

Audio Recording with Digital Signal Chains

By Tal Herzberg

The basic technology of audio recording has not changed much since its early days. Every recording process always starts with a microphonic element of some sort (dynamic, condenser, ribbon, magnetic pickup) which senses audio energy (sound waves) from various sources (vocal, guitar strings, orchestra). A very weak electromagnetic signal that's been generated by the microphonic element is then sent via cable to an electronic device called pre amp which amplifies that signal to a level that can then be recorded onto a capturing medium, such as analog or digital recorders. The only exception to this process was introduced with line level devices, such as synthesizers, but even when using such a device, a pre amp is still required to set the final recording level. The combination of these elements is called a Recording Chain.

Over the years, 2 additional elements have been added to the typical recording chain used by most recording engineers around the world, the Equalizer, which cuts or boosts certain sound frequencies present at the amplified signal, and the Compressor/Limiter, which controls the dynamic behavior and final level of the amplified signal. Although we will not discuss the ways to use these devices in this article, almost any audio professional is well aware of the benefits these devices introduce to the recording chain.

For many years, equalizers and limiters were analog devices, built inside powered enclosures. An audio engineer will typically connect the output of a pre amp into the equalizer, then send the filtered signal out of the EQ into the limiter for final dynamics and level control, and from there into the recorder.

The introduction of DAW's (Digital Audio Workstations) to the audio production community, brought not only the benefits of random access audio, but also of DSP technology (Digital Signal Processing). Audio software manufacturers, such as Waves, DigiDesign, McDSP,

and Eventide, managed to program digital algorithms (Plug-Ins) that can perform the same functions analog EQ's and limiters do, without compromising the final audio quality. It is now possible to substitute analog EQ's and limiters in any recording chain with their digital siblings, especially if a DAW is being used as the recorder. Working on a DAW, there are 2 main methods of incorporating digital EQ and limiters to any recording chain:

The first method is non-destructive, where the two are inserted on the monitor path of a destination audio track, causing the signal to be recorded flat (no processing), but monitored with the processing. The benefit of this method has to do with the ability to change the settings at a later stage, thus not committing to a final sound from the beginning.

The second method is destructive, where the two are inserted on an auxiliary input channel, not an audio track, and its output is then bussed into a final destination audio track that records the processed sound. An experienced audio engineer might choose this route, committing to the settings as final sound shapers.

In the last few years, many project studios I have visited chose to use digital EQ's and limiters as signal processors, making the pre amp(s) the only analog element in the chain. It is possible to set-up template DAW sessions with EQ's and limiters already inserted, and use those as starting points for many situations. Manufacturers such as Grace, Focusrite, and Prosonus are now offering multi-channel pre amp devices, some with built in AD converters. The results are very satisfying, and allow even an inexperienced person to record without fearing getting yelled at by the mixing engineer. ■

Tal Herzberg is a producer/engineer/mixer. He won a Grammy and TEC award in 2002 for "Lady Marmalade" by Christina Aguilera, Mya, Lil' Kim, and Missy Elliot, a Grammy and TEC nomination for "1000 Miles" by Vanessa Carlton, and a Grammy nomination for "Where Is The Love" by Justin Timberlake with Black Eyed Peas.



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