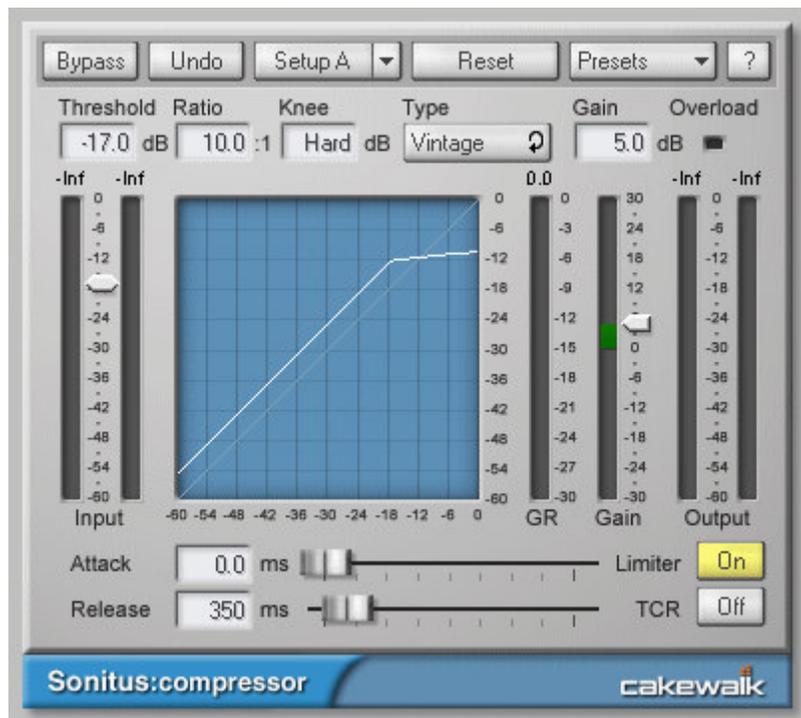


[www.ethanwiner.com](http://www.ethanwiner.com) - since 1997

Home & Contact	Audio & Music Bio	Programming	Wisdoms & Quotes	Funny Names
Magazine Articles	Cello Page	Ethan's Tunes	Oxymorons	Family Photos

## Compressors and Limiters



A compressor or limiter is an automatic volume control that reduces the volume when the input gets too loud. Originally they were used to prevent AM radio transmitters from distorting if the announcer got too close to the microphone, and to keep volume levels consistent. Then some creative folks discovered that a compressor can sound cool as an effect on voices and musical instruments.

The primary controls on a compressor are:

**Threshold** - also called ceiling - This sets the point at which the automatic volume reduction kicks in. Below that volume the compressor does nothing. When the input gets above that level,

the compressor reduces the volume automatically to keep the signal from getting much louder.

**Attack time** - This is how quickly the volume is reduced once the input exceeds the threshold. If it's too slow, then a short burst of loud music can get through and possibly cause distortion. So when using a compressor as a tool to prevent overload you generally want a very fast attack time. But when used on an electric bass to get a little more punch, 20-50 milliseconds is often good because that lets a little burst of the attack get through before the volume is reduced. So each note has a little extra "definition" but without the full length of the note being too loud.

**Release time** - This determines how quickly the volume comes back up when the input is no longer above the threshold. If it's too fast you'll hear the volume as it goes up and down. That sound is called "pumping" or "breathing." Sometimes this sound is desirable for adding presence to vocals, drums, and other instruments, but often it is not wanted. The best setting depends on whether you're using the compressor as a tool to prevent overloading, or as an effect to create a cool sound or add more sustain to an instrument. If you don't want to hear the compressor work, set the release time fairly long - one second or more. If you want an "aggressive" sound use a shorter release time. Note that as the release time is made shorter, distortion increases at low frequencies. This is often used by audio engineers as an intentional effect.

**Compression ratio** - This dictates how much the volume is reduced versus how far above the threshold the signal is. A ratio of 1:1 does nothing. 2:1 means if the input rises to 2 dB above the threshold, the compressor will reduce the level by only 1 dB so the output will now be 1 dB louder. 10:1 means the signal must be 10 dB above the threshold for the output to increase by 1 dB.

When a compressor is used with a high ratio - say, 5:1 or greater - it is considered a limiter. In fact, the compression ratio is the only distinction between a compressor and a limiter.

**Makeup Gain** - since a compressor can only reduce the volume when the incoming signal is too high, the Makeup Gain (output volume) control lets you bring the compressed audio back up to an acceptable level.

Some compressors also have a **Knee** setting, which affects only signals that are right around the threshold level. With a "hard knee" setting, signals below the threshold are not compressed at all, and as soon as they exceed the threshold the gain suddenly starts being reduced by exactly the amount that the ratio dictates. A "soft knee" setting works a bit differently. As the signal level approaches the threshold it's reduced in level slightly, and the reduction gradually increases until the level crosses the threshold. The compression does not use the full value set by the ratio until it's slightly above the threshold.

Besides serving as an automatic volume control, a compressor can also make notes sustain longer. To increase a note's sustain requires raising the volume of a note as it fades out. That is, making the trailing part of a note louder to counter its natural fadeout is what makes it seem to sustain more. To do this with a compressor you'll set the threshold low enough that the volume is reduced most of the time. Then as the note fades the compressor reduces the volume less, which is the same thing as raising the volume. For example, when you play a note on an electric bass the compressor immediately reduces the volume by, say, 10 dB because the start of the note exceeds the threshold by 10 dB. You don't hear the volume be reduced because it happens so quickly. But as the note fades over time, the compressor raises the volume which gives the effect of adding sustain. Also experiment with the release time to control the strength of the effect.

**Putting it to Use** - First, determine *why* or even *if* you need to compress. Every track or complete mix does not need compression!

Start by setting the threshold to maximum (too high to do anything), the attack to the fastest setting, and the release to between half a second and one second or so. Then set the ratio to 3:1 or greater. That's the basic setup.

Let's say you want to reduce occasional too-loud passages on a vocal track, or tame a few overly loud kick drum hits. While the track plays, gradually lower the threshold until the Gain Reduction meter shows the level is reduced by 2-6 dB at those loud parts. How much gain reduction you want depends on how much too loud those passages are.

If you want to add sustain to an electric bass track, use a higher ratio so you get more compression in general, then lower the threshold until the Gain Reduction meter shows 6 or more dB reduction. In all cases you adjust the threshold to establish the amount of compression, then use the Makeup Gain to restore the now-softer output level. Watching the Gain Reduction meter is the key to knowing how much you're compressing.

**And finally** - As useful as compressors are, I pretty much stopped using them a few years ago. Now I use volume envelopes in Sonar as needed to raise soft syllables or lower too-loud parts. Programming volume changes manually rarely takes longer than finding the right compressor settings, and of course you can change the volume envelope any time in the future. The big advantage of avoiding a compressor is to not add pumping and breathing sounds. These days the only things I compress - and always after recording, non-destructively - are acoustic guitar and electric bass if they need a little more sustain as an effect.

**[Boost Classroom Acoustics](#)**

Give Every Child a Front Row Seat. Amplify the Teacher's Voice.

[GoFrontRow.com](#)

**[Harris Institute](#)**

Audio Production Program (APP) and Arts Management Program (AMP)

[harrisinstitute.com](#)

**[BlackLionAudio Compressor](#)**

2 channel diode compressor limiter full transformer input and output

[www.blacklionaudio.com](#)

**[Infrasonic Sound](#)**

L.A. boutique recording studio, Vinyl and CD mastering facility

[www.infrasonicsound.com](#)

AdChoices 

---

Entire contents Copyright © 2004 by Ethan Winer, all rights reserved.