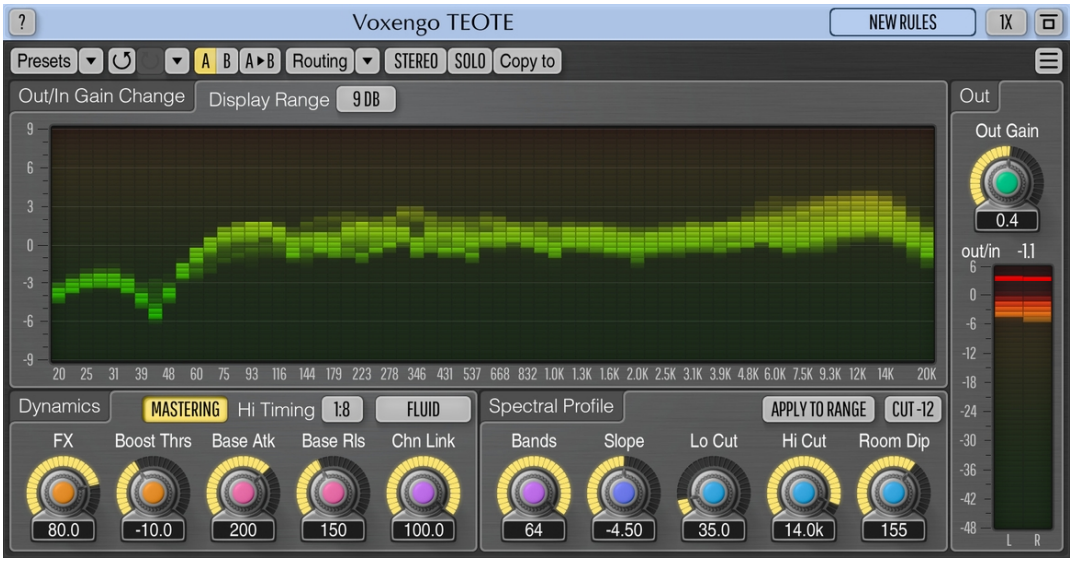
Voxengo TEOTE User Guide



Version 1.1

https://www.voxengo.com/product/teote/

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Introduction

TEOTE is an automatic spectral balancer plug-in for professional music production applications. It was designed to be a very useful tool for both mixing and mastering. It automatically performs such tasks like gentle resonances taming, de-essing, tilt equalizing, usually performed during mixing and mastering. In mixing, TEOTE sounds good on pretty much any material.

While by definition TEOTE is a dynamic equalizer, its technology is solely based on multi-band dynamics processing. This allows TEOTE to have only minor phase issues, and to produce a subtle transient-emphasis effect associated with dynamics processing. TEOTE tries to make the program material follow the specified spectral profile, tuned to the contemporary mastering standards by default. It can be said that TEOTE "straightens" the frequency response, making further adjustments a lot easier; it removes a lot of repeating work.

Is TEOTE an AI plug-in? In a sense that AI usually boils down to a "curve-fitting task", TEOTE is an AI plug-in that performs gain adjustment decisions in a quantity equal to "SampleRate multiplied by BandCount" per second. However, TEOTE does not use neural networks; it is based on an extremely-refined, completely predictable, curve-fitting function.

"TEOTE" is an acronym for "That's Easier On The Ear". TEOTE is a serious contender in helping bring your music production to the next level!

Features

- Automatic spectral balancing
- Selectable processing band count
- Unlinked stereo processing
- Multi-band gain adjustments meter
- Stereo and multi-channel processing
- Internal channel routing
- Channel grouping
- Up to 8x oversampling
- 64-bit floating point processing
- Preset manager
- Undo/redo history
- A/B comparisons
- Contextual hint messages
- All sample rates support
- Zero processing latency

Compatibility

This audio plug-in can be loaded into any audio host application that conforms to the AAX, AudioUnit, VST, or VST3 plug-in specification.

This plug-in is compatible with Windows (32- and 64-bit Windows XP, Vista, 7, 8, 10 and later versions, if not announced otherwise) and macOS (10.11 and later versions, if not announced otherwise, 64-bit Intel processor-based) computers (2.5 GHz dual-

core or faster processor with at least 4 GB of system RAM required). A separate binary distribution file is available for each target computer platform and audio plug-in specification.

User Interface Elements

Note: All Voxengo plug-ins feature a highly consistent user interface. Most interface elements (buttons, labels) located on the top of the user interface are the same in all Voxengo plug-ins. For an in-depth description of these and other standard features and user interface elements please refer to the "Voxengo Primary User Guide".

Dynamics

This panel contains parameters that affect plug-in's dynamic characteristics. Note that a threshold parameter is not required as this plug-in uses a weighted loudness estimation instead, similar to the one defined in the ITU-R BS.1770 specification. TEOTE estimates the momentary spectrum, and applies multi-band gain adjustments relative to the overall momentary loudness level.

The "FX" parameter specifies the "strength" of effect applied per band, when the input signal requires adjustments. This parameter is equivalent to a usual "Dry/Wet Mix" parameter. The required gain change solely depends on the program material relative to the "Spectral Profile" (see below), it is a parameter-less function.

The "Boost Thrs" (boost threshold) parameter specifies band's loudness level (relative to the overall loudness level) at which band's gain adjustment "stops" and returns to the unity gain. Tuning this parameter is required when working with a highly-dynamic or narrow-band program material so that both quiet parts and noise-floor are not over-boosted. Setting this parameter to "0" enables the "compression only" mode of operation, useful for narrow-band program material.

It may be useful to first test the maximal achievable gain change by setting the "FX" to the maximum, and the "Boost Thrs" to the minimum: if the gain change metering does not go above +/-4.5dB it means the program material already follows the spectral profile closely. If the gain change is too large, and rarely crosses zero, it may mean the program material still needs some basic preliminary processing, at least some tilt-like equalizing. After this test, both parameters may be set to less extreme values, to produce a more natural action. In this aspect, when bypassed, TEOTE can be used as a mixing and mastering equalization guide.

The "Base Atk" and "Base Rls" parameters specify dynamic adjustments' timing. These are similar to timing constants used in compressors and expanders. However, in TEOTE they specify times for the base (20 Hz) band, with higher bands receiving successively smaller timing constants, relative to the base (subject to the "Hi Timing" parameter). Depending on the "Hi Timing" parameter, 20kHz band may receive as little as 1/20 of the base band's timing values: that's a very fast compression/expanding action. Note that TEOTE uses the same dynamics algorithm as found in Voxengo Marquis Compressor's "New" mode, for both compression and expanding; it is a very natural-sounding algorithm. It may be useful to set the "Base Rls" to a value smaller than the "Base Atk", especially if it is apparent that the plug-in over-reacts on bass-drums. The balance between the "Base Atk" and "Base Rls" parameters affects the peak gain change, in tandem with the "FX" parameter.

The "Chn Link" parameter specifies the strength of linking between channels. In a fully unlinked mode (0) the plug-in adjusts all channels independently of each other; it also consumes a lot more CPU resources. Unlinked mode can skew the stereo-field information, and may not reach the overall spectral balance goals. In most cases, it is

suggested to leave this parameter at “100”, or close to “100”, as TEOTE does not affect the sound stage adversely anyway, due to its multi-band processing algorithm; lower values can be used to produce artistic sound stage coloration effects.

The “Energetic/Balanced/Controlled/Fluid/Fluid Stable/Fluid Punch” switch selects the overall loudness estimator’s response mode. This mode affects both the handling of transients, “stability of sound”, and overall sonic coloration of the result. While for an untrained ear the difference may not be large, for a trained ear it may be decisive. The difference is most apparent at lower “Base Atk” and “Base Rls” settings. The “Balanced” and “Controlled” modes offer “more instant” loudness estimations producing a minimal dynamic over-reaction, but they may sound a bit too controlled. The “Fluid” modes use a substantially different method of loudness estimation, they usually sound a lot gentler.

The “Mastering” switch enables the so called “Mastering mode” of dynamics processing. It offers a lot gentler gain adjustments, especially in the bass range, and usually reaches only ¾ of the gain of the non-mastering (feed-forward) mode, so it also requires the “FX” parameter fine-tuning. Technically speaking, it is a feedback dynamics mode, and only adds a single instruction to the processing topology; however, in practice this mode takes 80% more computing resources on some processors, and it may require lowering of the band count. This mode is best used on full-spectrum material that is initially close to the target spectral profile.

Spectral Profile

This panel displays knobs that control the target spectral profile that TEOTE makes program material follow. TEOTE balances the program material to this profile. Note that the plug-in does not apply any filters, so these knobs are not related to filtering of any kind. However, as the spectral profile acts as a reference, if the program material’s spectrum deviates from the profile, this may result in spectral adjustments that reflect the required spectral profile.

The provided set of profile parameters was designed for contemporary music mastering: this includes the “Slope” parameter which controls the target spectral slope, in decibel per octave, with -4.5dB being a de-facto standard in contemporary music. The “Lo Cut” and “Hi Cut” parameters apply -12 or -6 dB/oct roll-offs (depending on the “Cut -6”/“Cut -12” switch) to the profile: these can be also commonly found in contemporary music. The “Room Dip” parameter, though not being common, applies a -2.5dB, 1-octave wide, bell-shaped dip to the profile. Such dip accounts for usual listener room’s acoustics deficiency where the first offending room mode happens at 130-200 Hz, which makes the music sound a bit “mushy”. This dip can be disengaged by moving it to 20 Hz.

The “Bands” parameter adjusts the number of processing bands. This parameter affects both the precision of the processing and the CPU load requirements. For mastering it is suggested to set this parameter to a higher value while when processing the individual tracks, lower values can be used. At lower values, the “Lo Cut”, “Hi Cut” and “Room Dip” parameters may not be followed closely. The “Bands” values below 10 may produce a slight low- and high-frequency roll-off due to plug-in’s band-splitting design. The algorithm won’t be able to detect sharp resonances at lower “Bands” values; however, even at higher “Bands” values, TEOTE mostly performs smoothing of resonances rather than removes them completely.

The “Apply to Range” switch can be enabled if you would like to apply the effect to a selected range of frequencies only; in this case, the “Cut” parameters will be transformed into the “Range” parameters. If you would like to compare the “full spectrum” and “spectrum range only” performances, it’s suggested to use the “A/B comparison” feature of the plug-in.

As this plug-in only performs spectral balancing or normalization, it cannot create spectral content (except dynamics processing-associated harmonics, especially at lower frequencies). So, for example, if the program material generally lacks the higher frequency content, but mostly contains high-hat hits, they may be boosted considerably. While statistically the outcome will be balanced, compositionally it may sound like it’s filled with high-hat hits mostly. Similarly, this plug-in may not be immediately efficient on bass guitar (that lacks full-frequency content), but works well on vocals and drum buses. The “Lo Cut” and “High Cut” parameters can be used to reduce over-reaction on a lack of spectral content. Alternatively, the “Apply to Range” mode can be used on a narrow-band input signal.

Note that this plug-in uses analog-style band-splitting which produces a slightly non-even (+/-0.15dB) frequency response and induces a minor phase coloration (dependent on the “FX” parameter). In such a tremendously dynamic plug-in like TEOTE (which features a very fast response at higher frequencies) such approach is desirable in comparison to linear-phase band-splitting or dynamic equalization, which both may introduce transient artifacts. TEOTE uses the same band-splitting technology as Voxengo Soniformer plug-in, which is being used by engineers for more than a decade, without any objections to its sonic qualities.

More specifically, TEOTE, like Soniformer, changes the phase over the spectrum only minimally, while its dynamic adjustments do not change the phase by itself, but may induce harmonics. On the other hand, usual dynamic equalization may induce both phase/ringing and harmonics at the same time, depending on the EQ steepness and change timing. Moreover, in TEOTE, if you leave the “FX” parameter at e.g. “50”, it will be only 50% of full, initially minor, phase coloration. Plug-in’s full phase coloration is so small the full processed signal sounds well as just a mix with the dry signal (what the “FX” parameter does).

Level Meters

TEOTE features a multi-band gain adjustments meter, and the “Out” meter. The display range of the meter can be changed. Note that the gain adjustments meter displays integral per-band gain adjustments with 200-millisecond integration time. It may be beneficial to enable the “Density Mode” in the plug-in’s Settings window to have a somewhat more informative gain metering.

The “Out” meter shows plug-in’s master output level. You may take a look at the “out/in” indicator to see the average gain change taking place, which may be accounted for with the “Out Gain” knob.

In-Chain Position

This plug-in is best placed before the final clipper and/or mastering limiter, and after any equalizing and dynamics processing plug-ins. However, if the music style requires augmentation of certain frequency bands (e.g. 2.5-4kHz boost in metal music, or 80Hz, 1.5kHz, and 9kHz equal-loudness boosts), a plain equalizer can be

placed right after this plug-in: since TEOTE produces a somewhat balanced spectrum, post-equalizing it becomes an easy task. TEOTE is in no way a complete mastering solution: for best results, it may require a prior static tilt equalizing; preliminary dynamics processing is, however, less of a requirement, especially if individual tracks in a mix were also balanced with TEOTE.

It can be suggested to use a spectrum analyzer like Voxengo SPAN Plus, tuned to the required spectrum slope, with a longer averaging time, after TEOTE in the chain. Since TEOTE bases its multi-band gain adjustments on momentary spectrum, whose correlation to the integrated spectrum greatly depends on the program material and its dynamics, TEOTE may not always reach the target integrated spectral profile; in this case, a correction to the "Slope" parameter, or a preliminary tilt equalizing may be required.

To sum up, the most flexible plug-in chain looks like this:
EQ (preliminary) -> TEOTE (balancer, "straightener") -> EQ (profiling) -> Limiter.

The "profiling" EQ may be omitted if TEOTE's result sounds satisfying.

It is a common question, why TEOTE does not offer a way to define more elaborate profiles. The main reason they are not offered is because TEOTE is a multi-band processor; it is discrete relative to the required final EQ profile, and may not be precise towards required peak gains. Secondly, TEOTE is not "hard precise" in applying an integrated EQ profile as it is precise only relative to a momentary spectrum. Thirdly, fine-tuning a profile is as time-consuming as using an EQ, so there may not be any workflow-efficiency gains in such profiles.

Credits

DSP algorithms, internal signal routing code, user interface layout by Aleksey Vaneev.

Graphics user interface code by Vladimir Stolypko. Graphics elements by Vladimir Stolypko and Scott Kane.

This plug-in is implemented in multi-platform C++ code form and uses “zlib” compression library (written by Jean-loup Gailly and Mark Adler), “LZ4” compression library by Yann Collet, “base64” code by Jouni Malinen, filter design equations by Magnus Jonsson and Robert Bristow-Johnson, VST plug-in technology by Steinberg, AudioUnit plug-in SDK by Apple, Inc., AAX plug-in SDK by Avid Technology, Inc., Intel IPP and run-time library by Intel Corporation (used under the corresponding licenses granted by these parties).

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Happy Mixing and Mastering!