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μ: Micro (Greek “mu”). One millionth.

μ-law or **μ law**: The international standard telephony-encoding format, used to compress audio before posting it to the WWW. It’s a fast 2:1 compressor for 16-bit audio used mainly by Sun and NeXT computers. This scheme compresses 16-bit files to 8-bit, nonlinear resolution that offers better dynamic range than standard, linear 8-bit audio files. However, the sampling rate is low-fidelity, only 8kHz, about the sound quality of a telephone receiver. It has strong cross-platform support with playback software for Macs and Windows systems.

μs: Microsecond. One millionth of a second.

m: Milli. Prefix meaning one-thousandth of the quantity that follows, e.g., milliseconds (ms), and millimeter (mm).

M: Mega. One million times the quantity that follows, e.g., megabit (Mb), megabyte (MB), and megawatt (MW).

M&E: Music & Effects. The “M” and “E” in *DME*. A three-track film soundtrack mix, less dialogue, used for foreign voice dubbing. A foreign language film version requires that all sound effects that are otherwise included in the dialog stem are copied across to the effects stem. If these production effects are not clear of dialog, then they must be replaced either by Foley tracks or by cut effects. Once the effects are complete, the track is said to be filled, thus contracts specify “music and filled effects.” Also known as the international version, or *mufex*. See *stem*, *final mix*.

MACE: Macintosh Audio Compression/Expansion. Lossy audio *compression* algorithm, included in the Mac’s system software. It works with 8-bit digital audio files, and supports compression ratios of 3:1 (music) and 6:1 (speech). Resulting audio quality is not the best.

MADI: Multichannel Audio Digital Interface. Sometimes erroneously called the Musical Audio Digital Interface. A professional multichannel version of *AES/EBU* for transmitting up to 56 channels of digital audio data over a single coaxial cable terminated with BNC connectors. MADI uses a second cable for *word clock*, with a fixed data rate of 100Mbps used on large, open-reel digital multitracks. Optical MADI implementations are available.

MAF: Minimum Audible Frequency. The lowest line on an *equal loudness curve*, representing 0dB SPL.

mag: Shorthand for sprocketed *magnetic film*. Film that contains only sound, but no picture.

mag dubber: A type of sprocketed tape recorder/playback machine that reproduces one or more audio tracks onto the magnetic area of *magnetic film*. Some *mag dubbbers* which are equipped with dual sets of sprockets can reproduce more than one size of magnetic film, e.g., 16mm and 35mm. See *mag-optical print*.

Magnasync/Magnatech: Two brands of *mag dubber*. They can be used to transfer a sound source onto *magnetic film*. These brand names are also used generically to indicate any sprocketed tape recorder or playback unit. See *dubber*.

magnetic distortion: A type of distortion in *dynamic loudspeakers* caused by nonlinearities in the interaction between the magnetic field in the *gap* and the *voice coil*.

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magnetic film: Audio recording tape manufactured using a base of the same physical film stocks, e.g., 16mm, 35mm, etc., and which contains a magnetic area running longitudinally down the film for the recording of an audio track or tracks. Magnetic film is 3-5 mils thick, so that the same length of film and magnetic film will be of equal diameters when wound on reels. *Full-coat* magnetic film has magnetic oxide applied across its entire width. *Striped* magnetic film can have one or more thin stripes of oxide applied longitudinally on the film base. There is usually one (wide) stripe containing a single track of audio (in the same size and location as track-one of a 3-track), while another (smaller) stripe is placed on the opposite side to make the film pack evenly when wound together, usually known as a *balance stripe*. The balance stripe is sometimes used to record timecode from $\frac{1}{4}$ -inch or DAT timecoded *production masters*. Also called *mag*. Not used since the advent of synchronized audio multi-track recording. See *film soundtrack*.

magnetic recording tape: Most magnetic tapes have a mylar or polyester *base* with a thin coat of magnetic material, usually gamma ferric oxide or chromium dioxide, but newer tapes are double-layered which combine the good low-frequency response of ferric oxide and good high-frequency response and low noise of chromium dioxide; the oxide is cured onto the base and the tape is *calandered*. The metal particles have a random orientation in unmagnetized tape, but they are aligned into definite magnetic patterns by the magnetic field produced by the recording head. If all other factors are the same, the wider the track, the greater the *S/N ratio*: doubling the track width improves the S/N ratio by 3dB. Professional analog tape recorders are available with tape widths up to 2" and up to 24 tracks. There is a thin *guardband* of uncoated base tape between the tracks to yield improved *channel separation*, reduce *cross-talk*, and provide some tolerance for differences in head/track alignment among machines. See *Barkhausen effect*, *back coating*, *MOL*, *bias*, *domain*, *extinction frequency*, *scrape-flutter filter*.

Magnetic tape comes in a number of widths and formats (all denominated in inches):

Tracks	Historical Width	Next Standard	Most Recent
24	2	1	
16	2	1	$\frac{1}{2}$
8	1	$\frac{1}{2}$	$\frac{1}{4}$
4	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$ (cassette)
2	$\frac{1}{4}$	$\frac{1}{2}$	(DAT)
4	$\frac{1}{4}$		Quarter-track
2	$\frac{1}{4}$		Stereo (Half-track)
1	$\frac{1}{4}$		Mono

magnetometer: A device for measuring magnetism and magnetic fields. Useful for testing whether or not tape heads need to be degaussed, and also for verifying the magnetic fields generated by unshielded speakers.

magneto-optical disk: See *MO*.

magnitude: The portion of the *frequency response* or *impedance* of a device that represents the amplitude is called the magnitude, as distinguished from the *phase*, which is the other part. Precisely, the term magnitude only applies to complex quantities, i.e., quantities characterized by both a magnitude and a phase. For noncomplex quantities, the term *amplitude* is used.

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mag-optical print: A motion picture film that has both an *optical soundtrack* and magnetic soundtracks so it can be reproduced in conventional theaters with optical sound equipment and also in houses equipped with stereo magnetic sound.

mag stripe print: A 35mm or 70mm print with magnetic oxide stripes painted lengthwise down both sides of film, on either side of the perforations. These formats are now obsolete. See *print master*.

manual: The keyboard(s) on an organ or harpsichord played by the hands, as opposed to the pedalboard, which is a keyboard played with the feet.

map: A table in which input values are assigned to outputs arbitrarily by the user on an item-by-item basis, used as input to a *mapper*.

mapper: A device that translates MIDI data from one form to another in real-time. See *MIDI mapper*.

mark-in/mark-out points: In video synchronization and *post-production*, the *timecode* addresses selected by the editor as the beginning and end points of a *loop*. The synchronizer will stop *master* and *slave* transports at the mark-out point after each insert take, then automatically return all machines to the mark-in point in preparation for another take. Various synchronizers automatically add *pre-roll* and *post-roll* times to the mark-ins and -outs, so it is important to understand how each unit internally defines all of these locations.

mark/space ratio: See *duty cycle*.

marry: To print sound and picture onto the same strip of film, as on an *answer* or *release print*.

masking: A subjective phenomenon wherein the presence of one sound will inhibit the ability to hear another sound. See *frequency masking*.

master: (1) A *gain* control on a *sound reinforcement* or recording console that controls the level of a mixture of signals whose levels have been set by the individual channel *pots*. A console will have a master gain control for each output signal. (2) The final version of a performance which will be used for the production of copies in a film production, this is the *master dub*. See *APRS label system*, *bin-loop master*, *cut(3)*, *direct metal mastering*, *direct-to-disc*, *edit master*, *glass master*, *lacquer master*, *post-production*, *stamper*, *transfer*, *two-track*, *master tape*, *mastering lathe*. (3) One device within a *MIDI network* or recording/*dubbing chain* which provides the *master clock*.

master balance: A message of the Universal System-Exclusive type used for controlling the balance between the left and right outputs of a multitimbral synthesizer, in preference to adjusting individual channel balance.

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master clock: A clock signal which is sent from a master device to all slaves to maintain tape position synchronization. In this process, the master clock device sends a signal from a dedicated word-clock output to a dedicated word-clock input on all slave devices over a separate cable, typically terminated with a *BNC* connector. Master clock generators are available at various accuracies, measured in ppm (parts per million): The AES defines Grade 1 clocks as having a long-term accuracy of ± 1 ppm and Grade 2 clocks as ± 10 ppm. The IEC specifications are Level I ± 50 ppm for “pro” equipment, Level II (consumer) accuracy at $\pm 1,000$ ppm, and Level III has inaccuracy measured in days. It is important to be aware of the master clock spec on digital mixers, as some are specified with IEC Level II clocks, making attachment to high-resolution recorders problematic, and in this case, an external clock would be necessary to provide sufficient timing accuracy.

See *house sync*, *self-clocking*, *reference source*, *sync reference*.

master controller: In a MIDI network, the device which a musician plays in order to control other devices in the network. Typically a keyboard, but a master controller could also be drum pads or some other MIDI generator such as a string or wind controller.

master dub: See *master(2)*.

master fader: A fader to which the groups or channels in a mixing desk are connected. It normally controls the level of the stereo output from the desk.

mastering: The stage between mixing and the pressing plant, where cuts are assembled in the final order and the *master(2)* prepared for duplication: song-to-song levels are equalized, the stereo image is properly balanced, fade-ins and -outs and any crossfades are added, any last-minute compression/limiting is added to even out the dynamic range of the compilation as a whole, if necessary, additional effects such as some reverb to smooth any abrupt transitions, and clean-up of all remaining noise: hum, pops, clicks, crackles, etc. (Old) The common term for the process of transferring the musical signal from a magnetic tape, usually called a *master tape*, to an acetate master disc, being the first step in the manufacture of phonograph records from tapes.

mastering lathe: A lathe bed and carriage mechanism (the actual cutting stylus or head, arm, and armature). Using a high-wattage amplifier to drive the cutting stylus, with a pitch/depth control computer that controls the depth, width, and spacing of grooves being cut, the mastering lathe makes the master lacquer disk from which metal parts and then vinyl records are ultimately made.

master tape: (Old) Records are usually made from tape recordings, and the edited tape from which the acetate is cut is called the master tape. It could be an original recording, but more often it is a copy of original tapes.

matching: See *impedance-matching*.

matching transformer: Short for an *impedance-matching* transformer. Used to interconnect devices or cables of different *impedances*. Necessary, for example, when using a low-impedance mic with a guitar amp, which has high-impedance inputs. The transformer increases the energy transfer between the mic and the input, preserving the high-frequency response in the signal.

M

matrix: (1) A term used to describe any system which allows devices to be connected as though they were arranged along the two axes of a grid, i.e., a structured form of *patching*. For example, the VCS range of modular synths, where the outputs of the various modules are connected to the left edge of a grid of holes, while their inputs are ranged along the top edge. Electronic versions of a matrix are implemented in software. (2) See *matrixing*.

matrixing: Matrixing is the linear mixing of two or more signal channels at specific amplitudes and phases to form two or more new signals. These new signals can be combined in similar ways to recover the original signals. The circuit topology used for matrixing is called a matrix. Matrixing is a linear addition of signals used to encode directional information, e.g., *Scheiber matrixing* used in Dolby Surround-sound, and it is not the same as *modulation*.

matrix modulation: A method of connecting modulation sources to destinations in such a way that any source can be sent to any combination of destinations.

MAX: A real-time MIDI processing and graphic programming environment. Max software was first developed at IRCAM and later commercialized by Opcode Systems.

maximum output level (MOL): For an audio device such as a tape recorder, the MOL is generally taken to mean the output signal level that results in 3% *harmonic distortion* at low frequencies and usually 3% *intermodulation distortion* at high frequencies. Any higher signal output than the MOL will result in rapidly increasing distortion, and is a function of both input signal frequency and of the device itself. MOL also applies to a specification for analog magnetic tape. The MOL for a tape is frequency-dependent; all magnetic tape saturates faster at higher frequencies; it is also speed-sensitive: as the recording speed is slowed, the distortion point is lowered. MOL may be referenced to an absolute flux level, or to a test tape. See *third harmonic distortion*.

MCPS: Mechanical Copyright Protection Society. The UK equivalent of BMI/ASCAP. See also PRS.

MD: See *MiniDisc*.

MDM: See *Modular Digital Multitrack*.

meantone: In tuning, the meantone system was a common technique used for keyboard instruments before *equal temperament* came into general use. Meantone temperament is a tuning in which the thirds are turned pure, and all of the fifths are one-fourth of a *diatonic comma* too narrow. All the whole tones are equal and are precisely half a major third, hence the name meantone. It provides for the pure intonation of the key of C_{major} and those lying near it at the expense of the more extreme sharp and flat keys, which is the reason why remote keys were rarely used in keyboard works before the adoption of equal temperament. There was, for example, a pure F \sharp and B \flat , but these notes were out of tune when used as G \flat or A \sharp .

measure: Also called a *bar*. The space between two bar lines in music notation, suggesting a unit of time. Measured music has sections with a well-defined *meter*, and which can be easily notated within bar lines. Almost all western music of the past five hundred years is of this type.

mega: Prefix meaning “one million times the unit that follows,” e.g., a megawatt is one million watts. See *M*.

M

Melco: See *ProDigi*.

memory requirements: One minute of MIDI information takes up approximately 0.035MB of memory, compared to about 10MB for CD-quality stereo digital audio (16-bits at 44.1kHz), and over 34MB for 24-bit, 96kHz sampling precision.

merger: A MIDI accessory that allows two incoming MIDI signals to be combined into one MIDI output.

Meridian Lossless Packing: See *MLP*.

metadata: Generically, parameters which apply globally to a particular data transmission, as opposed to the data actually carried in the transmission. These data usually include type of codec, number of channels, channel format, originating node information (in a network context), type of data encryption, etc. In Digital Dolby, metadata specifically refers to the parameters which travel alongside the audio in the Dolby Digital stream as auxiliary data. The metadata here provides scalable decoding information about the audio which can be interpreted in different ways by different receivers, allowing a producer to tailor a program's mix to the playback environment without requiring the medium to store multiple versions, e.g., a 5.1 mix and a stereo mix.

meta event: See *SMF*.

meter: The *time signature* of the music, i.e., how many *beats* are in each *measure*.

MCI: Media Control Interface. A multimedia specification designed to provide control of onscreen movies and peripherals like CD-ROM drives.

mic-level: The nominal output level of a microphone, usually -50dBv to -40dBv, as opposed to *line-level*. This corresponds to a few millivolts of power.

mic/line switch: On a recording console, the two-position switch that allows the engineer to select whether each module will control the *mic-level* signal from a microphone in the studio, or the previously recorded track of a tape or other signal coming into the console at *line-level*.

micron: A standard unit of length, equal to one millionth of a meter. Used to specify very small measurements, such as tape recorder *head gap* widths.

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microphone: An *electroacoustic* device which delivers an electrical signal when actuated by a sound. A microphone consists of an acoustic system that supplies mechanical (acoustic) energy to a *transducer*, which converts the energy into electrical energy. Microphones are classified by their acoustical parameters, by their method of transduction, and by their *directional* characteristics. See *capsule*, *cardioid*, *supercardioid*, *hypercardioid*, *ribbon microphone*, *moving coil microphone*, *condenser microphone*, *dynamic microphone*, *boundary microphone*, *Soundfield microphone*, *Lavalier microphone*, *contact microphone*, and *omnidirectional microphone*.

Attribute	Construction		
	Moving Coil	Ribbon	Condenser
Normal Polar Response	cardioid	figure-8	cardioid/switchable
Robustness	high	low-average	average
Cost	low	average	high
Examples	Shure SM58 Electrovoice RE20	Beyer M88	AKG C451 Neumann U87
Transient/HF Response	good	very good	excellent
Diaphragm Weight	high	low	average
Output	average	low	high
Sensitivity/Efficiency	average	low	high
Application	general purpose vocal, brass combos, kick drums	strings, vocal overheads	acoustic instruments, piano, vocals, snare, hi-hats
Side Effects	average sound	handling and rumble slightly fragile	crackles when wet needs phantom power
Sound Characteristic	solid	smooth	crisp

microphone preamplifier: See *preamplifier*.

microphonic noise: Noise generated within an audio cable, caused by changes in *capacitance* between the inner conductors in the cable and/or its shield. Microphonic noise can result from unstable dielectric (insulating) material that allows the conductors and/or shield to move in relation to one another.

microtuning: A system that uses different *intervals* between notes in a *scale*. A number of microtuning systems attempt to reduce *beat* frequencies introduced by the simultaneous playing of the notes of a chord. Some systems use different numbers of notes in an octave (up to 53). It is necessary to decide on the *key* before a microtuning system can be selected. Instruments which support microtuning are called *microtonal*. See *equal temperament*, *just intonation*, *temperament*.

middle-eight: See *bridge(4)*.

M

MIDI: Musical Instrument Digital Interface. MIDI is a specification for the types of control signals that can be sent from one electronic music device to another. MIDI is a *serial* protocol, with a word length of 30 bits and a transmission speed of 32kbps. *MIDI* messages are either *channel messages* or *system messages*, the first of which describes the actual musical content of the sound, and all other synthesizer actions affecting that sound are controlled by the latter.

MIDI analyzer: A device that gives a visual display of MIDI activity when inserted between two pieces of MIDI equipment.

MIDI Bank Change: A type of *MIDI controller* message which is used to select alternate banks of MIDI patches where access to more than 128 patches is required.

MIDI choke: See *MIDI delay(2)*.

MIDI Clock: A timing reference signal sent over a MIDI cable at the rate of 24ppq; a System Real-Time message used to communicate timing information among instruments in a MIDI system. Also known as *MIDI Sync*. See also MTC.

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MIDI Controllers: (1) Devices which generate *MIDI messages* and which typically resemble musical instruments such as keyboards, guitars, drums, etc. Although originally conceived with a keyboard paradigm, MIDI controllers are now available as guitars, wind valves, drum kits, xylophone, piano, accordion, the violin family, as well as keyboards of all types. (2) MIDI Controller messages. These are a type of Channel Voice message designed for adjusting individual controls, such as pan position or channel volume, on equipment in the MIDI network. While not a part of the MIDI specification, certain conventions exist. The table below gives some of the more common controller numbers. See also *controller change*, *continuous controllers*, *switched controllers*.

Controller messages can be switched, i.e., their value is either On or Off, or they can be continuous. Controller messages 0-31 take one additional data byte and can therefore carry values in the range 0-127. However, these can be paired with controllers 32-63 to provide two bytes of resolution, e.g., Controller 4 is paired with Controller 36. When this is done, the controller in the range 0-31 takes the MSB and its pair in the range 32-63 takes the LSB, for a range of 16,384 possible values. Most continuous controllers carry values ranging upward from 0, although physical controllers that center around zero, such as balance, pan, and pitch-bend may be implemented so that their associated controller message carries values centered on the midpoint.

MIDI Controllers

Controller #	Function		Controller #	Function		
0	bank select MSB		70-79	sound controllers 1-10*		
1	modulation wheel					
2	breath controller					
4	foot controller	Continuous Controllers	70	synths	effects units	
5	portamento time		71	sound variation	exciter	
6	data entry MSB		72	harmonic content	compressor	
7	channel volume		73	release time	distortion	
8	balance		74	attack time	equalizer	
10	pan			74	brightness	expander
11	expression controller			80-83	general purpose 5-8	
12	effects control 1			91-95	effects depth 1-5**	
13	effects control 2			96-101	data controllers	
16-19	general purpose 1-4			120	all sounds off	
32-63	LSB for controllers 0-31		121	reset all controllers		
64	sustain pedal	Switched Controllers	122	local control	Channel Mode Messages	
65	portamento		123	all notes off		
66	sostenuto		124	omni mode off		
67	soft pedal		126	omni mode on		
68	legato footswitch		126	mono mode on (poly mode off)		
69	hold 2		127	poly mode on (mono mode off)		

* Manufacturers may implement these as desired. The first 5 default as indicated.

** Originally assigned to specific effects such as chorus, phaser, tremolo, etc.

M

MIDI Delay: (1) A facility provided on some sequencers to allow a track to be fractionally delayed or advanced relative to others. Particularly useful for synthesizer voices which speak late, or to give a part a sense of urgency by being played very slightly ahead of the beat. Also called *MIDI offset*. (2) Noticeable delay in the transmission caused by MIDI Choke. This usually happens when too many MIDI devices try to send *bulk dumps* or unthinned *continuous controller* data over the same MIDI port.

MIDI Echo: A feature that routes MIDI messages appearing at a device's MIDI In port through its processor, unaltered, to the MIDI Out port. This allows control of a MIDI sound module simultaneously from a sequencer and a keyboard. MIDI Echo differs from *MIDI Thru* in that there is a direct, hard-wired connection between the MIDI In and Thru jacks, so the datastream doesn't pass through the device's processor.

MIDI filter: See *filter(2)*.

MIDI interface/adaptor: A device that converts data from a MIDI device to a format that a computer can recognize.

MIDI loop: A (mistakenly) hard-wired *loop*. See *note-doubling*.

MIDI Machine Control (MMC): A protocol for using MIDI commands, usually from a sequencer, to control the transport functions (stop/play/record/locate/rewind/fast forward) of a tape recorder or other mechanical device. MMC is intended to link MIDI equipment with more traditional equipment such as audio and video tape machines and multimedia computer devices.

MIDI Mapper: An applet that automatically maps channel, program change, and note number data. For example, a map could cause all notes coming in on MIDI channel 3 to go out on MIDI channel 7.

MIDI Merge: The process of combining MIDI messages transmitted from two or more MIDI devices into one coherent MIDI data stream so that the messages appear to have been generated by only one device. This is not just connecting MIDI cables as MIDI messages are structured and this structure needs to be preserved. For example, if two Note On messages arrive simultaneously at the two inputs, the merge device will have to store one of them in a buffer until the first is sent. Because MIDI messages are variable in length, and because *real-time* messages have to take a priority, the merge device must be able to identify and distinguish between different data types. This generally requires a separate microprocessor, making a MIDI merge unit more expensive than a MIDI Thru device.

M

MIDI message: A full instruction consisting of at least one status byte and frequently with one or more data bytes, which causes a MIDI device to perform one of the functions defined in the MIDI specification. See also entries for each message type.

MIDI Messages (Message examples)

Channel Messages (apply to an individual channel)		System Messages (apply to the whole system)		
Channel Voice (Note On) (Program Change)	Channel Mode (Local On) (Reception Mode)	System Common (Song Position) (Tune Request)	System Exclusive (Data for specific items of equipment)	System Real-Time (Timing Clock) (System Reset)

MIDI module: A device for generating sound which does not have an integral keyboard.

MIDI network: A collection of MIDI devices connected together in such a way that MIDI messages can pass between them. The most common network is a *daisy chain* (each device connected to the previous device, i.e., in a linear arrangement) or in a *star topology*, where each device is connected to a central point, such as a multi-port *MIDI interface*.

MIDI Mode: Also called *channel mode* or *reception mode*. A setting that determines how a particular MIDI device or instrument reacts to transmitted voice and channel data. Four modes are created by different combinations of the messages Omni On/Off (defining the ability to react to data on all MIDI channels) and Poly/Mono (playing notes *polyphonically* or *monophonically*):

Omni On/Poly	Mode 1	The receiving instrument reacts to data on all MIDI channels (Omni) while playing polyphonically.
Omni On/Mono	Mode 2	Similar to Mode 1, but the instrument plays monophonically (rarely used).
Omni Off/Poly	Mode 3 "Multi"	Each synth (or multitimbral part) plays polyphonically on its own MIDI channel.
Omni Off/Mono	Mode 4 "Mono"	Used for MIDI guitar as it allows each string to play monophonically on its own MIDI channel.

MIDI Note Number: The decimal number, from 0-128, which represents the *equal temperament* scale of about eight octaves, where 60 represents Middle-C, having a frequency of 261.63Hz. The MIDI note number 36, for example, corresponds to the 4th key on a piano, referred to as C1, with a frequency of 32.7Hz. Middle-C is sometimes called C3 or C4, depending on the author. Commonly, modern instruments are tuned to A440, that is A3/A4, MIDI note number 69.

MIDI Offset: See *MIDI Delay*.

MIDI Out/Thru: A MIDI output port that can be configured either to transmit MIDI messages generated within the unit (Out) or to retransmit messages received at the MIDI In (Thru). See *MIDI echo*.

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MIDI patchbay: Essentially a patchbay for MIDI signals. Passive patchbays simply present MIDI In and MIDI Out sockets conveniently on a front panel to facilitate patching via patchcords. Active patchbays will generally have MIDI sockets on the rear panel, switches and displays on the front panel, and will also have a memory which allows commonly used patches to be stored. These, in turn, may be triggered by specific MIDI Program Change messages sent to the unit. As all of this requires some processing power, an active patchbay will often perform other functions such as *MIDI Merge* or *MIDI mapping*.

MIDI port: A means of bypassing the 16-channel limit of the MIDI specification by using a MIDI interface with multiple MIDI sockets that carry totally independent signals and effectively provide separate *MIDI networks* that function in parallel. Typically, there may be four such sets of sockets, each socket representing one MIDI port that can be used for up to sixteen channels. Such interfaces, which are generally the hub of a large MIDI network, are occasionally built into master keyboards. More typically, they are add-on hardware devices attached to a computer and will usually only operate in conjunction with sequencing software from the same manufacturer.

MIDI Show Control (MSC): A protocol in the MIDI specification designed to integrate and control stage equipment such as lighting, hydraulics, rigging, video machines, pyrotechnics, and fog machines. MSC is intended to control dedicated equipment in theater, live performance, multimedia and audio visual applications.

MIDI slop: The timing variations which occur within a multitimbral tone generator. As several different instrument sounds are generated on multiple channels, the machine must generate and output the notes in a short space of time, causing timing variations among the various notes. This is not the same as *MIDI delay*.

MIDI Splitter: See *MIDI Thru*.

MIDI Sync: One of the synchronization protocols supported by MIDI, either *MIDI Clock* or *MTC*.

MIDI Thru: There are two types of MIDI Thru. One, a simple hardware connection, is found on the back panels of many synthesizers. The *Thru jack*, in this case, simply duplicates whatever data is arriving at the MIDI In jack, being a hard-wired connection between the two. Compare with *MIDI Echo*. Sequencers have a second type, called a *Software Thru*. In this case, data arriving at the In-jack is merged with data being played by the sequencer, and both sets of data appear in a single stream at the Out- (not the Thru-) jack. A *Software Thru* is useful because it allows a master keyboard to be hooked up to the sequencer's MIDI input and a tone module to its output. The keyboard can then play and produce sound through the tone module, and the sequencer can also send its messages directly to the tone module. Also called a *MIDI Splitter*. See also *MIDI Out/Thru*.

midrange: A loudspeaker designed to reproduce the middle frequencies of the sound spectrum, generally most efficient between about 1kHz-4kHz.

midrange smear: A type of sonic degradation in sound reproduction systems that is the result of nonlinear *frequency response* in the playback *chain* which interacts with the broad band of frequencies present in music, producing a veil of *distortion* products throughout the mid-range frequencies, difficult to define and test. Also called *grunge*.

M

mil: Short for millinch, i.e., one-thousandth of an inch. Tape thicknesses and sometimes widths are usually given in mils.

MiniDisc (MD): A digital format that uses Sony's proprietary ATRAC (Adaptive Transform Acoustic Coding) data compression to fit up to 74 minutes of digital audio on a 64mm, recordable, erasable magneto-optical disk. Commercial prerecorded MD releases use an optical-only playback format and are not recordable. MD audio is compressed during recording, using lossy compression, so that the audio quality has lower fidelity than the same data written to a CD. See also *Digital Compact Cassette*, *DAT*.

mixdown: The process of bringing together separate tracks into a unified whole. The tracks can be audio tracks (from hard disk or tape) or MIDI tracks (from a soundcard, tone generator, or digital keyboard) or a combination of both. Usually, at least three or more such *source tracks* are mixed down to the left and right audio tracks of a stereo mastering deck (analog tape deck, DAT recorder, or even a hi-fi VCR.)

mix: (1) (*noun*) The composite blend of live sounds and/or recorded *virtual tracks* to a new program, usually of fewer tracks and often to a different recording/storage medium. (2) (*verb*) To produce the new composite program, adding the live sounds, recorded virtual tracks, effects and other processing such as equalization, compression, reverb, etc., ready for the production of a recording of the desired number of tracks and on the desired recording and/or storage medium, possibly for use as a *master*.

mixdown session: A recording session during which the separate tracks of a multitrack tape are processed and combined or blended into two or more channels, then rerecorded onto a multitrack recorder. The resulting tape is called the *master tape* and is the finished studio product. The master is ready, at this stage, for *dubbing*.

mixed-mode: A mixed-mode CD includes more than one type of track format, usually *Red Book* audio and *Yellow Book Mode 1* (ECC) information. Mixed-mode consists of a ROM track followed by any number of Red Book audio tracks. Mixed-mode has two problems: first, the CD-ROM track can be accidentally read by some audio players, causing an ugly static sound and potential speaker damage. Second, retailers don't know whether to market the discs as music or data. See *pregap*, *CD Extra*.

mixer: A device that adds two or more audio signals together. Also called a *mixing console*, *console*, *mixing desk*, *desk*, *mixing board*, or *just board*. See also *multiple mixer*, *split console*, *in-line*, *channel path*, *monitor path*.

mixing: (1) Using a *mixer*. (2) See *slip cue*.

M

mLan: A specification proposed as a part of the *FireWire* protocol standard which provides a definition of how to send multiple sample-accurate AES3 signals, raw audio, MIDI and other control information over a single 1394 cable. The specification reduces the clock jitter inherent in the IEEE 1394 8kHz isochronous clock to about 40ns. Implementations of mLan go farther, reducing the clock jitter among connected devices to less than 1ns. IEEE 1394 has adopted a portion of mLan as an official supplemental standard for handling IEEE 1394 audio and music control data; AES is also considering mLan, but is concerned that it is not sufficiently accurate for professional studio use as, while mLan ensures that multiple 1394 nodes are synchronized, the specification does not provide accuracy necessary to synchronize devices using the IEEE 1394 network to carry different types of signals, such as noncoherent audio, video, and/or musical control data.

MLP: Meridian Lossless Packing. A lossless file compression scheme developed by Meridian Audio of Cambridge, England adopted for use by the *DVD-A* standard. MLP is not a *perceptual coding* scheme, but instead, reduces the size of audio files without altering their contents. MLP may be used on sampling rates up to and including 192 kHz of 24-bit words, on up to 63 channels. The MLP compression process does not depend on assumptions made about incoming data; instead, it works on the audio waveform, using three proprietary technologies to reduce file size: first, non-data is removed from the audio file; second, matrixing is used to reduce the correlation among channels using a large palette of special filters. Lastly, Huffman coding is used to reduce the data rate by efficiently encoding the most likely occurring successive values in the serial stream. MLP coding produces variable-rate output data, and a proprietary data buffering scheme smoothes the output rate to keep peaks from exceeding carrier bandwidth limits.

MMA: MIDI Manufacturers' Association. See also *AMEL*.

MO: Magneto-optical. A type of removable digital storage medium used by several digital audio recorders. MO drives are now typically in the 2-4Gb range. See *LIMDOW*.

mod: Short for (1) modulation or (2) modification.

MOD (.MOD): Short for module. A compact type of computer file, originally developed on the Amiga, that plays back audio files when loaded into a *MOD player*. MOD files are a cross between MIDI and digital audio files, containing both digital samples and playback instructions that tell the player which notes and samples to play, i.e., MOD files include a user-defined group of digitized instrument sounds that are used to play the music. Basic MOD files contain just four tracks of 8-bit mono audio data: various *sampling rates* are used; the data can be compressed; and, each track can trigger any one of up to 31 samples from the MOD file for four-voice *polyphony*. Each instrument can have its own volume, and a few simple effects are included, such as echo and pseudo-reverb (achieved by repeating notes), tremolo, and pitch-bend. Most MOD files are in the *.STRK* format, but there are other file formats such as *.S3M*. There is a recent trend toward 8-channel MOD players, threatening compatibility.

mode: (1) See *room mode*; (2) Scales which became established in the Middle ages; (3) rhythmic modes of mediæval music which were classified into six patterns which corresponded to poetic rhythms.

modem: A device (MODulator/DEModulator) that allows digital information to be sent over an (analog) telephone line.

M

moderato: A moderately fast *tempo*, about 95-115 bpm.

modifier module: A synthesizer module which takes raw sound and modifies its *timbre* (tone) or its *amplitude* (volume) in some way. In most synths, these modules include filters and amplifiers. Also called a *modulator*. See also *VCA*, *VCF*.

modular digital multitrack (MDM): *Multitrack* recording systems which record digital audio data on a videocassette, using a rotating drum in the same manner as a DAT recorder. MDMs are typically expandable by locking together multiple MDM modules. There are two MDM standards: the Alesis ADAT and compatibles which record on S-VHS tape, and the Tascam DA-88 and compatibles, which record on Hi-8mm tape. Examples of MDMs include the Akai A-DAM, Alesis ADAT, Tascam DA-88 and Yamaha DMR8/DRU8. Also called a *modular recorder*.

modular recorder: See *modular digital multitrack*.

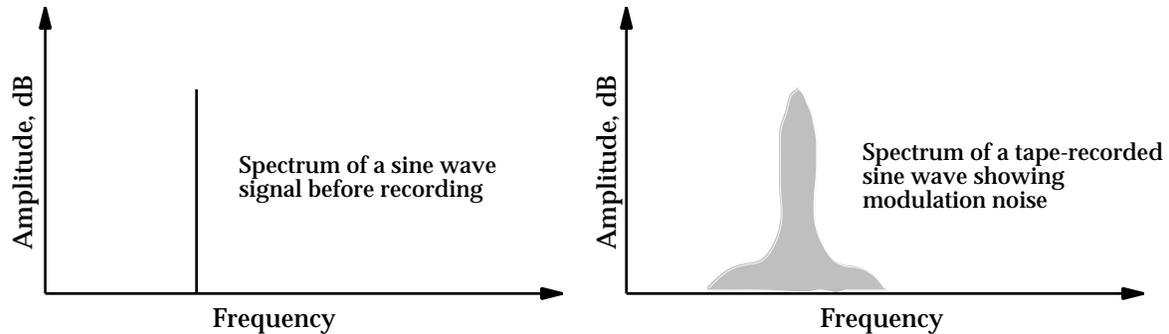
modular synthesizer: A type of synthesizer developed in the 1950's and popularized in the 1970's in which the components, such as *controllers*, *oscillators*, *filters* and *amplifiers* are designed as separate devices and interconnected by patch cords. Every module has input and output sockets that are used for interconnecting with the others. They don't have MIDI capabilities, memories, or presets, and they very rarely have hard-wired internal connections, all connections being "modular" via patch cords. The underlying principle of modular synthesis is voltage control, used to control VCOs, trigger an ADSR envelope. Also, in modular synthesis, there is little or no difference between audio and modulation signals, e.g., the audio output of a VCO can be used to modulate the control input of a second VCO, and a mixer can mix control voltage signals just as an audio mixer would.

modulation: (1) The process of sending a control signal to a sound source so as to change the character of the sound while the sound is playing. The modulation signal tells the receiving module to do something to the sound by changing one of its parameters in a predictable way. The place where a modulation signal originates is referred to as a *modulation source*. The place where the receiving module accepts the control signal is called a *modulation input*. For example, in a synthesizer, MIDI Velocity messages can be used to modulate the *rolloff frequency* of a filter. An *envelope generator* modulating an amplifier's amplitude setting causes the signal's level to change over time. (2) Changing a carrier signal in such a way as to carry information, e.g., *amplitude* or *frequency modulation*. (3) In music, a change of *key*. (4) The variation in the normally geometric groove on a record, which encodes the audio signal. (5) Electrically, another term for signal level, a usage typically encountered in England and Europe. See *overmodulation*, *undermodulation*.

modulation module: See *control module*.

M

modulation noise: Noise which is present only in conjunction with a signal is called modulation noise. In analog tape recorders, the recording process has a certain granularity due to the fact that the magnetic characteristics of the tape are not completely uniform as the magnetic domains are of finite size. A recorded signal has an irregularity which sounds like the addition of noise. In digital audio systems, there is also an uncertainty in the level of the signal because of *quantization error* in the *A/D converter*. This uncertainty also sounds like added noise and is not present if the signal is not present. Compare with *distortion*. See *Barkhausen effect*, *granularity*.



modulation routing: The routing of a *control voltage*, either via hardware or software, from one module source to another.

modulation synthesis. See *phase distortion synthesis*.

modulation wheel: One of the defined MIDI Controller Change messages. Physically, the mod wheel most often appears as a wheel at the left side of a keyboard. When operated, it induces some effect such as *vibrato*, although its precise function varies from device to device and can often be programmed by the user. See *real-time controller*.

modulator: See *modifier module*.

module: A hardware sound generator with no attached keyboard. A module can be either physically separate or integrated into a modular synthesizer, and is designed to make some particular contribution to the process of generating electronic sound.

modulometer: (Old) A meter, similar to the *VU meter* in appearance, which responds to the peak signal rather than the average level, accounting for *pre-emphasis*. Archaic, used in radio broadcasting to prevent *overmodulation*.

mod wheel: See *modulation wheel*.

MOL: See *maximum output level*.

molto: Italian for “a lot,” “much,” or “very,” e.g., *molto vivace*, very lively.

monaural: Literally, “one hearing.” Monaural refers to a sound system with only one channel, regardless of the number of loudspeakers used, as opposed to *stereophonic*, which must employ more than one independent channel. See *mono*.

M

monitor: (1) (*noun*) Originally, a loudspeaker in the control booth of a recording studio. More recently, this means the speakers placed on the stage to allow performers to better hear themselves, more often known as *foldback*. (2) (*verb*) To listen to or measure a signal at some point in the recording or synthesis chain. (3) The section on a mixing desk for adjusting aspects of the monitoring process. See *monitor module*.

monitor mix: A mixed signal in a *sound reinforcement* console that is sent to the monitor speakers on the stage. Because the monitors are near the microphones, this signal is usually highly equalized by notching out the *house modes* to reduce the tendency for *acoustic feedback*. There may be more than one monitor mix, each routed to a different musician or section.

monitor module: On a recording console, the module with the switching and master volume controls for studio and control-room monitors. This module often contains master *cue mix* selector switches and cue mix volume level controls, and sometimes the master reverb sends and returns.

monitor path: The replay portion of the signal chain in a *mixer*. See also *channel path*.

monitor send: This refers to a mixer's *auxiliary send* that is connected before a channel's output fader, usually called a *pre-fader send*. For example, if a pre-fader send is used to route part of a vocal track to a *stage monitor*, when the main vocal channel's level is raised, the amount sent to the monitor would be unchanged. Monitor sends are usually used for *foldback* or *cue mixes*. See *effects (post-fader) send*. Also called a *foldback send*.

mono: Abbreviation of *monophonic*. (1) Capable of producing only one note at a time. A clarinet is monophonic. A bagpipe or an organ is *polyphonic*. (2) An audio signal that is carried by a single channel. The number of microphones or loudspeakers that are used to generate and replay the sound is irrelevant; what counts is that the various signals are mixed to one channel. See *monaural*, *stereo*.

mono compatibility: The ability of a *stereo* musical signal to be mixed down to a single *monaural* channel without violence to the *timbre* of the signal. The result of the addition of two stereo channels would ideally sound like a signal that was recorded with a single microphone. Usually recorded using a *coincident pair*, mono-compatible stereo signals can be added together without creating *phase cancellations* which damage audio quality. See *ORTF*.

Mono Mode: One of the basic reception modes of MIDI devices. In Mono Mode, an instrument responds *monophonically* to all notes arriving over a single MIDI channel. In a guitar-to-MIDI converter, each string sends data over a separate MIDI channel. See *MIDI Mode*.

monophonic: See *mono*.

monotic: Literally, "with one ear." Generally refers to a sound presentation where only one ear hears the sound, e.g., through a headphone. See also *dichotic*, *diotic*.

MOR: Middle Of the Road. A very broad spectrum of popular music that is selected to be offensive to few people.

MOS: Mit Out Sound. Or, "without sound," in all-English. Any shot photographed without *sync sound*, also called *wild picture* (the analog of *wild sound*) or *non-sync picture*.

M

mother: In vinyl record production, a positive impression made by a two-step plating process, reproducing the exact shape of the grooves on a *lacquer master* on a metal disk. In *direct metal mastering*, the master itself is a mother. From it, stamper and pressings will be made directly.

motif: Also called *motive*. In music, a short but memorable melodic or rhythmic idea. Often used as building blocks for longer melodies or even complete movements. Motifs tend to remain recognizable as a binding force in the structure even when transposed, inverted or otherwise altered. A famous motif is the first four notes of Beethoven's *Fifth Symphony*.

motional feedback: A type of mechanical *negative feedback* where the actual motion of the cone of a low-frequency *loudspeaker* is used to generate a signal that is fed back to the amplifier. The motion of the cone itself is then inside the feedback loop, and distortion can be significantly reduced. In all motional feedback schemes, great care must be exercised to ensure that the system is stable. This means that *phase-shift* between the drive signal and the feedback signal must be accurately controlled.

motion controls: The controls on a video recorder/editor analogous to transport controls on an audio tape recorder. There is a set of six basic transport controls: Play, Stop, Record, Rehearse, Rewind, Fast Forward) and the six additional transport control functions: Location, Cue, Allstop, *Rollback*, Replay, and Edit.

motion sensing: In a tape transport, an *electromechanical* system designed to prevent damage to the tape either when the operator presses the Play button while the transport is in a fast-wind mode, or when two conflicting motion buttons are pressed simultaneously. The system brings the tape to a stop.

motorboating: A low-frequency oscillation caused by certain types of instability, usually in a power amplifier.

motor cue: See *projection*.

moving coil microphone: In a moving coil mic, a coil of wire is attached to a diaphragm and is suspended in a magnetic field. When sound waves vibrate the diaphragm, the coil vibrates in the magnetic field and generates an electrical signal similar to the incoming sound wave. For some reason, moving coil mics are called *dynamic microphones*, but not *ribbon microphones*.

Moviola: Trade name (used generically) for an upright film editing machine common in the U.S., containing a mono speaker. The term is often applied to any type of viewing and/or editing machine that runs picture and sound interlocked in sync. It is used by the film editor to decide which parts of specific takes of specific scenes will be used in the *workprint*. The film and soundtracks may run vertically on an upright Moviola (old-style) or horizontally on a flatbed version. All of these have been gradually replaced by digital audio workstations.

MP3: An audio file *codec* standard, allowing an entire CD of audio data to be compressed for *streaming* transmission over the internet. (MP3 stands for MPEG 1, Layer III.) MP3 is increasingly widespread in its use to transmit internet audio, and is currently the *bête noire* of the music industry, owing to the recent marketing of MP3 players (which have withstood an injunction attempt by RIAA.)

M

MPC: Multimedia Personal Computer. A specification stating the minimum hardware requirements a computer must meet to display the MPC logo. They include 2MB of RAM, a 16MHz 386SX processor, and 8-bit sound capabilities. This specification was established in 1990, and has since been superseded by the *MPC2* specification.

MPC2: Multimedia PC Level 2. This specification requires the same types of hardware as *MPC Level 1*, but with increased power and capacity: 4MB of RAM, a 25MHz 486SX processor, and 16-bit sound capability.

MPEG/MPEG-1: Moving Picture Expert Group. A body that defined a standard for *data compression* specifically for moving images: animation, audio, and video. This compression scheme includes its own file format. It is a type of *delta modulation* (differential) compression and hence very efficient, but not useful for nonlinear editing applications. Compression ratios are up to 200:1, lossy but acceptable. There are three layers of MPEG1 encoding of increasing complexity, each layer with its own format. Layer I is fast with typically a 4:1 reduction in data rate with a 32-band filter bank, but offers less compression for comparable quality. Layer II (.MP2 files) is a popular compromise for use with audio files with ratios of 5:1 to 12:1, retaining much of the original sound file's quality by employing more complex spectral analysis. At a ratio of 8:1, CD-rate audio exhibits little audible loss. Layer III takes longer to compress, but offers higher ratios while retaining much of the audio quality by varying filter bank bandwidths to better simulate the critical bands in human hearing as well as some non-linear quantizing to increase the efficiency of the data reduction. See *MPEG-2*, *MPEG-3*, *MPEG-4*, *DLS-2*.

MPEG-2: A professional standard for *MPEG* requiring specialized hardware and software; not used in consumer systems. *MPEG-2* is an extension of *MPEG-1* providing multichannel surround-sound capabilities such as 5.1, although other mixes are also supported. The original *MPEG-2* was designed to be backward compatible with *MPEG-1*, although an incompatible *MPEG-2* NBC standard has gained approval for DVDs and broadcast applications.

MPEG-3: A later *MPEG* standard which uses a *compression ratio* of approximately 13:1. The format is fast enough and good enough that this format is widely used to send digital music over data lines and is supported by Mac, PC, and UNIX platforms. In addition, the *MPEG-3* compressed *file format* is compatible with all computers.

MPEG-4: Heavily influenced by Apple computer's QuickTime™, *MPEG-4* is aimed primarily at game applications. In addition to streaming video and digital audio, it allows for the transmission of MIDI, provides a GM-compatible synthesizer, facilitates the transfer and playback of *DLS-2* and MIDI files, and incorporates a user-configurable synthesis language. This latter feature is called the Structured Audio Orchestra (SAOL) allowing the user to specify almost any existing synthesis method and create algorithms at one end, and have the sound played back identically at the end-user's player. The *MPEG-4* specification includes: *DLS-2*, MIDI/*DLS* sync, SAOL, digital audio transmission, audio spatialization, and text-to-speech.

MPSE: Motion Picture Sound Editors. A Los Angeles-based honorary organization of film and television sound editors founded in 1965 which give out its annual "Golden Reel" award.

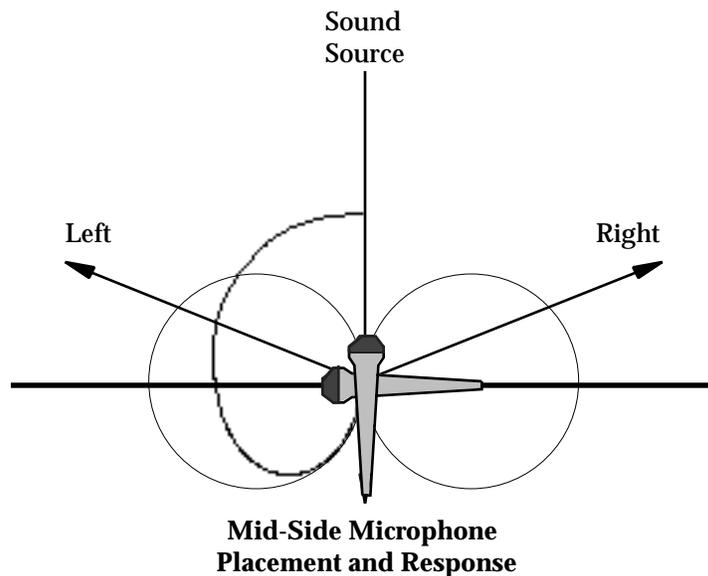
M

MPU-401: A peripheral developed by Roland for interfacing IBM PC-compatibles with MIDI devices, eventually accepted as an interface standard by many hardware and software companies.

MPX: Short for multiplex. The letters “MPX” when found on a button on a cassette deck mean the button activates a 19kHz *notch filter* to eliminate the FM stereo *pilot* so it won't cause gain mistracking in *Dolby noise reduction* systems. The Dolby playback system would sense the pilot and mistake it for high-frequency content of the music. The pilot can also cause audible *birdies* by *beating* with the AC *bias* used in tape recorders.

ms: Millisecond. One thousandth of a second.

MS or M-S or M&S: Mit Seit (or Mid-Side). A miking technique which uses a *cardioid* microphone facing directly into the sound source and a *figure-8* microphone facing sideways. The figure-8 picks up the left half of the source with one phase and the right half with the inverted phase. By changing the *matrixing* of the combined patterns of the two microphones, the width of the apparent stereo *image* can be manipulated. In M-S matrixing, the output of the side mic is added to the main mic channel to get the left channel, and subtracted to get the right channel. By adjusting the level of the side mics, you can adjust the width of the stereo image. MS techniques are most effective in larger, live rooms where it is possible to get the mics at least 10-15 feet away from the source and side walls.



To decode MS signals to normal left and right, pan the M mic to the center and split the S mics to feed a pair of adjacent channels (or a single stereo channel.) Gang the two S-faders together, panned hard left and right. Switch the *phase reverse* on the right channel. Listening with the monitoring switched to mono, balance the levels of the two S-channels for minimal output (make sure there is no EQ patched into either channel.) Once the two S-channels have been aligned, revert to stereo monitoring, fade up the M-channel and adjust the balance between the M and S signals for the desired image spread. Putting a phase reverse in the M-channel will swap the stereo image; the image width can be varied from mono to stereo to extra-wide by moving the S-fader.

M

MSB: Most Significant Bit. The leftmost (highest) value in any numbering system, but specifically the highest value (binary) bit, although sometimes it can mean Most Significant Byte. As opposed to the *LSB*.

MTC: MIDI Time Code. One of two protocols for *MIDI Sync*. MTC is a way of transmitting *SMPTE timecode* or other time-reference data over a MIDI cable. SMPTE and MTC don't provide any start or stop commands, nor do they change with tempo. They provide an absolute (positional) timing reference in minutes and seconds, rather than a music-related timing reference in bars and beats. Unlike SMPTE, MTC must share a MIDI cable with sequence information, so it is not as fast or accurate. This is not usually a problem, but if the MIDI channel is close to capacity, MTC data may be delayed, producing a small amount of timing *jitter*. An additional part of the MTC specification is the Setup message, which allows the specification of a list of events that should occur at specific times. See *MIDI Delay(2)*, *MIDI Clock*.

MTS: See *BTSC*.

MU: Musicians' Union. (UK)

muddy: A subjective term that describes a type of *intermodulation distortion* which reduces the clarity or transparency of the sound of a musical instrument, particularly transients, by adding *partials* to the natural *harmonics* of the instrument. Also used to describe the effect of *group delay distortion*.

mufex: See *M&E*.

mult: Short for multiple. A connection, usually in the form of an *outboard box*, that shorts two or more signals together. Often found in use at a *patch bay* where a group of *jacks* are connected in parallel. If one or other or both of the signals are at a low impedance, the mult will cause distortion and a reduction in level; not a substitute for a *mixer*.

multiband audio processor: A type of *compressor*, used by FM radio stations, which breaks up the audio frequency spectrum into from three to five bands, runs them through individual compression components, and then add them back together, resulting in a kind of re-equalization. This process tends to even out the bands, reducing the boominess of mixes with heavy bass, and the tinniness of mixes with a lot of high-frequency signal. See *split-band compression*.

multichannel: (1) In film, used to refer to a final mix that includes more than stereo information, i.e., *LCRS* or six-channel *surround-sound* formats. (2) In audio, any recording or playback system with at least two tracks.

Multichannel TV Sound (MTS): A standard for transmitting stereo audio signals to home television sets.

multicore: See *snake*.

multieffects processor: An *effects processor* which is capable of producing several types of effects at once.

Multi Mode: A MIDI reception mode in which a *multitimbral* module responds to MIDI input on two or more channels, typically playing a different patch on each channel. See *MIDI Mode*.

M

multimode filter: A type of filter which has a switch that allows a choice among *lowpass*, *highpass*, and *bandpass* modes.

multipath distortion: Multipath distortion is a type of *distortion* afflicting FM and television broadcasting. It is the receipt of the transmitted signal over more than one path due to *reflections* of the audio/video waves off of hills, buildings, etc. Because the path lengths are different, there is a delay between the various signal arrival times. In TV, this causes the familiar “ghosts,” or multiple images, on the screen. In radio, this is the “caught between stations” effect.

Multiple Loop Points: A category of message in the *SDS* which allows loop points to be determined or changed within a sampler independently of the sample itself, i.e., without having to retransmit the entire sample. Loop Points Request and Loop Points Transmit are two such messages.

multiple loops: The ability of a sampler to handle more than one *loop* in any given sample. Some machines allow only two loops per sample, while others allow as many as eight.

multiple mixer: A *mixer* which provides more than one combined output signal.

multiplex: When signals are combined in such a way that they can later be separated, they are said to be multiplexed together. A multiplexing device is called a *multiplexer*, abbreviated *mux*. One use of a mux is, in digital recording, a device that converts *parallel data* to *serial* format for output onto a MIDI network. Or, in an *A/D*, each sample is a binary number of bits equal to the *bit depth* of the word, e.g., a 16-bit sample for CD. All 16 bits cannot be stored to tape simultaneously, so a mux is used to sequence the bits for recording. A demultiplexer reassembles the sequenced data into complete word-samples again.

multisample: The distribution of several related samples at different pitches across the keyboard. Multisampling can provide greater realism in sample *wavetable synthesis*, since the individual samples don't have to be *pitch-shifted* over a large frequency range, with the result that the full range of *pitches*, *timbres*, and dynamics of the instrument are more accurately represented. The point on the keyboard at which one sample meets another is called the *multi-sample split point*.

multisession: Allows the *track-at-once* recording of independent sessions to be written to blank sections of a CD. In multisession mode, the disc is finalized after the last session. Compare with *disk-at-once*, whereby the entire disc is written as one session.

multistage: See *envelope generator*.

multitap: In digital *delays*, the ability to obtain delayed output signals, usually via patch points, at more than one point as the signal passes through a series of delay circuits. The signals derived at each of these taps, each with a different delay time, can be routed to separate destinations.

multitimbral: Capable of making more than one tone family (also called a *tone color* or *tone timbre*) at the same time, i.e., a device which can respond on multiple MIDI channels at once. A typical multitimbral tone generator can play, for example, the brass, piano, and violin parts all at once. *GM* requires 16-part multitimbral synthesis capability. Each multitimbral part can play *polyphonically*, that is play chords, up to the polyphonic voice limit of the module.

M

multitrack: An audio tape recorder capable of handling more than two tracks of information separately, but generally applied to recorders which handle eight or more tracks. Otherwise, the recorder is called a *two-track* or *four-track* recorder. Also, the actual recording tape on which eight or more tracks are recorded. The tape is nonsprocketed and the recorder may be analog or digital. The most common analog format is 24-track, 2" tape; the digital market is shared between the *DASH* format, using either 24- or 48-track ½" tape or the ProDigital format which records 32 tracks on 1" tape. MEMs use video cassettes to record 8-12 tracks of audio, but up to 128 tracks can be simultaneously recorded by locking together multiple transports.

multitracking: (1) The use of wide-format audio recording tapes on which parallel tracks are recorded, each containing a performance by one or more instrumentalists, vocalists, or *virtual tracks*. (2) See *overdubbing*.

multi-WAV: See *WAV/multi-WAV drivers*.

munchkin effect: The effect produced by *pitch-shifting* a sample sufficiently to produce distortion in the shifted tones.

MUSICAM: Masking pattern adapted Universal Subband Integrated Coding And Multiplexing. The first name given to what is now known as *ISO/MPEG Layer II* audio encoding.

music cue sheet: A list of music used in a film *soundtrack*, along with its type of usage (source, *BG* instrumental, visual vocal, etc.), i.e., not a conventional *cue sheet*.

music house: A company with staff composers, arrangers, and producers, and which has its own studio, engineering staff, etc. Clients in need of custom music can contract with the music house for a finished piece, instead of having to hire and manage all of the various creative and technical personnel and required equipment and facilities.

music track: (1) An edited track of *magnetic film* containing music. There may be more than one music track for a film, especially if the editor calls for a dissolve between two scenes, each with its own music track. (2) In a 35mm *three-track mix*, the "M" in *DME*.

mut: Make-Up Table. The motor-driven *bench* designed to load an rewind film. Mut usually refers to the setup that drives a large reel of *mag film* during a *double-system* preview screening.

mute: (1) A control on a *mixer* which allows the channel to be removed from the mix without touching the channel fader, which may be preset to the precise level called for by the composition. (2) A device placed on or in a musical instrument with the intention of reducing its volume or altering its *timbre*. (3) (*verb*) To cut off a sound, input, or track suddenly.

mute mode: In mixing console *automation* systems, an operational *write mode* in which the engineer enters off/on commands for various channels, turning these off and on to avoid noise, mistakes, and any unwanted sounds.

mute-write: The operating mode of *mixer automation* systems in which the engineer's *real-time* mute commands are written to tape or disk to be saved for subsequent passes and reuse.

M

mutual angle: The angle between microphones in a *coincident pair*. It is possible to change the mutual angle over a small range to adjust the precise relationship between the physical sound source positions in front of the microphones and their perceived positions in the stereo image.

mux: See *multiplexing*.

mylar: A strong polyester plastic used as a base for most recording tape. Mylar is stable, easily coated, and retains its elasticity in extended storage. The word is a Dupont Co. trademark, but the term is used generically for any polyester-base recording tape.