

GLOSSARY

A

AAC (Advanced Audio Coding): An increasingly used audio codec for downloaded music files (such as from Apple's iTunes Music Store), streaming-media, and satellite-radio applications.

access point: A transceiver that allows wireless devices to connect to a wired local-area network, or LAN.

accessory shoe: A connector on the top of a camcorder that can hold a floodlamp, an external microphone, or other accessories.

acoustical treatment: Measures to absorb or diffuse sonic reflections from room surfaces that can cause uneven bass response or muddy the sonic image.

acoustic-suspension: A speaker enclosure design that uses the air trapped inside a sealed cabinet to provide a portion of a driver's restoring force; see *infinite-baffle*.

active crossover: An electronic component that divides the audio signal from a source component into frequency bands (low and high, for example) before each band is separately amplified.

active scan lines: Scan lines in a video frame that carry picture information rather than being used for other data (such as closed captioning) or for synchronization.

adjacent-channel selectivity: A measure of how well an FM tuner rejects signals from stations one channel up or down (0.2 MHz away) from the tuned frequency; higher figures are better.

AES/EBU interface: The professional standard for transmitting digital audio signals between components, jointly specified by the Audio Engineering Society (AES) and the European Broadcasting Union (EBU).

alternate-channel selectivity: A measure of how well an FM tuner rejects signals from stations two channels (0.4 MHz) away from the tuned frequency; higher figures are better.

ambience: The acoustical character of a listening or performing space, determined mainly by the timing, level, frequency balance, and directions of the sound reflections in it. Some digital signal processors can synthesize ambience by generating artificial reflections.

AM rejection: A measure of a tuner's ability to ignore changes in an FM signal's amplitude caused by multipath and other types of interference; higher figures are better.

ampere (A, amp): The primary unit of electrical current, which is the rate of flow of electrical charges.

amplifier: A separate component, or a section built into an integrated component, that strengthens the electrical signal (increases its amplitude). A power amplifier, which is designed to drive speakers, must be connected to a preamplifier (or "control amplifier") to switch and process the sound.

amplitude modulation (AM): A technique in which the level (amplitude) of a high-frequency carrier signal is varied according to the level of a much lower-frequency signal so that the envelope of the carrier follows the waveform of the modulating signal, as when audio or video is impressed onto a radio-frequency (RF) carrier.

analog: A type of component or recording medium that operates with continuously varying waveforms directly analogous to the signals they represent; see *digital*.

analog-to-digital (A/D) converter (or ADC): An electronic circuit that converts an analog electrical signal into a sequence of binary numbers.

anamorphic: A means of recording a widescreen image using special lenses or processing such that the image is distorted in the medium but restored to proper proportions during playback.

aperture: In a video camera, an adjustable opening in the optical pathway that controls both the amount of light reaching the image sensor and the image's depth of field.

aperture grille: In a color picture tube, a type of shadow mask consisting of a metal sheet with thin vertical openings (instead of round holes) that are aligned with the red, green, and blue electron guns.

artifact: An audio or video distortion introduced during digital encoding or decoding; in video, *blocking* and *mosquito noise* are the most common artifacts.

aspect ratio: The ratio of width to height of a screen or image; expressed in whole numbers (4:3, 16:9) or divided out (1.33, 1.78).

assemble edit: An editing process by which a program segment is added to the end of an already existing segment; see *insert edit*.

ATRAC (Adaptive TRansform Acoustic Coding): The codec used in the MiniDisc (MD) format as well

ABBREVIATIONS

480i: 480 scan lines, interlaced
480p: 480 scan lines, progressive
720p: 720 scan lines, progressive
1080i: 1,080 scan lines, interlaced

A, amp: ampere
AAC: Advanced Audio Coding
A/D: analog-to-digital
A/V: audio/video
AC: alternating current
ADC: analog-to-digital converter
AE: auto exposure
AES: Audio Engineering Society
AFC: automatic frequency control
AGC: automatic gain control
AM: amplitude modulation
amp: amplifier or ampere
ANSI: American National Standards Institute
ATRAC: Adaptive Transform Acoustic Coding
ATSC: Advanced Television Systems Committee
aux: auxiliary
A/V: audio/video
AWG: American Wire Gauge

BD: Blu-Ray Disc
B-frame: bidirectional frame
BJT: bipolar junction transistor
B - Y: blue minus luminance
BPF: bandpass filter
bps: bits per second

CATV: community-access (cable) TV
CCD: charge-coupled device
CCTV: closed-circuit TV

CD-R: recordable CD (unerasable)
CD-ROM: computer data CD
CD-RW: rewritable CD
CEA: Consumer Electronics Association
CG: character generator or computer graphics
CIE: Commission International de l'Éclairage (International Commission on Illumination)
CRT: cathode-ray tube

D/A: digital-to-analog
DAB: digital audio broadcasting
DAC: digital-to-analog converter
DAT: digital audio tape
dB: decibel
dBA: decibel, A-weighted
dBf: decibel re 1 femtowatt
dBFS: decibel re digital full-scale
DBS: direct broadcast satellite
dBW: decibel re 1 watt
DC: direct current
DCDi: Directional Correlation Deinterlacing
DCT: discrete cosine transform
DD: Dolby Digital
DHCP: Dynamic Host Configuration Protocol
D-ILA: Direct-drive Image Light Amplifier
DIN: Deutsche Industrie Normen (German Industry Standards)
DLP: Digital Light Processing
DMD: Digital Micro-mirror Device
DPL: Dolby Pro Logic
DPL II, IIX: Dolby Pro Logic II, IIX
DSD: Direct Stream Digital

DSP: digital signal processing
DTCP: Digital Transmission Content Protection
DTS: Digital Theater Systems
DTS-ES: DTS Extended Surround
DTV: digital television
DV: digital video
DVD: not officially an abbreviation; often interpreted as "digital videodisc" or "digital versatile disc"
DVD-R, DVD+R: types of write-once (unerasable) recordable DVD
DVD-RAM, DVD+RW, DVD-RW: types of rewritable (erasable) DVD
DVI: Digital Visual Interface

EBU: European Broadcasting Union
EDTV: enhanced-definition TV
EIAJ: Electronic Industries Association of Japan
EMI: electromagnetic interference
EPG: electronic program guide
EQ: equalizer, equalization

F: farad, Fahrenheit
f: femto (one quadrillionth)
f/: f-stop
FET: field-effect transistor
FFT: fast Fourier transform
FM: frequency modulation
fps: frames per second
ftL: footlambert

G: giga (one billion, or 1,073,741,824)
GHz: gigahertz (1,000,000,000 Hz)
GUI: graphical user interface

HD: high-definition

HDCCD: High Definition Compatible Digital
HDCCP: High-bandwidth Digital Content Protection
HD-DVD: high-definition DVD
HDMI: High Definition Multimedia Interface
HDR: hard-disk recorder
HDTV: high-definition TV
Hz: hertz, or cycles per second

I/O: input/output
IC: integrated circuit
IEC: International Electrotechnical Commission
IEEE: Institute of Electrical & Electronic Engineers
IEEE 1394: FireWire or i.Link interface
IEEE 958: SPDIF interface
IF: intermediate frequency
I-frame: interpolated frame
IHF: Institute of High Fidelity
IM: intermodulation (distortion)
IP: Internet protocol
IR: infrared
IRE: Institute of Radio Engineers
ISO: International Standards Organization

JFET: junction field-effect transistor
JPEG: Joint Photographic Experts Group

K: kelvins
k: kilo (one thousand, or 1,024)
kbps: kilobits per second
kHz: kilohertz

LAN: local-area network

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as in Sony's SDDS theater sound system. MD equipment that supports the long-play MDLP option also uses the newer ATRAC3 codec, as do Sony's NetMD devices, and it is incorporated in RealAudio 8 streaming media when that codec is operated at certain bit rates.

ATSC (Advanced Television Systems Committee): The industry/government body that issued the U.S. digital TV standard.

attenuate: To reduce or lower a signal's strength.

Audible: An Internet spoken-word format for computers and portable players that also play MP3 files.

audio/video (A/V): Any system or component that involves both audio and video elements, like a receiver or a preamplifier that switches video signals and processes multichannel audio signals (including surround sound decoding) for a home theater system.

autofocus: A camcorder subsystem that focuses the image without user intervention by moving the focusing elements of the lens.

aux (auxiliary): An input on a receiver, integrated amplifier, or preamplifier that can be used to connect line-level source components; also, any general-purpose A/V input.

A-weighted: A standard equalization curve applied in sound-level meters and signal-to-noise ratio (S/N) measurements to make the readings conform more closely with perceived loudness, particularly at low levels, since human hearing is not equally sensitive at all levels and frequencies.

B

backlight compensation: A video-camera function designed to reduce the shadowed effect of the main subject when the subject is brightly lit from behind.

backlighting: A technique of illuminating the buttons and keys on a remote control so they can be identified even in a dark room.

back surround speaker: One or a pair of surround-channel speakers that are placed directly behind the listening position in a 6.1-channel system.

balance: A control that changes the relative volume level in two or more channels.

balanced line: An interference-rejecting connection technique in which the audio signal is carried on two out-of-phase conductors.

band: A particular continuous segment of a frequency spectrum. For example, a graphic equalizer may divide the audio spectrum (20 Hz to 20 kHz) into ten bands.

bandpass enclosure: A dual-chamber enclosure for a woofer that creates sharp acoustical rolloffs above and below its operating range, minimizing or eliminating the need for a crossover.

bandpass filter: A circuit that removes audio signals above and below a certain frequency range.

bandwidth: The range of frequencies a component can reproduce.

bass: The lowest part of the audio spectrum, from 20 Hz to 150 or 200 Hz; see *treble* and *midrange*.

bass-reflex: A type of speaker enclosure in which the sound emitted from the back of the woofer's diaphragm is used to augment low-frequency output by being fed through a port or a passive radiator; same as a "vented" enclosure.

Bessel filter: A type of filter with excellent phase characteristics but a very shallow rolloff slope.

biamping or biamplification: The use of separate power amplifiers to feed the woofer and midrange/tweeter in a speaker; see *biwiring*.

binary: The base-2 number system, whose numerals are 1 and 0, that forms the basis of all digital computation and electronics. The binary system is electronically useful since its two numerals can be easily represented by two simple electronic states.

binaural: An audio recording, recording system, or playback system (such as headphones) that carries signals picked up by two microphones placed in the "ears" of an acoustically accurate mannequin; theoretically, the only "perfect" record/playback scheme.

bipole: A type of speaker that radiates sound equally and in phase in two directions.

bit: The basic unit of information in digital audio or video, corresponding to on or off, 1 or 0; a contraction of "binary digit."

bit rate: The rate of transmission of digital data of any type, measured in bits per second (see *data rate*). A

ABBREVIATIONS

LCD: liquid-crystal display
LCoS: liquid crystal on silicon
LED: light-emitting diode
LFE: low-frequency effects
LNB: low-noise block downconverter
L/R: left/right
LSB: least-significant bit
LSI: large-scale integrated circuit
LT/RT: left-total/right-total

M: mega (one million, or 1,048,576)
m: meter or milli (one thousandth)
mA: milliampere
mAh: milliampere hours
MB: megabyte
Mbps: megabits per second
MD: MiniDisc
MDF: medium-density fiberboard
MDLP: MiniDisc Long Play mode
mH: millihenry
MHz: megahertz
mic: microphone
μ: micro (one millionth)
μs or μsec: microsecond
μV: microvolt
MIDI: Musical Instrument Digital Interface
MIPS: million instructions per second
mm: millimeter
MMC: MultiMediaCard
mosfet: metal-oxide-semiconductor field-effect transistor
MP3: MPEG-1 Layer 3 audio encoding
MPEG: Moving Picture Experts Group
MPX: multiplex
ms: millisecond
MSB: most-significant bit

MTS: multichannel television sound
mV: millivolt
mW: milliwatt

n: nano (one billionth)
NAB: National Association of Broadcasters
ND: neutral density
Ni-Cd: nickel-cadmium
Ni-MH: nickel metal-hydride
NR: noise reduction
NTSC: National Television System Committee

OFC: oxygen-free copper
OFHC: oxygen-free high-conductivity copper
Ω: ohm
OLED: organic light-emitting diode

p: pico (one trillionth)
PAL: phase-alternation line
PCM: pulse-code modulation
PC-OCC: pure copper, continuous casting
PDM: pulse-density modulation
pF: picofarad
P-frame: predicted frame
PIP: picture-in-picture
PLL: phase-locked loop
PLUGE: picture line-up generation equipment
PPV: pay-per-view
PVC: polyvinyl chloride
PWM: pulse-width modulation

RAM: random-access memory
RC: resistor-capacitor

RDS: Radio Data System
re: referred to, in reference to
R - Y: red minus luminance
RF: radio frequency
RFI: radio-frequency interference
RGB: red, green, and blue
RGB+H/V: red, green, and blue plus horizontal and vertical sync
RIAA: Recording Industry Association of America
RISC: reduced instruction-set computer
rms: root mean square
ROM: read-only memory
rpm: revolutions per minute
RPTV: rear-projection TV
RTA: real-time spectrum analyzer

s or sec: second
SACD: Super Audio CD
SAP: Secondary Audio Program
SBR: styrene-butadiene rubber
SCA: Subsidiary Communications Authorization
SCMS: Serial Copy Management System
SD: Secure Digital memory card
SDDS: Sony Dynamic Digital Sound
SDTV: standard-definition (digital) TV
SECAM: séquential colour avec mémoire (sequential color with memory)
SMPTE: Society of Motion Picture and Television Engineers
S/N or SNR: signal-to-noise ratio
SPDIF: Sony/Philips Digital Interface
SPL: sound-pressure level
SPL/W/m: sound-pressure level with a 1-watt input measured at 1 meter

SVCD: Super Video CD

TBC: timebase corrector
TCXO: temperature-controlled crystal oscillator
TFT: thin-film transistor
THD: total harmonic distortion
THD+N: THD plus noise
TIM: transient intermodulation (distortion)
TOC: table of contents
TTL: through-the-lens

USB: Universal Serial Bus

V: volt
VA: volt-ampere
VBI: vertical blanking interval
VCD: Video CD
VCR: videocassette recorder
VU: volume unit

W: watt
WAV or .wav: Windows audio file format
Wi-Fi: Wireless Fidelity
WMA: Windows Media Audio
WMV: Windows Media Video
wrms: weighted root mean square

XDS: Extended Data Service

Y: luminance
Y/C: luminance + chrominance
Y_C C_c: digital luminance + color difference
Y_P P_c: analog luminance + color difference

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stated bit rate may or may not include data for formatting, synchronization, and so on in addition to the audio or video data making up the program material.

bitstream: A signal that contains digital data in its undecoded state; often referring to the SPDIF digital audio output from a DVD.

biwiring: The use of separate wires between a single power amplifier and the woofer and the midrange/tweeter in a speaker; see *biamping*.

black-level control: On a TV, a control that adjusts the amount of light put out by the display when it receives the video signal for black (often called the "brightness" control). On a DVD player, a control that adjusts the video output voltage that's generated when it reproduces data representing black.

blocking: The perceptible breakup of a digital video image into an array of (usually) square blocks; can arise from inferior encoding or from a low data rate (high degree of compression).

blue minus luminance (B - Y): Part of a component-video signal; see *color difference*.

Blu-ray Disc (BD): A high-capacity, DVD-size format proposed for high-definition video programs. Blue instead of red lasers are used to obtain high data density. Also see *HD-DVD*.

BNC connector: A bayonet-type coaxial connector used on some A/V gear.

bobbing: One of the two primary methods of progressive-scan conversion (also see *weaving*), in which line duplication enables a single field to supply all the scan lines in a video frame, though reducing vertical resolution by half. See *interlaced* and *progressive scan*.

bookmark: A DVD-player feature that lets you return to a user-selected point in a movie or other disc.

bridge: A device that connects two local-area network (LAN) segments, whether they are similar or dissimilar types, such as Ethernet and HomePNA.

bridged: A stereo or multichannel amplifier design that allows the hookup of pairs of output channels to drive one speaker with considerably boosted power.

brightness: see *black-level control*.

broadband: A high-speed Internet connection, such as DSL or cable modem, that's fast enough to support downloading high-data-rate signals, such as streaming video.

buffer: A temporary storage area for data, especially data read from a disc or downloaded from the Internet, so that playback can continue uninterrupted if the data flow is intermittent.

burn: The process of recording with a laser on optical media in computer drives and standalone CD or DVD recorders. Nothing actually burns, but chemical reactions caused by the heat of the tightly focused laser beam produce spot-like changes in the disc's reflectivity that can be "read" like pits in a pressed disc.

Butterworth filter: A type of filter known for maximally flat frequency response in its passband.

byte: A cluster or group of eight bits that are transmitted, processed, or interpreted together.

C

CableCARD: A removable PC Card supplied by a cable-TV service provider that enables reception of encrypted premium channels without a separate set-top decoding box when it's inserted in a digital cable-ready HDTV.

cable modem: A broadband Internet hookup where the modem connects through a cable-TV line rather than a phone line.

camcorder: A portable, handheld combination video camera and video recorder.

capture ratio: A measure, in decibels, of an FM tuner's ability to reject all but the strongest signal on a tuned frequency; lower figures are better.

cardioid microphone: A microphone whose highest sensitivity is directly perpendicular to its diaphragm, usually straight ahead, and that rejects sounds from the sides and rear (compare omnidirectional microphone, shotgun microphone); the most common type of microphone in a camcorder.

carrier: A high-frequency sine wave whose alterations in amplitude, frequency, or phase are used to convey (carry) the information in a much lower-frequency signal or band of signals.

Category 5 (Cat-5): Network cabling consisting of four twisted pairs of copper wire terminated by eight-conductor RJ-45 connectors; supports data rates up to 100 megabits per second.

Category 6 (Cat-6): Like Cat-5, but supports data rates up to 1 gigabit per second (Gigabit Ethernet).

CD (compact disc): A polycarbonate disc 12 centimeters (approximately 4¾ inches) in diameter that can store more than 80 minutes of stereo sound in 16-bit linear PCM digital format. A laser pickup reads reflections from the microscopic "pits" and "lands" on its internal metallized information layer.

CD-R (compact disc-recordable): A format that permits data to be written onto a special type of blank CD but not erased from it.

CD-RW (compact disc-rewritable): A format that permits data to be written onto and erased from a special type of CD.

CD Text: Artist names, track titles, and the disc title stored as text on some CDs; you need a CD Text-capable CD player to read and display this information.

center channel: A third front channel used to complement the front left and right stereo channels in a multichannel audio/video or surround sound system; its primary purpose is to stabilize the center of the reproduced soundstage for off-center listeners.

channel: In audio, a distinct path for a signal; stereo and binaural signals have two channels; multichannel systems such as Dolby Digital, DTS, and Dolby Surround (Pro Logic) use additional channels for a center speaker in front and surround speakers at the sides or rear. In Dolby Digital and DTS, an LFE channel is devoted to loud low-frequency sound effects. In broadcasting, a channel is a specified frequency band assigned to carry a station's signal.

channel separation: A measure of the amount of signal leakage between audio channels, expressed in decibels; higher figures are better.

charge-coupled device (CCD): A semiconductor technology used to make, among other things, solid-state image sensors.

chip: An integrated circuit, so called because it usually is a small piece of silicon chipped off a larger "wafer" that may contain hundreds of other circuits. In a video camera the term applies to the image-sensing charge-coupled device, of which there can be as many as three.

chrominance (C): A video signal carrying only the point-to-point color, both hue and saturation, of a video image and not its brightness; see *luminance*.

Class A: An amplifier operating design in which the output devices conduct current at all times — an inefficient technique that eliminates crossover distortion.

Class AB: A very common amplifier configuration that is designed to minimize crossover distortion at low signal levels while maintaining higher operating efficiency than a Class A design.

Class B: A more efficient type of amplifier configuration than Class A or AB in which no current flows through an output device when it is not carrying a signal. While prone to crossover distortion, Class B designs have been successfully used as amplifiers in powered subwoofers.

Class D: So-called digital amplifiers, not because they're driven directly by binary data but because the output circuits are always either fully on or off. Operation is similar to that of a switch-mode power supply, except that audio signals control the switching action. Efficiency is very high, making Class D amps desirable for compact and battery-powered portable gear.

client: A component that receives information (such as digital music, movies, or photos) through a wired or wireless network; see *media server*.

clipping: Overload distortion that occurs when an electronic device cannot accommodate the maximum level requirements of the input signal, shearing off ("clipping") the waveform peaks.

clone: A digital copy that is a perfect (bit-accurate) numerical reproduction of an original digital signal.

closed captioning: A system that transmits caption or subtitle text and symbol data during the nonimage portion of a video signal. It requires special decoder circuitry for display, hence the "closed."

coaxial: A type of cable construction in which an inner conducting wire is surrounded by a shielding cylindrical outer conductor; commonly used in video and digital audio connections. Connectors maintaining this construction may also be referred to as coaxial. Also refers to a speaker configuration in which two drivers are mounted one behind the other so that their centers are in line.

codec: Short for coder-decoder, a circuit or computer program designed to reduce the amount of digital data it takes to transmit an audio or video signal.

coloration: A frequency-response anomaly that alters the perceived timbre of sound.

color balance: see *white balance*.

color control: A TV adjustment that changes the amount of chrominance applied to the image; also see *saturation*.

color difference: A system of transmitting video information — as on DVDs and in component-video signals — in which the color signals contain the difference between a given primary color (red, blue, or green) and the luminance signal.

color temperature: The specific shade of white produced by a TV in response to a pure-white (luminance-only) input signal, measured in kelvins (K). Low color temperatures produce a "white" that's tinted reddish-orange compared with the bluish "white" at high color temperatures.

comb filter: In video equipment, a circuit that separates the chrominance from the luminance signals contained in a composite-video signal. Music producers use comb filters in the recording studio to generate "phasing" and "flanging" effects.

CompactFlash card: A small, removable data-storage format, generally flash memory but also encompassing ultra-miniature hard-disk drives; used in many digital still cameras and a few portable MP3 players.

component: A separate piece of audio or video equipment, with its own chassis and power supply, that performs one specific function or set of related functions.

component video: A method of transmitting video signals that continuously keeps the various color components separate from each other. Consumer component-video connections carry luminance and two color-difference signals; see Y_C, C_b and Y_P, P_b .

composite video: A single video signal that combines

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three video subsignals (luminance, chrominance, and sync). Until the development of S-video and component-video outputs, all video connections in consumer products were composite video.

compression: A reduction of an audio signal's dynamic range or of the size of digital audio or video data files. Not all compression is bad: dynamics can be uncomfortably wide (soft sounds get lost in room noise, while loud sounds are deafening), and digital files can be much bigger than they need to be to convey audio and video of apparent high fidelity.

continuous average power: The maximum undistorted power that an audio amplifier can deliver on a sustained basis. This specification is meaningful only when accompanied by the load impedance into which the power is delivered, the frequency range over which the rated power can be delivered, and the maximum distortion at the rated power.

contrast: In general, the range between the brightest and darkest parts of an image; on a TV, a control that adjusts the overall gain of the video signal on its way to the display; see *contrast ratio*.

contrast ratio: A measure of the maximum and minimum light levels a TV can produce when fed the signals for maximum white and black, respectively.

convergence: Adjustments in a CRT-based projection TV that align the primary-color images produced by the three internal CRTs. In a direct-view color TV, convergence refers to the alignment of the beams generated by the three electron guns.

crossover (crossover network): A circuit or component comprising low-pass, high-pass, or bandpass filters that separate lower-frequency signals from higher-frequency ones. A crossover is used in a speaker that has more than one driver. In a two-way speaker, the crossover sends the low frequencies to the woofer and the high frequencies to the tweeter. See *active crossover* and *passive crossover*.

crossover (switching) distortion: A type of distortion that can occur in an audio amplifier when a signal does not smoothly swing from positive to negative or vice versa as it is passed (switched) from one output device to another.

crossover frequency (or point): In a crossover network, the frequency at which audio signals are divided so that they can be routed to the appropriate drivers (low frequencies to a woofer and high frequencies to a tweeter, for example).

CRT (cathode-ray tube): A vacuum tube in which electrons emitted by a hot cathode are focused into beams and scanned across a phosphor-coated surface to produce a picture.

crystal: see *quartz*.

current: The rate of flow of electrical charges in a circuit, measured in amperes.

cutoff frequency: The audio frequency at which a rolloff begins to take effect. It is normally specified at the point at which the output falls by -3 or -6 dB, depending on the rolloff.

D

damping: The application of mechanical impedance, such as from a rubber or silicone material, to the suspension of a speaker diaphragm to reduce the amplitude of a resonance.

damping factor: The ratio of a speaker's nominal impedance (usually 8 ohms) to the output impedance of the amplifier driving it. In amplifier specifications, higher numbers are better.

D'Appolito array: A symmetrical vertical array of speaker drivers, such as a tweeter midway between two woofers or two midrange drivers; the purpose is to limit vertical dispersion.

data rate: The rate at which digital information is transmitted or received; in audio and video, the rate is typically measured in kilobits per second (kbps) or megabits per second (Mbps), but it can also be measured in bytes per second. Despite referring to digital data, "kilo" and "mega" here retain their normal metric meanings of 1,000 and 1,000,000, respectively.

dBf: Decibels referred to a standard power level of 1 femtowatt (one quadrillionth of a watt) at a tuner or receiver's FM-antenna terminals.

dBFS: Decibels referred to a 0-dB level of digital full-scale, the maximum numerical signal level encodable by a digital audio system.

DB-25: One of the family of computer-style D-sub connectors with 25-pin plugs and jacks; sometimes used for transferring multichannel analog audio.

dbx: Formerly the name of a company that developed noise-reduction systems, it now most commonly refers to that firm's most long-lived product, the noise-reduction system used in analog stereo-TV broadcasts.

DCDi (Directional Correlation Deinterlacing): A video-processing technique, developed by Faroudja, for converting standard interlaced video signals into progressive-scan format. Specifically designed for programs that were originally shot on video rather than film, DCDi processes motion-video information separately from still-video information to produce smoother lines in moving images; see *deinterlacing*.

decibel (dB): The most commonly used measurement unit in audio, a decibel is a logarithmic unit expressing the ratio of two powers, currents, voltages, or sound-pressure levels (SPLs). An increase of 10 dB represents a tenfold increase in power, and an increase of 20 dB represents a tenfold increase in voltage. Doubling the power in watts delivered to a speaker raises its output SPL by about 3 dB.

decorrelation: A THX process that scrambles the relative phase of the signals sent to the surround speakers in a home theater system in order to increase the sense of surround-field envelopment.

de-emphasis: A form of equalization used in FM tuners that is complementary to a pre-emphasis used in transmission. The purpose is to improve the overall signal-to-noise ratio (S/N) while maintaining uniform frequency response. CDs recorded with a high-frequency pre-emphasis automatically engage complementary de-emphasis circuits in the player.

defeat: To bypass the actions of a signal processor, tone controls, or other circuitry.

defect tracking: A measure of how well a DVD or CD player's laser pickup and tracking circuits handle flaws on a disc.

deinterlacing: The process of converting a field-based image (for example, the video on a DVD) to a frame-based image (as would be delivered from a DVD player's progressive-scan output).

delta-sigma: A circuit technique used in analog-to-digital and digital-to-analog converters in which it is the change (delta) in the signal and not the signal itself that is encoded. At very high rates of oversampling the changes are small and can be accurately encoded using only 1-bit PCM. See *1-bit D/A converter*.

depth of field: The range of object distances in a camera image that are in focus at a given aperture and zoom setting.

DHCP (Dynamic Host Configuration Protocol): A computer protocol that enables a networked device to automatically extract its IP address from a server that's also on the network.

diaphragm: The moving surface in an audio transducer such as a speaker or microphone; the device in a camera that creates the aperture (also called the "iris").

digital: A digit is a number, and digital devices use

numbers in some way. A digital tuner, for example, may use numbers only on its front-panel display, or it may use digital frequency-synthesis tuning circuits. Digits can also be used to represent analog signals, as in digital audio or video. A CD carries a pattern representing a series of 16-bit binary numbers (16-digit strings of 1s and 0s); a CD player converts these numbers into a continuously changing voltage that represents the recorded music.

digital audio server: A component containing a hard-disk drive and a CD recorder that can rip CDs to the hard drive, encode audio signals from other sources, and send and receive files to/from computers or other digital audio devices on a home network.

digital cable-ready: A video component, typically a digital TV, featuring a slot for a CableCARD that enables decoding of premium channels.

Digital 8: A development of the 8mm videocassette system that uses standard 8mm tape but records a DV-type digital signal. Digital 8 camcorders will play both Digital 8 and 8mm analog tapes.

digital filter: A circuit that alters the frequency content of a waveform by arithmetic manipulation of its digital representation.

Digital Light Processing (DLP): A technology developed by Texas Instruments that utilizes a Digital Micromirror Device to project video signals.

Digital Micromirror Device (DMD): A chip whose surface is covered with more than half a million tiny movable mirrors that's used in DLP video projectors.

digital output: A coaxial or fiber-optic output found on some CD and DVD players and digital recorders that is used to send digital audio signals to a component with a digital input; see *SPDIF*.

digital signal processing/processor (DSP): A general term for the mathematical manipulation of signals that are in digital form. DSP can be used for a wide variety of tasks, including ambience enhancement, equalization, filtering, time-alignment, and noise reduction of audio and video signals. A digital signal processor can be either a separate component or a part of one.

digital subscriber line: see *DSL*.

digital-to-analog (D/A) converter (or DAC): An electronic circuit that converts a series of binary codes (or digital "words") into a continuous analog voltage.

digital TV (DTV): Broadcasts of digital television signals in the U.S. following the standards issued by the ATSC, which specify the 18 formats to be used. The most common high-definition (HDTV) formats are variants of 1080i (1,080 interlaced scan lines) and 720p (720 progressive scan lines), while the standard-definition (SDTV) formats use 480 progressive-scan lines (480p) or 480 interlaced scan lines (480i). Though the SDTV formats can have both widescreen (16:9) and conventional (4:3) aspect ratios, HDTV is widescreen only.

digitizing: The process of analog-to-digital conversion, which consists of the separate processes of sampling and quantization.

D-ILA (Direct-drive Image Light Amplifier): A reflective liquid-crystal technology used for high-resolution displays, also known as LCoS (liquid crystal on silicon).

dipole: A type of speaker that radiates sound equally in two directions but with opposite phase or polarity (see *bipole*); often used today for the surround channels in a home theater system. Alternatively, a type of antenna that receives radio signals primarily from the two directions broadside to it — for example, the T-shape antenna often supplied with receivers.

direct-radiating speaker: Basically, any kind of speaker that's not a dipole or a bipole; until dipole surround speakers, most speakers were direct-radiating.

Direct Stream Digital (DSD): A Philips/Sony-devel-

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oped delta-sigma system for recording high-quality digital audio, used in professional recording equipment and the Super Audio CD system.

direct-view TV: Usually refers to a CRT set whose single picture tube is intended for viewing head on, not projecting onto a screen.

dispersion: A characteristic of a speaker's radiation pattern, particularly at high frequencies; expressed in degrees or in terms of the frequency-response rolloff at various angles relative to the on-axis response.

dissolve: A video scene-transition technique where the old scene is faded down while the new scene is faded up; see *fade*.

distortion: Broadly speaking, any unwanted alteration of a signal; usually it refers to an unnatural-sounding nonlinear distortion, which adds to the output signal components that are mathematically related to the input signal. See *harmonic distortion*, *total harmonic distortion*, *noise*, and *intermodulation distortion*.

dither: A very low-level random noise added before digital quantization that turns quantization distortion into more audibly or visibly benign random noise.

Dolby Digital (DD): The Dolby Labs format for digital surround sound providing up to 5.1 channels; used in DVDs, the digital TV system, and some laserdiscs; formerly called AC-3 (for Audio Code 3).

Dolby Digital EX: A system of encoding a quasi-6.1-channel signal within the 5.1-channel framework of a standard Dolby Digital data stream. The sixth channel is encoded by matrix techniques on the left and right surround channels of the Dolby Digital signal. The first licensed decoding system was THX Surround EX, but some digital surround receivers and processors use a generic matrix-decoding system for 6.1 playback.

Dolby Pro Logic (DPL): An enhancement to Dolby Surround decoding that extracts a center channel and improves channel separation by means of logic-steering circuitry. Most DPL decoders today operate in the digital domain.

Dolby Pro Logic II and IIx (DPL II, DPL IIx): DPL II is a digital enhancement of DPL that can manipulate a Dolby Surround-encoded or plain two-channel stereo signal to simulate 5.1-channel playback, with separate modes optimized for Movies and Music. DPL IIx adds 6.1/7.1-channel playback for systems with one or two back surround speakers.

Dolby Surround: The consumer name for the Dolby Stereo system used for movie soundtracks. Dolby Surround encoding matrixes four channels — left, center, right, and surround — into two stereo-compatible channels (L_r/R_r) that can be carried on any two-channel sound medium. Basic Dolby Surround decoding extracts the single surround channel to feed a pair of speakers at the sides or back of the room; such decoders have now largely been superseded by Dolby Pro Logic decoders as well as by Dolby Digital systems.

dot pitch: The horizontal spacing between repetitions of the red, green, and blue phosphor pattern in a color CRT. It's measured in millimeters.

download: To transfer data such as music, video, text, or still images from an online source to a local storage medium, whether a computer hard-disk drive or a removable flash-memory device; also, transferring audio or other data from a computer to a portable device.

driver: An individual woofer, midrange, or tweeter, or other transducer within a speaker.

DSL (digital subscriber line): A method of high-speed data transfer over ordinary copper telephone lines (see *broadband*).

D-sub: A family of multipin connectors originally for data applications but now finding use in various audio/video capacities. The "D" refers to the connector's shape.

DTCP (Digital Transmission Content Protection):

A copy-protection scheme developed by Intel to prevent programming transmitted via a digital connection like FireWire (a.k.a. IEEE 1394 or i.Link) from being copied without permission of the copyright holder.

DTS: A multichannel codec developed by Digital Theater Systems and used to carry a 5.1-channel soundtrack on DVDs, CDs, and laserdiscs.

DTS Extended Surround (DTS-ES): A development of DTS that adds 6.1-channel capability. There are two types of DTS-ES, Matrix and Discrete. DTS-ES Matrix can be decoded by any decoder that also handles DTS-ES Discrete or Dolby Digital EX.

DTVLink: An IEEE 1394 (a.k.a. FireWire, i.Link) interface found on a digital TV, HDTV tuner, or digital video recorder that meets certain Consumer Electronics Association specifications for interoperability.

dubbing: The process of copying a recording, the result being a "dub."

DV: A videotape format that records video and audio as digital signals, most familiar in the MiniDV form used in camcorders (see *MiniDV*).

DVI (Digital Visual Interface): A high-speed digital interface for visual data (both video and still images), typically used in connecting a computer with a display device but also on a growing number of HDTVs, HDTV monitors, and HDTV tuners as well as on some DVD players.

DV in/out: see *IEEE 1394*.

DVD: A high-capacity optical-disc format that enables vast amounts of audio, video, or computer data to be encoded on a laser-read disc the size of a CD.

DVD-Audio: A music-oriented DVD format that can carry up to six channels of audio at up to 24 bits resolution, with or without video or interactive content; typical sampling rates are 48, 96, and 192 kHz. Most also carry Dolby Digital or stereo soundtracks for playback (though not at high resolution) on DVD-Video machines that lack DVD-Audio decoders.

DVD changer: A DVD player that holds three or more discs at a time.

DVD Forum: An international association of hardware manufacturers, movie studios, and recording companies that defines the specs for the DVD format and licenses the right to produce and sell discs and players.

DVD-RAM: A rewritable (erasable) recordable DVD format officially supported by the DVD Forum. DVD-RAM discs are compatible only with DVD players designated to play them.

DVD+R: A write-once (nonerasable) recordable DVD format.

DVD+RW: A rewritable (erasable) recordable DVD format. DVD+RW discs are said to be playable on most present-day DVD players.

DVD-R: A write-once (nonerasable) recordable DVD format officially supported by the DVD Forum.

DVD-RW: A rewritable (erasable) recordable DVD format officially supported by the DVD Forum. DVD-RW can be recorded in two modes, Video (essentially the same as standard DVD-Video) and VR, which allows for extensive editing. Video mode DVD-RW discs are said to be playable on most present-day DVD players, but VR mode recordings are less widely compatible.

DVD-Video: A DVD format used almost exclusively for movies and other image-intensive program material; it employs MPEG-2 video encoding and Dolby Digital or DTS and PCM stereo audio encoding. Most movie DVDs offer up to 5.1 channels of surround sound, and today most come in widescreen format.

D-VHS: A development of the Super VHS system that records video and audio as digital data on a special VHS-size videocassette. D-VHS machines will also

play standard analog S-VHS and VHS tapes. Some prerecorded HDTV movies are available in this format.

dynamic headroom: The amount, in decibels (dB) by which an amplifier can exceed its rated continuous average power at 1 kHz in short, 20-millisecond bursts.

dynamic range: The difference, in decibels (dB), between the highest and lowest levels in a sound or a recording or between the overload level and the noise floor of a component or a recording medium; higher figures are better.

dynamic speaker: A speaker using the most common type of driver technology, in which the diaphragm is driven by a voice coil.

dynamics: A subjective term describing the ability of a component to render loud and soft musical passages.

E

early reflections: Reflected sounds in any listening space that reach the ear within the first few milliseconds after the direct sounds; see *late reflections* and *reverberation*.

EDTV: see *enhanced-definition TV*.

EDTV monitor: A TV set that can display a 480p-format digital TV signal from an outboard tuner/decoder.

efficiency: The percentage of electrical input power going to a speaker that is converted into acoustic energy; often used synonymously with *sensitivity*.

802.11: see *IEEE 802.11*.

electron gun: A subassembly of a CRT responsible for generating and launching high-velocity electrons aimed at the phosphors on the face of the picture tube.

electronic crossover: see *active crossover*.

electronic program guide (EPG): An onscreen program guide/menu system used to select the program to be viewed; can also be used to set the recording timer in a VCR or hard-disk recorder. Schedule information is downloaded at night from the program service provider via a home network and broadband connection, a built-in modem connected to a telephone line, or a cable or satellite feed, or it's decoded from a TV channel's VBI.

electrostatic: Speakers and headphones that produce sound by moving a thin, electrically charged diaphragm suspended in a high-voltage electrical field.

embedded memory: Flash-memory circuits that are built into a device, such as a portable MP3 player, and cannot be removed.

8mm: A miniature camcorder and VCR format utilizing a tape 8 millimeters wide.

enclosure: The box or other construction that makes up the outer shell of a speaker. Its principal purposes are to hold the drivers in alignment and to prevent the sound from the back of a woofer from reaching the front in an uncontrolled way that would result in cancellation of low frequencies.

Energy Star-compliant: Adheres to a standard for efficient use of electricity as certified by the U.S. Department of Energy and the federal Environmental Protection Agency.

enhanced-definition TV (EDTV): A TV that's capable of displaying the 480p (progressive-scan) format at up to 60 fps — with either a 16:9 or 4:3 aspect ratio — rather than being limited to SDTV's 480i (interlaced-scan), 30-fps format.

equalization (EQ): Deliberate alteration of frequency response. LPs, for instance, require a specific type of playback equalization; see *RIAA*.

equalizer: A component, or part of a component, that di-

GLOSSARY

vides the audio signal into frequency bands with separately adjustable output levels. See *graphic equalizer* (the most common type) and *parametric equalizer*.

error concealment: Mathematical processes that interpolate audio or video data from existing data when error rates are so high that error correction fails (see *error correction*).

error correction: Mathematical reconstruction of corrupted digital data based on redundant data supplied in the recording or transmission. Error-corrected data are identical to the original data.

Ethernet: Trademark for a wired-network protocol covered by the IEEE (Institute of Electrical and Electronics Engineers) 802.3 international standard. Standard, Fast, and Gigabit Ethernet have maximum data rates of 10, 100, and 1,000 Mbps, respectively.

expander: A device that increases the dynamic range of incoming signals. An expander may be used to counteract the dynamic-range compression that sometimes occurs when recordings are made or when a signal is broadcast.

Extended Data Service (XDS): Text and other ancillary data included with a broadcast or cable TV signal, such as time checks, content ratings (see *V-chip*), station identification, and more; requires an XDS-capable receiver to display or use the information.

F

fade: A video transition technique in which a scene gradually recedes into black (fade out) or emerges out of black (fade in). Some camcorders allow fades in and out of white or some other color; see *dissolve*.

feedback: In electronics, negative feedback is the return of a small portion of the output signal to the input, in reversed polarity, usually to reduce distortion, obtain a specific frequency response, or to stabilize a circuit. Positive feedback is used in sine-wave oscillators and other test-tone generators.

ferrofluid: A ferromagnetic liquid (magnetic particles suspended in oil) used in some speaker drivers, especially tweeters, to conduct heat away from the voice coil and improve damping and power handling.

fiber-optic: A transmission medium in which signals are carried through a special plastic- or glass-fiber cable in the form of light; the primary benefit is immunity to electrical noise. See *Toslink*, *ST*.

field: One-half of the scan lines of an interlaced frame; see *frame*, *interlaced*.

field-effect transistor (FET): A semiconductor amplifying device that behaves more like a triode vacuum tube than like a bipolar transistor.

50-dB quieting sensitivity: A tuner specification that indicates the RF signal strength (in microvolts or dBf) required for an incoming FM signal to produce a background noise level 50 dB below the audio output at full modulation; lower figures are better.

filter: A circuit that boosts, attenuates, or removes selected frequencies from audio signals.

firewall: A system for preventing network access by unauthorized users.

FireWire: see *IEEE 1394*.

first-surface mirror: A mirror whose reflective coating is on the top, the first surface the light hits, unlike the typical "second surface" bathroom mirror; used in rear-projection TVs.

5.1-channel: The conventional designation for a medium or system that carries six channels of sound information: front left/center/right, surround left/right, and a restricted-bandwidth (hence the ".1") LFE channel.

fixed-pixel display: Any display technology that uti-

lizes separately activated pixels of constant size. Of the major TV display technologies, only CRT is *not* fixed-pixel.

flash memory: A type of nonvolatile random-access memory; flash memory can be embedded in circuitry or placed on a removable card.

flat: Applied to frequency response, a condition in which all input frequencies emerge from the device or medium with the same relative levels as when they entered. Also a setting, as of an equalizer or tone control, that results in a flat frequency response.

flying erase head: An erase head mounted on a video recorder's rotating head drum that can selectively erase the video information only, without disturbing the tape's audio, timing, and synchronization signals; allows accurate, glitch- and noise-free video editing.

focal length: The distance between the optical center of a lens to its focus point.

footcandle: A unit of illumination; 1 footcandle is the amount of light falling on the surface of a sphere of 1-foot radius from a light of 1 candlepower located at its center.

4:3, 4x3: see *aspect ratio*.

frame: A complete, individual picture on a motion-picture film or contained in a video signal.

frame rate: The rate at which frames are displayed. In typical modern movies the frame rate is 24 per second; in color NTSC video it's 30 per second.

frequency: Rate of vibration or oscillation, measured in cycles per second, or hertz (Hz). The audio spectrum is generally taken to be 20 to 20,000 Hz (20 Hz to 20 kHz), which encompasses all the frequencies humans can hear. In radio, frequency refers to the carrier signal of the station, such as 88.1 MHz for an FM station or 770 kHz for an AM station.

frequency modulation (FM): A technique in which the frequency of a high-frequency carrier is varied according to the level of a much lower-frequency signal. Commonly used to impress an audio signal onto a radio-frequency (RF) carrier.

frequency response: The range of frequencies (or bandwidth), expressed in hertz (Hz), that a component can handle, within specified limits of amplitude error, expressed in decibels (dB).

frequency synthesis: The process by which the various reference frequencies required by a tuner are derived by division of a single reference frequency, usually obtained from a stable quartz oscillator (see *phase-locked loop*). Frequency synthesis allows such tuner features as digital frequency readouts and station presets along with improved audio performance.

front end: The first stage of a radio or TV tuner, responsible for selecting and amplifying the desired signal.

front projector: A type of video display in which the projector elements are housed in a separate unit, not connected to the screen and mounted in front of it, much like a movie projector; front projectors are often mounted on the ceiling.

f-stop (f/): A number describing the relative size of a lens aperture in a camera, derived from the focal length divided by the aperture diameter and normally rated in standardized discrete steps (1, 1.4, 2.0, 2.8, 4.0, 5.6, 8, and so on). Moving from one f-stop to the next lower stop theoretically doubles the amount of light falling on an image sensor. Commonly referred to as the "speed" of a lens, a misnomer.

G

gain: How much the amplitude of incoming signals is changed by a circuit or antenna, usually in decibels (dB). Gain can be positive, for amplification; negative, for attenuation; or 0 dB for no change, or "unity gain."

gamma: A numerical specification for the nonlinearity of the signal/light intensity of video image sensors and displays (CRTs, LCDs, DLPs). Ideally, the gammas of a video system should cancel each other out so that the final displayed image has a linear light output.

giga (G): The metric prefix for billion. In reference to digital data, giga usually stands for 1,073,741,824 (2³⁰).

gigabyte (GB): One billion bytes (plus 73,741,824, to be exact), a measure of digital information storage capacity; commonly specifies the data-storage capacity of such media as DVDs and hard-disk drives.

graphic equalizer: An equalizer with control bands that are fixed in frequency but variable in level; the slider controls for the various bands provide a rough graphic representation of the selected frequency-response curve.

graphical user interface (GUI): Any "point-and-click" control system for an electronic component that uses menus and icons displayed on a screen instead of (or in addition to) physical pushbuttons and other controls.

grayscale: On a video display, the intermediate steps of gray between absolute black (0 IRE) and white (100 IRE). In the analog NTSC video system used in the U.S., black level is specified as 7.5 IRE.

ground: In an electrical circuit, the reference for 0 volts, above and below which other (AC) signals may vary.

H

hard-disk drive: A digital data storage/retrieval device utilizing a rigid, rapidly rotating disk coated with a magnetic recording surface. Thanks to the rapid rotation rate, the read/write head(s) float on a cushion of air very near the disk's surface, allowing almost instantaneous cueing to any desired location without touching the surface.

hard-disk recorder (HDR): A device using the immense data capacity of a hard-disk drive to store audio or A/V material in digital form. Video-oriented HDRs — often called "digital video recorders" (DVRs) and sometimes "personal video recorders" (PVRs) — usually have versatile options for unattended recording and playback that can let you skip commercials or watch a program from the beginning while it's still being recorded.

harmonic distortion: In audio, spurious output signals at whole-number multiples of the frequency of the input signal; see *distortion*, *total harmonic distortion (THD)*.

HD CD (High Definition Compatible Digital): An audio recording system for CDs developed by Pacific Microsonics that's said to provide greater bandwidth and dynamic range than standard CDs.

HD CP (High-bandwidth Digital Content Protection): A copy-protection scheme developed by Intel specifically to prevent digital programming transmitted across a DVI (Digital Visual Interface) connection from being copied; now also incorporated into HDMI (High Definition Multimedia Interface) connections.

HD-DVD: A high-capacity disc format approved by the DVD Forum for carrying high-definition video programs. The sandwiched disc structure resembles that of ordinary DVDs, but blue lasers instead of red are used to obtain high data density. HD-DVD discs and players may be available here sometime in 2005.

HDMI (High Definition Multimedia Interface): An enhanced version of DVI that adds stereo and multichannel digital audio as well as signals for integrated remote control and infrared (IR) repeater functions on a single cable with a 19-pin connector that's significantly smaller than a DVI connector. HDMI incorporates the HDCP copy-prevention scheme.

HDTV monitor: A TV set that can display high-definition images when connected to an outboard HDTV tuner; see *EDTV monitor*.

HDTV set: An HDTV display that has a built-in high-definition tuner.

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HDTV tuner: An outboard, usually set-top, digital TV tuner/decoder that can receive high-definition programs broadcast over the air as well as from a satellite receiver or cable service and then decode the signals for display on an HDTV monitor.

HDV: A new high-definition camcorder format consisting of specifications for recording and playing back high-def video using MiniDV tape cassettes, promulgated by JVC, Canon, Sharp, and Sony.

head drum: A rotating cylinder inside a VCR or camcorder around which the tape is wrapped; two or more heads are mounted on the head drum for video recording and playback, hi-fi audio recording and playback, and erasure; see *flying erase head*.

headphones: A pair of miniature speakers that fit over the ears; "open-air" headphones do not block outside sound or keep sound from leaking out; "circumaural" (around-the-ear) phones may do both. Even tinier headphones that fit inside the listener's ears are called "earbuds" or "earphones."

headroom: The difference between the signal level at any moment and the maximum level an audio device can handle without clipping or other significant distortion; expressed in decibels (dB).

helical scan: A videotape recording system in which the tape is wrapped around a spinning head drum (forming a helix) so that the recorded tracks trace diagonally across the width of the tape.

hertz (Hz): The standard unit of frequency, representing cycles per second, or changes away from a basic state and back again. In audio, the basic state is defined as either ordinary air pressure (without sound) or its electrical equivalent: a constant-level (DC) signal, often 0 volts, or ground. For a sound in the audible range, the higher the frequency in hertz, the higher the pitch. In video, frequency usually relates to horizontal luminance resolution; the higher the frequency, the finer the detail and the higher the resolution. A kilohertz (kHz) is a thousand hertz, a megahertz (MHz) a million hertz, and a gigahertz (GHz) a billion hertz.

hi-fi: High fidelity, used to refer to an audio system that can reproduce recorded sound with substantial fidelity to the original. VHS Hi-Fi is an audio recording system for VCRs.

high-definition TV (HDTV): A specific subset of the digital TV standard that features increased horizontal and vertical resolution, choice of interlaced or progressive scan, and widescreen images; see *enhanced-definition TV* and *standard-definition TV*.

high-pass filter: A circuit, as in a speaker's crossover network, that progressively attenuates signals below its cutoff frequency, passing those above unaltered; see *filter* and *low-pass filter*.

home network: A system in which at least one computer is linked with A/V and other devices via wires or wireless means so that digital audio or video files don't have to reside on the device that plays them.

HomePlug: A standard for sending network data over a home's electrical wiring.

HomePNA: A standard for sending network data over a home's telephone wiring without disrupting normal telephone service.

home theater system: A collection of audio and video components designed and configured to reproduce something like the picture and sound quality of a movie shown in a good cinema. A home theater is generally expected to include a TV screen of reasonable size and a surround sound audio system.

horizontal luminance resolution: Measured in lines, this is the most common parameter for characterizing the reproduction of fine detail in video. (Do not confuse these "lines" with *scan lines*).

hotspotting: A drop in brightness or a color shift that may occur when the image on a rear-projection TV

or from a front projector is viewed from an off-center seating position; often caused by the use of a high-gain screen surface to increase picture brightness.

H.264 (MPEG-4 Part 10): A very efficient, MPEG-4-based standard for encoding and decoding video, originally intended for low-bit-rate applications like cellphones and video over Internet.

hue: A color's position in the visible spectrum from red to blue, or its gradation of tint; the professional name for a video monitor's tint control.

I

IEEE 802.11: A specification developed by the IEEE (Institute of Electrical and Electronics Engineers) for wireless networking. **802.11a** operates in the 5-GHz band with a maximum data rate of 54 Mbps. **802.11b** operates in the 2.4-GHz band with a top data rate of 11 Mbps. **802.11g** operates in the 2.4-GHz band with a maximum data rate of 54 Mbps and is compatible with "b" devices. **802.11e** is a forthcoming specification that includes the QoS (Quality of Service) feature to provide improved streaming of multimedia content.

IEEE 1394: The IEEE standard for high-speed, high-capacity digital connections of audio and video components, computers, and peripherals; also known as FireWire and i.Link.

IF rejection: A measurement of a tuner's ability to reject external interference at the intermediate frequency; higher figures are better.

i.Link: see *IEEE 1394*.

image rejection: A measure of a tuner's ability to reject the sum or difference frequency of its own intermediate and oscillator frequencies; poor suppression results in reception at false frequencies; higher figures are better.

image sensor: The image-to-electricity transducer in a video camera. All consumer video cameras, camcorders, and digital still cameras now use solid-state sensors, usually charge-coupled devices (CCDs).

image stabilizer: A system that removes shakiness in a handheld camcorder image either by varying the readout pattern of the image sensor or by optical compensation with counter-movement of a prism.

imaging: The ability of an audio system to reproduce sounds in a spatially realistic manner.

impedance: In electronics, the total resistance of a component or circuit to the flow of alternating current (AC), expressed in ohms. In addition to pure resistance, it may include reactive (capacitive or inductive) elements that cause its value to vary with frequency; see *reactance*.

infinite-baffle: A speaker enclosure that is sealed in order to isolate the speaker's front radiation from the back radiation of its drivers. Acoustic-suspension is a special type of infinite-baffle design.

infrared (IR): Light whose wavelength is longer than visible red. "Near infrared" wavelengths close to the visible-light range are used by line-of-sight remote controls and sensed by some camcorders.

infrasonic filter: A type of high-pass filter used to attenuate frequencies below about 20 Hz.

insert edit: An editing process by which a new program segment is inserted into an already recorded segment, replacing the overlapping material; see *assemble edit*.

integrated amplifier: A component that combines the functions of a preamplifier and power amplifier.

integrated circuit (IC): A miniature, one-piece, solid-state device containing many transistors and other electronic components; it is the basic building block of most modern electronics; see *chip*.

interlaced: A video component or signal that assigns

alternating scan lines in a video frame to one of two fields, which are then displayed separately. Interlacing is used to reduce picture flicker without increasing the frame rate.

intermediate frequency (IF): In a radio tuner, the standard frequency to which the front end converts any tuned carrier for demodulation, 10.7 MHz for FM or 455 kHz for AM.

intermodulation (IM) distortion: A type of audio distortion whose components are at frequencies that are sums and differences of the input frequencies; lower figures are better.

J

jack: A female connector that serves as a receptacle for a male connector, or plug; see *RCA connector*.

JPEG: A storage format for digital images, devised by the Joint Photographic Experts Group, that uses a scalable "lossy" data-compression scheme to reduce file size.

K

Kapton: A plastic material widely used in the manufacture of speaker voice-coil formers.

kelvin (K): A unit on the Kelvin temperature scale, which is the same "size" as a degree on the centigrade/Celsius scale but starts from "absolute zero" (0 K = -273°C = -459.7°F) rather than the freezing point of water.

kilo (k): The metric prefix for thousand. In reference to digital data, kilo usually stands for 1,024 (2¹⁰).

kilobits per second (kbps): A statement of bit rate or data-transfer speed, usually encountered in reference to downloaded music files in MP3 and other compressed-audio formats, where 128 kbps is often cited as the "standard" for acceptable sound quality, though the quality at that rate can actually vary considerably depending on which codec was used. See *codec* and *MP3*, *AAC*, *RealAudio*, and *Windows Media Audio*.

kilobyte (KB): 1,024 bytes; a measure of digital information-storage capacity.

L

laser: A device that generates a coherent, monochromatic beam of light. These two characteristics allow a laser beam to be focused down to very small areas, a trait essential to its use in the CD, DVD, MD, and other optical or magneto-optical data-storage systems.

late reflections: Echoes in an enclosed space that reach the ear after multiple reflections and, consequently, have a relatively long delay time; see *early reflections* and *reverberation*.

LCD (liquid-crystal display): Color LCD panels are used in some flat-screen TVs and computer monitors as well as in some video-projection systems. Monochrome LCD readouts are used on the faceplates of some A/V components and remote controls.

LCoS (liquid crystal on silicon): A reflective liquid-crystal technology suitable for high-definition displays.

LED (light-emitting diode): A semiconductor device used as an indicator light on many components.

lenticular: In video, anything containing many small lenses; commonly used to describe video projection screens optimized to produce high picture brightness in certain viewing directions.

letterboxing: The scaling of a widescreen image to fit within a squarish 4:3 aspect ratio screen by shrinking the image's vertical dimension so that the width fits exactly and filling the resulting spaces above and below the image with black bars. Critics of the technique

GLOSSARY

think that the screen area is being “wasted” by the letterboxing bars; see *pan-and-scan*.

LFE (low-frequency effects) channel: The “0.1”-channel of a 5.1-channel surround sound system, containing only very low frequencies; in movie soundtracks it is used primarily for loud sound effects.

limiter: A circuit that prevents a signal from exceeding a certain amplitude.

line doubler: A circuit or standalone component that doubles the number of scan lines in an interlaced video image; line triplers and line quadruplers are also available.

line interpolation: A process by which additional scan lines are synthesized out of the original scan lines present in a video image; used to increase the apparent vertical resolution; see *line doubler*.

linearity: Describes the accuracy with which a component’s output signal tracks the input signal; a device whose output varies in direct proportion to the input is said to be linear.

line-level: Signal voltages in the range delivered from the outputs of most audio source components (such as CD players) and preamplifiers; also known as low-level or preamp-level. See *speaker-level*.

lines of resolution: The units that describe the ability of a TV, camera, video recorder, or other device to convey fine picture detail; higher values are usually better. Normally refers to horizontal resolution but can also describe vertical resolution; see *scan lines*, with which lines of resolution are often confused.

LNB (low-noise block downconverter): A device mounted at the focal point of a satellite dish that amplifies the microwave signals collected by the dish and converts them to a lower frequency that’s sent to a satellite receiver over standard coaxial cable. An LNB is an LNB with an integrated feedhorn.

local-area network (LAN): A system for connecting computers and other digital devices in close proximity so they can share files, multimedia content, and resources.

logic: In a surround sound system, “logic-steering” is used to improve separation between multiple channels derived from matrix-encoded two-channel signals.

loudness compensation: A form of equalization that progressively emphasizes low frequencies (and sometimes high frequencies) as volume is reduced. Loudness-compensation circuits are designed to offset the ear’s loss of low-frequency sensitivity as the sound level decreases.

low-pass filter: A circuit, as in a speaker’s crossover network, that progressively attenuates signals above its cutoff frequency, passing those below unaltered; see *filter* and *high-pass filter*.

lumen: A unit for the rate of flow of visible light.

luminance (Y): The portion of a video signal in which point-to-point brightness — not the color (chrominance) — of an image is encoded. Black-and-white TVs display only luminance signals.

lux: A unit of illumination, equal to one lumen per square meter.

M

macro: A lens or zoom setting on a camera or camcorder that is optimized for extreme closeups; also, a series of operations programmed to be executed with just one button push on a remote control.

macroblocking: see *artifact*, *blocking*.

Macrovision: A set of alterations of a standard video signal designed to prevent copying it or, failing that, to severely degrade the quality of any copies made. DVD players usually apply two types of Macrovision

processing to their outputs, “pseudo pulse” and “color striping,” via circuitry enabled by instructions on the copy-protected disc.

matrix: A type of circuit commonly used in surround sound encoders and decoders to squeeze three or more channels of information into two or to extract multiple channels from an encoded two-channel signal; also used to describe similar circuits that can synthesize an ambience channel from a nonencoded stereo recording. The term “matrix” derives from the mathematics involved. See *Dolby Digital Surround EX*, *DTS-ES*, *Dolby Pro Logic*, *Dolby Surround*.

MDLP: A long-playing version of the MiniDisc format utilizing the ATRAC3 codec to provide more than 5 hours of stereo recording time per disc.

media adapter: see *media receiver*.

media receiver: A component attached to a TV or stereo system to access digital music, photos, or video through a wired or wireless network; also called a media adapter.

media server: A computer or computerlike component that stores music, photos, or video and makes them available to a TV or stereo system either directly or through a wired or wireless network. Also see *client*, *media receiver*, and *server*.

mega (M): The metric prefix for million. In reference to digital data, mega usually stands for 1,048,576 (2²⁰).

megabyte (MB): One million bytes; a measure of digital information-storage capacity.

megachanger: A CD or DVD changer that holds 50 or more discs at a time in a jukebox-like mechanism.

MemoryStick: A flash-memory format developed and promoted by Sony.

MicroMV: A digital camcorder format using MPEG-2 compression that records an hour of video on a tiny cassette about the size of an audio microcassette.

microphone: A transducer that converts acoustical energy into an electrical signal; see *cardioid microphone* and *shotgun microphone*.

microprocessor: An integrated circuit containing a complete central processing unit (CPU) of a computer. A microcomputer is a complete computer (comprising a CPU, memory, and input/output circuitry) on a single IC chip.

midbass: The segment of the audio frequency spectrum covering sounds produced in the upper-bass and lower-midrange regions.

midrange: The segment of the audio frequency spectrum between the bass and treble, which includes most of the fundamental tones of the human voice and of most musical instruments; it runs from approximately 150 or 200 Hz to around 3 kHz.

midrange driver: A speaker driver designed to reproduce frequencies from 200 Hz or so up to 2 to 3 kHz.

MiniDisc (MD): A magneto-optical digital audio record/playback format based on the ATRAC family of codecs; more than 5 hours of audio information can be stored on and retrieved from a 2½-inch magneto-optical disc housed in a caddy like those used for computer floppy disks. MD is not compatible with any other disc format.

MiniDV: The most popular digital camcorder format, providing 1 hour of recording time in standard mode on a tape cassette that’s smaller than those used in the 8mm system. All MiniDV cams have an i.Link (a.k.a. FireWire) digital connection to send programs or images to a DTV, DVD recorder, or a computer; the same port can also transfer material between camcorders.

mode: A recording-quality setting on a DVD or hard-disk recorder; also a type of surround sound processing, whether it involves plain decoding of a format like Dolby Digital or ambience/sound-field generation. See *ambience*, *recording mode*, *surround sound*.

monitor: In audio, a speaker used in recording or other professional applications; in video, the term can refer to any display device, including TVs, but is often used specifically to denote a display device without tuning functions.

mono (monaural or monophonic): A recording or signal containing one channel of audio. In a component, it indicates that only one channel is handled, as in a mono power amplifier.

MOSFET (metal-oxide-semiconductor field-effect transistor): A type of field-effect transistor, used both in power amplifiers and in digital integrated circuits (such as microprocessors).

mosquito noise: An area of “busyness,” like a cloud of mosquitoes, around sharp edges or corners in a video image; caused by inferior encoding or by too low of a bit rate; see *artifact*.

MP3: The common term for the audio codec officially known as MPEG-1 Layer 3. Originally used for sound data in computer-related applications and now popular for music files ripped from CDs or downloaded from the Internet and played on a computer or portable digital device; also see *mp3PRO* and *MPEG-2*.

mp3PRO: An enhancement of the MP3 format that’s claimed to be twice as efficient, enabling a 64-kbps file to sound comparable to a 128-kbps MP3 file.

MPEG (Moving Picture Experts Group): A committee of engineers and scientists formed to issue standards for reduced-bit-rate digital audio and video.

MPEG-2: The standard reduced-bit-rate audio/video encoding scheme for digital TV, DVDs, and certain digital satellite transmissions.

MPEG-4: A data-encoding standard incorporating advancements to MPEG-2 and AAC in addition to facilities for the synthesis and manipulation of audio and video “objects” (shapes, textures, sounds, and so on). Also see *H.264*.

muddy: A subjective term describing reproduced sound, usually in the bass, that isn’t as clear as it should be.

multichannel: An audio system or component using more amplifier/speaker channels than a stereo pair; see *5.1-channel*, *6.1-channel*, *home theater system*, *Dolby Digital*, *Dolby Surround*, *Dolby Pro Logic*, *DTS*, *SDDS*.

multichannel analog input: A connection consisting of six or more RCA jacks that allows the hookup of a source component supplying a decoded surround sound output, such as a DVD-Audio or Super Audio CD player or some DVD-Video players.

MultiMediaCard (MMC): A flash-memory format used in many MP3 players.

multipath: When a broadcast radio or TV signal reaches the receiving antenna over two or more paths of differing lengths (“multiple paths”), usually because it has been reflected from buildings or other objects between the transmitter and the receiver. The resulting interference causes distortion on FM and “ghosts” on standard TV, and may prevent reception of digital TV signals altogether.

multiplex (MPX): Two or more channels transmitted on a single carrier so that they can be independently recovered by the receiver. Usually, as in TV and stereo FM, this is achieved by means of subcarriers, signals on the main carrier that are themselves modulated by other signals.

multiroom system: A system that directs music or video programs from one or more sources to secondary listening/viewing spaces, or zones.

N

native resolution: The picture resolution, usually expressed in horizontal by vertical pixels (such as 1,024 x 768), that a TV or other display device is inherently

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capable of *without* making use of line doubling, line interpolation, or other forms of rescaling. In a fixed-pixel display like a plasma, LCD, or DLP TV, the native resolution is the same as the actual pixel layout.

negative feedback: see *feedback*.

neutral density (ND): Commonly denoting filters that dim the amount of light reaching a camcorder's image sensor without changing the balance of colors.

noise reduction (NR): A system designed to reduce the noise added to a signal during recording or playback; see *dbx* and *Dolby B*, *Dolby C*, and *Dolby S*.

noise: Any unwanted signals that are not strongly correlated with the desired signal and that usually arise from a random process. Hiss and hum are typical examples of audible noise. In video programs, noise appears as "snow" onscreen or graininess in the image.

noise shaping: A digital signal processing technique used in digital filters, analog-to-digital converters, and digital-to-analog converters that reduces quantization noise at the frequencies where it is most audible, at the expense of increasing noise at other frequencies.

nonvolatile memory: A type of digital memory circuit that does not lose its data content when the power is removed; see *flash memory*.

NTSC (National Television System Committee): The industry/government body that issued the U.S. analog color TV standard approved by the FCC (Federal Communications Commission) in 1953; any video signal or component that operates according to that standard.

O

octave: A ratio of 2:1 or 1:2 in frequency (measured in hertz). The ear hears changes in frequency of equal multiples or fractions of an octave as equal changes in musical pitch. A one-third-octave interval, used in acoustical measurements, is equal to the musical interval of a major third.

ohm (Ω): The basic unit of electrical resistance; also see *impedance*.

OLED (organic light-emitting diode): Describes various technologies for producing fixed-pixel displays from self-luminescent plastics; used in cellphones and some automotive electronics and beginning to have A/V applications.

omnidirectional: Equally sensitive or effective in all directions; might be said of an antenna, a microphone, or a speaker.

1-bit D/A converter: A circuit that translates a digital signal into an analog waveform using a digital delta-sigma modulator followed by a PDM or PWM output converter; see *digital-to-analog (D/A) converter*.

optical (fiber-optic) input/output: A special type of jack that accepts fiber-optic connectors; see *ST* and *Toslink*.

output-current capability: A rating, in amperes, of the maximum current an amplifier can supply.

output level: A measure of the strength of the output signal of a component.

output transformer: A transformer used to couple the output stage of a power amplifier to a speaker. Output transformers are usually essential in tube amplifiers but are almost never used in solid-state amps.

oversampling: Any digital signal processing technique that generates or uses a sampling rate greater than that required by theory to encode the maximum frequency of interest; used in CD and DVD players' audio digital-to-analog (D/A) converters and output filters. In a D/A converter, a technique whereby multiple "samples" are mathematically generated from each real sample, which permits the use of digital filters to augment a simple, shallow analog output filter instead

of the complex and very "steep" analog filter that would otherwise be required.

overscan: The amount of a video image that falls beyond the borders of the display device.

P

PAL (phase-alternating line): The analog TV standard for Western Europe except France (see *SECAM*) and much of the rest of the world except Japan and North America (see *NTSC*).

pan (or panorama): A video shooting technique that swings the camera horizontally over a scene or tracks a horizontally moving object; see *tilt*.

pan-and-scan: A technique for making a widescreen movie fill a 4:3 aspect ratio screen by showing only selected parts of the original image, recropped scene by scene to focus in on what seems most significant to the action. Critics of this technique think the recropping compromises the director's intent. See *letterboxing*.

parametric equalizer: An equalizer that has variable parameters — such as center frequency, level, and filter sharpness (or Q) — typically to accentuate or reduce its action on user-determined frequency bands.

passband: The range, or band, of audio frequencies that a filter lets pass through; see *crossover*.

passive crossover: A network, typically built into a speaker, comprising some combination of capacitors, inductors (coils), and resistors that divides the audio signal into frequency bands (low, high, and possibly midrange) after it is amplified; see *active crossover*.

passive radiator: In a speaker, an unpowered diaphragm that is driven by the back wave from a woofer; it functions like the mass of air in the port of a bass-reflex enclosure.

PC Card (formerly PCMCIA): A small plug-in card for PCs that enables various high-speed operations, including data transfer through USB and FireWire interfaces and to and from flash-memory media.

PCM: see *pulse-code modulation*.

peak (or peak-level) indicator: A visual indicator on an audio recorder that indicates when transient signal levels have exceeded the recorder's ability to handle them without distortion.

perceptual coder: see *codec*.

peripheral: A device or system hooked up to (or sometimes inside of) a computer, like a monitor, printer, hard drive, CD or DVD drive, or speakers.

phase: The timing relationship among a set of audio waveforms or among the components that make up the spectrum of a single waveform. Also, a control that changes polarity. See *phase shift*, *polarity*.

phase-locked loop (PLL): A circuit used in radio tuners to lock the received frequency to a synthesized reference frequency; see *frequency synthesis*.

phase shift: A change in the timing relationship among a set of waveforms (inter-channel) or among the components that make up the spectrum of a single waveform (intra-channel).

phono input: The circuit in a preamplifier, integrated amplifier, or receiver that amplifies the low-level signals produced by a phono cartridge, raising them to the same level as signals from other audio source components (called line-level), and also applies the necessary RIAA equalization.

phosphor: A chemical lining the inside face of a CRT that glows when struck by electrons fired by an electron gun. Color CRTs have a repeating pattern of red, green, and blue phosphors named after the colors they emit when irradiated. See *dot pitch*.

picture-in-picture (PIP): A TV function that allows the simultaneous display of two different programs on the same screen, usually with a small image of the subsidiary program(s) superimposed over that of the main program.

piezoelectric: A kind of speaker driver (usually a tweeter) employing a ceramic or other element that bends in response to an applied voltage, generating sound.

pink noise: Random noise with equal energy in each octave, used as a test signal; see *white noise*.

pixel (picture element): The smallest subunit of an image that's treated separately in a digital video system or a non-CRT video display. Pixel counts are often quoted in specs for image sensors, LCD viewfinders, plasma and LCD flat TVs, and LCD and DLP projection TVs; see *front projector* and *rear-projection TV*.

plasma: A type of video display that employs an enormous array of tiny cells of ionized gas (plasma), which is used to activate each cell's colored phosphor.

polarity: An electrical convention that describes one side of a circuit connection as positive and the other as negative. Reversing, or inverting, the polarity of an audio connection is equivalent to a wideband phase shift of 180°; see *reverse polarity*.

port: An opening (also called a vent) in the cabinet of a bass-reflex speaker that enables the sound wave from the back of a woofer to reinforce the sound wave from the front; equivalent to a *passive radiator*.

power: The rate of transfer or absorption of energy per unit time in a system. Electrical power is usually measured in watts, as in the output specifications for a power amplifier.

power amplifier: A component, or part of a component, that strengthens the audio signal from a preamplifier so that it can drive speakers.

powered speaker: A speaker, usually a subwoofer, that has an amplifier built in.

power supply: A subsection of a component that takes AC line voltage and converts it to one or more DC voltages to operate the rest of the circuitry. In audio, power-supply design can have an enormous influence on noise levels and the maximum output power an amplifier can produce.

power tower: A floor-standing speaker that includes a built-in powered subwoofer, either instead of a conventional passive woofer or in addition to one.

preamplifier: A component, or part of a component, that switches and processes signals from a variety of source components.

pre-emphasis: Boosting or cutting a range of frequencies with the expectation that reciprocal equalization (de-emphasis) will be applied later to restore flat response. The usual purpose is noise reduction.

preset: A memory circuit that is programmed by the user. For example, tuner presets store the frequencies of radio or TV stations so they can be recalled instantly.

programming: The process of entering instructions for a component to carry out at a later time. For instance, many CD players can be programmed to play selected tracks in any order; see *macro*.

progressive scan: A video component or signal that processes or displays each scan line of a video frame in sequence; the opposite of interlaced scan.

pulse-code modulation (PCM): Representation of an analog signal by a sequence of multidigit binary numbers. PCM, used for CDs, is the most common digital encoding scheme.

pulse-density modulation (PDM): A signal-generation method, used in the outputs of some 1-bit digital-to-analog converters, in which all of the extremely short signal pulses are of the same amplitude and duration but are

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either positive or negative; the output must be low-pass-filtered to recover the original analog waveform.

pulse-width modulation (PWM): A signal-generation method, used in the outputs of some 1-bit digital-to-analog converters, in which all of the signal pulses are of the same amplitude but of varying duration, or width; the output must be low-pass-filtered to recover the original analog waveform.

Q

Q: In an equalizer, Q specifies the width of the frequency band relative to its level; the higher the Q, the narrower the band. In a speaker, Q refers to the sharpness of the speaker's low-frequency resonance and is inversely proportional to damping.

QoS (Quality of Service): A technique for identifying and prioritizing data to provide improved streaming of multimedia content like music and video.

quantization: In digital audio, the representation of a continuous analog signal by a sequence of discrete numbers. In PCM, the dynamic range of the system is determined by the number of possible values available to represent various levels of signal amplitude, which is in turn determined by the number of bits used to represent each sample. In the CD data format, the resolution of the quantization is 16 bits, which means that each sample can have any whole-number value between -32768 and +32767.

quantization noise: A form of distortion unique to digital signals, it is the difference between a quantized signal (which can only take certain discrete numerical or voltage values) and the original analog signal.

quartz: A form of crystalline silicon dioxide that can be used to construct very stable radio-frequency (RF) oscillators and clocks.

quartz synthesis: see *frequency synthesis, PLL*.

R

Radio Data System (RDS): A system for transmitting text information along with the audio in a radio broadcast for display on an RDS-equipped tuner or receiver.

radio-frequency (RF): The high-frequency electromagnetic signals used to broadcast radio and TV programs, or any very high-frequency signal, whether intended for broadcast or not.

rainbow effect: A flash of multicolored light occasionally seen in images created by single-chip DLP projection TVs, most often on the edges of a bright object in motion against a dark background. The rainbow is an artifact of the projector's color wheel, which sequentially filters the white light projected by a bulb into its red, green, and blue components.

random access: The ability to go directly to the beginning of a numbered or labeled song, track, chapter, disc, or program without scanning the intervening material.

RCA connector/plug/jack: The most common kind of audio connector, using a small, single-pin plug and a coaxial shield.

reactance: The portion of the electrical impedance in an AC circuit that is not due to pure resistance. Capacitive reactance causes impedance to rise as the frequency of the signal decreases, whereas inductive reactance causes impedance to rise as the frequency of the signal increases.

RealAudio: A codec system promulgated by RealNetworks. At certain bit rates, RealAudio 8 utilizes the ATRAC3 upgrade of the ATRAC codec.

rear-projection TV (RPTV): A TV set that beams the output of video transducers (CRTs, DLPs, LCDs, and the like) in the rear of its cabinet onto an angled mirror, which in turn reflects it onto a large screen (from 40 to 80 inches diagonal) at the front of the cabinet.

receiver: An audio component that receives radio broadcasts, switches and processes audio signals, and amplifies the selected signal to drive speakers; also see *A/V receiver*. A television receiver is a monitor that contains a tuner for TV signals.

recording-level meter: An indicator that displays the audio signal levels recorded from moment to moment.

recording mode: In a DVD recorder, the selected mode determines the overall bit rate (amount of data compression) used for recording. Different modes let you trade off image quality for increased recording time; DVD recorders generally offer at least four modes.

record loop: see *tape monitor*.

red, green, and blue (RGB): The three primary additive colors of most video systems (such as NTSC and DTV); also, the three color signals used by computer monitors. An RGB video connection provides each color as a discrete signal (also see *RGB+H/V*).

red minus luminance (R - Y): Part of a component-video signal; see *color difference*.

regional coding: A "feature" of the DVD system that gives program producers the ability to restrict the geographical areas in which a DVD can be played. The U.S. and Canada are Region 1; Europe is Region 2.

residential gateway: A device that combines the functions of a cable or DSL modem and a router.

resistance: Electronic "friction" that turns the flow of electrical charges into heat; resistance is impedance that is the same for all frequencies.

resolution: A measure of the ability of a video system to convey fine image details. Most resolution specifications or measurements are for horizontal luminance resolution, but there can be vertical luminance and color resolution figures as well.

resonance: The tendency of a mechanical or electrical system to vibrate at a certain frequency when excited by an external force, and to keep vibrating even after the exciting force is removed. Resonances are undesirable in audio equipment and listening rooms because they can produce colorations.

reverberation: A dense pattern of diffuse and multiple reflections that results when sound is created in an enclosed space. The more reflective the walls and surfaces of the listening space, the louder and longer lasting the reverb; the perceived effect of reverberation depends on the size of the room and how long it persists. Reverberation influences both the clarity or intelligibility of the sound (the more, the muddier) and the feeling of spaciousness or ambience (the less reverb, the more closed-in the sound will seem).

reverse polarity: An electrical condition in which the "positive" and "negative" wires running to one speaker in a stereo pair are reversed relative to the other; this causes the sound waves emanating from the speakers to be out of phase with one another, which weakens bass output by cancellation and impairs stereo imaging.

RF interference (RFI): When a radio or TV broadcast or other radio-frequency signal interferes with the operation of a component.

RGB+H/V: see *red, green, and blue*.

RIAA (Recording Industry Association of America): A trade and lobbying group based in Washington, DC, that has been one of the moving forces behind the Serial Copy Management System (SCMS) and efforts to curb Internet file-sharing. Decades ago, the RIAA set standards for the equalization used on vinyl records to minimize noise.

ribbon speaker: A form of speaker driver using a light, conductive ribbon suspended in a strong magnetic field; it produces sound by vibrating when a signal current is passed through it.

rip: To extract the digital audio data from a CD; also

applied to the process of converting such data to a compressed audio format, typically MP3.

ripper: Computer software used to rip audio CDs for storage on a hard disk.

RJ-11: A standard modular telephone jack.

RJ-45: The standard Ethernet connector found on some home-networkable components.

rms (root mean square): The most accurate way of averaging voltage and power measurements.

rolloff: A gradual attenuation of a signal above or below a certain frequency.

router: A device for dividing an Internet connection among multiple computers or networks.

RS-232: A standard for serial communications ports on computers and some A/V components.

S

sample: The value of a signal at an instant in time.

sampling: Repeatedly and regularly obtaining samples of a waveform, such as a soundwave, in order to digitize it; see *quantization*.

sampling frequency (or rate): In digital audio, the number of times a signal is sampled each second. The standard sampling rate for the CD format is 44.1 kHz, which means that the voltage of the audio waveform for each channel is measured 44,100 times per second. The sampling rate must be at least twice the highest frequency to be recorded.

SAP (secondary audio program): A separate mono channel broadcast along with the two stereo channels in the U.S. system for stereo analog TV. The SAP channel can be used for an alternative-language soundtrack or descriptions for the sight-impaired.

saturation: In video, saturation is the intensity of a color, specifically defined as its "distance" from white (for example, a lightly saturated pink vs. a deeply saturated red); also, the professional name for a video monitor's color control. In audio, saturation occurs when an analog tape becomes fully magnetized and an increase in signal input level does not produce a corresponding increase in recorded level; saturation can also occur in the magnetic structure of the tape heads.

scaler: A circuit or digital signal processing program that converts a video signal from one image format to another (for instance, from 480i to 720p).

scan doubler: see *line doubler*.

scan line: One of the thin horizontal strips that together make up a video field or frame. The basic subunit of an analog video image; see *pixel*.

scan-velocity modulation: In a tube TV, a technique for improving the apparent sharpness of an image by varying the rate at which a scanning electron beam sweeps across the screen or the face of a CRT.

screen-door effect: A faint gridlike pattern in pictures on LCD and DLP projection TVs from the control circuitry surrounding the individual pixels in an LCD or DLP chip, which becomes visible when the image is blown up to a large size.

SDTV: see *standard-definition TV*.

SDTV monitor: A TV set that can display a 480i-format standard-definition digital TV signal when connected to an outboard tuner/decoder.

SECAM (sequentiel couleur avec mémoire): The broadcast TV standard in France and much of the former Eastern Bloc; see *PAL* and *NTSC*.

Secure Digital (SD) card: A flash-memory format supported by Toshiba, Panasonic, and others.

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sensitivity: A speaker measurement that tells how much sound, expressed as sound-pressure level (or SPL) in decibels (dB), is produced at a specified distance (usually 1 meter) from the speaker when it is fed a specified input signal (usually 2.83 volts, equivalent to 1 watt into 8 ohms). A speaker that is 3 dB more sensitive than another requires only half as much amplifier power to deliver the same playback volume.

separation: see *channel separation*.

Serial Copy Management System (SCMS): Incorporated in all consumer digital audio recorders to limit digital-to-digital copying of copyrighted music to a single generation. Any number of first-generation digital copies can be made from a digital original, but the resulting copies cannot themselves be copied via a direct digital link.

server: Any device that makes stored data available to other devices, often through a wired or wireless network; see *client*, *media server*.

servo: Short for servomechanism, a negative-feedback control system that uses an output signal as feedback, comparing it to a reference signal; the difference between them is used to correct the output; a servomechanism is sometimes used in powered speakers to reduce distortion.

set-top box: Any of several types of decoder, such as for cable TV, digital TV, or Internet functions, designed for hookup to a TV set.

7.1-channel: A 6.1-channel system where a recorded back surround channel is reproduced by two speakers, usually with individual amplification. Strictly speaking, however, unless additional processing is applied to send a different signal to each speaker, it's still one channel in surround sound terms.

shadow mask: A sheet of metal perforated with thousands of tiny holes that are aligned with the electron guns within a color CRT; the purpose is to prevent the electron beam from one color from hitting the phosphors of another.

sharpness control: A TV control that affects the middle to high frequencies of the luminance signal, which convey the subjective impression of sharpness.

shotgun microphone: A long, tubular microphone that is highly sensitive in the direction its tip is pointed and strongly rejects sounds from the side and rear; most often sold as a camcorder accessory; see *cardioid microphone*, *omnidirectional*.

shutter speed: Since camcorders don't have mechanical shutters, this refers to the length of time the image sensor is exposed to the image before its contents are read out.

signal: An electromagnetic wave, current, or voltage whose variations carry audio or video information.

signal processor: A component that manipulates line-level audio signals; equalizers and surround sound processors are the most common varieties.

signal-to-noise ratio (S/N or SNR): Measured in decibels (dB), the difference in level between a signal (usually at a standard level) and the residual noise of the component through which it is passed; higher numbers are better.

6.1-channel: Any system that has provisions for a back surround channel, reproduced by one or two speakers centered behind the listening position, in addition to the conventional left and right surround channels of a 5.1-channel system; see *7.1-channel*.

16:9, 16x9: see *aspect ratio*.

slew rate: The rate at which a signal changes amplitude, or the maximum rate at which an amplifier can change the amplitude of its output; usually expressed in volts per microsecond.

slope: The rate at which a filter or crossover attenu-

ates out-of-band frequencies, in decibels per octave. Typical slopes are 6, 12, 18, and 24 dB/octave, which are also referred to as first- through fourth-order filters, respectively; the higher the order, the faster the rolloff.

SmartMedia card: A flash-memory format used in many MP3 players and digital still cameras.

solid-state: Electronic circuits whose active elements are transistors and integrated circuits, and specifically not vacuum tubes.

Sony Dynamic Digital Sound (SDDS): A multichannel audio reproduction system for movie theaters utilizing ATRAC encoding and featuring as many as five front channels along with two surround channels and an LFE channel.

Sony/Philips Digital Interface (SPDIF): The standard format for exchanging digital audio signals between consumer audio components. Connections can be coaxial or optical.

sound-pressure level (SPL): A measure of physical loudness, usually encountered in speaker sensitivity ratings; expressed in decibels.

soundstage: The virtual space created by an audio system; either the imaging of a stereo pair of speakers at the front of a room or the three-dimensional sound field created by all of the speakers in a multichannel home theater system. (Of course, the original soundstage is the *real* space where a movie soundtrack is recorded.)

speaker (or loudspeaker): A component that accepts audio signals from a receiver or amplifier and converts them into sound waves for listening at some distance (unlike headphones); see *driver*.

speaker-level: Audio signals that have been sufficiently amplified to drive a speaker; see *line-level*.

specification (spec): A manufacturer's numerical rating of a component's performance in terms of a discrete, measurable characteristic such as frequency response or distortion.

spectrum: The frequency and amplitude distribution of the various pure-tone components that make up a complex waveform; commonly shown in a graph with amplitude on the vertical axis and frequency on the horizontal.

standard-definition TV (SDTV): A subset of the digital TV (DTV) standard covering digital signals that will yield picture quality at least as good as that of analog NTSC television; see *high-definition TV (HDTV)* and *enhanced-definition TV (EDTV)*.

ST (AT&T ST) connection: A fiber-optic digital audio connector that uses glass fibers rather than plastic; see *Toslink*.

stereo: The use of two or more audio channels to provide spatial realism or directional effects; nowadays "stereo" usually refers only to two-channel programs, equipment, or systems. See *imaging*, *binaural*, *multi-channel*.

streaming media: Digital audio or video data downloaded from the Internet or from a computer on a home network for simultaneous decoding and playback.

subsonic filter: A misnomer for *infrasonic* filter.

subwoofer: A speaker designed to reproduce only low-bass frequencies. A powered subwoofer contains an amplifier and an electronic crossover.

Super Audio CD (SACD): A high-density audio disc that uses Direct Stream Digital (DSD) audio encoding. "Hybrid" SACD pressings are playback-compatible with both SACD and standard CD players.

supertweeter: A tweeter used to reproduce only extremely high frequencies.

Super VHS (S-VHS): A development of the VHS video-

cassette system that originally required special tape to obtain its extended luminance resolution.

surround: Channels or speakers in a multichannel audio system whose purpose is to create a sense of sonic envelopment or all-around directionality. Also a compliant suspension at the outer edge of a speaker driver's diaphragm.

surround sound: A reproduced sound field that is three-dimensional instead of a soundstage heard primarily in front of the listener; an audio system or part of a home theater system that creates such a sound field. See *5.1-channel*, *6.1-channel*, *Dolby Digital*, *Dolby Surround*, *Dolby Surround EX*, *Dolby Pro Logic*, *DTS*, *DTS-ES*, *home theater*, and *THX*.

S-video: A connector that separately carries the luminance and chrominance information for a single video signal; a set of video signals divided into luminance and chrominance components.

sync: That part of a video signal that tells a video component what part of the picture is being processed. Sync signals are usually carried on a luminance waveform except in computer video signals and some wide-band component video, where they are completely separate; see *red*, *green*, and *blue (RGB)*.

T

telephoto lens: Any lens of longer than normal focal length; used for telescopic views of distant subjects.

3-D comb filter, 3-D Y/C separator: Circuits used to extract the luminance and chrominance signals from a composite-video signal. The three dimensions are left, right, and time.

3:2 pulldown: see *2:3 pulldown*.

through-the-lens (TTL): Any camcorder function that operates on signals obtained from light entering the lens, including autofocus, white balance, and exposure controls (aperture, shutter speed); also an obsolescent type of digital circuitry (transistor-to-transistor logic).

THX: A certification for audio components of a home theater system that adhere to standards and specifications developed by Lucasfilm THX and can reproduce soundtracks with very high fidelity to what is obtained in a movie sound studio. There are two grades of certification, THX Ultra2 (for price-no-object setups) and THX Select (for modest room sizes and budgets).

THX Surround EX: Circuitry for decoding Dolby Digital Surround EX signals approved by THX Ltd.; may include THX enhancements of plain DD Surround EX.

tilt: A video-camera shooting technique that swings the camera vertically over a scene; see *pan*.

time-alignment: A speaker design in which all of the drivers are arrayed, or their crossover delays adjusted, so that their sound reaches the listener's ears at the same time.

tint control: The consumer video-monitor control that adjusts the general coloration of an image; see *hue*.

titrer: A camcorder function or video accessory that displays user-entered text over a video image.

tone controls: A kind of rudimentary equalizer included in most receivers, and in some preamplifiers and integrated amplifiers as well, that allows changing the relative balance among preset frequency bands, usually bass and treble but sometimes also midrange.

Toslink: The most common fiber-optic connector for digital audio; uses plastic fibers; see *ST*.

total harmonic distortion (THD): The percentage of an audio output signal that consists of spurious harmonics, or whole-number multiples, of the input frequencies that were introduced by an amplifier or another component through which the signal passed; lower numbers are better.

GLOSSARY

total harmonic distortion plus noise (THD+N): The sum of all distortion and noise, expressed as a percentage of the output signal; lower is better.

tracking: The ability of a CD or DVD player to follow the pattern recorded on a disc in the presence of physical or optical disturbances.

transducer: Any device that transforms energy of one type into energy of another type. Speakers, microphones, image sensors, CRTs, and plasma displays are all transducers.

transformer: A passive electrical device that raises or lowers AC voltages (as in a power supply), or changes input or output impedances; used in some amplifiers to match their output impedance to that of the speakers.

transient: A rapid change in the waveform of an audio signal caused by the attack of musical instruments, especially percussion; any short-duration sound.

transient intermodulation (TIM) distortion: A type of audio distortion that can occur in a feedback amplifier when the slew rate of a signal approaches or exceeds the amplifier's maximum slew rate. TIM is not a major problem with most amplifiers and receivers today.

transistor: The basic solid-state amplifying element used in most audio components; see *solid-state, field-effect transistor (FET), and MOSFET*.

transport: The parts of a DVD/CD player or a tape deck/VCR that move the disc or tape, including the motor(s), spindle, reel hubs, and other mechanisms.

treble: The upper part of the audio spectrum, from 2 or 3 kHz up to 20 kHz; see *bass* and *midrange*.

tuner: A component, or part of a component, that receives radio or TV signals from an antenna or cable connection, allows the user to select a station, and demodulates the audio or audio/video signal from the broadcast radio-frequency (RF) signal.

tweeter: A speaker driver designed to reproduce treble frequencies.

2:3 pulldown: Video processing that compensates for the different frame rates in film (24 frames per second) as opposed to video (30 fps).

two-way, three-way, and so on: Refers to the number of frequency bands a speaker's output is divided into. A two-way speaker has a woofer and a tweeter; a three-way speaker adds a midrange driver. Four-way power towers add a built-in subwoofer.

U

universal remote control: A remote that can operate multiple devices, not simply a single component, and usually from more than one brand or manufacturer. Universal remotes are either preprogrammed with control codes for a multitude of specific products from most popular brands, or they can be "taught" the infrared codes used by the dedicated remotes you already have, thus replacing them.

Universal Serial Bus (USB): A general-purpose standard connection for transferring digital audio, video, or control signals between A/V components, computers, and computer peripherals. USB 2.0 is a newer version of the interface capable of much higher data rates.

usable sensitivity: A tuner specification that indicates the minimum level of an incoming mono antenna signal required to produce a satisfactory output signal, one with no more than 3% noise and distortion; lower numbers are better. Less relevant in urban and suburban reception areas, where antenna signals are stronger, than the 50-dB quieting sensitivity specification.

V

V-chip: An integrated circuit built into a TV set that allows parents to automatically restrict the viewing of

objectionable material. It works in conjunction with program-content codes transmitted with the TV signal; see *Extended Data Service*.

vent: see *bass-reflex, port*.

vertical blanking interval (VBI): The part of a TV signal that is blanked to allow time for a direct-view CRT set's electron gun to move from the bottom to the top of the screen. EPG, closed captioning, Internet links, and other data can be inserted in the VBI.

VGA: A PC graphics standard equivalent to RGB+H/V and found as an output option on some HDTV tuners and as an input on some HDTV monitors and projectors. Instead of five RCA jacks, it uses a 15-pin D-Sub connector.

Video CD: A forerunner to the DVD system designed to produce "VHS-quality" video using a standard-size CD and MPEG-1 video encoding; also see *MPEG-2*.

Video mode: One of the two methods of recording video on a DVD-RW disc (the other is VR mode); essentially the same format used for commercial DVD-Video discs.

viewfinder: A display device used to monitor the image while recording with a camcorder; common types range from simple optical lenses to miniature CRTs or LCD screens viewed through magnifying optics.

viewscreen: A direct-view display device on a camcorder — typically an LCD screen measuring from 2 to 4 inches (diagonal) — used to monitor the image while recording.

virtual surround sound: A system that can simulate the effect of multichannel surround sound using only two speakers or headphones. Many of these systems work well if you sit exactly in the "sweet spot," but the illusion diminishes or vanishes if you move.

voice coil: In a dynamic speaker or microphone, a hollow cylinder wound with wire that is immersed in the field of a permanent magnet and attached to a diaphragm. In a speaker, current through the wire from the amplifier creates an alternating magnetic field in the coil that causes it and the diaphragm to move back and forth according to changes in the input signal. In a microphone, sound moving the diaphragm also moves the coil, generating a signal voltage in it that is fed to a recorder or directly to a sound system for amplification.

voltage: The measure, in volts, of the strength of an electrical field; it can be thought of as pressure pushing electrical charges through a circuit, forming a current.

VR mode: One of the two methods of recording video on a DVD-RW disc (the other is Video mode). Among other things, VR mode allows fine-grained editing operations, but the recordings are less likely to be compatible with standard DVD players than Video mode recordings.

W

watt (W): The primary unit of electrical power.

watts per channel: A specification of the output power an amplifier or receiver can deliver to each speaker connected to it.

WAV (.wav) file: A Microsoft Windows file format for storage of audio data, typically, but not necessarily, in linear-PCM form; often applied to other file formats that also store PCM audio data.

waveform: A graphical representation of an audio signal as the curve that results when the instantaneous voltage (vertical axis), representing sound pressure, is plotted across time (horizontal axis); the positive-going portion of a waveform moves upward and the negative-going portion downward.

weaving: One of the two primary methods of progressive-scan conversion (also see *bobbing*), consisting

of the reinterlacing of separately recorded fields. See *interlaced* and *progressive scan*.

white balance: In a camcorder, the control or system that compensates for the different quality of color produced by different sources of scene illumination (sunlight, incandescent bulbs, and so on) as seen by its image sensor.

white noise: A type of random noise characterized by equal energy per hertz (in contrast to pink noise). White noise is naturally generated by analog electronics, and the ear hears it as a treble-dominated hissing.

wide-angle lens: Any lens of shorter than normal focal length, which offers a wider-than-normal field of view; wide-angle accessory lenses are available for many camcorders.

wideband component video: An output on a DVD player or other device that can generate or pass progressive-scan or high-definition video signals to a TV set or monitor able to display them.

wind-noise filter: A high-pass filter in the microphone circuit of a camcorder that is designed to reduce rumble caused by wind passing over the microphone's diaphragm.

widescreen: A piece of program material or a component that contains or operates with images of wider than "normal" aspect ratio (which is 4:3). High-definition TV's widescreen aspect ratio is 16:9. Display of wider images on a 4:3 screen requires letterboxing or pan-and-scan techniques.

Wi-Fi (Wireless Fidelity): A certification logo for Ethernet devices that comply with certain wireless standards (see *IEEE 802.11*).

Windows Media Audio (WMA): An audio codec, developed by Microsoft, used for downloaded music files and streaming media applications.

Windows Media Video (WMV): A video codec, developed by Microsoft, for streaming multimedia and downloaded video files. A high-definition version, WMV HD, is now available.

wipe: A video transition technique in which a new scene gradually replaces the old scene at a boundary that moves over the image.

woofer: A speaker driver designed to reproduce bass or bass/midrange frequencies.

X

XLR: A three-conductor balanced-line connector; also called a Cannon connector.

Y

Y,C_b,C_r: Digital component-video signals as recorded by professional digital video recorders and encoded by an MPEG-2 encoder for recording on a DVD; often confused with Y,P_b,P_r.

Y,P_b,P_r: Analog component-video signals as obtained at the outputs of a DVD-Video player or a digital TV set-top box.

Z

zone: A listening/viewing area in a multiroom audio or A/V system.

zoom: A feature of video devices, principally camcorders and DVD players, that lets you enlarge a portion of the picture.

zoom lens: A lens of variable focal length, usually ranging from a mild wide-angle setting to a telephoto setting. Often the lens's optical zoom range is supplemented by an electronic zoom function that enlarges the center of the image on the CCD. **S&V**