

# V

**VA:** An expression of the work which can be performed by an electrical device, but which ignores the *inductance* of the load. It is related to the *watt* in that it is also the product of potential difference in *voltage*, (V) and *current* in *amperes* (A), but it ignores the *power factor* inherent in that unit.

**valve:** (1) See *tube*. (2) On musical instruments, a device for lengthening or shortening the air path through the instrument, resulting in lower or higher pitched tones, respectively. Valves are typically depressed with the fingers, such as on a trumpet or French horn.

**vamp:** In a performance of a song, the ending. Either a continuing repetition of the last *chorus* intended to be faded out during the mix, or a *coda* section with solo lines, leading to a hard ending. See *outró*.

**variable area:** The most common type of *optical soundtrack* used in motion pictures. The variable area track is a transparent line in a black background. The relative width of the transparent part is varied in accordance with the sound waveform. Most movie soundtracks today consist of two parallel variable area tracks, making possible the recording of stereophonic sound. See *SVA*.

**variable-rate converter:** A new type of digital recording, marketed by Kinetix, which attempts to provide very high resolution sound without resorting to a static increase in *bit depth* and *sampling rate*. Typical linear systems divide audio signals into equal quanta of amplitude and equal quanta of time, producing serially correlated sampling errors, or, errors which are necessarily related to one another and are, therefore, not only not random, and therefore not mutually canceling, but potentially mutually reinforcing at specific bands within the audio frequency, making them more noticeable. Briefly, a variable-rate converter wobbles at random between 44.1kHz and 48kHz to distribute the sampling errors over a wide frequency range, with the general result that they are inaudible. The Kinetix converter also randomizes the quantization steps so that each successive sample is quantized differently. This renders quantization distortion is redistributed as (Gaussian) noise where it is shifted into the 15-18kHz range on output where it is unlikely to be audible. Variable-rate converters provide low bit-rates, do not require dither or compression, produce less background noise and distortion, with increased the audibility of low-level signals and enhanced stereo imaging. The downside is that the variable clock frequency causes problems for interfacing to other digital systems which is why the current Kinetix product includes its own recorder.

**variation:** A musical form in which a theme is presented and then repeated in a succession of different guises. These may include retaining the *harmonic structure*, while elaborating or otherwise varying the melody, changing the *time signature* and/or rhythmic framework, or using new harmonies, such as substituting the minor for the major of the harmonic sequence.

**varispeed:** A means of changing the speed at which a tape recorder runs in order to change the *pitch* or duration of a tape recording. Recently, this involves the use of a *servo-controlled capstan*, and the speed may be varied by changing the *reference frequency* of the servo.

**varispeed oscillator:** In tape recorders, an oscillator used to vary the frequency of the AC driving an AC *capstan motor* and, hence, the tape speed. Recorders whose capstans are driven by DC motors often have DC voltage controls for varispeed operation. These are often mistakenly called varispeed oscillators.

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**VCA:** Voltage-Controlled Amplifier. A device that responds to a change in *voltage* at its control input by altering the *gain* of a signal being passed through it. Also, the digital equivalent of a VCA which is more properly called a *DCA*.

**VCF:** Voltage-Controlled Filter. A filter whose *rolloff frequency* can be changed by altering the amount of voltage being sent to its control input. Also, the digital equivalent of a VCF.

**VCO:** Voltage-Controlled Oscillator. An electronic oscillator whose output frequency is controlled by the application of an external direct voltage. VCOs are used extensively to generate musical signals in *synthesizers*. The ease by which their frequency can be controlled makes them very suitable for *frequency modulation* and *complex sound synthesis*. See *DCO*.

**VCR:** Video Cassette Recorder. A device for recording and replaying video signals on cassette tape. Cassette *formats* in current use are  $\frac{1}{4}$ " , 8mm,  $\frac{1}{2}$ " , Beta or VHS (consumer formats), and  $\frac{3}{4}$ " *U-Matic*. See also *VTR*.

**VDP:** Video Disc Player.

**velocity:** (1) A type of MIDI data (range 1 to 127) usually used to indicate how quickly a key was pushed down (*attack velocity*) or allowed to rise (*release velocity*). A Note-On message with a velocity value of 0 is equivalent to a Note-Off message. (2) The velocity of sound: The speed at which sound waves propagate. The precise speed will depend on the density of the medium through which the sound waves travel: in air, at sea level and at 0°C with 30% relative humidity, this is approximately 1088 ft/sec. (331.7 m/sec.) At average room temperatures it is slightly faster.

**velocity compression:** Each MIDI Note-On message has a velocity value between 1-127. The velocity corresponds to how hard the key was struck. In *velocity scaling*, (more accurately called a *velocity offset*), a group of notes is selected for editing and then their velocities are all cut or boosted in a linear manner: e.g., with a scaling value of -20, three notes originally recorded with velocities of 65, 91, and 37 would be set to play back with velocities of 45, 71, and 17, respectively. In *velocity compression* (sometimes called *velocity scaling*), the velocities are multiplied or divided by some factor so that the differences between them get larger or smaller. With a compression value of 75%, for example, the same three notes would be played back with velocities of 49, 68, and 28. This means that the note with the largest starting velocity is reduced the most, while soft notes play back closer to their original velocity, helping to keep them audible. Thus, compression is a better way to smooth out the *transients* in a passage that were played too loudly, without changing the musical dynamics of the piece.

**velocity crossfade:** The blending of multiple *samples* in varying proportions depending on *key velocity*. Sounds on samplers that are often programmed to use velocity crossfades include pianos and other tuned percussion instruments whose *timbre* changes character markedly depending on how hard a note is played.

**velocity curve:** A *map* that translates incoming velocity values into other velocities in order to alter the feel or response of a keyboard or tone module. Some devices have a preset range of velocity curves, and some allow users to program their own.

**velocity offset:** See *velocity compression*.

**velocity of sound:** See *velocity*(2).

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**velocity scaling:** See *velocity compression*.

**velocity sensitivity:** A type of *touch sensitivity* in which the keyboard measures how fast each key is descending. Compare with *pressure sensitivity*.

**velocity switching:** See *cross-switching*.

**vestigial sideband:** In AM, whereby a portion of one *sideband* is suppressed.

**VFO:** Variable Frequency Oscillator. An oscillator used in the generation of electronic music and for audio equipment test signals. Often the VFO is a simple knob or wheel. VCOs are a subtype of VFO which are voltage-controllable.

**VHF:** Very High Frequency. *Electromagnetic waves* with frequencies between 30MHz-300MHz. The subrange of 88.1-108MHz is used for FM radio broadcasting in most countries. In the U.S., channels 2-13 on most television sets. Compare with UHF.

**VHS:** Video Home System. A domestic standard ½" cassette *format* for making analog video recordings. The commercially more successful of two such systems which first appeared in the early 1980's, the other being Sony's Betamax. Both formats have been used as a medium for recording digital audio data: Betamax in Sony's PCM-F1 system, while the successor to VHS, S-VHS is used in the ADAT digital multitrack system.

**vibrato:** A slow *pitch* oscillation; a *periodic* change in frequency, often controlled by an LFO, with a periodicity of less than 20Hz, most commonly about 5Hz-8Hz. Vibrato is created in the wave oscillator when a modulation signal is sent from an LFO into the *frequency modulation* input of the oscillator. In synthesizers, *vibrato depth* is the intensity of the effect, and *vibrato delay* is the amount of time a note is set to sustain before the vibrato effect enters. Compare with *tremolo*.

**Video-8:** A consumer video recording format which uses 8mm tape in a small cassette. It was developed for use in hand-held cameras and other portable equipment, but has also been adopted for use in some digital audio systems, such as ADAM.

**video black:** A video signal composed of all black, containing horizontal sync, vertical sync, and color burst information. Video black is used to *pre-stripe* video tape as the *master clock* (35.8MHz for NTSC) for sound synchronization. SMPTE timecode may be derived from the color burst data. Also called *black-burst color signal*, but video black is actually black in color.

**video sync:** A subset of *video black* which does not necessarily contain color burst signal. It uses horizontal sync or vertical sync to provide a very stable video *reference source*. The signal is used to control the speed of the video machines, digital audio machines, and is used as a timing reference to ensure accurate synchronization. See *master clock*, *word clock*.

**virtual track:** A synthesizer part, as opposed to a recording of an acoustical instrument.

**vision mixer:** A device for mixing video signals from a number of sources. The relative amounts of the signals are controlled by *faders*, primarily for mixing the output of television cameras.

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**VITC:** Vertical Interval Timecode. A means of recording *SMPTE timecode* or other timecode into the vertical blanking interval on a high-end, pro video recorder, offering the advantage of being readable even when the tape is not moving. As the VITC signal is recorded by the rotary heads, it must be recorded at the same time as the video signal, whereas timecode signals recorded on a VTR's linear audio tracks can be *striped* either before or after the video picture is recorded.

**VMAx:** Virtual Multi Axis. A 3D audio technology developed by the Harman Interactive Group which purports to deliver *ambisonic* sound through two channels. VMAx 3D Interactive is a version aimed at multimedia computer applications, while VMAx 3D VirtualTheater™ is the edition of VMAx used for decoding Dolby *ProLogic* and *AC-3* programs for two-channel playback. There is also a VMAx Stereo Enhancement for adding width and depth to stereo *imaging*.

**V/O:** See *voice-over*.

**VOC (.VOC):** A file extension specifying the Creative Labs' Sound Blaster™ audio format. Typically encountered as `FILENAME.VOC`. Originally 8-bit, newer cards accommodate 16-bit stereo sound. VOC files support compressed or uncompressed data at a range of sampling rates up to 44.1kHz. Compression options are from 2:1 to 4:1. Not as popular as the *.WAV* format.

**vocal booth:** An acoustically isolated booth in which one or more singers can perform while rhythm instruments are playing in the studio, but that keeps *leakage* of these instruments from reaching the mics located inside the booth. The same booth can be used to house acoustic instruments being played at the same time as amplified ones in the studio, or vice versa.

**vocal score:** A notated form of vocal music in which any orchestral parts are expressed as a piano (*treble* and *bass clef*) score, i.e., there is no *full score*.

**vocoder:** Voice Operated reCORDER. A signal processor (considered one of a family of *analysis synthesizers*) that imposes the *amplitude envelopes* of one input (control) signal upon a second input (program) signal. In the most common application, someone speaks into a microphone to provide a control signal; the amplitude characteristics of the speech elements are superimposed on an input instrument, giving the latter a "talking" quality. Vocoder use a bank of *bandpass filters* to dynamically analyze the *frequency spectrum* of the control signal and thus continuously derive the amplitudes of the component frequency bands. The resulting *amplitude envelopes* are used to continuously control the operation of another, identically tuned bank of filters. Any program signal applied to the input of this second bank will be shaped by the amplitude envelopes of the control signal, yielding the same spectral characteristics as the control input.

**voice:** (1) The simplest, individual sound-producing circuitry (*generator module*) an instrument possesses; an element of synthesizer circuitry capable of producing a note, which typically consists of the combination of *oscillator/filter/amplifier* with associated *envelopes* for the filter and amplifier. The *polyphonic* capability of a synthesizer is defined by how many voices it has. See *voice channel*. (2) In Yamaha synthesizers, a *patch*. (3) The instrument for human speech or singing.

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**voice channel:** A signal path containing, at a minimum, an *oscillator* and a *VCA*, and capable of producing a note. On a typical synthesizer, two or more voice channels, each with its own *waveform* and *parameter settings*, can be combined to form a single note.

**voice coil:** The *transducer* part of a loudspeaker, consisting of a coil of wire mounted on a *frame*. Variations in the electrical signal passing through the coil cause it to be repulsed from, or attracted to, a fixed magnet in proportion to the *frequency* and *amplitude* of the signal. The resulting motion is mechanically transmitted to an attached cone, whose piston effect excites the surrounding air to reproduce recorded sound.

**Voice of the Theater™:** A motion picture theater speaker system developed in the 1940s by the Altec Lansing Corporation, and the industry standard for forty years until the introduction of *direct radiator* speakers. The Altec Lansing loudspeakers included the single-cabinet A-7 and A-4, and the dual-cabinet A-2 for larger theaters.

**voice-over:** An audio track containing an announcement or narration to accompany a TV or film advertisement, recorded by a person who does not appear on camera. Often abbreviated as V/O. See also *post-sync*.

**voice stealing:** A process in which a synthesizer that is being required to play more notes than it has *polyphony* switches off some currently sounding voices (typically those that have been sounding the longest or are at the lowest amplitude) in order to assign them to play new voices. See *dynamic voice allocation*.

**voiced:** An amplifier which is designed to have a *frequency response* which is shaped to a particular instrument, rather than being completely flat. An example are the loudspeakers systems used for electric guitars and basses. The amplification has a very limited frequency response which filters out the worst of the *distortion* due to the amplifier.

**voicing:** (1) The process of creating a sound on a piano, organ, or synthesizer; voicing means much the same thing as *programming*. (2) *Room equalization*.

**volt:** Unit of electrical potential between two points in space where  $V = \text{Resistance} \times \text{Current}$  ( $V = IR$ ), *resistance* is in  $\Omega$ , *current* in *amperes*, equal to the force required to produce a *current* of one *ampere* through an element having a resistance of one *ohm*. See *Ohm's Law*. The voltage of an audio signal is usually measured in terms of the *RMS* value of the signal, but sometimes the peak or average voltages are measured. The RMS voltage squared is proportional to the amount of *power* the signal carries. See also *VA*.

**voltage:** The difference in the electrical potential of two points in a circuit.

**voltage-controlled amplifier:** See *VCA*.

**voltage controlled attenuator:** An amplifier or *resistive network* whose gain is *unity gain* at maximum, and whose attenuation of an audio signal varies in proportion to an externally supplied DC voltage.

**voltage-controlled filter:** See *VCF*.

**voltage-controlled oscillator:** See *VCO*.

**voltage gain:** See *gain*.

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**volume:** (1) The degree of *loudness* or *amplitude*. (2) One of the MIDI Controller Change messages assigned to the parameter in a synthesizer which determines output volume, sometimes called the Main Volume, although it only operates on the channel to which it is assigned.

**volume control:** A voltage divider that adjusts the percentage of input signal without regard to the input frequency that is applied from one amplifier stage to the next. Compare with *loudness control*, *gain control*.

**volume expander:** A device for increasing the *dynamic range* and reducing the apparent *noise* of a signal. The second half of a *comparer*. A volume expander decreases the system gain as the signal level decreases, making soft signals softer still. This results in an apparent noise decrease because the relative level between the softest and loudest sounds is greater. If the noise level is already low enough that the signal will mask it in the loud passages, the expansion will put the low end of the dynamic range at a point where the ear has reduced sensitivity, making the noise less audible.

**VPM:** Variable Phase Modulation. A feature of the only modern FM synthesizer, the Korg Prophecy monosynth and XY polysynth. Both synthesizers use the carrier and modulator, and have only two oscillators. However, these can be set to produce all of the audible waveforms.

**V.S.:** Volte Subito, meaning “turn the page.”

**VTR:** Video Tape Recorder. A device for recording and replaying video signals on tape, usually open-reel as opposed to cassette. See also *VCR*.

**VU:** Volume Unit. VU meters show how loud various signals are and measure the *RMS* value of the input voltage. For example, a sine wave that alternates between +1V and -1V will produce a reading on a voltmeter of 0.707V, the average of the voltage in DC. VU meters may be the speedometer type or electrical LEDs, and meter scales in dB. See also *crest factor*, *peak*, *PPM*.