Comparative Testing

UrsaDSP Boost is a dynamics management plugin which allows close control of overall volume level whilst maximising clarity by minimising harmonic distortion using a novel algorithm, designed to overcome some of the limitations of traditional compressor-limiters.

Boost's Trajectory technology measures a signal's continuous peak level whilst Peak Remapping applies a maximal amount of gain without breaching the Output ceiling, as set in the plugin.

To evaluate the performance of the methods implemented in Boost, we formulated some tests with links to real world scenarios and compared the results from Boost and two other dynamics plugins: a DAW 'stock' compressor plugin and an industry-standard maximizer. We encourage you to do the same in order to rate Boost's transparency for yourself.

50Hz Tone Test

Whilst simple to describe, a single 50Hz test tone presents challenges to a classic limiter - the relatively long gap between maxima in the sine wave can be misdetected as changes in peak level. Any incorrectly fluctuating peak level will cause the limiter to modulate the incoming sound in a way comparable to ring modulation. This modulation is a cause of harmonic distortion.

Whilst a little harmonic distortion can be acceptable and may even sound pleasant at the right times, it is preferable to apply this separately from the overall volume level using a specifically chosen control or effect.

To test for this modulation and harmonic distortion, we set up three tools with settings that provided similar gain reduction, and tested their output when fed a 50Hz sine wave.

We set Boost up in a way intended to match or exceed the values for the other test candidates (e.g. same or lower attack and release settings). We use the maximum setting on the maoin boost knob and we are also driving the input signal to ensure that it is being forced into limiter mode. We use relatively short Attack and Release settings (10ms Attack / 18ms Release). While these are shorter than those recommended for bass notes or mastering, Boost did not introduce any measurable harmonics.

Test setup

We set Boost up in an aggressive way intended to match or exceed the values for the other test candidates. We use the maximum boost setting and we are also driving the input signal to ensure that it is being forced into limiter mode. We are use aggressive attack and release settings (10 / 18ms) whilst these are shorter than those recommended for bass notes or mastering Boost performs flawlessly with no introduced harmonics.

For the Maximiser, we are using a well-regarded Industry standard mastering maximiser / limiter. The plugin has been set up to increase the signal to a point where it would provide more boost than the available headroom. e.g. so it is not simply increasing the volume like the mix slider could. We have also set it to use a release setting of 18ms as this created less distortion than other settings available from the plugin.

For the Compressor we are using a simple compressor that is included with the excellent Reaper DAW, we have chosen this compressor because it does not make any claims about adding colour. It has been set up with 10ms Attack, 18 ms release and 10ms pre-comp. We are using a 1:infinity ratio although the output is very similar for all scenarios above 1:1.5 ratio.

Test Results

In this test, both the Maximiser and the Compressor show a number of bands of frequency distortion.

For the maximiser, the loudest band of distortion is at -53dB, 37dB below the output.

For the Compressor, the loudest band is at a similar level to the loudest from the maximiser, but as the output is not as high this shows more distortion relative to the level of the signal. However, there are fewer other bands and they are at a lower level.

Boost however introduces no measurable distortion

A single 50Hz test tone whilst simple to describe does present some challenges, it is possible that the other plugins are interpreting the relatively long gap between maxima in the sine wave as changes in peak level.
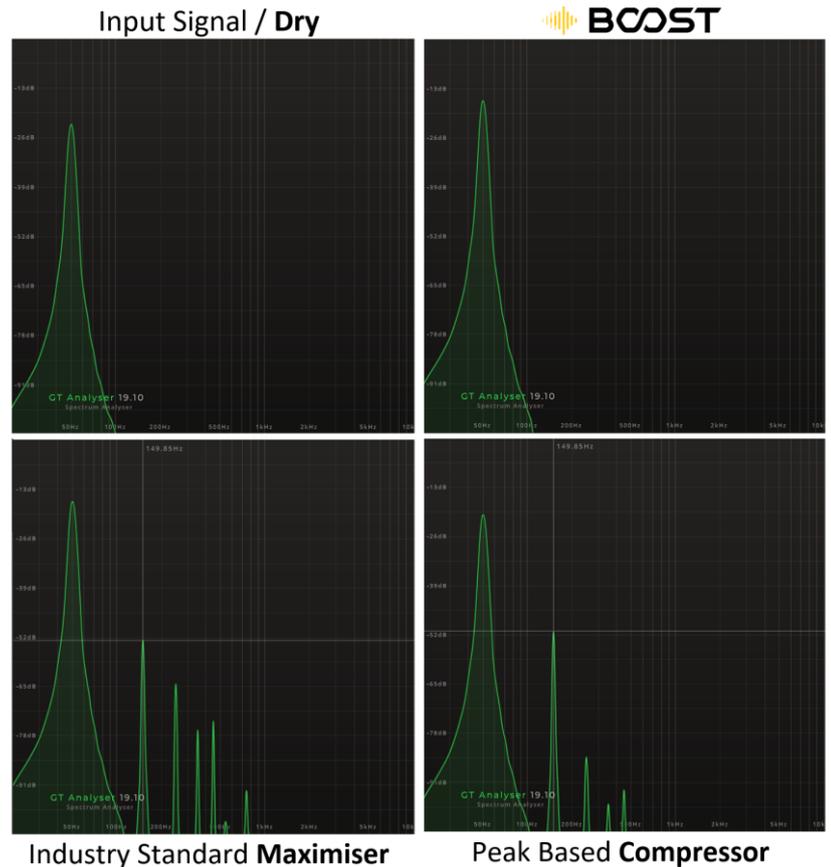

Figure 1 - 50Hz Test Results

50Hz + 820Hz Intermodulation Distortion Test

As music is a much more complex set of frequencies than the first test, this test aims to explore what happens when multiple frequencies are introduced. The (somewhat unusual) frequency of 820Hz has been chosen as it is not a clear multiple of 50Hz. The interaction between these frequencies causes a signal that only repeats 10 times a second. Put another way, it would be possible to describe the resultant waveform as a signal that is repeating at 10Hz. Typical music contains these patterns which can appear as beating e.g. in a synth using unison or as other higher frequency interaction. These emergent signals can trigger similar problems to those described in the first test.

The setup of the plugins is the same as in the previous test, we are again running Boost at the relatively low 10ms attack setting. Note that we would typically recommend that Boost is run using a 40ms lookahead for mastering usecases.

Figure 2- Intermodulation Test Results

At these settings, Boost's first band of distortion is at -82dB giving 57dB of clearance from the primary peak.The maximizer has a peak again at -53dB, however as the main signal frequency is now just under -25dB this means it only has 27dB clearance between the signal and the noise.

The Compressor has a much lower first peak and fewer other bands. This is typical of other compressors too. The reason for this is that compressors are not making any guarantees about the maximum loudness and may exceed 0dBFS. Note that the primary peak is lower for the compressor than the maximizer or Boost.

Unlike character compressors, Boost is trying to avoid leaking transients, and so the Attack is the same as Lookahead.

Having the Trajectory algorithm detect transients before they arrive is key to Boost's transparency.

Note: Lookahead should be chosen relative to the lowest signal in your music. 40ms is recommended as it allows for signals right down to infrasound which can emerge when sub bass tones interact.

The result of the 40ms setting for lookahead can be seen on the right.

Figure 3- Intermodulation Result, with Boost at recommended settings of 40ms look ahead

Summary

During mastering, it is possible to increase levels without adding unwanted colouration. With its unique technology, Boost does not introduce any harmonic distortion operating transparently whilst maximising volume and never exceeding 0dBFS.

We are immensely proud of the capabilities and quality of Boost. However we'd love you to do your own tests and draw your own conclusions as there are some amazing tools out there and in the world of mastering. It's to this end that we offer a demo period for you to try it out.

In short, we are all standing on the shoulders of giants and each of us take turns to reach new heights. UrsaDSP Boost offers the highest possible quality and at a price that aims to make it accessible to all producers.

Testing Notes

For the maximizer, we are using a well-regarded Industry standard mastering maximiser/limiter. The plugin has been set up to increase the signal to a point where it would provide more boost than the available headroom, so it is not simply increasing the gain like a mixer slider. We have also set it to use a release setting of 18ms as this created less distortion than other settings available from the plugin.

For the Compressor we are using a simple compressor that is included with the excellent Reaper DAW, we have chosen this compressor because it does not make any claims about adding colour. Similarly, it has been set up with 10ms Attack, 18ms Release and 10ms pre-comp. We are using a 1:infinity ratio although the output is very similar for all scenarios above 1:1.5 ratio.