P

φ: An abbreviation for phase. Some control consoles have a small switch on their input modules labeled "   " that inverts the *polarity* of the signal in that channel. This is to allow all the signals being mixed together to have the same polarity regardless of wiring errors in patch panels and microphone cables and in the microphones themselves. See *out-of-phase*, *phase cancellation*.

PA: (1) Public Address. The distribution of audio signals to loudspeakers for an audience. (2) A system of equipment, including a mixing desk, amplifiers, loudspeakers, etc., assembled to provide PA sound.

pad: (1) A switch or knob that lowers the level of an incoming signal before it reaches the rest of the circuitry. A short name for an *attenuator*, usually with a fixed amount of *insertion loss*. Pads are used between audio devices if there is a danger of the output of one device causing a signal overload in the input of the other device. An input pad is also called a *trim pot*. See *pot*. (2) A sustained chord part which provides harmonic padding in a piece of popular music. (3) Drum pads.

paddles: (PEC∕Direct)

PAF:

PAL: Phase-Alternating Line. The UK television broadcast standard. Uses 625 lines at a *frame* rate of 25fps.

PAM: Pulse Amplitude Modulation. The first stage in digital sampling, in which pulses of fixed-width have their amplitude modulated by an analog signal, i.e., the height of the pulse is determined by the amplitude of the signal. It is followed by an *encoding* stage known as *PCM*.

pan: Short for panorama. (1) (*noun*) Refers to the left-right placement of a sound. (2) (*verb*) Moving a sound from stereo-center to one side or the other, either on a mixer or on a synthesizer, sequencer, etc. Usually this is not completely effective as panning alters only the relative amplitude of the sound left to right, and not the crucial aspect of delay. See *Haas effect*. (3) One of the defined MIDI Controller Change messages assigned to the parameter in a synthesizer which determines the stereo image of the sound, effectively making that controller a *panpot*.

PAN: A dedicated on-line internet service provider for the music industry.

pancake: A 10½" reel of recording tape without the reel *flanges*. Recording studios often buy tape in this form and spool it onto smaller reels as it is used.

panic button: A hardware or software feature that simultaneously sends All Notes Off and Reset All Controllers commands to a MIDI system. Because some instruments don't respond to All Notes Off commands, some panic buttons are designed to send Note Off messages (0-127) on all channels as well.

panpot: Short for panoramic potentiometer. An audio *mixer* control which is used for positioning the channel's signal somewhere between the right and left speakers. See *pan*.

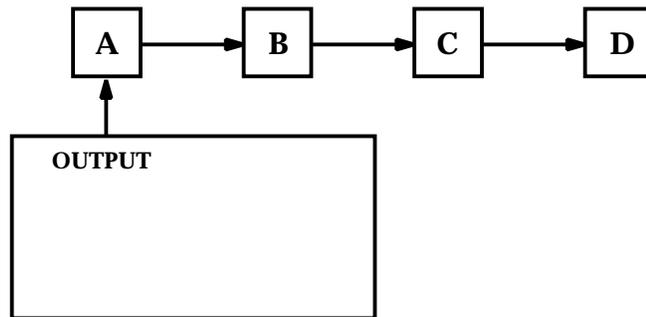**paper leader**: See *plastic leader*.

P

parabolic reflector: A dish-shaped structure used to focus sound waves onto a microphone. The reflector faces the sound source and the microphone is mounted backwards, i.e., pointing at the center of the parabola. Used mainly to gather sound in outdoor locations, such as in wildlife recording. A satellite receiving dish for television uses a similar principle to focus incoming *electromagnetic* waves.

parallel: In the connection of one signal or power source to more than one device or destination, the wiring configuration in which the input leads of all the devices meet at a common point. Signal or power routed to this point flows directly to each device. The opposite of *serial* wiring, in which the source is wired to the input of one device, whose output becomes the input for the next, etc.
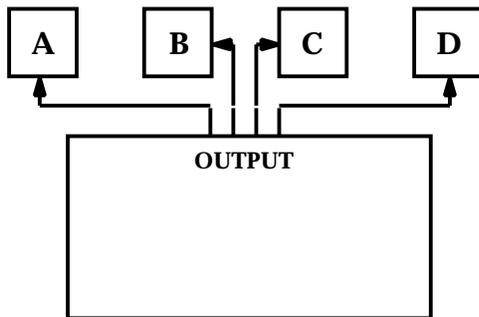
Parallel Wiring Topology   **Serial Wiring Topology**

parallel connection: See *bridging.*

parallel interface: A protocol for transmitting data whereby all bits in a word (typically two or more bytes) are sent simultaneously. This method is generally more expensive to implement than *serial* protocols as the connectors and cable must have a pin/wire for each bit, plus a few extra for ground, handshaking, etc. This cost is offset by the faster transmission times.

parallel port: A connector on a PC-type computer which is used to connect devices which use a *parallel interface*, such as some MIDI interfaces and parallel printers.

parity check: In digital recording, one or more bits of data derived from the audio sample and appended to it as a part of the data *word.* The parity bit allows *error-detection* circuitry to determine whether the audio bits are correct, and therefore, whether they should be sent on for D/A conversion, discarded, or repaired. Also called a *parity code.*

parameter: A user-adjustable quantity that governs some aspect of a device's performance. Normally, the settings (values) for all of the parameters that make up a synthesizer *patch* can be changed by the user and stored in memory, but the parameters themselves are defined by the operating system and cannot be altered.

parametric equalizer: A parametric equalizer is a *sweep bandpass* EQ, except that a third control is added to allow the Q to be adjusted. Because the filter response is curved, the actual frequency width is measured in increments of 3dB. Also called a *peaking equalizer.* See *equalizer*, *graphic equalizer.*

P

parasitic oscillation: A malfunction occurring in some audio devices, especially power amplifiers, in which the device will generate an *ultrasonic* signal during a part of the audio signal, only when the input signal is present and only during part of the audio waveform. Although the ultrasonic component is not directly audible, its existence modulates the signal, causing audible distortion and is potentially damaging to tweeters.

partial: The *fundamental, harmonic, subharmonic, overtone*, or a tone at some other frequency which forms part of a complex tone. Any component of a sound, whether or not it is an integer multiple of the *fundamental frequency* is a partial. The fundamental frequency is the first partial of a tone.

PASC: See *Digital Compact Cassette.*

passband: The passband of a filter is the frequency span that the filter passes, or the range of frequencies not attenuated by the filter. The passband is usually measured between the points where the response is 3dB down in amplitude relative to the maximum level. See *rolloff frequency.*

passive: A device is called passive if it contains no amplification circuitry and a signal suffers *insertion loss* in passing through it, i.e., more energy goes into the device than is available at its output. This is opposed to an amplifier or other device which has the potential for at least *unity gain.* Many audio equalizers are passive, as are most *crossover networks.* Passive devices in general do not add any appreciable nonlinear distortion or noise to the signal, but they have so much attendant insertion loss that additional amplification is needed, and this always contributes some noise and distortion. Passive devices can and do cause *phase distortion*, however. As opposed to *active.*

passive crossover: See *crossover network.*

passive equalizer: An equalizer that employs only *passive* electronic components, i.e., resistors, capacitors, and/or inductors. Since these components require voltage, passive equalizers can only cut each operating band, the output signal level is necessarily lower than the input level. See *active equalizer.*

patch: (1) (*verb*) To connect together, as the inputs and outputs of various modules, generally with *patch cords.* (2) (*noun*) The configuration of hookups and settings that results from the process of patching, and by extension, the sound that such a configuration creates. Patch is most often used to denote a single sound or the contents of a memory location that contains parameter settings for the sound, even on an instrument that requires no physical patching. A synonym for *sample* or *program.*

patch bay: A group of similar receptacles, or *jacks*, in an audio system. The act of plugging and unplugging the patch cords is called *patching.* Also called a *router, jack field*, or *jack bay.* Increasingly, physical patching is being replaced by digital routing.

patch cord: A short cable, typically fitted with a *phone plug* or *TT connector* at each end, used to make a connection between two points on a patch bay.

patch map: A map with which any incoming MIDI program change message can be assigned to call up any of an instrument's *patches.* This is a table set up by the user with entries such as 1=3, 2=2, 3=984, etc. See *patch mapping, MIDI Mapper.*

P

patch mapping: A Program Change message is limited to only 128 values, while some synthesizers can store many thousands of separate patches. This would mean that only 128 of the programs could be accessed via MIDI. Patch mapping is a process whereby a given program change number received by a MIDI device can be linked to any one of the available patches, as determined by a *patch map*. To get beyond the 128 limit, the MIDI *Continuous Controller* message, Bank Select, has been defined for selecting different banks of sounds prior to sending a program change number.

patch point: A location in an electronic circuit at which access to the circuit is provided by a *jack* in the patch bay or console *channel strip*. **See** *normalled connection, output.*

path length: The distance between a sound source and the listener or microphone. See *near-field, far-field.*

pattern looping: A digital composition technique whereby long, looped samples are mapped into a sampler along with other samples such as bass riffs, drum variations, and solo samples (vocal sounds, *effects,* etc.) The different loops and solo sounds are brought in and out via a keyboard to create a finished composition.

PA version: Public Appearance version. A prerecorded tape or just the instrumental backing of a song, with which a solo vocal artist can sing during public appearances to promote a record.

PCI: Peripheral Component Interface. An internal bus architecture for PCs and the Mac commonly used for digital audio cards.

PCM: Pulse Code Modulation. A technical term for *sampling.* Any digital method of encoding and decoding the amplitude of an audio signal. For example, an 8-bit PCM yields amplitude values of 0-255, and produces attendant *sampling errors* and *quantization errors.* PCM cards are always ROM, and contain only sampled *waveforms,* contained in a *wavetable.* See *PWM, split-band.* **See also** *PAM.*

PCM-F1: A reference to the (discontinued) Sony digital recording system which used an EIAJ-format, 16-bit PCM processor to convert audio into a digital form that can be stored on consumer videotape. The first attempt at digital audio.

PD: See *ProDigital.*

PDL: Projectionist Dummy Loader. Union designation for the person in a film recording facility who functions both as projectionist and as a machine room operator.

peak: Peak value is the maximum instantaneous excursion from zero of an audio waveform, as measured by a peak meter (*PPM*). The peak value of a sound is also the maximum instantaneous pressure excursion of the sound. See *crest factor, VU meter.*

peak expansion: The adjustment of an *expander's* threshold so that most program material passes through unaffected, but peaks or *transients* are heavily expanded. Used to restore peaks to program material that has been overly *compressed.*

peak hold: A function of some volume indicators that indicates the *peak* level of the signal and holds that level until it is either exceeded by a higher peak or the indicator is reset by a time delay or manual reset.

P

peaking equalizer: Another name for a *parametric equalizer.*

peak level: See *peak.*

peak-to-peak value: A measure of the highest positive-to-negative voltage swing in any speci-fied segment of the program signal. Twice the absolute value of the greater voltage reached by an adjacent positive or negative transient peak. See *PPM.*

Amplitude

Peak Value

RMS Value

Time

Peak-to-Peak Value
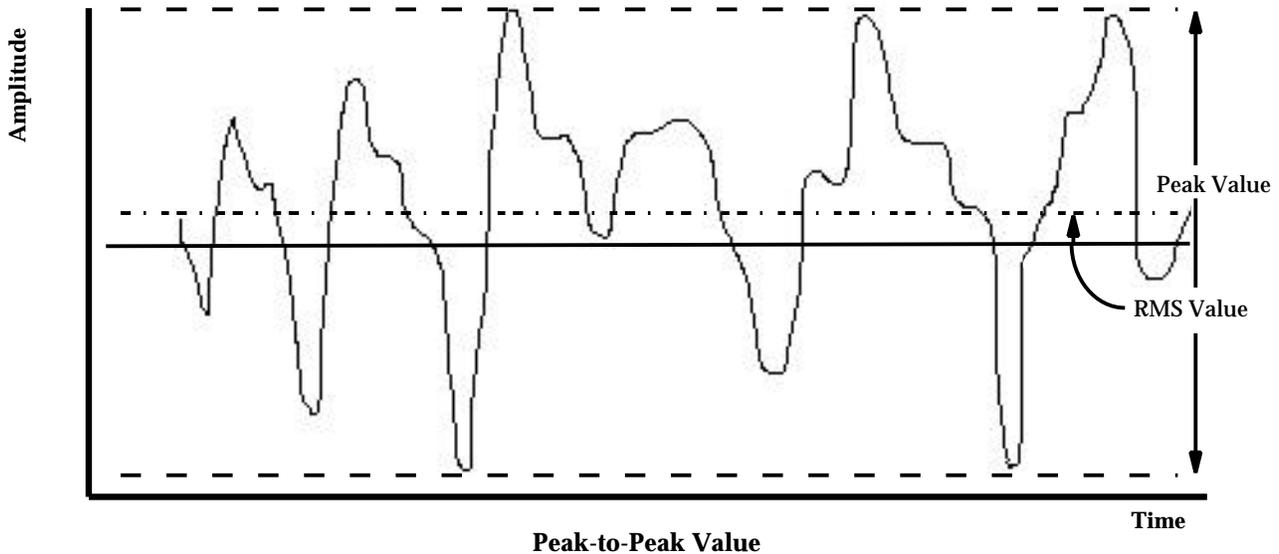
peanut microphone: See *Lavalier microphone.*

PEC/direct: Photo-Electric Cell. In film re-recording, the act of switching between playback from the recorder either in playback mode or

pedal: (1) A foot-operated lever on a musical instrument. On a piano, the indication, ⎪⎪ means to use the sustain pedal. (2) Strictly, pedal point. A sustained or continually repeated note that occurs throughout a passage of changing harmonies. Commonly on the dominant note, it creates a feeling of tension; on the *tonic,* it creates a sense of repose. It often occurs in the bass; if played above the other parts, it is known as an *inverted pedal.* Also known as a *drone* in folk music.

pedalboard: A large and widely spaced keyboard designed to be played by the feet, com-monly found on organs, although also available as a type of MIDI controller. Generally used to play bass notes.

perfs: Perforations. Sprocket holes in motion picture film.

pentatonic: A *scale* in which the *octave* is divided into five notes.

percentage quantization: A method of *quantization* in which notes recorded into a sequencer with uneven rhythms are not shifted all the way to their theoretically perfect timings, but in-stead are *humanized,* with the amount of shift being dependent on the user-selected percentage, called *quantization strength.*

P

perceptual coding: Any audio compression scheme that deletes audio frequencies that are masked by other, more dominant frequencies, and thus are not perceived by the listener. See *split-band coding, transform coding, temporal masking, MPEG, PASC, ATRAC,* **and** *AC3.*

percussion waveform: A percussion waveform is generated through the *random noise* generator of a synthesizer. If a second-order (two-*pole*) filter that has a high *Q* (low loss) is used after the noise generator, it simulates a drum. If repeated at a predetermined rate, it is called a *repeat-percussion waveform,* which constitutes the basic rhythm section of a synthesizer.

period: In a waveform that repeats a particular pattern over and over, the time required for one repetition of one wavelength is called the period. The waveform is then called *periodic,* and can be expressed as the summation of a series of *sine waves* called *harmonics.* The length of the period of the waveform varies inversely with frequency.

perspective: The effect of front-to-back depth in an audio signal. This may be inherent in the stereo image or may be artificially achieved by varying the amount of *direct sound* **and** *reflected sound.* The indirect signal may be obtained from mics places away from the source, or may be generated by a reverberation unit.

PFL: See *pre-fade listen.*

PFX: Production sound effects. Tracks of sound effects, as opposed to *Foley,* music, or dialog, which get mixed into the final *DME* tracks of a *film soundtrack.* Sometimes Foley gets mixed into the dialog stem, and *PFX* into the effects stems to separate the effects which accompany the dialog from *BG/walla* effects.

phantom image: A *monophonic* sound panned equally to both speakers.

phantom power: DC power (usually 9V to 52V) supplied to *condenser microphones* by a pre-amplifier close to the microphone, necessary due to the extremely high *impedance* of the microphone, via the signal wiring of the microphone.

phase: Phase is defined as the time relationship between two corresponding points on a continuous wave, or the angular, or time, displacement between the voltage and current in an AC circuit. A *sine wave* signal is the simplest possible *waveform* and goes through 360˚ in one cycle, whereby it returns to its starting point. Another way of saying the same thing is that the signal has gone through 360˚ of phase angle, or phase change. The phase is actually a measure of time, 360˚ equaling one period of the signal. The time represented by a phase change of a certain number of degrees is thus dependent on frequency.

Phase-Alternating Line: See *PAL.*

phase cancellation: An attenuation of signal components resulting from combining *out-of-phase* waveforms. When two waveforms are mixed, their *harmonics* are added. If these signals are out-of-phase with each other, the amplitudes of the harmonic components differ at various times, as determined by the phase relationship. If the added harmonics have the same polarity, the signal is reinforced at those frequencies, and vice-versa. See *phase distortion.*

phase coherent: A condition encountered in the summation of two or more in-phase signals, in which the signals combine constructively, with little or no *phase cancellation.*

P

phase compensation: In some tape recorders, there is a special *equalizer* whose purpose is to minimize *phase distortion.*

phase difference: The measure of time delay with which two identical signals reach a common electrical or acoustic point. In the case of a *sine wave*, for a pure tone of *F*Hz, 360˚ of phase difference, *D*, represents one full cycle. If *F* = 1kHz, *D* = 360˚ takes exactly 0.001 sec. For any *F*, the number of degrees phase difference, *D*, between two sources whose identical outputs arrive at a common point with a time difference of *T* seconds is:

$$\mathbf{D} = \mathbf{F} \times \mathbf{T} \times \mathbf{360}$$

phase distortion: An effect caused when *phase-shift* in an audio device is not a *linear* function of frequency. In other words, different frequencies experience different time delays. This changes the waveform of the signal and is especially injurious to *transients*. Most *transducers* produce significant phase distortion. As low frequencies travel slightly faster than high frequencies and as air absorbs high frequencies more readily than low ones, the more delay there is between low frequencies and the higher harmonics of a sound, the sound becomes progressively more smeared and is perceived as more distant.

phase distortion synthesis: A form of modulation synthesis in which the spectrum of a *DCO*'s output signal is altered by modulating the DCO's *clock* frequency within each cycle, while the over-all frequency is kept constant. The oscillator's clock frequency speeds up and slows down, producing rapid *phase* changes as the waveshape is alternately compressed and expanded (distorted) to fit within the regulated period. Popularized by the Casio CZ-series synthesizers.

phase inversion: See *phase reversal.*

phase invert: See ϕ.

phase linear: The ability of an audio device to pass a signal without causing *phase-shift.*

phase-lock: See *sync-lock.*

phase-locked loop (PLL): A *closed-loop* electronic circuit that automatically adjusts and locks the frequency of an oscillator to the correct frequency for receiving a signal. The PLL is the preferred FM detector circuit in commercial systems today as it requires no tuned circuits, hence does not require alignment. It normally has high amplification which produces a strong output audio signal. Since it does not respond to amplitude variations, it also provides limiting action.

phase manipulation: A technique used by *aural enhancers* which realigns the relative phase of existing *harmonics.*

phase meter: An electronic circuit and display that compares two incoming signals and shows the *phase difference* between them.

phase modulation: See *phase-shift.*

P

phase reinforcement: The opposite of *phase cancellation*. An reinforcement of signal components resulting from combining *phase coherent* waveforms. When two waveforms are mixed, their *harmonics* are added. If these signals are not perfectly in-phase with each other, the amplitudes of the harmonic components differ at various times, as determined by the phase relationship. If the added harmonics have the same *polarity*, the signal is reinforced at those frequencies.

phase reversal: (1) The condition where the connection in one channel of a stereo signal are reversed. This is most likely to happen at the loudspeaker, and results in *phase cancellation*, particularly apparent in the bass. (2) In electronic signals, changing the *polarity* of the signal from positive to negative or vice versa, thereby causing a reversal in polarity of the signal. When viewed on an oscilloscope, the waveform flips with respect to the time axis. Also called *polarity reversal* or *phase inversion*. See *common mode*, *out-of-phase*, φ.
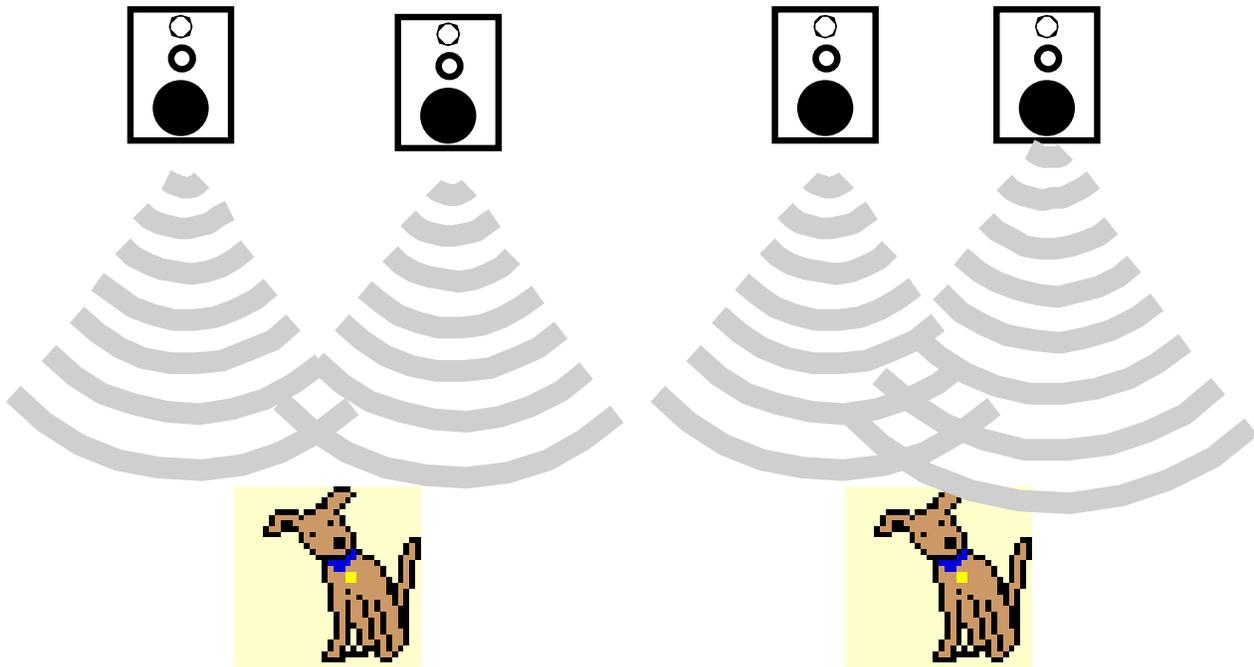
The pair of loudspeakers on the left are in phase--the speaker cones cause compression and rarefaction the surrounding air in unison. Those on the right are *out-of-phase*, causing the air compression generated by one speaker to be cancelled by the rarefaction generated by the other.

phase reversal switch: A switch, usually found in a *balanced line*, that allows the user to interchange the two conductors, causing a 180˚ shift in phase of the signal. This is often a feature of recording consoles to allow the engineer to optimize the phase relationships of multiple microphones placed in close proximity to each other, i.e., mics likely to pick up substantially identical signals, such as on a drum kit. See *phase cancellation*, φ.

P

phase-shift: An alteration of the phase in the partials of a tone. Virtually all signal processing devices will cause a certain amount of phase-shift, also called *phase modulation*, as none of them are completely phase linear. Phase-shift is a characteristic of a device and is the change in phase impressed on a signal that passes through the device. An electronic device will always add a time delay to an applied signal. If the time delay is constant on all frequencies, the phase-shift between the input and output of the device will be a *linear* function of frequency, and the device is called *phase linear*. Deviations from phase linearity are called phase-shift. Equalizers, in particular, exhibit large amounts of phase-shift. In a complex waveform, phase-shift will cause a distortion of the waveform, even though the *frequency response curve* may be perfectly flat. There is considerable controversy over whether the ear can detect this type of *phase* distortion. See also *PIM*.

phase-shifter/phaser: (1) Phasing is an effect on higher frequencies which make a whispering or ocean-like sound, produced by a device called a *phaser*, also called a *phase-shifter*. See *flanging*. (2) Originally one of the defined MIDI Controller Change messages. It was assigned to the parameter in a synthesizer which alters the depth of the effect described as *phasing*. More recently, this message has been reassigned as one of five generalized Effects Depth messages. See *effects control*.

phase sync: In *SMPTE timecode* synchronization, an option by which the slave machine is speed-controlled in such a way that the phase of its *bi-modulated sync tone* is held in phase with the sync tone on the *master* machine. This provides much closer alignment of the two than just *frame lock*. However, because the synchronizer must make continuous adjustments to the slave's speed, phase sync can introduce noticeable *flutter* when the audio machine is slaved to video. In some synchronizers, only sub-frame information is used to achieve interlock, yielding a 1/100 frame accuracy between machines.

phasing: See *phase-shifter/phaser*.

phon: A unit which takes account of the ear's nonlinear response to the *loudness* and frequency of a sound. The phon uses a *decibel*, i.e., *logarithmic*, scale which is based on the level of intensity of a given sound that corresponds to the dB rating of a pure tone at 1kHz, subjectively judged to be of the same loudness. An increase of one phon is about the smallest increment in loudness that can normally be perceived. The scale practically ranges from 0dB to 130dB, and its logarithmic nature means that a rise of three phons approximates a doubling in intensity. See *equal loudness curves*, *SPL*.

phon lines: See *equal loudness curves*.

phone connector: A ¼" plug connector, called such as it was originally developed by Bell Telephone. Used as audio connectors on electric guitars, synthesizers, and some signal processors and mixers. See also *TRS, TT*.

phono connector: Also called an *RCA connector*, these are generically known as *pin-jack connectors* as they contain both the pin and jack portions of a connector. Commonly used on home stereo equipment, the *phono* designation comes from the fact that they are almost universally used for the outputs on phonographs.

P

physical modeling synthesis: A type of *sound synthesis* done by programming a computer to mathematically model the physics of a particular instrument. These models are sets of complex equations which describe the physical properties of the instrument (such as the shape of the bell, or type and density of the material) and the way in which a musician interacts with the instrument, such as plucking, bowing, strumming, blowing, etc.

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

Picture Start: See *LFOP, sync pop.*

piezo pick-up: A device, often fitted into the bridges of acoustic guitars, where the mechanical vibrations in the bridge cause microscopic distortions to the shape of a piezo-electrical crystal, generating a small voltage in the process. The other common type of pick-up is the *electromagnetic* pick-up used in electric guitars. EM pick-ups use a coil of wire which senses any changes in the *magnetic* field created by a small permanent magnet. As the guitar string above the coil vibrates, it disturbs the magnetic field, and the coil generates a small electrical current which is passed onto an amplifier and loudspeaker. This is the pick-up part of the *DI.*

pigtail: The end of an audio cable which simply has bare wires rather than any type of connector, used to connect cables to binding posts or screw terminals.

pilot: A 19kHz tone transmitted along with stereo FM broadcasts in order to synchronize the local oscillator in the receiver to 38kHz for the detection of the stereo subcarrier. If not filtered out of the receiver output, it can cause problems with *Dolby noise reduction.* See *MPX.*

pilot tone: A 60Hz *sine wave* is recorded on one track of a tape which is used for motion picture sound recording, generated when the film is being shot, thus the frequency is an accurate measure of the camera speed. The pilot is then used later to synchronize the tape playback to the picture action, allowing movie sound to be recorded independently of the film, as *double system sound.* However, with a pilot tone, although the slave can *sync lock* with the master, the slave has no way of knowing where in the program the material the master tape is, and so is severely limited as a synchronization tool. The same is true for speed-only sync codes such as *FSK* and DIN sync. See *neo-pilot, control track, reference frequency.*

PIM: Phase Intermodulation Distortion. PIM arises in amplifiers that have a nonlinearity such that one signal will cause *phase modulation* of another signal. Phase modulation is the same as *frequency modulation* but to a lesser degree. For PIM to occur, a high-amplitude signal must modulate the *power bandwidth* of the amplifier, and this varying bandwidth varies the phase of another signal, also being amplified. See *intermodulation distortion.*

pin-jack connector: See *phono connector.*

pinch wheel: In a tape recorder, a free-wheeling rubber roller which presses the magnetic tape against the *capstan,* ensuring enough friction to drive the tape past the heads. Also called a *pinch roller.*

ping-pong: (1) A stereo effect generated by an autopanner or some multieffects units, whereby a sound is made to appear at the extreme right and left of the stereo field in rapid alternation. (2) See *bounce.*

P

pink noise: A type of *random noise* which has a constant amount of energy in each *octave* band, as opposed to *white noise*, which has equal energy at all frequencies. Pink noise can be made from white noise by passing it through a filter with a 3dB per octave *rolloff*. Pink noise is used to align the frequency response of tape recorders and loudspeaker systems.

ping-pong: To *bounce* tracks in a multitrack recording.

pinning: Referring to audio level meters, a condition in which the signal is too high, causing the indicator to hit the top of its scale. This can damage ballistic meters, such as *VU meters*, in addition to producing distortion in the program.

pirate ship: Film term with means to make a copy of material for one's own use. Commonly used to refer to making a copy of good sound effects recorded in production, thus the order to "pull up the pirate ship" and to make sure that those recordings will be available after the film is finished and masters are sent away.

pitch: (1) A sound characteristic of repeating vibration at a specific *frequency*. Unpitched sound is called *noise*. Pitch is measured in units called *Hertz* (Hz) which is equivalent to "cycles per second." For practical purposes, pitch and frequency are interchangeable terms. (2) The number of grooves per inch on the surface of a phonograph record. (3) The subjective impression of the frequency, or musical tone of a sound, expressed in the latter case by its name-number, e.g., A2. Also the frequency of that musical note, e.g., for this example, 440Hz. (4) The distance between two perforations or sprocket holes along a strip of film. Camera-original film is generally short-pitch, and print film is generally long-pitch, the difference in these lengths being on the order of .0006" per frame. The two different pitches are necessary to prevent slippage between original and print film as they wind around various sprocket wheels in the contact printers used to make most prints.

pitch-bend: A shift in a note's pitch, usually in small increments, caused by the movement of a pitch-bend wheel or lever; also, the MIDI data used to create such a shift. MIDI Pitch-Bend messages are a type of MIDI *channel message*, but not a MIDI *continuous controller* message. See *bend*.

pitch-shift: To change the pitch of a sound without changing its duration, as opposed to *pitch-transpose*, which changes both. Some people use the two terms interchangeably. Also called *time-stretching*. **See also** *frequency shifter*.

pitch-to-MIDI-converter: This translates a *monophonic* musical line, such as singing or a reed instrument, into a stream of MIDI data.

pitch tracking: A misleading term meaning frequency-to-voltage conversion. A pitch tracker will accept a complex *periodic* signal and extract from this the *fundamental frequency*. It will then convert this frequency into a direct voltage output that can be used as a *control voltage* in a synthesizer.

pitch-transpose: See *pitch-shift*.

P

pits: On a *CD, MD,* or *OD,* microscopic depressions laser-burned into the surface on which the digital data is stored. Each pit-edge encodes a 1 in the datastream. Incremental lengths of flat disc surface (either *land* between pits or the bottom of an extended pit) designate zeros in the data. Audio samples, location and synchronizing information, bands and indexing, visual information, etc. are all encoded in the pits.

Pit Signal Processing (PSP): See *digital watermark.*

pixel: PIXure ELement. The smallest visible element of a picture or image, corresponding in video to the brightness and color information for one location on a single *line* of the video image.

planar loudspeaker: A type of *dipole* loudspeaker design which combines aspects of both *dynamic* and *electrostatic* designs. The planar speaker consists of a large plastic sheet with conducting wires imbedded in it, these wires functioning as the *voice coil.* Many small magnets in front and behind the sheet set up a magnetic field so current in the wires causes a force on it and it moves as a unit, similar to an electrostatic speaker. Planar speakers suffer from the same directional problems as electrostatic loudspeakers, but their impedance is more similar to dynamic designs.

plastic leader: Usually, white or yellow *leader tape* in between songs on a master tape. Plastic leader can pick up static electricity, which can create clicks or pops on the master tape. For that reason, *paper leader* is generally used on masters. There are special types of plastic leaders made of an anti-static base that are used for archival storage where paper leader, which changes shape in varying humidity and deteriorates with age, will not suffice. See also *leader.*

plate: See *back plate.*

plate reverb: An electromechanical substitute for an acoustic reverb chamber, where electronically generated reverb was unavailable, whereby a metal plate was suspended behind the sound source, fitted with a *transducer* and microphone pick-up. The plate was typically 4' by 6', suspended on springs within a sound-deadening case as a reverberant space. A vibrating transducer feeds the *direct sound* into the metal plate, and a pair of pick-ups extract the reverberation as vibrations bounce off the plate's edges. A motorized damping plate parallel to the main plate can be remotely positioned at varying distances to control the duration of the reverb. The plate has a characteristic metallic, bright sound. Other substitutes were *spring reverbs* and *slap echo* devices.

platter projection: See *projection.*

playback: (1) The amplified reproduction of any type of sound recording. (2) The reproduction of a recorded take immediately after it is recorded, done to make æsthetic and technical judgments about the performance and recording quality. (3) On a motion picture set, the reproduction of music or other sounds recorded previously under studio conditions, to which the actors, singers, and dancers in a scene mime and move in exact synchronism. Called *shooting to playback.*

playback-equalization: See *record-equalization.*

P

playback head: The *head* on a tape recorder that is used to detect the varying remanent magnetism present on the tape. The output of this head is then amplified and heard as the recorded program.

playlist: (1) A list giving the chronological order in which a number of pieces of music or sound effects are to be played. The list will often describe the start time, duration, and finish time of each item. (2) In editing, particularly digital audio editing, a list similar to (1) above which gives the order in which sections from various recording takes will be used. It will usually include timing information which may be locked to timecode, as well as information about type and duration of *crossfades*, etc. Both also known as an *EDL*.

plosive: See *pop filter*.

plug-and-play: An oft touted feature of PC-type devices, making the promise that the device, when attached to your system, will simply work as advertised, without making you deal with arcane hardware or software settings and/or subtle issues of compatibility. The typical real situation is "plug-and-pray," the more common epithet.

plug-in: A third-party software program sold to add additional function to an existing, larger software suite. An example of a plug-in is the Waves™ *TDM*-based plug-in audio diagnostic suite which runs under ProTools.™ There are two types of plug-in: file-based and *real-time*. The former are usually less expensive, less powerful and require the user to wait while the effect is calculated by the computer. The plug-in modifies the data on the disk (*destructive editing*), but no additional hardware is required to use the plug-in. Real-time plug-ins allow the user to hear the effect while the music is playing. The real-time plug-ins require dedicated hardware to process the sound in, of course, real-time. Changes in the original file are not saved unless requested by the user (*non-destructive editing.*)

poco a poco: Italian for "little by little," or gradually.

point source: A hypothetical sound source which is very small compared to the wavelengths of the sound it is radiating, and which is radiating into a *free-field*.

polarity: The orientation of magnetic or electric fields. The polarity of the incoming audio signal determines the direction of movement of the loudspeaker *cone* or microphone *diaphragm*, i.e., the sign, + or -, of the transducer's output voltage when a positive sound pressure strikes the microphone, or when the speaker cone is pushing away from the cabinet. Note that on a microphone, by convention, positive sound pressure, which pushes the diaphragm in, makes a positive voltage on mic pin 2 with respect to pin 3. A sound is perceived as being louder if the largest peaks are in positive polarity, that is when the *compression* portion of the sound wave is pushing the speaker cone outward, toward the listener. Polarity reversal is the same as *phase-reversal*, or 180˚ of *phase-shift*.

polarizing voltage: The DC voltage supplied in opposite polarities to the *plate* and *diaphragm* of a *condenser microphone* (**via** *phantom power*) or *electrostatic loudspeaker*.

P

polar pattern: A circular, two-dimensional plot that indicates the directional response of a transducer, such as a *directional microphone*. Whole polar patterns are commonly used to show microphone response patterns, they also can indicate the dispersion of a speaker. In the diagram below, points X and Y indicate response nulls in the *hypercardioid* microphone, which represent optimal angles for the placement of stage monitors. A good microphone should have a similar polar pattern from 200Hz to 10kHz, otherwise the mic will produce noticeable *off-axis coloration*. Also called a *polar diagram* or *response pattern*. The *cardioid* pattern microphone is most sensitive to sounds coming directly from the front and least sensitive to sounds coming directly from the rear. The hypercardioid is most sensitive to sounds coming directly from the front and least sensitive to sounds coming in the direction of X and Y, a good place for stage monitors.

Back

Back

X

Y
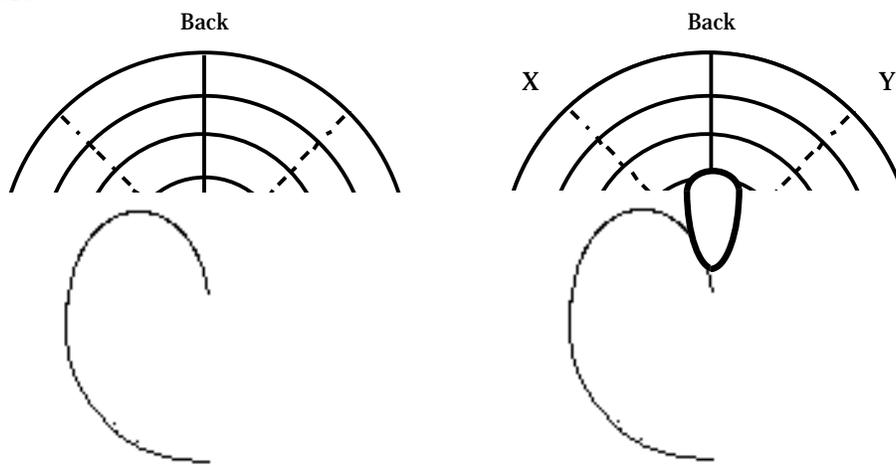
Patte

pole: A portion of a *filter* circuit. The more poles a filter has, the more abrupt its *rolloff slope* will be. Each pole causes a slope of 6dB per octave; typical filter configurations are two-pole and four-pole (12dB/octave and 24dB/octave, respectively). See *order*.

Poly Mode: A MIDI reception mode in which a module responds to note messages on only one channel, and plays as many of these notes at a time (*polyphonically*) as it can. In a guitar-to-MIDI converter, Poly Mode allows multiple strings to share the same channel. Compare with *Mono Mode*.

polyphonic: (1) Music which simultaneously has more than one independent melodic line. (2) Capable of producing more than one note at a time. On most electronic organs, all of the notes can be sounded polyphonically at once, but all synthesizers place a limit on how many voices of polyphony are available. *General MIDI*-compliant synthesizers are required to provide 24 voices of polyphony. Compare with *multitimbral*.

poly pressure: Polyphonic pressure. A type of MIDI Channel Voice message in which each key senses and transmits *aftertouch* data independently. With poly pressure, if a chord is played pressing into the top note, only this note will be modulated without affecting the others. Expensive to implement, so rarely seen. Also called *poly aftertouch* or *key pressure*. Compare with *channel pressure*.

P

pop a track: The act of aligning a *two-pop* exactly nine feet from the *start mark*, either on *mag film* or on a *bench*, or in a digital audio workstation.

popcorn noise: Film expression for *ambient noise* in a theater environment that influence the low end of the *dynamic range*, and how soft a sound will be heard (or "read") in an actual theater. See *Little Old Ladies with Umbrellas*.

pop filter: A device that is used to reduce the *popping*, distortion caused by *overmodulation* of a microphone, usually as a result of placing it too close to the sound source. It commonly occurs with the vocal *plosives*: b, p, and t. Also called a *pop screen*, *windscreen*, or *windshield*.

popping: See *pop filter*.

port: (1) An opening in the front surface or baffle of a loudspeaker enclosure, called a *ported enclosure*. (2) One or more openings on the body of a *unidirectional* microphone, either rear-entry or side-entry. Passing through the port(s), sound waves reach the rear side of the *diaphragm* and, through *phase cancellation* or reinforcement, contribute to its *directional* response pattern. See *acoustic labyrinth*.

portamento: (1) A continuous movement in *pitch* from one note to another without step. Instruments with notes of fixed pitch, such as the piano, are unable to do this, but the human voice, fretless instruments, e.g., violins, and instruments fitted with slides, e.g., trombones, can. It is a different effect from *glissando*. (2) See *glide*. (3) One of the defined MIDI Controller Change messages used to switch a synthesizer's portamento on or off.

Portamento Time: One of the defined MIDI Controller Change messages assigned to the parameter in a synthesizer which determines the time taken for *portamento* to occur.

positional reference: A signal that provides location information that various devices can use to establish *synchronization* during playback and recording.

post: (1) Means "after," as opposed to *pre*. In recording studio parlance, it is used to indicate that the signal has already had the designated effect added, such as post-equalization, post-effects, or post-fader. Also used as an abbreviation for *post-production*. (2) Binding post. A connector, consisting of a threaded shaft and nut, used to terminate bare wire. Usually found on loudspeakers and occasionally amplifiers. See *pigtail*.

post de-emphasis: The same as *de-emphasis*.

post fade listen: Also called *after-fade listen AFL*. Signal routing within a *mixing console* to allow audio signals to be monitored at the level set by the fader on that input, rather than monitoring the level coming to the input, as in *pre-fade listen.*. *Aux sends* are usually monitored post-fader. Because of the ambiguity of the abbreviation PFL, be sure to use AFL (after-fade listen) for post-fade listen as PFL is generally taken to denote pre-fade listen.

post-fader send: See *effects send*.

P

post-**production**: (1) In audio, a term used for tasks which have to be done after mixing is complete and the *master tape* has been made. These include further editing, grouping of individual tracks into an album, and for CD, the addition of *subcode*. (2) Any work on a recording, film, or video that is done after the main recording session or filming is completed. Typical post-production work can include editing, mixdown, looping, sound cutting, making of titles, etc.

post-**roll**: (1) The number of beats/amount of time a *sample* ends after the playback-end marker. (2) In *SMPTE timecode* synchronization for videotape *post-production*, the number of seconds and/or frames specified which are automatically added to any timecode address subsequently specified as a *record-out* point. Thus, when inserting dialog or music, on each take master and slave machines will continue to roll for the post-roll duration after recording is stopped. This prevents the type of *wow* that occurs when a transport is stopped while the electronics are still recording. Some brands of synchronizer add the post-roll to the *mark-out* rather than the record-out location.

post-**score**: To compose and/or produce a musical score or jingle after the film or videotape for the production has been shot, and usually after a *fine cut* is completed. The composer can then spot *cues*, take counts, locate hits and really tailor the music to the visuals.

post-**stripe**: To *re-lay* the mixed soundtrack onto the edited video master, or onto a copy made from it.

post-**sync**: Post-synchronization. (1) *ADR* recording with *M&E* made to synchronize with an existing film or video tape, usually for translation of a foreign-language film. This term is used mainly in Europe, while in the U.S., the term ADR is used as a synonym. (2) The recording of sound to be added to the *sync sound*.

pot: Potentiometer. A device (commonly attached to a knob or slider) used to adjust some aspect of the signal being passed through it, or to send out a control signal corresponding to its position. A variable resistor, usually controlled by a rotary knob, is used extensively as a volume control, tone control, etc. The term is also sometimes used for a step-type *attenuator*.

power: (1) Electric power: The time-rate of doing work or the rate at which energy is used. A *watt* of electrical power is the use of one *joule* of energy per second. *Watts* of electrical energy equals *volts* times *amperes*. See Appendix B. (2) Acoustic power: The number of watts of energy produced by any sound source or *transducer*. See *acoustic intensity*.

power amplifier: A device that accepts a low-level audio signal and strengthens, or amplifies, it to a suitable *voltage* and *current* level adequate to drive a loudspeaker or similar load. See *preamplifier*, *active*, *differential amplifier*, *integrated amplifier*, *combining amplifier*.

power bandwidth: The bandwidth of an audio device such as a power amplifier, measured while delivering its full *rated load*. This is limited by the *slew rate* of the device and is always narrower than the *small signal bandwidth*.

power factor: See also *watt, VA.*

power level: See *level.*

power ratio: See *decibel, voltage gain.*

P

PPM: Peak Program Meter. Similar to a *VU meter* in appearance, but which responds to the *peak* level of the signal, rather than the average level. PPMs read the peak-to-peak value, i.e., the voltage swing between the negative and positive peaks. However, they still don't read absolute peak values, because clipped peaks shorter than a ms or so are generally inaudible. Peak detection usually is most effective with percussive sounds. See also *modulometer*.

ppq: Pulses Per Quarter-note. The usual measure of a sequencer's clock *resolution*. Sometimes written as *ppqn*.

PQ subcode: These control bytes contain the timing information which allows the CD player to cue instantly to the beginning of each selection, display the selection's number and running time, and provide a continuous display of elapsed time. See *Control and Display signals*.

preamplifier: (1) In an audio system, the first amplifier to accept the signal from the *transducer* is generally called a preamplifier. Preamps must usually accept very low-level, e.g., *mic-level*, signals and amplify them to *line-level* without adding appreciable noise. (2) A small amplifier built into a *condenser microphone* to boost the very low output level of the capsule before transmission over the mic cable.

Precedence Effect: See *Haas Effect*.

pre-delay: In *reverberation*, the time between the *incident* sound and the first sound reflection is heard.

pre-echo: (1) Depending upon the width of each frequency band in a *transform coding* scheme, it is possible for the decoder to produce variable amounts of pre-echo. For example, a *transient* that has its rising edge contained within a *frequency band*: the *codec* quite correctly detects the transient's presence and codes the information within the appropriate band, and also uses that information to re-use bits from surrounding masked envelopes. Upon decoding, the output level is turned on the for complete duration of the coded frequency band, which means that the signal will be heard before the arrival of the actual transient. Such pre-echoes sound very much like analog tape *print-through* and may produce unacceptable results, particularly on material containing large numbers of sharp level excursions. (2) In room acoustics, any *early reflections* of sound that occur within about 40 ms, the shortest time for which the ear can distinguish two non-simultaneous sounds. Some digital reverb devices include simulated pre-echoes as a part of their hall simulation program.

pre-emphasis: (1) Generally, the process of equalizing a signal to increase the content of a desired frequency band before the signal is sent to another device. (2) A type of high-frequency boost applied to signals about to be broadcast on FM stations or recorded on tape to reduce the apparent noise level. Pre-emphasis brings the high-frequency content of the music up to a level further above the *noise level* of the recording medium. In order to restore the proper balance of high and low frequencies to the reproduced music signal, the boost added by pre-emphasis must be removed by a complementary cut, called *de-emphasis*. See *equalization curve*.

pre-fade: A *fade-out* starting at a predetermined time so that it finishes precisely at the end of a recording.

P

pre-fade listen: Abbreviated PFL. A monitoring point placed before a fader on a mixing desk so that the signal can be listened to before being *boost* or *cut* for recording or broadcasting, i.e., the incoming signal can be heard regardless of the position of the fader on that particular input. Note that *aux sends* are generally monitored *post-fade listen*.

pre-fader send: See *monitor send*.

pregap: A *mixed-mode* CD encoding format designed to hide the computer data at the front of the audio portion of the CD, between index 0 and index 1 of track one. A CD player still thinks it's an audio-format CD, while a computer thinks it's a CD-ROM. Pregap improves upon mixed-mode by not allowing the audio user to access the *Enhanced CD* track directly, but there are other problems: patent disputes and a bug in Windows'95 makes the pregap track inaccessible to PC users. See *CD Extra*.

pre-lay: Usually stands for the act of editing sound onto a *multitrack*, i.e., multitrack editing.

premix: (1) (*noun*) If many tracks of effects or music are required for a specific scene, the mixing engineer may elect to mix all of these effects together onto a single strip of magnetic film or onto a single track (or at least fewer tracks) of the multitrack *master*, then use this one track during the final mix rather than the individual effects tracks. Because this effects mix is done before the *final mix*, it is called the pre-mix. Dialog premixing often does not actually reduce the number of tracks that will go into the final mix, but instead just copies a *cut track* across with careful equalization and fader moves. See *binky*. (2) (*verb*) To mix and bounce two or more tracks of a multitrack tape before making the final mix of all tracks. Done to free up tracks for additional instruments or voices, or to save time in the final mix by having sections already mixed.

pre-production: A term used for those tasks which can, or need to, be done before the actual recording or filming is made. A pre-production suite may be provided for the programming of synths and preparation of samples and sequences for use during the session.

pre-roll: (1) The number of beats/amount of time a sample starts before the playback marker. (2) In *SMPTE timecode* synchronization for videotape *post-production*, a number of seconds and/or *frames* which are to be automatically subtracted from any *record-in* point (some brands of synchronizer subtract the pre-roll from the *mark-in* point, rather than the record-in point.) The synchronizer will then return master and slave machines to a point located ahead of the record-in by the duration of the specified pre-roll. This assures that all machines will be up to speed, properly interlocked, and that the talent can find their place and be ready to perform by the actual record-in point. For example, if the record-in point is 20:10:00, and the pre-roll is 5:00, the deck will actually stop at 20:05:00, precisely five seconds before the specified record-in. See *post-roll*.

pre-score: To compose and/or produce a musical score or jingle before the film or video has been shot. This can be done in anticipation of filming live actors to playback, or in animation to provide the animator with exact scene lengths, *cue* points, and other information necessary to match the animated scene to the music. Almost all animated films are pre-scored, including dialog and effects, after which frame counts are taken from this in the music so that the animators can time actions to fit the soundtrack. The opposite of *post-score*.

P

presence: The intelligibility of a track; a subjective term describing the amount of mid- to upper-midrange frequencies in the sound source. Boosting a track's presence helps to bring the track forward in the *image*, and is effected by increasing the amplitude of frequencies in the range of approximately 800Hz-6kHz, typically in the more narrow band of 2kHz-4kHz.

presence peak: A characteristic of some transducers, typically *dynamic microphones*, whereby the *frequency response* in the 5kHz range is naturally boosted, giving an edgier, punchier sound.

preset: (1) A factory-programmed synthesizer *patch* that cannot be altered by the user. (2) Any patch. Some synthesizer manufacturers make distinctions between presets, programs, and/or patches, each of which contains a different set of *parameters*.

pressure: See *aftertouch*.

pressure gradient: A type of *microphone* construction which supports the *transducer diaphragm* on the top and bottom, leaving it open to the air on both sides. This produces a *figure-eight* response pattern. Mics of this type are more complex and delicate than *pressure operation*-type mics, and have many more mechanical and physical problems such as extreme susceptibility to handling noise, *rumble*, sensitivity to wind, and *proximity effect*. In addition, the diaphragm assembly has to compensate for the inadequacies of the pressure gradient by making the diaphragm resonate at very low frequencies, generally restricting the smoothness and extension of the very lowest part of the audio spectrum. These disadvantages are, however, overlooked because of the *directivity* of these microphones. *Cardioid microphones* are a combination of pressure gradient and pressure operation transduction within a single unit.

pressure operation: A type of *microphone* construction, using a sealed box with a *diaphragm* on one end (much like a drum), producing an omnidirectional *polar response*. This design usually provides a very smooth, extended, and flat *frequency response*. See *pressure gradient*.

pressure sensitivity: See *aftertouch*, *channel pressure*, *poly pressure*.

pressure zone effect: See *boundary effect*.

prestriping: See *stripe*.

preview codes: *Edgecodes* on an edited *workprint* or its copies and sound elements to create a new reference for a given version of the film. When the film is subsequently re-edited, the process of *conforming* multiple tracks can be sped up greatly.

preview head: A supplementary *playback head* on a tape recorder designed for reproducing the master tapes for the manufacture of phonograph records. The signal from the preview head tells the variable-pitch circuitry on the cutting lathe the program amplitude level that it will cut one groove later. This allows the unit to space the grooves so that they do not intersect due to amplitude *transients*. In quieter passages, it allows the circuit to pack the grooves more closely, minimizing *land*.

P

print master: The final edit of a *film soundtrack* that can be transferred directly to a *track negative* or a *mag stripe print* with no further changes in level or EQ. If *noise reduction* is used on a print master, it most often matches that of the final print format, and thus can be transferred stretched to the mag stripe print or track negative. In the case of a *stereo optical film*, the print master contains two tracks, *Lt-Rt*, that are transferred directly to an optical sound negative. The soundtrack of a *discrete* 35mm 4-track or 70mm 6-track mag print will be recorded from a 4- or 6-track printing master in a *real-time* transfer. Also called a *running master*.

print-through: When tape recordings are wound tightly on the reel, the adjacent layers of tape sometimes influence one another so that the signal from one layer will bleed into the next layer of tape. This causes a faint echo of the signal which may be heard as a *pre-echo*, audible before the main signal. Print-through is worse at recording levels which approach the *tape saturation level*. See *heads-out*.

processor: Sometimes used synonymously with the term *effects* device, a processor circuit modifies a signal passing through it, whereas an effects circuit leaves the original signal intact and adds something to it. Processors include *EQ*, *compressor/limiters*, *expanders/gates*, *panners*, and *single-ended noise reduction* units.

ProDigital (PD): (1) A digital audio format used in stationary-head *multitrack* digital tape recorders. In competition with the *DASH* format, ProDigital (also called ProDigi) supports two formats: $\frac{1}{4}$" 8-channel audio tape and 1" 32-channel audio tape, with various sampling rates, and allows editing of digital tapes by mechanical splicing and *punch-in* recording. (2) A *parallel, master clock* format for up to 32 channels of 16-bit audio. Also called *Melco*. There are three versions of Melco/ProDigital: Dub-A, Dub-B, and Dub-C.

production channel: See *channel*.

production master: See *master tape*.

production mixer: The person who records sound during filming. See *recordist*.

production sound: See *location sound*.

program: (1) (*verb*) To create a synthesizer *patch*. (*noun*) A patch. Also called a *preset*. (2) (*noun*) The desired audio or video signal passing through any system or stored on any medium such as tape, as opposed to *noise*.

program chain: The series of components or devices which is used to process a signal. It usually starts with a microphone and ends with loudspeakers, incorporating a mixing desk, tape recorder, etc. See *chain*. Also called a *set-up*.

Program Change: A MIDI message that causes a synthesizer or other device to switch to a new program/sound/patch contained in its memory. MIDI defines a range of 128 Program Change messages, numbered 0-127. GM goes further, assigning a specific type of sound (e.g., hi-hat) to a specific number.

programmable: Equipped with software that enables the user to create new sounds or other assignments by altering *parameter* settings and storing the new settings in memory. An individual control parameter is said to be programmable if its setting can be stored separately with each individual *patch*.

P

projection: In most commercial movie theaters, all reels are joined together on a platter to form one continuous strip of film through one projector. In screening rooms equipped with two projectors, each reel is kept separate and the projectionist will manually start the incoming projector with s/he sees *change-over dots* on the upper right-hand corner of the screen. This first set of dots is the *motor cue*, with a second set of dots (a second before the end of the current reel), indicating the time to switch to the next reel.

projection sync: The relative location of picture and sound in a motion picture print that produces proper synchronization during projection. In **16mm**, *answer* and *release prints* are made with the soundtrack advanced 26 frames ahead of the picture. At 24fps, this distance represents over one second of footage. In 35mm, prints are made with the sound advanced 20 frames. Since each frame of picture must be held still while light shines through it, illuminating the screen, and since quality sound can only be read from film moving continuously past an optical or magnetic playback head, the picture frame and sound frame corresponding to the same event on film must be separated by a distance on film that will match the image projection with the sound reproduction. See *editorial sync.*

ProLogic: See *Dolby ProLogic™.*

propagation delay: The time taken for a signal to move through a circuit, system, or device.

proximity effect: A boost in the low-frequency response of a *directional microphone* that occurs when the sound source is relatively close to the microphone. The phenomenon begins when the source is about two feet away from the mic capsule and becomes more noticeable as the subject gets closer to the mic. A singer can use the proximity effect as a means of adding fullness to a voice; however, the effect can also emphasize low-frequency noises such as breath sounds and *plosives.* See *pop filter.*

PRS: Performing Rights Society. The UK equivalent of *BMI/ASCAP.* See also *MCPS.*

pseudo-balanced: See *floating unbalanced output.*

PSP: Pit Signal Processing. See *digital watermark.*

psychoacoustics: The study of the way in which audio information is processed by the brain. Humans have developed a number of techniques for processing sound. These techniques allow information to be recovered even when obscured by considerable noise and allow the brain to disregard unwanted information. See *cocktail party effect*, *auditory masking*, *perceptual coding.*

psychoacoustic surround-sound: See *transaural audio.*

pull: (1) See *cut effects.* Also, a film term which connotes the act of deciding which sound effects from a library will be used in a scene. See also *spot.* (2) Film term for adding another recorder to a chain.

pull up/pull down: The deliberate miscalibration of an audio sample rate clock in order to compensate for a speed change in the device, such as an analog tape deck, to which the audio is being synced. For example, used in cases where film footage running at 24 fps is translated to an NTSC video tape. See *frame*, *sampling rate.*

pulse: See *beat*, *clock*, *difference tone*, *ppq*, *pulse wave*, *sync pulse*, *tach pulse*, *tempo*, *trigger.*

P

pulse-code modulation: See *PCM.*

pulse wave: A generic term for a variable rectangular waveform that varies between high (+) and low (-). The *square wave* is a pulse wave with a ½ (50%) *duty cycle*, therefore the value of every even-numbered harmonic is zero. A pulse wave with a duty cycle of greater than ½ has the same spectrum as a pulse wave whose duty cycle has the same denominator (e.g., a ⅓ has the same spectrum as a ⅔ duty cycle.) See *PWM,* Appendix C.

pulse width: See *duty cycle.*

pulse-width modulation: See *PWM.*

pumping: See *breathing.*

punch-in recording: A feature that allows a user to enter (punch-in) or exit (punch-out) the recording function while a MIDI sequencer or audio recorder is playing. *Punching* often is used to replace certain sections of otherwise usable recorded art without having to redo an entire track.

pure tone: A sound whose *waveform* is a *sine wave,* or a signal with a single frequency and no *harmonics.*

PWM: Pulse Width Modulation. An analog synthesis technique in which an *LFO* or some other modulation source is applied to vary the length of time a *pulse wave* remains in its high state (i.e., its width). This varies the amplitudes of the *fundamental frequency* and lower *harmonic*s, with an effect similar to sweeping a *lowpass filter.* Used by video laser disc systems, and sometimes as an intermediate stage between sampling and A/D conversion. Better than *PCM* in that it only uses one bit and produces no *quantization noise.* It does, however, have attendant *sampling errors.* See Appendix C.

Pythagoras' comma: See *diatonic comma.*

PZM: Pressure Zone Microphone. See *boundary microphone.*