O

Ω: See *Ohm.*

OBU: Outside Broadcast Unit. A team of technicians responsible for recording or broadcast away from a studio.

OCN: See *EK neg.*

octave: The *logarithmic* relation of sound frequencies used in most modern Western music. The frequency of each higher octave is twice the preceding one, i.e., an octave is a frequency ratio of 2:1. An *octave band* consists of all the frequencies within an octave. There is one octave between 100Hz and 200Hz, also between 1kHz and 2kHz. Octaves are perceived as equal pitch intervals, even though the true bandwidth in Hertz varies with the frequency level of the octave. The name arises from the musical practice of defining the eight notes of the scale within a doubling of the frequency. To ears, two frequencies an octave apart sound like the same note.

OE: Operator Error. A failure in any mechanical or electronic system caused by inappropriate action on the part of the humans setting up or operating the system.

off-axis: The opposite of *on-axis.* (1) Not directly in front of a loudspeaker. (2) Not within the optimal *acceptance angle* of a microphone, and therefore not recorded at full level. See *directional microphone.*

off-axis coloration: A dull or colored effect on sound sources that are not placed within the *acceptance angle* of the microphone. To avoid off-axis coloration, place mics so that they are aimed at sound sources that put out high frequencies, such as cymbals, when miking a large source. And, use a microphone that has a flat *frequency response* over the recording field, i.e., has similar polar patterns at midrange and high frequencies. Most large-diaphragm mics have more off-axis coloration than smaller mics (¾" diaphragm or under).

offbeat: See *beat.*

offlay: To separate individual sound effects, pieces of dialog or other sounds originally on one roll of *magnetic film,* placing each on a separate roll to allow for individual equalization or other effects treatment.

off-line: See *on-line.*

off-mic: See *off-axis.*

offset: (1) A time-difference correction made between two or more devices to achieve proper synchronization. For example, if a VCR and multitrack are 1.5 seconds out of sync, instructing the synchronizer to calculate an offset for that amount could resync the sound and picture. (2) A correction that affects the onset of an event. For example, a *velocity curve* offset defines a threshold below which no velocity data is sent. When the velocity value exceeds the threshold, velocity response follows the selected curve.

ohm (Ω): A unit of electrical resistance or *impedance,* that which opposes an electric *current* in a conductor.

O

Ohm's Law: A basic law of electrical circuits, the mathematical relationship between electrical *voltage*, *current* and *resistance*: the current in an electric conductor is directly proportional to the voltage across it and inversely proportional to its resistance, i.e., the voltage and current in a conductor exhibit a linear relationship. It states that the current, I, in *amperes* in a circuit is equal to the voltage, V, in volts divided by the resistance, R, in ohms: thus, $I=V/R$. Ohm's law works for DC, and for AC if the resistance is a pure resistance, but if the resistance has any reactive components, inductance or *capacitance*, the current depends on the frequency as well as the voltage.
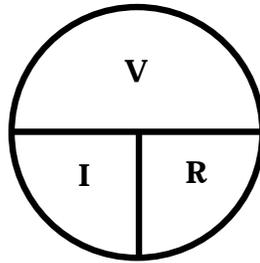
OMFI: A *file format* first proposed by Avid to allow for digital audio data interchange among *digital dubbers*, **editorial** *workstations*, **and hard disk editors.**

omnidirectional microphone: A *pressure operation* microphone with a non-directional *acceptance angle*, i.e., one that is spherical, usually called an *omni*. See *directional microphone.*

Omni Mode: See *MIDI Mode.*

OMS: Open Music System, formerly Opcode MIDI System. A *real-time* MIDI operating system for Macintosh and PC audio applications. OMS allows communication between different MIDI programs and hardware, so that a *sequencer* could interface with a *librarian* program to display synthesizer patch names (rather than just numbers) in the sequencer's editing windows.

on-axis: See *off-axis.*

on-board effects processor: This can be used in a synthesizer to add *reverb*, *chorusing*, or other *effects*. On most synthesizers, it is possible to set the *effect send level* separately for each of the *multitimbral* parts. As opposed to *outboard.*

one-legged: A term to describe a broken electrical connection. In a *balanced line* connection, a symptom is the loss of gain and low frequency content in the signal. In an unbalanced line connection, the signal will probably disappear altogether. See also *open circuit.*

one-shot sampling: A sound which is sampled once and then triggered as necessary.

one to one: See *1:1.*

O

on-line/off-line: (1) The opposite of real-time, i.e., processing to an audio or other file which is not done at the same time as the human actions which initiate the processing. (2) In the videotape editing process, off-line is when the final edit list is compiled on a less expensive machine, i.e., where the *EDL* is created, but not *conformed*, in preparation for the final edit. On-line is where the video tape master is created from the EDL, including all effects using high-quality equipment, usually a 1" video deck. (3) In a network, any device which is able/unable to receive or transmit a signal. (4) In a system of synchronized devices, a slave device which is waiting for a particular *timecode* value to be reached before it will play or record, etc., is said to be on-line.

opamp: Operational amplifier. A *differential amplifier* with extremely high input *impedance* and high gain. Its characteristics can be tailored to various amplification tasks by the application of proper *feedback* to produce various effects, but is characterized by a low, ground-referenced output impedance.

open air acoustic: In a studio, the simulation of open air acoustic is achieved by the use of screens to surround the sound source and a microphone. This ensures that much of the sound energy which travels away from the microphone is absorbed and is not reflected back to it. This absence of *reflection* makes the sound appear to be located outside.

open circuit: A circuit through which an electrical current cannot flow, perhaps because a component has failed or a connection has been broken. See also *one-legged*, *short circuit*.

open-circuit voltage rating: The output voltage of a microphone with no load, i.e., with infinite *resistance* such as in an open circuit, or when driving a resistive load at least twenty times the microphone's internal *impedance*. One of the standard specifications of microphones.

open-loop: An amplifier without *feedback* is said to be in an open-loop mode, or to be an *open-loop amplifier*. The feedback around the amplifier closes the loop.

open-reel: A type of tape machine which uses tape wound on spools, rather than tape which is sealed in a cassette.

open track: On a multitrack tape, any track that has not yet been used, or that may be erased and reused for overdubs.

operating level: The voltage level defined for any audio system at its nominal, 100% modulation level, not including any *headroom*. Usually defined as 0dBVU for a steady *sine wave*.

operator: (1) A term used in Yamaha's FM synthesizers to refer to the software equivalent of an *oscillator*, *envelope generator*, or envelope-controlled amplifier. (2) The general term for a structural component of *FM synthesis*, analogous to an oscillator/envelope/amplifier in synthesizer parlance.

optical disc (OD): A very dense type of digital data storage medium. The data are *encoded* in a spiraling pattern by a laser that carves tiny pits into the surface of the OD master, every change from *land* to a pit indicating a change from a 1 to a 0, or vice versa. Where no change is recorded, the last-read digit is indicated for each increment of *groove length*. In the reproduction device, a small laser scans the groove, reading the changes from land to pits, converting this information back into data. The data can be text, video, or digital audio, such as CDs and laserdiscs. See *LIMDOW*.

O

optical recording: Sound recording on film. The photographically printed *film soundtrack* is known as the *optical track*. See *SVA, variable area*.

opticals: (1) Effects on 35mm film that are made in an optical printer, such as dissolves, *fades*, super-impositions, freeze-frames, matte shots, etc. (2) Loosely, any effect used in a film or video production.

optical sound: The type of sound reproduction on film that employs a photographic printing process of the *optical track*. As opposed to *magnetic film*. See *optical recording*.

optical track: A method of recording an audio signal in the emulsion of a film alongside, and in sync with, the picture frames. The photographically printed *film soundtrack* that appears either between one row of perforations and the picture in an *answer* or release print (in 35mm), or along the edge of the print opposite that with the perforations (in 16mm). The track area on a 35mm print takes up a total width of 100 mils, which, being one-tenth of the space between the sprocket holes, displaces the centerline of the image on the film by 50 mils, hence called the *Academy centerline*. See *DES*. (2) The master or original photographic soundtrack made directly from the mono mix or 35mm *three-track mix*. This strip of film has no video image, but is printed along with A- and *B-rolls* onto the composite answer print or release print. The track can be a negative or positive image, depending on the type of camera and print stock. See also *stereo optical print*, *50% level*.

opto-electric: A device which uses a variation in light intensity to cause a change in electrical current. Variable photoresistors are sometimes used as gain control elements in compressors where the side-chain signal modulates the light intensity.

opto-isolator: An electronic component that can pass a signal via a light path, avoiding a direct electrical connection between two separate circuits. This will prevent voltage spikes generated in one piece of equipment from damaging another unit in the network, as well as breaking *ground loops*. The unit consists of a light source (an LED) and a light detector (a phototransistor) enclosed in a sealed box, the whole package looking IC-like. The part of the MIDI specification that deals with hardware requires that all *MIDI In* connections use an opto-isolator.

ORC: Optical Radiation Corporation. See *Cinema Digital Sound*.

order: In discussing *filters*, the number of *poles* a certain filter possesses is called the order of the filter. Thus a T-section is a third-order filter and an L-section is a second-order filter, etc. The *slope*, in dB/octave, of the filter response in its *stopband* is equal to six times the order.

ORTF: Office de Radiodiffusion-Television Française. A stereo microphone configuration designed by the French national broadcasting system. This method calls for two *cardioid* microphones to be spaced 17cm (6.7") apart, at an angle of 110˚. The 17cm represents normal ear spacing, and the 110˚ is to simulate the directional pattern of the ears. Recordings made using the ORTF method sound more open and spacious than those produced by the *X-Y* miking method. ORTF works well with headphone applications, but tends to sound somewhat dry and lacking in warmth due to the directional patterns of the cardioids, which pick up little *ambient* room sound. However, because of the close spacing of the microphones and the resultant similarity in phase, ORTF does provide *mono compatibility*, desirable in broadcasting. The Swedish equivalent is *NOS*, which is the same, except that the angle is 90˚ with a spacing of 30cm (11.8").

O

oscillator: (1) An electronic device which generates a *periodic* signal of a particular frequency, usually a *sine wave*, but sometimes a square wave or other *waveform*. In an analog synthesizer, oscillators typically produce regularly repeating fluctuations in voltage--that is, they oscillate. (2) In a digital synthesis, an oscillator more typically plays back a complex waveform by reading the numbers in a *wavetable*. An oscillator allows a choice of *pitch* and waveform, the first affects the perceived musical pitch and the second affects the *timbre*. Additional parameters that are almost always found in the oscillator section of a synthesizer are those that deal with *vibrato* and *pitch-bend*.

oscillator sync: A *sound synthesis* technique whereby one *oscillator's* cycle is synchronized to that of a second. This forces the *waveform* of the slave oscillator to restart its cycle each time the master crosses the *zero-point*. As a result, the *fundamental* of the slave is the same as the master, but the waveform is radically changed. The pitch of the controlling oscillator is not normally added into the audio mix, but can be shifted by *pitch-bend*, *envelope*, *aftertouch* or an *LFO*, producing substantial changes to the *harmonic* content of the slave oscillator, but without changing the fundamental pitch as does *ring modulation*. Instead, the higher harmonics around the pitch of the slaved oscillator are emphasized, producing a very hard edge to the tone.

ossia: Italian for "or." Usually used to indicate an alternative version of a musical passage.

ostinato: Italian for "obstinate." A short melodic and/or rhythmic idea which is continually repeated, often in the bass. Known as a *riff* in popular music.

outboard: In a recording studio, special equipment such as *effects* devices and power amplifiers that are not included within the recording console are called outboard devices. Compare with *on-board*.

out-of-phase: A condition where two signals have a *phase* difference of 180°, or one-half cycle. It should be called out of *polarity*, phase being a continuous variable rather than discrete. The same as *antiphase*. See *phase reversal*.

output: The point of exit of a signal from a system, e.g., a section in a *mixer* or other device where the signal is transmitted to a device external to the mixer, such as an *effects processor*, headphones, or monitors.

output impedance: The output impedance of a device is the actual impedance at the source output terminals. See *impedance-matching*.

output level: See *nominal level*.

output point: See *channel insert*.

output power: The lower level that a system outputs under a specified load. Expressed in VA or *RMS* (watts). See also *power bandwidth*, *rated load*.

outro: A term derived from *intro* and which refers to a section at the end of a piece of music; used in popular music in preference to the classical term *coda*. It leads to or replaces, in the case of a *fade-out*, a definite ending. See *vamp*.

out-take: Any take produced in a recording session which is not used in the final master.

O

overbias: The use of more *bias* current in an analog magnetic recorder than is required for maximum sensitivity. Overbias will reduce the *distortion* and the sensitivity to *dropouts*, but will also reduce the high-frequency response, so compensatory equalization must be applied.

overdrive: To input a signal to an audio device in such magnitude that an *overload* occurs. Specifically, a characteristic electric guitar sound in which a guitar amplifier (preferably a tube-type) is overloaded to the point of *clipping*. A similar result can be provided by an *effects* unit of the same name. Not to be confused with *fuzz*, in which the distortion is introduced before the amplification stage.

overdub: To record additional parts alongside (or merged with) previous recorded material, either by a mixing and/or re-recording process or by adding a new track in multitrack recording. Overdubbing enables one-man band productions, as multiple synchronized performances are recorded sequentially. Also called *tracking* or *multitracking*.

overflow: MIDI devices invariably have a limited amount of polyphony; any attempt to exceed this by sending too many simultaneous notes will result in an overflow of MIDI data. If a device has an overflow facility, Note On messages beyond its total polyphonic capacity are passed out to a second device for it to voice. Otherwise, the condition results in *voice-stealing*.

overlap: The film dialog equivalent of an *overdub*. (check)

overload: An audio device is overloaded when the input signal level is so high that it drives the device out if its *linear* range and into distortion or *clipping*. Overload may be continuous or may affect only *transients* in musical waveforms.

overmodulation: A situation which occurs when the *amplitude* of a signal exceeds the limits of the recording or broadcasting system. This causes distortion and can, in exceptional circumstances, damage equipment through which the signal passes. The opposite of *undermodulation*.

overs: Input peaks recorded onto a digital medium in excess of 0VU, causing a crackling, ripping type of distortion. See *clipping, headroom*.

oversampling: The principle of sampling a signal at an integer multiple of the normal sampling rate. The factor can be as little as two times, or much more. The effect is to distribute a fixed level of *quantization noise* over an ultrasonic frequency range, diluting the noise in the audio bandwidth and improving the *S/N ratio*. See also *quantization error, Shannon's channel capacity theorem*.

overshoot: (1) (*noun*) If a *compressor* or *limiter* is subjected to a sudden large input signal level, its *attack time* may not be fast enough to prevent the output from being momentarily too high. This initial excessive level is called overshoot, and its severity depends on the speed of the device. (2) (*verb*) Imperfect t*ransient response* in an audio device will result in the waveform going past the desired value on fast signal transitions, as is frequently seen on *square waves* and the *impulse responses* of CD players.

O

overtone: Overtones are produced by a musical instrument and are higher in frequency than the *fundamental*. They may or may not coincide with the frequencies of a *harmonic* series. The overtones define the harmonic spectrum of a sound. The fundamental is the first *partial*, so the second partial is the first overtone. Overtones are defined as the harmonics above the fundamental, but in common usage they are taken to mean any partials above the fundamental. In most instruments, the higher overtones are lower in volume than the lower overtones. See *subharmonic*.