

TOKYO DAWN LABS

TDR Feedback Compressor – Manual

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CONCEPT

The TDR Feedback Compressor is dedicated to sum/bus compression and is the result of an intensive study around the musical behavior of the feed-back compressor topology. Most modern compressors analyze the input signal to control gain reduction. The feed-back compressor design however “listens” to its output. This non-intuitive approach delivers an unobtrusive and highly musical compression characteristic that is able to handle complex signals with ease (more about this in the “Feed-back compression” chapter).



These unique characteristics were combined with a minimalistic audio-path and state of the art digital signal processing techniques. The compressor is carefully tuned for intuitive and musical operation. We want to emphasize the fact that the processor neither tries to emulate any previously available device, nor does it follow popular trends like “virtual analogue”, “vintage” or similar buzz terms. This is a proud digital processor, made with an immense amount of love and care.

Beside the inherent “feed-back” behavior, the processor comes with an array of unusual features and great flexibility. The most notable is probably the unusual two-stage release timing controls, a generous transfer function display and metering section, as well as mastering optimized side-chain filters.

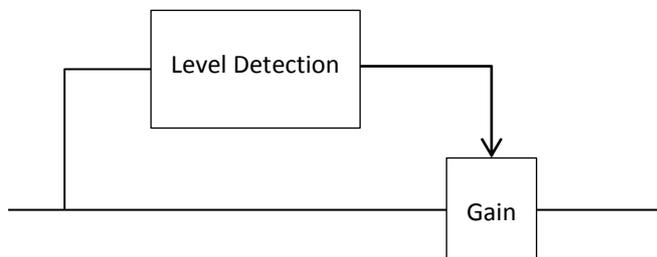
Although the compressor was specifically designed for stereo bus operation, it will also work well with individual sound source such as drums and vocals.

The following pages mostly cover the advanced features of the processor, the reader is expected to have practical experience with the matter.

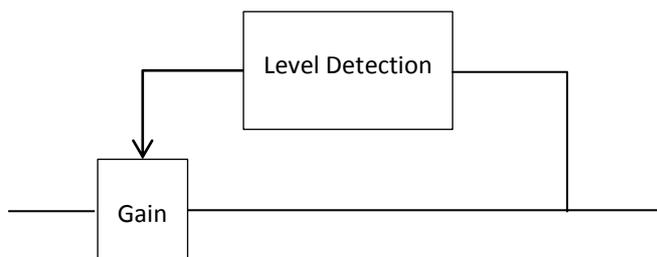


FEED-BACK COMPRESSION

Dynamic range compression in the digital domain can be accomplished in several ways. The most straight forward approach is the idea to detect the input level and use the signal to control an amplifier.



This kind of control structure is called "feed-forward" and it works as expected. The device analyzes the input and reduces gain accordingly. Most modern compressors are built this way. However, a similar behavior can also be achieved by feeding the detector with the output of the compressor:



In this case, the detector detects to the output level of the compressor. That is, the compressor listens to what "he has done". This interesting variation is well established in the analogue domain mostly due its better cost efficiency and restrictions of certain circuit types.

From the technical point of view, the feed-back structure has several disadvantages. It's much more difficult to control, distortion is significantly higher and compression dependent "by design". It has difficulty to achieve higher ratios than ~3:1, the maximum amount of gain reduction is limited too.

On the other hand, the feed-back approach has some musically related advantages: Most of all a very natural compression behavior and interesting distortion pattern. The compression timing and ratio is program dependent and seems to naturally adapt to most sources quickly. No complicated tweaking required, the compressor sounds fine in most situations. This is the route we took with this project.



CONTROLS AND DISPLAYS

All knobs and range display controls can be fine-tuned via “SHIFT” + Left Mouse. “CONTROL” key + Left Mouse re-sets the control to its default value.

THRESHOLD, KNEE AND RATIO



Threshold defines above which level the compressor begins to compress the signal. The lower the threshold, the deeper the compressor “grabs” the signal.

Knee adjusts the threshold transition “softness”. Lower knee values create a sharp transition at the threshold point, while higher knee values will compress more gradually.

Ratio control defines “how strong” the signal will be compressed above threshold. The range of the ratio control is continuous between 1:1 and 3:1 and offers two additional “turbo charged” ratios 4:1 and 8:1.

[i] Soft knee reduces the effective threshold.

[i] The threshold affects compression based on the compressor's output level, not the input level. The higher the compression, the lower the detection signal will be. You can easily observe this detail with the SC meter (side-chain level meter). That means the threshold effectively “rides” on the signal instead of accurately tracking its overloads.

MAKEUP GAIN



Make-up gain is used to compensate the gain-reduction introduced by the compressor. The make-up control can also attenuate the compressed signal up to 60dB which is useful for parallel compression techniques.

[i] The TDR Feedback Compressor doesn't provide overload protection. Since nearly all mastering scenarios involve a brick-wall limiter at a later point of the chain, we decided to not include such a feature.

DRY MIX

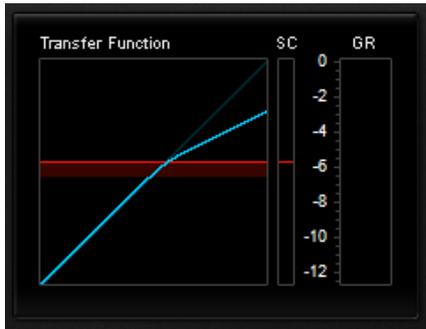


“Dry Mix” blends the original signal into the processed (i.e. compressed) part. It enables the use of parallel compression techniques (upward compression, “NY compression”) without the complicated routings and latency compensation inside the DAW.

Note that the “Transfer Function” display properly reflects the results of the parallel mix on the compressor's transfer function.



TRANSFER FUNCTION, SC AND GR DISPLAY



“Transfer Function” shows the current in/out gain transfer function of the compressor. The threshold is indicated by the red line. The soft knee region appears in dark red.

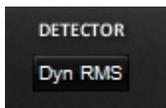
“SC” shows the current level in both (internal) detectors. White = fast detector, blue = slow detector.

“GR” shows the current gain reduction applied to the signal. An additional slowly decaying reduction amount is shown in dark blue. The scale range can be switched by clicking the scale or meter area. A

red marker appears at the bottom of the reduction bar in case the reduction amount doesn't fit inside the current scale.

All values are displayed in the dB range. Both the transfer function display and the SC level-meter cover a range between 0dB and -65dB.

DETECTOR



The TDR Feedback Compressor supports three different detector modes. The choice of the detector affects the whole compression behavior and should be chosen wisely. Adjustable via click and drag.

- **PEAK**
Very fast peak detection. This mode accurately tracks the absolute level of the side-chain signal and thus creates the most aggressive (i.e. distorted) results. Peak detection is most useful for “fast” and dynamic sources such as drums and is not recommended for complex material.
- **RMS**
This mode smoothly “listens” to the average level of the side-chain. The smoothing size is adjustable between 0.1ms (very fast) to 60ms (super smooth). Typical values range from 5ms to 25ms.
- **Dyn RMS**
The dynamic RMS mode detects the side-chain with an adaptive smoothing size. This mode works fine for most tasks and should be chosen *if you don't know better*.

SIDE-CHAIN FILTER



The side-chain filter allows to reduce the compressors sensitivity for low frequencies. That is, the compression threshold becomes frequency dependent and thus less responsive to low frequency content. Two different filter modes are supported, a 6dB/Oct high-pass filter and an exotic 3dB/Oct high pass approximation. The latter has the nice ability to nicely equalize the typical pink noise frequency distribution typically found in most music signals, the result is a very transparent compression behavior.

Both filter modes are parametric; the cutoff can be set between 30Hz to 300Hz.

[i] “Off” is a valid alternative, too! Some users reported a nice results when compressing bass-guitars with disabled SC filter.



ATTACK



Attack time controls the speed of gain reduction, i.e. how long the compressor takes to reach full gain reduction. Fast attack times quickly respond to level changes in the side-chain. Slow attack times on the other hand respond smoothly and let small event pass through the compressor without reduction.

We recommend attack values between 5ms and 50ms for complex input such as mixes. Faster values are more suited to tracking purposes and individual instruments.

RELEASE FAST/SLOW

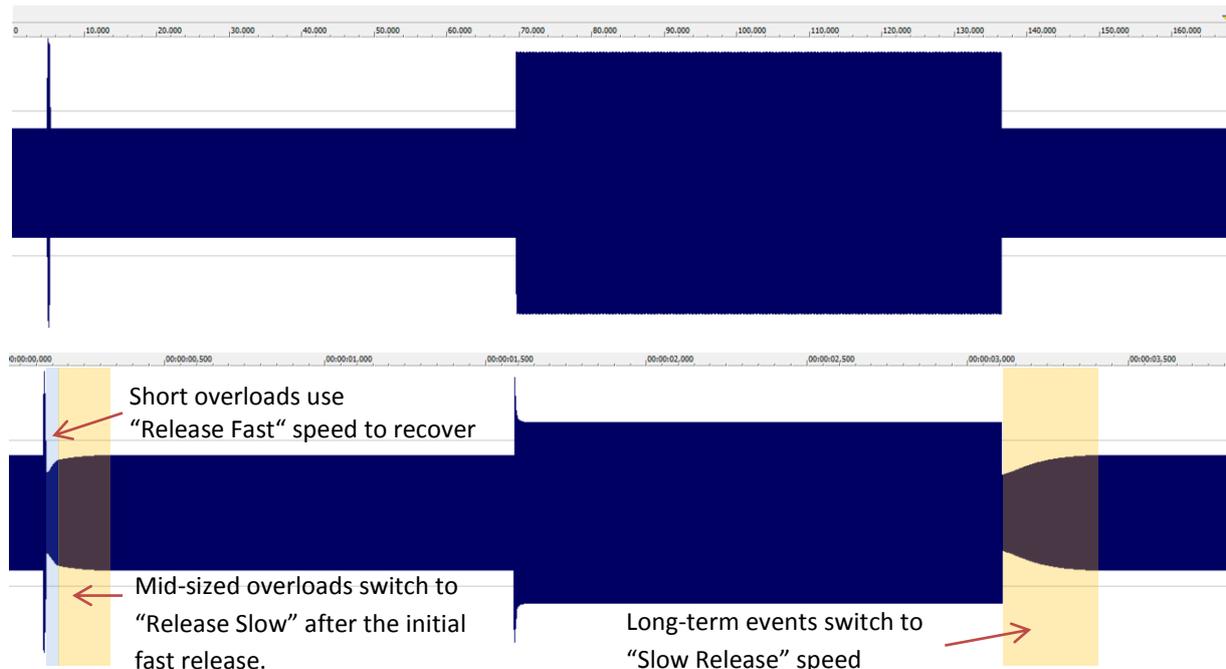


The timing section differs slightly from the typical layout found on most compressors. The TDR Feedback Compressor can dynamically select the most suitable release “path” depending on the program material. Two LEDs indicate the currently active release controls.

“Release Fast” defines how quickly gain recovers after short overloads (i.e. fast transients). “Release Slow” defines how fast gain recovers sustained tones and other “steady-state” content.

Note that “Release Slow” is automatically disabled if set faster than “Release Fast”, that is, the compressor will act like a standard compressor and only use the “Release Fast” settings.

The following images show a test-signal before and after compression. It consists of one short event (such as a snare), a long term event and some “background noise” in order to make the effect more visible. As you can see, the reduction triggered by the short overload recovers much faster than the reduction caused by the second overload:



Two release paths offer a wide range of musically useful options. For example, single drum peaks can be allowed to recover quickly to avoid “dulling” and “breathing” side-effects. At the same time, sustained content like bass-lines or synth pads can recover slower and thus strongly reduce typical side-effects like “pumping” and distortion.

We recommend “Release Fast” value between 25-200ms and “Release Slow” to values above 200ms for complex content such as mixes. Slower values may be useful for particularly dynamic material like drum solos, bongos and acapellas.

The “Release Slow” path is automatically disabled if the release time is set slower than “Release Fast”. In other words, the algorithm “falls back” to a single stage release and will behave much like a common one-stage release compressor.

[i] Due to the feed-back structure, the effective reduction and recovery speed will depend on program material, Ratio and Knee settings. This is the reason why the controls behave differently that in common feed-forward compressor.

[i] The compressor offers access to a wide-range of attack and release times. To avoid unpleasant distortion during low frequency events, make sure to keep the sum of attack and release time above ~100ms.

LOW COLOR



Low color adds harmonics to low frequency content before compression. The effect amount is adjustable via click and drag.

HIGH COLOR



Adds high frequency harmonics before compression. The total effect amount is adjustable via click and drag.

SIDE-CHAIN PREVIEW



Preview the side-chain filter.

DELTA



Listen to the difference between the original signal and the compressed signal. This is best described as “*what the compressors actually does*” and is very useful to get a better understanding how different settings affect the original signal.

BYPASS



Bypasses the whole processor. Processor latency is accurately compensated and the actual processing is never interrupted for better comparison.



PRESETS AND USAGE TIPS

Downward Comp. Reset

Compressor full reset.

Upward Comp. Reset

Upward/Parallel Compression full reset. Use “Makeup” to mix the compressed signal into the original.

Mastering: Smooth

Example of very smooth and transparent “glue” compression.

Mastering: Tight

Example of moderate stereo bus compression.

Mastering: Aggressive

Example of aggressive, yet well controlled compression.

Mastering: Upward

Example of subtle upward compression.

Leveler

Example of a typical “Leveler” compression setting. Both attack and release are set very slow, the setting is meant to keep long term dynamics under control for mix-tape or live-recording.

Classic Compressor I & II

Classic, one stage release compression examples.

FREQUENTLY ASKED QUESTIONS

How can I recreate the sound of the previous version (before 0.9.0)?

Set the detector to “Dyn RMS” and disable “Slow Release” (turn it full left).

Can I do “NY Compression” with this compressor?

Yes. This is exactly what the “Dry Gain” control is meant for. “Makeup” and “Dry Mix” essentially work like a 2-channel mixing-desk.

How can I do upward compression as described in Bob Katz’ book?

Turn “Makeup” full left and “Dry Mix” full right. Set “Threshold” very low, chose a fast attack time (2-5ms) and moderate release settings. You can now mix the compressed signal into the original with the “Makeup” control.

The compressor doesn’t really reduce the maximum peaks of my track, isn’t it meant to reduce the dynamic range and avoid clipping?

You are right and wrong. The idea that conventional compressors protect from overloads is a wide-spread misconception. The TDR Feedback Compressor, much like most other conventional dynamic range compressors act too slow this task. Instead, it is designed to compress the average level of the incoming signal without taking out the “life” of the musical content.



TECHNICAL SPECIFICATIONS

VST version:	2.4
Available binaries:	32bit and 64bit
Input / Output resolution:	32bit and 64bit (if supported by host)
Latency:	151 samples (for all sample-rates)
Supported sample-rates:	From 44.1kHz to 192kHz
Channels:	Stereo

GET IN TOUCH!

Ideas? Bugs? Improvements? We want to hear your feedback! You can easily reach us via one of the websites below.

Check out the Tokyo Dawn Labs website for feedback, news, updates and downloads:

<http://www.tokyodawn.net/tokyo-dawn-labs/>

You can also directly head to the TDR Feedback Compressor page:

<http://www.tokyodawn.net/tdr-feedback-compressor/>

Tokyo Dawn Labs is closely affiliated to Tokyo Dawn Records, so make sure to check out their artists and releases!

<http://www.tokyodawn.net>

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