correct the problem of attenuation.

**t-stop** A rating of a lens in terms of its ability to transmit light; the transmission ability, or transmission stop, of a lens; more exact in terms of a lens transmission ability than an *f*-stop rating, but no more helpful than the *f*-stop when working with a video camera; used on some lenses in motion picture and still photography in place of *f*-stop. The t-stop number (the t stands for transmission) indicates the exact amount of light reaching the film or tape, whereas the *f*-stop number indicates the amount of light reaching the lens.

**TT** See *Teletext*.

**TTL optical finder** See *Through-the-lens optical viewfinder*.

**tumble** A combination of gradual vertical squeeze and mirror effects that cause the displayed picture to appear as though it is rotating about a horizontal axis. Syn.: turn.

**tuner** The first stage of a TV set that is used to select a particular broadcast channel. There are two types of electronic tuners: the analog type that are adjustable and the frequency-synthesis tuners that are preset for all cable-ready channels. A TV tuner commonly contains only the RF amp, LO and mixer stages, whereas a radio tuner also contains the IF amp and second-detector stages. Also called front end.

**tuner/controller** A unit that permits owners of projection TVs to receive cable or broadcast signals without the use of a VCR tuner. The tuner/controller often comes with remote control; on-screen audio and video control; and several inputs and outputs, including those for S-video and RGB, the latter for driving video projectors.

**tuner/timer** The second half of a two-part portable VCR system. The tuner/timer permits recording off-the-air programs at predetermined times by pre-setting the timer. This unit usually remains behind while the VCR deck, that contains the battery, is taken into the field along with a video camera. Some manufacturers have sold each unit separately while others offered only the complete system. Tuner/timers have virtually faded from the home video market with the introduction of the one-piece camera-recorder, or camcorder.

**turn** See *Tumble*.

**turnaround** Flipover.

**Turner, Ted** Businessman, promoter, owner of the Atlanta Braves, TV station owner. He built his Atlanta station, WTBS-Channel 17, into a superstation in 1976 by placing its signal on RCA's satellite, Satcom, enabling WTBS to be picked up by virtually any cable system in the country. He also introduced the first 24-hour all-news cable station, Cable News Network (CNN).

**turnstile antenna** An antenna that consists of one or more layers of crossed horizontal dipoles on a mast, usually energized so the currents in the two dipoles of a pair are equal and in quadrature. It is used with TV, FM, and other VHF or UHF transmitters to obtain an essentially omnidirectional radiation pattern.

**turret tuner** A tuning device used in a TV set. It contains a set of resonant circuits each tuned to the frequency of one of the separate broadcast channels. One or more manually operated switches, termed band switches, allow the particular circuit corresponding to the desired channel to be selected by the user.

**TV** Television.

**TV antenna** See *Antenna*.

**TV broadcast signal** The composite RF signal that is transmitted from TV stations. These signals are picked up by a TV antenna, pass through the antenna cable to the TV tuner that is used to select the channel or frequency. The signals are amplified and converted to a lower frequency signal by the tuner so that they can be fed to the TV picture tube. The broadcast signals are then divided into their audio and video parts by a video detector and again amplified.

**TV/cable tuner** A device to convert a non-cable-ready TV into a cable TV.

**TV camera** Video camera.

**TVCR** A TV set/videocassette combination, sometimes described as a TV/VCR. Some models are quite portable, offering a 3.3" screen and weighing only five pounds. Other TVCRs have a 19" or 27" screen with hi-fi stereo sound.

**TV Crossover Link** A type of enhancement that notifies users that there is enhanced or Web content associated with a program or an advertisement. A TV Crossover Link appears as a small icon in the corner of the TV screen at a point in time determined by content producers. Clicking the link displays a panel, giving the viewer an option to go to the content enhancement (Web site) or continue watching TV. If the viewer chooses to go to the Web site, the receiver connects to the site, while the current program or advertisement remains on-screen. Pressing the View button on the remote control or keyboard returns to TV viewing. The term is a trademark of the Microsoft Corporation.

**TVI** TV interference.

**tvI** See *TV line*.

**TV line** (television line, tvI) Commonly used measure of spatial frequency of periodic pattern in a TV picture expressed as a ratio of picture height to the half period of the pattern. E.g., for 625/50/2:1 scanning standard a 1-MHz video signal produces a periodic TV screen pattern with a spatial frequency of about 78 tvI .

**TV line number** See *Aperture response*.

**TV memory** See *Memory*.

**TV monitor** See *Monitor, Monitor/Receiver*.

**TV receiver** Also called TV set. A unit that collects RF broadcasts and reproduces them in their original audio and video forms. A TV receiver has a tuner for channel selection. Radio waves transmitted from a TV station enter the TV set as an RF signal through the antenna input. The composite signal carries video, audio and sync information and is separated by various components. Each channel signal enters an IF amplifier that increases the signal that then travels to a video detector where it is separated into a video and audio signal (the separation is also possible after a tuner). The video portion is carried to a video amplifier for more processing until it ends up

displayed on the CRT. The audio is sent to its own amplifiers and finally to the speaker.

**TVRO** A TV-Receive-Only satellite system. Usually refers to the large-dish systems as opposed to the small-dish Ku-band DSS systems. TVRO systems receive TV signals from C-band satellites.

**TV set** TV receiver.

**TV signal generator** Signal generator.

**TV still** See *Memory*.

**TV storyboard** Sheets of paper with blank TV screens on them; used for roughing out the action of a program.

**TV trigger** Video trigger.

**TV/VCR combo** A hybrid TV and VCR. Today, TV/VCR combos most generally come in 13-inch and 19/20-inch models, usually with two-head VCRs.

**TV/VCR selector** A control on a VCR used to choose either the antenna or the VCR source programming. The selector permits (1) watching regular TV with the VCR off, (2) taping a TV program while watching another, (3) taping a TV program while watching it, and (4) playing a recorded videotape. With a recorded tape set in the VCR, the machine will automatically switch to VCR mode when Play is engaged.

**tweaking** A term used for the technical modification of recording devices in which the automatic gain control (AGC) is deliberately bypassed. Since the AGC attenuates and boosts all sounds, it may present problems in certain situations. For example, if a subject being interviewed is prone to long pauses, the AGC will boost these intervals, causing extraneous sounds to be recorded. In addition, when the subject continues the interview, his remarks will begin at an excessively high level. Tweaking restores control of the audio level to the operator of the VCR or other recording unit.

**tweens** Jargon term to designate frames computed by a computer animation workstation or digital video effects equipment to fill the time intervals between actual defined or selected keyframes. In the case of a DVE, trajectory settings are used to enable the calculation of tweens. Syn.: in-betweenes .

**twilight mode** In camcorders, a mode to record night views, neon signs or fireworks.

**twinax** Twinaxial cable made up of two central conducting leads of coaxial cable. See *Twinaxial cable*.

**twinaxial cable** Two insulated conductors inside a common insulator, covered by a metallic shield, and enclosed in a cable sheath. Because it carries high frequencies, twinaxial cable is often used for data transmission and video applications, especially for cable TV.

**Twincam** Dual-lens camcorder, Sharp.

**twin-deck domestic VTR** A VTR that combines most of the facilities of two standard domestic VHS machines neatly and conveniently inside a single case.

**twin-digital tracking** Digital tracking.

**twin-interlaced scanning** The lines of each vertical sweep fall midway between those of the previous sweep—process by which adjacent lines in the scanned image belong to alternate fields—i.e., line 1, line 3, line 5, etc., form part of the odd field, and lines 2,4 and 6 form part of the even field. Compared with a sequential system of the same picture frequency and number of lines, a twin-interlace system requires only half the transmitted bandwidth, but it also conveys only half the picture information. Its purpose is to double the effective picture rate and thus raise the flicker frequency from an unacceptable 25 or 30 Hz to an acceptable figure of 50 or 60 Hz.

**twinlead** TV hookup cable that consists of two wires separated a certain distance by a plastic spine. It needs no connectors and is less costly than the 75-ohm coaxial. The 300-ohm twinlead is more susceptible to radio interference and has a propensity for more signal loss than its counterpart. It is also available in a shielded version that better maintains signal quality.

**twin lens scanner** In a telecine (film scanner), two separate lenses may be used to focus two separate images of the scanning tube onto separate places. This is done to achieve double scanning of a frame of film.

**twisted-nematic LCD (TNLCD)** A display containing a liquid crystal whose twisted-nematic molecules align on a helical axis in the absence of an electric field, twisting polarized light up to 90 degrees. When the liquid crystal is channeled on its new axis through an exit polarizer, the viewer sees a bright background region. With an electric field across opposing electrodes, the crystals align themselves parallel to the field, and entering polarized light is blocked by the exit polarizer. A dark region appears—typically dots (pixels) or alphanumeric segments. The electrodes can be organized so that the OFF state corresponds to the dark background region and the ON state to bright picture elements.

**twist pin** A thin metal guidepost that works in conjunction with a tape guide at different stress points of the tape path, positioning the tape at the same angle as the head drum. Twist pins are usually located next to tape guides.

**two-channel sound** On a VCR, the ability of the machine to record and play back audio on two separate tracks. Of course, this is the basis for stereo sound in VCRs. Two-channel sound also permits audio dubbing in stereo. Mono sound is produced by a single sound track (in home video, the audio track is located near the top edge of the videotape). To obtain two-channel sound, that portion of the tape allotted to audio is divided into two, one part for the left channel and the other half for the right channel, with a small separation band between the two tracks. Because each audio track is so small,

## two-eye picture image

the sound quality would suffer without the aid of some noise reduction system.

**two-eye picture image** See *Three-dimensional picture image*.

**two-field metering system** Refers to an electronic process employed by some camcorders as a means of providing a balanced exposure. The system involves one separate reading of the entire field and another reading of the central zone. Both are then automatically calculated by the camcorder to produce an accurate exposure.

**two-field picture** One complete frame of an interlaced TV picture is made up of two fields, normally called odd and even. These two fields are interlaced to form a complete picture.

**two-inch** See *Quadraplex*.

**two-shot** A photograph, motion picture, or close-up TV scene that focuses on two persons or objects.

**two-thirds-inch vidicon** A vidicon with a target area  $\frac{2}{3}$ " in diameter; the most commonly used vidicon in portable video cameras.

**two-three-two-three scanning** Method of displaying a 24-fps film on a 60-field TV system (the North American standard). Successive frames of the film are exposed to two field scans and then three field

scans, respectively. Thus, a second's worth of film contains 12 frames scanned twice, making 24 plus 36 or 60 fields. Also called 3:2 pulldown.

**two-tube color camera** A video camera with one vidicon tube dedicated to luminance (black and white brightness values) and the other to color (hue and saturation of color).

**TWT** See *Traveling-wave tube*.

**Type B video recorder** See *Type C video recorder*.

**Type C video recorder** The standard of broadcast-level analog composite video recorders. Uses 1" video tape in a reel-to-reel format. This equipment is the workhorse of broadcast TV around the world and delivers the best analog recording performance available today. The basic Type C machine is a large unit weighing somewhat more than 100 pounds and intended for fixed or transportable use. The Type C recorders will deliver good performance after three generations and are usable up to 5 or 6 generations. Another broadcast-level format, which is somewhat less used in the USA but is found extensively in Europe is the Type B system. The Type B recorders also use 1" tape, but their format is different in a way that allows smaller machines to be built. Type B performance is equivalent to Type C.

# U

**U** CATV superband channel, 282-288 MHz.

**UCM** Ultra Compact Machine. A 1/2" home video camera developed chiefly by Japanese manufacturers in the early 1980s. Small and light, UCM cameras were one-piece units, combining camera and recorder, and had a one-hour recording time. A small videocassette fit directly into the camera, which produced a picture of satisfactory resolution. This minicamcorder differed from Technicolor's CVC (Compact Video Cassette), which came out at about the same time but was a two-piece unit. These two systems were incompatible with each other and the VHS-C format, another mini-system which used a small VHS cassette that fitted into a conventional VHS holder for playback on any VHS machine.

**UCT** UltraClean Technology.

**UHF** A band of frequencies extending from 300 to 1000 MHz. In TV, refers to the ultra high frequency channels 14 through 83. Found on most TV sets and VCRs.

**UHF connector** Standard type of video-in/video-out jack; also commonly found on professional monitors; used to carry either composite or noncomposite video signal.

**UHF converter** An electronic circuit that converts UHF signals to a lower frequency to permit reception on a VHF receiver. It converts UHF TV signals to VHF signals for reception on VHF TV receivers.

**UHF taboos** A set of NTSC transmission prohibitions based upon certain UHF TV channel combinations and transmitter mileage separations that the FCC determined are required to prevent interference to TV receivers; most of the taboos are caused by receiver characteristics.

**UHF translator** A TV broadcast translator station that operates on a UHF TV broadcast channel.

**U-load** The Beta format loading system. The videotape is threaded around the video head drum in a U shape. A typical Beta VCR withdraws about 24" of videotape from the cassette, wraps the tape around the head drum and directs it in a U-turn around various tape guides before it returns to the take-up reel in the cassette. The VHS format uses the M-load system.

**U loop** The shape in which tape is laced around the heads in U-Matic and Beta VCRs.

**Ultimedia™** IBM's word for the ultimate in multimedia, combining sound, motion video, photographic imagery, graphics, text and touch into a unified, natural interface. Coined in 1992.

**Ultra High Frequency** See *UHF*.

**ultra hi-res** Ultra high resolution. Properly speaking, the term should be for monitors with resolutions of 1600 x 1200 or better, but it is sometimes used to describe monitors with 800 x 600 resolution and above.

**ultrasonic** A reference to signals, equipment, or phenomena involving frequencies just above the range of human hearing, hence above about 20 kHz.

**ultrasonic delay line** A delay line that depends on the propagation time of sound through a medium to obtain a time delay of a signal.

**ultrasonic light valve** A device that can be used to transmit video information. It consists of a piezoelectric quartz crystal immersed in a transparent liquid. The crystal is excited by ultrasonic-frequency alternating current and the resulting mechanical vibrations set up compressive waves in the liquid. If the crystal is fed a modulated video signal, corresponding changes in the compression result. The system acts as a liquid diffraction grating to a light beam that is shone through it. The video information may be recorded on photographic film or detected with a suitable photodetector.

**Ultrawideband (UWB)** An emerging technology using the transmission of very short impulses of radio frequency (RF) energy whose characteristic spectrum signature extends across a very wide range of frequencies. UWB systems have shown promise for application in a number of telecommunications functions, including short-range broadband wireless networks. In 2002 the FCC approved limited use of unlicensed wireless systems that transmit high-speed data using UWB.

**U-Matic** A 3/4" video cassette system designed by Sony, 1971. In professional-level, the format uses a cassette with 3/4" tape; machines come in rack-mounted, tabletop, and portable configurations. The 3/4" system uses a method of getting the composite signal onto the tape that requires that the luminance and chrominance be taken apart and then

## unassigned bits

put back together inside the recorder. Doing that to a composite signal introduces some inherent degradations so that the picture quality of the 3/4" system is not as good as Type C, particularly with respect to color sharpness and luminance bandwidth. The 3/4" system typically can go only two generations with acceptable pictures.

**unassigned bits** See *Time code word*.

**unattended recording** A feature, found on virtually all VCRs, which permits the machine to automatically record a program at a pre-set time. This is performed by setting the digital clock and programmable timer. Unattended recording can refer to programming any home VCR or portable model with a built-in automatic timer capable of taping one event within a 24-hour period or recording up to 8 events from as many channels over a 12-month period. See *Time shift*.

**underbunching** A condition that represents less than optimum bunching in a velocity-modulation tube such as klystron.

**underlay data** In Digital Video Interactive (DVI) technology, data contained in a separate stream in an audio-video subsystem (AVSS) file, intended for use for any purpose that requires data retrieval in synchronism with the frames of video. An example of underlay data is the time code that must be stored with each frame of an AVSS file created by Real-Time Video (RTV).

**underscan** A condition that occurs when an image does not fill the entire screen. An underscanned picture has a black border at the edges of the screen where the image normally extends. This is sometimes done deliberately to make certain that no part of the picture is lost.

**unexcited field brightness** Syn.: dark field brightness. The brightness of the kinescope when it is turned off; this is primarily the result of reflection of ambient light from the picture tube face.

**unidirectional microphone** A cardioid-type microphone designed to minimize unwanted sounds from behind and beside the mic.

**unified (multi-purpose, universal) remote control** A single control unit designed to operate several different components of the same brand, including a TV set, DVD player, VCR, LP turntable, stereo amp, AM/FM tuner, an audio cassette deck and a CD player. See *Multi-purpose remote control*, *Remote control*, *Universal remote control*.

**uninterrupted power supply (UPS)** An alternative method of assuring that a VCR (or other electronic device) will operate during unattended recording even after a power failure. The UPS unit is an external accessory designed to sense power loss, in which case it automatically becomes active and provides the necessary power to keep a VCR running for a limited time. Although most VCRs come equipped with either a built-in nickel cadmium battery or a

supercapacitor, two very dependable memory backup methods, they usually offer less storage time than the more costly UPS device.

**unique hue** See *Variables of perceived color*.

**universal lens mount** A uniform bayonet-mount standard designed for interchanging lenses regardless of the camcorder format. Japanese manufacturers of VHS, VHS-C and 8mm camcorders early in 1990 decided to turn out interchangeable lenses and camcorders containing microprocessors which would permit the camera to control the autofocus, power zoom and auto-iris of any lens.

**universal remote control** A single control unit that can operate a variety of components, including those of different brands. The universal control has the capability of "learning" different pulse patterns, which it then transmits to various equipment. This is accomplished by placing the universal control next to each remote control from other units. The universal control then "listens" and memorizes all the necessary commands of each remote. A built-in sensor in the TV set, VCR or other unit then translates these pulse patterns into electrical signals so that individual instructions can be executed. Some VCRs provide several built-in weekly timers and can store up to 38 sequences of up to 14 commands each. See *Multi-purpose remote control*, *Remote control*, *Unified remote control*.

**universal VHS VCR** A VCR, in the VHS format, designed to record and play back different broadcast standards of tape. In addition, the universal unit can convert one standard to another so that the signal can be duplicated on another machine. One could, for example, copy a tape encoded with the PAL standard by playing it on the universal unit which would deliver an NTSC signal to another VCR with the NTSC standard. Although there have been other multiformat VCRs, none have been able to offer all the functions of the universal VCR.

**up converter** An electronic device which changes or "converts" VHF, midband and superband cable TV signals to conventional UHF channels. The converter permits a programmable VCR to record all channels including those on CATV. For example, midband cable channels A through I on a cable box now become channels 47 to 56 on UHF while superband letters J-R are translated into UHF numbers 63-71. Also known as block converter or cable converter.

**up converting** A process that increases the number of pixels and/or frame rate and/or scanning format used to represent an image by interpolating existing pixels to create new ones at closer spacing. The process does not actually increase the resolution of the image. Up converting is done from standard definition to high definition.

**uplink** The radio or optical transmission path upward from the earth to a communication satellite. The return path is the downlink. Also the component of



a satellite TV system on earth which transmits the original signal to the satellite. The uplink signals that are transmitted usually range from 5.9 to 6.4 GHz, with each channel requiring a bandwidth of 40 MHz. Since the difference in the range amounts to 500 MHz, there is room for 12 satellite TV channels. The spherical dish that receives the return signal from the satellite is called the downlink antenna.

**upper sideband** See *Carrier wave*.

**UPS** Uninterrupted power supply.

**upstream channel** The band of frequencies on a CATV channel reserved for transmission from the user to the CATV company's headend.

**upward modulation** (US) Positive modulation.

**urban-type CATV** A CATV system which provides five or more channels of locally originated programs in

addition to simultaneous retransmission of over-the-air programs to 10,000 or more subscriber terminals with two-way transmission capabilities.

**URC** Universal remote control.

**user bits** An additional encoded information for users of time code to enter their own information. It may contain date of shooting, shot or take identification, reel number, etc.

**Uvicon** A TV camera tube that has a conventional vidicon scanning section preceded by an ultraviolet-sensitive photocathode, an electron-accelerating section, and a special target.

**UWB** See *Ultrawideband*.

**UXGA** Ultra Extended Graphics Array. Computer graphics display standard offering a resolution of 1600 x 1200.

# V

**V** 1. Vertical. 2. VHF. 3. CATV superband channel, 288-294 MHz.

**VAD** Value-added data. A communications network with additional data services. Cf. VAN.

**value-added network (VAN)** A service (e.g., videotex), provided through telecommunications, for which a charge is made, thus providing additional value to the basic network technology.

**VAN** Value-added network. VANs are communications services that, as well as transmitting data via a common carrier, offer some sort of extra (added-value) facility, such as a particular sort of software.

**Van Allen belts** Belts of high-energy radiation encircling the earth, important in satellite communications because they may damage electronic components.

**VAPI** Video Application Programming Interface. The C-language programmer's interface for DVI technology.

**vapor deposition** A technique of placing magnetic oxides on tape without the use of a binder, resulting in fewer dropouts, etc. Evaporated metal is placed on the backing while in a vacuum. This process combines metal foil with the backing, eliminating the binder on which oxide or metal particles are normally placed. Doing away with the binder results in a stronger, much thinner tape, providing longer lengths for extended playing time. In addition, vapor deposition offers the potential for a higher density of magnetic material, leading to better performance.

**vaporware** Software or hardware that is talked about, promised, or "hyped" before it is completed or on the market.

**varactor** Variable reactor. A semiconductor diode or Schottky diode operated with reverse bias so that it behaves like a voltage-dependent capacitor. Also called varactor diode, varicap, varicap diode.

**varactor diode** Varactor.

**varactor tuner** A tuner that uses the change in capacitance of varicap diodes to select a desired station. On some VCRs, a feature that, among other things, permits tuning in midband cable TV channels D through I on the high-band range. In some cases, the VCR can tune in as low as channel B and as high as channel I of the mid-band channels. A

varactor tuner is sometimes blocked from receiving mid- and super-band channels by a few cable TV systems that employ single conversion block converters.

**varactor tuning** Capacitive tuning employed in TV receivers and VCRs, in which the variable capacitance element is provided by a varactor.

**variable audio line output** A VCR remote control feature that permits the user to control the volume of several TV sets along with the TV set connected to the VCR. This feature is usually restricted to unified remote control units.

**variable audio output** A TV monitor/receiver feature designed to control the volume of the unit even when it is connected to an external stereo amp and speaker system. Variable audio output can be operated by the TV's remote control pad.

**variable bit rate** Variable bit rate (VBR) means that a bitstream (compressed or uncompressed) has a changing number of bits each second. Simple scenes can be assigned a low bit rate, with complex scenes using a higher bit rate. This enables maintaining the audio and video quality at a more consistent level.

**variable-d** See *Super-cardioid*.

**variable-focal-length lens** A TV camera lens system whose focal length can be changed continuously during use while maintaining sharp focusing and a constant aperture, to give the effect of gradually moving the camera toward or away from the subject. The Zoomar lens is an example.

**variable-length Huffman coding** In HDTV, a coding to reduce the data rate by assigning short code words to certain values in the data stream that occur more often than others. Longer code words need be used only for values occurring less frequently. An example of that technique can be seen in the International Morse Code where letters A, E, I, M, N, and T are represented with just one or two dots or dashes. By contrast, less frequently used letters (e.g. J, Q, and X) and numbers are assigned four or five symbols.

**variable microphone** A microphone with a number of ports in its casing, designed to correct the proximity effect and to produce a super-cardioid pickup pattern.

**variable power zoom lens** Zoom lens.

**variable slow motion** A feature of many VCRs that permits changing the rate of speed of the slow motion control—usually starting from freeze frame. The result on the screen is often accompanied by various noise bars, except in some VCR models that offer variable noiseless slow motion and other machines with digital effects. Slow-motion playback speeds often range from 1/30 to 1/6 of normal speed. Variable speed slow motion, as it is sometimes called, was first introduced by JVC. See *Slow motion*.

**variables of perceived color** The appearance of colors can be described and ordered in terms of three independent variables: hue, saturation, and brightness. Three variables are necessary and sufficient, so the range of perceived colors may be represented by a 3D spatial co-ordinate system.

*Hue:* Hue is a variable describing the similarity of a color to one in the series ranging circularly through red, yellow, green, blue, purple and back to red. Colors either have a hue that can be fitted somewhere into this series (e.g., flesh pink: a yellowish-red hue; tobacco brown: a reddish-yellow hue; olive drab: a greenish-yellow hue; etc.), and are called chromatic colors; or they have no hue at all (black, white and gray) and are called achromatic colors. For any point in the hue sequence, there is another that is least like it, and opposite to it in character; such pairs of opposite hues are loosely called complementary colors. Two pairs of opposite hues (red and green, blue and yellow) suffice to define any hue, much as directions are defined by the cardinal points of the compass. These four are called unique hues.

*Saturation:* This is the variable that describes the position of a chromatic color in a radial series in terms of its distance from the nearest achromatic color—in other words, its difference from gray. Neutral or truly achromatic whites, grays and blacks have zero saturation; yellowish whites, greenish grays and bluish blacks, etc., have very low saturation. Dull, grayish and pale colors have moderately low saturation, whereas vivid and brilliant colors have high saturation. Chroma refers to the distance from gray, taken as a measure of the amount of coloredness of the color. Sometimes the word saturation is restricted to mean the proportion of coloredness to uncoloredness in the color; in these terms, when an object is moved into shade, the saturation of its color remains the same but the chroma is reduced, because the object now appears less colorful.

*Brightness:* The position of any color in a vertical series on a scale from darker to lighter is called brightness. It can be found by comparing the color with the nearest one of a series of achromatic colors. Consideration of this variable leads at once to the concept of light as something that shines through space and makes objects visible—more light makes everything look brighter. The total amount of light that

appears to be coming from the direction of a color patch is called the luminosity of the color, but the proportion of total light that appears to be reflected by the area of color seen is called the lightness of the color. Luminosity ranges from total darkness up to dazzling or blinding light, and applies to any perceived patch, including a primary source of light. Lightness ranges between extremes of absolute black (seeming to reflect no light) and absolute white (seeming to reflect all the light); it applies only to illuminated objects, or secondary sources, and can be assessed only where colors can be related together with some standard. The moon, for example, though a secondary source, is unrelated to other objects and does not look at all gray; in comparison with the sun it merely appears to be rather dim, with a low luminosity, and it is not directly perceptible that this is partly because it has a rather low reflection factor.

**variable speed display** Variable speed playback.

**variable speed playback** A DVD, VCR, and videodisc player feature that allows the viewer to control slow motion to a fraction of a second or view fast play at several times the normal speed. Variable speed playback, also known as variable speed display, performs other special-effects tasks such as advancing one video frame at a time.

**variable speed search** A VCR feature that permits steady images during the searching process at different speeds. The results of special electronic circuitry and uniquely designed video heads, variable speed search gives the viewer the choice of moving from about 3 to 21 times the normal speed—in either direction—while retaining a stable picture.

**variable speed shutter** A video camera feature that allows the camera user to select a setting commensurate with the action of the subject in different lighting conditions. Some variable speed shutters range from 1/60 to 1/4000 of a second. The faster the shutter, the sharper or clearer the moving subject will appear on screen.

**variable window filter** A noise reduction device designed to eliminate hiss. The filter permits loud sound (which covers hiss) to pass through, but when sound is low and hiss is detectable, part of the treble range is cut.

**varicap** Also varactor, varactor diode, varicap diode. In TV set/VCR tuners, a variable tuning element in both VHF and UHF local oscillators.

**varicap diode** Varicap.

**VASS** VHS address search system. An electronic indexing system that marks videotape during recording or playback so that the viewer may later quickly locate specific points on the tape. See *Address search*, *Index search*.

**vaults** Storage places for long-term and archival keeping of videotapes. Vaults are of fireproof construction, and are either provided with means of temperature control and humidification, or are so

## VBI

situated that these factors remain as constant as possible.

**VBI** Vertical blanking interval. In interlaced NTSC, an interval that comprises 21 lines. Each line arrives in two 1/60-second stages, or fields, totaling 42 of the 525 horizontal scan lines in a 1/30-second frame of NTSC video. The VBI is used for carrying close-captioned signals for the hearing impaired. Digitized data can also be inserted into the VBI for transmission at rates greater than 100,000 bps. Information services such as stock market quotations and news offering are available via the VBI of a CATV signal. The data embedded in the VBI signal is retrieved from a standard cable or satellite receiver wall outlet by a receiver set, that connects to a RS-232 port on a microcomputer. Software packages then allow subscribers instant access to the information, which may be displayed in a number of formats. Also known as field suppression.

**VBR** Abbreviation for variable bit rate.

**VC-C1** Communication video camera; Canon. It features a motorized pan/tilt mechanism in a portable package. The camera's multiple parts connect to a desktop computer using the built-in computer interface, or with an IR remote control. Up to six positions can be set—e.g., to highlight certain speakers at a conference.

**VCD** Abbreviation for VideoCD.

**VCEP** Video compression/expansion processor chip.

**V-chip** See EIA-744.

**VCO** Voltage-controlled oscillator.

**V-CORD** A now-defunct VCR system introduced by Sanyo in the late 1970s. Because it had its own videocassette format that was incompatible with either Beta or VHS, it failed to win consumer approval and was dropped by the company.

**VCP** Videocassette player.

**VCR** Videocassette recorder.

**VCR-2** A dual deck videocassette machine consisting of two VCRs. It allows convenient dubbing and videotape editing for the home video buff. The patented device has two loading slots, side by side on the front panel. A blank tape is inserted in one slot and the tape to be copied in the other. Punching a button marked "Copy Tape" starts both cassettes rolling.

**VCR deck** The unit of a two-piece portable VCR that is taken into the field and to which a video camera is usually connected. It contains the videocassette housing; operating keys such as Play, Stop, Eject; tape counter; tracking control; and other essential elements that affect the tape movement, recording and playback. The second unit, that usually remains behind, is known as the tuner/timer. With home video systems, the one-piece camcorder has virtually replaced the two-piece video camera.

**VCR dubbing enhancer** A device to boost video signal for improved results when dubbing. Helps elimi-

nate second generation (copy) losses including picture sharpness and audio crispness.

**VCR modification** See *Modification kit*.

**VCR PLUS+** Also VCR Plus. A device for unattended recording. The compact gadget operates a VCR automatically and—if applicable—a cable tuner for unattended recording. The device uses a short numerical code printed with the show in local program listings. At the proper time, the VCR Plus+ will generate IR signals to power up a VCR, tune to the correct channel and start recording.

**VCR transmitter** A device to send a signal from a VCR in one room to a TV set in another; 902- to 928-MHz UHF frequencies, range of roughly 100-200 feet.

**VCR/TV selector** See *TV/VCR selector*.

**VCS** Video computer system.

**VXCO** Voltage-controlled crystal (X) oscillator.

**VDA** Video distribution amplifier.

**VDP** Videodisc player.

**VDI** Video display terminal. A data terminal with a TV screen. Another name for computer monitor (Europe).

**VDU** Visual display unit.

**vector** A quantity in the visual (video) telecommunications industry that describes the magnitude and direction of an object's movement—for example, a head moving to the right. See *Vector image*.

**vector assignment** Operation of signal post-processing in a motion estimator that attributes motion vectors to pixels by creating boundaries around sets of pixels having the same motion.

**vector image** Image based on lines drawn between specific coordinates. In contrast, a raster image is a bit-mapped (i.e., bit-drawn) image. A vector image can easily be converted to a raster image, but it's much more difficult to go from a raster image to a vector image. Some storage systems now store images as combination raster/vector.

**vectorscope** A piece of equipment that shows a graphic display of the color portion of the video signal. See *Color vectorscope*, *Oscilloscope*.

**veejay** Video disc jockey.

**velocity-modulated scanning** An electronic technique designed to increase the sharpness and contrast of a TV monitor/receiver image. This is accomplished by means of a series of electromagnetic coils encircling the neck of a CRT so that the speed of the electron beam is altered. By changing this speed, the scanning process allows the beam signal, which must pass from black to white to produce image contrast, to remain longer on white. Variations of velocity-modulated scanning, or velocity scan modulation as it is sometimes called, include delay line aperture control and horizontal image delineation.

**velocity modulation** The process of periodically altering the velocity of an electron stream by subject-

ing it to a high-frequency electric field that alternately accelerates and decelerates the beam. If the period of the variation is comparable with the transit time of the electrons in the space concerned, the electrons subsequently gather into bunches. Bunching makes possible microwave amplification and oscillation in klystrons and traveling-wave tubes.

**velocity scan modulation** See *Velocity-modulated scanning*.

**vertical blanking** Blanking of a TV picture tube during the vertical retrace.

**vertical blanking interval (VBI)** The brief time interval between TV fields or frames required for the scanning electron gun to retrace from the bottom of the image to the top to begin scanning the next field or frame. It is the fraction of time during broadcasting and playback of videotape in which the screen goes blank, which is the time the VCR switches from one video head to the other. This interval is imperceptible to the viewer but important in electronics. For example, during freeze frame special circuitry moves the tape so that any noise bars are hidden during the vertical blanking interval. See *VBI*.

**vertical centering control** 1. The centering control provided in a TV set to shift the position of the entire image vertically in either direction on the screen. 2. A feature found on waveform monitors designed to place blanking at zero (0) IRE so that accurate waveform interpretation can be attained. Vertical centering control is a basic function of portable waveform monitors made for field use.

**vertical convergence control** The control that adjusts the amplitude of the vertical dynamic convergence voltage in a color TV set.

**vertical definition** Vertical resolution.

**vertical deflection oscillator** The oscillator that produces, under control of the vertical sync signals, the sawtooth voltage waveform that is amplified to feed the vertical deflection coils on the picture tube of a TV set. It is also called vertical oscillator.

**vertical hold** A control that regulates and stabilizes the TV image and keeps it from rolling. Many TV manufacturers have eliminated this external feature, depending on internal circuitry to halt vertical image problems. However, many anti-piracy signals work on the principle of a weak vertical hold so that VCRs cannot duplicate tapes with this track. But some TV sets without the external control cannot lock into these prerecorded tapes. Image stabilizers, sold for this purpose, control the vertical signal both in TV sets and in VCRs, thereby defeating the purpose of most anti-copying signals.

**vertical interval** Vertical blanking interval.

**vertical interval editing** A method of electronic editing in which the edit takes place on the vertical interval between picture fields so the picture switches from one signal to the next without visible distortion.

**vertical interval reference (VIR)** A broadcast signal

that, when received by a VIR-equipped receiver, helps to automatically control both tint and color. The VIR signal, developed in 1977 by GE, is broadcast on one (usually on line 19) of the vertical blanking interval lines. It contains a color reference bar, color sync, a black level reference and the horizontal sync pulse. The appropriately equipped receiver matches its red and blue color and black level with those of the incoming signal and automatically eliminates any color distortion.

**vertical interval signaling (VIS)** Digital encoding of the transmission mode in the vertical sync portion of a slow-scan TV (SSTV) image. This allows the receiver of a picture to automatically select the proper mode. This was introduced as part of the Robot modes and is now used by all SSTV software designers.

**vertical interval switcher** A switcher that delays cuts between video sources until the entire system is in vertical blanking. Since vertical blanking happens 60 times a second, the delay is very small and imperceptible to humans, but it ensures sharp, clean cuts every time. Anything that is going to be switched for use on the air must go through a vertical interval switcher.

**vertical interval switching** A method of switching video signals in a special effects generator (SEG); this replacement of one signal with another takes place during the vertical retrace period.

**vertical interval test signals** See *VITS*.

**vertical interval time code (VITC)** In video, a special signal recorded during the VBI. One of its uses is in relation to some edit controllers that depend on the VITC for accurate editing. These controllers use the VITC to find and return to specific edit points. See *SMPTE/ANSI frame coding*.

**vertical linearity control** A linearity control that permits narrowing or expanding the height of the image on the upper half of the screen of a TV picture tube. It gives linearity in the vertical direction so circular objects appear as true circles.

**vertical lock** A method of stabilizing videotape playback that tries to match the control track pulses of the playback signal to vertical sync pulses coming from the sync generator. Since the vertical sync pulses come from the sync generator at precise intervals, they act as a clock. If there are 60 pulses from the sync generator and only 55 from the control track, then the tape is moving too slowly and the capstan servo is signaled to increase the playback speed. But if there are 60 pulses from the sync generator and 63 from the control track, then the tape is moving too fast and the capstan servo is signaled to slow it down. The big advantage of vertical lock is that a vertical interval switcher will be able to switch to tape without a breakup. However, time base error will still be a problem and dissolves, wipes and other special effects with tape will not be possible. Also called capstan servo. See *Lockup*.

## vertical oscillator

**vertical oscillator** Vertical deflection oscillator.

**vertical polarization** Property of an electromagnetic wave in which the plane of polarization of the electrical field is vertical.

**vertical resolution** The number of distinct horizontal lines, alternately black and white, that can be seen in the reproduced image of a TV test pattern. Vertical resolution is primarily fixed by the number of horizontal lines used in scanning. The more horizontal lines, the better the vertical resolution or detail and quality of the picture. With many home video components, a vertical resolution of 400 horizontal lines is considered excellent. Although the US standard produces 525 lines, very few pieces of equipment come close to that number. Also called vertical definition.

**vertical retrace** The return of the electron beam to the top of the screen at the end of each field in TV.

**vertical scan rate** For noninterlaced video, this is the same as the frame rate. For interlaced video, it is usually one-half the field rate.

**vertical sweep** The downward motion of the scanning beam from the top to bottom of a televised image.

**vertical sync** The signal that tells the electron beam to return to the top of the screen for the start of a new video field or frame; the portion of the composite video signal that tells the receiver the location of the top of the picture.

**vertical timebase** In a CRT, the circuits generating the signals that give vertical deflection of the beam. In TV this is usually termed the field or frame timebase.

**vertical timing** Relative (in discrete lines) of two sets of vertical sync pulses held in synchronism. An error in V-timing results in vertical shifts of the TV picture. Syn.: V-timing.

**very high frequency (VHF)** Radio waves in the range from 30 to 300 MHz; used primarily for TV broadcasts.

**very small aperture terminal (VSAT)** Very small earth station that is capable of bidirectional communication by Ku-band.

**vestigial sideband** A method of encoding digital data onto a carrier for RF transmission. 8-VSB is used for over-the-air broadcasting of ATSC HDTV in the USA.

**vestigial sideband transmission** A system of modulation in which one sideband is transmitted in full, only part of the other sideband being transmitted (usually that corresponding to the lower modulating frequencies). The system is used for transmitting the vision component of a TV signal and has the advantage that it occupies less bandwidth than if both sidebands were transmitted in full. It is also called asymmetrical-sideband transmission. May also be used in digital frequency modulation to send data over a coaxial cable network. It is faster than the more commonly used QAM, but also more noise-sensitive.

**VF** 1. Video frequency. 2. Still video floppy disk. The medium used in still video cameras. See *Still video floppy disk*.

**VGA** Video graphics array. A graphics display system for personal computers. Unlike previous graphics standards for PCs—MDA, CGA and EGA—VGA uses analog signals rather than digital signals.

**VHD videodisc system** A now-defunct format that used a rotating disc to produce a picture and sound by means of a TV set or monitor. The Video High Density player used a stylus similar to that of the RCA system and a groove-less disc like that of the LaserVision (LV) format. The VHD player, which had a playing capacity of 1 h per side, offered fast and slow motion, freeze frame, rapid picture scan and several other features. It played in stereo, similar to other formats.

**VHF** 30-300 MHz. In TV, refers to the Very High Frequency channels 2-13. VHF uses less energy during transmission than does UHF. See also *TV channel assignments*.

**VHF/UHF splitter** See *Signal splitter*.

**VHS** Video home system. A format of VCR recording, JVC, 1976, that is the dominant format for home use. The video heads are mounted in a rotating drum or cylinder, and the half-inch tape is wrapped around the cylinder. This way, the heads can scan the tape as it moves. When a head scans the tape, it is said to have made a track. In NTSC two-head helical format, each head records one TV field, or 262.5 horizontal lines, as it scans across the tape. Therefore, each head must scan the tape 30 times/s to give a field rate of 60 fields/s.

**VHS Address Search System** See *Address search*.

**VHS-C** A format of VCR recording that uses a minicassette (C for compact) inserted into the camcorder. The minicassette can later be installed into a special VHS housing or adapter to be played on conventional VHS machines. Besides offering a compact and lightweight camcorder, the format allows editing, with the addition of an optional editor, onto a regular VHS cassette. The format was originally restricted to SP mode for quality recording. Later VHS machines have a permanent built-in adapter for VHS-C cassettes.

**VHS Hi-Fi** A method of very high-quality audio recording using a VHS video cassette as the recording medium. VCRs equipped with the VHS Hi-Fi system, have a regular audio track and two VHS Hi-Fi audio tracks, allowing audio recordings in the stereo or bilingual modes to be made from an MTS broadcast, a stereo audio system, stereo videodisc or VCR and played back in the stereo or bilingual mode. In VHS Hi-Fi VCRs, the video signal is recorded on the tape surface, and the hi-fi audio signal is recorded below the video signal on the video tracks of the tape. A mono audio signal is recorded automatically onto the mono audio track, even if hi-fi is selected for recording.



**VHS HQ circuitry** See *HQ circuitry*.

**VHS Index Search System** (VISS) With this system, up to 20 addresses can be skipped to directly locate the beginning of the desired program in FF or REVW mode. An index signal is automatically recorded every time when the REC button is pressed. See *VISS*.

**VHS speed mode** A speed at which videotape plays or records in a VHS-type VCR. The three basic speeds are SP (Standard Play), LP (Long Play) and EP or SLP (Extended or Super Long Play). SP plays for 2 h on a conventional T-120 cassette and is the mode used for best resolution and prerecorded tapes. LP, which has a 4-hour range, has been phased out as a recording mode by some VHS manufacturers who consider the speed superfluous. These companies often provide two additional video heads designed especially for the EP mode. With a thinner-type tape, the VHS maximum play/record time has been extended to 8 h.

**VHS/VHS-C VCR** A VCR that can accommodate both standard VHS cassettes and VHS-C compact cassettes without the required additional adapter. Normally, the smaller VHS-C cassettes, to play in conventional VHS machines, must first be placed into a cassette adapter that is then inserted into the VCR. The decks have a dual-loading system consisting of a built-in VHS-C adapter in the main transport compartment and special transport devices to handle the thinner tape.

**vid** Informal. A short video film.

**V-identification** Using the special signals in each field blanking period to recognize SECAM signals. V-identification is more reliable than the H-identification because the identification signals are longer and have a greater frequency deviation (3.9 MHz for B-Y and 4.756 MHz for R-Y). When it is required to transmit other information during the field blanking period, several transmitters (e.g., in France) stop transmitting the V-identification signals.

**video** Literally "I see" in Latin. Refers to picture information or a medium which uses TV to transmit and receive video. Video has emerged to a position in which it is no longer synonymous with TV. For instance, video does not have to be sent from long distance as TV does. Participating in a video game or playing back a videotape or videodisc is not watching TV. TV is, or has become, only one form of video, albeit a major one.

**video accessory** See *Accessory*.

**video album maker** A VCR function that lets the user pick out exactly the sections desired and dub them to another VCR in any order.

**video amplifier** A wideband amplifier capable of amplifying video frequencies in TV.

**video animation** See *Pixilation*.

**video arcade game** A coin-operated electronic game console containing its own controls and screen. It is often adapted to home video game use. Sega Enterprises introduced the first 3D video arcade game

called SubRoc-3D. Other innovations in arcade games include the use of videodiscs for realism and the process of holography to produce 3D images.

**video art** A creative use of video technology including lasers, videotape, computers, TV furniture and sound; expressed, often abstractly, in stills, moving images, sculpture and sometimes architectural forms. Artists first experimented with video as a means of artistic expression in the late 1960s. To some video artists the term is considered derogatory; they prefer to be known as "artists who use video."

**video artist** Any artist who works full- or part-time with any number of components related to video and/or its technology.

**video/audio amplifier** Audio/video amplifier.

**video cable** Coaxial cable for signal transmission in video systems. Also used as TV tuner-to-IF amp interface—see RG-58A/U. Basic types include: (1) 75-ohm unbalanced indoor cable, (2) outdoor cable that has a single conductor centered in a shield, (3) 124-ohm balanced indoor cable, and (4) outdoor cable that has two parallel or twisted insulated conductors centered in a shield.

**video cable tester** A device designed to check cables for broken conductors, continuity and shorts and whether the problem stems from the shield or the center conductor. The tester usually accepts BNC and UHF cables as well as a combination, such as BNC-to-UHF. There are separate audio cable testers available.

**video camera** A video recording system component that collects images (through a lens onto an image pickup tube or similar device) and sound (through a microphone) and converts them into electrical signals that are then changed to magnetic signals by a VCR. There are several types of video cameras: professional, industrial, surveillance (in banks, stores and other places requiring high security) and home models. Early home video cameras required a two-piece system made up chiefly of the lens, image pickup tube and viewfinder in one unit and a portable tape deck in the second unit. The one-piece camcorder, which houses both components in one compact unit, has virtually replaced the two-piece home models. Digital video cameras have also come to prominence.

**video camera features** Any functions, controls and/or switches excluding the basic components, such as the lens, of a video camera. The number and sophistication of features vary, of course, with each camera. Some offer the most popular features, such as audio/video dub, which replaces part of the old audio and video; backlight control, which slightly boosts exposure; clock/calendar to superimpose time and/or date; self timer, which allows the camera user to step into a scene; and tape time remaining indicator, which shows how much shooting time is left on the cassette. Other camera models provide addi-

## video camera sensitivity

tional features, including, among others, auto image stabilizer, which moves the lens assembly to help steady the video capture; character generator for making titles; color viewfinder; digital enhancer to boost contrast for better images in low light; dual camera recording, which mixes pictures from two different cameras; flying erase head, which helps to prevent video noise and glitches between scenes; microphone mixing; monitor speaker, which replaced headphones; and trigger alarm, which warns user at the beginning and end of recording.

**video camera sensitivity** The ability of a camera to reproduce a usable image with a minimal amount of light. Sensitivity is usually measured in footcandles (fc) or lux. For instance, the sensitivity of a certain camera may be rated at 50 lux (5 fc). Many video cameras feature a sensitivity switch, which increases sensitivity. To decrease sensitivity, a neutral density filter is attached to the front of the lens. All video cameras have a sensitivity range, the average range being approximately 10-10,000 fc.

**video capture** Converting a video signal into a format that can be saved onto a hard disk or optical storage device and manipulated with graphics software. This is accomplished with a device internal to a computer called a "frame grabber" or video capture board. Images thus captured are digitized, and can be dropped into a document or database record and may be transmitted locally on a LAN or long distance over a WAN. See *Video capture board*.

**video capture board** To capture a single frame of motion video successfully, a board inside a PC must capture the two fields comprising a single video frame. See also *Frame grabber*.

**video carrier** 1. A specific frequency that is modulated with video data before being mixed with the audio data and transmitted. 2. The TV signal that carries the picture, sync and blanking signals within its modulation sidebands.

**video card/adaptor** An expansion board used in a computer to produce the video signal required by the monitor to display text or graphics.

**videocassette** A rectangular, flat plastic shell or housing containing two built-in tape reels (supply and takeup) and a single, 1/2-inch-wide cobalt-alloy magnetic tape that is exchanged between them during recording, rewind, and playback. The cassette is inserted in the VCR, and the VCR pulls out the tape and positions it over rollers and around a rotating head drum at an angle for helical recording. The cassette for the most popular VHS format measures approximately 7-3/8 x 4 x 1 in and records at a rate of 580 m/s.

**videocassette adaptor** An accessory that allows VHS-C mini-cassettes to be played in conventional VHS machines. Normally, the compact videocassette is placed into the adaptor, which is then inserted into the VCR housing that accepts conventional-size cas-

ettes. Some machines provide built-in adapters that accept the compact cassettes directly.

**videocassette player (VCP)** A videocassette deck that has the appropriate functions to play back prerecorded tapes but lacks those features needed to record. Obviously designed as a second unit or a primary machine for those who just want to view tapes, these players often have additional features, such as automatic rewind, on-screen displays (for the time counter), double speed play and high-speed search. Dubbing, of course, can only be done from a VCP to a VCR and not vice versa.

**videocassette recorder (VCR)** A consumer electronics video recorder that can capture live TV programs on tape for later replay. It is also capable of playing back prerecorded cassettes of personal events (from camcorders), commercial movies, or other televised entertainment or educational material through a standard TV set.

**videocassette rewinder** Rewinder.

**Video CD** Compact discs that hold up to about an hour of digital audio and video information. The audio and video are compressed and stored using MPEG-1. Video resolution is 352 x 240 (NTSC). DVD provides much higher resolution, and Video CD never caught on in North America. The next generation, defined for the Chinese market, is Super Video CD.

**video circuit** A broadband circuit that carries intelligence that could become visible.

**video codec** The device that converts an analog video signal into digital code.

**video coder overload** Can occur with rapid scene cuts, only a few frames apart, which stress digital compression systems by presenting them with a video signal that contains little or no temporal redundancy (frame-to-frame correlation).

**video combination IC** A device to convert the color difference signals and the luminance signal into the RGB signals. Usually this integrated circuit (IC) incorporates the saturation, contrast, and brightness control circuits and allows for the insertion of external RGB signals. Used in older TV sets.

**video compositing** A system, similar to chroma keying, in which one or more images is combined with another image to form a final and different picture. For instance, a shot of the Grand Canyon can be used as background. Then a family is recorded against a blue background. When the two shots are integrated, it appears as though the family were at the site.

**video compression** Refers to methods for reducing the size of video files digitally so they can be stored and transmitted using less memory and bandwidth. Video compression methods are advancing at a rapid rate, with new, powerful codecs (compression/decompression techniques) being developed. Codecs work in two ways: using temporal compression,

which compares frames and deletes redundant information; and using spatial compression, which also looks for redundancy but defines those areas using coordinates. See *MPEG*.

**video conference** Also videoconference. To communicate with others using video and audio software and hardware. Audio can be provided through specialized videoconferencing equipment, through the telephone, or through the computer. Videoconferencing has traditionally been done with dedicated video equipment. But, increasingly PCs communicating over switched digital lines are being used for videoconferencing.

**video conferencing** Also videoconferencing. Video and audio communication between two or more people via videocodec at either end and linked by digital circuits. Formerly needing at least T-1 speeds (1.54 megabits/s), systems are now available offering acceptable quality for general use at 128 kbits/s and reasonable 7-kHz audio. Factors influencing the growth of videoconferencing are improved compression technology, reduced cost through VLSI chip technology, lower-cost switched digital networks—particularly T-1, fractional T-1, and ISDN—and the emergence of standards. See *Teleconference*, *Videoconferencing standards*.

**videoconferencing standards** CCITT H.261 was the standards watershed. Announced in 1990, it relates to the decoding process used when decompressing videoconferencing pictures, providing a uniform process for codecs to read the incoming signals. Originally defined by Compression Labs Inc. Other important standards are H.221: communications framing; H.230: control and indication signals and H.242d: call set-up and disconnect. Since replaced by H.263.

**video controller** A professional/industrial device that provides frame-accurate control of most videotape and videodisc units. Similar to an edit controller or editing console, the video controller offers several additional and unique features. A composite video switching function, for example, allows frame-capturing or frame recording to and from the same unit for rotoscoping purposes. In the field, the video controller can pilot two machines.

**video converter** A professional/industrial instrument designed to convert video graphics to various broadcast standards signal specifications, such as NTSC and PAL. Video converters may operate in genlock mode or independently with composite, Betacam, S-VHS and MII formats.

**video copy processor** A unit designed to produce full-color hard copies (print-outs) from video images. These professional/industrial machines incorporate a sublimation-type printing process, can store images and data and produce 640 pixels x 480 lines NTSC resolution. See *Video printer*.

**video crosstalk** See *Crosstalk*.

**VideoCrypt** Encryption system in European and US satellite TV. The VideoCrypt scrambling system used by the DSS system in the US differs from the European implementation: European VideoCrypt is a purely analog system that scrambles only the video. DSS is a completely digital system that encrypts the digitally encoded video and audio. However, there are many similarities between DSS and VideoCrypt, including the use of smart cards.

**video data** Information transmitted electronically and displayed on a TV screen. There are three systems of providing video data. Cable TV offers a one-way passive system in limited areas to paying subscribers only. Computer networks, available to subscribers nationally, offer the most sophisticated video data services. This data can be stored or processed by a machine into hard (printed) copy. This system also permits data input. The third method consists of signals carried by telephone lines or broadcasts available presently only in a few areas. The above three sources of video data vary in programming, from simple news printout, financial information and transportation schedules to ordering merchandise electronically and reserving a seat on a commercial airline.

**video data digital processing** Digital processing of video signals for pictures transmitted over a TV link, to improve picture quality by reducing the effects of noise and distortion. The computer compares each scanned line with adjacent lines and eliminates extreme changes caused by electromagnetic interference.

**video detector** The detector that demodulates video intermediate frequency (IF) signals in a TV set.

**video dial tone** In “telco-speak,” a means by which the phone company, in competition with the cable TV business, can provide video to houses and offices. It does not affect the content of that video signal in any way. This is Nortel’s explanation of video dial tone: “Recent advances in communications and computer technology, such as fiber optic cables, digital switching and hyperspeed computing, make it possible to transmit extraordinary volumes of interactive electronic information in digital form through telephone networks. Consumers may soon be able to access an intriguing array of multimedia electronic entertainment and information services from the comfort of their homes via a gateway service called video dial tone, which is part of what multimedia is all about. Multimedia means interactive full-motion video, sound, text and graphics all available on your TV, computer terminal or advanced intelligent telecomputer. There may soon be a proliferation of so-called “intelligent phones” that will transform the touch-tone telephone into a versatile home computer. By means of simple push-button commands, customers will be able to:

- Select entertainment on demand (movies, music, video).

## video digitizer

- Order groceries or other services or products.
- Record customized news and sports programming.
- Enroll and participate in education programs from the convenience of their living rooms.
- Find up-to-minute medical, legal and encyclopedic information.
- Pay bills and manage finances.
- Make airline, rental car and hotel reservations."

**video digitizer** A professional/industrial instrument designed to display images of 30 frames/s in real time on a computer monitor. Video digitizers can usually accept multiple inputs, such as RGB, Super-VHS and composite video signals from NTSC or PAL, with the capability of displaying them at the same time.

**videodisc** A record that plays sound and pictures through a conventional TV set. Two major types of videodiscs are the LaserVision and the Capacitance Electronic Disc (CED). The grooveless LV disc is decoded by means of a laser; no arm or head makes physical contact with the disc. The now-defunct CED system used a grooved disc that required a stylus to read the information on the surface. The videodisc, popular in the early 1980s, fell into disfavor for most of the remainder of the decade, and made a comeback in the late 1980s. Still favored by some videophiles because of its higher-quality picture.

**videodisc player (VDP)** An electronic unit, resembling a record player, that plays back pictures and sound from a prerecorded disc to a TV set. Although it cannot record, the VDP features some advantages over videotape, such as direct random access, longer-lasting software and better resolution.

**videodisc recorder** A professional/industrial machine that can produce 12" videodiscs. These units record on both sides, provide standard recordings of 54,000 frames/s and offer remote control.

**videodisc speed** The LaserVision has two speeds: CLV (Constant Linear Velocity) discs play for 60 minutes per side while CAV (Constant Angular Velocity) discs play for only 30 minutes. Both CLV and CAV discs are compatible with all LV machines, but the 60-minutes-per-side disc cannot be used with freeze-frame and other special effects.

**video distribution amplifier (VDA)** An amp for strengthening the video signal so that it can be supplied to a number of video monitors at the same time.

**video dubbing** A special feature found on some VCRs which permits the insertion of a scene or title onto an existing scene. Video dubbing with these VCRs provides superimposed effects without picture breakup at the beginning or end of the newly added material. With conventional machines, recording over previous information automatically erases whatever audio and video signals are on the tape. Video dubbing also applies to the technique of replacing a portion of recorded video information while keeping the original sound track.

**video effect titler** A stand-alone unit designed to superimpose computer-generated color images over another video image coming from an external source such as a VCR, video camera or VDP. The video effect titler permits the user to superimpose color titles over a camera image as well as add titles to prerecorded videotape while editing. Most industrial models include genlock (for locking in to other video sources without time base correction), a keyboard, expansion port and computer interfacing. The keyboard may have a color key to change the color of characters, backgrounds of objects; an object key to display, change or delete an object; and a page key to shift to any page in the unit's memory. The video effect titler usually includes several fonts, the capability of storing many pages of titles in memory and special function keys such as color key, object key, page key and clear key. Although a video effect titler is similar in many respects to the more costly character generator, the latter has more sophisticated features, such as direct and sequential page access, edit capability with full cursor control, screen blank function and the ability to generate its own sync without the presence of video. In addition, an industrial-model character generator may also feature preview output, video fade control, key output, loop through and BNC connectors.

**video encryption** A method of encoding video material for security reasons. There are several systems employed for video encryption. Some are designed to prevent access to unauthorized persons; others have the capabilities to destroy video and audio data; still others are accessible through the use of certain decoder devices. Both transmitted signals and videotapes can be encrypted, depending on the system used. Some systems, such as Macrovision, which configures the vertical blanking lines, are chiefly used with consumer videocassettes. Other, more sophisticated systems, are used exclusively in professional situations. Current professional video encryption systems, which because of the high cost can usually be rented, use either analog or digital encryptors.

**video enhancer/stereo audio mixer** An accessory unit that combines the capabilities of an image enhancer with selected audio features. The stereo audio portion of the unit allows the user to add narration and/or background music to a home video tape. These accessories usually offer several stereo audio inputs and separate volume control knobs along with video signal control.

**video equalizer** See *Equalizer*.

**video feedback** A simple special video effect created by aiming a video camera at a TV set used as a monitor during taping. By zooming in on the image, the camera records an infinite number of images of itself videotaping itself. By changing positions, one can create an endless variety of images.

**Video for Windows** Microsoft. System-level

- Windows® software architecture integrating video, sound, and animation, similar to Apple's QuickTime.
- video frequency (VF)** A composite video signal unmodulated by a radio carrier frequency. One of the frequencies that exist in the output of a TV camera when an image is scanned. It can be any value from almost 0 to well over 4 MHz.
- video-frequency amplifier** An amplifier capable of handling the entire range of frequencies that comprise a periodic visual presentation in TV.
- video frequency converter** An electronic accessory designed to convert the color frequency of a composite video signal to a different frequency. For example, in some foreign systems in which a 4.43-MHz frequency is used, the video encryption can change this to be compatible with the NTSC domestic frequency of 3.58 MHz. A professional/industrial component, the converter permits the connection of multi-standard video recorders to NTSC-standard monitors and recorders for both playback and recording.
- video frequency response** See *Frequency response*.
- video gain** See *Gain*.
- video game** An electronic game that can be connected to or built into a TV set, to use the TV screen as a playing field or display showing player and ball movements, scores, or other actions called for by the game, race, or other type of activity which is controlled remotely by one or more players. Microprocessor-based models can also provide sound effects and interchangeable program cards for changing the rules of a game or changing the entire game.
- video game cartridge** Software for a video game system. In general, a cartridge produced for one particular system will not fit another game system.
- video-game epilepsy (VGE)** Youngsters who play video games may suffer generalized convulsions, splitting headaches or other unpleasant symptoms either while playing video games or watching other people play them. The affliction, first diagnosed in 1981, is known as VGE. Studying children who had suffered attacks of VGE, Japanese doctors identified repetitive geometric patterns and flashing white lights as among the visual stimuli that set off seizures. While normal TV broadcasts or flickering TVs have also provoked seizures in certain viewers, the doctors speculated that video games might provoke seizures more easily "because video-games show more geometric figures and usually are played with the child sitting close to the screen."
- video game hardware** The system upon which video games are inserted and played. Hardware may be dedicated game systems (such as those manufactured by Atari, Nintendo and Sega), PCs equipped with CD-ROM players, or combination computer/game arrangements.
- video game recording** The output of a video game placed on tape by way of a VCR. The RF output of

the game may be connected to the VHF input of the recording machine. The VCR is set at an open channel, either 3 or 4, and the Record button is pressed.

- video game software** The games, or game cartridges, disks and videocassettes, that fit the various video game consoles or systems.
- video game system** Also known as game consoles. A popular form of entertainment. The most current video game systems include Microsoft's Xbox, Sony PlayStation, Nintendo 64, and Sega Dreamcast. A video game system is a highly specialized computer, easily connected to a TV and/or stereo system. Most systems allow multiple players. Individual game cartridges can be purchased or rented.
- videographer** A term sometimes applied to one who uses a video camera or camcorder. From video photographer.
- video graphics** See *Graphics*.
- video graphics generator** An electronic accessory designed for commercial displays, closed circuit TV applications and, through the use of color graphics and characters, the creation of pictures on the TV screen. Some graphics generators permit storing up to 15 pictures in its memory, provided the power is not turned off, while other models allow superimposing images on present recordings. Generally, the graphics produced by these generators lack the detail of computer graphics. The units resemble the detachable keyboards of computer terminals. Some low-cost video graphics generators do not reproduce the same quality image on videotape as they do on the TV screen.
- video head** A magnetic unit consisting of a small metal housing, a coil through which a signal is passed, and a narrow gap from which a magnetic force places video information on the videotape as it passes by. The basic VCR has two heads, each of which places down a diagonal field on the tape. Some VHS machines have four heads, two for the fastest speed and two with a special gap for the slowest speed. Still other VHS recorders have four heads, but with different functions. One pair is for recording and playing back while the other two heads are for special effects such as slow motion and freeze frame.
- video head alignment** See *Alignment*.
- video head cleaner** An accessory, such as individual swabs, complete kits and special cleaning cassettes, that dissolves or removes dirt, oxide particles, dust and grease from heads and other critical parts of a VCR.
- video head clogging** A condition caused by an accumulation of oxide particles peeling from the tape, dirt, dust and/or other foreign matter on the heads of a VCR. Clogging results in snow appearing in the TV image and other signs of picture interference.
- video head drum** A cylindrical component that holds

## video head gap

the video heads (it might also house the hi-fi audio heads in a VHS hi-fi VCR). Located inside the VCR, the drum rotates at 1800 rpm and is set at an angle. The diameter of the drum varies according to the format of the machine.

**video head gap** See *Gap*.

**video head separation** The position of the video heads as they appear on the head drum of a VCR. A typical two-head machine has each of the heads mounted 180 degrees apart around the drum. Most VCRs with four heads have each head equally located 90 degrees apart. Some machines with four heads, on the other hand, place two heads adjacent to each other while their two counterparts are on the opposite side of the head drum. This radical arrangement minimizes noise bars, thereby improving such special effects as freeze frame.

**video head-switching noise** See *Head-switching noise*.

**Video High Density** See *VHD videodisc system*.

**Video Home System** See *VHS*.

**video hum** Video disturbances caused by ground voltage differences or electromagnetic pickup.

**video IF** See *VIF*.

**video image compositing** A professional/industrial system that employs screen correction circuitry to produce improved multi-layered compositing in post-production work and composites with imperfect blue screens. In addition, the system allows for realistic composites with natural shadows in a multi-layered image without the usual darkening in the corners.

**video input** A jack or receptacle on a VCR or other component that accepts video signals. It is often used in place of an RF input to give a direct signal, thus a higher definition picture. If a video signal is modulated to RF (as when using a TV receiver), then demodulated to its original form, some loss of definition occurs. The video input is also used for recording from another VCR's video output.

**video insert** A video camera feature that permits recording a new image over the previous one without affecting the audio portion of the tape. On some cameras the insert is performed in the following way: the camera is placed in VCR mode and the tape advanced to the part where the insert is to start. Next, the Pause control is pressed to stop the tape. When the camera trigger is pressed, the new video information is recorded while retaining the original audio material. The video insert feature is especially useful in adding titles to recorded videotape.

**video inserter** A stand-alone accessory designed to superimpose messages and graphics onto video images. Chiefly a professional/industrial device, the video inserter conforms to several standards, including NTSC, PAL and SECAM. Some models have the capability to display information from integral memory or from external sources.

**Video Interface Port (VIP)** VIP has two parts. One

part is a digital video interface (based on BT.656) designed to simplify interfacing video ICs together. The other part is a host processor interface that is similar to a two-bit PCI-type interface. Used to interface two or more digital video clips together.

**video inversion** A type of encoding or scrambling in which the transmitted downlink video signals are inverted. The TV set may or may not sync on it (depending whether the sync pulses are inverted also). Usually nothing is done to the sound, although it may be modulated onto an ultrasonic subcarrier, and the sound carrier may have what is called barker audio on it. This is usually a taped message telling you how to subscribe to the service, or what you are missing.

**video inverter** A device to invert a camcorder video output to view photographic negatives.

**video jockey** A person who presents a continuous program of short video films and similar material on TV.

**video keyer** A professional/industrial post-production unit that can combine several key sources over a single background picture. Other features include individual clip adjustment for each input, advanced edging effects and full linear keying through a wide-range gain control.

**video level** Refers to the degree of brightness or contrast in the screen picture. If the picture is too bright, the detail in white portions of the image is lost; if the picture is too dark, detail in the shadows or dark portions of the image suffers.

**video line in** Video input.

**videolog** A videocassette featuring advertisements for items (e.g., clothes) that can be bought via mail order.

**video mail** Electronic mail that includes moving or still images.

**videomicroscopy** The use of TV cameras to brighten magnified images that are otherwise too dark to be seen with the naked eye.

**video mixer** A mixer that combines the output signals of two or more TV cameras.

**video mixing** Merging two independent video sources (they must be genlocked). See *Alpha Mix*.

**video modulation** Converting a baseband video signal to an RF signal.

**Video Module Interface (VMI)** A digital video interface initiated by SGS-Thomson designed to simplify interfacing video ICs together. It is being replaced by VIP.

**video moire** See *Moire*.

**video monitoring equipment** Monitoring equipment for analog TV includes picture monitors, which also come in various price/performance levels. Broadcast-level video monitors cost several thousand dollars and come as close as possible to being transparent, which means that the picture you see depends on the signal and not the monitor. Broadcast monitors



also include various display modes that allow different aspects of the signal (in addition to the picture component) to be observed. One common feature is the pulse-cross display, which shows the synchronizing signal part of a composite video signal. Broadcast monitors are designed to be capable of being matched, so that a group of monitors shows the same signal the same way. Matching is important when several monitors are to be used to set up signals that may eventually be combined into the same program. In such a case, it is important that the color reproduction of all signals match as closely as possible. Broadcast monitors always have inputs for composite signals. Some monitors also have RGB inputs, but this is unusual, because RGB signals seldom exist today in broadcast studios or postproduction facilities. Professional-level monitoring equipment is designed to a slightly lower price/performance point—pictures are still very good but some features may be sacrificed in the interest of price. Consumer-level monitoring equipment is mostly done with the ubiquitous TV receiver. All TV sets have an antenna input for receiving the composite signal in RF form as it is broadcast on a TV channel. Current TV sets also have video inputs for a baseband composite signal, which may come from a consumer camera, VCR, or home computer. (A baseband composite signal is a video signal that has not been modulated up to a TV channel.) A YPbPr or RGB input is also now included on most TV sets.

**video music** A technique employed to display music graphically on a TV screen. The intensity of music being played on an average stereo system is translated into visible patterns, shapes and colors. The TV image constantly changes as it responds to the music, allowing the viewer to “visualize” the sound.

**video noise** Interference or an unwanted signal in the TV picture, usually in the form of dark or light horizontal lines, bars, etc. Video noise, which causes “snow” in black and white pictures and dark blotches in color picture, is measured in dB. Video noise affects color clarity and image sharpness. The higher the number of the signal/noise ratio, the better the image.

**video on demand (VOD)** Punch some buttons. Order up “Gone With the Wind” to start playing at your house at 9:38 P.M. on Channel 37. You have VOD. In other words, when video can be requested at any time and is available at the discretion of the end-user, it is VOD. VOD requires a very large media storage system (terabytes).

**video-on-sound (VOS)** A VCR editing feature that permits the user to record a video signal over an earlier recorded hi-fi audio track. This provides more versatility in mixing audio and video. Hitherto, picture and sound tracks were recorded simultaneously since they are both written in the same area on the videotape.

**video output** A jack or receptacle on a DVD, VCR or other piece of equipment to transmit the video signal to another unit. For example, when copying a videotape onto another machine, a cable is connected from the video output of the player to the video input of the recording VCR. Video jacks usually accept RCA phono plugs.

**videophone** Video telephone.

**Videophone 2500** In 1992 AT&T introduced a product called Videophone 2500, which transmitted moving (albeit slowly moving) color pictures over normal analog phone lines. Videophone 2500 relies on video compression from Compression Labs, Inc. of San Jose, California.

**video piracy** The illegal duplication and sale of copyrighted material or receiving pay TV programs for free via an illegal decoding device. See *Anti-piracy signal*.

**video player** A player that converts a videodisc, videotape, or other type of recorded TV program into signals suitable for driving a home TV set.

**video printer** A device to convert video images to still prints. Usually uses a thermal ink transfer method. Video printers equipped with field-only memory will capture one of the fields (half the image).

**video processing** Refers to the electronic alteration of a video signal. This may take the form of adjusting the color or brightness of the signal during copying.

**video processor** Processing amplifier.

**Video Program System (VPS)** A device that assures that the TV shows programmed for timer recording will be recorded exactly from beginning to end, even if the actual broadcasting time is different from the scheduled time. The VPS function is operative when the VCR is equipped with the VPS decoder.

**video recorder** A recorder capable of storing the video signals for a TV program and feeding them back later to a TV transmitter or directly to a receiver. Examples include electron-beam video, holographic video, video disc, and VTRs.

**video recording** Recording of information that has a bandwidth in excess of about 500 kHz, such as TV signals.

**video repeater** Amplifier inserted at a point in a video line to compensate for the attenuation in the line.

**video replay** Also known as video tape replay. 1. A procedure in which the audio and video signals of a TV program are recorded on tape and then the tape is run through equipment later to rebroadcast the live scene. 2. A similar procedure in which the scene is rebroadcast almost immediately after it occurs. Also known as instant replay.

**video scanner** A computerized CCD unit designed to copy flat artwork, text, maps, photographs and other pictures. These graphic images can be altered with new colors and superimposed on video recordings.

**video server** A device that can store thousands of

## video signal

movies, ready for watching by subscribers at their individual whim. A video server could be a jukebox-like device that stacks several hundred movies, or it could be a powerful, large computer with several large hard disks and/or optical disk drives. This device is to be used in conjunction with the local telephone companies' service called video dial tone—providing movies over normal phone lines to subscribers—or it can be used with the CATV industry's proposed video on demand service.

**video signal** (US: composite signal) In TV, the signal obtained by combining the picture signal with the synchronizing signal. Some lines may carry closed caption and teletext data. A commercial quality full-color, full-motion TV signal requires 6 MHz.

**video signal-to-noise ratio** The amount of distortion or video noise in a picture, expressed in dB. The higher the dB ratio, the less noise or distortion in the picture. Most home video components tend to fall into the 35 to 45 dB range.

**video single** (VS) A prerecorded videocassette introduced by Sony in Japan in 1982 and in the US in 1983. VSs, contain two to four songs each and have an average viewing time of about 15 or 20 minutes. They are similar to 45 rpm records in concept.

**video stabilizer** See *Image stabilizer*.

**video still camera** An electronic camera designed to use a small electronic memory card instead of photographic film. After recording, the disc is inserted into a viewer that displays still pictures on a TV set. Prints can be made on an accessory printer. This technology is moving more and more into the digital realm.

**video streaming** Refers to techniques for delivering video and audio files over the Internet, cable, or DSL from a server to a client, with the client playing the incoming multimedia stream in real time as the data is received. New compression algorithms are being developed specifically for Internet video, including MPEG-4, wavelet and fractal codecs.

**video switcher** A piece of equipment that allows a choice from many incoming video sources and makes transitions or other special effects between those sources. It is the keystone around which the rest of the TV studio is built. See *Production switcher*, *SEG*, *Switcher*.

**video synthesizer** An electronic console designed to transform video signals from various ordinary sources into a variety of patterns. Developed by video artists Nam June Paik and Shuya Abe, the synthesizer, of which there are several versions, is intended to turn TV viewing from its passive absorption of images into an active medium.

**Video System 2000** Teleconferencing system offering audio and videoconferencing via Europe's ISDN. It comes with a video camera (to mount on top of the monitor), an ISDN plug-in board, a headphone set and software.

**videotape** A heavy-duty magnetic tape designed primarily for recording and playback of the video signals of TV programs. The tape consists of several elements: a backing that resists stretching and decomposition; a coating of microscopic particles that can be easily magnetized, hold their magnetic charge and resist shedding; and a binder that causes the particles to adhere to the base. Early videotape stemmed from the technology of audio tape, with a handful of manufacturers supplying the many tape companies. But the quality improved rapidly, especially with the second generation, HG (High Grade) tapes. Present tapes often consist of several layers, such as the magnetic particles and binder, an adhesive, a film base, carbon for added opacity, another film base followed by another adhesive, and a backcoating for improved reliability.

**videotape cleaner** A device designed to clean and polish a videotape in several minutes. Some videotape cleaners provide additional features such as inspection and rewinding. Other models have a tape information display that gives tape length and the number and position of physical defects.

**videotape coating** See *Coating*.

**videotape evaluator** A table-top device which uses LED readouts to count tape defects. A videocassette is inserted into the evaluator which fast-forwards the tape at 25 times the normal speed. The machine also cleans the tape during the defect-measuring process.

**videotape format** Refers to the size, length and method of enclosure of videotape as well as to the speed at which it moves past video heads. There are formats for both consumer and professional/industrial use. Generally, consumer formats come in cassettes or cartridges and include VHS, Super-VHS, Super-VHS-C, 8mm, Hi8; popular professional tape formats include D-1, D-2, 1" Type B, 1" Type C, 3/4", 1/4" SP, Betacam, Betacam SP, MII, industrial Beta, HDTV. Three major techniques developed for recording sound and picture on magnetic tape: longitudinal (LVR), quadruplex (quad), and helical scan videotape recording. LVR principles are seldom used in video recording today, and the quad method is obsolete. The helical-scan technology has become the predominant method.

**videotape grade** A method a manufacturer uses to mark the quality of videotape. Although some video users believe there are no differences among the many grades of tape, manufacturers assert there are distinctions in their tape formulas and processes and that higher-grade tapes provide better audio and video results. Tests conducted by some leading video magazines tend to show some differences, but the technicians are quick to point out these differences generally are slight. Better-grade tapes usually are accompanied by such relative descriptions as "pro," "super," "high" or "extra" on their boxes. Some

tests often list a high-quality standard tape as superior or equal to some high-grade tapes.

**videotape lengths** Minutes.

Cassette	VHS-SP	VHS-LP	VHS-EP
T-30	30	60	90
T-60	60	120	180
T-90	90	180	270
T-120	120	240	360
T-160	160	320	480

**videotape quality** The ability of videotape to withstand certain pressures, resist others and retain important features. Videotape performance can be measured in three basic areas: video, audio and physical properties. Video characteristics include video signal-to-noise ratio, chroma signal-to-noise, video frequency response, dropouts, FM loss (affecting the number of replays). Audio properties encompass audio signal-to-noise ratio, audio frequency response, etc. The physical aspects of tape that are often judged involve length, width, strength, stretching, evenness of tape edges.

**videotape recorder** See *VTR*.

**videotape replay** A VTR that uses a relatively short endless loop of magnetic tape to permit the repetition of a televised sports scene within seconds after the original action. See also *Video replay*.

**Videotel** Videotex system, Italy.

**video teleconferencing** Also called videoconferencing. The real-time, and usually two-way, transmission of digitized video images between two or more locations. Transmitted images may be freeze-frame (where the TV screen is repainted every few seconds to every 20 s) or full-motion. Bandwidth requirements for two-way videoconferencing range from 6 MHz for analog, full-motion, full-color, commercial grade TV to two 56-Kbps lines for digitally encoded reasonably full-motion, full-color, to 384 Kbps for even better video transmission, to 1544 Mbit/s for very good quality, full-color, full-motion TV. See *Teleconference*.

**video telephone** Also called videophone. A combined telephone and video receiver that allows each party to see the other party while talking.

**video test chart** Refers to a method of testing or measuring one aspect, function or feature of a video component. There are various test charts. For example, a color bar chart can be used for a video camera set-up or for recording a color reference on tape. Containing the primary and secondary colors, it checks the color accuracy of lenses, color separation and other related areas. A resolution chart measures the sharpness of camera images; in addition, it checks other aspects of a video camera, including camera streaking, ringing and aspect ratio. A linearity chart measures a camera's scanning linearity and assists in its adjustment. A registration chart is designed to test cameras for scan height, skew, width,

rotation, linearity and centering of each channel by using a special grid pattern. A gray-scale chart, progressing in steps from black to white, measures differences in phase and gain. A flesh tone reference chart checks for skin and hair color, avoiding the use of a live subject during camera setups. A multi-burst chart is used in testing and adjusting camera system response. There are also multi-chart systems for professional use. One two-chart system, e.g., contains a registration and color balance chart designed to check alignment, registration and color balance.

**videotex** A system of storing a large tree-structured database, consisting of pages of text and graphics data, with user-friendly commands, and accessing pages from low-cost terminals, often videotex adaptors, using a standard domestic TV set for the display screen. Data is communicated over standard telephone lines. A number of countries have established public videotex services, such as Ceefax in the UK, and private videotex systems have become of major importance to a wide range of commercial and industrial organizations. Videotex is the internationally accepted term for the system, originally called viewdata in the UK. While popular in Europe, videotex never became popular in the U.S., although it could be said that early computer information services such as Prodigy and CompuServe were a type of videotex service.

**videotex adaptor** A device incorporating a modem and videotex decoder which when attached to a standard domestic TV set and to the public telephone network allows a user to access a videotex system.

**videotex charges** Charges for the videotex system; they include the telephone line and a cost per page based on the value of the information. Charges are higher for specialized data; there is no charge for menus, classified advertisements, and some of the infopages.

**videotex decoder** A circuit that permits the TV set to be connected to the telephone network for communication with a database. It can be built into existing TV sets or into adapters for attachment to existing units. A decoder is composed of five devices:

1. A line isolator. Its function is to protect the telephone lines from high voltages present in the TV.
2. A modem to convert the analog telephone signals into digital and the digital into analog.
3. A memory to store data for display.
4. A display generator able to transform characters stored in the memory to dot patterns.
5. An input processor, whose function is to control and synchronize component operations, process incoming signals, and store the signals in memory.

**videotex default** The default format: 24 rows of 40 columns with automatic wraparound on rows and columns.

**videotex editing terminal** A terminal that allows the user to create videotex pages and update a videotex database.

## videotex features

**videotex features** The ability to restrict access via security keys to parts of the database and only from authorized terminals; automatic billing of the charges to the user; credits to the information providers concerned; the possibility of making purchases via the system; and message handling facility.

**videotex page** A single frame (screenful) of information, containing 24 lines each of 40 characters of the standard videotex character set. Normally only the middle 20 lines are free for information. The first and last line are reserved for the videotex system, and it is well to leave a buffer line on each side.

**videotex standard** The standard adopted within a country or by a system supplier for the transmission of data within a videotex system. There are three main types of videotex standard: alphamosaic, alphageometric and alphaphotographic.

**Videotext** 1. Videotex system, Spain and Switzerland. 2. Sometimes used to embrace both teletext and videotex.

**video-to-film** A process in which theatrical productions are first produced on videotape and then transferred to film. Using the latest video technology including HDTV and electronic beam scanning, film studios can lower production and post-production costs.

**video track** One "strip" of information laid down during recording onto a tape as the video head scans across the tape.

**video transmitter** See *Visual transmitter*.

**video trigger** A circuitry in many scopes that extracts the horizontal and vertical sync signals from the input video to trigger the scope. The simplest form of video triggering lets the user trigger on all horizontal sync pulses (all lines) or all vertical sync pulses (all fields). More advanced triggering systems let the user pick the individual line and field to trigger on, allowing any particular portion of the video waveform to be easily displayed. Also called TV trigger.

**videotron** (US) Monoscope.

**video up** A directive to brighten the TV picture, sometimes used in editing videotape.

**videowall** An assembly of closely placed video screens working in unison and designed to display various special visual effects such as single, "split" images across all monitors or multiple images. Presenting larger-than-life images in stores, shopping malls, exhibitions and other shows with large attendances, videowall presentations are instant attention-getters. Layouts are described by the number of monitors; e.g., five screens across and three screens high (15 monitors) is commonly known as a 5x3 videowall.

**videowall controller** (VC) A sophisticated electronic instrument or unit designed to program and manipulate the images of a group of closely placed TV screens usually on display at trade shows, special events and other places with large audiences. VCs usually provide such special features as inter-

active program selection and simultaneous control of several players.

**video wallpaper** A TV background or visual effects that are dull.

**video waveform** 1. The display of a video signal on an oscilloscope. The signal is dissected into its various components, which can be examined for integrity. 2. The portion of the TV signal waveform that corresponds to visual information. Sync pulses are not included.

**Videoway** A Canadian interactive CATV system. Using an interactive device located on the top of the TV set, a viewer at home can select optional visual images.

**video windowing display controller** A professional/industrial editing controller that integrates real-time video with computer-generated text and graphics on a monitor. NTSC and PAL real-time video appears on screen as a window which can be positioned, scaled, clipped and superimposed with computer graphics. The resulting images can then be digitally stored for future reference. Video windowing controllers, which accommodate several signals connected at the same time, can usually receive inputs from a video camera, recorder, live TV or interactive videodisc.

**vidicon** A photoconductive tube whose charge-density pattern is formed by photoconduction and stored on a photoconductor surface (a target area coated with antimony trisulfide) that is scanned by an electron beam, usually of low-velocity electrons. Its chief applications are in industrial and other closed-circuit TV cameras.

**vidiot** A video idiot, a zealous amateur.

**vidiplex** A simple "multiplexing" method, where two different TV program signals are transmitted sequentially in the odd and even fields of the TV frame. Equally suitable for transmission of NTSC, PAL or SECAM signals.

**Viditel** Videotex system, Holland.

**vidkid** American. A child who is a compulsive watcher of TV or video.

**Vieth-Muller horopter** In 3D TV systems (with laser projectors) based on a spatial depth signal, the shape of the horopter circle is the same as for human vision since both systems rely on sensing the relative angles of incoming light rays at the two sensor (or eye) positions. (The horopter circle is the set of points on the retina perceived to have no retinal disparity for a given fixation point.) For the 3D TV systems the assumption is made that at great distances from the sensors (in relation to the distance the sensors are apart), the horopter circle between adjacent viewed points is a straight line if there is no change in distance from the sensors.

**ViewCam** Camcorder configuration, Sharp. The first model employs the Hi8 format, but others are expected in standard 8-mm size. In place of a tiny

viewfinder, ViewCam has a 4" color LCD mounted beside the camera portion of the camcorder that is able to swivel 180 degrees vertically. The user can hold the instrument at waist level and look down into the viewer, or shoot over the heads of the crowd by looking up into the viewer. The viewing screen can be twisted so that the operator can get into the picture while viewing the LCD; the supplier remote control cable operates the camera.

**ViewCam TelePort video modem** Device that enabled sending one detailed still-frame from a home video recording every 20 s over ordinary phone lines; Sharp.

**viewdata** Syn.: videotex. An information retrieval system that uses a remote database accessible through the public telephone network. Video display of the data is on a monitor or TV receiver. Another name for videotex, the original UK name for it, still used widely in the UK.

**viewed picture format** Combination of screen aspect ratio and picture aspect ratio.

**viewfinder** That part of the video camera that displays, by various methods, the scene that will eventually be recorded. There are three types of viewfinders. The optical, easiest to use and the least costly, is also the most limited since it cannot accommodate different focal-length lenses or zoom lenses and doesn't "see" exactly what the lens sees. The TTL (through-the-lens) optical finder has advantages over the optical type and costs more. It sees exactly what the lens sees, and when the zoom lens changes its angle of view, so does the finder. But the TTL finder does not have the special features of the third kind, the electronic viewfinder, which can be made mobile and can be used as a playback monitor.

**viewfinder diopter adjustment** A video camera feature that allows the near- or farsighted user to adjust the finder so that he or she can record without the need to wear glasses.

**viewfinder inversion switch** A control on some video cameras to permit the user to change the position of the viewfinder so that it can be used by either the right or left eye. This arrangement also allows for special up-side-down effects.

**viewing distance** Since the eye's ability to resolve detail is limited, the more detailed HDTV image should be viewed more closely than is customary in the conventional systems in order to realize the benefits of the higher-definition image. Full visual resolution of the detail of conventional TV is available when it is viewed at a distance equal to about six times the height of the display. The HDTV image should be viewed from a distance of about three times the picture height for the full detail to be resolved. If viewed at six times the height of the picture, the extra cost of the HDTV set is wasted so far as pictorial detail is concerned. It follows that the

HDTV image must be larger than the conventional one. When viewed at six feet, the HDTV image must be not less than two feet high, and its diagonal is then not less than four feet. Displays capable of presenting such large images represent a major fraction of the HDTV set cost.

**viewing ratio (VR)** The ratio of viewing distance to picture height. With 440 active scanning lines (as in 525-line broadcast systems) and a visual acuity 1.7', individual scanning lines can be distinguished at a VR as great as 4.4. At a VR of 4, the minimum usually assumed for broadcast systems, individual scanning lines can be faintly distinguished by a typical viewer. A VR of 3 or less is usually assumed in designing HDTV, while a range of VRs from 4 to 8 is assumed for broadcast TV.

**VIF** Video intermediate frequency (IF). VIF and SIF refer to circuits between the front-end tuner and video processing circuits. The circuits are generally known as the VIF and SIF stages, and usually include both video and sound detectors (although there are many different configurations in present-day integrated circuit sets). The basic function of the IF and video/sound-detector circuits is to amplify both picture and sound processing circuits, and to trap (or reject) signals from adjacent channels. In some Hitachi literature, the video IF is called the picture IF, or PIF.

**VIP** Video Interface Port.

**VIR** See *Vertical Interval Reference*.

**virtual editing** A technique used by an editor to record only decisions concerning editing, not audio or video. This editing system, used chiefly with industrial equipment, usually requires several decks and an editing machine. Selected scenes are recorded on different machines, each scene with extended footage at the beginning and end. These scenes are then shuttled to and from each machine. If a scene needs to be lengthened, the information is available. Finally, all the scenes are then assembled in their proper sequence and length on one machine for the finished edited version. For an early version of virtual editing, see *Position identification*.

**virtual reality (VR)** Now a common high-tech buzzword, which refers to the combined computer and video technologies that place the observer in computer-generated situations for obtaining new and exciting visual experiences vicariously, training in the operation of moving vehicles, gaining insights into architectural structures, and playing games.

**Virtual Reality Modeling Language** See *VRML*.

**virtual vision** A production device that allows the cameraperson to see behind, above, or to the left or right without turning the head. A pair of goggles attached to a camera includes a tiny color TV with a small mirror in front of it. The picture is projected from the mirror onto a visor. The user can view the picture, or if the visor is clear, can see the live action on the set.

## Virtual Vision Sport

**Virtual Vision Sport** One of the first head-wearable, entertainment video display system introduced in 1993 by Virtual Vision, Inc. It was based on the “heads-up” displays used in aircraft, and uses a single LCD and lens-mirror to display a picture that appears to be as large as 60 inches, 8 to 15 feet in front of the viewer. The picture was off to one side, so the user could perform other tasks while watching it. Has evolved into other wearable display systems.

**VIS** See *Vertical interval signaling*.

**visible light** Electromagnetic radiation visible to the human eye at wavelengths of 400-700 nm.

**vision carrier** In TV transmission, the carrier wave that is modulated by the video signal.

**vision frequency** In TV transmission, the frequency of the vision carrier.

**vision pickup** Camera tube.

**Visortron** A video picture system developed by Sony, using two small LCDs that are viewed through built-in lens systems. Introduced in 1993.

**VISS** VHS index search system. See *Index search*.

**Vista** 1. A videotex project in Canada in the early 1980s.  
2. Visual System Transmission Algorithm. Also NYIT/Glenn VISTA. A wide-channel HDTV system devised at the New York Institute of Technology by Dr. W. E. Glenn. Employs a standard NTSC 6-MHz channel and a 6-MHz augmentation channel. A variation employs one of two 3-MHz augmentation channels, in a 6-MHz channel shared by two stations.

**visual acuity** The smallest angular separation at which individual lines can be distinguished. Visual acuity varies widely, as much as from 0.5' to 5' (minutes of arc), depending on the contrast ratio and the keenness of the individual's vision. An acuity of 1.7' is often assumed in the design of TV systems.

**visual angle** The pitch between pixels divided by the viewing distance and converted into minutes of arc.

**visual carrier frequency** The frequency of the TV carrier that is modulated by picture information.

**visual display unit (VDU)** Another term for a computer monitor. VDU is preferred in Europe.

**visualization** A combination of computerized graphics and imaging technology that provides high-resolution, video-like results on the workstation or personal computer's screen.

**visually compressed digital** A special kind of signal in TV cameras to eliminate unnecessary data that the eye cannot see. Developed at Florida Atlantic University.

**visual polarity** Refers to amplitude-modulated (AM) visual carriers. Positive polarity indicates that an increase in light intensity causes an increase in radiated power. Negative polarity (as used in the US—Standard M) means that a decrease in light intensity causes an increase in radiated power.

**visual scan** A feature on a VCR that permits the rapid viewing of a tape. By first pressing the Play mode

and then FF (or REW), the viewer can visually scan the material, skip undesirable portions or locate particular segments. When the fast scan mode is operating, the picture is “noisier” than usual and the sound track is muted. Introduced by Sony, it is also known as fast scan, fast search, high-speed picture search or rapid picture search, depending on the brand and model.

**visual signal** The picture portion of a TV signal.

**Visual Solutions** A family of AT&T products that handle videoconferencing, first announced on March 23, 1993.

**visual transmitter** The radio equipment that transmits the video part of a TV program. Also known as picture transmitter; video transmitter. The visual and audio transmitters together are called a TV transmitter.

**visual transmitter power** The peak power output when transmitting a standard TV signal.

**VITC** SMPTE/ANSI time code. See *Vertical Interval Time Code*.

**VITS** Vertical interface test signal to check the quality of the transmitted TV picture. Two common VITs are known as NTSC-7 signals, identified by the industry committee report that standardized them in 1975. These test waveforms are transmitted along with the video during the vertical blanking period. The video quality of a TV set can be determined by examining the video waveform on a waveform monitor.

**vizmo** A rear-projection device used to insert a background into a TV broadcast.

**VJ** Video jockey. See *Veejay*.

**VLC** Variable length coding.

**VM** Very mature; see *Movie rating systems*.

**VMI** Video module interface.

**VO** Voice-over.

**VOB files** The default format of DVD movies. They usually contain multiplexed Dolby Digital audio and MPEG-2 video. VOB Files are named as follows: vts\_XX\_Y.vob where XX represents the title and Y the part of the title. There can be 99 titles and 10 parts, although vts\_XX\_0.vob never contains video, usually just menu or navigational information.

**VOD** See *Video on demand*.

**voice-activated universal remote** A device that recognizes voice commands to operate a TV or VCR. Can be taught to recognize the voices of a few different users.

**voice activated video** A microphone/camera that is activated in response to voice.

**voice generator** A VCR feature that uses a microchip to produce a synthetic voice that takes the viewer through each step of the programming process. Once the user has finished entering the necessary data, the ersatz voice reviews the information before it is saved. This voice-coaching method of programming the VCR was designed to help users who



are often baffled by the complexities of setting up their machines for recording future off-the-air shows. The feature is also known as voice-prompt remote control programming.

**Voice Interactive Programming VCR** Matsushita. A VCR that could be programmed by voice command.

**voice/music switch** See *Music/voice switch*.

**voice-over (VO)** Spoken narrative added to a picture either during recording or after the video camera has completed shooting. Some cameras have a rear microphone attached for adding voice-over while shooting.

**voice-prompt remote control programming** See *Voice generator*.

**voice recognition** The ability of a machine to recognize your particular voice. This contrasts with speech recognition, which is the ability of a machine to understand human speech.

**voice switching** Equipment used in voice and video conferences that is activated by sounds of sufficient amplitude—hopefully speech, but also loud noises. Fast switching activates microphones so that only one conference participant can speak at a time. See also *Voice activated video*.

**voice synthesis module** A video game accessory that adds speech to particular game cartridges.

**voltage-controlled crystal oscillator (VCXO)** A crystal oscillator circuit whose oscillator output frequency can be varied or swept over a range of frequencies by varying a DC modulating voltage. A VCXO is just like a voltage-controlled oscillator except that a VCXO uses a crystal to set the free-running frequency. This means that a VCXO is more stable than a VCO but it's also more expensive to implement.

**voltage-controlled oscillator (VCO)** An oscillator whose frequency of oscillation can be varied by changing an applied voltage. Used in down-converters and satellite receivers to select from among transponders.

**voltage selector** Syn.: clipper. See  *Limiter*.

**voltage spike protector** An accessory plug that absorbs voltage fluctuations usually attributed to power line surges while permitting normal current flow. The spike protector, used to protect home computers and stereos as well as video equipment, plugs directly into the wall socket.

**voltage standing wave ratio** See *VSWR*.

**voltage-synthesized tuner** A tuning system, installed on some VCRs, that requires manual tuning of those channels that are not part of the conventional VHS broadcasting band. These include many cable and UHF channels. These tuners, as opposed to frequency-synthesized tuners, provide a restricted number of presets that can be kept in memory. However, some VCRs offer as many as 100 presets that can be selected. See *Frequency-synthesis tuner; Tuner*.

**VOS** Video-on-sound.

**VPN 56** Sprint's Switched 56-Kbps service, that sup-

ports advanced voice, data and image network communication tools including Group IV Fax, high resolution image transfer, file transfer, videoconferencing and switched data service via access to SprintNet, a large public data network.

**Vpp** Peak-to-peak voltage.

**VPS** Video program system.

**VPS decoder** See *Video program system*.

**VR** Virtual reality.

**VRML** Virtual reality modeling language, an ISO standard for 3D multimedia and shared "virtual worlds" on the Internet.

**VSAT** Very small aperture terminal. A relatively small satellite antenna, typically 1.5 to 3.0 m in diameter, used for transmitting and receiving one channel of data communications. VSATs can often be seen on top of retail stores, which use them for transmitting the day's receipts and receiving instructions for sales, etc.

**VSB** Vestigial sideband.

**VSM** See *Velocity scan modulation*.

**VSWR** Voltage standing-wave ratio. The ratio of the amplitude of the electric field or voltage at a voltage minimum to that at an adjacent maximum in a stationary-wave system, as in a waveguide, coaxial cable, or other transmission line.

**VSYNC** See *Vertical sync*.

**VT** Videotape.

**V-timing** Relative (in discrete lines) of two sets of vertical sync pulses held in synchronism. An error in V-timing results in vertical shifts of the TV picture. Syn.: vertical timing.

**VTR** Videotape recorder. An open reel video recorder using a supply reel and a take-up reel. VTRs are mostly used industrially and professionally. Some of these machines use direct-drive capstan servo motors that permit a VTR to be synchronized electronically with any other format for editing purposes. In addition, these motors permit remote control, required when connecting the deck to an editor. VTRs may have other features, such as variable voltage power, not found on home VCRs. The introduction of digital technology to VTRs has enhanced videotape recording possibilities in both audio and video areas. Because the quality of digital recording remains constant, the process solves such problems as dropouts and moire, which have plagued conventional analog recording. In addition, digital tape life is much greater than analog.

**VTR lockup** See *Lockup*.

**VTR type B format** A professional/industrial reel-to-reel 1" videotape system still popular in Europe but superseded in the US, especially with TV networks, by the C format. Relegated primarily to production use, the B format still boasts of many loyal users who emphasize its special virtues. They find it useful in post-production work and, because it was the first format to feature long play, they prefer it for producing film-to-tape transfer masters. Also, the

## VTR type C format

format is more economical, consuming over 200 feet of tape less per hour than its counterpart. Perhaps most important, its users consider it more reliable in the field. But the B format faces a few shortcomings and some major problems. It uses what is called a segmented head system, necessitating the addition of an expensive digital storage unit for certain functions such as freeze frame. The C units, on the other hand, use a less costly time base corrector to obtain these same effects. The B machines lack the ability to produce variable fast speed functions, which the C units perform with relative ease. Finally, many large studios and networks have adopted the C format as their standard.

**VTR type C format** A professional/industrial reel-to-reel 1" videotape system used widely in the US, particularly by TV networks, local stations and studios. The type C, which has become the industry standard,

has largely replaced the B format. Although the two formats are similar in terms of the spec sheets, the C units can produce variable fast speed functions for broadcasting and less costly functions such as freeze frame. In addition, a larger number of commercials and programs are produced in this format, more companies offer a wider range of C models and the units are less expensive than their B counterparts. See *VTR type B format*.

**VU meter** A device which registers audio loudness or softness. Some VU (volume unit) meters have gauges divided into segments that represent dB levels while others are divided simply into a safe zone and a red distortion zone.

**VX format** A now-defunct VCR system introduced by Quasar. The VCR was not compatible with any other format.

**VXO** Voltage-controlled crystal oscillator.

# W

**W** 1. White. 2. Watt. 3. Wide. 4. Width. 5. CATV superband channel, 294-300 MHz. 6. The first letter in the call letters of almost all US radio and TV stations east of the Mississippi.

**wallpaper video** In TV, slang for generic visuals, graphics, or other stills or tape that can be used as introductions or backgrounds, or that can be inserted in a window on the screen. They are commonly used in newscasts.

**wall-ready display** A flat TV screen that can be mounted on a wall. See *Plasmavision TV*. See also *Flat television receiver*.

**WAN** Wide area network. A network that uses common carrier-provided lines that cover an extended geographical area. Contrast with local area network (LAN). The WAN uses links provided by local telephone companies and usually connects dispersed sites.

**WARC** World Administrative Radio Conference. Sets international frequencies.

**warm color** A color with a yellowish or reddish cast, akin to that of the sun, as opposed to cold color.

**warning light** See *Camera cue*.

**warp** A digital video effect involving any two- or three-dimensional change in shape (deliberate geometric distortion) of a picture.

**wash** Variant of background with a gradual change from one color to another across the picture. Syn.: graduated matte.

**WAV** Windows-compatible audio file format. A WAV file can be recorded at 11 kHz, 22 kHz, or 44 kHz, and in 8- or 16-bit mono and stereo.

**waveform** A graphic picturization of an electronic signal. All signals such as video, blanking and sync have a distinct waveform that can be displayed on either an oscilloscope or waveform monitor. Some video cameras display a waveform in the electronic viewfinder as part of the information needed for proper adjustment. Waveforms are most often alluded to in repair manuals as a point of reference. Each waveform should be adjusted to match its drawing in the manual.

**waveform color/picture monitor** A professional/industrial instrument designed chiefly to be used in the field. The unit provides such features as on/off

switchable IRE filter, on/off gain boost, sweep and the ability to accurately master pedestal adjustments.

**waveform digitizer** An electronic component designed to connect to an oscilloscope, converting the scope to a digital storage unit. Using its own memory to produce waveform storage without a storage CRT, the digitizer generates its own CRT readouts for video sweep rates, deflection factors, etc.

**waveform generator** A professional device designed to be used with a standard oscilloscope. The waveform generator converts composite color video signals to standard waveform monitor signals. Typical generators show luminance, chrominance, direct picture information and other related data.

**waveform monitor** Cathode ray oscilloscope specifically designed for displaying TV signals. The X or horizontal axis represents time, and the Y or vertical axis represents the amplitude of the signal.

**waveform sampler** An electronic unit that permits the measurement of the composite video signal so that video equipment can be adjusted for optimum signal quality. In addition, the sampler checks such video functions as amplitude and pedestal level.

**wavelets technology** Asymmetrical video compression algorithms providing the transmission of video over existing copper-based networks without an ISDN link. The technology compresses video so that it can be transmitted over 28.8-Kb/s modems. It allows a compression ratio of as much as 120:1 while still producing images that convey facial expressions and sharp facial features. In addition, the algorithms lend themselves to scaling more effectively than the DCT algorithms currently used. As communications bandwidth is constrained, the wavelets algorithms reduce picture quality, whereas DCT algorithms drop entire frames and transmit a jerky picture. This feature is especially useful in LANs, where bandwidth changes dynamically as usage varies. The technology solves the problems of today's video teleconferencing solutions and MPEG-4 still image compression is based on wavelets.

**wave resonance** A technique employed chiefly in some compact TV receivers to enhance the bass sound. This is accomplished by separating the bass from the treble and mid-range tones and reproduc-

## Weber's law

ing and improving it so that it sounds more realistic. TV receivers with wave resonance try to emulate large, full sound within the limited, available space of their cabinets.

**Weber's law** The visibility of an object in an image depends on the brightness contrast between different areas. As in the case with most physical sensations, the magnitude of this perception tends to be proportional to the brightness ratio rather than to the absolute brightness difference. This is expressed in Weber's law: The increase in stimulus necessary to produce an increase in sensation of any of our senses is not an absolute quantity but depends on the proportion that the increase bears to the immediately preceding stimulus. The perception of contrast between two areas also depends on the sharpness of the boundary. If the boundary is sharp, a much smaller brightness difference can be perceived.

**WebTV®** Microsoft trademark for set-top boxes used for interactive and regular TV. Lets users access the Internet via connections to a standard TV and a phone line. Supports WebPIP, which lets users simultaneously view web pages and TV programming on the same screen. The WebTV service is now called the MSN® TV service.

**wedge** A convergent pattern of equally spaced black and white stripes (usually from three to seven, on a gray background), that vary in repetition pitch so as to give the appearance of a wedge. Used in a TV test pattern to indicate resolution. Syn.: wedge mire.

**wedge mire** See *Wedge*.

**weighting noise, audio component** Human hearing is not equally sensitive to all frequencies. This is especially true for low-level sounds, such as those in the background noise of audio systems. Our ears are much more sensitive to midfrequencies than to ultra-low and ultra-high tones. It follows, then, that noise delivered by a component only at the frequency extremes would be less bothersome than an equal amount of noise at midfrequencies delivered by another component. Because of this, a system of measurement known as weighting has been developed, that attempts to measure signal/noise ratios in terms of their subjective effect upon the listener. This system employs a specific filter so that low and high frequency noise makes less of a contribution to the final signal/noise readings than midfrequency noise. If you see a specification preceded by the notation "A-weighted," this method of measurement was used.

**wh** White.

**whip** Syn.: zip pan. See also *Swish pan*.

**white** The mixture of red, green and blue in color TV.

**white balance** Refers to the amount of color that can be seen on a neutral object when the white balance controls on a video camera are adjusted for optimum. White balance is measured in IRE: the lower

the IRE number, the better the color purity. A perfect white balance would measure zero IRE. Adjustments for white balance are necessary when using a color video camera so that all color and light values register as true as possible. Some cameras have automatic controls and meters. Others have flashing warning lights and a hue control dial that is rotated until the appropriate white balance has been reached.

**white balance control** A feature on a video camera to help set or define colors by matching the white balance of the camera exactly to prevailing light conditions. There are different kinds of controls for this purpose. Red/blue controls are convenient but ineffective with green. Independent red and blue controls can affect green by being turned all the way up (reducing green) or down (increasing green). Some cameras provide two tint dials: one for red and blue and one to balance green and magenta. These controls are operated either automatically, by meters, by indicator lights, by click-stop positions, etc. There are various ways to control white balance. One approach is to factory-preset the red-green-blue signals to tungsten light and place color conversion filters behind the camera lens. A switch then determines indoor/outdoor position (one filter) or, in some cases, indoor/hazy/sunny (two filters). Another technique for white balance control is to factory-preset average lighting condition such as tungsten, hazy light and bright sunlight. The proper level is then set electrically by a switch. For more flexibility, a red/blue knob is added to change the relative balance of red and blue in the picture. The knob controls red at one end of its turn and blue at the other. The effects can be witnessed on a color monitor or on cameras with a meter. Expensive cameras feature Automatic white balance, while others provide three controls: a switch to choose a filter or an electronic setting; then auto white balance is set; finally, the manual red/blue knob is used to check or override the white balance.

**white balance hold** A video camera feature that, when engaged, "sees" a white object and locks the unit into this position to maintain proper color as long as lighting conditions remain the same.

**whiteboard** An electronic device on which text can be written and one or more copies printed using optical sensors. The material can be transmitted over telephone lines and viewed on a TV set, so that a whiteboard can be part of a teleconference.

**white clip** After emphasis, the positive-going spikes (overshoot) of the video signal might be too large for safe FM modulation. A white-clip circuit is used to cut these spikes off, at an adjustable level. See *Dark clip*.

**white clip level extension** Part of the high-quality (HQ) circuitry of particular VCRs. The white clip level phase of the circuit is designed to provide sharper

- edges and a more distinct contrast between light and dark portions of the picture.
- white compression** (or white crushing) In TV, reduction of the gain at signal levels corresponding to white compared with the gain at black and mid-grey levels. The effect of white compression is to reduce the visibility of detail in highlight areas of the reproduced image. Also called white saturation.
- white crushing** A form of peak distortion in the TV image resulting from amplitude nonlinearity, affecting the higher amplitude portions of the video signal. Since the signals corresponding to white are at the peak of the waveform, they are often the first part to be distorted. They usually distort to a greater degree than signals corresponding to other tonal values, with the possible exception of signals at or near black. The nonlinearity causes the video signal to be compressed, so that the tonal values no longer have the same range. The resulting compression on the TV screen is a loss of detail in the whites of the picture. If the amplitude distortion is severe, the white compression becomes white clipping, showing as a complete loss of tonal detail in the white parts of the picture.
- white field brightness** The upper limit of the TV transfer function (S-shaped curve). It is usually established by the limitations of the display device, ordinarily a kinescope.
- white flag** See *Multiburst waveform — NTSC VITS*.
- white level** (US: reference white level) TV signal level representing full peak excursion above or below the sync level, according to whether modulation is positive or negative. It represents a peak-white object. This level defines what white is for the particular video system. In black and white TV, the maximum permitted level of the picture signal (or, in color TV, of the luminance component).
- white level set** White set. A camera control that establishes the luminance level for a color camera.
- white light** Light that is comparable in wavelength content to average noon sunlight.
- white object** An object that reflects all wavelengths of light with substantially equal high efficiencies and considerable diffusion.
- white peak** (US) A peak excursion of the picture signal in the white direction. Syn.: peak white, picture white.
- white peak carrier** Part of a carrier wavelength that holds the luminance signal. When the white peak carrier is increased, the amount of space available for recording video detail on tape is expanded. This contributes to the number of horizontal lines of resolution, which, in some cases, may be raised to 400 lines or more.
- white peaking circuit** Advanced circuitry used on some TV monitor/receivers designed to produce a purer white on screen. This is accomplished by reducing the red beam of the electron gun and amplifying the blue beam.
- whiter-than-white** An excursion of the TV waveform signal above the normal peak (white) level.
- white saturation** White compression.
- white set** See *White level set*.
- white uniformity** On inferior TV sets, white objects on the screen may not always appear as white as they should. White objects farthest from the screen's center may display as gray. A 100 IRE white field is used to measure how consistently whites are reproduced on the set without any gray areas or areas of color contamination.
- whiz** Syn.: zip pan.
- wholesale politics** Chiefly American. Electoral campaigning via the media, especially TV, rather than by the politician's traditional methods of addressing meeting, canvassing, etc.
- Wide Area Network (WAN)** A data network typically extending a LAN outside the building, over telephone common carrier lines to link to other LANs in remote buildings in possibly remote cities. A WAN typically uses common-carrier lines. A LAN doesn't. WANs typically run over leased phone lines—from one analog phone line to T1 (1.544 Mbps). The jump between a LAN and a WAN is made through a device called a bridge or a router.
- wide-angle lens** An optical lens with a very short focal length; a lens that has a large angular field (angle of view), generally greater than 80 degrees.
- wideband** Broadband. Refers to a channel wider in bandwidth than a voice-grade channel. Denoting an electronic device or circuit, such as an amp, that operates satisfactorily over a large range of input signal frequencies.
- wideband axis** The direction of the phasor that represents the fine chrominance primary (the I signal) in NTSC color TV; it has a bandwidth from 0 to 1.5 MHz.
- wideband switch** Switch capable of handling channels wider in bandwidth than voice-grade lines. Radio and TV switches are examples of wideband switches.
- wideband video amplifier** An electronic circuit, often found in TV monitor/receivers, designed to capture and reproduce the entire range of an incoming video signal. The wideband video amplifier boosts the video signal by raising its frequency response, which affects the horizontal resolution. TV monitor/receivers equipped with this active circuitry often attain 800 lines or more of horizontal resolution.
- wide open** Descriptive of a lens set at its lowest *f*-stop rating so that the iris is opened as wide as possible.
- widescreen** Viewed picture format with aspect ratio higher than in conventional TV and full screen occupation—e.g., 16:9. This is the aspect ratio used by HDTV.
- wide screen signaling (WSS)** 1. Method of transmission of information about aspect ratio and some other parameters towards the TV receiver by data

## width

inserted in the vertical blanking interval. 2. Data embedded in the video signal containing information on the image aspect ratio and its position, on helper signal presence, on the position of the subtitles and on the camera/film mode selection. In 625-lines systems—e.g., in the PALplus system—WSS data are transmitted during first half of TV line 23. WSS may be used on (B, D, G, H, I) PAL line 23 and (M) NTSC lines 20 and 283 to specify the aspect ratio of the program and other information. 16:9 TVs may use this information to allow displaying of the program in the correct aspect ratio. ITU-R BT.1119, ETSI EN300294 and IEC 61880 specify the WSS signal for PAL and NTSC systems. EIAJ CPX-1204 also specifies another WSS signal for NTSC systems.

**width** 1. The horizontal dimension of a TV picture. 2. The time duration of a pulse.

**width control** 1. In TV receivers, the control that determines the amplitude of horizontal deflection and hence the width of the displayed picture. The control is often a variable inductor connected in series with the line deflection coils. 2. In stereo sound reproduction, a control that determines the apparent width of the sound source. It is often a variable resistor bridging the two channels and, in the zero-resistance position, parallels them so that the sound appears to originate from a point source located midway between the two loudspeakers.

**wild footage** Audio tape recorded out of sync with any particular video picture for use in post-production as an audio track; video tape recorded without audio for use as visual material in post-production to which narration will be added.

**wind** The manner in which magnetic tape is wound onto a reel. In an A wind, the coated surface faces the hub. In a B wind, the coated surface faces away from the hub.

**wind noise switch** A camcorder feature that helps to minimize some types of unwanted extraneous audio interference that may reach the built-in microphone.

**window** 1. Test pattern in a form of a white box on a black or gray background. A change of window size provides an easy way to control the average picture level. 2. A mode of test pattern generation where the main test signal is gated by a window signal to provide a gray or black background at the main test perimeter. 3. In 3D-TV systems, the position of a reference frontal plane. See also *Depth matrix*.

**window dub** A copy of a videotape that contains a box in the lower third of the tape that displays the time code on the tape. Window dubs are generally only used when logging tape and during the off-line edit.

**windowing** The videotape slippage that sometimes results from a loosely wound spool; also called *clinking*.

**window mode [of HDTV down conversion]** Mode of HDTV down conversion where the output TV pic-

ture is produced from part of an HDTV source picture with on-line control of its size and position. Syn.: zoom mode.

**window of correction** The maximum amount of time base error a time base corrector (TBC) can correct, measured in video lines. A TBC with a four-line window might be fine for VTRs and tapes that never leave the climate-controlled confines of a studio, but it would be almost useless with tape that is shot in the field. A TBC with a 32-line window costs a good deal more money, but it should be able to handle anything shot in the studio or the field.

**Windows CE** Microsoft Windows CE is a 32-bit real-time embedded operating system (RTOS) designed from the ground up to empower the development of a new range of emerging computing appliances, including set-top boxes, digital versatile disc (DVD) drives, entertainment consoles, smart phones, highly portable and personal computing devices like handheld computers, and home appliances. Windows CE is modular, allowing use of a minimum set of software components needed to support receiver requirements. This uses less memory and improves operating system performance. Windows CE provides a subset of the Win32 application program interface (API) set, which provides an effective amount of application source-code level portability and compatibility and user interface consistency with other Microsoft Windows operating systems and Windows applications.

**Windows Media Player** Leading digital media platform for PCs that delivers the most popular streaming and local audio and video formats, including ASF, WAV, AVI, MPEG, QuickTime, and more. Windows Media Player can play anything from low-bandwidth audio to full-screen video.

**wind screen** Similar to a pop filter; a heavy foam rubber cover for a microphone, used outdoors to diminish wind noise, etc.

**wipe** A special effect in which one image replaces another by means of a predetermined pattern. In video, hundreds of different wipes can be produced by using a professional device called a mix/effects switcher. Two of the more popular wipes are the rotary wipe and matrix wipe.

**wire broadcasting** The distribution of sound and/or TV programs to a number of receivers over a wired distribution system using audio frequencies or modulated carrier frequencies.

**wired city** A city or area with a high level of fiber optic networks and Internet services; popular slang in U.S. for a city that is attuned to the latest in telecommunications and information technology.

**wireless cable** A TV service in which a TV signal is received from a satellite and retransmitted to a viewer's rooftop antenna on a superhigh-frequency microwave channel. See Multichannel Multipoint Distribution Service (MMDS).



**Wireless Cable Association (WCA)** An organization of cable operators who use microwave transmitters, as opposed to coaxial cable, to broadcast cable programming to subscribers. Wireless cable service requires a microwave antenna and an addressable receiver/descrambler. See *Multipoint distribution service*.

**wireless camcorder microphone** A short-range, low-power FM transmitter. Consists of three main sections: the microphone element, the audio amp, and the RF oscillator. The best receiver for the wireless camcorder microphone is a good-quality (sensitive) Walkman-type FM receiver because it is portable and lightweight. The only requirement for the receiver is that it must have a headphone jack.

**wireless infrared** See *Remote control*.

**wireless remote control** See *Remote control*.

**wireless video sender** A device (transmitter and receiver) to extend cable, TV and VCR signals throughout a house.

**Wollaston prism** In a laser-type videodisc player, an optical component through which the laser passes before reaching the disc surface. It then returns in polarized form.

**word graphics** The titles, credits, announcements or other word messages that appear superimposed on the TV screen. Word graphics may crawl vertically up or down on the screen or move horizontally across the bottom, announcing news flashes, election returns and so on without interrupting program content. Word graphics are usually white or light-colored against a dark background, often created by means of a technique called "keying."

**word register** See *Digital image superimposer*.

**World Administrative Radio Conference (WARC)** The ITU meetings that work out standards for international radio communications (including satellite TV).

**World Standard Teletext (WST)** A British-developed teletext system. Based on the successful experiences with both the Oracle and Ceefax one-way teletext operations in the UK, WST has been aggressively promoted as the standard for all teletext systems. See also *Electra*.

**World System Teletext** See *WST*.

**World Wide Web** Another name for the Internet, used loosely. Actually refers to the entire constellation of resources that can be accessed via Gopher, FTP, HTTP, telnet, USENET, and other tools, plus the universe of

hypertext servers (HTTP servers) that allows graphics, text, sound files, video files, etc., to be mixed together.

**WORM** Write once, read many times. Refers to the type of storage devices that can be written to only once, but read many times. In other words, once the data is written, it cannot be erased. Being optical, WORMs provide very high recording densities and are removable, making them useful for archiving.

**wow** Refers to tape speed variations that result in the distortion of the audio signal.

**Wraase** A family of amateur SSTV transmission modes first introduced with Wraase SC-1 scan converter developed by Volker Wraase, DL2RZ, of Wraase Electronic, Germany.

**wraparound controls** In videotex, a set of rules that govern what happens when the active position attempts to move off the defined display area.

**wrap-around theater sound** Surround sound.

**writing speed** The effective speed at which videotape moves past the recording heads in relation to the tape travel speed. On VHS and VCRs, the video heads rotate at 1800 rpm while the linear tape speed is (3.34 cm or 1.32" per second in SP. Therefore, the effective writing speed equals 230 ips for VHS. See also *Transverse recording*.

**WSS** Wide screen signaling.

**WST** World Standard Teletext; World System Teletext. Based on the British teletext standard in which a one-to-one correspondence exists between transmitted characters, page memory, word addresses and the display screen character locations. Over 98% of the world's TT decoders are WST compatible.

**WTBS** A superstation transmitted by satellite, offering baseball, basketball, professional wrestling, movies, TV reruns and some original shows. WTBS, owned by Ted Turner, was the first superstation in the US. It began operations in 1976 and offers programming 24 hours a day.

**W-VHS** Compatible analog HDTV recording system, JVC. The system is available in Japan for recording and playback of standard, widescreen, and HDTV signals.

**www** See *World Wide Web*.

**WYSIWYG** Stands for "what you see is what you get" but screens don't always work that way in reality. Refers to the accuracy of a screen display in showing how the final result will look—for example, how a brochure will appear in its final printed form.

# X

**X** 1. Frequency band 8-12 GHz. 2. No one under 17 admitted; see *Movie rating systems*.

**X-1** The original Beta tape speed, providing 60 minutes of recording and playing time on an L-500 videocassette. Today, Beta I is reserved for professional and industrial machines.

**XGA** Extended Graphics Array. Computer graphics display standard introduced by IBM in 1990. XGA-2 offers 800 x 600 pixel resolution in true color (16 million colors) and 1024 x 768 resolution in 65,536 colors.

**x-ray television** A closed-circuit television system replaces photographic film during X-ray inspection of

welded joints and other industrial X-ray applications. The technique gives instant images, without the time and cost of developing film. It can show enlargements of as much as 50x, for detecting small defects. For permanent records, a VTR can be added, or the images on the TV screen can be photographed selectively. The TV monitor can be located remotely from the inspection area, so personnel are protected from harmful x-ray radiation.

**XSVCD** Abbreviation for eXtended Super VideoCD. See *Super VideoCD*.

**XVCD** Abbreviation for eXtended VideoCD. See *VideoCD*.

# Y

**Y** 1. Yellow. 2. In NTSC, PAL, SECAM and component video, the luminance signal, so named because it is the Y-axis of the chart of the spectral sensitivity of the human visual system. 3. In HDMAC,  $Y_L$  and  $Y_H$  are the low- and high-frequency components of the luminance signal.

**Y adapter** A connecting audio cable that is used to join two lines into a single input or output. The Y adapter can be applied to many tasks, such as copying a stereo tape onto a mono VCR. Using the stereo recorder as the playback machine, the owner connects the Y adapter from the two audio channel outputs of the stereo to the single audio input of the mono VCR. It comes with various plugs or jacks. Also known as Y connector or Y splitter.

**Yagi aerial** A sharply directional aerial array from which most aerials used for TV have been developed. The active part of the aerial consists of one or two dipole aerials together with a parallel reflector and a set of parallel directors. The directors are relatively closely spaced, being from 0.15 to 0.25 of a wavelength apart. When the aerial is used for transmission, the directors absorb energy from the back lobe of the dipole radiation pattern and re-reflect it in the forward direction; the major lobe is thus reinforced at the expense of the back lobe. When used for reception the inverse process occurs, causing the signal to be focused on the dipole.

**yaw** A term borrowed from aeronautics to describe the effective static rotation of the aircraft about an imaginary vertical pin. Thus, the aircraft can be moving forward but not necessarily facing forward, offset by the yaw angle. In digital video effects, this term can be used to describe the positioning of the effect (rotation about the Y axis).

**Y/C** Y equals the luminance portion and C equals the chrominance portions of the video signal. A Y/C piece of equipment or system will keep the components separate as much as possible. See *S-video*.

**Y'CbCr, YCbCr** Y'CbCr is the color space defined by BT.601 and BT.709. Y' is the luma component and the Cb and Cr components are color difference signals. The technically correct notation is Y'Cb'Cr' since all three components are derived from R'G'B'. Many

people use the YcbCr notation rather than Y'CbCr or Y'Cb'Cr'.

**Y/C connection** Popular two-signal interface format, where Y is a luminance component and C is a chrominance component at NTSC or PAL color sub-carrier frequency. Because the C signal is transmitted separately there are no cross-effects, so the decoded picture looks almost as good as the original. The Y/C interface is used in DVD players, S-VHS and 8-mm VCRs, set-top boxes, televisions, plus related equipment. Syn.: S-Video; Y/C interface.

**Y/C connector** A multipin input that helps to eliminate several types of video interference by processing the brightness (Y) and (C) portions of the signal separately. Previously, the luminance and chrominance signals were mixed and had to be separated by the TV set. By avoiding this intermediate step, the Y/C connector eliminates such interference problems as crosstalk. Y/C connectors, usually installed on more recent TV monitor/receivers and other similar equipment, accept connections from DVD players, Super-VHS and Beta VCRs, set-top boxes, and some models of laserdisc players. These inputs are sometimes known as S-video inputs or S-connectors.

**YC-2 board** Y (luminance) signal and C (chroma) signal record/playback circuits, Betamax VCR.

**Y/C interface** See *Y/C connection*.

**Y/C separator** A Y/C separator is what is used in a NTSC/PAL decoder to separate the luma and chroma. This is the first thing that any video decoder must do. The composite video signal is fed to a Y/C separator so that the chroma can then be decoded further.

**Y/C video** See *S-video*.

**yellow** The color obtained by mixing equal intensities of green and red light.

**yield strength** Refers to the degree of force necessary to produce a 5% elongation in a videotape. If a tape is stretched beyond this point, it may affect the overall quality so that the tape is unwatchable.

**Y'IQ, YIQ** 1. The components of the NTSC system: luminance and chroma. 2. Also Y'IQ. A color space optionally used in the NTSC video system. The Y' component is the black-and-white portion of the image. The I and Q parts are the color difference compo-

## Y matrix

nents; these are effectively nothing more than color placed over the black and white, or luma, component. Many people use the YIQ notation rather than Y'IQ or Y'I'Q'. The technically correct notation is Y'I'Q' since all three components are derived from R'G'B'.

**Y matrix** A circuit to construct luminance signal according to the equation  $Y = 0.299R' + 0.587G' + 0.114B'$  (SDTV) or  $Y = 0.213R' + 0.715G' + 0.072B'$  (HDTV).

**yoke** Deflection yoke. See also *Flyback transformer*.

**Y'PbPr, YPbPr** Y'PbPr is a scaled version of the YUV color space, with specific levels and timing signals, designed to interface equipment together. Consumer video standards are defined by EIA-770; the professional video standards are defined by numerous SMPTE standards. VBI data formats for EIA-770 are defined by EIA-805. Many people use the YPbPr notation rather than Y'PbPr or Y'Pb'Pr'. The technically correct notation is Y'Pb'Pr' since all three components are derived from R'G'B'.

**Y signal** Luminance signal.

**Y'UV, YUV** 1. The components of the PAL system: lu-

minance and chroma. 2. Also Y'UV. The color space used by the NTSC and PAL video systems. As with the Y'IQ color space, the Y' is the luma component while the U and V are the color difference components. Many people use the Y'UV notation when they actually mean Y'CbCr data. Most use the YUV notation rather than Y'UV or Y'U'V'. The technically correct notation is Y'U'V' since all three components are derived from R'G'B'.

**YUV9** Intel's compressed YUV (actually YCbCr) format, providing a compression ratio of up to 3:1. The picture is divided into blocks, with each block comprising 4 x 4 pixels. For each block, 16 values of Y, one value of U (Cb), and one value of V (Cr) are assigned. The result is an average of nine bits per pixel.

**YUV12** Intel's notation for 4:2:0 YCbCr stored in memory in a planar format. The picture is divided into blocks, with each block comprising 2 x 2 pixels. For each block, four values of Y, one value of Cb, and one value of Cr are assigned. The result is an average of 12 bits per pixel.

**YUY2** Intel's notation for 4:2:2 YCbCr format.

**zap** The use of a remote-control device to change TV channels or turn off the sound during commercial messages; the use of a device to blip out commercials, as with a pause button in videotaping; also called zapping. The A.C. Nielsen company defines the term as the practice of eliminating commercials on a videocassette during playback, but most industry practitioners use zipping to describe that process.

**zapping** See *Zap*.

**Z-axis modulation** Intensity modulation.

**Z.B.** An instruction to a camera operator to zoom back.

**zelda** A mannequin, generally just the head and shoulders, used to focus film or TV cameras.

**zeroing** Zeroing is what's done to the bank of comparators in a CMOS flash A-to-D converter to keep them accurate. Without zeroing, the comparators build up enough error so that the output of the flash ADC would no longer be correct. To solve the problem, the comparators are "zeroed," or the accumulated error removed.

**Z demodulator** Same as the X demodulator, except it is for the blue (B-Y) signal.

**zebra tube** A color display tube, so called from the vertical red, green and blue-emitting stripes that make up the phosphor screen, that closely resembles the apple tube. It is one of the index types and, like the apple tube, makes use of index strips over the phosphors. These index strips, instead of giving out secondary electrons, emit ultraviolet (UV) light that is amplified in a photomultiplier. By ingenious circuitry, the need for a separate pilot electron beam is eliminated.

**Zenith Spectrum-Compatible HDTV system** Also SC-HDTV system, Spectrum-Compatible HDTV system. A single-channel noncompatible simulcast HDTV system specifically designed to coexist with NTSC in the existing TV bands of terrestrial broadcasting. Sharing of the existing TV bands requires the use of the so-called "Taboo" channels. The camera of the SC-HDTV system progressively scans 787.5 lines, at 59.94 frames/s for a horizontal deflection frequency of 47.203 kHz, exactly three times the NTSC rate. The R, G, B bandwidths extend over 37. The aspect ratio is 16:9. The number of active lines per frame is 720 and there are 1280 active pixels

per line. The video encoder applies adaptive + transform/sub-band coding. Potentially, a full picture's content is retained but in flat areas with little detail and little variation in the image, little information is transmitted. This makes time available for the transmission of more information needed for areas of greater detail. Adaptation and control information are transmitted separately during the vertical blank interval as part of the digital data signal.

**zero frame dissolve** A dissolve with a duration of zero frames, equivalent to a cut; a technique used to synchronize two source machines so that manual audio or video transitions can be made between them.

**zero-subcarrier chromaticity** The chromaticity that is intended to be displayed when the subcarrier amplitude is zero in a color TV system.

**zip pan** A rapid movement of the TV or film camera; also called blur, whip, or whiz. See also *Swish pan*.

**zipper** 1. On a TV or broadcast, an inconsequential, humorous, or even zany final item; also called kicker. 2. See *Creepy-crawlies*.

**zipping** TV-commercial avoidance during playback accomplished by fast-forwarding through taped commercials.

**zonal mixing** Keying mode when a key signal of the mixer (e.g., a diamond-shaped wipe pattern) comes from a source other than the video that will eventually fill the hole. The key source, in this case, may be either internal or external. Syn.: in-lay.

**zone satellite** See *Satellite focus*.

**zoom** To increase or reduce the size of a TV image, usually in a gradual way. Zooming can be accomplished by means of electronics or optics. See *Digital zoom*.

**zoomed video port** Used on laptops, the ZV Port is a point-to-point uni-directional bus between the PC Card host adapter and the graphics controller, enabling video data to be transferred real-time directly from the PC Card into the graphics frame buffer.

The PC Card host adapter has a special multimedia mode configuration. If a non-ZV PC Card is plugged into the slot, the host adapter is not switched into the multimedia mode, and the PC Card behaves as expected. Once a ZV card has been

## zoom in

plugged in and the host adapter has been switched to the multimedia mode, the pin assignments change.

**zoom in** Expansion of the picture details within the zoomed picture area. Syn.: expand.

**zoom lens** Special lens that has a continuously variable focal length (and thus magnification) over a certain range without moving the camera. Most video cameras come equipped with a standard 6:1 zoom lens (relationship of the longest focal length to its shortest) while some consumer models offer an 8x, 10x or even 12x variable power zoom lens. The zoom may go from wide angle through normal viewing to close-up or vice versa. This feature is usually adjusted by a zoom ring, a zoom ring lever or a power zoom that works electronically. The focal lengths for video lenses are different from those used in still photography. For example, a 12-75mm range in video would be equivalent to a 45-350mm lens on a 35mm camera.

**zoom light** An accessory normally used indoors with a video camera. Some zoom lights can be connected to wall outlets while other models, if used in the field, can be plugged into the cigarette-lighter socket of an automobile.

**zoom mode** Mode of HDTV down-conversion in which the output picture is produced from part of an HDTV source picture with on-line control of its size and position. Syn.: window mode [of HDTV down-conversion].

**zoom out** A zoom effect with objects being decreased in size. Syn.: compression; reduction.

**zoom ratio** The telescoping range of a lens. A mathematical expression of the two extremes of focal length available on a particular zoom lens. The ratio

depends on how close or large the subject appears in the finder compared to its original distance or size. The typical zoom ratio is 6:1 although some cameras feature an 8:1 ratio. Extender lenses are available; these extensions increase the zoom ratio. For example, a particular extender lens may increase an 8:1 ratio to a 12:1 telephoto zoom.

**zoom ring** A control encircling the zoom lens. Its back-and-forth movement permits the mechanical adjustment of the focal length. When the zoom ring is rotated, the focus is changed. Other zoom controls are the zoom ring lever and the power zoom.

**zoom ring lever** A control on the zoom lens with an extended handle to help facilitate changing the focal length. An intermediate control, it is easier to operate than the basic zoom ring, but not as sophisticated as the power zoom.

**zoom** To increase or reduce the size of a TV image, usually in a gradual way.

**ZV port** See *Zoomed video port*.

**zweiton** A technique of implementing stereo or dual-mono audio for NTSC and PAL video. One FM subcarrier transmits a L+R signal, and a second FM subcarrier transmits a R signal (for stereo) or a second L+R signal. It is discussed in ITU-T BS.707, and is similar to the BTSC technique.

**Z-wheel** In the digital video effects sense, it describes a single coordinate control used for changing effects parameters in the Z-axis (perpendicular to the screen plane). Syn.: spinwheel.

**Zworykin, Vladimir** (1889–1982) Russian inventor of the iconoscope, a television transmitting tube, and the kintoscope, a CRT that projects pictures it receives onto a screen.



# APPENDIX A

## ASSOCIATIONS

**Advanced Television Enhancement Forum (ATVEF)**

<http://www.atvef.com/>

**Advanced Television Forum (ATVF)**

<http://www.atvf.org/>

**Canadian Association of Broadcasters**

<http://www.cab-acr.ca/>

**CEA** Consumer Electronics Association (formerly CEMA)

<http://www.ce.org/>

**Digital Display Working Group**

<http://www.ddwg.org/>

**Digital Television Group**

<http://www.dtg.org.uk/>

**DTVIA** Digital Television Industrial Alliance of China Enterprise Confederation

<http://www.dtvia.com/>

**DVB-MHP** DVB-MHP (Multimedia Home Platform)

<http://www.mhp.org/>

**DVDA** DVD Association

<http://www.dvda.org/>

**ETG** Entertainment Technology Group

<http://www.etg.tv/>

**ICDIA** International CD-i Association

<http://www.icdia.org/>

**IEEE 1394** Trade Organization

<http://www.1394ta.org/>

**IMTC** International Multimedia Telecommunications Consortium

<http://www.imtc.org/>

**Korea Multimedia Association**

<http://www.multimedia.or.kr/>

**Linux4.tv**

<http://www.linux4.tv/>

**LinuxTV.org**

<http://www.linuxtv.org/>

**Media Communications Association**

<http://www.mca-i.org/>

**MHP Forum** Multimedia Home Platform Forum

<http://www.mhp-forum.de/>

**MIDI Manufacturers Association**

<http://www.midi.org/>

**MPEG 4 Industry Forum**

<http://www.m4if.org/>

**Multimedia Benchmark Committee**

<http://www.spec.org/gpc/>

**Multimedia CD Consortium**

Marantz Japan, Inc.  
35-1, 7-Chome, Sagamiono  
Sagamihara-shi, Kangawa  
Japan, 228  
(81) 427-44-0431  
FAX: (81) 427-48-1007

**National Association of Broadcasters**

<http://www.nab.org/>

**RTSP.org** Real Time Streaming Protocol information and updates

<http://www.rtsp.org/>

**Satellite Broadcasting and Communications Association of America (SBCA)**

<http://www.sbca.com/>



# APPENDIX B

## STANDARDS ORGANIZATIONS

**AES** Audio Engineering Society

<http://www.aes.org/>

**ATSC** Advanced Television Systems Committee

<http://www.atsc.org/>

**DAVIC** Digital Audio Visual Council

<http://www.davic.org/>

**DVB** Digital Video Broadcast

<http://www.dvb.org/>

**DVD Forum**

<http://www.dvdforum.org/>

**EBU** European Broadcasting Union

<http://www.ebu.ch/>

**EIA** Electronic Industries Association

<http://www.eia.org/>

**ETSI** European Telecommunications Standards Institute

<http://www.etsi.org/>

**IEC** International Electrotechnical Commission

<http://www.iec.ch/>

**IEEE** Institute of Electrical and Electronics Engineers

<http://www.ieee.org/>

**ISO** International Organization for Standardization

<http://www.iso.ch/>

**ISMA** Internet Streaming Media Alliance

<http://www.isma.tv/>

**ITU** International Telecommunication Union

<http://www.itu.ch/>

**MPEG** Moving Picture Experts Group

<http://mpeg.telecomitalia.com/>

**OpenCable**

<http://www.opencable.com/>

**SCTE** Society of Cable Telecommunications Engineers

<http://www.scte.org/>

**SMPTE** Society of Motion Picture and Television Engineers

<http://www.smpte.org/>

**TV Anytime**

<http://www.tv-anytime.org/>

**TV Linux Alliance**

<http://www.tvlinuxalliance.org/>

**VESA** Video Electronics Standards Association

<http://www.vesa.org/>