Compressors/Limiters

The primary use of compressors/limiters is to keep the gain constant, limiting the dynamic range by a certain amount. The compressor's side-chain monitors the signal for peak signals. It then sends a control voltage to an amplifier which reduces the gain to fit within a user specified range called the threshold. Only the frequencies which fall outside of the threshold are lowered. Dynamics below the threshold are unaffected. This results in a reduction of the dynamics of a musical performance. This reduction in dynamics is necessary because audio systems are not capable of recreating the dynamics that we can hear with our own ears. The signal monitor can respond to either a signal's peak or an average amplitude (RMS, which means root-mean-squared). Peak detectors are much faster than RMS detectors. However, because they are slower, RMS detectors produce a smoother, more musical response.

A limiter is an extreme type of compressor with a greater than 10:1 compression ratio (see below).

Place compressors/limiters in-line.

Aspects of a compressor:

(1) Threshold – The peak level. This is the level where compression will begin.

(2) Ratio – The compression ratio determines just how much the level above the threshold is reduced. A ratio of 4:1 means that a signal that is 4db higher than the threshold will be lowered to 1db over the threshold. The greater the ratio, the closer to the threshold the dynamics will come. For all practical purposes, a ratio of 10:1 or greater would produce limiting, and the dynamic would be perceived as being the same as the threshold.

(3) Attack Time – The amount of time it takes for the compressor to respond to a signal that has crossed the threshold.

(4) Release Time – The amount of time it takes for the compressor to return a signal to its normal gain once it crosses back under the threshold.

(5) Output Volume (Make-Up Gain) – Because a compressor reduces the overall gain of a signal, the output of the compressor would be lower than the input. This could possibly create unworkable levels at the output. The output level increases the volume back up to a good working level.

(6) Patching into the Side-Chain – On some compressors you have access to the side-chain where you can patch in an EQ. This is useful for compressing certain frequencies. For example, if you have a signal that is too bright, you could set the EQ to increase the level of the upper frequencies. Then, when

compression takes place, the upper frequencies, whenever they cross the threshold, will be lowered and the other frequencies will not. (see Split Band Compression below)

(7) Ducking – By patching another instrument into the side-chain you can control the level of the main signal.

(8) "Soft Knee" Compression – The amount of compression increases as the level increases. Very simple and easy to use.

(9) Gates – Since a compressor cannot differentiate between a quiet sound and unwanted signals, it may increase low level noise, unless a gate is used. A gate closes off the sound not allowing noise to be amplified. Gates contain a threshold control and an LED to show when it is closed.

(10)   Stereo Linking – Ensures that both the left and right channels are compressed identically.

(11)   Split Band Compression – Only certain frequencies are compressed.

(12)   Breathing – If the input signal is raised 10-12db or more during compression, noise will be introduced. As the gain raises the background normally low level noise will be amplified, producing a "breathing" sound in between musical gestures.