L

L/A synthesis: Linear Arithmetic synthesis. A *sound synthesis* method developed by Roland that creates new sounds by attaching the *attack* portion of a sampled waveform to a simpler waveform. Human sound recognition is heavily influenced by hearing the *attack transient* part of a sound, but simple waveforms require less storage than samples. By combining the two, L/A synthesis is capable of relatively sophisticated sounds with modest data storage requirements.

labels: Special non-audio information encoded along with the audio in digital recording systems, used to encode information about the recording session, number of microphones used, dates, etc.

lacquer master: The disc produced from a master recording tape which is used to press vinyl copies.

land: (1) The flat area of vinyl between the grooves of a record. (2) The flat area between the laser-carved pits of a CD.

largo: Italian for "broad." A slow or stately tempo, 48-60 bpm.

later reflections: See *early reflections*.

Lavalier microphone: A small microphone, either *condenser* or *dynamic*, which can be easily hidden in a piece of clothing so as not to be seen by the camera. Also called a *peanut*.

layback: Transfer of the finished audio mix back onto the video *edit master*. See *layoff*.

layback recorder: A videotape recorder, usually 1" format, on which a mixed soundtrack with all *DME* stems can be *re-recorded* in *sync* with the edited video master. Because of its special purpose, a layback machine should have less *flutter* and higher quality audio heads and electronics than standard 1" video decks. Some layback machines designed especially for that purpose have no video reproduction capability at all. They merely read timecode and do an extremely high-quality job of recording audio, and nothing else. The layback process is also called *re-laying*. See *layback*, *layoff*.

layer: See *split point*.

layering: Sounding two or more voices, each of which typically has its own *timbre*, from each key depression. Layering can be accomplished within a single synthesizer, or by linking two synths together via MIDI and assigning both to the same MIDI channel.

layoff: Transfer of audio and timecode from the video *edit master* to an audio tape. See *layback*.

layover/layup: Transfer of audio onto hard disk or multitrack tape.

LBR: Laser Beam Recorder. The device used to create a *CD* master for duplication.

LC Concept: A system, developed by a French company of the same name, for implementing digital audio for cinemas. The system relies on the presence of an optical timecode on the film which is used to synchronize the digital audio soundtrack stored on a separate magneto-optical disc reader, i.e., the film carries no sound at all, allowing for multilingual presentation from the same film print. This also solves the problem of getting high-quality audio onto film.

L

LCRC: See *LCRS*.

LCRS: Left, Center, Right, Surround. The four playback channels used in 35mm motion pictures, now available on home hi-fi systems. L, C, and R speakers are located behind the screen. The S channel surrounds the audience and may be mono or encoded stereo. See *matrix, surround-sound*. Variants include LCRC, when the fourth track is to be assigned to the center, or even CCCC, as in a center-channel dialog *premix*.

lead sheet: An abbreviated musical *score*, consisting of a melody line with chord names or symbols, and sometimes including lyrics.

leader: Blank (unexposed) motion picture film attached to the beginning or end of a reel of film, usually used for threading a playback machine, and which contains information about the reel's content such as film title, reel number, etc. as well as the count-down section. Opaque leader is used in *A* and *B Rolls*, in editing *workprints* and *film soundtracks*, to fill spaces between specific sound *effects* or musical segments, or to fill in for picture or sound segments to be added later. See also *Academy leader*, *SMPTE Universal leader*, *plastic leader*, *fill leader*.

leadering: The process of removing the out-takes, count-offs, and noises between *takes* in a magnetic tape (and by extension, digital) recording. In analog magnetic tape recording, this process also involves inserting *leader tape* between songs.

leader tape: Nonmagnetic plastic or special paper tape that is spliced onto magnetic tape between musical selections and at the beginning and end of the magnetic tape, protecting the tape and delimiting the selections. Some leader is timed and has marks every 7½" or 15" to allow the tape editor to insert the desired time between selections.

lead-in: See *spiral*.

leakage: The pick-up of unwanted, *off-axis* sounds by a *directional microphone* due to the fact that its directional pattern is not ideal or that the microphones and/or instruments are not sufficiently isolated from one another, as in a multitrack studio recording. Also called *spill*.

learning curve: In mechanical or electronic systems controlled by computers, the computer's ability to learn the hardware/software, input/output environment and use this information to control the system's state.

LEDE: Live End Dead End. A commercial trademark used to indicate a particular acoustical design of a recording studio control room. In this design, the area around the monitors is made acoustically absorbent, or *dead*, while the area behind the listener's position is made reflective, or *live*, in an attempt to increase the accuracy of the reproduction. See also *ESS*, *RFZ*.

LFE: Low-Frequency Effects. The equivalent of the subwoofer designation for audio-for-video, where the low-frequency band between about 20Hz-120Hz is *matrixed* or channeled for replay. In home audio systems, the subwoofer will frequently contain LF information from the main channels in addition to the original LFE track. See also *in-band gain*.

legato: A musical effect whereby the *decay* of one note overlaps the *attack* of the next.

leger line: See *stave*.

L

Lemo: A Swiss company which makes high-quality, very dense connectors. Rarely used, Lemo connectors are found on some specialty audio equipment, such as *Soundfield* microphones (because of the large number of capsules) or compact mics which require a high density of pins in a small space. There is no standard for the pin-outs in Lemo connectors, a fact which contributes to their scarcity.

lento: Italian for "slowly."

Leq: Equivalent sound Level. The Leq of a sonic event is that constant *SPL* which has the same amount of energy as the actual event. Thus, the Leq is a long-term average, or integration, of an SPL. It is approximately the average of the powers of instantaneous levels taken at equal intervals over time during the measurement period. Leq is a convenient way of accurately measuring the level of a fluctuating sound over a range of a few seconds to several hours.

Leslie cabinet: A type of loudspeaker cabinet, developed by Don Leslie in the 1930's and used in electronic (especially Hammond) organs. The sound from fixed *transducers* is dispersed via a rotating horn or (for bass speakers) an aperture in a rotating chute. This causes a continuously varying *Doppler* shift of the pitches in the audio signal, which mixes, with some *phase cancellation*, to give a swirling, chorus-like effect.

Leslie simulator: An *effects* unit which is intended to create the effect produced by a *Leslie cabinet*. It is similar to a *chorus* unit, but produces a richer effect.

level: Loosely used when the *magnitude* of a signal is meant, usually *voltage*. Strictly speaking, the term should be reserved for the value of a *power* in dB. The measured level of an audio signal is the *amplitude* that is caused by the sum of the *powers* of all of the components of the sound.

level control: An *envelope* parameter which controls the level of certain synthesizer actions, such as the *sustain* portion of an *ADSR* envelope. Compare with *rate control*.

leveling: The use of a *compressor* set to high ratios and very slow *attack* and *release* times. With a digital recorder, it may be beneficial to have some kind of leveler followed by a processor that does peak-limiting.

level scaling: See *keyboard scaling*.

level-sensing circuit: An electronic circuit that generates a *control voltage* in proportion to signal level. This control voltage can then be used to affect the amount or type of signal processing done by a separate device. Also called a *detector*.

LFE: Low Frequency Effect (film) or Low Frequency Enhancement (audio). The *subwoofer* channel signal in a *5.1* surround mix. See *in-band gain*.

LFO: Low Frequency Oscillator. An oscillator whose output is *infrasonic*, typically used as a control source for modulating the sound to create *vibrato*, *tremolo*, trills, and so on. Unlike a normal oscillator which produces audio signals, an LFO is a generator module that produces a modulation / control signal. The LFO's signal output is in the form of a slow, periodic waveform, usually less than 20Hz. The most common parameters found in the LFO are depth, frequency (rate control) and *waveform selection*. See Appendix C.

L

LFOA: See *LFOP*.

LFOP: Last Frame of Picture. Film acronym for the length of a given reel of film, usually connoting the head *leader* up to and including the last frame of the reel. Because it is standard to start counting with the *Picture Start* from of the leader as 0000+00 (zero feet, zero frames), the actual running time of a reel can be calculated by subtracting 11+15 (eleven feet, fifteen frames) to account for the 12-foot, 8-second leader. The *two-pop* is at 0009+00, and the first frame of picture of a reel is at 0012+00, sometimes referred to as *LFOA*.

librarian (software): Allows for computerized storage and organization of MIDI information for large numbers of synthesized or sampled sounds. Information is organized to be specific to synthesizer manufacturers' protocols. Librarian software sends *patch parameter* instructions to the synth via a MIDI cable. See *editor/librarian*.

lift: A section of a longer piece of music which may be edited out and used independently. For example, a musical phrase which is part of a longer piece of commercial music which may be used for use for another purpose than which it was originally written.

lifter: A tape transport's head-lifter mechanism. Tape machines normally lift the tape off the heads when in fast-forward or rewind mode. The synchronizer intelligently controls the machine's lifter operation to read *timecode* when required.

light metronome: A metronome which silently marks beats by flashing a light on and off, as opposed to audible clicks, to mark the tempo.

Lightpipe: A *serial*, *multiplexing*, eight-channel interface for digital audio on a single fiber-optic cable, terminating in a proprietary connector. The Lightpipe was invented by Alesis to connect its ADAT *MDM*s. The data rate is 256 times the *sample rate*, or four times the data rate of *AES/EBU* or *S/PDIF*. See also *TDIF*.

light valve: The mechanism which controls the intensity of light or the area on which light falls in the making of an *optical track* for a *film soundtrack* from the finished mix. For variable-density tracks, it consists of a narrow slit whose width is varied by the waveform reproduced from the mix, and which in turn modulates the width a beam of light that is focused on a continuously moving strip of photographic film.

Lightworks: A particular brand of *nonlinear* picture editing system. See *digital dubber*.

LIMDOW: Light Intensity Modulation Direct OverWrite. A format for *MO* disks where the direct-overwrite technology eliminates the need for an erase cycle and allows for the writing of new data directly over existing data, with the result that the burst transfer time is cut in half.

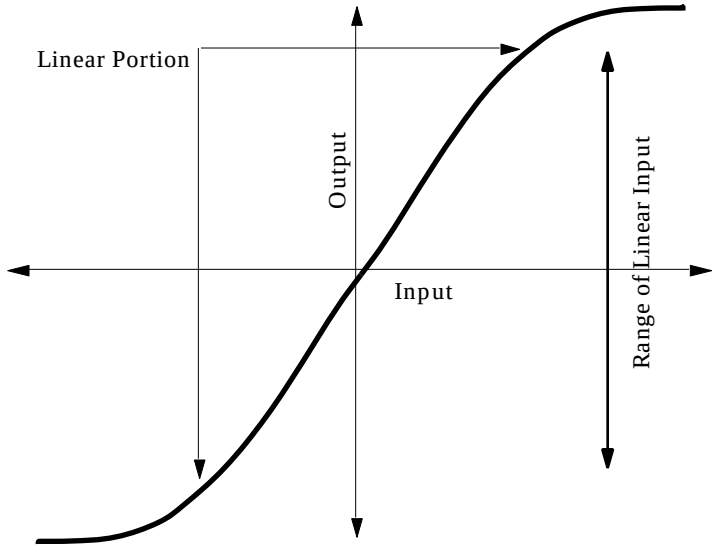
limiter: A special type of *compressor* which prevents the signal from exceeding a certain preset threshold setting, no matter what the input signal level may be, by using compression ratios of 20:1 or greater. Limiters are sometimes used in front of power amplifiers to prevent high-level signals from causing distortion. See *compressor/limiter*. Called a *clipper* in Europe.

line: (1) A signal path or actual cable through which a signal passes. (2) One horizontal scan of the raster in NTSC, PAL, or SECAM video signals. See *field*(4).

L

line amplifier: Now, any amplifier with a *line-level* output and an output *impedance* of approximately 600Ω.

linear: (1) A system is said to be linear if it meets the conditions of proportionality and additivity: if its output level changes smoothly in proportion to input level changes, and if input *x* causes output *X* and input *y* causes output *Y*, then *x + y* at the input must cause *X + Y* at the output. Most tests in audio including *frequency response*, *gain*, *phase*, *impulse response*, etc. assume linearity.



Linear

(2) Uncompressed, i.e., an audio file that has not been processed by some kind of *compression* algorithm, such as *ADPCM*. (3) A process which works in a sequential fashion, such as magnetic tape recording, playback the or editing tape media, etc., as opposed to a sequence of steps which can be taken in any order and / or in any location, such as the *random-access* editing and playback processes which are made possible by digital storage technology.

linear distortion: Any type of distortion that a linear system is capable of producing, as opposed to *nonlinear distortion*. Some types of linear distortion are *frequency response errors* and time-delay errors such as *phase-shift*.

line input: Any set of input terminals of an audio device designed to accept *line-level* signals, or signals above about 25mV RMS. Normally high *impedance* and, therefore, not suitable for most microphones.

line-level: The average audio voltage level of a signal at a particular point in an audio system above 25mV *RMS*. The output level of a preamp is typically line-level, and the input level of a power amplifier is line-level. In home or semi-pro equipment, the input or output operating level is usually -10dBV. In commercial audio systems, line-level is metered with a *VU meter*, where 0VU corresponds to 0.775V RMS of a signal. The line-level in pro audio systems may be +4dBm (1.23V RMS) or (archaic) +8dBm (1.95V RMS) or even +20dBm (~9V). Typical line-level audio signals include *synthesizer* outputs, *mixer* outputs, and *effects* outputs. As opposed to *mic-level*.

L

line-matching transformer: An electronic component that matches the output *impedance* of one device with the input impedance of the next device in a signal path.

line pad: A *passive* attenuation *network* that can be inserted in a *line*.

line-up: The procedure carried out to ensure that recording, editing, playback, amplification, etc. equipment works to the highest possible standard. It consists of systematic adjustment of the equipment according to a schedule and may involve specialized calibration and test apparatus such as a multimeter, tone generator, oscilloscope, etc.

line-up tone: (1) Also called a *reference tone* or *reference frequency*, a *sine wave* used for *servo* control, such as on a *sync tone*. See *vari-speed*. (2) A sine wave tone at one of a range of standard frequencies (usually 100, 1,000 and 10,000Hz) It is set to zero-level and is intended to be used for calibration, such as during a *line-up* procedure. The *APRS*-specified line-up tones for *magnetic tape recording* are:

Length	Tone	Calibration Purpose
20”	1kHz at 0VU (0dB)	Maximum level check
20”	1kHz at -10dB	Calibrate the -10dB level
20”	10kHz at -10dB	Azimuth line-up check
20”	100kHz at -10dB	EQ alignment

link: See *track-at-once*.

lip ribbon: A ribbon microphone with a guard which is placed on the upper lip. The proximity of mouth and microphone makes it useful in situations with high background noise, e.g., battlefields or boxing matches.

lip sync: The process of matching dialog sound to the picture. See *ADR*.

Lissajous: See *X/Y function*.

little dipper: Nickname for a popular *dip filter* previously manufactured by UREI.

Little Old Ladies with Umbrellas: Film sound expression for how loud a film can be before the movie patrons will complain. The effect is, therefore, that the top end of the dynamic range available to mixers is not necessarily defined with regard to a theater’s ability to reproduce a mix. See also *popcorn noise*.

live: (1) Acoustically reflective, as opposed to *dead*. See *LEDE*, *reflections*. (2) In electrical systems, a conductor which carries current. (3) A broadcast which is transmitted as it happens, i.e., in *real-time*.

live side: The side of a microphone which is most sensitive to sound. See *acceptance angle*.

live-to-two-track: See *direct-to-two-track*.

Lmax/Lmin: Lmax/Lmin are measurements of the *dynamic range* of a recording, Lmax obviously representing the maximum measured *level* of the recording, and Lmin, its minimum-level counterpart. The dynamic range of an audio signal is Lmax-Lmin.

L

load: (1) Any component or device that consumes power produced by a separate source. Or, to connect such a device to a power source. (2) To copy the contents of a file, database or program from disk or other storage medium into memory.

loading: Placing a *resistive* load across a line, and generally one that is of lower *impedance* than the line or device to which it is connected. This draws additional *current* from the preceding device, and can cause electrical power capacity problems.

load resistor: (1) A simple resistor placed across a transmission line in order to decrease the *impedance*, generally for *impedance-matching* purposes. (2) A resistor wired across the outputs of a power amplifier, simulating the impedance of a speaker.

lobes: In a mic's *polar pattern*, the expanding curves represent the maximum value for each direction of highest *sensitivity*. For example, the bi-directional polar diagram of a *figure-eight* microphone shows two equal-sized lobes 180˚ apart.

local control: With Local Control on, playing a synthesizer or sampler does two things: it triggers built-in sound generators and sends data to the MIDI Out. With Local Control off, the keyboard still sends data to the MIDI Out but does not drive the internal sound generators, which now respond solely to data appearing at the MIDI In. In other words, Local Control off disconnects a synthesizer's keyboard from its sound generator, while leaving them both active for MIDI purposes. See *MIDI mode*.

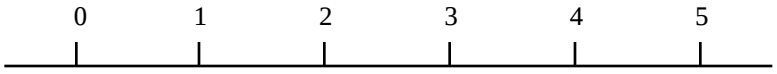
local/remote switch: The switch on a synthesizer that selects whether tones will be generated in response to its own keyboard, or from a remote device via MIDI.

locate point: See *autolocator*.

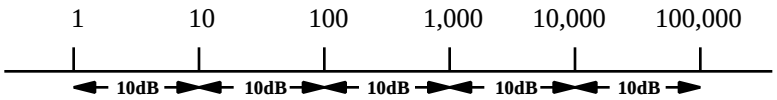
location sound: Sound recorded and/or mixed on location during the film or video shoot; also known as *production sound, live sound, location recording,* and *live recording*.

L

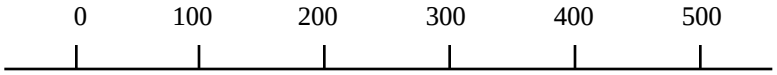
logarithmic: Having to do with the logarithms of numbers rather than the numbers themselves. In graphs of audio phenomena, frequently the log of amplitude is plotted versus the log of frequency. The common log of a number is the power to which the number 10 must be raised to obtain the number. A log scale is a scale where distances are proportional to the logs of the represented numbers, while a linear scale has distances proportional to the numbers themselves. See Appendix A.



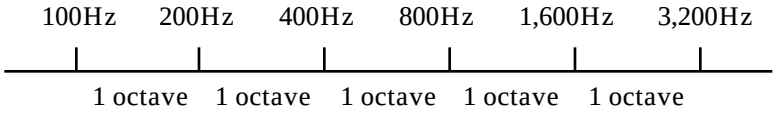
Linear Amplitude Scale



Logarithmic Amplitude Scale



Linear Frequency Scale



Logarithmic Frequency Scale

Logic 7: Differing significantly from the discrete *5.1 surround-sound* formats, Logic 7 is a *matrix*-surround format with full-bandwidth channels. Logic 7 uses a proprietary *decoder* to combine data from a discrete five-channel digital mix into two channels, thus Logic 7 is known as a *5-2-5* matrix. Additionally, the matrix can decode to seven channels instead of five, in which case the matrix creates two side loudspeaker channels, moving the rear channels completely to the rear. Logic 7-encoded material can be played through conventional two-channel systems, as well as ProLogic- and Dolby Surround-encoded systems, although the encoded material will sound best when replayed through a Logic 7 decoder.

logical editing: To set up note criteria (such as pitch range, velocity range, duration range, placement within a measure, etc.), to which digital editing operations (e.g., cut, transpose, quantize, etc.), will apply. Also called *conditional editing*, *change filtering*, *selection filtering*, *split notes*.

longitudinal timecode (LTC): Refers to *SMPTE timecode* recorded on one of the audio tracks of a video tape. Usually the highest-number edge track at -3dB.

L

loop: (1) A piece of material that plays over and over. In a sampler, loops are used to allow samples of finite length to be sustained indefinitely. See also *sustain loop, release loop.* (2) A section of tape with the two free ends joined, used for creating repeated sounds. Tape loops were used in the first *delay* units, where a short tape circulated around a system consisting of a record head followed by a series of replay heads to pick up the increasingly delayed signal (as well as an increasing proportion of noise.)

loop (cont'd): (3) In tape recorders equipped with *zero-locators*, a transport operating mode in which the engineer has designated a starting and ending point, either in tape time or *SMPTE timecode*, and instructed the locator and machine to play the enclosed tape segment repeatedly, rewinding to the starting point each time the end point is reached. Most video *interlock* devices can be programmed to cause both video and any synchronized audio decks to repeatedly reproduce a loop of picture and its corresponding sound. The engineer may place the audio or video deck into record mode during a section of each repeat of the loop in order to replace dialog or other *sync sound*, or to perform *insert edits*.

loop (cont'd): (4) In cameras and projectors, a slack section of film located just before and after the *gate*. The loop prevents tearing of the film as it passes from continuously turning sprockets to the intermittent movement of the supply reel. (5) A wire or cable system which has at least two ends joined together, usually creating *ground loops*. (6) An electronic connection where a device has a circuit from its output back to its input. See *feedback*.

looped recording: A sequencer option whereby a saved sample is played over and over again. The new data can either replace previously played data in real-time, or add to what was played previously.

looping: See *ADR*.

looping modes: A loop can play (1) forward from start to end, (2) in reverse from end to start, or (3) alternating between forward and reverse. Also called *loop type*. See also *crossfade looping*.

Loop Points Request: A Universal System-Exclusive message of the non-real-time type, within the *SDS*, which allows a receiving device (e.g., a sampler) to request that a transmitter (e.g., a computer) send information about the two sample numbers between which a loop will occur.

Loop Points Transmit: A Universal System-Exclusive message of the non-real-time type, within the *SDS*, which allows a transmitting device (e.g., a computer) to request that a receiver (e.g., a sampler) send information about the two sample numbers between which a loop will occur.

L

loop tempo: To find the exact *tempo* of a loop when you know the *sampling rate* that was used to make the sample (assuming you are using the sample at its original pitch), set the start point and the loop point at the desired points, and subtract the start point's value from the loop point's to find the length of the sample:

$$\frac{\text{beats} \times \text{rate} \times 60}{\text{length}} = \text{bpm}$$

For example, assume a two-bar, $\frac{4}{4}$ loop=eight beats, sampled at 32kHz. The loop (according to the sampler) is 135,500 sample words: (8 x 32,000 x 60) / 135,500 = 113.35 bpm.

For each *half-step* that the sample has been transposed downward, multiply the length parameter by 1.0595. For each half-step upward, divide the length by 1.0595, i.e., if the loop is being played two *keys* higher, divide by 1.0595 twice. Then use the same formula, substituting the new length figure for the original one.

Lo-Ro: Left only-Right only. Indicates a standard left-right stereo signal that has been *downmixed* from a larger format mix, such as *5.1*. Because the surround information has been incorporated into the stereo signal without matrix encoding, a Lo-Ro mix cannot be subsequently *decoded* back into the larger format. See also *Lt-Rt*.

loss: The opposite of *gain*. When a signal passes through a circuit or audio device, if the output power is less than the input power, the circuit or device is said to have loss, usually expressed in dB. See *insertion loss*, *passive*.

lossy/**lossless**: If, upon decoding by a *codec*, an audio file *compression* algorithm restores the sound to its original fidelity, it is said to be lossless. To the extent that the exact sound quality of the uncompressed signal cannot be reconstructed, the algorithm is said to be lossy.

loudness: Loudness is a subjective attribute of sound and cannot be quantified. If a large group of listeners is asked to adjust the strength of two signals so that one is twice as loud as the other, the average *power* difference will be about 10dB, and this will be almost independent of the absolute levels of the two sounds. The loudness of a sound, especially a complex sound containing many frequencies, has no simple relation to its *SPL*.

loudness control: An addition to some amplifiers or preamplifiers which attempt to correct for the reduced aural sensitivity to low-frequency, low-level sounds. The loudness control is simply a bass-boost circuit which has a relatively greater effect as the volume is turned down so that the perceived *loudness* of each frequency is the same as the loudness of a 1kHz tone.

loudspeaker: A *transducer* which converts electrical energy into acoustical energy. The most common type of loudspeaker today is the *dynamic loudspeaker* which has a *resonant frequency*, the frequency at which it will vibrate naturally if perturbed. The resonant frequency, also called the *natural frequency*, will be near the lowest frequency that the speaker will reproduce well, and is that frequency at which it is easiest to move the *cone* (the output from the speaker will be at a maximum). Damping must be added to a speaker system in order to reduce this peak in response.

low-frequency oscillator: See *LFO*.

lowpass filter: A filter that attenuates the frequencies above its *rolloff frequency*.

L

L-pad: A type of *potentiometer* that maintains constant *impedance* at its input while varying the signal level at its output. L-pads are most often used as an external *balance* control or variable attenuator (volume control).

LPF: See *lowpass filter*. In other circles, a Liquidity Preference Function. See *TLA*.

LSB: Least Significant Bit. The smallest change in signal voltage level which an *A/D converter* can encode. The value of the LSB is also equal to the amplitude resolution of a digital system, in other words, the minimum nonzero difference in level between two successive samples is 1 LSB.

Lt: See *stereo optical print*.

Lt-Rt: Left total-Right total. Indicates the presence of *matrix encoding* of four channels on a 2-track stereo master. Compare with *Lo-Ro.* See *downmix, stereo optical print*.