

Dynamics

Dynamics processors automatically adjust volume on a moment-by-moment basis, altering the **dynamic range** (difference between soft and loud).

When the volume level crosses a **threshold** level, the processor adjusts the volume.

Dynamic processor types:

- **Limiter** - limits volume to the threshold level
- **Compressor** - scales down volume when it's above threshold, reducing dynamic range
- **Gate** - mutes sound when volume is below threshold
- **Expander** - scales down volume when it's below threshold, expanding dynamic range

Gate

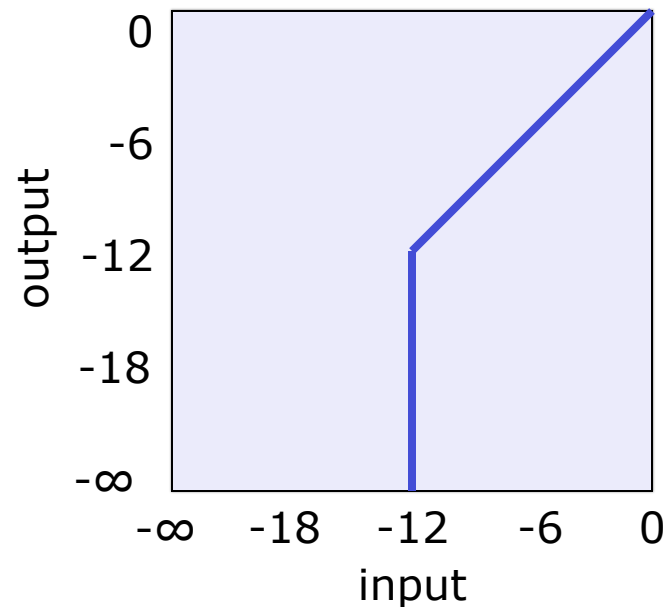
Gate mutes sound below the *threshold* level. Often used as a crude noise suppressor.

Example:

For a threshold of -12 dB ...

when input is above -12 dB, input flows through gate;
when input is below -12 dB, gate blocks input.

A **transfer function** graph shows relationship between input and output levels.



Envelopes

All dynamics processors have an **attack time** and a **release time**.

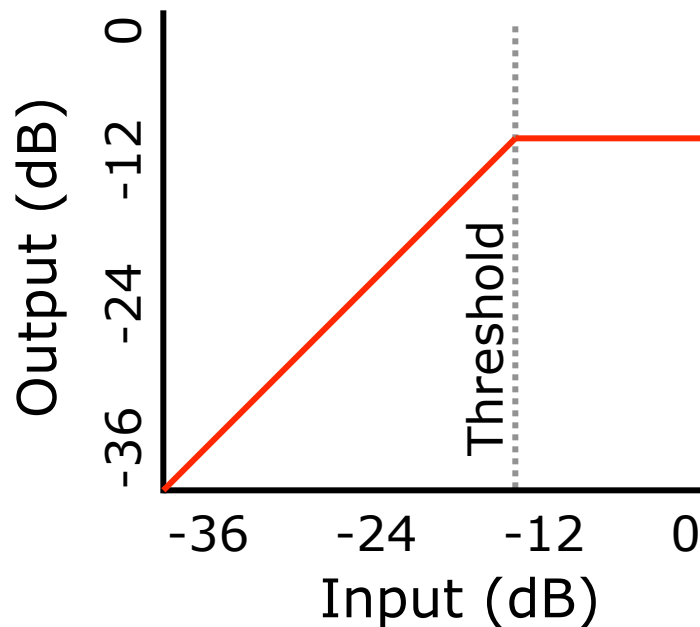
These affect behavior of the processor when input rises above or falls below the threshold.

In the case of a **gate**...

- When input falls below the threshold, the gate gradually closes over the course of the **attack time**.
- Then when input rises again above the threshold, the gate gradually opens over the course of the **release time**.

Limiter

Limiter keeps volume below *threshold*, preventing clipping and reducing dynamic range, which allows you to raise the apparent volume level.

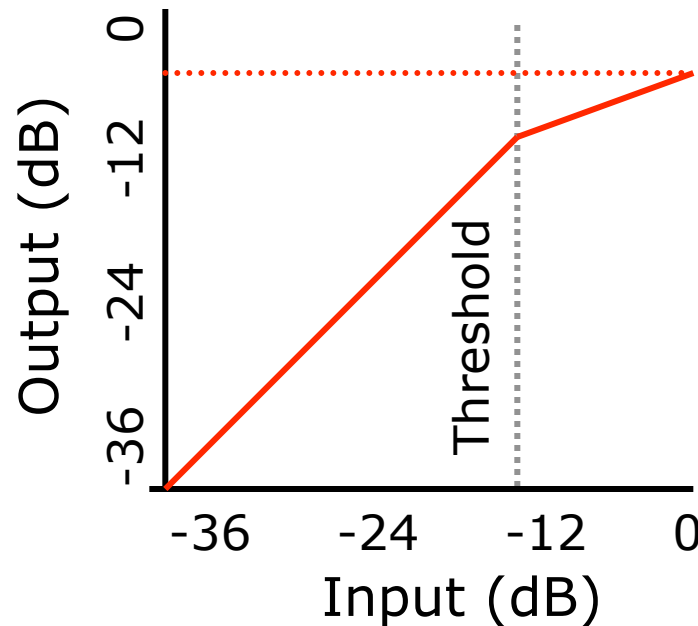


Now you can increase output by 12 dB without clipping.

Compressor

Compressor turns down volume whenever it rises above *threshold*, reducing dynamic range.

Compression *ratio* determines amount of reduction.



2:1 ratio means that for every 2 dB increase of input, compressor allows a 1 dB increase.

Side chain

There are actually two inputs: the audible input and the **key input**, or **side chain**.

The processor analyzes the dynamics of the key input and uses them to affect the audible input.

Usually the audible and key inputs are the same, but they don't have to be. For example, you can analyze the dynamics of speech and use them to control the volume of a sustained sound.

Side chain applications

Some applications of **side chain** processing...

- A **ducker** analyzes the level of an announcer's voice and uses that to suppress the level of background music when she's talking.
- Trigger a synthetic sound from transients in an audio track, like a drum track. Put a gate on the synthetic track (like white noise), and set its key input to the drum track: the noise will turn on whenever there is a drum hit.
- A **deesser** removes sibilants from vocals. Route the vocal through a peaking EQ with center freq. of 5-10 kHz, then into the compressor side chain. The compressor will attenuate when the high frequency sibilance is too strong.