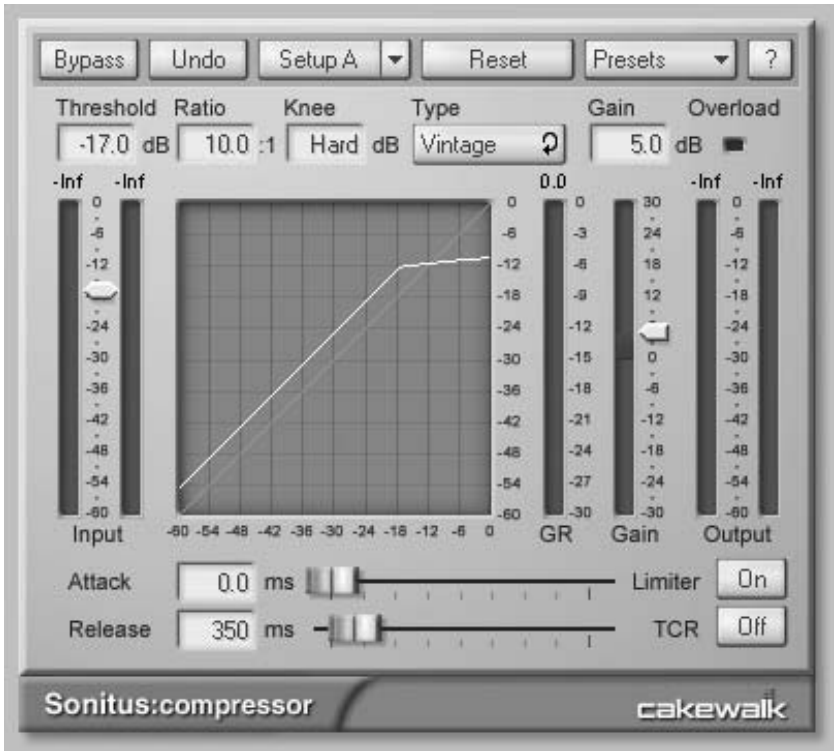
Compressor - Limiter

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.

Noise gate

In audio, noise gating reduces steady noise sources such as rumble from LP records, hiss from audio tape, static from a radio or amplifier, and hum from a power system, without greatly affecting the source sound. An audio signal such as music or speech is broken up into many frequency bands by a collection of overlapping band-pass filters, and if the signal amplitude in any one band is lower than a preset threshold then that band is eliminated from the final sound. This greatly reduces perceptible background noise because only the frequency components of the noise that are within the gated passbands survive.