

# Basic Compression Terms

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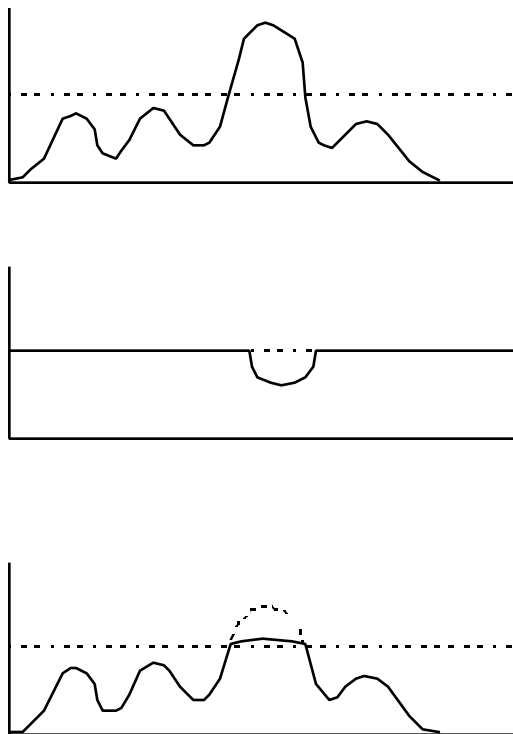
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Signal Processing

## Introduction

Compressors are often difficult to grasp for beginning musicians and engineers. Where an effect like pitch shifting or delay is easy to hear, compression often performs subtle changes on a signal and can be more difficult to learn. This tech note is designed as an expanded glossary which shows what the controls on the compressor's front panel are doing to the input signal.

## Threshold

The THRESHOLD knob sets the level where compression will begin. As long as the input signal level is below the Threshold level, the NanoCompressor will do nothing to the signal. Once the input signal crosses the Threshold, the compressor will begin compressing at a ratio set by the ratio control.



[Graphic: NanoCompressor: Knee/Thresh (p.17,18)]

In the diagram above, Figure (a.) shows the input signal to the NanoCompressor. In this example the compressor Threshold is set for -10dB and the Ratio is set for 4:1. When the third peak of the input signal crosses the Threshold, the NanoCompressor starts to reduce the signal level, as shown in Figure (b.). Figure (c.) shows the output signal level, with the original signal shown with a dotted line.

## Ratio

The RATIO knob controls the amount of compression which will happen once the input signal crosses the Threshold level, described above. Ratio controls how much the input signal will be reduced as a ratio of the input signal level. For example, if the compression ratio is set for 6:1, the input signal will have to cross the threshold by 6 dB for the output level to increase by 1dB. The maximum setting is typically labeled  $\infty:1$  (Infinity to 1), and is also called Limiting. This means that the input signal won't go above the threshold at all.

## Attack

The ATTACK knob controls the amount of time before compression starts. The range of this control is 0.1 to 200 milliseconds. The Attack and Release controls may only function when the compressor is in Peak mode. Long attacks are useful for percussive sounds, where shorter attacks are good for melodic parts like vocals and strings. The Attack control is also useful for keeping the transients on percussive drum or bass sounds. Experiment with different short attack times on snare drums to get more or less of the “stick” attack.

## Release

The RELEASE knob controls the amount of time the compressor takes to stop compressing after the signal crosses under the threshold. The range of this control is 50ms to 3 seconds. The Attack and Release controls may only function when the compressor is in Peak mode. Short release times are good for percussive, punchy sounds, where longer release times can make compression less obvious on vocals. Adjusting the release time may be necessary when using extreme compression and “pumping” or “breathing” is audible, or if lower level signals after peaks are getting lost. (See also the tech note on [Pumping and Breathing](#).)

## Output

The OUTPUT knob controls the level of the NanoCompressor’s output. The Output control is useful for making up gain which was reduced by the compression circuit or matching the input level of a mixer or recorder. If the Gain Reduction meter shows that the input signal is being attenuated by -6dB, then the Output control generally should be set around +6dB. The [OUTPUT] knob is labeled with tick marks every 6 dB ( $\pm 6, 12, 18, 24\text{dB}$ ). This control is disabled if the [BYPASS] button is pressed.

## Hard/Soft

The [HARD/SOFT] switch is used to switch between Hard and Soft knee compression styles. When the NanoCompressor is set for Hard knee, the compression ratio applies only to signals above the threshold level. If the NanoCompressor is set for Soft knee, the compression ratio gradually increases from 1:1 to the currently selected ratio over a range of approximately 5 dB, so that the transition from uncompressed to compressed is more gradual. The difference between Hard Knee and Soft Knee is more obvious at high compression ratios. Once the input signal crosses the Threshold, the unit will compress the signal at the full ratio level.



[Graphic: NanoCompressor: Knee/Thresh (p.17,18)]

Soft knee compression is useful when performing high-ratio compression or limiting on a signal. When the compression gradually fades in, it doesn’t sound as obtrusive as when it suddenly starts limiting the signal. If you’re looking for a “brick wall” limiter, the switch should be set for Hard knee to stop any transients from slipping through without affecting lower level signals. Lower Ratio levels may require a hard knee setting so that the compression slope isn’t too narrow and you lose some of the compressive “punch”.

## Peak/RMS

This switch selects either the Peak or RMS compression style, which affects the detection of the signal input. When set for Peak, the compressor is looking for peaks in the input level. For example, if your tape recorder overloads every time the kick drum hits, you can use Peak limiting to keep the kick from peaking above the rest of the music.

RMS compression works by detecting a signal’s *average* level, much like our ears adjust to loud or soft sounds. In RMS mode, your source can have more of a dynamic, transparent sound (because short peaks don’t clamp down the overall level) but still be prevented from getting too loud.

Generally, if you’re trying to raise the apparent volume of the track for radio or mixdown, use **RMS** compression. If you’re trying to stop peaks from distorting your tape recorder or amplifier, use **Peak** mode.

[Keywords: threshold, ratio, attack, release, peak, rms, hard, soft, knee, compressor]  
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