

# T

**tablature:** Pictograms which represent fingering positions on a string fretboard.

**tach:** See *tach pulse*.

**tach pulse:** A signal generated by the *tachometer roller* of an audio or video transport, one or more times per rotation. Because the tach roller is in contact with the tape in fast-wind modes as well as play or record mode, it can be used to get approximate tape location data when *SMPTE timecode* data cannot be read. Tach pulses sent by various decks to the *synchronizer* allow it to stop each deck near the SMPTE timecode designated by the engineer. Once in play or record modes, the decks will again interlock via the SMPTE timecode data. Tach pulses do not include location information, only speed and direction. Tach pulse is the mechanical, or analog, equivalent of *word clock*. See also *bi-phase/tach*.

**tail:** (1) Additional information which follows a block of data either on disk or for the purpose of data transfer between devices. The tail usually serves as a full stop to the data that precedes it. Commonly encountered in MIDI System-Exclusive transfers. For example, in Yamaha System-Exclusive transfers, the last two bytes are tail information in the form of an ECC and an EOX status byte. (2) The end of a reel of tape or film.

**tail-out:** See *spiral*.

**tails-out:** See *heads-out*.

**take:** A term meaning a single, continuous recording. This may be of a complete work, but is more often a short section. The *EDL* is comprised of selected takes in their final order.

**take sheet:** A sheet of paper on which the engineer makes notes about each take as it is recorded, such as complete or incomplete, good or n.g., which sections of the take are usable, etc.

**take-up motor:** On a tape recorder, the motor that applies take-up tension to the tape. This motor also powers the fast-forward mode.

**take-up reel:** The reel onto which tape is wound after it passes from the *feed reel* over the audio or video *heads*.

**talkback:** A facility on a *mixer* which sends signal from the control room to the recording area, allowing an engineer or other studio personnel to talk over headphones or a loud-speaker to give instructions, identify takes, etc. A microphone on the console is normally routed directly into the studio amp and monitors, while a relay mutes or attenuates the volume of the control room monitors to prevent *feedback*.

**tangency:** The parameter of tape-head alignment that determines the geometric relationship between the plane passing through the head gap and the tape passing over the gap. Ideally this plane would be exactly perpendicular to the plane that is tangential to the tape passing the gap. Misadjustment of tangency will cause uneven head wear on both sides of the gap.

**tap:** In a *digital delay*, a point in the circuit after one or more delay stages at which the delayed input signal can be patched-out and routed to another destination.

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**tape:** (1) (*noun*) Recording medium consisting of a magnetic coating applied to a plastic substrate. See *magnetic recording tape*. (2) (*verb*) To record music or other program material, whether or not the recording is actually written to magnetic tape, for storage, editing, and/or playback. (3) Another name for the tape recorder operating mode normally called *repro*.

**tape bias:** See *bias*.

**tape counter:** A mechanical or electronic display of the relative amount of tape that has passed through the transport system of a tape recorder. In professional systems using some kind of *timecode*, it may also show the absolute time value recorded at any given point on the tape.

**tape delay:** The original *delay lines* were made by using a three-head tape recorder to record a signal while playing it back on the same machine. The distance between the record and replay heads causes a time delay which varies with tape speed; this technique is called *tape delay*. If some of the replay signal was mixed with the direct signal, a *pseudo-reverb* could be created. The record-replay idea was further developed with specific machines which used tape loops and multiple replay heads and the ability to adjust the contribution and feedback of each head. These machines were replaced with *DDLs*.

**tape echo:** An early method of producing echo effects by means of a *tape loop*. See *loop(2)*.

**tape head:** The *transducer* used in a *magnetic recording tape* machine to create patterns in the magnetic surface of the tape during the recording process, or conversely, to read the patterns on playback. See *magnetic recording tape*.

**tape hiss:** Noise that is characteristic of analog *magnetic recording tape*, produced by the random fluctuations in the positioning of magnetic particles along the tape, and heard as a low-level *hiss* during playback. The noise, although *broadband*, is most noticeable in the high frequencies. See *Barkhausen effect*, *noise reduction*, *grain(2)*.

**tape loop:** See *loop(2)*.

**tape pack:** The smoothness with which magnetic recording tape is wound onto the hub of a reel, or simply, the *pack*.

**tape returns:** Mixer inputs that typically come from a *multitrack* tape recorder. They are different from common line inputs in that they are typically switchable between *monitor* and *mixdown* functions, depending on whether or not the recorder is recording, or the mixer is mixing.

**tape speed:** Professional equipment records at standard speeds of 30ips (76cps), 15ips (38cps), or 7½ips (19cps). Consumer recorders run at 1⅞ips (4.75cps). Faster tape speeds mean higher-quality recording as the signal has more tape area onto which to be recorded.

**tape splicer:** See *Guillotine splicer*.

**tapeless studio:** A recording set-up which uses exclusively digital recording, storage, and playback equipment.

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**tape sync:** A method for synchronizing a pair or group of independent devices which uses one track of a tape recorder attached to the other device(s) on which is striped the *master timecode signal* which provides timing for the other device(s). See *FSK*, *pilot tone*, *SMPTE sync track*, *sync track*.

**tape type:** Categories for recording tape are based on the magnetic coating of the tape. Usually applied to cassette tapes, they include: Type I (ferric oxide), Type II (chromium dioxide), and the now-discontinued Type III (metal).

**tape weave:** An improper gradual up and down motion of magnetic tape as it passes over the tape heads in a tape recorder, causing *tape skew*. It is usually caused by the tape not having been properly slit, but can also result from worn tape guides.

**Tartini tone:** See *difference tone*.

**taskbar:** The menu on a Windows™ system which displays open applications.

**TCA:** Timecode Address. The HH:MM:SS:FF bits of the *SMPTE timecode* word.

**TDF:** Triangular probability Density Function. See *dither*.

**TDIF:** TASCAM Digital Interface Format: An eight-channel digital interface used to connect TASCAM *MDMs* to one another and to compatible external gear. The TDIF format uses *master clock sync* and carries eight channels of digital audio on a electrical cable with 25-pin *D-sub* connectors. Each wire in the cable carries two multiplexed channels, which closely resembles AES/EBU. The entire cable can handle eight channels to and from any compatible device, and so is bi-directional. The maximum *bit depth* is 24 bits, and the data rate is four times the sample rate. See also *Lightpipe*.

**TDM:** Time-Division Multiplexing. Digidesign's proprietary 24-bit *DSP* environment, providing *real-time* digital audio processing and mixing on ProTools™ hardware. Many third-party manufacturers make software *plug-ins* to add audio functions to TDM-based-systems. TDM itself refers to the division of each sample period into 256 different addresses, each available to a plug-in.

**Telecine:** (1) A machine that transfers film to video signal for broadcast or storage onto videotape. Also generically refers to the process of film-to-videotape transfers. It consists of a film projector with a special optical system that connects to a television camera which records the projected film image. Better quality than a video-video dub, but the Telecine transfer must happen in real-time. Telecine occurs at three points in the filmmaking process: first, when the film is transferred to video in preparation for editing on a nonlinear system; when an edited *workprint* is transferred to video to give sound editors a guide with which to edit sound; and, when an *interpositive* is transferred to a videotape to create a master for home video release. (2) The UK name for a film *chain*.

**Telharmonium:** Also called the Dynamophone. An early electric keyboard invented around 1900, weighting over 200 tons, it was the feature of the world's first music broadcasting service in New York in 1906. The Telharmonium used the *tone-wheel* principle and so was the predecessor of the later, smaller Hammond organ.

**temp dub:** A quick and temporary mix of a film soundtrack made during post-production for screening and evaluation in *double-system*.

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**temperament:** In the tuning of a musical instrument to a *scale*, temperament is the compromise, or deliberate mistuning, of pure or *just intervals* so the various frequency ratios between notes of the scale are compatible with *octaves*. This compromise is called a temperament, of which there are theoretically an infinite number. Also called *tempered tuning*. See *meantone*, *equal temperament*, *just intonation*, *syntonic comma*, *diatonic comma*.

**temp score:** Music placed by the director or music editor to get an impression of how a scene will work once it's scored.

**tempo:** The speed of the pulse, or *beat*, of the music. See *rhythm*.

**tempo-dependent:** A clock, such as the *MIDI clock*, which is dependent on the tempo of the music for tracking, i.e., the MIDI clock will transmit more MIDI clocks per second if the master *sequencer* increases the tempo, as compared with other synchronization signals which encode information about absolute time, such as *SMPTE timecode*.

**tempo map:** Data containing the initial tempo of a composition and the *SMPTE timecode* location of the song start, plus the degree and location of any subsequent tempo changes are stored in a tempo map. Usually the tempo map is built by the sequencer and stored along with sequence data.

**temporal masking:** A data reduction technique which takes advantage of the fact that a loud sound affects the perception of quieter signals both before and after it. If, for example, a relatively quiet signal occurs 10-20ms before a louder one, it may still be masked by the louder signal. This is called *backwards masking*. The hearing mechanism also takes time to recover from a relatively louder sound, and this creates a masking effect which extends up to 100-200ms after the masking signal has ceased, called *forward masking*. The length of the masking is related to the relative amplitude of the masking signal. To reduce data by using this technique, the input signal is divided up into blocks of samples usually around 10ms in length, and each block is analyzed for transients which act as temporal maskers. Most systems vary the length of the block to take advantage of both backwards and forwards masking. Also called *time-masking*. See *perceptual coding*.

**tenor:** From *tenere*, the Latin "to hold." Originally, a vocal part with sustained notes in sacred music. Now used to refer to a male voice which has a range from about C-below-middle-C upwards about two octaves, and by extension, instruments which have a similar *tessitura*. Music written for the tenor register is notated with a *tenor clef*, which has middle-C on the fourth line of the staff. The term *counter tenor* is used to specify a male voice singing in the alto range. The other registers are *alto*, *baritone*, *bass*, and *soprano*. See also *treble* and *voice*.

**tent:** An area of a recording studio enclosed in absorptive panels, constructed to provide a *dead acoustic space*.

**tenuto:** A notation indicating that a note should be held for longer than its nominal value, shown by a short, heavy line on the note.

**terminal:** The point at which the signal either enters or leaves an audio device, including wire nuts, and by extension, other audio-type connectors.

**terminal strip:** A series of connections, usually screw terminals, arranged in a line to permanently connect multiple audio lines to such devices as recording or broadcast consoles.

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**termination:** A transmission line is said to be terminated if it is connected to an *impedance* equal to its characteristic impedance, i.e., the end of the line is connected to a load that matches the impedance of the line. Microphones should not be terminated because the termination load reduces the signal voltage level. Also misused to indicate the proper *resistance* to which an audio device is intended to be connected. See *impedance-matching*.

**tessitura:** The range of “comfortable” sounds of an instrument.

**test tape:** See *biased noise*.

**THD:** Total Harmonic Distortion. An audio measurement specification used to determine the accuracy with which a device can reproduce an input signal at its output. THD describes the cumulative level of the *harmonic overtones* that the device being tested adds to an input *sine wave*. THD+n is a specification that includes both *harmonic distortion* of the sine wave and *nonharmonic noise*.

**theme:** A musical idea or phrase that becomes an important motif throughout a *score*.

**Thérémin:** An early electronic instrument which used *heterodyning* by one fixed RF oscillator which was modulated by a hand and an antenna. Audio-range frequencies were produced by the sum and difference signals from this modulation, making the Thérémin a predecessor to modern *FM synthesis*. The instrument was *monophonic* and almost uncontrollably *microtonal*.

**thermal capacity:** An unstandardized performance specification for an amplifier which describes its *thermal headroom*. This is not particularly meaningful as amplifier thermal performance varies with the input test signal. Also used as a synonym for thermal headroom.

**thermal equilibrium:** The length of time it takes electronic circuitry to reach its steady-state operating temperature. For example, it takes about ten minutes for most audio equipment to reach thermal equilibrium, and all components are stabilized as far as voltage, current and temperature swings which occur at start-up having been attenuated.

**thermal headroom:** A term which denotes the difference between the nominal operating temperature of a power amplifier and the maximum temperature at which the amplifier will continue operating, i.e., before its thermal protection circuitry will shut it down.

**thermal noise:** See *quiescent noise floor*.

**third:** The *interval* between a note and the one three *scale steps* above or below it: three *half-steps* (minor third) or four half-steps (major third).

**third harmonic distortion:** That part of *harmonic distortion* which represents only the third *harmonic* (three times the *fundamental* frequency) of a *sine wave* input to an electronic device. The third harmonic of any tone is musically an *octave* and a *fifth* above the original tone, and is easily noticeable in the output. For this reason, the *MOL* of analog tape recorders, for example, is often specified as that level at which third harmonic distortion reaches 3%.

**third-octave:** Short for one-third of an *octave*. The usual *bandwidth* on the individual faders on a *graphic equalizer* and *graphic displays* on most *RTAs*. Also, the *Q* on *narrowband filters* is usually one-third octave.

**three-head:** A tape recorder with separate record, replay, and erase heads.

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**three-stripe:** See *3-track*.

**three-track mix:** See *3-track*.

**threshold:** The specific point in a range at which some process or effect occurs. In an audio signal, it is the lower limit in the dynamic range above which a device, such as a *compressor*, *limiter*, or *noise gate*, will affect the incoming signal. See also *expander*, *gain-before-threshold*.

**threshold of hearing:** The lowest-level sound detectable by a listener with good hearing. Defined as 0dB SPL and usually specified for a 3kHz tone since the human ear is most sensitive in this frequency range. See *loudness*, *SPL*, *equal loudness curves*.

**throat:** The opening at which a *driver* attaches to a *horn*. Or, the narrow end of the horn itself.

**thumper:** A low-frequency sine wave at around 30Hz, triggered by a *noise gate* keyed to a *click track*. A thumper is used to give filmed dancers the beat of a song while recording *sync sound*; the thumper is subsequently filtered out.

**THX™:** A trademark for a special motion picture *surround-sound* specification developed by Lucasfilm in collaboration with audio engineer Tomlinson Holman. The acronym comes from both the name of George Lucas' first feature film, THX-1138 and also from the initials of Tomlinson Holman eXperiment. Only the loudspeaker crossover network is manufactured by Lucasfilm; other components of the B-chain, including their placement and installation must be approved before the theater can be designated as "THX approved." THX is a theater sound system specification, and as such does not involve any type of film audio format, as does Dolby Digital™, nor does it indicate that any of the film sound was produced by Lucasfilm Ltd.

**tie line:** A permanent, but undedicated, connection between two points some distance apart, e.g., between a terminal box in the studio and the *patchbay* in the control room.

**tie-tack microphone:** See *Lavalier microphone*.

**tight:** (1) Low-frequency performance of a loudspeaker when relatively free of *hangover*. Poorly damped systems are said to sound *loose*. (2) A recording made using *close miking*. Also called *tight miking*.

**timbral interference cues:** The same as *comb filtering*.

**timbre:** (1) The perceived quality of a sound, unrelated to *pitch* or *amplitude*. Timbre is determined by how many *harmonics* are present in the sound, their frequencies, and how loud each is in relation to the *fundamental frequency*, and how the relative amplitudes of those harmonics change over time. The initial and ending *transients* of a tone have more to do with the timbre of a tone than its harmonic content. Also referred to as *tone color*. (2) One of the building blocks of a *patch* in a Roland synthesizer.

**timbre envelope:** The change in the tone of an instrument over time.

**timbre modulation:** A technique whereby a sample *loop point* length or position is changed via modulation, such as sweeping through a *wavetable* to produce an extreme stuttering effect.

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**time alignment:** In a multiple-driver loudspeaker system, it is important that the time delay of each driver and its associated *crossover network* be the same to preserve accurate *transient* response, i.e., the high frequencies and low frequencies reach the listener's ear at the same time. Crossover networks have different delays depending on the frequency range they cover, as do speakers; woofers have more delay than tweeters. One can place tweeters farther from the listener, or build time-delay into the high-frequency signal path. See *transient response*.

**time-base corrector (TBC):** An electronic device that repairs *dropouts* and other defects in the synchronizing signals of a video picture, then acts as an outside *sync reference* to which playback machines can conform.

**timecode:** A type of non-audio signal that contains information about elapsed time on a film, tape, or disk recording. Used for a synchronization reference when synchronizing two or more machines such as sequencers, drum machines, and tape decks. See *SMPTE timecode*, *MTC*, *FSK*.

**timecode generator:** An electronic device that produces *SMPTE timecode* signals, which can be used to synchronize the *frame rate* of motion picture cameras and recorders, television cameras, VTRs, VCRs, etc.

**timecode regeneration:** The process of creating a new timecode based on an incoming timecode signal or *positional reference*. See *dropout*, *freewheeling*.

**time-coherent:** A device is said to be time-coherent if it exhibits an essentially linear *phase-shift* over frequency, i.e., the characteristics of a pure delay. It is not necessary that the frequency response be flat, just that the phase-shift vary linearly with frequency. Apparently, humans can hear time differences in the 5 $\mu$ s-10 $\mu$ s range. A lack of time-coherency is usually problematic in multi-way speaker systems and some microphones. The *crossover point* in multi-way loudspeakers, without careful control and compensation, causes the speaker to output a multi-lobed pattern, i.e., the main energy output is not in front of the speaker, and the *polar pattern* is asymmetric. In a microphone, a perfect characteristic *impulse response* would be where the *diaphragm* would cease moving as soon as the sound ended. However, bodies in motion tend to remain in motion; in addition, all of the microphone resonates, not only the diaphragm. All of this additional motion contributes to the coloration of the sound by smearing the various arrival times of the various frequencies. By using a very small, lightweight diaphragm housed in a capsule that has a minimum of resonance and reflective surfaces, coloration is reduced.

**time masking:** See *temporal masking*.

**time signature:** The *meter* of a work is indicated at the beginning by two numbers, one above the other: the lower indicates the chosen unit of measurement (half-note, quarter-note, etc.), while the upper indicates the number of such units which make up a measure. In *simple times*, such as  $\frac{2}{4}$ ,  $\frac{3}{4}$ , and  $\frac{4}{4}$ , each *beat* is normally halved to form eighth-notes, etc. In *compound times*, such as  $\frac{6}{8}$ ,  $\frac{9}{8}$ , or  $\frac{12}{8}$ , the basic beat is grouped into threes to form dotted notes. In faster tempos, musicians can regard these dotted notes as the actual beat. The time signature,  $\mathbb{C}$ , is called *common time* and indicates  $\frac{4}{4}$  time, while  $\mathbb{C}$ , *cut time*, indicates the generally faster  $\frac{2}{4}$  time.

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**time-stretch:** To change the length of a sample without altering the pitch. Compare with *pitch-shift*.

**timing clock:** See *MIDI clock*.

**tip, ring, and sleeve:** See *TRS*.

**TLA:** (1) Three Letter Acronym. From NASA, a long time ago. Modern usage is somewhat disparaging, as the world is now speaking exclusively in TLAs. (2) Transformer-Like Amplifier. A design for microphone *preamplifier* design by Rupert Neve which uses *active* components to simulate the operational characteristics of conventional transformer coupling, but with lower crosstalk.

**TOC:** Table Of Contents. The inner track of a CD, containing information about the disc such as number of tracks, their position on the disc, timing, and disc ID number.

**Todd-AO:** Todd-American Optical. The 70mm widescreen process developed jointly by Mike Todd and the American Optical Company. Also the name of a film sound company in Hollywood.

**tonal:** Music that is written with a primary pitch, i.e., is written in a specific *key*, such as C, is called tonal. See *tonic*.

**tone:** (1) Refers to a signal which has a particular and usually steady *pitch*. The simplest of tones are *sine waves*. (2) Tone also refers to *timbre*, or quality of a musical sound, such as “bright,” “mellow,” etc. (3) A synonym for *whole-step*, an *interval* of two *half-steps*, e.g., from C to D. (4) A synonym for note, i.e., any particular sound.

**tone color:** See *timbre*.

**tone control:** One or more knobs on an audio amplifier or preamp which modify the relative balance between the treble and bass tones. Tone controls are actually *equalizers* and they change the *frequency response* curve of the device implementing them.

**tone module:** See *expander*(2).

**tonic:** The reference (lowest) pitch on which a musical *scale* is built, i.e., the “do” of do-re-mi. It is defined in terms of the musical note rather than in terms of absolute frequency. For example, if one changes the *key* of a musical selection from C to A $\flat$  this is a change of the tonic from the note C to the note A $\flat$ .

**top hat:** A plastic disc and a handle designed for placing over a tape *pancake*, taking the place of the upper reel *flange* to allow smooth winding of the tape. Also called a *hat*.

**topping and tailing:** The process of removing extraneous sound at the beginning and end of a *song*, any fades are added or adjusted, and running times are calculated for a master tape or digital copy.

**top sheet:** See *binky*.

**Toslink:** See *S/PDIF*.

# T

**touch-sensitive:** Equipped with a sensing mechanism that responds to variations in *key velocity* or *key pressure* by sending out a corresponding control signal. See *aftertouch*.

**track:** (1) (*verb*) To be controlled by or follow in some proportional relationship, as when a filter's *rolloff frequency* tracks the keyboard, moving up or down depending on what note is played. (2) (*noun*) One of a number of independent memory areas in a sequencer. By analogy with tape tracks, sequencer tracks are normally longitudinal with respect to time and play back in sync with other tracks. See *channel*. (3) One of the longitudinal areas of a magnetic tape which is formed by recording an audio signal along it, separated by *guardbands*. (4) A section on a recording, containing a discrete song or other selection.

**track-at-once:** A CD production method whereby one or more tracks is burnt at a time; a link is written between the tracks. This method is often used to create *multisession* CDs. A disadvantage of track-at-once recording is that gaps between tracks must be at least two seconds in length. Compare with *disk-at-once*.

**tracking:** (1) The process of following the *envelope* of a signal's waveform, as in a level meter of any type. (2) In describing the performance of a phonograph stylus or other *transducer*, the measure of its ability to precisely follow the instantaneous *waveform* of the applied signal, be it mechanical, e.g., a record groove, acoustic, or electrical. (3) A synonym for *over-dubbing*. (4) See *double-tracking*(1).

**tracking error:** (1) Because the tonearm of a record player is pivoted at the stationary end, the stylus moves across the record in an arc and meets the groove at an ever-changing angle. The cutting stylus, however, moves in a straight line, always 90° to the groove direction. This condition is called tracking error. (2) An error which occurs in disk drives when the read/write head cannot be placed accurately over the data blocks due to a misalignment in the head *servo*, a defect in the recording medium, or a misalignment in the recording process. Also, a similar error in CD player mechanisms.

**track laying:** (1) The process of recording audio signals to a track or tracks, either simultaneously or sequentially, prior to *mixdown*. (2) The editing and assembly of the various tracks of *magnetic film* containing dialogue, narration, sound effects, music, etc., in preparation for re-recording, mixing, or dubbing. Also called *sound cutting*.

**track negative:** Film terminology for a soundtrack negative.

**track select:** The process of enabling specific tape machine tracks for recording.

**transaural audio:** The use of *psychoacoustics* to give the listener the illusion of sound coming from all around, even though there are only two loudspeakers. The listener must be positioned on the center line of the two speakers to correctly perceive the *phantom images*. An example is the QSound™ system. Also called *psychoacoustic surround-sound*, or *fifty-yard line surround*.

**transducer:** A device which converts mechanical, magnetic, or acoustic energy into electrical energy, or vice versa. See *DI*, *electroacoustic*, *electroacoustical transducer*.

# T

**transfer:** (1) The same as *regroup*. The process of copying audio and/or video from one medium to another, possibly combining audio and video or audio and audio (such as from a sampler and sequencer to multitrack tape). For example, the final audio mix for a film is transferred (typically these days) from a digital workstation's hard disk and written to the audio tracks on the *print master*, which is then copied for distribution. Implicit in the term transfer is a change of medium. Transfer from one like device to another, such as cassette duplication, is called *copying* or *dubbing*. (2) The *magnetic film* itself that results from this copying process. A *straight transfer* is made without any equalization or compression of the audio signal as it goes from the source to the magnetic film.

**transfer channel:** See *channel*.

**transfer characteristic:** The graph of the output amplitude of an audio device vs. the input amplitude. If the system were perfect, the transfer curve would be a straight line and the slope of that line would indicate the system's *gain* or loss. Also called the system's *transfer curve*. For example, see the diagram under *rotation point*.

**transfer curve:** See *X-curve*, *transfer characteristic*.

**transfer suite:** A facility where film *location sound* recordings are transferred to sprocketed magnetic tape. The soundtrack and the film can then be mechanically synchronized. See *Telecine*.

**transform coding:** Used in Dolby AC-2 and MPEG codecs, whereby an input signal is analyzed within the frequency domain as a series of narrow bands, e.g., an AC-2 encoder/decoder uses 256 narrow bands. Frequency-masked bands whose information is inaudible because of sustained tones or *transients* will be ignored by such systems, thereby enabling the compression algorithm to concentrate its bit allocation on those bands which contain subjectively relevant information. In addition, transform-based systems use a system of predefined waveform patterns from an established wavetable of sound models and send only the identity code to the decoder to resynthesize the closest-fit library model. As opposed to, for example, ADPCM.

**transformer:** A device consisting of two or more coils of wire wound on a common core of soft iron or other magnetically permeable material. The number of turns in one coil divided by the number of turns in the other one is called the *turns ratio*. An alternating voltage across one coil will appear across the other coil multiplied by the turns ratio.

**transformerless input:** On an audio device, an input which does not use a transformer for *impedance-matching*. Such inputs will make use of semiconductors such as transistors, and may be described as *active* inputs. Their main advantage is a saving in size, although some argue that they give better performance than transformers, the truth of the assertion probably depending most on the quality of the device, rather than its type.

**transient:** A non-*periodic* sound *waveform* or electrical signal. Any of the non-sustaining, non-periodic frequency components of a sound, usually of brief duration and higher amplitude than the sustaining components and contribute most to a sound's *timbre*. Transients usually occur near the onset of the sound such as the *attacks* of musical instruments, percussive sound, or speech consonants, which are called *attack transients*.

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**transient distortion:** This includes *transient intermodulation distortion* (TIM). The beginning and ending *transients* of musical sounds are largely what determine their *timbre*, rather than their *harmonic content*. An audio device which passes steady-state signals perfectly well may distort the loud, high-frequency transients, causing audible coloration of the music. Low transient distortion means a device must have a wide, linear *frequency response*, no *phase distortion*, and no *hangover*. TIM is caused by amplifier *slew-limiting* and is principally a problem in *solid-state* amplifiers that use large amounts of negative *feedback*.

**transient generator:** See *envelope generator*.

**transient response:** (1) The instantaneous change in an electronic circuit's output response when input circuit conditions suddenly change from one steady-state condition to another. (2) Accurate transient response is the reproduction of sound such that high-frequency and low-frequency sounds reach the listener's ear at the same time. See *time alignment*.

**transistor:** A type of *solid-state* device generally having three terminals called emitter, collector, and base, which has the property of letting current flow in one direction only, under the control of a biasing voltage present at the base. It is really an electronically operated switch, principally used where a gain increase is required, such as in amplifiers.

**transmitter:** A device for converting an audio and/or video signal into a modulated *carrier* wave which can be radiated by an antenna. By extension, any device generating output which is sent electronically to another location.

**transoncent:** Possessing the ability to freely transmit sound, analogous to transparent in reference to light, e.g., the grill cloth on a speaker must be transoncent.

**transport:** The mechanical portions of a tape recorder, including all parts that handle and guide the tape from the *feed reel*, past the *head stack*, and onto the *take-up reel*.

**transport control:** The buttons on a tape recorder, i.e., Play, Rewind, FF, Stop, etc. which control the movement of the tape within the unit. These controls may be duplicated on a remote unit. More elaborate controls may include an *autolocator*.

**transposition:** See *pitch-shift*.

**trap:** A *band-reject* filter designed to eliminate a particular frequency from a desired signal, e.g., a *bass trap*.

**treble:** (1) The upper end of the audio spectrum, usually given to be about 2kHz-20kHz. (2) A high voice or musical part equivalent to *soprano*, particularly a part sung by a boy. By extension, instruments which operate in a similar range may be prefixed by the term, e.g., treble recorder. The treble, or G, *clef* is the one with middle-C one *leger line* below the *stave*. See also *alto*, *baritone*, *bass*, and *tenor*.

**tre corde:** Italian for "three strings." Usually used in piano music to indicate the release of the *soft pedal*. This has the effect of returning the action to its normal position so that all of the strings available are struck. As opposed to *una corda*.

# T

**tremolo:** (1) A *periodic change in amplitude*, usually controlled by an *LFO*, with a periodicity of less than 20Hz. Compare with *vibrato*. (2) A MIDI Controller Change message which is assigned to the parameter in a *synthesizer* which alters the depth of the effect described in tremolo. More recently this message has been reassigned as one of the five generalized Effects Depth messages. See *effects control*. (3) Italian for “trembling.” A rapid reiteration of one or more notes, especially on string instruments.

**triad:** A three-note *chord* that is formed from any note of the *scale*, plus the note a *third* above it and the note a third above that. The lowest note is called the *root* (or root position), and the letter name of the root is used to identify the entire triad, e.g., the triad of C. In practice, the notes may be arranged in any order, although if the lowest note is no longer the root, the triad is said to be *inverted*. As either of the thirds can be either major or minor, four different types of triad are possible, as shown below. The most common are major triads (lower interval a major third) and minor triads (lower interval a minor third). It is important to note that these terms refer to the structure of the *interval* and not to *key*; major triads occur in minor keys, and vice-versa.



Four Types of Triads

**triamp:** Short for “triamplication.” A three-way *crossover network*.

**triangle wave:** A *periodic waveform* with a linear increase or decrease in amplitude, followed by a linear change in amplitude at the same rate but in the opposite direction. Triangle waves exhibit a strong *fundamental*, with weak, odd-numbered *harmonics*. Usually used for *vibrato synthesis*. See Appendix C.

**trigger:** An instantaneous voltage *pulse* generated from a *synthesizer* keyboard when any key is depressed. The trigger is used to initiate the action of some other device, such as an *envelope generator*. The most commonly encountered form of trigger is that generated by drum pads for electronic percussion devices.

**trigger sync:** A method for slaving a *DAW* to the *SMPTE timecode* from an *ATR*. The *DAW* initially will sync up to the timecode when starting play or record, but once started will use its internal clock. This feature is available on most *DAWs*. If you use a trigger sync when recording to the *DAW*, no two passes will correspond to the *ATR* exactly because of its speed variations. Tracks from separate passes will start together, but drift in and out of sync over time. This is acceptable for short segments, and in the *DAW*, a longer audio segment can be sliced up into smaller segments so that trigger sync is appropriate. As opposed to *continuous sync*.

**trill:** A rapid alternation between one note and the note one *half-step* above it, played in this manner for the notated duration of the note. Used as ornamentation to a musical idea. See *diminution*(3).

# T

**trim:** (1) Usually refers to a small adjustment, synonymous with *tweak*. (2) The attenuation control associated with the first stage of amplification in each module of a console, and by which the incoming level of a mic or line input can be lowered. Usually refers to the *trimpot* on each channel of a mixer used to adjust the incoming signal to set recording levels. (3) A short section of exposed film, *workprint*, or *magnetic film* track that has been cut out of a *take* and included in an *assembly* or *workprint*.

**trimpot:** A small pot whose setting is usually adjusted by a small screwdriver, designed to be adjusted only rarely and are used in sensitive circuits such as *equalizers* where they can be finely adjusted and left for long periods.

**triplet:** Three notes (or rests) executed in the time normally taken by two of the same value. See *tuplet*.

**tripole:** A type of *loudspeaker* design developed by M&K which is a combination of a *direct radiator* and a *bipole* speaker. These have been specifically designed for use with *surround-sound* systems.

**tritone:** An *interval* of three *whole-steps*, e.g., F to B.

**trombone gobble:** A classic sound effect developed by Warner Bros. to accompany a cartoon character being hit on the head.

**TRS:** Tip, Ring, and Sleeve. A type of *phone connector* found on patch cords for *balanced* audio connection and headphones. See also *TS*, *TT*.

**truss rod:** A metal bar within a guitar neck which is tensioned so as to counteract the tendency for the neck to bend under the tension of the strings.

**TS:** Tip and Sleeve. A type of *phone connector* found on patch cords for *unbalanced* audio connection and headphones. See also *TRS*, *TT*.

**truck:** The vehicle in which video recorders, audio mixers, and other equipment is installed for mobile productions. Normally, sound or video trucks are permanently wired with several record and playback decks, and have the capacity for adding extra machines when necessary. Lighting, mics, stands, and other equipment may also be carried in luggage compartments, so that one vehicle is a complete mobile video and/or audio recording studio.

**truncation:** Trimming extraneous material for a sample's *head* or *tail*.

**TT connector:** Tiny Telephone. TT connectors use miniature *phone connector* plugs with a 0.173" diameter. Due to their compactness and reliability, TTs are often used for professional mixer and outboard *patch bays* where a single patch bay may require hundreds of patch points in a limited space. The *TRS* versions of TT connectors are capable of handling *balanced line* signals and are preferred in pro audio installations. Also called a *bantam*. See *phone connector*.

**tube:** An electronic device which consists of various types of electrodes (anode, cathode, etc.) and a heating element, all contained in a vacuum. Its simplest form, the *diode*, is used as a *rectifier*. The triode is functionally similar to a *transistor*. Tubes are called *valves* in the UK.

**Tuchel connector:** Another name for a connector which is a *DIN*-standard connector.

# T

**Tune Request:** A System Common message which instructs a MIDI device to re-tune its oscillators. This was useful with analog oscillators which are prone to pitch drift, but is less useful with solid-state devices which generate signal based on an electronically generated clock pulse, and hence do not drift.

**tuning:** (1) The process of adjusting the frequency of a radio or television receiver to lock onto a transmitted signal. See *carrier*. (2) The process of adjusting the pitch of all or some notes on a musical instrument in order to conform with the pitch of other instruments and/or concert pitch. See also *beating*, *temperament*, *microtuning*.

**tuplet:** A generic term used by some sequencers for any non-standard subdivision of a beat or beats, derived from the suffix of quintuplet, septuplet, etc., but also encompassing *duplet* and *triplet*. See *time signature*.

**turd polishing:** General term, including film sound nomenclature, which describes either the process or the futility of making poor quality work acceptable.

**turnaround:** In a song or arrangement, the *measure* or measures in which one verse or chorus ends, leading into the next section. Also, the short instrumental or vocal lines that accomplish this transition.

**turnover:** See *adjustable turnover*.

**TVA:** Time-Variant Amplifier. The *amplitude* section of a synthesizer. Same as a VCA.

**tweak:** To make a fine adjustment.

**tweeter:** A loudspeaker designed to reproduce high frequencies.

**two-ended:** See *noise reduction*.

**two-pop:** See *sync pop*, *LFOP*.

**two-track:** A tape machine which records onto two tape tracks, used primarily for stereo mastering. See also *half track*, *four-track*.