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**1:1:** One to one. In standard usage, a copy of the edited *worktrack* copied onto another roll of striped mag film so that sound editors and mixers will have access to the *worktrack*. In general, however, it denotes any single-track-to-single-track copy, and thus has variants 3:3, 4:4, etc.

**3:1 rule:** A rule for microphone placement: space microphones at least three times the mic-to-source distance. For example, if two mics are each placed one foot from their sound sources, they should be at least three feet apart. This method prevents the blurred, colored sound caused by *phase cancellation* between microphones.

**3-stripe:** See *3-track*.

**3-track:** A mix of all the soundtracks of a film, in which the sounds are divided into the *DME* stems, each stem recorded on a separate stripe along the width of the 35mm magnetic film. Also called *three-stripe*.

**4+2:** Four Plus Two. Film sound slang for a 6-track element (usually mag film) that contains a 4-track *M&E*, one track of material for a foreign-language mix, and one track of original dialog as a reference.

**4:2:4:** See *Dolby ProLogic™*.

**4-track:** A film soundtrack format used for overseas markets. Called a *completely filled mix*, the four-track stereo *M&E* mix is ready for the addition of dubbed languages. The *M&E* tracks should include background sound effects and room tone for every scene, i.e., all sound except dialog.

**50% level:** The standard reference level for optical sound recordings that corresponds to the width of the track at 50% modulation, or at 6dB below clipping. In practice, there is about 2dB headroom available, if all of the recording/playback heads are perfectly aligned.

**5.1-channel format:** A digital, discrete *six-channel mix* of Left/Center/Right/Left Surround/Right Surround/subwoofer mix. 5.1 is not a specific surround format tied to any particular company or *codec*. However, all the hardware is the same for any 5.1-based system except for the *codec*. It is planned that CDs, laserdiscs, and DVDs will have an ID flag to let the decoder know which *codec* was used, enabling decoders to recognize all incoming bit-streams and automatically switch modes and process the incoming signal appropriately. It is a listening platform and hardware concept for a surround loudspeaker system. See *DTS*, *Dolby Digital*, *HDTV*, *CDS*, *LFE*.

**5-2-5 matrix:** See *Logic 7*.

**70mm:** See *film*.

**7.1 Split-Surround:** The additional two speakers are employed at the front of the soundstage to deliver more uniform sound in wide-format theaters of screen widths of up to 60' or more, where there might be seats with *hole-in-the-middle* in between the C-L, and C-R channels. See *SDDS*.

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**85:** A common *SPL* level reference in the film audio business, which is found by setting the *SPL* of pink noise is sent through one speaker (L, C. or R) at 0VU (analog) bus level, which is the equivalent of  $-20\text{dBFS}$  in digital recording. Measurement is made at the console, with an *SPL* meter set to *C-weighting* and the meter *ballistics* set to slow response.

**88:** The *SPL* for *Dolby Stereo SR* films. If a film has been monitored at 85 during the final mix, the stems will be lowered 3dB each when making an *SR Lt-Rt printmaster* to accommodate the increased gain from summing the stems.

**A:** The left-hand part of a *stereo* signal.

**A-2:** See *Voice of the Theater*.

**A-3:** *Dolby* laboratories low-bit-rate *codec* system used in its *Dolby Digital* format film, in both broadcast and consumer video formats.

**A-4:** See *Voice of the Theater*.

**A-7:** See *Voice of the Theater*.

**A440:** See *concert pitch*.

**AAC:** *Advanced Audio Coding*. A flexible *streaming* format that supports multichannel audio including subwoofer and embedded data channels, using a variety of sample rates up to 96kHz. AAC is being developed as a successor to *MPEG-2*.

**Aachen Head:** A *binaural* microphone developed by *Head Acoustics*.

**AB recording:** In the US, this means recording with a *spaced pair*. In Europe, this means recording with a *coincident pair*.

**A/B:** A comparison between two recordings of the same material; pre- and post-equalization, or pre- and post-effects, or any other comparison between two similar audio devices.

**AB-reel:** Term for a 23-minute or 2,050' maximum reel of film specially made for theater screening. The AB-reel may originally have been made from two 1,000' edit reels; "Projection reel 1AB" would have been originally been reel #1 and reel #2 during editing and mixing. [In the event that the total footage of the first three editing/mixing reels added up to less than 2,050', there may be a projection reel "1ABC," but this is rare.] It is becoming more commonplace to edit films in AB reel format as the *mag film* units are gradually replaced with *DAWs*. AB-reels are also known as "big reels" or "2,000-foot reels."

AB-reels are not the same as *A/B-rolls*, in which the camera negative is checkerboarded into two strands, allowing for simple optical effects such as fades and dissolves to be made when making original-negative prints (see *EK Neg*) called *interpositives*. This latter process is not limited to two (A,B) rolls, but can involve as many rolls of film as desired, e.g., a camera negative cut in four strands would have a "D-roll."

**ABS:** *ABSolute time*. *Timecode* which is the actual running/recording time in HH:MM:SS, where 00:00:00 is the head of the tape. For example, *DATs* use *ABS timecode*. See also *feet/frames*.

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**absorption coefficient:** The ability of a material to absorb, rather than reflect, sound waves. A higher absorption coefficient means better acoustical *damping*. See *bass trap*, *boundary effect*, *standing wave*, *Sabins*.

Material	Frequency (Hz)*					
	125	250	500	1,000	2,000	4,000
Acoustic Panels	0.15	0.3	0.75	0.85	0.75	0.4
Brick	0.024	0.024	0.03	0.04	0.05	0.07
Carpet	0.05	0.1	0.2	0.25	0.3	0.35
Concrete	0.01	0.01	0.02	0.02	0.02	0.03
Curtains	0.05	0.12	0.15	0.27	0.37	0.5
4" Fiberglass	0.38	0.89	0.96	0.98	0.81	0.87
Wood Floor (joists)	0.15	0.2	0.1	0.1	0.1	0.05
Glass	0.03	0.03	0.03	0.03	0.02	0.02
Seated Person	0.18	0.4	0.46	0.46	0.5	0.46
Plasterboard	0.3	0.3	0.1	0.1	0.04	0.02
Plywood on 2" Batten	0.35	0.25	0.2	0.15	0.05	0.05
3/4" Wood Panel	0.1	0.11	0.1	0.08	0.08	0.11

\*Note: A coefficient of 1.0 means 100% absorption, such as an open window, while 0.0 means 100% reflection. All figures are given for one square meter of material.

**AC-1:** A form of *ADPCM* first used in 1985 for digital radio (sound-only) applications and since adopted for other *DBS* (direct broadcast satellite) services, including soundtrack-with-video, satellite communication networks, and digital cable radio systems. AC-1 has a data rate between 220 kbps and 325 kbps.

**AC-2:** A *transform encoding/decoding* scheme for audio *compression* developed by Dolby labs which uses 256-band transform coding at a data rate of 128 kbps or 192 kbps on two channels. Used in the Dolby Fax System and also *DP5xx encoding*.

**AC-3:** See *Dolby Digital*.

**ACA:** Active Combining Amplifier. See *combining amplifier*.

**Academy centerline:** See *optical track*.

**Academy curve/Academy sound:** The name of the standard mono *optical track* that has been around since the beginning of sound on film. Standards were codified in 1938, although the standard has changed somewhat through the years. The standard specifies a flat response throughout the range of 100Hz–1.6 kHz and is down 7dB at 40 Hz, 10dB at 5 kHz, and 18 dB at 8 kHz. Also called an *N-Curve*. See also *X-Curve*.

**Academy leader:** The visual countdown that precedes the first program *frame* of a motion picture. Symbols and numbers on the academy leader are used for aligning the various film reels and the optical track for composite printing, for aligning the *workprint* and edited soundtracks for mixing, and for timing the change-over from one reel of film to another during projection. Academy leader contains one number per foot following the Picture Start, with 11, 10, etc., leader to three. (As projected, these numbers appear upside-down.) Named after the Academy of Motion Picture Arts and Sciences, which sets all film format standards. See also *leader*, *SMPTC Universal leader*, *plastic leader*, *fill leader*, *LFOP*.

# A

**academy Theater:** Specifically, the Samuel Goldwyn Theater at the Academy of Motion Pictures Arts and Sciences on Wilshire Boulevard in Los Angeles, considered the best-sounding theater in the world. Academy members screen films at the Academy Theater prior to voting on them for the Oscar awards.

**AC bias:** See *bias*.

**accelerando:** An indication that the *tempo* of a piece of music should gradually be increased.

**acceptance angle:** The usable working area in front of a microphone is defined by the *polar pattern* and is called the acceptance angle.

**accidental:** In a musical scale, the accidentals are the extra sharp and flat notes that are not part of the *diatonic* series. For example, in the key of C on the piano, the accidentals are the black keys.

**AC coupling:** Coupling between electronic circuits that passes only time-varying signals (i.e., alternating current), not direct current.

**A-chain:** The part of the motion picture reproduction system in a theater that contains the sound transducer (such as an optical analog track reader or digital sound format decoder), preamp, noise reduction and matrix decoding, where applicable. The A-chain equipment decodes the sound in preparation for the *B-chain* and loudspeakers.

**AC-M:** A newly developed *codec* based on a soft data *compression* ratio of between 2:1 and 3:1. Used in the Dolby Digital Dubber, it is designed specifically to record eight tracks of 20-bit material on removable media, including Iomega Jaz and MO drives. AC-M is said to be optimized for multiple record/replay generations. Initial tests have reported as many as 14 codec processes being possible with no audio degradation.

**Acmade:** The British manufacturer of *edgecoding* machines.

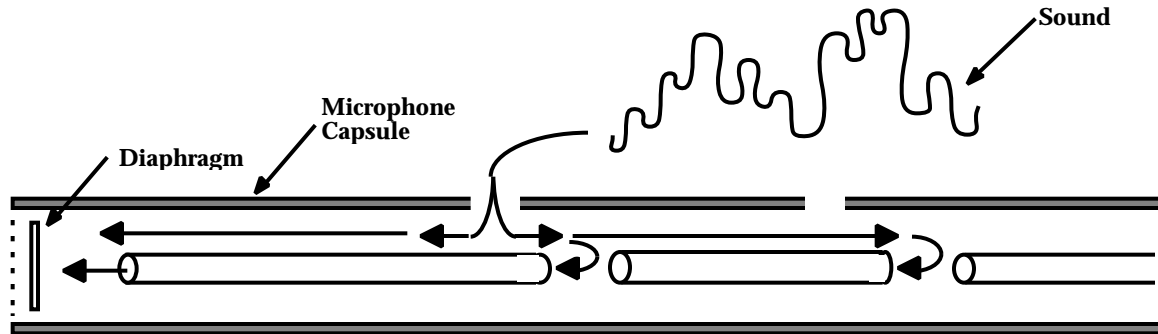
**acoustic baffle:** See *baffle*.

**acoustic feedback:** A squealing sound when the output of an audio circuit is fed back in *phase* into the circuit's input. See *feedback*.

**acoustic intensity:** See *sound pressure level*.

# A

**acoustic labyrinth:** (1) A type of design for the housing of highly directional microphones that enhances the rejection of off-axis sources. Two or more concentric tubes in front of (and sometimes around) the capsule create a compact series of folded pathways through which all sounds approach the diaphragm. Those arriving on-axis reach the capsule via these paths in *phase coherence*. Off-axis sounds, due to the different lengths of the passways, reach the diaphragm and are partially or fully removed due to *phase cancellation*.



**Acoustic Labyrinth**

Sound entering from sides and rear arrive out-of-phase

(2) A type of speaker enclosure in which sound waves emanating from the rear of the *woofer* cone travel through a long, folded interior path before coupling with the outside. This extends bass response considerably.

**acoustic lens:** A device placed in front of a high-frequency speaker that disperses or directs the sound in a desired pattern. Normally used to increase the angle of dispersion, either horizontally, vertically, or both.

**acoustic suspension:** A *loudspeaker* designed for, or used in, a *sealed enclosure*. Typically, a low-frequency *loudspeaker baffle* where most of the damping of the cone is the result of the elasticity of the air in the sealed cabinet.

**acoustics:** The science or study of sound and its interaction with the human hearing mechanism.

**active:** (1) An audio device which requires a power source such as from an AC line or battery, as opposed to *passive*. Sometimes amplifying components such as transistors or ICs are called active circuit elements. (2) See *MIDI patchbay*.

**active crossover:** See *crossover network*.

**active equalizer:** An equalizer that employs *active* components such as transistors or ICs in its processing circuits. A pre-amplifying circuit generally follows each stage of actual equalization, boosting the signal level to restore *unity gain*. See also *passive equalizer*.

**active monitor:** A type of *loudspeaker* which has amplification circuitry built-in. In addition, a true active monitor system utilizes active equalization and active crossovers to precisely contour the system sound. If there is only one amplifier driving all transducers, and/or there is no active equalization or crossover circuitry, the terms *powered speaker* or *powered monitor* are more correct.

# A

**active sensing:** A MIDI system message that carries no note data or control instructions, but simply indicates to a receiving device that the MIDI line is in working order.

**A/D:** See *analog-to-digital converter*.

**adagio:** A slow or leisurely tempo: 66-76 bpm.

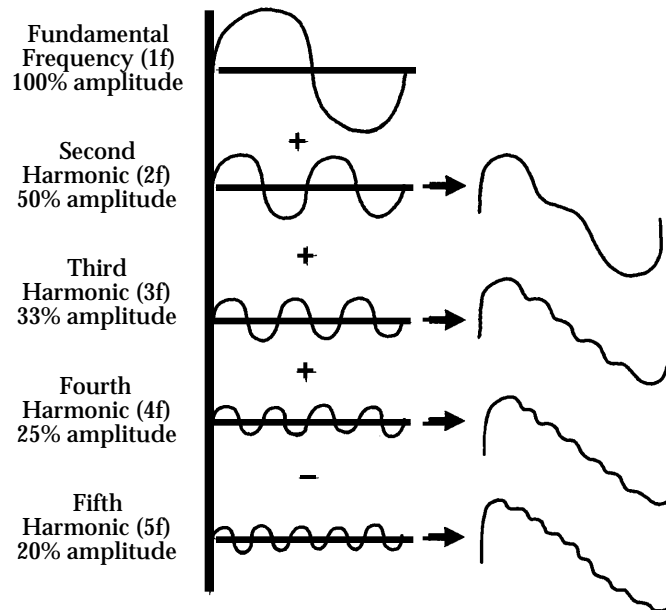
**A-DAM:** Akai Digital Audio Multitrack. A format developed by Akai in 1987 for recording twelve tracks of digital audio data on a standard *Video-8* cassette and which allows the synchronization of multiple decks for 24- or 36-track recording. The tape runs at four times the normal *Video-8* speed and gives about 15 minutes of recording time at 44.1kHz.

**ADAT:** Alesis Digital Audio Tape. A second-generation (1992) *MDM*. Like the Tascam DA-88, ADAT systems record digital audio on consumer videocassette formats and provide for interlocking up to 16 8-track, rack-mount recorders in sample-accurate (48kHz) sync for up to 128-track recording. ADAT is a 16-bit format, currently supported as well by Panasonic, using T-180 S-VHS tape. ADAT-II is a newly proposed 20-bit S-VHS format used by newer Alesis and Studer 8-track recorders. See also *DTRS*.

**ADB:** Apple Desktop Bus. The original *serial* interface for the keyboard, mouse, and other “desktop” peripherals on Apple computers. ADB has recently been replaced by *USB*.

**ADC:** See *analog-to-digital converter*.

**additive synthesis:** The generation of complex musical waveforms in electronic synthesizers by the linear addition of *sine wave* components whose frequency relationship is a *harmonic series*. See *sample synthesis*, *sound synthesis*, *subtractive synthesis*.



**The Making of a Complex Waveform**

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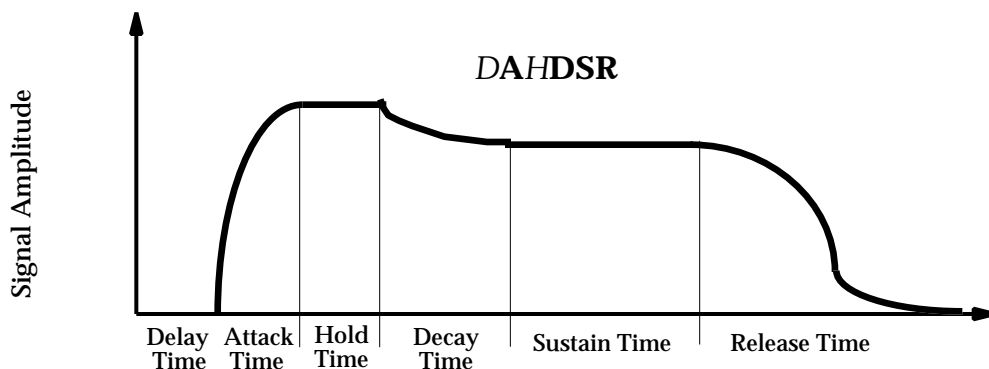
**address track:** A control/timing track on the edge of videotape (1", C, and 3/4" formats) that contains control data for quick and accurate location of program material, recorded at the same time as the picture. See *control track*.

**adjustable turnover:** A variable tone control in a preamplifier which allows the adjustment of the boost/cut and the frequency below or above which the gain/attenuation is applied (turnover), but not the *rolloff slope* of the *shelving equalizer*; if it were possible to adjust the rolloff slope, the result would be a fully *parametric* tone control.

**ADPCM:** Adaptive Delta (Differential) Pulse Code Modulation. A type of *split-band*, time-domain audio *compression* algorithm for 16-bit digital audio based on describing level differences between adjacent samples. Different from conventional linear PCM by coding only level differences between samples, rather than the absolute level of each sample. According to the characteristics of the audio signal, ADPCM adapts the step size represented by each quantizing interval to accommodate rapid changes in level caused by high frequencies or *transients*, thereby providing an overall reduction in bit rate; the compression ratio is 4:1. There are at least two ADPCM standards: Microsoft and IMA/ADPCM, the latter popular for multimedia applications. See *delta modulation*, *split-band*, *sub-band*, *transform coding*.

**ADR:** Automatic Dialogue Replacement. Recording of dialog for a scene after it has been shot, usually to replace *location sound* that is unusable because of street noise, camera noise, etc. The *workprint* and *magnetic film* transfer for the scene are spliced into continuous loops and projected in a sound studio so that the actors can recreate the phrasing and feeling they had on the set. New takes are recorded on a separate mag film loop and/or other synchronous tape until an acceptable performance is obtained. *Virgin looping* is the process of recording onto a blank piece of mag film which would later be manually synced to the picture. Also known as *looping*. See *lip sync*.

**ADSR:** Attack/Decay/Sustain/Release, the four segments of a common type of sound synthesizer *envelope*. The controls for these four *parameters* determine the duration (or in the case of sustain, the height) of the segments of the envelope. Two additional parameters, D (Delay Time) and H (Hold Time) are available on some synthesizers. See *envelope*, *envelope generator*.



**ADT:** Auto Double Tracking. An effect produced by taking a track and copying the material onto another track, delayed by a few ms, then mixing it with the original. Like *chorusing*, but with a shorter delay. See also *double-tracking*.

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**AES:** Audio Engineering Society. The professional organization whose members report on new technological developments in audio, and bring together designers, manufacturers, and users of various audio equipment to establish international standards.

**AES/EBU:** Audio Engineering Society/European Broadcast Union. A standard for encoding multiple channels of digital audio along a *serial* cable, officially named AES3-1985. The standard specifies 3-pin *XLR* jacks and *balanced line* cables, usually running at +4dBm. Originally designed as a *self-clocking* system, a subsequent addendum to the specification permitted *master clock* systems. Two channels of digital audio data are *multiplexed* on a single conductor within the cable, with a maximum bit depth of 24 bits. Data are transmitted at 64 times the sample rate, allowing the possibility of sending two channels of 24-bit audio (plus *ECC*) to play the resulting stereo signal in *real-time*. AES/EBU does not carry the *SCMS* copy code. It has been adopted by the *EIAJ*, which calls it the CP-340, Type 1. See also *S/PDIF*.

**AES/EBU null clock:** See *null clock*.

**AF:** Audio Frequency. Means having frequencies within the audible range, usually taken to be 20Hz-20kHz. This frequency range is an average; many people hear tones below 20Hz, although most people are virtually deaf above 15kHz or 16kHz.

**AFM:** (1) Audio Frequency Modulation. A processing scheme used for recording high-quality analog audio in videocassette recorders equipped with “Hi-fi” stereo audio. (2) American Federation of Musicians. The union that represents professional musicians in all their client and employer relations.

**after-fade listen:** See *post-fade listen*.

**aftertouch:** A type of *MIDI controller* data, generated by pressing down on one or more keys after they have reached and are resting on the keybed. Also called *pressure*. See *channel pressure*, *poly pressure*.

**AFTRA:** American Federation of Television and Radio Artists.

**AGAC:** American Guild of Authors and Composers. A third performing rights organization similar to ASCAP and BMI but much smaller. AGAC primarily represents modern classical composers.

**AGC:** See *AVC*.

**aharmonic:** See *inharmonic*.

**AIFF:** Audio Interchange File Format. A common Macintosh audio file format. It can be mono or stereo, at sampling rates up to 48kHz. AIFF files are QuickTime-compatible and support uncompressed mono, stereo, and multichannel audio at many different resolutions and sampling rates, including the *CD* standard. It was designed to serve as a universal interchange format that allows any program to open a digital recording created by any other program. AIFF is high-quality audio, used in pro-level Mac and PC audio software. As AIFF is a standard for uncompressed audio, Apple introduced AIFF-C which can use *MACE* and *IMA/ADPCM* compression with ratios as high as 6:1, but the audio sound quality suffers.

**AIM:** Amplitude Intermodulation Distortion. *Intermodulation distortion* where one signal will cause *amplitude modulation* of another signal.

# A

**A.I.R.:** Always In Record. The practice in a recording session to record virtually everything on the off-chance that something which was not formally recorded as a *take* will be useful.

**airline version:** A remixed and possibly re-edited version of a film that has any objectionable material removed. The airline film standard is more stringent even than those of the broadcast networks, and is often used as a benchmark for TV viewing.

**air suspension:** An *acoustic suspension* loudspeaker.

**algorithmic composition:** A type of composition in which the large outlines of the piece, or the procedures to be used in generating it, are determined by the human composer while some details, such as notes or rhythms, are created by a computer program.

**alias:** A file on a Mac that serves as a pointer to another file. The most common use for an alias is to sit on a desktop or in a top-level folder, where the real document or application file is nested deep within the file system. This is similar to a *shortcut* file on a PC-type computer.

**aliasing:** Distortion that is produced when higher *harmonic* components of the input audio signal sampled by a digital recording device, or generated within a digital sound source, lie above the *Nyquist frequency*. This happens when the sampling rate is less than twice the frequency of the signal being sampled. The effects of aliasing differ from some other types of distortion in that its pitch changes radically when the pitch of the intended sound changes. Also called *foldover*. See *anti-aliasing filter*.

**alignment:** (1) In tape recording, the process of adjusting all parameters of the position and orientaton of the tape heads and guides with respect to the tape path. See *azimuth*. (2) The adjustment or calibration of any parameter of an electronic circuit or device, e.g., program level, bias level, to bring this parameter into conformance with an industry standard. (3) The process of matching mixer and recorder meters so that only one meter needs to be watched during recording. When the mixer and (analog) recorder are both peaking about 0VU, this minimizes the noise and distortion in both units. Ideally, both units would be matched with a steady tone (the C or B two octaves above middle-C, or about 2kHz, for example.) See *line-up tone*.

**alignment recording:** See *biased noise*.

**alla breve:** A term historically related to mediæval note lengths, in which the breve was one of the shortest notes. In modern usage, the term is usually used to denote  $\frac{2}{2}$  (cut-time). In commercial and popular music, it is frequently used to mean *half time*, i.e., play twice as fast. See *time signature*.

**allegro:** A lively to reasonably fast *tempo*: 116-150 bpm. *Allegretto* is a slightly slower tempo than *allegro*.

**All-Notes-Off:** A MIDI command, recognized by some but not all synthesizers and sound modules, that causes any notes that are currently sounding to be shut off. The *panic button* on a synth or sequencer usually transmits All-Notes-Off messages on all 16 MIDI channels.

**all-pass filter:** See *all-pass network*.

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**all-pass network:** An all-pass network, also called an *all-pass filter*, is an electrical circuit with a uniform amplitude response versus frequency response, but with a *phase-shift* which does not vary in a *linear* relationship with frequency. (A pure time-delay device such as a digital *delay line* will have a phase-shift which is directly proportional to frequency, i.e., its phase-shift increases at a constant rate with frequency.) Complex filters often have significant *phase distortion* because they are not *phase linear*, and an all-pass network can be designed to correct phase anomalies without affecting the amplitude response.

**alternating current (AC):** An electrical current that periodically changes in direction. The rate of alternation is called the *frequency* and is measured in cycles per second, or *Hertz*. Audio signals are always alternating, the frequency corresponding to the pitches of the sounds the signals represent. See Appendix B.

**ambience:** Ambience refers to the acoustical qualities of a listening space, such as *reverberation*, *echoes*, background noise, etc. On most music recordings, some of the ambience is recorded along with the music and are, to a certain extent, reproduced in the listening environment, e.g., an organ in a cathedral. See *room tone*, *walla*, *NC Curve*.

**ambience track:** An edited roll of magnetic film, or one track of a multitrack tape, assembled by the sound editor in preparation for the final mix of a motion picture or video production, containing the series of *room tones* or *ambient sounds* of the various sets and locations in which a scene was shot.

**ambient noise:** *Ambient sound* which is environmental in nature, such as traffic noise coming through walls, heating or air conditioning, or other extraneous sounds which cannot be turned off or removed.

**ambient sound:** Sounds such as *reverberation*, *room tone*, *walla* and *atmospherics* that form a background to the main sound, usually in the context of a *film soundtrack*, taking place at any given moment. The lack of ambient sound is noticeable because the human hearing system expects it. See also *ambient noise*.

**ambisonics:** A system for the reproduction of a three-dimensional *sound field*, using two or more transmission *channels* and four or more loudspeakers. See *Soundfield microphone*.

**AMEI:** Association of Music Electronics Industries. A group that works with MMA on MIDI standards, among other things.

**ampere (A):** The unit of measurement for electrical *current* in coulombs ( $6.25 \times 10^{18}$  electrons) per second. There is one ampere in a circuit that has one *ohm resistance* when one volt is applied to the circuit. One should not speak of the “flow of current.” The current exists; the charge flows. This is analogous to the current in a river, which consists of the flow of water.

**AMPEX:** A former manufacturer of videotape recorders, analog audio tape recorders, and associated magnetic tape media. For the historic trivia fan, AMPEX is an acronym based on the founder’s name, Alexander M. Poniatoff Excellence.

**amplifier:** An electrical circuit or device designed to increase the current, voltage, or power of an applied signal. An amplifier is an *active* device and, strictly speaking, should always increase the power of a signal; some amplifiers, such as certain distribution amplifiers, may only reduce the *impedance* level of the signal for the purpose of driving long lines.

# A

**amplifier gain:** The amount of amplification that an amplifier provides is called its *gain*. The gain is a ratio of the input signal level to the output signal level and is simply a number. Commonly expressed in dB, one should not express the voltage gain of an amplifier in dB unless the input and output *impedances* are matched as the gain of a typical amplifier is not related to its power output capability. For instance, if an amplifier has a voltage gain of 10, it might be said that it has a gain of 20dB because it actually would raise the power level of a signal by 20dB if the input and output impedances were matched. In practice, however, this is very seldom the case, and the true power gain is usually very much different from what would be predicted by the voltage gain. See *impedance matching*.

**amplitude:** The relative strength (amount) of a signal, without regard to its frequency content. Amplitude is measured by determining the amount of fluctuation in air pressure (of a sound), voltage (of an electrical signal), or numerical data (in a digital application). When the signal is in the audio range, amplitude is perceived as *loudness*. Amplitude is the measurement of how much energy the sound has, i.e., the total change in air pressure during a single cycle of the sound wave. Amplitude, or sound pressure, is measured in a scale called *decibels* (dB). An increase of 3dB is equal to a doubling of a sound's pressure. Amplitude can be expressed as either a negative or positive number, depending on the signals being compared. See also *magnitude*, *SPL*.

**amplitude errors:** See *frequency response errors*, *jitter*.

**Amplitude Modulation (AM):** The instantaneous amplitude modulation of one signal by another. This results in the formation of *sidebands* which contain the same information as the original signals, but translated upwards and downwards in frequency. In AM radio transmission, the audio signal is combined with a very high-frequency sine wave, called a *carrier*, in such a way that the amplitude of the carrier is varied in exact response to the amplitude and frequency of the signal. This is called the amplitude modulation of the carrier. The modulated carrier is transmitted at high power where it is received by radio sets that are tuned to the carrier frequency. The modulated carrier is then demodulated by a process called *detection*, recovering the original signal. In radio, a circuit that does amplitude modulation is also called a *heterodyne*.

**amp/speaker simulator:** A *filter* circuit that mimics the amplifier and loudspeaker voicing of an electric guitar and amplifier system.

**AM suppression:** The ability of an FM tuner or receiver to reject *amplitude modulation* of the received signal and be sensitive only to *frequency modulation*. Much of the interference and noise in broadcasting appears as amplitude modulation, so a tuner with good AM suppression will have less *distortion* and *noise* than a tuner with poorer suppression. Also called *AM rejection*.

**anacrusis:** See *beat*.

# A

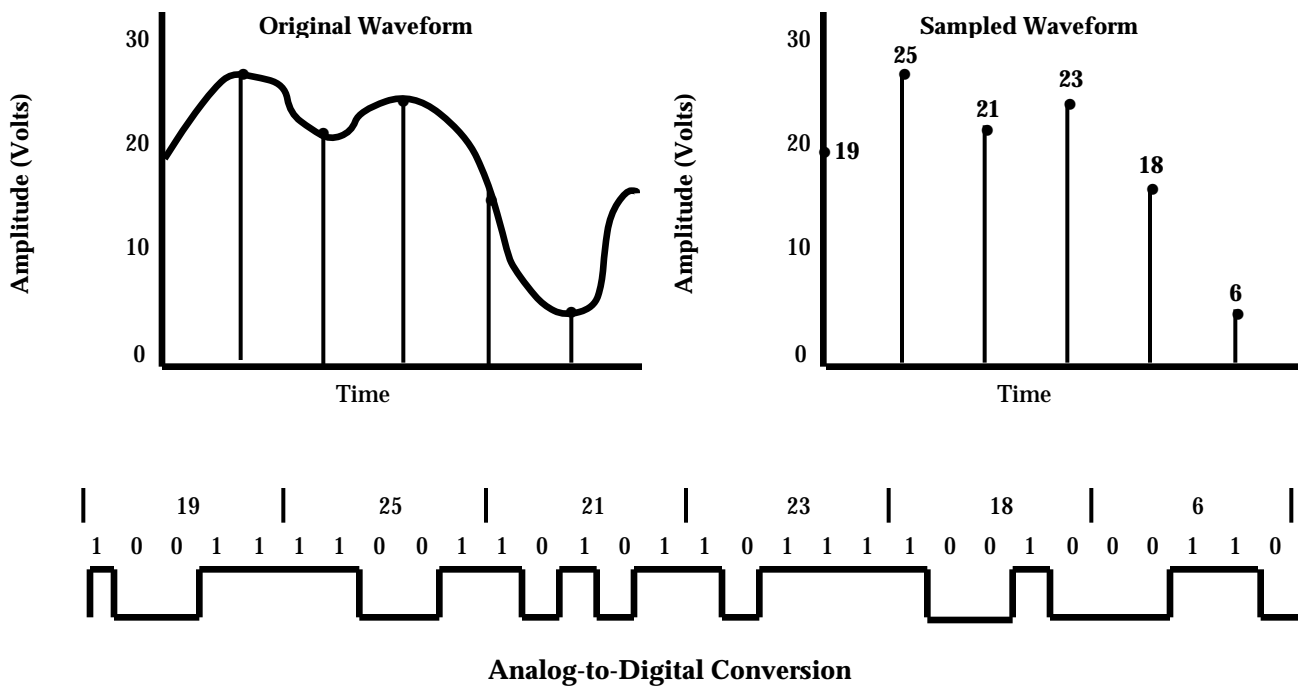
**analog:** Capable of exhibiting continuous fluctuations. An audio signal is an electrical replica, or analog, of the waveform of the sound it represents. The voltage of the signal varies up and down (negatively and positively, in electrical terminology) the same way as the sound pressure varies up and down at the microphone. In an analog synthesizer, such parameters as *oscillator pitch* and *LFO speed* are typically controlled by analog control voltages rather than by digital data, and the audio signal is also an analog voltage. Compare with *digital*.

**analog recording:** Any method of recording in which the recorded *waveform* is a continuous representation of the original signal, e.g., conventional magnetic tape recording.

**analog sequencer:** A *sequencer* into which sounds for storage and playback are fed as analog signals, via analog *potentiometers*.

**analog synthesis:** See *subtractive synthesis*.

**analog-to-digital converter (ADC):** Commonly abbreviated *A/D converter* or just *A/D*. A device that changes the continuous fluctuations in voltage from an *analog* device (such as a microphone) into *digital* information that can be stored or processed in a *sampler*, *DSP*, or digital recording device.



**anamorphic:** The camera/projector lens system which squeezes an image, usually originally in a 2:1 *aspect ratio*) onto film during shooting and “unsqueezes” it during projection. The resulting viewed image has an aspect ratio twice as wide as what was originally recorded on the film, e.g., if the image on the print is 2.2:1, the screen image will be 2.4:1. See also *CinemaScope*, *flat(4)*, *'scope*.

**andante:** At a “walking” speed: 76-94 bpm. *Andantino* can mean either a little faster or a little slower than *andante*, although it more commonly denotes a little faster.

# A

**anechoic:** Without echo. Said of an acoustic which is *free-field*, and specifically of a room which is designed to produce no *reverberation* or other echo effects. This is achieved by giving the walls very irregular surfaces of considerable and varying depths so that, in theory, all sound waves which strike them are completely absorbed and not *reflected*. Anechoic chambers are used to test audio equipment and for other types of acoustic and electromagnetic research.

**anharmonic:** See *inharmonic*.

**anhysteretic:** See *hysteresis*.

**anode:** The anode in any electronic component, such as a silicon diode or a vacuum tube, is the electrode normally connected to the positive voltage.

**answer print:** The first composite print made from the edited picture negative in 35mm film, or the *A-* and *B-*rolls of a motion picture in 16mm. Each shot is exposed, color-balanced, and otherwise processed. Further changes and corrections can be made in a second or third answer print, if necessary. In many contracts, the delivery of the answer print is specified because it means that *post* has ended and release printing can begin, although the *release print* is usually made from an internegative, not the answer print. The answer print is not the same as a *black-track* answer print which contains no *soundtrack*.

**anti-aliasing filter:** Before a signal is subjected to the process of *A/D conversion*, it must be passed through a lowpass *brick-wall filter* to remove any components that are higher than the *Nyquist frequency*. This is because it requires at least two samples per cycle to determine the existence and strength of a frequency component or the *A/D* process will create *aliased* signals. See *reconstruction filter*, *decimation*, *FIR*, *IIR*.

**anti-imaging filter:** See *reconstruction filter*.

**antinode:** A place of minimum *sound pressure level* in a standing wave, as opposed to a *node*, which is a maximum level.

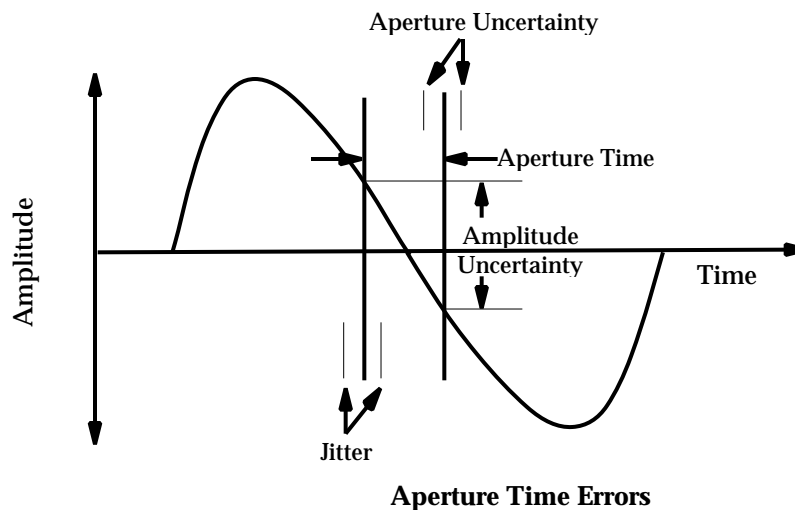
**antiphase:** See *out-of-phase*, *phase reversal*.

**antiphonal:** A term used to describe music that is played or sung in alternating sections by two separate groups of performers, widely separated.

**AOR:** Album-Oriented Rock or Adult Oriented Rock. A tendency of some FM radio stations to play longer album tracks.

# A

**aperture time errors:** In an *A/D converter*, the sample-and-hold circuit would ideally take zero time to determine the *level* of the signal waveform and to hold this level until the next sample is called for. However, it takes a finite time to charge the holding capacitor in the *sample-and-hold* circuit, and this is called the *aperture time*. Because the time required to establish a new value of charge depends on the amount of change in the signal level from one sample to the next, the aperture time will vary with the rate of change in signal level, increasing for high-level, high-frequency signals. The starting time of the sampling aperture is also slightly uncertain, and this is called *jitter*. In other words, lack of precision in the sampling time leads to amplitude errors in rapidly changing signals. The errors involve aperture time, uncertainty in aperture time, and jitter. The result is distortion of the sampled signal which rises with frequency.



**Apple (🍏) menu:** The main menu on a Mac, used to access system utilities (such as Keycaps), applications, files, and control panels. This is the equivalent of the *Start* menu on a PC-type system.

**AppleScript:** A system-wide macro facility on Macs which gives operating system-level control for compatible applications.

**APPV:** Audio Post-Production for Video. The process of preparing the individual soundtracks and the final mix for a videotaped production.

**APRS:** Association of Professional Recording Studios. An industry body set up to ensure a uniform standard of service and practice in the area of sound recording.

# A

**APRS Tape-Label System:** The APRS has decided on a standard color-code for tape labelling:

Type	Color	Details (Note: A clone is digital and a copy is analog.)
Session Tape takes.	blue	A multitrack or two-track work tape that may contain out-
Original Master	red	The first-generation of the final stereo product. Not necessarily suitable for production purposes.
Production Master program indicated. For encoding for the	green	All necessary EQ and treatment has been applied to the material (vinyl, CD, cassette, DAT) for the format example, a CD master would need further PQ-pressing process.
Production Master Copy (DAT) copy and should not be	orange	If source and duplicate are digital, then the copy is a (CD, clone. If the duplicate is analog, the tape is a duplicated further without the producer's consent.
CD Tape Master (original, regenerated	grey	Fully prepared and PQ-encoded tape for glass mastering digital clone). Any clones generated must include timecode and relaid PQ-encoding information.
Safety Copy permission.	pink	Strictly for safety. Not to be used without producers'
Not For Production	yellow	Identifies a tape that is not currently suitable for production.
Media Copy or on the box.	yellow	Supplied for a specific medium and not for general production reproduction. May also include timecode as detailed

**APT x100:** See *ISDN*.

**A&R:** Artists and Repertoire. The department of a record company that selects the performing groups or artists who will be signed to the label, what songs or compositions each artist will record, and who will work with the artist in the production, arranging, and performance of the material in the production of master tapes.

**aria:** Italian for air (song). Generally indicates a composition for solo voice with accompaniment, also by extension, a lyrical instrumental piece.

**A-roll:** Film footage used to introduce or provide backup material for a live video broadcast.

**arpeggio:** The playing of *chord* patterns by sounding each note in a sequence, rather than simultaneously. An *arpeggiator* is a device which will automatically produce arpeggiation, given the parameters which control Direction (up or down or random), a Hold button which allows note patterns to be triggered which keep playing when the keys are released, and a Range control which sets the group of notes to be played over.

# A

**arrangement:** (1) A version of a piece of music for resources other than those originally intended. This may be an instrumental version of a vocal number, a piano reduction of an orchestral piece, or may involve altering other parameters of the original, such as its harmony, rhythm, or structure. (2) In sequencers, a term sometimes used for the general layout of *tracks*, *channels* and *patches*, rather than a complete song. This template can often be saved as a separate file.

**articulation:** The way of characterizing notes (usually in a melody) by the precise control of their individual lengths to produce or eliminate gaps between them. The terms *staccato* and *legato* reflect the two extremes of articulation. It is one of the most important ways by which music can be shaped into phrases.

**ASCAP:** American Society of Composers, Authors, and Publishers. The first performing-rights organization formed in 1908, ASCAP collects fees for broadcast of recorded compositions on radio and television, and for live public performances of music and distributes payments to the copyright holders of these compositions.

**ASCII:** American Standard Code for Information Interchange. The most common encoding for transmitting text data digitally. The code employs 8-bit binary words, by which each letter of the English language, numeral, and symbol is uniquely designated.

**aspect ratio:** The width-to-height ratio of an image. Specifically in film, the format that the film image is intended to be shown in, most commonly expressed as width relative to height, where the height parameter has been scaled to represent 1 unit. Standard TV screens are 1.33:1, films shown in U.S. theatres are 1.85:1, *anamorphic* films are 2.4:1. Ratios may also be expressed as integers, e.g., the TV ratio may be expressed as 4x3, and widescreen TVs are 16x9, or an aspect ratio of 1.78:1.

**asperity:** A small irregularity or imperfection in the surface of a magnetic tape. Low-frequency noise in analog tape recordings caused by asperities produce *asperity noise* in the recording, a type of *modulation noise* in that the noise is manifested in the band immediately above or below the program signal. See *calendering*, *dropout*.

**assemble editing:** Editing of an audio or video program by making a master copy of the various takes, rather than physically splicing pieces of tape together. Virtually all digital editing is done this way. The opposite of *insert editing*.

**assembly:** See *copyediting*.

**assigns:** Push-buttons on the input modules of a control console that connect, or assign, that particular input to any of the output busses of the console. The signal is routed to the desired tape track of the destination device usually by a matrix of switches in each module of the mixing and/or recording console. This routing process is known as *assignment*.

**asynchronous:** Not according to a fixed rate of repetition. An asynchronous signal can occur at intervals which do not necessarily coincide with a fixed-rate system or master *clock pulse*.

**ATA:** See *IDE*.

# A

**ATF:** Automatic Track Following. The system used by R-DAT players to ensure that the rotary heads follow the recorded track. This uses a set of signals that is recorded along with the digital data and which are passed to the *servo* controls to ensure that the tape is correctly positioned with respect to the heads.

**atmospherics:** See *backgrounds*.

**ATR:** Audio Tape Recorder. This is the analog version. A digital audio tape recorder is called a *DTR*.

**ATRAC:** Adaptive TRansform Acoustic Coding. A lossy, 5:1-format *split-band perceptual coding* and *compression* scheme for reducing data to be written on a *MiniDisc*. ATRAC offers a 5:1 data reduction ratio in the case of *MiniDisc*, employing the equivalent of 52 filter bands for spectral analysis and requantization. Later versions of ATRAC vary the size of the sample blocks dynamically between 11.6ms and 1.45ms according to the input signal to allow for temporal masking, providing extremely good resulting sound.

**A-track:** The primary dialog track cut by the picture editor. The B- and subsequent tracks would be used for *overdubs*.

**attack:** The first part of the sound of a note. In a synthesizer *envelope*, the attack segment is the segment during which the envelope rises from its initial value (usually zero) to the attack (peak) level (often the maximum level for the envelope) at a rate determined by the attack time parameter. See *ADSR*.

**attack time:** (1) The rate of *attack* of a note. (2) The time it takes for a *compressor* or *limiter* to reduce its gain after a strong signal is applied to it. See *release time*.

**attack transient:** The actual attack *waveform*. See *transient*.

**attenuation:** The reduction, typically by some controlled amount, of an electrical signal.

**attenuator:** A potentiometer (*pot* or *pad*) that is used to adjust the *amplitude* of the signal passing through it. The amplitude can usually be set to any value between full (no attenuation) and zero (infinite attenuation). Pots can be either rotary or linear (sliders), may have discrete dentents (more often in older equipment), and can be either hardware or virtual sliders on a computer screen.

**A-type:** See *Dolby noise reduction*:

**AU (.AU):** An audio file format developed by Sun Microsystems, supported by some PC and Mac audio programs. This format supports stereo and mono files with either 8-bit or 16-bit resolution. It can encode *linear* files, or use  $\mu$ Law or ADPCM compression.

**audio:** Literally, "I hear" in Latin. The term pertains to any signal, sound, waveform, etc., that can be heard, as opposed to *subsonic* or *ultrasonic* sound, radio-frequency signals or video signals.

**audio coding mode:** A parameter in *Dolby Digital* surround-sound format which refers to the number of channels and their location in for form F/R, where F is the number of front channels and R is the number of rear channels. For example, 5-channel surround is called 3/2 mode, stereo is 2/0, and mono is designated 1/0.

# A

**audio enhancer:** Any dynamic signal processing device that in some sense improves a dull or lifeless sound. It can be as simple as *EQ* or a complex *DSP* algorithm. Examples of exciters are the Aphex Aural Exciter, BBE Sonic Maximizer, or SPL Vitalizer. Enhancers combine dynamic equalization with either harmonic synthesis or phase manipulation.

**audio frequency:** See *AF*.

**audio silence:** A type of diagnostic recording made with the recording *set-up* as planned, but with all faders down. Used to make a reference measurement of the *noise floor* and/or a tape of *biased noise*.

**audio taper:** A type of *potentiometer* designed for use as a volume control in audio equipment where the resistance varies in a *logarithmic*, rather than a *linear*, fashion with rotation of the knob. This gives a better correlation between control rotation and the subjective *loudness* of the signal.

**audio-to-MIDI:** Software or hardware that takes a *monophonic* instrumental or vocal line, analyzes the pitches, amplitude, and timbre, and converts the line to MIDI notes, complete with *pitch-bend*, MIDI *velocity* and volume, and possibly additional controller data.

**AudioX:** An open MIDI driver specification/standard being promoted by Cakewalk™.

**auditory masking:** See *frequency masking*, *masking*.

**augmentation:** (1) The increase of a major or perfect *interval* by one half-step to make an *augmented interval*. (2) The appearance of a musical idea in note durations which are longer than those used for its first appearance. This technique was often used in the *polyphonic* music of the middle ages and renaissance, as well as in *contrapuntal* music (e.g., *fugues*) of the baroque and later periods.

**aural:** Of, relating to, or perceived by the ear.

**auto-assembly:** In *on-line* editing, the process by which the edit-programmer produces the edited video master tape according to the instructions on the *EDL*, without human intervention. This is only possible where footage is consistently lit and exposed.

**auto-correct:** See *quantization*.

**auto-input:** One of the electronic operating modes of a multitrack recorder. When auto-input is selected, all channels will remain in *sel-sync* playback mode until the machine is placed in *record mode*. Any channels that are in *ready* status will then begin recording and will automatically pass their input signals direct to their outputs. When recording is stopped, these channels return to *sel-sync* playback mode. Also called *stand-by* mode.

**autolocator:** A device for controlling the transport system of a tape recorder, allowing *timecode* referencing such as *SMPTE*. Usually a number of *locate points* can be stored by the device. Some sequencers have an *autolocate* facility. Also called *zero locate*.

**Automatic Volume Control:** See *AVC*.

**Avid:** A brand of *nonlinear* video editing system, which, while not being exactly an industry standard, is the most commonly used digital video editing system.

# A

**automation:** A system where manual control of a process is replaced or enhanced by computer control, such as mixing desk automation where faders, mutes, and equalization can be controlled in part or in whole by a computer. In *write mode*, the automation system produces a continuous record of all the actual fader settings and adjustments made by the engineer during a mix. Most systems allow changes on replay, while remembering and recreating previous manipulations of other tracks. The level changes are recorded and recreated by *VCA*s in each input module of the console. The *VCA*-produced data can be recorded directly onto a track of the multitrack tape, giving a continuous record of all mixdown fader settings. Or, the *VCA* outputs can be recorded onto a separate disk. In the latter system, alignment of the fader data with the multitrack master tape is achieved by referring to a common *SMPTE* timecode recorded on the tape and disk systems. See *mute mode*, *mute-write*, *null-point*, *read mode*, *snapshot automation*, *update mode*, *write mode*.

**autopanner:** A device for processing a signal so that it can be made to appear at various positions in a stereo image via a remote control or MIDI commands.

**aux or auxiliary:** An assignable, *line-level* input with no dedicated input source. Generally refers to an input connector in a preamplifier or integrated amplifier, signal processor, mixer, effects device, etc. The aux input has no *de-emphasis* or other special equalization and accepts *line-level* signals. Tone controls on a preamp usually also affect signals sent to the aux input.

**auxiliary:** A bus allowing a signal to be sent from a mixing desk prior to the main output, usually to provide an input to effects. See *effects send*.

**auxiliary envelope:** An extra envelope in a synthesizer that, instead of being hard-wired to a *filter* or amplitude, is intended as a modulation source that can be applied to various destinations.

**auxiliary messages:** A classification of MIDI messages which includes Active Sensing, All Notes Off, Local On/Off, and Reset, and which describes whether the particular MIDI device responds to any of these messages.

**aux section:** A smaller, independent *mixer* within the main mixing console which has an output consisting of a mix of everything going into the channels on which the appropriate *effects send* been turned up.

**auxiliary send:** Also called *aux send*. See *effects send*, *insert point*.

**AVC:** Automatic Volume Control. A circuit which adjusts the *gain* of an audio device in inverse proportion to the incoming signal level. An example is a portable tape recorder which is designed for speech recording; when the speaker is close to the microphone, the gain is reduced so as not to overload the tape. Also, a circuit which increases a TV or radio receiver's gain when it is tuned to weak stations and decreases the gain when it is tuned to strong stations. Called *AGC* (Automatic Gain Control) in TV.

**AVI:** Audio Video Interleaved. Microsoft's answer to Apple's QuickTime, and not compatible with Macs.

# A

**A-weighting:** An equalization curve first applied to sound level meters in an attempt to make their measurements correspond better to the perceived loudness of sounds, decreasing the sensitivity of the meter to frequencies below 1kHz. An important note is that the bottom octave (32Hz) is attenuated by almost 40dB; the second octave (63Hz) by 26dB, and the third octave (125Hz) by 16dB. See *B-weighting*, *C-weighting*, *equal loudness curves*, *SPL*.

**axis:** In microphones, the direction of maximum sensitivity, generally perpendicular to the surface of the *diaphragm* or *ribbon*. In loudspeakers, the line projecting through the center of the *voice coil* toward the listening area. This is usually the direction in which the speaker exhibits the best overall frequency response. See *acceptance angle*, *off-axis*, *directional microphone*, *polar pattern*.

**azimuth:** In a tape recorder, the azimuth is the angle that the gap in the *record* or *playback head* makes with the direction of the tape travel, and it must be precisely 90° to ensure proper high-frequency performance.

# B

**B:** The right-hand part of a *stereo signal*.

**baby boom:** The nickname of the Dolby 70mm process that dedicates two of the six tracks on a 70mm print to low-frequency information (signals below 250 Hz) This term is no longer used as the new digital multichannel film sound formats specify a dedicated subwoofer track.

**backbeat:** A music term refering to the second and fourth *beats* in a four-beat *bar*, often emphasized by the drummer.

**back coating:** In *magnetic recording tape*, a thin coating applied to the non-oxide or back surface of the tape to reduce slippage between tape layers, prevent accumulation of static charge, and to minimize curling or wrinkling.

**backfill:** To edit fill between words so that the whole length of a scene, including sections where the take or angle in question is not being used, is contiguous.

**backgrounds:** Sound effects that sonically define the time and place of a location. Also called *ambience*, *atmos* or *atmospheres*, backgrounds give a sense of lush sonic effects and placements, more specifically, usually a tasteful use of *pan controls*, *reverbs*, *delays*, and other positioning tools. BGs are considered sound effects and are not the same as *room tone*.

**backing track:** Pre-recorded music used by a singer or other musician during performance and which augments or entirely replaces other performers. This has become increasingly popular as musicians attempt to recreate the sound of their studio recordings live on stage.

**backing vocals:** In popular music, extra vocal parts which fill gaps in, or harmonize with, the lead vocal line. Usually sung by specialist session singers. Usually abbreviated *bvox*.

**backline:** On-stage instrument amplification.

**back plate:** In a *condenser microphone*, the fixed, rigid *capacitor* element that is charged with an electric *polarity* opposite to that of the *diaphragm*.

**backtiming:** Subtracting the length, in minutes and seconds, of a recorded segment from the time in a longer program at which the segment is supposed to end. If a three-minute segment is to end a 30-minute program, backtiming will indicate that the end segment needs to roll at 27:00.

**backward masking:** See *temporal masking*.

**BAC&S:** British Academy of Composers and Songwriters. A group being formed among the current Association of Professional Composers, the Composers' Guild of Great Britain and British Academy of Songwriters, Composers and Authors, building a larger and more influential "umbrella" organization.