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VOL. TWENTY NINE
NUMBER NINE
JUNE 2016
USA $5.99
CANADA $5.99

$5.99US $5.99CAN 06

0 09281 03050 8

Great Tone In The Box

Using harmonics and distortion for analog sound in digital mixes

By James Lindenschmidt

There is a school of thought that says in this digital age of plug-ins, a recordist is best off recording tracks as cleanly and as flat as possible, to maximize flexibility during the mix. Another school of thought says that you should craft your tones ahead of time on the way into a digital recording system, to maximize the sonic potential and save yourself time during the mix. Both approaches are used successfully every day on recordings, but there is little question that the latter approach generally requires a much higher budget for hardware: analog preamps, EQs, compressors, and other devices to achieve the desired tonality.

In a way, the gear choices that an engineer makes reflects their sonic personality. Familiarity allows the engineer to quickly get the sounds they are looking for. For busy professional engineers who need to work quickly, this approach makes perfect sense, and is at the root of the analog gear explosion of the last decade. The amount of great gear available these days, all made by passionate people, is astounding.

Ask the right question

The new generation of front-end hardware typically has more controls, often a gain and a level knob or perhaps simple EQ or input impedance controls to manipulate tone, rather than just a single gain knob on an interface preamp. Despite the additional expense of many of these units, they aren't necessarily *better*—they just sound *different*, and in many cases the differences are quite subtle. The four main parameters of audio are frequency response, distortion, noise, and time-based effects, so whatever differences in sound exist between audio products like mic preamps can be described in terms of these parameters, and we can manipulate these parameters using plug-ins.

We can debate whether digital distortion can sound the same as analog, but I believe this is the wrong question. Rather, I prefer to ask: *can we make a given recording sound better with the tools available to us?*

With distortion plug-ins, we can add back in much of the tone we associate with analog technology: tape, tubes, analog preamps, etc. We can then fine-tune the added distortion with additional EQ or compression.

Figure 1: Harrison Mixbus 3.2, shown running on AVLinux 2016. Note the "drive" control on all 8 buses, as well as on the Master bus, just below the VU meters.

It is quite edifying to mix with simple stock plug-ins not known for a particular tone they impart, but rather for simply and cleanly doing their job. These simple plug-ins allow the engineer to experiment with these ideas, learning how to sculpt tone using the basic building blocks of audio. Using these techniques, we can add harmonics and get our tones using software rather than having to invest in hardware.

Distortion isn't always bad

While EQ and compression are widely regarded as the most useful tone-sculpting tools for the mix engineer, I think of distortion as a third method to change the tone of a recording. Some mix engineers—Tchad Blake is an obvious example—have developed a unique and popular style based in large part on their creative use of distortion. In some ways, harmonic manipulation encompasses both compression (since clipping can reduce dynamic range) and also EQ (since it changes perception of certain frequency ranges).

For instance, if I find myself doing a lot of broad EQ boosting to get better tone out of a track, often using distortion to add harmonics in those frequency ranges sounds even better. By using distortion, we are adding additional harmonic content not present in the original recording, which is not the same as an EQ boost. This technique is fantastic both on individual tracks and on the master bus.

In the early days of analog recording, it would have been ludicrous to intentionally add harmonics to a recording... the gear being used added so much distortion of its own that adding more did not improve the tone of recordings! But today, with digital audio recording so ubiquitous and so clean, often some additional distortion—or as I prefer to think of it, enhanced harmonic content—is just what the mix calls for. Certainly by the end of the 1960s, it was relatively commonplace to use distortion to add tone to a mix, the recordings of Joe Meek and some of The Beatles' later experiments being good examples.

I grew up playing electric guitar, and for me a good guitar tone was just as important as the playing itself. The interaction between playing dynamics and tone was essential, and this practice carries over to my use of distortion in mixing. Even on instruments other than guitar—including and especially vocal tracks—I love a tone just on the edge of breaking up, where louder, more dynamic passages are distorting audibly but softer passages are cleaner. Gain structure and dynamics, and how the recordings respond to both over time, are essential to dial in a sound like this. You have to "hit" the distortion generator with just the right amount of gain, and the results can sound exquisite when done right.

Figure 2: Softube's Saturation Knob plug-in—sweet, simple, and free.

Figure 3: The RedLightDist distortion plugin bundled with PreSonus Studio One. Note the Mix wet/dry control in the bottom right.

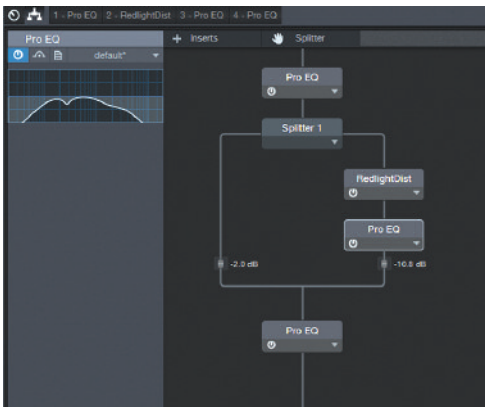

Figure 4: Studio One's Channel Editor routing view.

Parallel processing: it's not just for compression any more

So what are the best ways to accomplish this in a mix? Occasionally it makes sense to put a lot of distortion onto a sound as an intentional effect, but for warming up clean tracks without the obvious characteristics of distortion being discernible, we will usually opt for parallel processing. This approach, as with compression or other effects, maintains the integrity of the original signal, but enhances its tone by providing additional harmonic content tucked in just the right amount with the original signal.

The simplest way to achieve this technique is to set up an effects bus, and route any audio that needs warming up to that bus. Sometimes it is just one track, or you can send multiple tracks to it. One up-and-coming DAW is in large part based on this concept. Harrison MixBus (shown in Figure 1 and reviewed September 2015) began with the full-featured, open-source Ardour DAW, but Harrison was the first to integrate extensive expertise with analog and digital mixing technology to create a platform with this sort of tone-enhancing distortion built into the DAW.

While sometimes parallel distortion works well alongside parallel compression—or even sometimes with both compression and distortion in the same bus chain—it is important to distinguish between the sounds of distortion and compression, as well as how compression and distortion interact with one another. For instance, if you hit a distortion plug-in *before* a compressor, there will be a wider dynamic range to explore a wider range of saturation than if you compress it first, which makes for a smaller dynamic range and more consistent saturation.

Many classic compressors add quite a bit of their own distortion, which is a big part of their tone and hence their mystique. For many years, to warm things up I'd turn to a parallel compressor, but these days I'm more likely to turn to parallel distortion.

Once you have the tone and amount of saturation dialed in, you can then sculpt it a bit with EQ. I will nearly always use both a highpass and a lowpass filter; the harmonics I am looking for are usually in the midrange more than anything, though this can vary. In most cases we are after a smoother distortion, not a harsh, ugly tone (though this is, of course, subjective!).

If the tone seems harsh no matter where the gain is set, then one solution is to notch out offending frequencies. These are often caused by comb filtering from poor room acoustics present during tracking, since they are often much louder than other frequencies and will therefore trigger distortion sooner. In other words, they are adding additional harmonic content to already problematic frequencies. Get rid of them with a narrow, steep EQ cut before the distortion plug-in, and often the resulting distortion will sound much smoother.

This method of using a bus for the parallel distortion effect is necessary with plug-ins that don't have a wet/dry control, one (free!) example of which is Softube Saturation Knob (see Figure 2). I also will sometimes use guitar amp simulation plug-ins of one type or another on the bus to achieve the distortion I am looking for.

Dirty it in the mix

A second way to add parallel distortion is to simply use a distortion plug-in that has a wet/dry mix control. SoundToys Decapitator is a popular choice here, and I also like the RedLightDist plug-in that comes with PreSonus Studio One (see figure 3). With plug-ins like this, I will begin by setting them to 100% wet to dial in the tone I want to add.

Here, selecting the type of distortion (most plug-ins offer multiple types of saturation), manipulating the drive and gain structure, and also the lowpass and highpass filter combination, allows me to get very close to what I want. Shown here is a 3-stage op amp solid state distortion, which is more subtle than a tube setting. Try the different types to get a feel for what the track needs, and fine tune to taste.

Once I have the distorted signal dialed in, I then back off to 100% dry to reset my ears for a bit. Finally, I slowly increase the wetness, adding distortion to fill out and fatten up the tone to taste.

Studio One's Channel Layout

As a heavy user of PreSonus' Studio One DAW, I'm very excited about a third option to achieve parallel distortion introduced with version 3.1 (3.2 is current as of this writing and is reviewed elsewhere in this issue). The new "Channel Layout" feature allows me to dial in any combination of series and/or

parallel effects routing, all inside the normal effects bin of a single audio channel/track. This approach, as a new feature on one DAW, has a bit of a learning curve, but once I familiarized myself with the flow of this method, it became my favorite technique for adding harmonics. I have little doubt that this feature will be copied by other DAWs.

Setting it up is relatively straightforward. First, click on any of the effects in the bin, or on the bin itself if there are no effects yet. Then, in the top left of the window, click the Routing icon to open up the Channel Layout window. Alternatively, you can click the Channel Editor button on the track to look at the Routing view, which shows all of the plug-ins and how they are routed.

Use the Splitter icon to drag a parallel split into the effects chain. The Split Mode can be tweaked to split normally, by sending an identical copy of the signal down both paths, or you can also set it up to split by frequency, like a crossover circuit, to send different parts of the frequency spectrum down different paths. The third option is Channel Split, which sends the left channel of a stereo track down one path, and the right channel down the other. You can also specify the number of parallel paths, or splits, though it defaults to two. In most cases I use a normal split for parallel distortion.

Once the parallel paths are set up, I will add the distortion plug-in I wish to use on one path of the split, along with an EQ after it to sculpt the tonality. In Figure 4 you can see this arrangement; first is an EQ applied to the incoming signal to notch out any problem frequencies. Then is the splitter, which sends one path back to the summing point, and the other path to the RedLightDist plug-in followed by another EQ. You can see the curve of this second EQ in the left panel, whose job is only to sculpt the tone of the distorted signal, before it is blended back in with the original signal. This EQ curve is typical of what I like to do, with fairly aggressive highpass and lowpass filters, a fairly broad cut in the upper bass to remove muddiness, and a high shelf cut below the lowpass to further reduce the treble.

At the end of each path, before they are summed again, Studio One provides a volume control. In this case the distortion path is set 10.8 dB lower than the original signal, with the original signal reduced by about 2 dB. This gives a pretty good level match with the original signal to doublecheck tonality when it's bypassed.

The second EQ after the distortion plug-in is, in my opinion, what gets us closest to the authentic sound of analog. The key is to tune the distortion that you then blend back in with the original signal. This allows you to create a tone that works best with the recording itself... and of course it's available to those of us recording without six-figure budgets for analog gear!

Harmonics = Tone

These techniques are especially important for those who prefer to record as clean and flat as possible, so that tonality can be manipulated in the mix. EQ and compression are well understood, but I think distortion is just as important, particularly with today's proliferation of ultra-clean preamps and converters found in commonly available interfaces.

Often, these devices are much cleaner in comparison to boutique preamps, so the clean tracks recorded with them often benefit from using distortion to add additional harmonics and tone.

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Excerpted from the June edition of RECORDING Magazine 2016

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