SONAR 2016.04 Update

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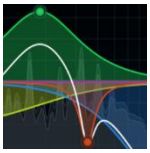
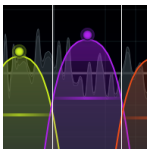
April brings three exciting new plug-ins to SONAR, as well as innovative VST3 technology that adds a useful extension to the standard VST specification. The long-awaited TH3 Cakewalk Edition is here for Artist, Professional, and Platinum; it features more refined and detailed algorithms, improved cabinet IR responses, and a classic bass amp emulation. And of course, it's good for more than just guitar.

Professional and Platinum owners receive two new linear-phase mastering-quality plug-ins for multiband compression and EQ. While conceptually similar to the previous linear phase plug-ins, the latest versions are a new design with superior performance, more options, and a more informative user interface. You can even turn off the linear phase aspect to use them as tracking plug-ins. And there are the usual fixes and enhancements, tips on mastering, a review of the Line 6 Helix, and Blog Beat. Enjoy! *– Bill Jackson and the Cakewalk Team*

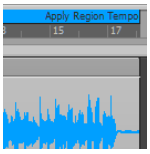


LP EQ: This from-the-ground-up VST3 revision of the LP-64 Linear Phase EQ not only offers linear phase operation with varying degrees of precision, but conventional EQ operation—with independent left/right processing *and* true mid-side processing. If this sounds like a great EQ…well, it is.



LP MB: To complement the LP EQ, this VST3 multiband compression improves on the LP-64 Multiband in several ways. Its linear-phase operation makes it ideal for crossover applications, and its clean, transparent sound makes it ideal for any kind of dynamics control application, from individual tracks to precision mastering.

TH3 Cakewalk Edition: Several user interface changes partner with improved sound quality and additional components. What's more, TH3 Cakewalk Edition can replace instances of TH2 used in projects—you'll have the same sound, but with the additional options offered by the latest version, including VST3 support.



VST Persist Compatibility—New SONAR Technology: Suppose you have a new version of a plug-in that's compatible with an older version, and a project that uses the older version—but it's not installed. If the new plug-in has VPC, it will read the older plug-in's parameters to eliminate those pesky "plug-in not found" messages.

How to Install SONAR's Legacy Linear Phase Processors: The old LP-64 EQ and LP-64 Multiband linear phase plug-ins are no longer included in the Engineering Suite, because the new versions are so much better. But if you ever need to re-install them for older projects, here are two simple ways to add them back in.

Fixes and Enhancements: The issue of file sizes increasing dramatically with lots of AudioSnap usage is fixed, as is the playback distortion that happened after the Kingston update when rewiring Reason—along with fixing a couple authorization issues and other updates.

Review | Line 6 Helix: As much as we love our computers and plug-ins, it sure would be nice to have the same level of performance when using a hardware multieffects for live performance. Does the Line 6 Helix *really* deserve the hype it's been getting?

Mastering Basics | The Importance of What's *Outside* the DAW: The new linear-phase plug-ins introduced this month have put a spotlight on mastering as well as mixing, but one of the most important elements of mastering has virtually nothing to do with electronics.

BlogBeat: This month's Blog Beat covers a variety of topics: find out what makes Console Emulation tick, how to use Melodyne to create tempo maps that follow you, tricks about drum maps for Addictive Drums 2, how Jimmy Landry entertained his inner synthesist, and more.

How to Download the SONAR 2016.04 Update

Open the **Cakewalk Command Center**. If you don't have the latest version (CakewalkCommandCenterSetup_1.1.5.0.exe), please download it from the Cakewalk Command Center home page.

To download the **SONAR 2016.04** core update itself, download from the core SONAR Artist, Professional, or Platinum category.

Artist: TH3 Cakewalk Edition installs with the core Artist program.

Professional: Update the Boutique Suite (its LED will be yellow) to install TH3 Cakewalk Edition.

Platinum: Update the Engineering Suite and Boutique Suite (their LEDs will be yellow) to install the new mastering plug-ins and TH3 Cakewalk Edition.

LP EQ Equalizer

Professional, Platinum

The LP EQ is a redesigned VST3 replacement plug-in for the LP-64 EQ linear-phase EQ. Unlike traditional analog EQs that alter phase, linear-phase EQs maintain phase coherancy. Known for their transparency and freedom from amplitude changes caused by phase shifts, linear-phase EQs are often the EQ of choice for mastering and other precision applications where a neutral, unobtrusive sound is important. Furthermore, the LP EQ even offers a non-linear mode for a different type of sound that doesn't require as much CPU power.

The LP EQ provides an ideal complement for the ProChannel's QuadCurve, whose ability to impart "character" is often desirable. Between the two, you can find the type of EQ that works best for any given material.

However the LP EQ is more than "just another EQ," as it offers spectrum analysis (both pre- and post-EQ), as well as multiple convenience features.

MID-SIDE, TOO!

The LP EQ can do conventional stereo processing, and even apply separate processing to the left and right channels. However, it's also a mid-side processor. Although the term "mid-side" is often applied to a particular recording technique, it's also used for signal processing.

For those unfamiliar with mid-side processing, a technique called *mid-side encoding* uses phase and panning to split a conventional stereo file so that the center of the stereo spread (the material that both channels have in common) goes into the left ("mid") channel, while what the channels don't have in common goes into the right ("side") channel. This means that you can process the center separately from the left and right "sides" of a stereo signal. For example, because the kick and bass are often placed in the center of the stereo spread, you can process the mid channel to affect these sounds without affecting percussion that may be panned to the left and right sides. Another common mid-side processing technique is adding a bit of a high-frequency boost to the "side" channel so the left and right sides of the stereo field have a brightness that tends to widen the stereo image.

After this processing, decoding the mid-side signal converts it back into a standard stereo file. However, what's totally cool about the LP EQ is that all the encoding and decoding happens transparently, under the hood. When you do mid-side processing with the LP-eq, encoding and decoding happens automatically on the fly, so while you're tweaking the parameters, you hear the results as a standard stereo audio file.

THE EXPERT PANEL

The Expert panel offers some of the LP EQ's most powerful features. When you're looking for subtlety, the dry/wet mix control lets you blend the dry and EQed sound for parallel processing—it's easy to alter the effect of the EQ on the overall sound. The Expert panel is also where you can set the precision to reduce CPU power if needed, as well as choose whether you want the EQ to operate as a traditional stereo EQ with the option for independent processing of the left and right channels, or do mid-side processing.

There's a spectrum analyzer that's similar to the one in the QuadCurve, but has multiple adjustments in the Expert panel: see the spectrum at the input, the output, or both, as well as choose the response speed.

GAIN CHANGES

The way the LP EQ allows for changing Gain is also helpful. Suppose you select multiple EQ nodes, with two that are boosting at 6 dB, and another one that's cutting at 4 dB. If you click on one of the nodes that's boosting by 6 dB and bring it down to 3 dB of boost (half as much), then the node that's cutting will now cut by 2 dB—half as much. This makes it really easy to reduce or increase the overall effect that EQ has on a signal (it's also a good way to follow the advice about "the rule of half").

COMPARISONS *AREN'T* ODIOUS

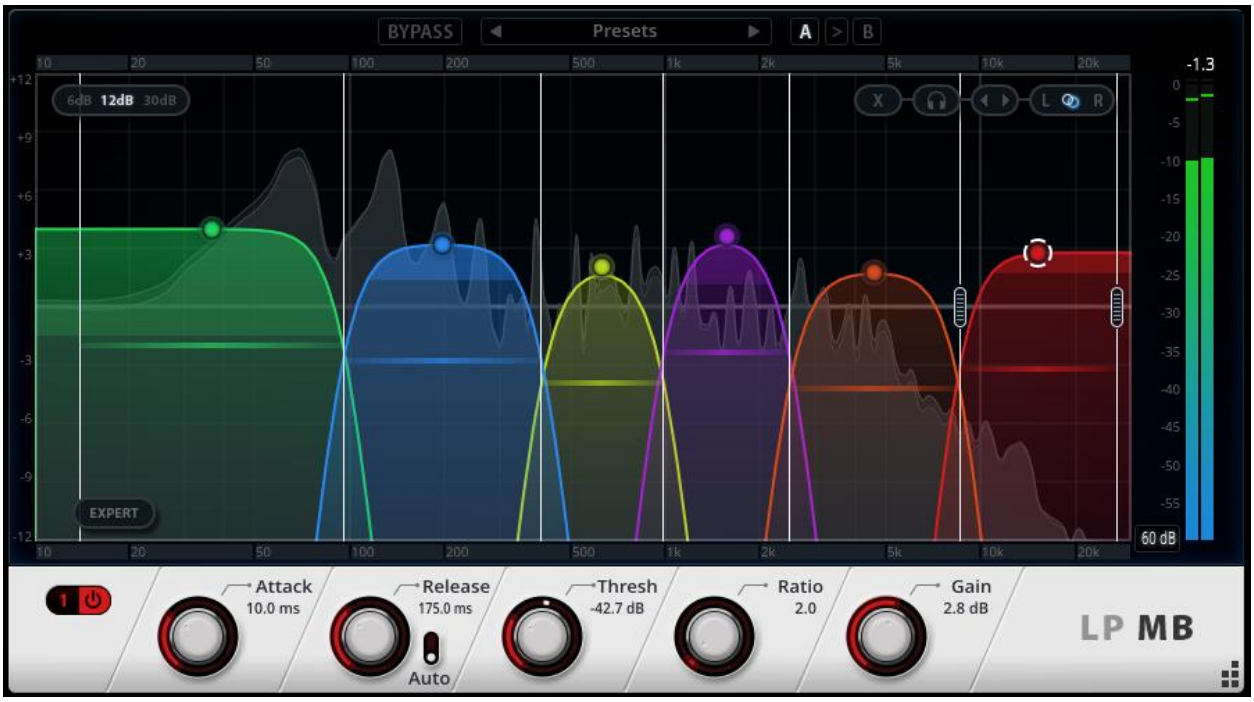
There's a saying that "comparisons are odious," but that's not the case with signal processing—so the LP EQ has a comparison function that lets you switch between two different curves. This is in addition to the bypass option, so you can actually compare among no EQ, two different EQ curves, and with the wet/dry mix control, various amounts of EQ. Of course, you can also name, save, and delete presets via the plug-in's preset management in the header.

OTHER FEATURES

The LP EQ has many other useful features (like the outstanding Solo mode); these are only the highlights. For the complete story, click on the UI to give it focus, and type F1 to bring up the online help.

LP MB Multiband Compressor

Professional, Platinum



Similarly to the LP EQ, the LP MB has been re-designed from the ground up as a VST3 replacement plug-in for the LP-64 Multiband. It has much in common with the LP EQ, including linear-phase operation (which can be switched to non-linear to conserve on CPU power), the ability to process the left and right channels independently, mid-side processing, and spectrum analysis.

Because the filters are linear-phase, even after splitting up the audio spectrum into different bands, re-combining them maintains phase integrity. This eliminates comb filtering, “phasey” smearing, transient degradation, and unintended coloration. What’s more, being able to apply dynamics processing to the center and/or sides of the stereo field via mid-side processing techniques is extremely powerful. For general information about mid-side processing, please refer to the section in the LP EQ description titled “Mid-Side, Too.”

Although most people tend to think of multiband compression in terms of dynamics control, the ability to create separate bands and change their levels means that the LP MB also offers powerful equalization features. In fact, you can think of the LP MB as a supremely flexible graphic equalizer that just happens to have dynamics processing, or as a dynamics processor that allows for highly frequency-selective operation.

There are six available bands, which can be linked so that (for example) adjusting one band's upper frequency simulaneously adjusts the adjacent band's lower frequency. They can also be unlinked, which allows specifying narrow, independent bands as a range for dynamics control.

THE EXPERT PANEL

Like the LP EQ, there's an Expert panel with advanced options. This includes parallel processing via a wet/dry mix control, and the same spectrum analysis options as the LP EQ. And again, you can specify the degree of precision for linear-phase operation, as well as select non-linear option. You'll also find two important compressor-specific paramters: the lookahead time, and compressor knee.

In this example, Left/Right is selected as the mode. In this case, the LP MB offers separate compression for the left and right channels.

AND, IT'S A CROSSOVER

The SONAR 2016.03 update included Track Templates for multiband processing that are based around using the Sonitus Multiband as a crossover. However, Platinum members can take advantage of the LP MB's superior fidelity and phase linearity when used as a crossover thanks to the ability to solo individual bands. For more information on multiband processing, see the article "Multiband Processing Track Templates" starting on page 11 of the SONAR 2016.03 eZine.

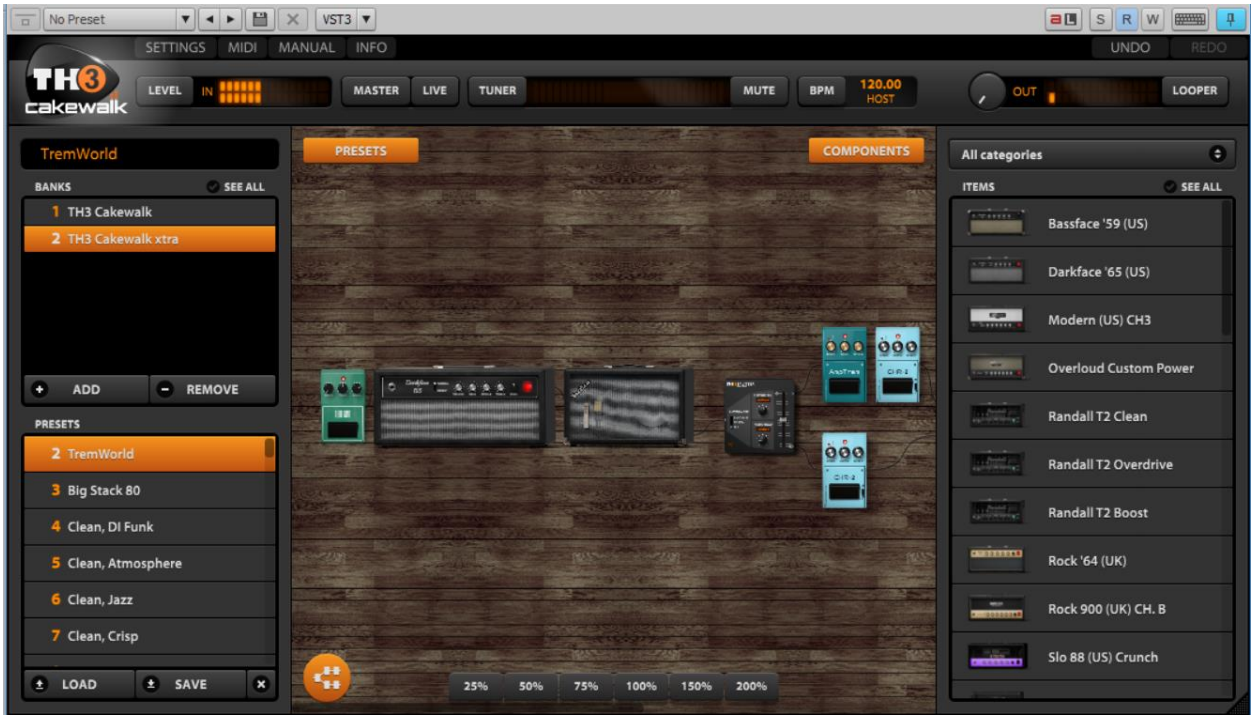
OTHER FEATURES

The remaining features again follow the LP EQ closely: A/B comparison, Solo mode for highlighting a specific frequency range, and the like. Also like the LP EQ, you can click on the UI to give it focus, and type F1 to invoke the online help to find out more about this outstanding plug-in.

TH3 Cakewalk Edition

Artist, Professional, Platinum

TH3 Cakewalk Edition, the long-anticipated update to TH2, is a VST3 effect that features an updated UI, new components, and more detailed modeling accuracy. Furthermore, it works with Cakewalk's exclusive VST Persist Compatibility for VST3 plug-ins (please refer to the article on page 12 for more details).



One of the main differences compared to TH3 is the 4th generation analog emulation technology, which improves the realism and "feel" compared to TH2. Overloud has also introduced ReSPiRe 2 Technology, which (aside from indicating Overloud may be having intermittent issues with their caps lock key) provides cabinet emulations with more realism and "feel."

Furthermore, there's full compatibility with TH2 user presets, so you can bring presets you've already created in TH2 and dress them up with TH3's improved sound quality and emulations. However, TH3 will also faithfully reproduce any presets based on TH2—even effects chains. So if you've created an FX Chain that uses TH2, it will sound exactly the same even if it's using TH3. Also note that installing TH3 doesn't overwrite any version of TH2 you have installed; it will still be available if you want to use it.

Not only has the UI been enhanced, with the ability to “zoom out” and see all of the effects in your setup at once, but there’s a more generous assortment of components than with TH2 Producer: 14 amps, 10 cabinets, 13 effects, and a volume pedal. Also, many musicians—not just guitarists—will appreciate TH3’s new looper, which lets you build up layers of sound by looping parts and doing overdubs.

The basic operation remains the same as TH2, as does the ability to do parallel processing, so you won’t have to scale any radical learning curves. The main differences are more options, an updated UI, and superior sonic quality, as well as far more capabilities for those using SONAR Artist. So grab your axe, and take advantage of what makes TH3 Cakewalk Edition a step up from TH2 SONAR and TH2 Producer.

VST Persist Compatibility: Exclusive SONAR Technology

Artist, Professional, Platinum

With any DAW, if you have the latest version of a plug-in, don't have a compatible older version of the plug-in installed, and try to open a project that uses the older plug-in, you'll get some kind of "missing plug-in" error message. End of story.

However, it doesn't have to be that way anymore. Cakewalk has come up with an ingenious extension to the VST3 spec called "VST Persist Compatibility" (VPC). As a long as a newer plug-in indicates compatibility with an older plug-in (VST2 or VST3), when loading a project SONAR will automatically swap in the latest plug-in and adopt the parameters of the older plug-in—even if it's *not* installed.

```
class IPersistCompatibility : public Steinberg::FUnknown
{
public:

    /** Get enumeration of all known forward compatible plugins.
    *  This lists earlier generation plugins that can replace THIS plugin
and retain preset compatibility.
    *
    *  @return - kResultOk on success and kResultFalse if no compatible
plugins were returned.
    *            kInvalidArgument if ppEnumPersistCompat is a NULL
pointer.
    */
    virtual Steinberg::int32 PLUGIN_API getForwardCompatiblePlugins(
IEnumPersistCompatible** ppEnumPersistCompat ) = 0;

    /** Get enumeration of all known backwards compatible plugins.
    *  This lists earlier generation plugins that can be replaced by this
plugin with preset compatibility.
    *  If multiple plugins available, enumeration should be in preferred
compatibility order.
    *  Host must handle an empty enumeration.
```

As a practical example, there have been several different versions of TH2 for different SONAR versions. The TH2 parameters are a subset of TH3 Cakewalk Edition so with VPC, *even if no version of TH2 is installed,* TH3 will tell SONAR it's compatible with TH2 and load the TH2 parameters stored in the older project. Furthermore, via the VPC interface, the host may additionally attempt to remap any automation for the old plug-in to the new plug-in. This saves laborious reassignment of envelopes in the DAW. Also with VPC, newer VST3 plug-ins can also be backward compatibility with older VST3 versions of the same plug-in.

The magic that makes this happen is in a header that the plugin vendor needs to implement (and of course, the host needs to support it). So far only TH3 has been "retrofitted" for this kind of backward compatibility, but the same technique can be applied to other plug-ins. It can even be added as an update to plug-ins that have already been shipped, and new, backward-compatible versions can be added at any time to future updates.

While not part of the official VST3 specification, Cakewalk has offered it to the industry as a possible extension. Meanwhile, the best part about this feature is you won't even know it exists if it's needed—all you'll know is that your project loaded without the error messages you might otherwise find.

How to Install SONAR's Legacy Linear Phase Processors

Professional, Platinum

The LP-64 EQ and LP-64 Multiband legacy linear phase plug-ins are no longer included in the Engineering Suite, because the new versions are so much more advanced. However if you have older projects that use the older plug-ins and install SONAR on a new computer, you'll probably want them installed for backward compatibility. There are two easy ways to obtain the older builds.

ACCOUNT PAGE

1. Log in to your account page on Cakewalk.com, then click on "My Products."
2. Click on either SONAR Professional or SONAR Platinum.
3. Click on the Engineering FX Suite.
4. Download the attached installer using the link for build 1.0.0.13, which includes the older LP-64 plug-ins.
5. Run the installer.

USING C3 (CAKEWALK COMMAND CENTER)

1. Open Cakewalk Command Center.
2. Expand the product list for either SONAR Professional or SONAR Platinum.
3. Right-click on the Engineering FX Suite.
4. Select build 1.0.0.13 from the Rollback menu.
5. Select [Yes] when prompted to Rollback.

Fixes and Enhancements

Fixed issues where:

- Projects with AudioSnap grew in size with each save
- Distorted Reason Rewire playback occurred after the Kingston update
- SONAR would hang upon closing
- Default synth icons didn’t load as originally saved in the Synth Rack View
- Documentation relating to the location of TTSSEQ.INI was inaccurate
- Automation write didn’t respond when inserting a soft synth from a Track Template
- Opening the Help module caused draw corruption when editing in Staff View
- Enabling X-Ray didn’t work as expected on the Help Module
- Setting an audio track input to a mono source changed the track interleave
- Tab to transient would fail after adding tempo changes
- SONAR would sometimes launch incorrectly in demo mode
- Offline Authorization needed some improvements

Review: Line 6 Helix Multieffects

By Craig Anderton

If someone had told me years ago that in 2016, I would get excited about a hardware multieffects…I would have highly doubted it. I switched to using a laptop for live performance over a decade ago, and while I always appreciated and enjoyed devices like the POD HD 500 (as well as the sheer brilliance of the Kemper profiling amp), I was able to get "the sound" I wanted if I wrestled enough with plug-ins. In fact, the CA-X amps are the result of some of those wrestling matches.

But there's no denying a single, well-designed hardware box is easier to manage in live performance than a computer-based rig—and I've really bonded with the Line 6 Helix. No, it's not a Gibson Brand. And no, I'm not an endorsee, nor does Line 6 pay me to say nice things about it. I'm writing this because I think Line 6 is doing something truly innovative; and as a lot of SONAR users play guitar, you should at least know what the fuss is all about, whether you end up bonding with it or not.

For me to truly enjoy (not just appreciate) a multieffects, there are three non-negotiable demands in addition to sound quality.

- It has to have a great user interface. I don't want to have to think, I want to create. If I have to go deeper than one layer in a menu, I get frustrated.
- It has to be flexible, because I have some pretty "out there" ideas of sounds I want. Having been spoiled by what can be done with computers, a serial combination of a Vox wah emulation followed by a Tube Screamer emulation followed by a Marshall Plexi emulation doesn't do it for me.
- I want it to *respond.* When I hit the strings harder, I want the "amp" to react and the breakup from clean to distortion to be smooth and real. Choruses need to shimmer,

reverb needs to put me in a room. Any multieffects needs to bring out the best in my guitar, not muffle it.

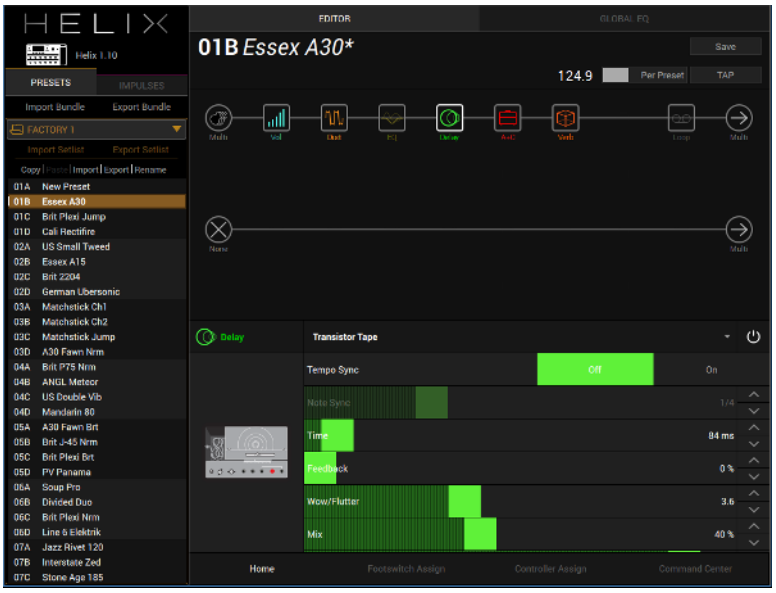
This review is not intended to be comprehensive, because Helix is a deep processor. There are a zillion YouTube videos, and I'm also doing an interactive, long-form Pro Review over on Harmony Central. So the point is not to get you interested or disinterested in Helix, but to provide an overview of its *gestalt.*

THE BAD NEWS

First, let's get the 800-pound gorilla in the room out of the way: It "streets" for around $1,400 - $1,500. That isn't cheap, and if it ever becomes orphaned to the point where you can't get replacement parts, you're not going to be happy…unless you already got a lot more, either in pleasure or income, compared to what you paid. However, I've been following the progress of Helix since November. Although Line 6 hasn't been promoting it as a "platform," my take is that it clearly is, so it's likely intended to have a long life span. There have already been several updates and new effects, as well as increasingly sophisticated support software. You're also paying for some *serious* construction quality.

THE USER INTERFACE

Helix has the best user interface and display I've seen on any hardware device of this genre (I also thought DigiTech's ill-fated iPB-10 had a great interface, but that's because it piggy-backed on the iPad—which ultimately was the iPB-10's undoing). The display is gorgeous, all the controls are obvious, and you can even tweak parameters using the footswitches and pedal. There's no scrolling through menus; pretty much everything is on the same level—flat. There's also the clever Home button, which is like what you always wanted Undo to *really* do.



After a few minutes of orientation, you can get quite far without even reading the documentation; I was creating patches literally within minutes of plugging it in. So when I found out that Line 6 was considering coming up with a software editor (see left), it really seemed like it would be have to be designed by the Department of Redundancy Department.

However the software editor was clearly designed with touch in mind, and has a superbly designed touch interface (I suspect someone in a back room at Line 6 is porting it over to a tablet as we speak). Given that I switched to a touch screen for SONAR's benefit, it's nice to have a piece of software that not only uses touch, but implements it thoughtfully and fully. In a way, Line 6 did it backwards: instead of coming up with a hardware controller for their software, they came up with a software controller for their hardware. In either case, both are exemplary.

I place such importance on the user interface because I've never met a multieffects where my first impulse after playing with the presets wasn't to wipe them *immediately* and start over with my own. Helix is no exception, even with a recent update that has new presets. I'm not a snob; it's just that there are so many variables to playing guitar, the odds of someone coming up with something that's compatible with how I play are remote. So it's vital to me that a device be easy to program.

THE SOUND

Aside from a few Line 6 originals, the amps have all been re-done from scratch with a new modeling process that goes well beyond what the POD HD could do. I suspect they're throwing a lot of CPU cycles at those amps, and that's also part of what accounts for the price.

Of the 41 guitar amp models and gobs of cabinets (there are 7 bass amp models too, and while I'm thinking about it, don't overlook what Helix can do for bass), there are some I'll probably never use but the sheer number means there are more than enough to get the variety of sounds I want. Ditto the effects. Of course Line 6 has to provide the old favorites, like emulations of all the popular fuzzes. But sprinkled in there are several Line 6 original effects, which in several cases I like more than the emulations. Effects like the Harmony Delay are…well, just try it. And, there are a few emulations of wacky vintage effects, too.

I still have to do some wrestling to get the sounds I want—mostly involving pre- and post-amp EQ, lowering drive, and changing the virtual mic position—but not much. I can dial in the desired sounds within a couple minutes, even without using the software editor. You can also split the signal into four *stereo* branches for parallel processing (yeah, baby!), and Line 6 has nailed superb clean and crunchy sounds, not just high-gain ones.

Of course emulations are subjective, but I've rarely seen so many guitar players agree in online forums and user reviews that these are satisfying, realistic models.

ACCESSORIZING

Helix is designed with extras—for example sends and returns that let Helix function as a decent 8-in/8-out computer interface. Not surprisingly it also interfaces with the Variax, and incorporates much of the POD HD 500's input/output flexibility (the image below shows only some of the I/O, and none of the digital I/O). However it goes further because it can also serve as the control center for an existing rig, and includes thoughtful additions like three expression pedal outputs. As with the HD 500, it builds in MIDI control capabilities via the footswitch. You can even load in third-party cabinet IRs, although I haven't tried that yet because I'm still learning how best to exploit the onboard models.

CREDIT WHERE CREDIT IS DUE

My main goal when writing reviews isn't to say "I like it" or "I don't like it" because who cares what I think? What matters is what *you* think, so I try to describe something with sufficient accuracy that you can decide whether you want to check further into a product or not. But I guess I haven't really followed that guideline this time, because it's probably obvious I feel Helix doesn't just hit a home run, it hits a bases-loaded home run. So I'm writing this review in case some of you are itching to upgrade your live rig, looking to sell a bunch of your old gear and replace it with something simple, or need a toolbox that makes it easy to create your own sounds.

To my ears *and* to my fingers, Helix jumps to the next quantum level of guitar multieffects. Now, maybe it just coincidentally happens to mate well with my Gibson guitars and EB5 bass (which aside from a James Tyler Variax and 50-year-old Telecaster, is what I've been using for testing). Or maybe I've just been seduced by being able to reproduce the sounds I hear in my head within minutes…or for the conspiracy theory fans, maybe there's a subliminal message that flashes across the display periodically and says "You will think Helix is *awesome."* Or maybe its appeal is that, like the Les Paul Standard 2016 HP I've been playing lately, Helix is one of those rare entities that lives a dual life as technology and art.

In any event, here it is 2016 and I'm blown away by a guitar multieffects. Who would have thought…

Mastering Basics: The Importance of What's *Outside* the DAW

By Craig Anderton

SONAR's new LP EQ and LP MB are ideal for a variety of applications, but the option of linear-phase operation can be particularly suitable for mastering. If you're intrigued by the idea of doing your own mastering, let's talk about what's involved. Most of this applies to mixing, too.

The art of mastering is the process of taking your mixes, adding any final polish (e.g., altering the tone, doing dynamics control, making sure levels are consistent, etc.) and in the case of an album, assembling the various cuts so they create a cohesive listening experience. You may even do tweaks like shorten intros or solos, add reverb, or other, even more drastic changes—whatever it takes to produce a great-sounding recording.

However, the requirement for years of expertise hasn't changed, and you still need good ears—and a serious skill set—to do mastering well. But the way to acquire years of expertise is to roll up your sleeves, start mastering, and learn the ins and outs of how the process works. If your mixes end up sounding better after you've mastered them, you're on your way.

But before you even boot up your computer, it's important to create a proper environment for mastering. Let's look at this all-important prep work.

THE IMPORTANCE OF YOUR ROOM

After your ears, the single most important piece of gear for mastering is not a plug-in, rack processor, or software, but an acoustically-treated room. It doesn't matter how good your speakers are, or what kind of a system you're running, if you can't accurately evaluate the sound because of room problems. Conversely, good room acoustics can show problems in other elements of the signal chain.

Acoustics is one of the main reasons why so many mixes that come out of project studios aren't "transportable": You mix something that sounds fine in your studio, but doesn't anywhere else. That's because you've mixed and then mastered to compensate for the deficiencies in your room, and other rooms will have different deficiencies. If you have an accurate response in your room, then the deviations won't be as great when you play back your music in other rooms.

Probably the biggest issue involves bass. The wavelength of a 100 Hz wave's single cycle is about 11 feet, and for a 50 Hz wave, 22 feet. So if your room is 20 feet long, a single 50 Hz cycle can't fit in it! This means that it will reflect back on itself and cause nulls and peaks that wreak havoc with frequency response. Often the result is cancelation, making the bass sound much

lower in level. So you mix the bass higher…but then when it plays back on other sounds, the bass is super-loud and "tubby."

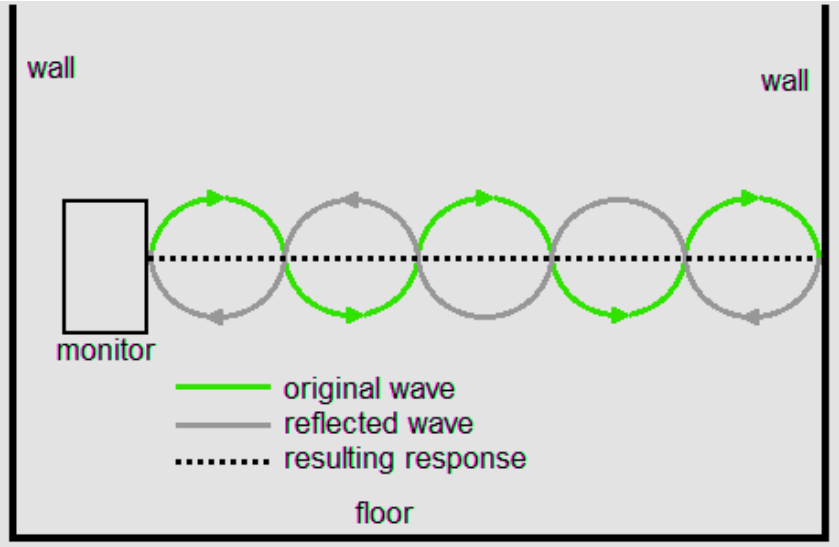


Fig. 1: This simplified illustration shows a standing-wave condition, where a wave reflects back from a wall out of phase, thus canceling the original waveform. At other frequencies, the reflection can just as easily reinforce the original waveform. These frequency response anomalies affect how you hear the music as you mix.

Acoustic treatment is a topic that could take up a book, and in fact, there's a good one by Mitch Gallagher titled Acoustic Design for the Home Studio (Thomson Course Technology, ISBN-10: 159863285X, ISBN-13: 978-1598632859). While you can certainly improve matters yourself, if you have the budget, it's worth calling a professional. When a best-selling pianist friend of mine was building a studio, he wisely allocated a significant portion of his budget to hiring a professional studio designer who was well-versed in acoustic treatment. Over the years, gear has come and gear has gone, but his fine-sounding room has remained the constant for all his work.

There are many sources of information on acoustics other than the above-mentioned book. Web sites for companies like Real Traps, Auralex, Primacoustic, and others often have a wealth of information and ideas on how best to tune a room. I do have a couple pieces of advice, though.

If you don't have an acoustically-treated room and don't think you need to do anything, for a real ear-opener set up an audio level meter (although these can cost hundreds of dollars, there are some smart phone apps that are adequate for our intended purposes). Sit with it in the middle of your room, run a sine wave test tone oscillator through the speakers, and watch the meter. Unless you have great monitors and an acoustically tuned room, that meter will fluctuate like a leaf in a tornado. Speakers by themselves do not have perfectly flat responses, but they look like a ruler compared to the average untreated room.

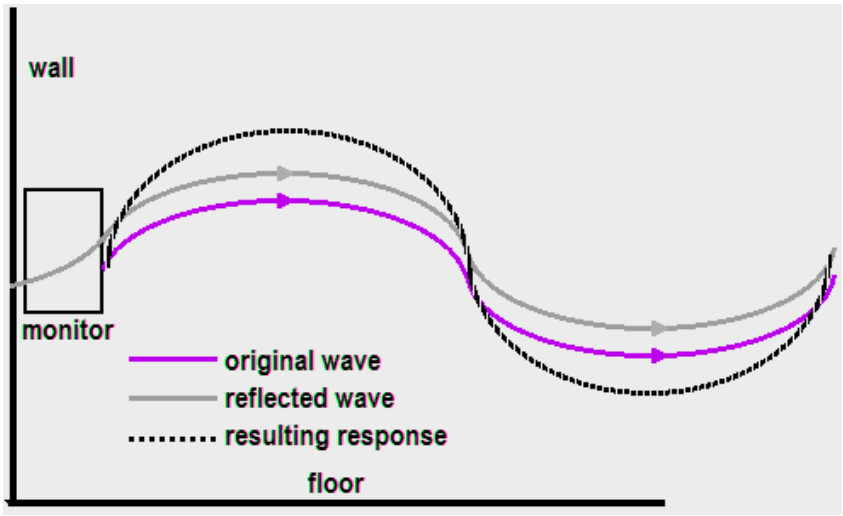


Fig. 2: Placing a speaker with its back against the wall often gives an apparent increase in bass; placing it in a corner accentuates the bass even more.

You don't even need a level meter to conduct this test: Play a steady tone around 5 kHz or so, then move your head around. You'll hear obvious volume fluctuations. (If you can't hear the 5 kHz tone, then perhaps it's time to look for a different line of work!) These variations occur because as sound bounces around off walls, the reflections become part of the overall sound, creating cancellations and additions.

Another example of how acoustics affects sound is when you place a speaker against a wall, which seems to increase bass. Here's why: Any sounds emanating from the rear of the speaker, or leaking from the front (bass frequencies are very non-directional), bounce off the wall. Because a bass note's wavelength is so long, the reflection will tend to reinforce the main wave. This is a greatly simplified explanation, but it gets the principle across.

As the walls, floors, and ceilings all interact with speakers, it's important that any speakers be placed symmetrically within a room. Otherwise, if (for example) one speaker is 3 feet from a wall and another 10 feet from a wall, any reflections will be wildly different and affect the response.

Some people try to compensate for room anomalies by inserting a graphic equalizer just before their power amp and "tuning" the equalization to adjust for room anomalies. While this sounds good in theory, if you deviate at all from the "sweet spot" where the microphone was, the frequency response will be off. Also, heavily equalizing a poor acoustical space simply gives you a heavily equalized poor acoustical space. Like noise reduction, which works best on signals that don't have a lot of noise, room tuning works best on rooms that don't have serious response issues because you've already addressed any underlying problems.

THE MONITOR FACTOR

After the room (and your ears, of course), speakers are the most important element in mastering and mixing—again because you have to trust what you're hearing. Traditional studios have large monitors mounted at a considerable distance (6 to 10 ft. or so) from the mixer, with the front flush to the wall, and an acoustically-treated control room to minimize response

variations. The “sweet spot”—the place where room acoustics are most favorable—is designed to be where the engineer sits at the console.

In smaller, project studios, near-field monitors have become the standard way to monitor. With this technique, small speakers sit around 3 to 5 feet apart, about 3 to 6 feet from the mixer’s ears, with the head and speakers forming a triangle. If slightly above ear level, they should point downward toward the ears.

Fig. 3: When using near field monitors, the speakers should point toward the ears and be at ear level (image courtesy KRK Systems).

Near-field monitors reduce (but do not eliminate) the impact of room acoustics on the overall sound, as the speakers’ direct sound is far greater than the reflections coming off the room surfaces. As a side benefit, because of their proximity to your ears, near-field monitors do not have to produce a lot of power. This also relaxes the requirements for the amps feeding them.

However, placement in the room is still an issue. If placed too close to the walls, there will be a bass build-up. High frequencies are not as affected because they are more directional. If the speakers are free-standing and placed away from the wall, back reflections from the speakers bouncing off the wall could cause cancellations and additions for the reasons mentioned earlier.

You’re pretty safe if the speakers are more than 6 ft. away from the wall in a fairly large listening space (this places the first frequency null point below the normally audible range), but not everyone has that much room. My solution, crude as it is, has been to mount the speakers a bit away from the wall on the same table holding the mixer, and pad the walls behind the speakers with as much sound-deadening material as possible.

Nor are room reflections the only problem; if placed on top of a console, reflections from the console itself can cause inaccuracies. The bottom line is you want as direct a path as possible from speaker to eardrum, with as few alternate paths as possible.

ABOUT NEAR-FIELD MONITORS

There are lots of near-field monitors available, in a variety of sizes and at numerous price points. Most are two-way designs, with (typically) a 6” or 8” woofer and smaller tweeter. While a 3-way design that adds a separate midrange driver might seem like a good idea, adding another crossover and speaker can complicate matters. A good two-way system will beat a so-so 3-way system, although a well-designed three-way system (like KRK’s Rokit 10-3) is a joy to have in the studio.

There are two main monitor types, *active* and *passive.* Passive monitors consist of only the speakers and crossovers, and require outboard amplifiers. Active monitors incorporate any power amplification needed to drive the speakers from a line level signal. I generally prefer powered monitors because the engineers have (hopefully!) tweaked the power amp and speaker into a smooth, efficient team. Issues such as speaker cable resistance become moot, and protection can be built into the amp to prevent blowouts. Powered monitors are often bi-amped (e.g., a separate amp for the woofer and tweeter), which minimizes intermodulation distortion and allows for tailoring the crossover points and frequency response for the speakers being used.

However, there’s nothing wrong with hooking up passive monitors (which are less expensive than active equivalents) to your own amps; just make sure your amp has adequate headroom. Any clipping that occurs in the amp generates lots of high-frequency harmonics (ask any guitarist who uses distortion), and sustained clipping can burn out high-frequency drivers.

One important point is that monitors have improved dramatically over the years, yet prices have spiraled downward; it’s now possible to get a truly fine set of speakers for well under a thousand dollars. Cakewalk recommends KRK active monitors, and not just because they’re a Gibson Brand; there’s a reason they continue to be consistent top-sellers around the world year after year, due to their reputation for quality and accuracy.

IS THERE A “BEST” MONITOR?

On the net, you’ll see endless discussions on which near-fields are best. Although it’s a cliché that you should audition several speakers and choose the model you like best, I believe you can’t choose the perfect speaker, because such a thing doesn’t exist. Instead, you choose the one that’s as neutral and accurate as humanly possible. While some people advise choosing a speaker that colors the sound the way you prefer, that’s the approach to take with the hi-fi speakers in your living room, not mastering tools.

Choosing a speaker is an art. I’ve been fortunate enough to hear my music over some hugely expensive, very-close-to-perfect systems in mastering labs and high-end studios, so I know

exactly what it should sound like. My criterion for choosing a speaker is simple: Whatever makes my "test" CD sound the most like it did over the high-end speakers wins.

Fig. 4: KRK's Rokit G5 (3rd Generation) is popular for mixing and mastering applications because it emphasizes accuracy. (Image courtesy KRK Systems)

If you haven't had the same kind of listening experiences, book 30 minutes or so at some really good studio and bring along one of your favorite CDs or WAV files (you can probably get a price break from the studio because you're not asking to use a lot of the facilities). Listen to the CD and get to know what it should sound like, then compare any speakers you audition to that standard. For example, if the piano on your mix sounds a little understated on the expensive speakers, choose speakers where the piano is equally understated.

One caution: if you're A-B comparing a set of speakers and one set is slightly louder than the other (even a fraction of a dB can make a difference), you'll likely choose the louder one as sounding better. Make sure the speaker levels are matched perfectly in order to make a valid comparison.

LEARNING YOUR SPEAKER AND ROOM

Ultimately, because your own listening situation is likely to be at least slightly imperfect, you need to "learn" your system's response. For example, suppose you master something in your studio that sounds fine, but in a high-end studio with accurate monitoring, the sound is bass-heavy. That means your monitoring environment is shy on the bass, so you boosted the bass to compensate. When mastering in the future, you'll know to mix the bass lighter than normal in order to have it come out okay.

Compare midrange and treble as well. If vocals jump out of your system but lay back in others, then your speakers might be "midrangey." Again, compensate by mixing midrange-heavy parts back a little bit.

HEADPHONES AND HI-FI SPEAKERS

Musicians on a budget often wonder about mixing over headphones, as $150 will buy you a great set of headphones, but not much in the way of speakers. Although mixing *exclusively* on headphones is not a good idea—people still listen to speakers—I highly recommend keeping a good set of headphones around as a reality check. (I prefer the kind that totally surrounds your ear, not the open-air type that sits on your ear; I use KRK's KNS-8400 headphones because they're voiced like monitor speakers, not hi-fi speakers.) And depending on how bad your room is, sometimes you'll hear bass more accurately using headphones than you will with near-fields.

Careful, though: It's easy to blast your ears with headphones and not know it. Watch those volume levels (and be real careful about accidentally setting up a feedback loop—a loud enough squeal could cause permanent hearing damage).

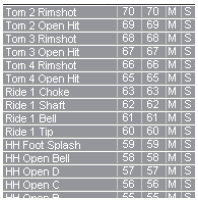
As to hi-fi speakers, just say no. Their design philosophy is to put makeup on the music. It may sound good, but you want the naked truth.

TESTING ON MULTIPLE DELIVERY SYSTEMS

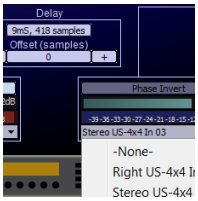
Finally, no matter how good your speakers and acoustics, before signing off on a mix or master run off a "proofing" CD or two and listen through anything you can—car stereo speakers, hi-fi bookshelf speakers, big-bucks studio speakers, boom boxes, headphones, etc. This gives an idea of how well the song will translate over a variety of systems. If all is well, great—mission accomplished. But if the CD sounds overly bright on, say, five out of eight systems, consider pulling back on the brightness just a bit.

BlogBeat

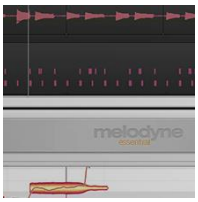
The Cakewalk blog is loaded with useful and interesting information, so don't miss out! Here are some of the blog's recent "greatest hits."



Drum Maps for Addictive Drums 2 in SONAR: **Joey Adams** helps you take the guesswork out of editing your MIDI drum tracks—thanks to Drum Maps that let you see exactly which MIDI notes trigger which sounds in your VST drum kit, along with free Drum Map files and Cakewalk Templates for Addictive Drums that you can download.

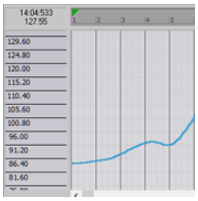


Basics | Five Questions About Using Stompboxes with SONAR: Sure, we all love plug-in processors. But what about that funky guitar pedal that has no equivalent in the virtual world, like that ancient analog delay you scored on eBay? Fortunately, **Craig Anderton** shows how to convince SONAR into thinking your stompbox is a plug-in.



Sonar X-Series Users Will Love These 55 Improvements in the New Sonar: So what exactly has been improved since SONAR X3? There are the big, obvious improvements like VocalSync, the Drum Replacer, ReMatrix convolution reverb, Patch Points, and the like…but here are the some of the other improvements that were on **Joey Adams'** "X3 wish list."

The Sound of Console Emulation: Console Emulation was introduced in SONAR X3, but it remains an extremely popular feature in SONAR 2016. Okay, you use it—but what *exactly* does it do, anyway? **Dan Gonzalez** does a deep dive into what console emulation is, how it affects your sound, and the differences among the three different types offered in SONAR.



How to Create Easy Tempo Maps in Sonar with Melodyne 4: Thanks to Melodyne's tempo detection and SONAR's ARA drag-and-drop integration, your projects can now follow a live recording's tempo. Find out how to drag a standard audio clip to SONAR's timeline, and create a tempo map that follows the clip tempo.

SONAR Platinum Adds Ultra Analog Session 2 Synth: **Jimmy Landry** checks out the latest synth addition to the Platinum version of SONAR, and finds out there's more than meets the ear. As a self-proclaimed "not a synth expert," Jimmy finds out that arpeggiators are useful, presets are helpful, and it's possible to program some really cool sounds in under 10 minutes.

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