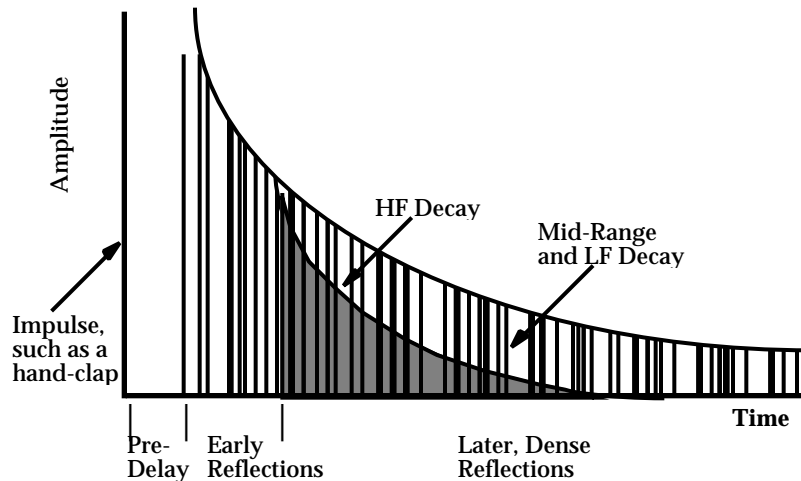


# E

**early reflections (ER):** (1) The first and following reflections from adjacent room boundaries, as opposed to later reflections which are produced by farther surfaces or which have taken a longer path to reach the listener. (2) A reverb algorithm whose output consists of a number of closely spaced discrete *echoes*, designed to mimic the bouncing of sound off of nearby walls in an acoustic space. See *ESS, reflections, reverberation*.



**Early Reflections**

**earwig:** A small earpiece microphone used to give actors an audio reference (frequently a guide music track) so that their live audio can be recorded live. See also *thumper, IEM*.

**ECC:** Error Correction Code. See *error correction*.

**echo:** An audio effect which is a discrete (where the onset of the repeated sound is distinct) repetition of a sound arriving at least 50ms after the *incident* sound, as opposed to *reverberation*, which is a continuous wash of closely spaced, non-discrete, echoing sound. See *delay(3)*.

**EDC:** Error Detection Code. See *error correction*.

**edge:** A subjective impression of a certain roughness in the reproduced sound of a musical instrument. It is usually caused by non-uniform, high-frequency response in the loudspeaker or other audio device.

**edgecode:** Inked numbers applied outside the sprocket holes on film prints and mag film, used for synchronization reference. See *Acmae, preview codes*.

**edge track:** (1) In multitrack recording, either of the recorded tracks located along the edge of the tape. (2) The U.S. standard position of the recorded track on 16mm magnetic film, i.e., the position along the edge opposite the sprocket holes. See *film soundtrack*.

**edit controller:** See *edit programmer*.

# E

**edit decision list (EDL):** Prior to editing a master recording or motion picture, the various takes are auditioned and a list of the desired ones is created, along with notes telling exactly where the cuts are to be made. The resulting document is the EDL. This consists of the list of *SMPTE timecodes--in feet/frames*, including instructions for fades, dissolves, and other special effects--corresponding to all the segments that the editor of a videotape production has decided to use in the final cut. The EDL is usually computer-generated. See also *playlist*.

**editing:** Intercutting of several analog tape or digital data recordings of an audio or film take in order to make an improved performance.

**editing block:** A cast metal block with a channel that holds *magnetic tape* firmly and in a straight line. Diagonal slits through this channel allow a razor blade to make precisely angled cuts in pieces of tape, so that two separate pieces aligned in the channel may be spliced together. The resulting splice, if properly made, will be inaudible as it passes over the playback head of the recorder.

**edit master:** Video industry term for the tape containing the finished (edited) program.

**edit mode:** See *cue mode*.

**editorial sync:** Alignment of picture and soundtracks such that their start marks are equal numbers of frames prior to the first frames of picture and sound, respectively. See *projection sync*.

**editor/librarian:** A piece of computer software that allows the user to load and store patches and banks of patches (the librarian) and edit patch parameters (the editor) by patch name.

**edit programmer:** A computer used to perform on-line edits and auto-assemblies. The video editor enters the *EDL*, a sequence of *SMPTE timecodes* corresponding to the shots and specific frames to be connected. The edit programmer then controls the video playback and *re-recording* decks to produce the edited video master tape according to the editor's instructions. Depending on the sophistication of the specific unit used, the editor may have to perform some special effects manually, on prompts given by the edit programmer. Also called an *edit controller*.

**edit switch:** On a tape recorder, a switch that engages the play mode but not the take-up motor. Tape is driven past the playback head and reproduced, but then spills off the machine and may be edited out. This process is called a *dump edit*. On some machines, the edit switch merely defeats the tape lifters, allowing the editor to *scrub* the tape past the playback head.

**effect send level:** The amount of effect to be added, such as *reverb*, *chorusing*, or other enhancements, to each *channel*.

**effects:** Abbreviated *FX*. Any form of audio signal processing or a device to produce: *reverb*, *delay*, *chorusing*, *echo*, *flanging*, and *phasing*, rotary (Leslie) speaker simulation, *distortion*, and *tremolo*, etc. See *processor*.

**effects bus:** The mixing bus in a recording console used to mix the signal to be sent to the various effects devices. Also called the *effects send bus*.

# E

**effects control:** Two classes of Controller Change messages which are used to introduce and adjust some kind of effect such as reverb.

**effects control 1 & 2:** Controller Change messages which are intended to be assignable to parameters (other than depth) which appear in a synthesizer or effects unit and which control some aspect of an effect such as *reverb* time or *pitch-shift*. They operate in conjunction with Effects Depth messages; the two message types taken together are called Effects Control.

**effects depth:** (1) A parameter on a synthesizer, effects unit, etc. which can be adjusted by the user to alter the amount of a particular effect, such as *reverb*, *delay*, or *chorus*. (2) Effects Depth controllers. Controller Change messages which are used to implement the function described in Effects Depth. These were initially assigned to specific effects, but are now generalized and operate in conjunction with Effects Controls 1 & 2 messages; the two message types taken together are called Effects Control.

**effects loop:** A mixing console circuit that is used to add an effect to a signal or a group of signals. When the effect unit is plugged into the *effects bus* circuit (via the *effects send* and *effects return* jacks), it literally functions as a loop, splitting the signal off from the mixer and sending it to the effect, then returning it to the mixer, where it is combined with the original signal.

**effects master:** See *effects send*.

**effects return:** An input on a mixing console that receives the *wet* signal from the effects devices. The effects return inputs usually have volume controls (faders) to control the intensity of the particular effect in use.

**effects send:** An output from a *mixer* that is connected to the input of an effects device. The effects send outputs usually have volume controls to set the *effect send level*, and the overall level of all the effects send outputs may be controlled by an *effects master* control operating from the effects bus. Effects sends (usually referred to in this case as *aux sends*) are typically used to feed effects processors such as reverbs, or are used to feed monitor systems, either speakers on stage or headphones in the studio. Whereas the main outputs of a mixer have a mix of everything that has a main fader turned up, the effects sends, with their own mix controls, have an independent mix. Effects sends are also used to feed the *house mix* to the PA system, when they are usually called *post-fader sends*. Also called an *aux* (*auxiliary*) *send*. See *insert send*.

**effects track:** (1) An edited track of magnetic film containing sounds other than dialog or music. There can be many *effects* prepared for a film mix. (2) In videotape productions whose sound is assembled on a multitrack tape, the track or tracks on which sound effects are recorded. (3) In the 35mm *three-track mix* of a motion picture, the recorded track that contains sounds mixed from all the effects tracks. See *film soundtrack*.

**efficiency:** A measure, usually applied to loudspeakers, of how much of the input electrical energy is converted to sound energy, expressed in percent. The remaining energy is converted into heat.

# E

**EFM:** Eight-to-Fourteen Modulation. The data *encoding* scheme used in CDs in order to optimize the process of reading off the disk. Groups of eight data bits are regrouped into fourteen-bit blocks by *EFM modulator* during cutting of the CD master, permitting about 25% greater data density to be laser-inscribed on the disc and allowing easier error recognition. An *EFM demodulator* in the CD player decodes the data.

**EIAJ:** Electronic Industries Association of Japan.

**EIDE:** See *IDE*.

**eigentone:** See *standing wave*.

**EK neg:** Eastman Kodak negative. Film laboratory colloquialism for “original camera negative.” Used in film production to describe a *release print* made from the original negative, whether or not any of the film involved was actually made by Kodak, Inc. Also called an OCN, probably for Original Color Negative.

**electret:** If two metal plates have molten wax poured between them and a high DC voltage is sent across the two plates, this assembly yields a permanent electric field, in the same way that a magnet produces a permanent magnetic field. It is hypothesized that the polar molecules in the wax align, producing the electric field. An assembly of this type is used to provide a polarization voltage for small *condenser* microphones so that they do not require *phantom power* at 48V, but operate instead at a small pre-amplified voltage of 5V-12V. Microphones constructed in this way are called *electret microphones*.

**electroacoustic:** The name for interactions between electrical and acoustic phenomena. The science of electroacoustics deals with the application of electrical principles and apparatus to acoustical phenomena. *Transducers*, such as microphones and loudspeakers, are electroacoustic devices.

**electroacoustic transducer:** A device which converts sound waves to electrical signals. Transducers such as *microphones*, *loudspeakers*, and *phonograph cartridges* are electroacoustical devices. The primary problem with electroacoustic transducers is that they do not exhibit a linear *frequency response* except for a relatively small range of signal frequency and amplitude. See *DI*.

**electromagnetic (EM):** The name for interactions between electrical and magnetic phenomena. The science of electromagnetics deals with the application of electrical principles and apparatus to magnetic phenomena. Transformers, antennæ, and phonograph cartridges are electromagnetic devices. Longer explanation: There are four known forces operating in the universe: strong and weak nuclear forces, gravity, and electromagnetism, the latter two being the two manifestations of electromagnetic force. These are mutually affective, i.e., a magnetic field can influence an electric field and vice versa as an electromagnetic wave consists of both an electric field and a related perpendicular magnetic field. The electromagnetic spectrum consists of (in order of increasing frequency) radio waves, microwaves, infrared light (heat), visible light, UV light, X-rays and gamma rays. All electromagnetic waves propagate at the same speed, the speed of light.

**electromagnetic compatibility (EMC):** Audio equipment that is designed to be immune to *EMI* is said to be electromagnetically compatible. Shielding is one EMI technique, as is line-filtering, etc.

# E

**electromagnetic pick-up:** See *piezo pick-up, DI*.

**electronic feedback:** See *feedback*.

**electrostatic loudspeaker:** A *dipole* speaker with a *transducer* that uses the audio signal to vary the strength of an electric field which, in turn, induces vibration in a metallic or metalized membrane. In principle, it is the reverse of an *electrostatic microphone*, and very different from the more common electromagnetic *voice coil* arrangement. Used for consumer equipment as the power output is low. Electrostatic speakers are usually quite large, such as 6' high by 2' or 3' wide. They are always *direct radiators*, and they must be large to attain reasonable efficiency at low frequencies. The radiation pattern of an electrostatic speaker in a free-field is similar to that of a *figure-eight* microphone. Because of their large size, electrostatic loudspeakers tend to become very directional in the high-frequency range. They are also characterized by a low *impedance*, and this is problematic for some amplifiers. See also *planar loudspeaker*.

**electrostatic microphone:** A class of microphone, of which *condenser* and *electret* are types, in which air pressure changes cause changes in the *capacitance* of a condenser. The capacitor is normally *biased* by a voltage which is supplied from batteries or via *phantom power* from the signal cable. The electret is an exception, as this requires such a small biasing voltage that it is possible to charge it permanently at the time of manufacture; Sennheiser mics use a proprietary biasing scheme which utilizes RF instead of a DC voltage.

**electrostatic noise:** A field of random electrical charges that can affect an audio line. Electrostatic noise can be generated by neon or fluorescent lighting, electrical motors, and other broad-spectrum emissions sources. Electrostatic noise is the electrical field which is generated by *EMI*.

**elliptical equalizer:** A special equalizer which causes the two channels of a stereo signal to be more nearly in *phase* at low frequencies, making the signal easier to cut into a record (an LP stylus has an elliptical cross-section).

**elliptical filter:** A multiple-element, *lowpass* or *bandpass filter* which has the steepest possible *rolloff slope* and a small amount of *ripple* in the *passband*, with one or more *notch filters* added to it. Elliptical filters are used as *anti-aliasing filters* in digital audio devices.

**EMI:** Electromagnetic Interference. Stray *electromagnetic* fields generated from any current-carrying conductor such as nearby motors, switching controllers, high-power contactors, etc. which cause a brief, intense *pulse* that often couples into low-level signal circuits causing *noise*. This interference can enter either directly into the signal path, or indirectly via the power or ground connection. High-power RF transmitters can cause similar effects, called *RFI*. See *induction*.

**emphasis:** See *resonance*.

**encoding:** (1) The process of converting the already sampled, numerical voltage of the analog input into binary numbers and assembling these with any location and error-related data generated elsewhere into complete digital words, usually of 16 bits. See *analog-to-digital converter*. (2) The application of any type of processing to a signal before recording which will later be removed by *complementary* processing during playback. Most NR systems are good examples of the encoding/decoding process. See *stretched*.

# E

**end-addressed:** A microphone that is aimed at the sound source, as opposed to *side-addressed*, which is aimed with the side of the mic at the sound source.

**Enhanced CD:** A *multisession* CD format which allows Red Book, Yellow Book and Blue Book CD data to be stored on one disc. See *CD Extra*.

**envelope:** The shape of the amplitude vs. time graph of a musical sound; the shape of a sound as it changes over time. The shape of a synthesizer's envelope is controlled by a set of rate (or time) and level parameters. The envelope is a control signal that can be applied to various aspects of a synthesizer's sound, such as *pitch*, *filter rolloff* frequency, and overall *amplitude*. Usually, each note has its own envelope(s).

**envelope follower:** A device used in electronic music synthesis that converts the *envelope* of a musical signal into a *control voltage*. That is, the output voltage will be low when the signal is soft and high when the signal is loud. The control voltage can then be used to control any number of parameters in the synthesizer.

**envelope generator:** A hardware device or software routine that generates a sound *envelope*. Also known as a *contour generator* or *transient generator* because the envelope is a *contour* (shape) that is used to create some of the *transient* (changing) characteristics of the sound over time. The purpose of an envelope generator is to give a shape to each note. By itself, an envelope generator makes no sound. Its output is used as a control source that tells some other part of the synthesizer what to do. Typical synths have three envelope generators for each oscillator: one to control *pitch*, one to control the *filter rolloff*, and one to control *amplitude*. See *ADSR*.

**envelope tracking:** A function that changes the length of one or more *envelope* segments depending on which key on the keyboard is being played. Envelope tracking is most often used to give higher notes shorter envelopes and the lower notes longer envelopes, mimicking the response characteristics of percussion-activated acoustic instruments. Also called *keyboard tracking*, *key follow*, and *keyboard rate scaling*. See *ADSR*.

**EOX:** End Of eXclusive. A System-Common MIDI message used as a flag in a MIDI datastream to indicate the end of a *System-Exclusive* message transmission.

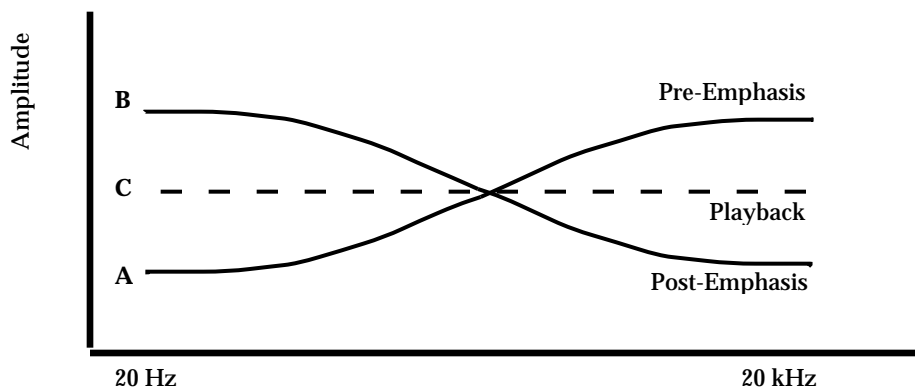
**EP:** Extended Play. A type of 7" phonograph record, usually played at 33  $\frac{1}{3}$  rpm, allowing two songs to be cut on each side for a total recording time of up to 7 minutes. Also a 10" or 12" album with between three and seven songs. EPs are intended to sell at less than album prices, and are a way of establishing new artists without requiring record buyers to pay full LP prices. (2) Also, Executive Producer.

# E

**equalizer:** An adjustable audio *filter* inserted in a circuit to divide and adjust *its frequency response*, altering or distorting the relative amplitude of certain frequency ranges of an audio signal. The *effects processor* used for equalization. Equalizers come in two varieties, graphic and parametric. A *graphic equalizer* typically has a number of fixed-frequency bands (5-10 in consumer equipment, 31 in professional equipment), each wired to its own front-panel slider. The control is over the amount of cut or boost (in dB) at each band. A *parametric equalizer* goes two steps further: the center frequency of each band can be selected by the user, as can the bandwidth. This affords more precise control over which frequencies will be affected by the boost or cut in amplitude. Because EQ circuitry with these controls is more expensive to build, a parametric equalizer will typically provide fewer bands than a graphic equalizer. A *semi-parametric equalizer*, sometimes found in multieffects devices, provides control over the center frequency of each band, but not over the bandwidth. See also *active equalizer*, *passive equalizer*, *shelving equalizer*, *Q*.

**equalization (EQ):** An *effect* that allows the frequency-selective manipulation of a signal's amplitude. The simplest *equalizers* are *shelving* types, offering the ability to cut or boost *gain* above or below a given frequency. Equalization doesn't only change the level of specific parts of the audio spectrum, it also changes the phase of the affected frequencies relative to those that aren't being EQ'd, i.e., EQ affects both the frequency response and phase relationships of the signal. See *composite equalization*, *pre-emphasis*, *room equalization*.

**equalization curve:** In tape recording and playback, a standardized equalization effect applied to an audio signal. *Pre-emphasis* and the complementary *de-emphasis* curve is applied to the recorded and reproduced signal, respectively. Pre- and post- equalization curves are different for each standard tape speed, and standards are given by the various organizations such as NAB, CCIR, and IES for their respective countries. Also described as a *pre-emphasis curve* and *de-emphasis* or *post-emphasis curve*. See also *RIAA curve*.

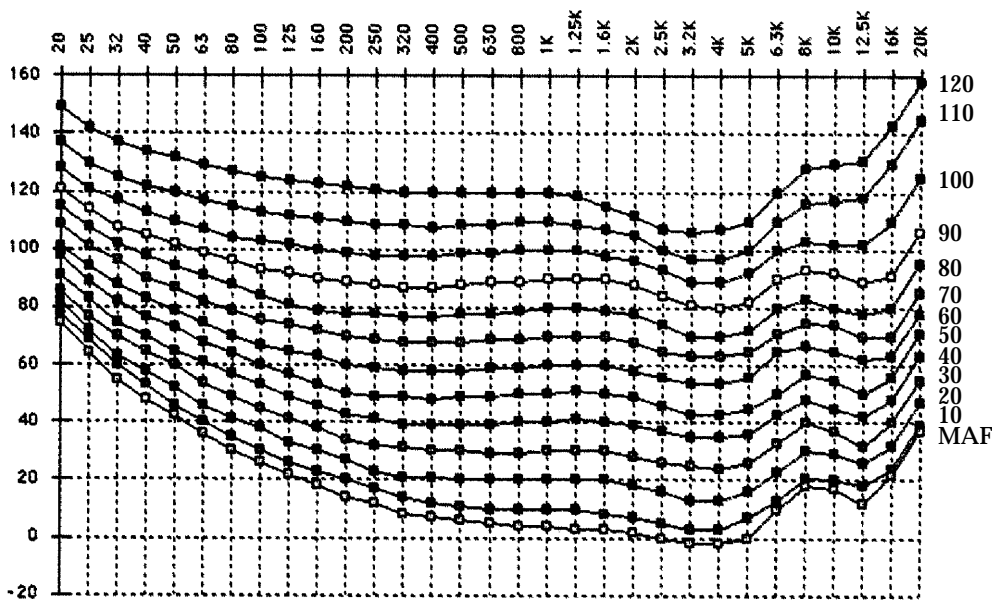


**Pre-Emphasis and Post-Emphasis Curves**

# E

**equal loudness curves:** Also known as *Fletcher-Munson curves* or *phon lines*. Equal loudness curves are the inverse of *frequency response curves* and reflect the phenomenon that humans do not hear all frequencies as having equal loudness. In other words, human hearing is not linear in frequency. This is particularly problematic in recording as a mixed master will be perceived differently depending on the playback level. Specifically, there is a marked drop-off in aural sensitivity at low frequencies. At the opposite extreme, humans have high sensitivity to sounds in the 1kHz-8kHz range, with sound again dropping away above 12kHz. Also called *equal loudness contours*.

In the graph below, note that at 60dB SPL, a 1kHz tone is perceived as of equal loudness as a 20Hz tone at over 100dB SPL. At low levels, these differences are accentuated: the same 1kHz tone at 10dB SPL requires 80dB SPL at 20Hz.



Robinson-Dadson Equal Loudness Curves  
20 Hz - 20 kHz  
Right-Hand Legend Reference 1kHz

**equal-tempered:** A system of tuning in which the *diatonic comma* is divided equally between the twelve *half-steps* of the *octave*. All the half-steps are equal in size and are exactly one-twelfth of an octave, spanning a frequency ratio of  $\sqrt[12]{2}$ , or about 6%, or 1:1.059. In equal temperament, all the *intervals* are the same regardless of the *key* in which one is playing, and none except the octave is perfectly tuned. This makes it very easy to modulate from one key to another, although the keys lose their individuality because they all have equal *intervals*. The result is that the fourth and fifths are within 0.001% of just intervals, however the thirds are about 0.01% away from pure thirds which produce audible beats, the thirds in all keys being equally bad. See *temperament*, *syntonic comma*, *diatonic comma*.

**equivalent input noise (EIN):** EIN is becoming a common method for specifying noise in audio equipment. This is a derived figure equal to the noise measured at some gain setting, minus the gain. For example, if a microphone preamplifier puts out -85dBV noise when set for 40dB of gain, the EIN is -125dBV. Note that, while -125dBV seems better than -85dB, both figures represent the same amount of noise.



# E

**ER:** See *early reflections*.

**erase head:** The *head* on a tape recorder that erases magnetic information on the tape, located just before the record head in the tape path. A high-level, high-frequency (150-300kHz) tone, called an *erase frequency* which, when fed through the erase head, re-randomizes the orientation of the tape's magnetic *domains* so that the signal to be recorded will have no *hysteresis*. See *erase oscillator*.

**erase frequency:** See *erase head*.

**erase oscillator:** A very high-frequency oscillator built into a tape recorder to supply current to the erase head. In most machines, the same oscillator supplies the *bias* and *erase frequency*.

**error concealment:** A technique to reduce the audible effect of a digital error in a digital audio system when the error cannot be corrected by the techniques of digital error correction. Error concealment usually consists of making a smooth transition from the last good data block before the error to the first good data block after the error, usually in some form of interpolation, i.e., crossfading. Error concealment is the reason that a digital copy from one source is often not exact an exact clone of the digital master. When duplicating a digital master, *error correction* and error concealment algorithms must be thoroughly understood and the dubs checked for reproduction quality. See *error protection*.

**error correction (ECC):** Error Correcting Code. In digital audio systems, the sampled amplitudes of the signal waveform are expressed by digital encoding. If, in the transmission of the digital words, some bits are missing or incorrect due to tape dropouts, etc., the result will be gross distortion of that portion of the signal when it is reconstructed. Error correction is made possible through the use of a parity check bit added to each data word, as well as more complex schemes. See *error concealment*, *error protection*, *CRC*.

**error detection:** In digital playback, the use of error bits and data derived from the audio samples to check the completeness and accuracy of the audio data before passing it on to the D/A. See *error protection*.

**error protection:** All of the circuits and data handling procedures that together accomplish *error detection*, *error concealment*, and/or *error correction* functions in any digital recording and playback format.

**ESS:** Early Sound Scattering. A design for control rooms where the characteristic reflections are so uniformly random that they have no character to impose on the listening space. An ESS control room is one which features a highly diffusive front end (including the monitor walls) which scatters the early sound using *Schroeder-type diffusers*. The body of the room is absorbent, with most of the lows damped by membrane panels. These rooms can be made fairly *live* compared to older control rooms, with a flat frequency response and good stereo imaging, both of which remain stable right to the rear corners of the room. As compared with *LEDE* and *RFZ* designs.

**event editing:** See *step input*.

**exciter:** A device for artificially enhancing a signal by adding new *partials* to it. These devices are said to compensate for loss of high frequencies in analog tape recordings. Also called an *aural exciter*.

# E

**expander:** (1) A signal processing device which is the inverse of a *compressor*, providing the gradual attenuation of signals that fall below a user-defined threshold. This process, known as *expansion*, reduces background noise and at the same time increases the *dynamic range* of the input signal. (2) A synth, with out a keyboard or other master controller, often rack-mounted. Also called a *tone module*.

**expansion:** See *expander*(1).

**expansion ratio:** In an expander that is working below its *threshold*, the ratio given by the number of dB change in input over the number of dBs change in output. Typical ratios are in the range 1:2 or even 1:20. Expansion ratio is the opposite and complement of *compression ratio*.

**expression:** One of the defined MIDI Controller Change messages, usually assignable to some *parameter* in a synthesizer, such as Volume or Filter Cut Off.

**extension:** Files used by Mac computer application programs to provide additional functionality to the computer's operating system. The equivalent of a DLL (Dynamic Link Library) file on a PC.

**extinction frequency:** In *magnetic tape recording*, the high frequency beyond which significant cancellation occurs because its wavelength on tape, at the specified tape speed, approaches the width of the *head gap*.