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October 2004

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REVIEWS

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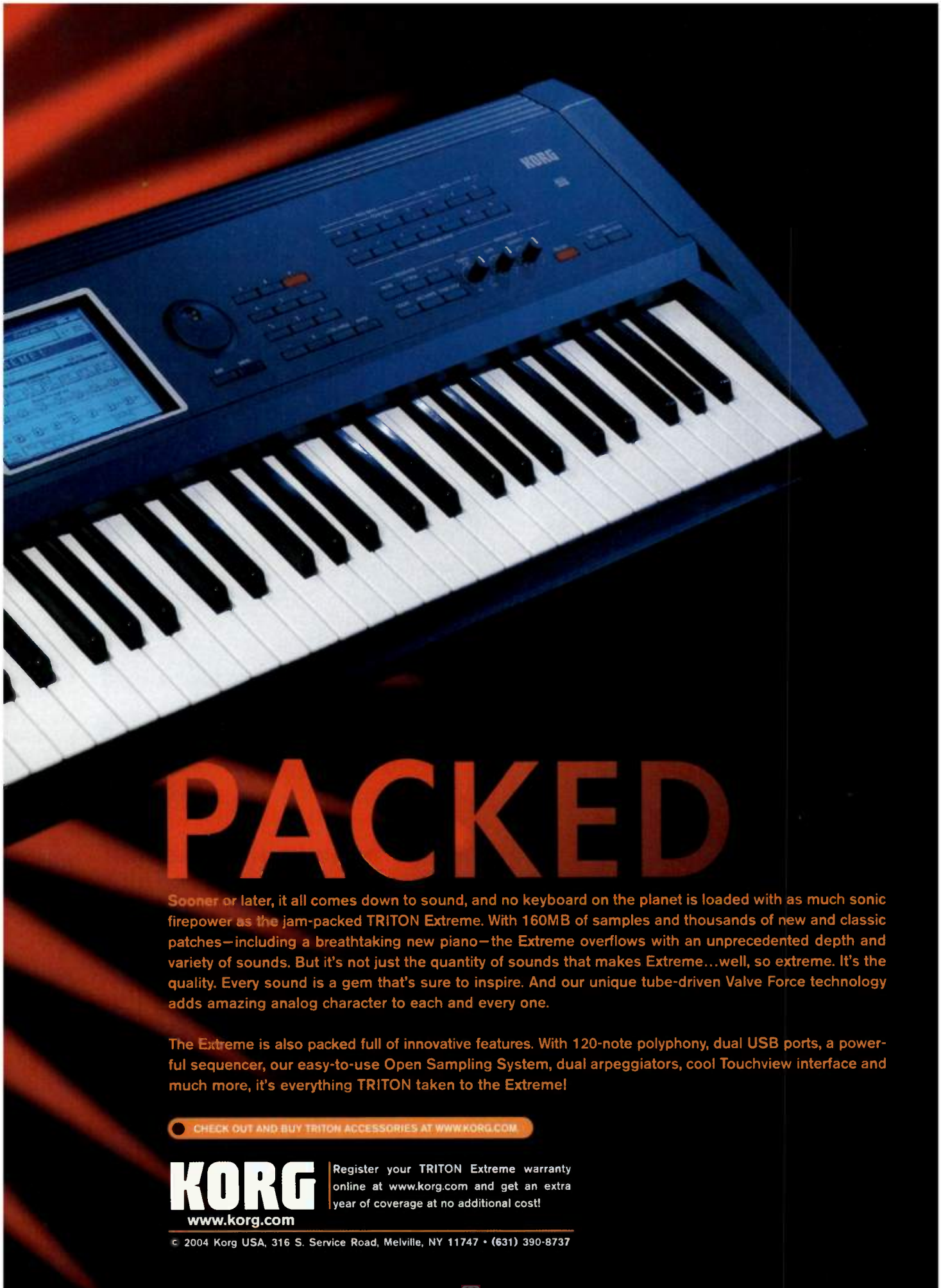

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I N S I

FEATURES

DEPARTMENTS

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COLUMNS

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REVIEWS

Buying In


DAN PHILLIPS

Just when I thought we might get a breather in the recent trend toward industry consolidation, several new mergers and acquisitions were announced, starting the grapevine buzzing all over again. It's too early to know what these deals will lead to down the line, but the implications for electronic musicians are worth contemplating.

In mid July, Focusrite announced that it had purchased Novation Electronic Music Systems. Both companies hail from the town of High-Wycombe Bucks, in the UK. Both make quality music-technology products, but of very different types, so I doubt that technology was a primary reason for the deal. Focusrite has much stronger marketing and distribution than Novation, so I suspect that Focusrite's management saw a chance to buy a company they knew well, presumably at a good price, and grow it. If this deal indeed strengthens the market presence of Novation products, it would seem to be good news for electronic musicians.

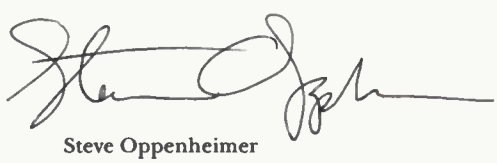
Sonic Solutions' purchase of Roxio's CD- and DVD-burning products, on the other hand, offers obvious technical and business synergies. Sonic Solutions is a world leader in professional DVD-authoring products and offers such consumer and small-business Windows programs as MyDVD and DVDit. By purchasing the Roxio consumer-software line, Sonic acquires a set of popular products for Mac and Windows and gains marketing and distribution strength in the consumer-software world. Some Mac users have been nervous about whether Sonic Solutions will continue to support its Mac products. The official word is that it intends to do so.

I've saved the biggest deal for last. We were taken by surprise when we learned that Avid had acquired M-Audio and assigned the fast-growing company to Avid's pro-audio arm, Digidesign. According to sources at Digidesign and M-Audio, M-Audio founder Tim Ryan will remain as GM of a semiautonomous division. M-Audio will keep its name, maintain its product lines and distribution deals, and keep doing its thing.

M-Audio's "thing" is what makes this deal so interesting. Most of the company's products are designed by contractors and are manufactured elsewhere. But I'll be surprised and disappointed if Pro Tools LE isn't working with M-Audio audio interfaces by next year.

Still, I don't think Avid was after engineering. The biggest reason for this deal is that M-Audio has strong distribution, is continually expanding sales, and is a popular brand name in the world of lower-cost products for the personal studio and, increasingly, in consumer audio. Avid has few lower-end products; had Avid wished to make a major competitive push into the areas that M-Audio is strongest, it would have had its work cut out for it. It makes a lot more sense to buy rather than fight your way in.

What does this mean for users of M-Audio products? I, for one, am encouraged that Tim Ryan is joining Avid's board of directors. That indicates M-Audio's product line and customer support will continue on in the same general direction.



Steve Oppenheimer
Editor in Chief

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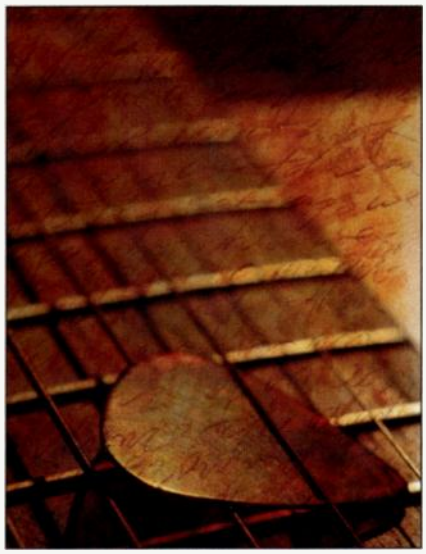

LIZ HEAVERN

COMPUTER TEAMWORK

I had Brown's excellent article ("Cover story: Two Heads Are Better Than One," August 2004) elucidates a few tricky aspects of using two or more computers in a personal studio and offers some great solutions.

As I began using more software synths, I found that latency settings crept up to at least 23 milliseconds when the host digital audio workstation ran a lot of audio tracks, effects plug-ins, and soft synths. That's too high for real-time monitoring if I want to add a new synth track.

The solution is simple—it requires two computers, a mixer, a second synth-hosting application, and a means of splitting the source MIDI signal to the two computers. I load both computers with identical sets of software synths, software samplers, and samples. I split the MIDI output from my controller and route it to both the primary and auxiliary computers. I run a second synth-hosting application on the auxiliary computer at a very low latency. Then, I load the same soft synth into each DAW, but monitor the synth from the auxiliary computer while I record a new MIDI track on the primary computer. Once I have a track I want to use, I switch to monitoring the synthesizer on the primary computer.

Bill Lorentzen
via email

IRONING OUT DIFFERENCES

I just finished reading "Capturing the Kit" (July 2004), and it's a good and useful article. But the annoying word "dampening" kept popping out and irritating me like fingernails on a blackboard.

Dampening is spritzing water on your good shirt just before you iron out its wrinkles. To "dampen" means to "make moist" or to "make damp." *Damping* is the process of reducing the activity of something, or (in the case of vibrations) of decreasing the length of time of a resonance. The verb is "damp," as in "I used duct tape to damp the snare's top head."

I speak from the authority of a master's degree in electronics engineering, a lot of technical-writing experience, and of having ironed a lot of shirts.

Bob Wey
Ear-Relevant Sounds

Bob—You are correct, sir! —Steve O

LEGAL ADVICE

Your article on manufacturing CD-G's ("CD+G=$," June 2004) was very informative. However, the section on the legal aspects of karaoke recordings (under the subhead "Technical and Legal" on pp. 60 and 62) missed the mark.

A karaoke recording with synchronized lyrics requires a voluntary (not a compulsory) license from the publisher. This was set by a landmark case in 1990 involving the Rolling Stones' publisher, ABKCO Music and Records, Inc., which made synchronized lyrics a "synchronous" use. This obviates the applicability of the compulsory license provisions of the copyright act.

The most significant difference between the voluntary license and the compulsory license is that the publisher can say "no" under a voluntary license. Compulsory licenses are obligatory (provided that you follow strict licensing guidelines), and the publishers are not permitted to say "no." Your article mistakenly stated that "compulsory licenses do not cover the charts." They cover all previously released commercial recordings whether or not they are hits or charting songs.

If one does not have synchronized lyrics, then the recording is considered "backing tracks." This type of recording, while not a CD-G type of recording, is subject to a standard mechanical license, and the Harry Fox Agency will license it.

Furthermore, it is pertinent to note that most publishers will charge a one-time, nonrecoupable fixing fee ($50–$250), as well as an advance payment against future royalties.

Steven Corn
Corn Music Services, Inc.

Steven—Thanks for clarifying this. We asked music-industry attorney and EM *author Michael Aczon, and he concurred with your opinion.—Steve O*

CAVEAT EMPTOR

I appreciated the article about preparing your computer for use as a digital audio workstation ("Desktop

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Musician: Conquering the DAW," June 2004). For me, synths and home studios are just a hobby. (I've subscribed to EM for 16 years.) However, my business is maintaining Windows business networks, and I am constantly amazed at the cheap PCs people buy for running business applications. A DAW requires much more out of a PC than the average business application. Author Kevin Smith spent a good portion of his article trying to steer people away from using an entry-level PC as a DAW, but I would like to expand on his admonitions.

Steer clear of *any* PC that can be purchased at a store. Your best bet is to purchase online from a major manufacturer and to purchase from a "business line" of PCs, like the Compaq DeskPro (now known as HP's Desktop d-series) or the Dell OptiPlex models. In addition, if the PC is offered with Windows XP Home Edition or a Celeron chip, keep looking: Windows XP Pro and a Pentium 4 chip are the baselines for business PCs. Personal-studio owners have other choices, such as rackmount DAW systems. That is the way to go when you want your PC to run music software right out of the box.

Avoid cheap PCs. When you see two PCs side by side that have similar specs but one is twice as expensive as the second, there is usually a good reason for that. Performance is much more than the component parts; it depends on the quality of those parts and how well they work together.

Don't use the motherboard's built-in graphics chip. The overwhelming majority of them use the computer's main memory for their storage, robbing performance from the CPU. Instead, get a separate video card that has the graphics capability for your uses.

Laptops are compromises. Get one only if you need extreme portability, and then be realistic about your performance expectations.

Avoid the Windows Millennium Edition (ME) operating system. Windows 98 SE is much more stable. If you need Windows 9*x* compatibility for some programs, consider dual-booting Windows 98 SE and Windows 2000 or XP Pro.

If a minitower is available, don't opt for the compact-case version. You'll appreciate it when you have to add that third hard drive and yet another DSP Farm card.

Consider using multiple hard drives. The first one ought to be your system drive. If you plan to dual-boot, divide it into two partitions (one OS per partition). The second one ought to be your data drive, and should be as large as you can afford. If you get a third drive for backing up (which I highly recommend), don't mirror it to your primary data drive unless you have a hard RAID controller. Soft RAID controllers rob performance from the processor. The better solution is to manually copy files after the session is over.

Thanks for letting me get that off my chest. And many thanks for years of great articles and reviews—I devour them all!

Name Withheld by Request
via email

Name— Thanks for your advice! For the most part, I agree with you, but I do have a few comments. For one thing, I would be wary of buying strictly from a company's business line, as those machines may not be tweaked for optimal real-time performance. For example, a company may put a slower drive into their business models than into their high-end "workstation" products, and since drive speed has an influence on a number of things—track count among them—that could be a factor. I have experience with the Dell OptiPlex, for instance, and would not necessarily recommend it for music production.

Second, in my opinion, it's not advisable to purchase Win 98 SE at this point, assuming you could even find a vendor that specs it. Newer products from many major manufacturers (Steinberg and Cakewalk among them) are configured for XP only. Dual booting is an option, but XP should be adequate in nearly all cases today.

Finally, when purchasing drives, be aware of acoustic noise levels and buy only what you need now, as external drives are readily available for upgrading. I have had good luck with the Maxtor One Touch series, which is relatively inexpensive and very quiet.—Dennis Miller

MUCH ADO ABOUT NOTHING

In reading Larry the O's entertaining May 2004 "Final Mix" piece on the subtle shadings of semantics ("What's in a Word?"), his "O-grown" proverb contained a "generalization of the extreme" when he stated "a person has control over nothing in his life." That is something I try to avoid.

In the spirit of subtleties and pinpoint accuracy discussed in his article, perhaps the proverb should be revised to say "a person has control over 'little' in his life." Nothing is that simple. Or is that being simplistic?

Kevin White
Storrs, Connecticut

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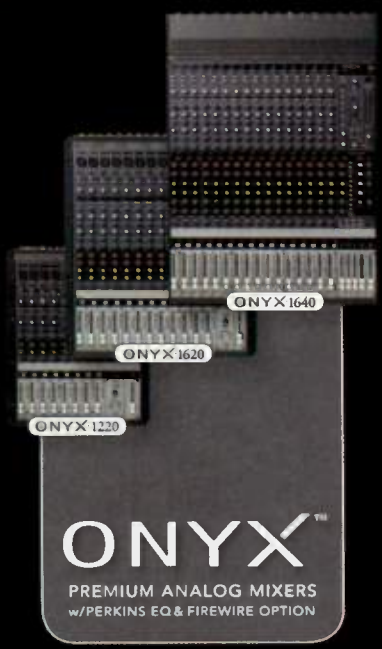

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GREG MACKIE, *our founding father, shows off a killer shirt and an Onyx 1220.*

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WHAT'S NEW

By Geary Yelton

HARTMANN NEURON VS

Hartmann Music recently announced Neuron VS (Mac/Win, $899), a virtual instrument that harnesses the same synthesis engine as the groundbreaking Neuron synthesizer. Real-time parameter control is made possible using Nuke, an included controller featuring a joystick, a button, four rotary encoders, and a USB connection. Nuke also serves as a copy-protection dongle for the program, which runs standalone and as a VST or Audio Units plug-in.

Neuron VS resynthesizes sampled sounds and lets you build new ones from a collection of acoustical models. It ships with more than 300 sounds and over 250 models. Hartmann Music/Russ Jones Marketing Group (distributor); email: hartmann@hartmann-music.com; Web: www.hartmann-music.com.

KORG ES-1MKII

Korg has taken the wraps off of the Electribe-S Rhythm Production Sampler ES-1mkII ($599), a tabletop instrument for sequencing and live performance. Compared with the previous ES-1, the mkII model has a new metal case and an enhanced wave ROM with plenty of fresh hip-hop, house, and urban-oriented sounds. The ES-1mkII can store as many as 128 patterns, 16 songs, and 100 mono samples or 50 stereo samples in memory. The unit comes preloaded with 64 patterns and 86 samples. Maximum mono sample time is 95 seconds at a sampling rate of 32 kHz.

The ES-1mkII lets you record your own samples or import WAV or AIFF files from SmartMedia cards, then time-slice them to create your own loops and patterns using step and real-time sequencing techniques. Play the front-panel buttons to easily create complex rhythms, even playing a roll or reversing a sample with a single button. With real-time resampling, you can record entire phrases played by the ES-1mkII, apply effects, and then create new sequences using the resampled phrases. Use the gate effect to rhythmically process external audio in sync with pattern playback. Other features include Mod Delay and ten other effects, 20-bit A/D/A conversion, motion sequencing, tempo tap, and real-time pattern-arranging features. Korg USA, Inc.; tel.: (631) 390-6500; Web: www.korg.com.

MOTU MX4

MOTU has begun shipping MX4 (Mac, $295), a new instrument plug-in that supports AU, MAS, and RTAS formats. MX4's multiple-architecture sound engine incorporates wavetable, FM, AM, and analog-modeling synthesis. According to MOTU, its polyphony and number of instantiations are limited only by the host computer's processing power.

Like MOTU's sampler plug-in, MachFive, MX4 appears in a single window in which all edits are made. Three audio oscillators supply wavetables sampled from vintage synthesizers. The filter section contains two resonant filters offering 16 types and a distortion stage. Stacking both filters can produce a 48 dB-per-octave slope. Six monophonic or polyphonic LFOs offer adjustable symmetry, rate delay, and other parameters that give MX4 some unusual modulation capabilities. You can freely assign the four DADSHR envelope generators to control any modulation destination. Modulate a single parameter with any number of sources simultaneously, or use a single source to modulate any number of destinations. Onboard chorus and delay effects are saved as part of each patch, and all effects parameters respond to modulation.

Other features include external audio processing, parameter randomization, unison multiplication, and hundreds of factory presets. Minimum system requirements are a Power Mac G3/500 MHz, Mac OS X 10.2, and a compatible host. Mark of the Unicorn (MOTU); email: info@motu.com; Web: www.motu.com.

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what more

Fireface 800

56-Channel, 24-Bit 192 kHz FireWire Audio Interface

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- 4 Discrete Line Inputs
- Hi-Z Instrument Input with Speaker Emulation, Soft Limiter and Distortion
- 8 Balanced TRS 24bit/192kHz AD/DA Converters
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MIX CERTIFIED hit

OctaMic D

Advanced 8-Channel Microphone Preamp

- 8 balanced XLR mic / line inputs
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The World's Most Powerful FireWire Audio Interface!

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samplitude V8

it just sounds better...

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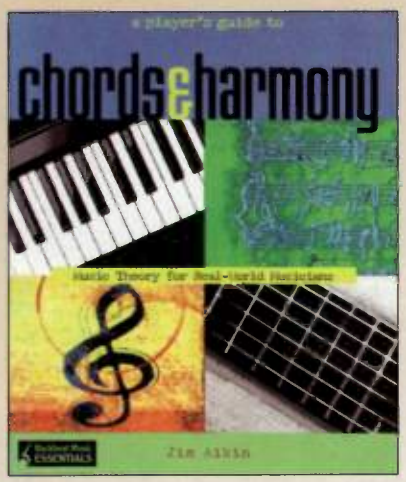
- Multi-editor for MIDI controllers
- MAGIX Analog Modeling Suite
- MAGIX Elastic Audio
- MAGIX Robota Pro
- Manager for file libraries, objects, tracks, segments and markers
- DVD audio
- ReWire support
- Remix/slice agent
- Full-screen video output (supports 16:9)

Electronic Musician 2004 EDITORS CHOICE

today and get it all!

SOUND ADVICE



BACKBEAT BOOKS

Frequent EM contributor Jim Aikin's latest book is *A Player's Guide to Chords and Harmony* ($19.95), subtitled *Music Theory for Real-World Musicians*. Its 196 pages serve as a detailed introduction to music theory, written in a casual tone that manages to avoid the academic stiffness of many college-level textbooks.

Aikin approaches music theory on a practical level, applying time-honored notions of melody and harmony to modern musical forms such as rock, jazz, folk, and pop. He familiarizes the reader with intervals, scales, modes, and chords, while explaining how to read music transcriptions and interpret chord symbols. In addition, he demystifies voice leading and chord progressions. He gives the reader a vocabulary for communicating with other musicians and a conceptual framework for understanding the inner workings of music itself. Each of the eight chapters ends in a quiz, allowing you to demonstrate what you've learned. The answers are located in the appendix. For beginning or experienced musicians, or anyone who wants a deeper understanding of what makes music tick, Aikin's book can be a valuable and eye-opening resource. Backbeat Books; email: books@musicplayer.com; Web: www.backbeatbooks.com.

COURSE TECHNOLOGY PTR

For anyone who needs help getting the most from their music software, the Cool School Interactus (CSi) Starter Series (Mac/Win, $29.99 each) of CD-ROMs provides hands-on guidance. Titles include CSi Starters for Cubase SX 2, Digital Performer 4, GarageBand, Logic, Pro Tools LE, Reason, Sonar 3, and Sound Forge. Each course presents a series of QuickTime movies that cover topics such as setup, recording, editing, mixdown, creating audio CDs and MP3s, and file backup. Lengths vary from two to three hours. Just as the Starter Series is ideal for beginners, the CSi Master Series (Mac/Win, $49.99 each) is more suitable for intermediate to advanced users, with lengths from five to six hours.

In *Logic CSi Starter*, for example, narrator George Leger III begins by showing you how to use the Setup Assistant, set up an Autoload file, and specify preferences in Emagic Logic Pro and Logic Express. From there, you will learn how to import, record, and freeze audio and MIDI tracks; use the editing and automation tools; apply effects processing plug-ins; bus and bounce tracks; and prepare a project for final delivery. The disc provides over 2.5 hours of video tutorials, as well as quizzes that let you confirm what you've learned.

To run the CSi series on your PC, you'll need a minimum Pentium III/400 MHz, a 16-bit sound card, and Windows 98, ME, or XP. Mac users will need a Mac G3/300 MHz and either OS 9 or OS X 10.2. Both platforms require at least 32 MB RAM, 50 MB free disk space, and a 16x CD-ROM drive. Cool Breeze Systems/Course Technology PTR; email: ct.retail@thomson.com; Web: www.courseptr.com.

OXFORD UNIVERSITY PRESS

Peter Manning's Revised and Expanded Edition of *Electronic and Computer Music* ($35 softbound, $80 hardbound) is the second update of his classic text on the subject. Over the course of 474 pages, he discusses music technology in its many forms. Manning, a professor at the University of Durham in the UK, takes the approach of exploring his subject matter in a historical context, tracing its development from its roots to the present, beginning with Thaddeus Cahill's 1897 patent for the Telharmonium and continuing up to the present age of virtual synthesis and signal-processing software.

After a brief discussion of electronic music before 1945, he describes pioneering work in the classical tape studios of Europe and the U.S., early synthesizers and the contribution of rock in the 1960s, the development of digital audio and MIDI, and the use of desktop computers for music production. Along the way, Manning touches on many technical aspects without going into unnecessary detail. A section on performance controllers is especially interesting. *Electronic and Computer Music* is suitable as a classroom textbook or for anyone interesting in the history of synthesizers and computer music. Oxford University Press USA; email: music@oup-usa.org; Web: www.oup.com.

▼ PG MUSIC BAND-IN-A-BOX

PG Music's popular algorithmic composition program is now fully carbonized to run 32-bit native in Mac OS X. Band-in-a-Box 12 for Mac OS X ($88) encompasses dozens of features that the Windows version has embodied for over a year, as well as a few new ones.

Version 12 includes many more Styles, Soloists, Harmonies, and Song Demos than previous versions. It now supports odd time signatures, and it can easily transform songs from 3/4 time to 4/4 or vice versa. Use one- or two-bar drum patterns for count-ins rather than metronome clicks. PG Music claims a threefold increase in speed that improves redraw, song-generation, and solo-generation times. A new harmonization feature adds a voice that plays chord roots, and the virtual bass player plays natural 5ths over certain chords. For Mac OS 9 users, the installation disc also includes Band-in-a-Box 11. An upgrade from version 11 is $49. Upgrades from earlier versions are $59.

Also available is Band-in-a-Box 2004 for Windows ($88). In addition to version 12's features, it offers a 32-bit program engine, DXi support, one-button SMF import, and much more. You can combine up to five Styles to create and save your own Hybrid Style, or record an audio track and apply 4-part vocal harmony. PG Music; email: info@pgmusic.com; Web: www.pgmusic.com.

STEINBERG CUBASE SX3

Just when you thought DAW makers couldn't pile on any more functionality, Steinberg has announced Cubase SX3 (Mac/Win, $799.99; upgrades from 2.0, $149.99). Cubase SX3 adds more than 70 new features, many of which accommodate innovative techniques for loop- and pattern-based composition, arranging, and mixing. Using the Audio Warp time-stretching and pitch-shifting algorithm, Acid loops and other audio data can automatically adopt a project's tempo and follow tempo changes in real time. A new Play Order Track lets you divide songs into sections and then rearrange them on the fly, converting them back to linear form for mixdown. Use the new Inplace Editor to modify MIDI events without leaving the Project window.

Got a favorite hardware processor you want to integrate into your virtual studio? Cubase SX3's External FX plug-ins let you incorporate external effects in its VST mixer and compensate for delays. The Extended Freeze function adds flexibility and improves performance when freezing virtual instruments or entire audio tracks, with or without insert effects. Part-based volume envelopes, MIDI Device Maps/Panels, and improved hit-point detection are just a few of the additional features.

Minimum system requirements are an Athlon or a Pentium 4/2.8 GHz, Windows 2000 or XP, and 384 MB RAM; or a Power Mac G4/867 MHz, OS X 10.3.3, and 384 MB RAM. Steinberg; email: info@steinberg.net; Web: www.steinbergusa.net.

▲ ARTURIA MOOG MODULAR V 2.0

Soft-synth maker Arturia has updated Moog Modular V to version 2.0, offering six new modules, 200 new presets, and several new user interface features. Now you can scroll the entire interface to view every module. You can also rearrange certain modules as desired. Instead of generating waveforms that always begin at the zero point, the oscillators are now free-running, just as real voltage-controlled oscillators are. Arturia also says that envelope times are faster and that the filters respond more realistically to modulation. An updated soft-clipping technique conserves processor power.

Four classic modules are made new again in software: the Moog 12-stage phaser, the 1630 Bode frequency shifter, the 928 sample and hold, and the 912 envelope follower or Schmitt trigger. The formant filter and ring modulator modules are all-new Arturia designs. Moog Modular V 2.0 also has a new unison mode and external audio input options. It runs in Mac OS X 10.2 or higher and Windows 98 SE, 2000, ME, or XP. It requires a 1 GHz CPU and 256 MB RAM on both platforms. Arturia; email: info@arturia.com; Web: www.arturia.com.

DOWNLOAD OF THE MONTH ▲▲▲▲

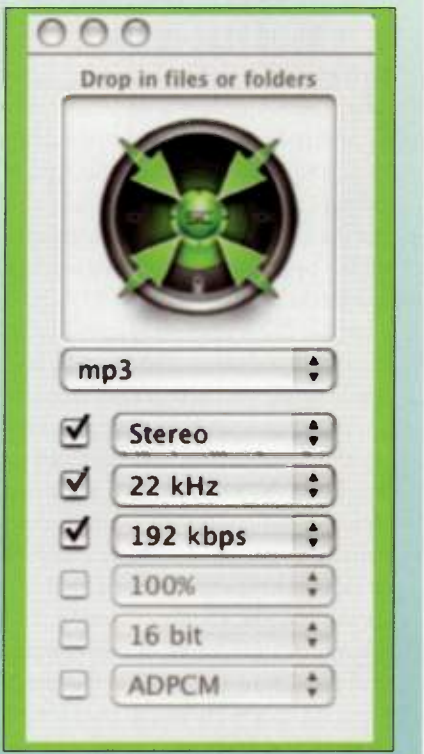
▶ SOUNDCONVERTER

SoundConverter (Mac, $10) is a sound-file conversion utility from software designer Steve Dekorte (www.dekorte.com/software/osx/SoundConverter). It handles uncompressed formats such as AIFF, WAV, and SDII, as well as compressed formats such as MP2, MP3, and SND. You can download a free version that converts files under 500 KB; paying the license fee removes that limitation. In an interesting twist, SoundConverter will also convert a variety of ringtone formats to either other ringtone formats or to most audio formats. Because ringtone formats are based on musical notes, conversion from audio to ringtone formats is not possible.

SoundConverter will convert individual files as well as batches. In either case, you launch SoundConverter, choose an output format from a drop-down menu, and then drag the file or files to be converted from the Finder to the SoundConverter application. You can also drag folders for batch conversion, which will convert all files at any level of nesting. Care is advised when doing batch conversions, because the conversion process can be lengthy.

SoundConverter lets you to set conversion parameters appropriate to the output format. For example, for MP3 conversion, you can choose mono or stereo and set sampling and bit rates. SoundConverter supports a huge number of input and output file formats. You're probably unfamiliar with most of them, but if you happen upon a Web site with audio files in some little-used format, then you'll be covered. (Mac OS X 10.2 or above is required for some conversions.) Whether you need to frequently convert large batches of audio files or occasionally convert an off-the-wall format, SoundConverter can save you time and frustration.

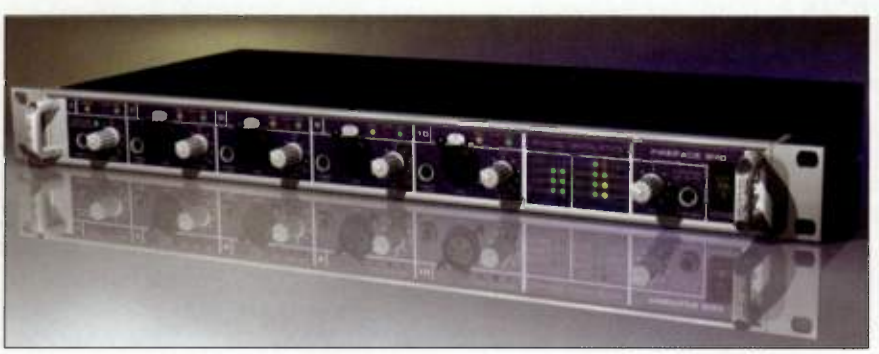
—Len Sasso



▼ RME FIREFACE 800

RME has announced Fireface 800 ($1,799), an audio interface that uses the high-speed FireWire 800 protocol to communicate with a host computer. The 1U rackmount unit can record as many as 35 inputs to 28 channels simultaneously. All inputs and outputs can be freely mixed using the included TotalMix software (Mac/Win), which stores all settings in flash memory and allows a maximum 14 independent stereo submixes.

Fireface 800 has eight balanced ¼-inch line inputs with software-controlled reference-level switching (+4 dBu, -10 dBV, or high-gain); four discrete balanced mic inputs with Class A preamps, phantom power, and simultaneously available XLR and TRS jacks; a high-impedance instrument input; eight balanced TRS outputs; and a high-output ¼-inch headphone jack that doubles as an assignable stereo output. The instrument input has a soft limiter that creates harmonic distortion and prevents A/D converter overloads, as well as a drive circuit and a speaker-emulation filter. In addition to a pair of coaxial AES/EBU or S/PDIF RCA jacks, two optical digital audio ports accommodate either 16 channels of ADAT Lightpipe or 8 channels of Lightpipe and stereo S/PDIF. Fireface 800 comes with three FireWire ports: one for FireWire 800, one for FireWire 400, and one that supports either format. MIDI In and Out ports are also provided.



The A/D/A converters handle 24-bit audio at rates as high as 192 kHz. Drivers for Windows XP, Windows 2000, and Mac OS X 10.3 and up are available, with support for connecting as many as three units. A time-code option is expected to ship by the end of the year. RME/Synthax (distributor); email: info@synthax.com; Web: www.rme-audio.com. ●

Industry Profile

Is customer service dead?

Not if you're smart about where you buy gear.

By Adam Cohen

Buying musical equipment in 2004 is quite a bit different than it used to be. Music technology is more complex now than at any other time in history, and yet we as consumers have less and less access to knowledgeable people to help us sift through the choices out there or help us get our gear up and running once it's in our studio.

When mom-and-pop music shops ruled the retail landscape, this sort of customer service was commonplace. The folks at your local music store would get to know you and what you did and didn't like, and would help you make decisions about what to buy. If you had questions about how to use something they sold you, chances are they could help you figure it out and, maybe more importantly, were willing to help you figure it out.

THAT WAS THEN, THIS IS NOW...

These days, that level of customer service is largely a thing of the past. While the rise of huge national chain stores has lowered the cost of the average gear purchase, it has also conditioned you to expect the same dismal level of customer support you get at the local discount warehouse. As long as there is a warm body that can point you in the direction of that 5-gallon jug of mustard (or the Guitar Department), you've gotten precisely the level of customer service you expect. The level of "service" one can expect from most mail order or Internet retailers is even less inspiring.

So with music technology becoming more and more complicated, and retailers becoming less and less able to help you figure out what to buy and how to use it, where should you turn? There is one retailer that still believes that customer service is not only important, but the cornerstone on which to build a business, and that retailer is Sweetwater. While others may say they offer great service, Sweetwater actually does it, by hiring only the best to staff their sales department, and backing up their pre-sale advice with post-sale support.

RETAIL DONE RIGHT

You may think that this sort of service would come at a high price, but the reality is that due to their size, Sweetwater is able to offer the same sort of deep discounts as other big retailers AND a level of support that doesn't exist elsewhere. It's as much about their customer service philosophy as anything else — from the receptionist answering the phone to the shipping specialist who packs your order, everyone at Sweetwater is focused on providing the customer with the best experience in music retail.

This fanatical attention to customer service is most evident with Sweetwater's sales staff. Each sales engineer goes through extensive, ongoing product training, augmenting their heavy-duty real-world experience with the latest information about the products they sell.

Over the years, my friends at Sweetwater have always been able to help me stay on top of the latest developments in Music Technology. They actually use much of the gear they sell, so I'm always able to get great advice about how a given product will work in the real world.

Jon Sloate

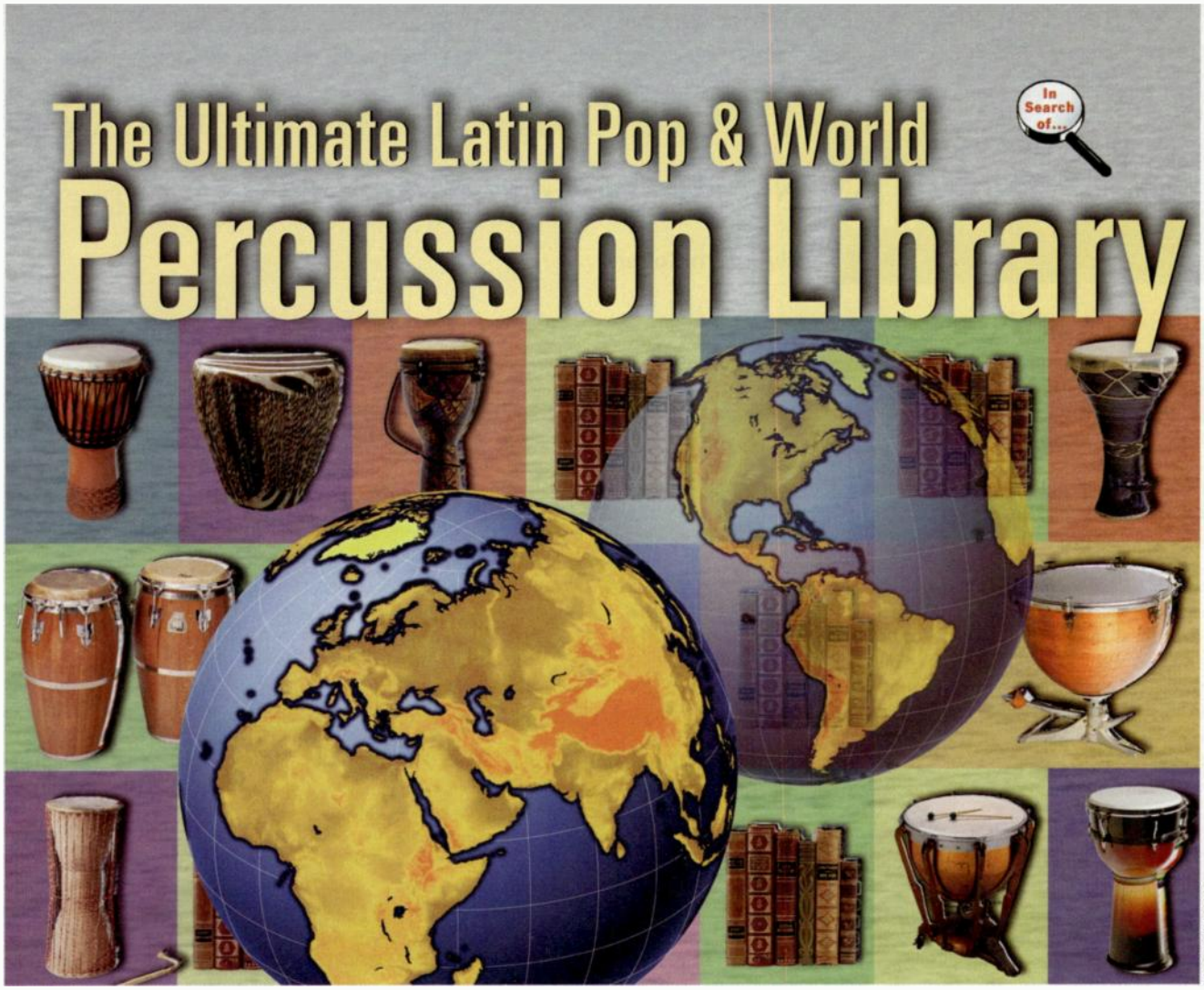
For Sweetwater, customer service doesn't end once the sale is made. They've invested heavily in staffing and training a technical support and service department with over two dozen music technology experts capable of helping customers use the gear they buy at Sweetwater or repair it if the need arises.

Sweetwater customers have unlimited free access to the technical support department, which supports every brand of gear they carry, making Sweetwater a one-stop tech support shop for complex multi-manufacturer setups. Todd Tatnall, one of Sweetwater's senior support technicians, says "with today's computer-based music systems, it's very easy for end users to find themselves amid a sea of manuals from a half-dozen hardware and software companies, wondering why their virtual synth isn't responding to their MIDI controller, or why they're only getting 6 tracks of playback on a system that's supposed to deliver 32 tracks or more. We handle these sorts of issues all day, six days a week, so we're usually able to get a customer up and running in no time."

So whether you're looking for a retailer with the gear you want in stock at great prices, the willingness and expertise to help you make decisions about what to buy, or someone that will be there to help you get your system up and running once it's in your studio, Sweetwater is the place to call. They can be reached at (800) 222-4700 or visited online at www.sweetwater.com

Sweetwater sales engineers take the time to fully explain the gear they sell to their customers—in person or on the phone

The Ultimate Latin Pop & World Percussion Library



LAURA WILLIAMS

Spanning the globe for the best collections.

By Rob Shrock

Percussion instruments are some of the first instruments ever to be sampled. Most of their sounds have sharp transients and short sustains, which make the sounds easy to capture and reproduce in a music production. Though a wide variety of percussion libraries exist today, new collections keep appearing; there always seems to be room for more commercial percussion samples.

While it may be understandable to select a single tambourine hit, for example, and use it repeatedly in a pop song, most percussion instruments are capable of producing sonic variety and expressiveness, just like a guitar, a violin, or a piano. Many of the more recently created libraries have recognized that fact not only by adding more dynamic velocity layers, but also by providing more types of hits and sounds from a given instrument. With the wide variety of available percussion loops and the warping capabilities of modern software like Ableton Live and ReCycle, creating great-sounding organic or other-worldly percussion tracks is easier than ever. Gone are the days of General MIDI providing a single sample each for high and low timbale, bongos, and congas, or that obnoxious single guiro scrape.

Many good percussion libraries have been released over the past ten years. Some are so good that they remain relevant today, and others have added new tools or a unique approach to the game. The titles reviewed here have those qualities and will help you cover a lot of rhythmic ground in your productions.

Sounds good enough to eat.

Today's Special

If you're looking for delicious sound, meet the Bluebird, Blue Microphone's new Class A discreet condenser mic. Combining the best characteristics of our award-winning designs in a single package, the Bluebird is uniquely versatile, with applications ranging from vocals to electric and acoustic guitars, drums, percussion, piano, horns, strings, and any other application where crystal-clear sound quality and detail is of the utmost concern. It's truly a microphone of exceptional quality, cutting-edge design and superior craftsmanship for even the pickiest of audio gourmets.

The Bluebird comes with the Bluebird Accessory Pak – BirdCage Pop Filter, BirdNest Shockmount and Blueberry Cable.

Stereo Tuna Salad $1.25
Preamp Pot Pie (Giles' Favourite) $1.75
Veal à la Virella $1.90

"The Bluebird Cafe serves up some of the best audio vittles in the whole tri-state area. Whenever I'm traveling through, I always stop in and sing its praises."
– Simon Gooddie, *EarCandy Revie*...

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The Bluebird Cafe

Try these tasty

PLATINUM COMBOS!

Our chef has outdone himself with these special combos featuring three best-selling **Focusrite Platinum Series** entrees along with the scrumptious new **Bluebird Mic** and accessories. Not only are these special creations aurally satisfying, but the savings are even more delectable. Bon appétit!

Combo Number 1 — VoiceMaster Pro Pak

A tasty combo featuring the award-winning VM Pro. Vocalists desiring a sonic upgrade with lots of features will appreciate this entree. The 24/96 digital output card has been added to cleanse your sound palette.

- Focusrite VoiceMaster Pro Channel Strip w/ Class A Mic Pre, Latency-free Monitoring, Vintage Harmonics, Compressor, Voice Optimized EQ, Tube Sound and more
- Bluebird Mic w/BirdNest & BirdCage (Pop/Shock) & Blueberry Cable
- Focusrite 24-bit/96 kHz A-D Card

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Combo Number 2 — TwinTrak Pro Pak

An equally delectable dish for the digital DAW-user who desires to get rid of a traditional mixing desk and gain improved tracks with latency-free monitoring. We've doubled the feature-set for tantalizing sonic results.

- Focusrite TwinTrak Pro Channel Strip featuring Dual Class A Mic Pres and Instrument Level Inputs, unique "Scoop" EQs, Dual/Mono Compressor, Stereo Latency-free Monitoring, and available 24-bit/96 kHz A-D (additional cost)
- Bluebird Mic w/BirdNest & BirdCage (Pop/Shock) & Blueberry Cable

SRP: $1685 – SPECIAL BUNDLE PRICE: $1099

Combo Number 3 — TrakMaster Pak

Our most value-oriented dish with mouth-watering features and a great price to match. Don't let the low price fool you, this flavorful combo packs a lot on its plate!

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- Bluebird Mic w/BirdNest & BirdCage (Pop/Shock) & Blueberry Cable

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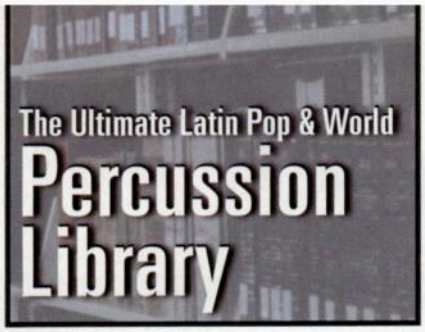

BEST SERVICE

PLP120 Percussive Live Performances

Following the trend of virtual instrument plug-ins, *PLP120* includes a collection of rhythmic grooves accessed from a proprietary user interface. The library consists primarily of world loops—Indian, Arabic, African, and Eastern, but very little Afro-Cuban or Brazilian-type material. A small collection of single hits is included; however, this is really a plug-in geared toward manipulating idiomatic loops of live percussionists.

That's where the program's unique interface comes into play. At first glance, you can't help but notice the big compasslike orb (see **Fig. 1**). Called the "loop eye," it is a graphic representation of the loop with the transients of the hits clearly visible. As a loop is played, a line from center to edge rotates clockwise, very much like what your would see on Doppler radar. Two moveable dials can instantly change the start and end points of the loop, which is great for making, say, a 5/4 loop out of two-bar 4/4 loop. You can adjust the start and end times on the fly, but you have to retrigger the sample to hear the change. The resolution of the loop points can be extended from a 32nd note all the way up to a bar (no triplets). I have yet to hear a bad loop created by adjusting the start and end times from their default positions.

FIG. 2: The interface of Quantum Leap *Stormdrum*, based on Native Instruments' Intakt sampler, enables access to sound-shaping tools such as a multimode filter, envelope follower, two LFOs, and effects.

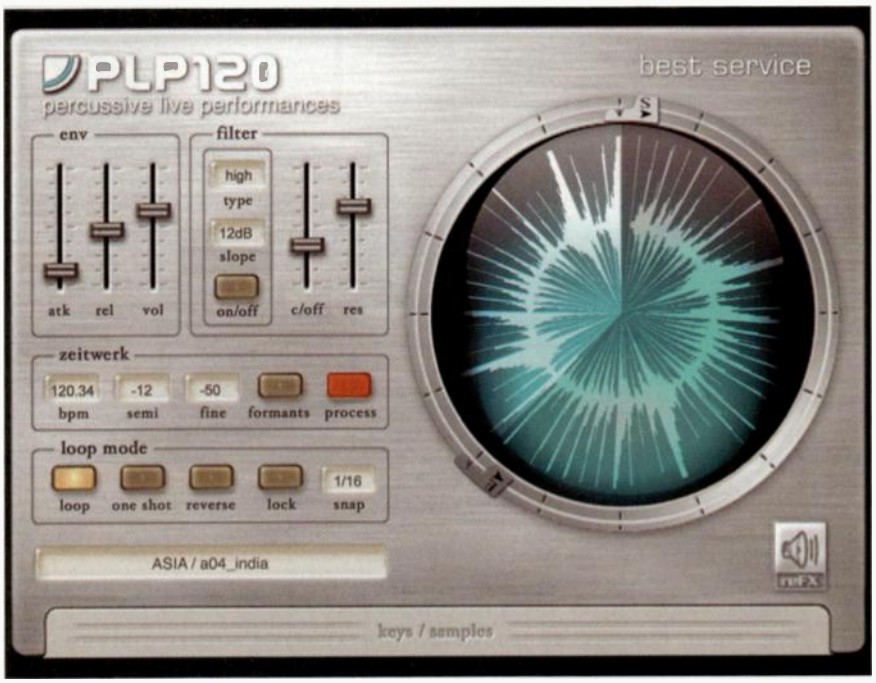

FIG. 1: The radarlike "loop eye" in Best Service's *PLP120 Percussive Live Performances* interface has a visual representation of a loop and dials for changing its start and end points.

Each bank brings up as many as 24 different loops that can all be played simultaneously, along with any individual edits. You can make an adjustment to the start and end points of one loop and have it play against the pattern of another loop that is triggered by a different note. (I created one really cool bed by having an 8-beat pattern play against 7- and 5-beat patterns.)

As the name of the product implies, all of the loops were recorded at 120 bpm. However, you can change the tempo or pitch of the material. Tempos can be moved effectively between 90 and 150 bpm with no audible artifacts. Although the initial loading of loop banks is almost instantaneous, you must process any tempo or pitch changes by pushing a button. Slowing a loop down from 120 bpm to 90 bpm took between 10 and 20 seconds on my G4. Tempo changes have to be applied individually to each loop that you want to use at the new tempo. The pitch

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The Motif ES is the most powerful keyboard workstation on the planet. So what could possibly make it better? Imagine that you could transform your ES from being just a synth into the most important part of your computer studio!

What if you could connect guitars and mics to the audio inputs on your ES, add any of the ES insert effects and then record directly into your computer's software? What if you composed on the Motif's built-in sequencer and then simultaneously recorded all 16 ES tracks into Sonar, Logic, Cubase or Digital Performer? What if you could turn the ES into a complete DAW control surface and use its faders, knobs and buttons to open windows, move faders, set panning and EQ—even control and view VST /AU plug-ins directly from your ES? Well, if you could do all that, why not take 4 stereo audio buses from your computer, send them to the Motif's superior reverbs and mastering effects before sending the fully mixed computer tracks via the Motif's audio outs to your monitor speakers?

Imagine a Motif ES and a computer could make up this completely integrated professional computer studio. And for good measure, demand to do it with just one FireWire cable connected between your ES and your computer.

WHAT IF just became WHAT IS—the mLAN 16E for the Motif ES.

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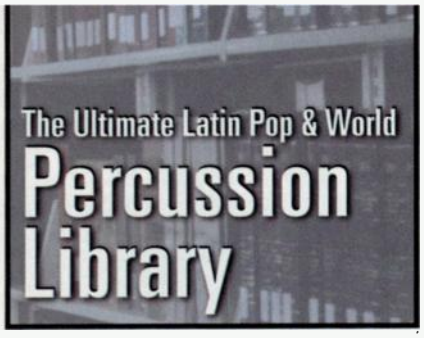


change can also adjust the formant and offers semitone and fine pitch adjustments. The DSP is nondestructive and sounds great, so I think it's worth the few seconds it takes to do its thing. You can still adjust the start and end points after a tempo or pitch change.

You can set the loop to repeat by holding a key down or as a one-shot, and you can also play a loop in reverse. A rudimentary envelope and filter are included, which add more value to a really cool plug-in. I wish there were more Latin material.

QUANTUM LEAP

Stormdrum

Stormdrum is another in the ever-growing population of sample libraries delivered in the form of a software instrument. Although much of the content comes from acoustic drum kits, *Stormdrum* features a lot of nondrum percussion. The program treats all of the sounds as a wide palette of colors.

Stormdrum has Kompakt and Intakt engines—the former for use with the huge collection of its individual hits, and the latter for the percussion beds (see **Fig. 2**). Kompakt acts more like a traditional multitimbral sampler, while Intakt is designed to play back the loops and dense beds. The percussion beds are sliced by beats, so the tempo in Kompakt can be set to match the sequencer's tempo, and the loops will adjust accordingly. You can adjust the loops within an acceptable range before hearing artifacts, but it's best to find percussion beds that are fairly close to your desired tempo.

Stormdrum's samples have a large sound, which makes the program well suited for using with film scores, electronica, and other styles that call for an esoteric approach to percussion sounds.

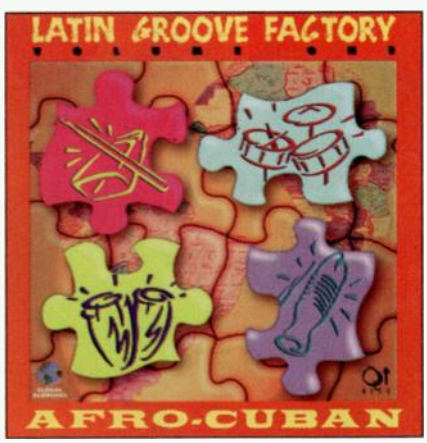


FIG. 3: Q Up Arts' *Latin Groove Factory* covers the percussion sounds of South and Central America in three volumes, featuring Afro-Cuban (vol. 1), Brazilian (vol. 2), and Caribbean (vol. 3) instruments.

Q UP ARTS

***Latin Groove Factory*, vols. 1, 2, and 3**

Latin Groove Factory (see **Fig. 3**) is planted firmly in South and Central America. Vol. 1 concentrates on Afro-Cuban, and Vol. 2 is strictly Brazilian. If you need mambo, merengue, bolero, and salsa loops, look no further. All of the loops are authentic, and the recording is excellent. Several tempos are provided for the loops, and the players' level of expressiveness adjusts accordingly; throw these loops into Ableton Live, and you're ready to go.

The individual hits are also excellent. Vol. 1 has bongos, chekere, clave, congas, cowbell, guiro, maracas, timbales, and woodblock. My main complaint is that there is usually only one sample set per instrument. For instance, although the guiro is good and has lots of samples, they come from only that specific guiro. Fortunately, there are five different cowbells (as you would need for salsa), but most instruments are represented only once.

Vol. 2, geared to Brazilian music, has more instruments than Vol. 1: Agogo bells, bongos, cabasa, caixa, caxixi, chekere, congas, cuica, cowbell, metal shaker, pandeiro, repinique, surdos, tambourim, samba whistle, and wood block are represented. As in Vol. 1, the loops sound great, as well as authentic.

Both libraries also have an excellent acoustic drum kit that sounds like a Yamaha Recording Series kit. The drums are better than a lot of standalone drum libraries, and I've used them for many productions unrelated to Latin music. The same kit is used in both volumes.

Vol. 3, which is not reviewed in this article, concentrates on Caribbean sounds.

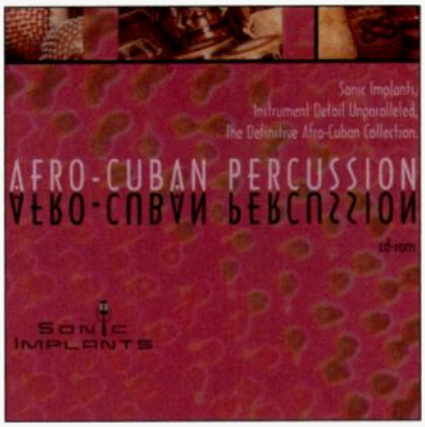


FIG. 4: Sonic Implants' *Afro-Cuban (Latin) Percussion* gives you up to four Velocity layers per note and multiple articulations per instrument in monophonic close-miked and stereo ambient samples.

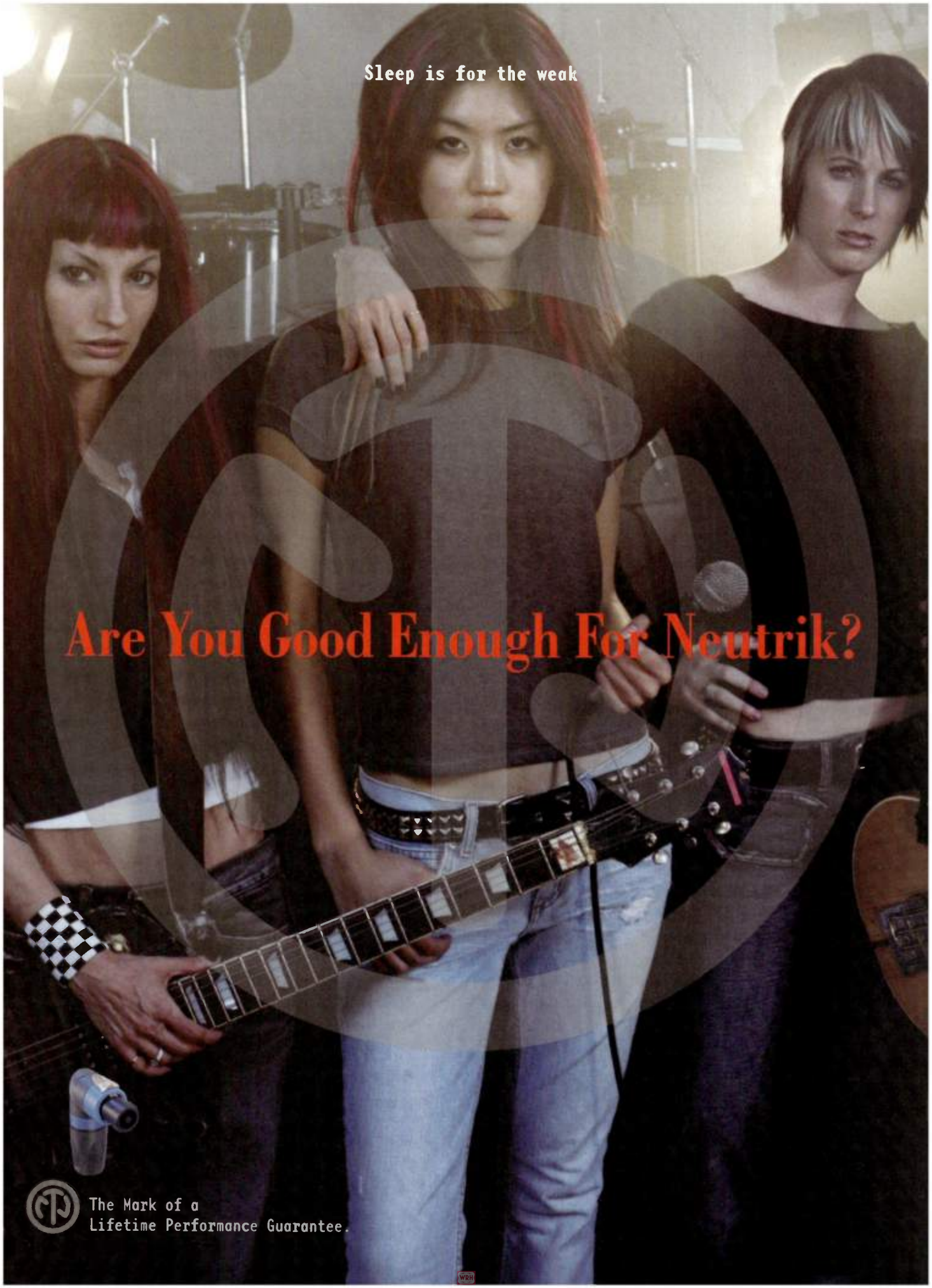
SONIC IMPLANTS

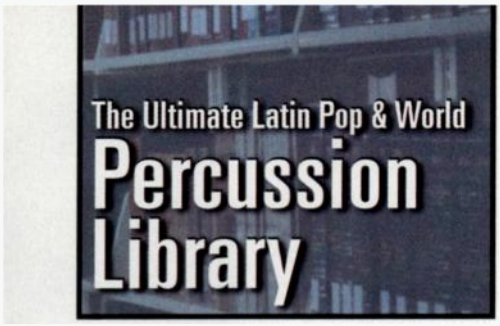
Afro-Cuban (Latin) Percussion

Sonic Implants, once a developer of SoundFonts only, has gained a reputation as a premier developer of high-end, professional sounds. *Afro-Cuban* (see **Fig. 4**) has a thorough representation of Central and South American percussion. The sampling and programming are excellent. It gives you as many as four Velocity layers per note, along with a large selection of articulations per instrument.

Each instrument comes in monophonic close-miked and stereo ambient samples that can be mixed together. The stereo samples aren't overly ambient and have just enough air and space. (In general, Jennifer Hruska—Sonic Implants' owner and head programmer—has shown a great ear for creating ambient samples that aren't distant and mushy.) The combination of close and ambient can be stunning in a production.

My favorite ones are the congas,


Sleep is for the weak
Are You Good Enough For Neutrik?
The Mark of a
Lifetime Performance Guarantee.



surdos, cowbells, and the large basket. Combined with the ability to balance close and ambient perspectives, *Afro-Cuban* is a real winner for Latin music percussion.

SPECTRASONICS

Supreme Beats

The *Supreme Beats* collection (see **Fig. 5**) has been a mainstay for good reason: it's a great library, performed by percussionist Bashiri Johnson with collaborators. Johnson helped to set the standard for modern percussion sample libraries by including immaculately recorded loops and individual hits that can be seamlessly intermixed. He introduced U.S. audiences to lots of instruments from various regions of the world. For example, he has given us an education on how to play unique drums such as dun dun, maman, and bala in a musical context by providing stylistically appropriate looped performances.

The individual hits sound great. The recordings have a natural feel that allows for additional EQ and compression processing without the sounds falling apart, which is why this library has been a favorite of film composers for years. Natural air and space around the samples give them depth, and you can sequence very realistic performances with the hits.

Supreme Beats tends toward African percussion, but it offers Middle Eastern and Asian sounds as well. All of them are top-notch, especially the collection of human hand, feet, and mouth sounds. Creating an authentic-sounding Latin production with *Supreme Beats* would be difficult, though, because that material isn't represented in full. Maybe one day Johnson will bless us with a new, supplemental collection.

Heart of Asia and *Heart of Africa*, also offered by Ilio, are worth mentioning. They have seen a lot of studio time and integrate well with *Supreme Beats*.

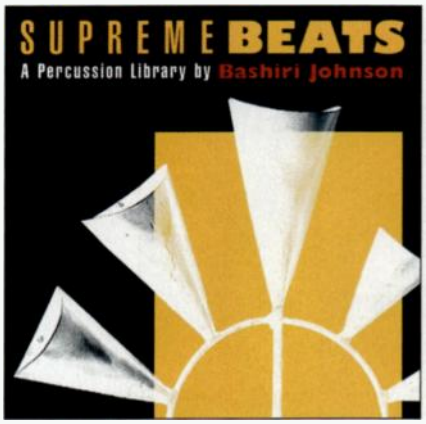


FIG. 5: The studio mainstay Spectrasonics *Supreme Beats*, created by percussionist Bashiri Johnson, focuses on African percussion but also includes Middle Eastern and Asian sounds.

COMPANY CONTACTS

Best Service/EastWest (distributor)
tel.: (800) 833-8339 or (310) 271-6969
email: info@eastwestsounds.com
Web: www.bestservice.de

Quantum Leap/EastWest (distributor)
tel.: (800) 833-8339 or (310) 271-6969
email: info@eastwestsounds.com
Web:www.soundsonline.com

Q Up Arts
tel.: (800) 454-4563 or (801) 486-8225
email: info@quparts.com
Web: www.quparts.com

Sonic Implants
tel.: (888) 769-3788 or (617) 718-0202
email: biz@sonicimplants.com
Web: www.sonicimplants.com

Spectrasonics/Ilio Entertainments (distributor)
tel.: (800) 747-4546 or (818) 707-7222
email: ilioinfo@ilio.com
Web: www.spectrasonics.net

Wizoo GmbH/Big Fish Audio (distributor)
tel.: (800) 717-FISH or (818) 768-6115
email: info@wizoo.com
Web: www.wizoo.com

Yellow Tools/EastWest (distributor)
tel.: (800) 833-8339 or (310) 271-6969
email: info@yellow tools.de
Web: www.yellow tools.com

WIZOO GmbH

Platinum24 Latin Percussion

The selection of instruments on *Platinum24 Latin Percussion* (see **Fig. 6**) is fairly similar to *Latin Groove Factory* and *Afro-Cuban (Latin) Percussion*. The primary difference between them is that *Platinum24 Latin Percussion* gives you more variations per instrument than do the others. For instance, you get six guiros, eight claves, two sets of bongos and four caxixis, many of which have as many as eight Velocity layers. The downside is that some of these instruments don't give you as many articulations per instrument.

All of the instruments are multisampled single hits; there are no loops. The individual sounds are excellent, and the various instruments work well together. All of the samples are in stereo yet have nice punch and presence. I especially like the pandeiro, vibraslap, and bongos.

Wizoo has taken a slightly different approach to its distribution than do other manufacturers. In addition to buying the complete libraries, you can purchase a half dozen individual percussion kits online.

YELLOW TOOLS

Culture

Culture is one killer software instrument. Yellow Tools uses a proprietary interface (see **Fig. 7**) for its instruments that is similar to Kontakt in layout. Under the hood is a powerful engine that allows you to remap the sample to accommodate your playing preferences or to create custom mappings.

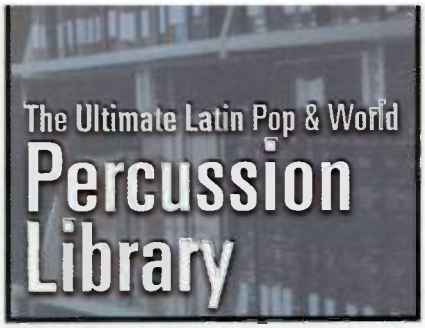
In addition to the standard fare of Afro-Cuban and Asian instruments, *Culture* has a nice collection of Industrial percussion, with barrels, claps, flight cases, ratchets, metal thunder sheets, trash cans, plastic and wah-wah tubes, and watering cans. Orchestral percussion includes cymbals, gongs, bass drum, snares, tambourine, timpani, temple blocks, toms, triangles, and vibraslaps.

Many of the instruments have as many as 12 or more samples per key as well as a large variety of articulations, which makes for some very authentic performance potential. Nevertheless, *Culture* is very easy to use.

But what matters most is its sound, and *Culture* sounds phenomenal. The low frequencies are full and more extended than those of the other libraries, and the highs are crystal clear. Some of the sounds have a "big" quality that makes

SAMPLE LIBRARIES

COMPANY	TITLE	FORMAT	DESCRIPTION	SYSTEM REQUIREMENTS	PRICE
Best Service	*PLP120 Percussive Live Performances*	AU, RTAS, VST, Mac/Win	3 CDs	MAC: G3/233; 256 MB RAM; Mac OS 9.2, OS X 10.2; 3.1 GB free hard-disk space PC: Pentium II/300; 256 MB RAM; Windows 98/2000/ME/XP	$199.95
Quantum Leap	*Stormdrum*	Kompakt/Intakt, AU, DXi, RTAS, VST, Mac OS X/Win	2 DVDs: 1 Kompakt, 1 Intakt	MAC: G3/500; 256 MB RAM; Mac OS 10.2.6; 6 GB free hard-disk space PC: Pentium III or Athlon; 256 MB RAM; Windows 98/ME/XP; DVD	$399.95
Q Up Arts	*Latin Groove Factory* (volumes 1, 2, and 3)	Akai, EXS24, Giga, Roland, SampleCell	1 CD	Library only	$199.00 each
Sonic Implants	*Afro-Cuban (Latin) Percussion*	Akai, EXS24, Giga, Kontakt, Kurzweil, SoundFont	1 CD	Library only	$99.95
Spectrasonics	*Supreme Beats*	Akai, Roland	1 CD	Library only	$199.00 African Contemporary; $199.00 World/Dance
Wizoo GmbH	*Platinum24 Latin Percussion*	Akai, EXS24, Giga	3 CDs	Library only	$99.95 EXS24, Giga; $119.95 Akai
Yellow Tools	*Culture*	AU, DXi, RTAS, VST	2 DVDs	MAC: G3/400; 256 MB RAM; Mac OS 9.2.2, OS X 10.2.2, or later PC: Pentium, Celeron, or Athlon; 256 MB RAM; Windows 98/2000/ME/XP 9 GB free hard-disk space; USB port for authorization key; DVD free	$399.95



them great for film scores or dramatic effects. I've had no problem using *Culture* in music productions either; its sounds seem to work all the time.

BANG A GONG

There may not be a lot of gongs represented here, but there are certainly enough to handle most needs. Each of these libraries is strong in certain areas. If you could afford to have them all—along with some great drum libraries like Stylus, DFH Superior, and BFD—you would have practically all of your bases covered for pop, electronica, world, and film music.

As with most sample libraries, I love mixing and matching sounds from different titles because it adds to the depth of the track. For quickly getting a world groove going, I'd first turn to *PLP120* and *Culture*. Both of them sound great right out of the box. *PLP120* gives you great loops played by real players, and it's easy to create new odd-bar loops on the spot with the loop eye. *Culture* sounds huge and would fit in a bigger-than-life film score without touching any EQ or compression. *Stormdrum* also has that large cinematic sound, and is great for creating bubbling beds. *Stormdrum* processed through a cool filter sounds awesome.

If you need to program some specific beats—either by themselves or on top of loops—*Supreme Beats* is a great place to start, especially for African or world stuff. The quality of the single hits is excellent and has proven to stand up in a well-produced mix alongside live tracks.

When it comes to Latin and Afro-Cuban, I mix and match between *Platinum24 Latin Percussion*, *Latin Groove Factory*, and *Afro-Cuban (Latin) Percussion*. I wish I could say that one had the best, say, bongos over the others, but the truth is that the right instrument depends entirely on the song. I like the choices afforded by all three of these libraries. I like that the "size" of a particular instrument varies from library to library, making it possible,

FIG. 6: Wizoo's *Platinum24 Latin Percussion* has lots of variations in its instrument sounds, which are all multisampled single hits; no loops are in the set.

FIG. 7: Yellow Tools' *Culture* has a powerful engine that allows you to easily remap samples to accommodate playing preferences or to create custom mappings.

for instance, to find a "smaller" shaker if the one at hand is too big. It's a drag that *Latin Groove Factory* repackages a lot of the same material, but the samples are good and may be worth the redundancy to many users. The tasteful ambiance in the samples of *Afro-Cuban Percussion* helps these samples find their own space in a track without having to resort to artificial reverb.

Numerous percussion sets besides the ones covered here are available, but these collections make up a good starting point for building your own library.

Producer-composer **Rob Shrock** *has worked with a host of world-class artists, including Burt Bacharach, Elvis Costello, LeAnn Rimes, Aretha Franklin, and Ronald Isley. However, he is way more interested in the opportunities for new artists and good music as the music industry is finally beginning its long-overdue transformation.*

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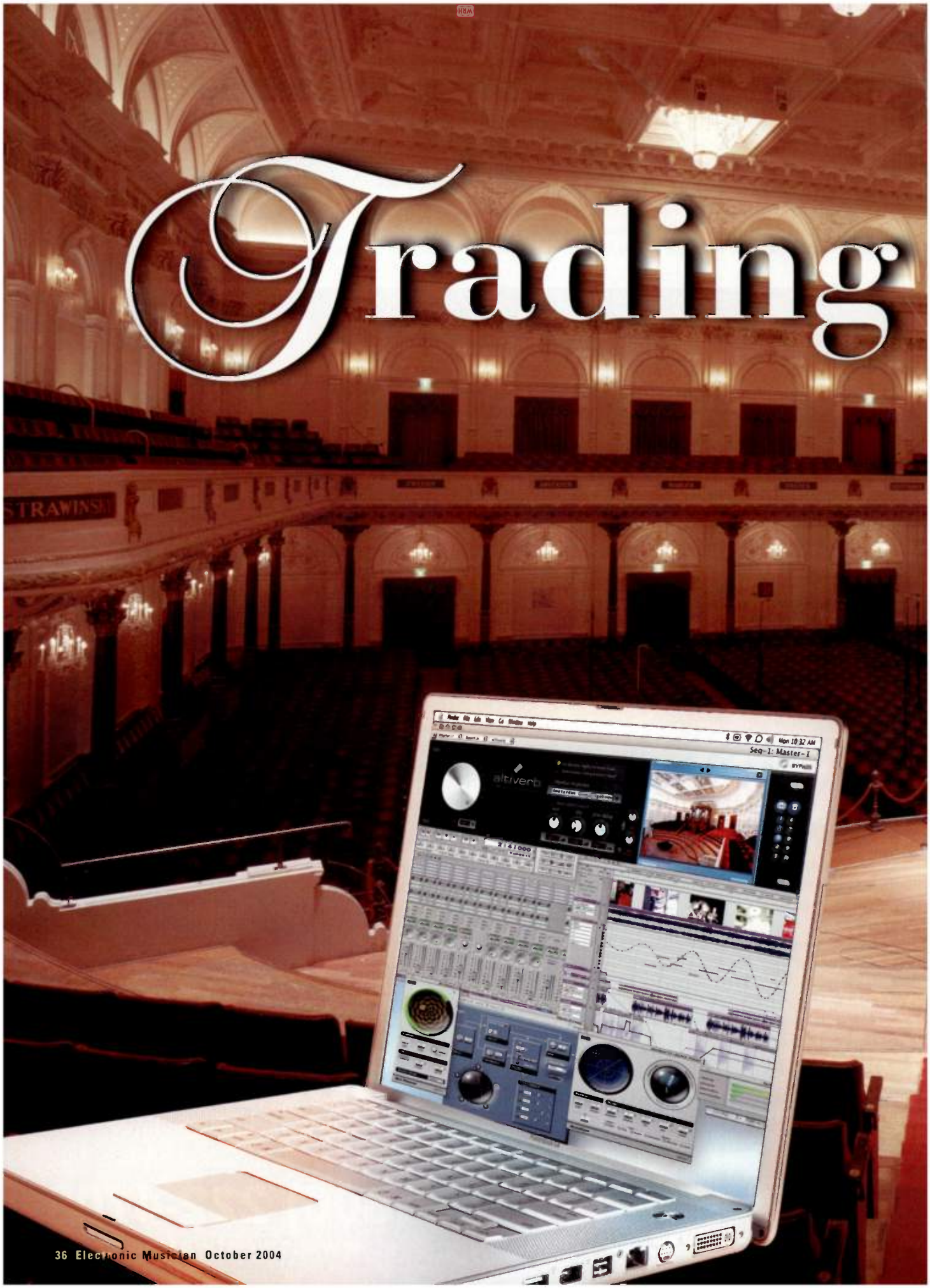

Spaces

Thirteen convolution programs that will change the way you look at reverb.

Convolution is one of the most musically useful, creative, and fascinating techniques to hit the desktop in a long time. It allows you to "merge" two audio files to produce effects that range from controlled reverbs to unpredictable sonic hybrids. The technology has fantastic potential for the electronic musician and can serve a variety of purposes.

Convolution is most commonly used to model real acoustic spaces, allowing any sound to take on the characteristics of those spaces. That approach, often called sampling reverb, is the focus of several convolution plug-ins, including Waves IR-1, Tascam GigaPulse, Audio Ease Altiverb, and Emagic Space Designer. These products take plug-in reverb to new heights of realism and sound quality. Not only are they useful in music production, but their space-emulating features are also a boon in post-production environments.

But convolution also has more esoteric purposes, offering an infinite range of filtering options and allowing any two arbitrary audio files to interact in unusual ways. For sound designers and computer-music composers, that use of the technique has great potential and can provide unlimited variations of their audio material.

In this article, we'll explore 13 different convolution programs. Our main focus will be on sampling reverbs, but we'll also discuss using convolution software for sound design. We'll look at tools that work as plug-ins, as well as those that are specific to particular host programs.

We'll begin with an overview of the programs as a whole, then offer a more detailed, minireview of each. For a list of links to files that you can use in your own convolution experiments (and experimentation is a key to exploring convolution), see the sidebar "IR Libraries." Before we start, we'll offer a short explanation of convolution and what it can do. You'll find in-depth coverage of the topic in John Duesenberry's article "Convolution Number Nine" in the June, 1999 issue of EM, available online at the EM Web site (www.emusician.com).

BY DENNIS MILLER AND MIKE LEVINE

COURTESY OF AUDIO EASE

GET CONVOLUTED

Convolution is a signal-processing technique in which the spectra of two audio files are multiplied. Most commonly, one of the files, called the impulse response (IR), is short and represents the acoustic signature of a room or some other real space. The other file, often called the source, takes on the characteristics of the room when it is multiplied by the IR. In effect, it has the quality of having been recorded in that space.

IRs are created by sampling the space in question. Typically, a wide-spectrum sound, such as a balloon pop or swept sine wave, is recorded in the room being sampled to determine what impact the room will have on that sound (that is, what the response of the room will be). The reverberant qualities of the room can then be extracted from the recording through a process called deconvolution and applied to any new sound.

When creating impulses, you need to choose which kind of mic you'll use, the sampling rate, and the number of channels (stereo IRs mixed to mono can result in comb filtering and phase cancellation), but those and other factors are beyond the scope of this article.

Many of the programs that we will examine come with their own library of IRs that were carefully sampled in all kinds of spaces, including cathedrals, concert halls, recording studios, bathrooms, living rooms, and even car interiors. IRs come in a variety of file formats—including proprietary formats that can't be read by other programs—but the most common are simple WAV files. The majority of the programs we will be looking at can use (either directly or after conversion) WAV IRs, and you will find hundreds of such files on the Web.

You can make your own IRs without ever leaving home by sampling electronic devices such as reverb or multieffects processors. And if you download IRs that are in a common audio format such as WAV, you can edit them, adding fades or EQ before applying them to your source material. As you will see, the possibilities are endless.

THE CANDIDATES

The programs we'll be looking at fall into two broad categories: plug-ins and host-specific software. The plug-in group consists of Audio Ease Altiverb 4, Christian Knufinke SIR 1.008, DelayDots SpectrumWorx 1.1, Voxengo Pristine Space 1.1, and Waves IR-1 1.0. In the host-specific category we'll look at

IR LIBRARIES

You don't have to look far to find a vast number of IRs online. You can download and use most of them right away (host software permitting). The majority of the files are in WAV format, but you'll find some in AIFF and others in proprietary formats as well.

Free Collections:

http://altiverb.daw-mac.com
This site hosts a large collection of traditional IRs as well as experimental files contributed by users.

http://homepage.hispeed.ch/zidee
This site has a collection of files sampled from the Lexicon PCM 90 digital reverb.

http://music-server.king.ac.uk/~hfweb/isrc/isrc.html
Howard Frederics's World Soundscape site offers a couple dozen files in AIFF format, recorded mostly in churches, many with photos of the spaces.

http://sound.media.mit.edu/KEMAR.html
This site hosts a collection of transfer functions from the MIT Media Lab that were created by measuring a dummy head's response to an impulse. The files are available in TAR (Unix) and Zip formats.

www.echochamber.ch
This German-language site offers impulses from a variety of high-end hardware devices, such as Lexicon 960 and TC Electronic M3000.

www.geocities.com/kangimp
Although this site provides nice reverbs, the fun stuff can be found in the Chromatic Series. The site author spent a lot of time inside his piano to create the Chromatic set.

www.noisevault.com
This site is an open community for all things related to convolution. The news is current and the files are plentiful.

www.voxengo.com/impulses
There are four sets of impulses at this site, all of which were created with Voxengo's program Impulse Modeler. The files are packed using RAR compression.

Commercial Collections:

C.K.S.D.E (Cyber Kitchen Sound Design Enterprise)
www.cksde.com
The first two DVDs in this planned series include hundreds of IRs created by sampling a range of analog gear. The files are available in WAV, AIFF, and split SDII formats. If you're a user of a vintage hardware-delay unit, these IRs will do wonders for your audio's signal-to-noise ratio.

Spectral Relativity 1.5
www.spiritcanyonaudio.com
Once you move outside the realm of traditional reverb, finding the right impulse to create the effect you want can be a study in frustration. Spirit Canyon Audio may be the answer. It offers a terrific collection of impulses that are a sound designer's dream. The set consists of over 800 16-bit, 44.1 kHz WAV files and is organized into a number of categories, including Colors, Cosmic, Weird, Weirder, and Industrial. The collection is available on CD for $24.99 and even includes a manual with usage tips.

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RØDE MICROPHONES

the convolution features in Adobe Audition 1.5, BIAS Peak 4 (ImpulseVerb), Magix Samplitude 7.22 (Room Simulator), Sony Sound Forge 7 (Acoustic Mirror), Steinberg Nuendo 2.1 (Acoustic Stamp), and Tom Erbe's freeware program SoundHack 0.892. We included one plug-in—Emagic Space Designer—in this category even though it only runs in Logic Pro 6.4 (and version 6.3 or higher of Logic Platinum, Logic Audio, and Logic Gold). We also included Tascam GigaPulse Pro 1.0, which runs both in GigaStudio 3 and as a VST plug-in.

Two other convolution reverbs were not released in time to be included in this roundup: Trillium Lane Labs TL Space plug-in (see the sidebar "Convolving in TDM"), which will offer native and TDM versions for both Mac and Windows; and Red State Sound's RevolVerb Lite (http://revolverb.hostrocket.com/), a Windows product that was still in beta at press time.

Prosoniq's Rayverb (see the sidebar "A Ray of Difference") is a sampling reverb that mainly uses technology other than convolution. As a result, we didn't feel that the program fit our criteria for this roundup.

Additionally, we chose not to cover some tools due to space considerations, such as Sounds Logical WaveWarp, which is aimed more toward DSP engineering applications; and a handful of Linux convolution tools. We saved the topic of hardware convolution processors for another article.

We considered making direct comparisons of all the programs by testing them with the same impulses and the same source sounds, but after noting the vast range of differences in the implementation of convolution, we decided against that approach. Instead, we'll explore a variety of IRs and source files and document our results both here and at the EM Web site (see **Web Clips 1** through **10**).

The programs we reviewed cover a wide range of feature sets, user interfaces, and prices. Rather than doing head-to-head comparisons, which in many cases would be comparing apples to oranges, we opted for a broad overview, with the aim of letting you know what the strengths and weaknesses are of each of the programs covered. Armed with that information, you can choose the software that best meets your needs.

Despite their differences, there are some common features to all the programs. The most obvious one—and the reason they were chosen for this story in the first place—is their ability to apply convolution processing. As you might expect, they don't all do it the same way.

The plug-ins—Altiverb, Space Designer, Pristine Space, GigaPulse Pro, and IR-1—perform their processing nondestructively in real time, whereas ImpulseVerb, Acoustic Mirror, and SoundHack write the convolution results to an audio file. The convolution features in Audition and Room Simulator can be run as effects inserts or as destructive processes. Many of the programs have a preview feature that allows you to check out the effect of an IR on a file before writing it to disk.

SHARE AND SHARE ALIKE

Another feature that all the applications share is the ability to use third-party IRs, although some of the programs make the importing process easier than others. The ability to import IRs not only allows you to access a greater range of sampled acoustic spaces for reverb purposes, but it also means that you can modify any source with any type of audio file. Imagine using your singing voice as a source and convolving it with a horse's whinny, a wailing lead guitar, or the sound of breaking glass.

You'll find major differences in the programs when it comes to the file formats that they can open as IRs. Space Designer and Acoustic Stamp are the most versatile, handling AIFF, Sound Designer II (SDII), and WAV files; SpectrumWorx, Pristine Space, and SIR restrict you to WAV files; and IR-1, Acoustic Mirror, and Room Simulator support WAV and their own proprietary formats. Altiverb requires that you use its own file standard or import

CONVOLVING IN TDM

Because convolution software is processor intensive, a plug-in that gets its processing power from somewhere other than your computer's CPU has a definite appeal. Enter Trillium Lane Labs TL Space (Mac/Win: $995 TDM edition; $495 native edition), distributed by Digidesign (www.digidesign.com).

Scheduled to ship shortly after this story goes to press, TL Space (see Fig. A) is touted to offer zero latency when used with Pro Tools HD Accel systems and will be able to utilize as many as eight Pro Tools HD DSP engines in parallel. According to Trillium Lane Labs, TL Space will be able to read a variety of different IR formats and will come with its own IR library. A native version, for RTAS and AudioSuite, will also be available.

FIG. A: Trillium Lane Labs TL Space is the first TDM-based convolution reverb. It is also available as a native version in RTAS and AudioSuite formats.

Blown Minds...

"During the last eight years or so I've reviewed over 60 different soundcards for SOS, and it is not often that they surprise or impress me any more... Many companies have tried to produce a soundcard with versatile I/O and DSP effects, but few have succeeded. In my opinion E-MU are the first company to have got it right, and have done so at prices that will result in some dropped jaws from their competitors."

— Martin Walker, ***Sound On Sound***, June 2004 Edition

"In terms of audio fidelity, the 1820M really does stand out – it sounds superb! E-MU have come up trumps with this one; it's going to be big, mark our words..."

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— Ray Legnini, ***Recording Magazine***, July 2004 Edition

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noninterleaved SDII files, and Audition will only open files in its own IMP format (although you can make IMP files from any type of file that Audition will open). GigaPulse can read raw WAV files, but requires a few steps to convert them into its own Impulse Set format. According to Tascam, an upcoming release of GigaPulse will offer drag-and-drop conversion of individual WAV files into Impulse Sets.

The maximum length of an IR supported by each program varies greatly. Room Simulator has no maximum, while a number of the others are approximately five to six seconds at a 44.1 kHz sample rate. Length may or may not be an issue, depending on whether you're doing straight reverb (where short IRs are the norm) or sound-design work (where longer IRs could be useful).

CHANNELING CONVOLUTION

The software examined here gives you mono-to-stereo and stereo-to-stereo operation. Several programs offer other options, such as Altiverb's mono-to-quadraphonic and stereo-to-quadraphonic channel configurations and GigaPulse's mono-to-seven-channel setup. Pristine Space scores big here, with eight discrete channels each of which can hold a different IR. Not only do the channel possibilities vary from program to program, but sometimes you also get different capabilities with the same plug-in, depending on the host software.

The programs all offer help in various formats. Some offer documentation in PDF or HTML format only, while others merely provide contextual help. Altiverb, Audition, Space Designer, and Room Simulator include both printed and PDF manuals.

USER FRIENDLINESS

Most of the programs have functional and good-looking user interfaces. Many show you photos of the space from which the IR was sampled. Altiverb can display photos, scrolling photos, and mic-position diagrams of the venues from its library. It even lets you open a larger window for viewing purposes. Both Acoustic Mirror and GigaPulse can associate an image with an IR file.

Space Designer and IR-1 offer slick-looking controls in their main windows that let you drag control points to change envelope values. SpectrumWorx uses a modular approach, providing 16 slots in which you can insert not only its convolution module, but also any of the program's 43 other spectrum-processing modules. Its controls are small, but they still do the job. Room Simulator and SIR have a graphic display on which you can draw the frequency response of your IR. Pristine Space offers a single display that toggles between its six main functions.

One area in which there are big differences between the convolution programs is parameter control. The sampling-reverb plug-ins offer high and low damping, wet-dry controls, and often predelay. IR-1 gives you controls that come the closest to resembling those on a traditional reverb unit. GigaPulse includes a number of familiar reverb parameters, and its large Placement Selection window lets you interactively adjust mic position and the placement of the listener. Additional GigaPulse parameters (Perspective, for example) include mic modeling, and others can take your impulses into unknown territory.

A RAY OF DIFFERENCE

Prosoniq Rayverb (Mac/Win: $299) is a unique reverb plug-in that uses a process called inverse raytracing to derive a room model (including size, space, and room material) from an IR. Rayverb is designed to go beyond convolution by allowing the movement of the sound source within a sampled space. Because it mainly uses a different technology to achieve its effects (it uses convolution only for simulating the wall material in its room emulations), it didn't fully fit the criteria for inclusion in this roundup. However, because it does use IRs and its effects are similar to convolution reverb, it deserves a mention.

FIG B: The round, yellow X/Y Parameter Control in Prosoniq Rayverb lets you change the position of the source in the simulated room.

Rayverb's 3D-style interface is unique. Its most striking element is the X/Y Parameter Control (see **Fig. B**), a round yellow ball that can be dragged around side-to-side and forward-and-back to change the perceived position of the source sound in the sampled space.

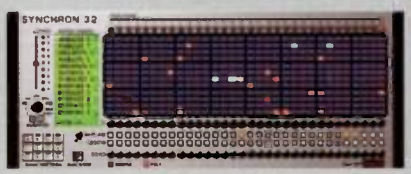
The space can come from one of Rayverb's built-in room simulations, in which you can choose whether the surfaces are made of wood, glass, concrete, carpet, or tin. You can also load in two IRs, and Rayverb can combine, mix, or morph them.

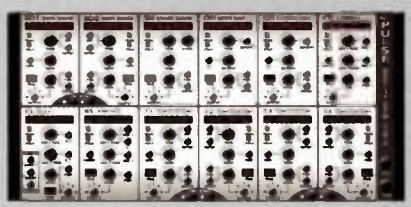
Rayverb can save and export custom IRs based on the settings you make, and these can be opened in other convolution programs.

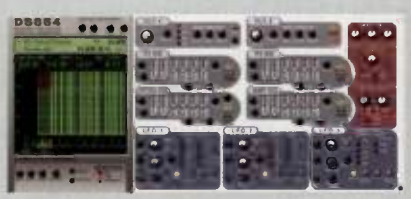
Rayverb is compatible with Mac OS 9 and OS X, VST-compatible host; and Win VST-compatible host (www.prosoniq.com).

project5

SOFT SYNTH WORKSTATION







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QUALITY AND QUANTITY

Overall, we were impressed with the sound quality of the convolution reverbs. In most cases, they more than held their own against conventional reverb plug-ins. By virtue of their IR libraries, many offered a much wider range of sound possibilities. That said, standard reverb plug-ins tend to offer more conventional parameter editing than the convolution tools in our roundup (with the possible exception of IR-1).

As to whether you'll want to replace your hardware reverbs with convolution plug-ins, you're going to have to decide that for yourself. In our admittedly subjective and unscientific comparisons, we found our hardware reverbs to be slightly warmer than the convolution plug-ins, but they were similar.

Of course, convolution software excels when it comes to number of sounds, ability to save and recall, and flexibility. Moreover, the ability to use *any* sound as an IR gives these programs unlimited sonic potential (see the sidebar "Five Tips for Better Convolution" for suggestions about successful convolving).

Keep in mind that convolution programs are processor intensive, so if you don't have a relatively fast CPU, you're going to be in trouble. In fact, many of these plug-ins and programs won't even run on outdated computers. If you're unsure about whether your computer can effectively run any of these programs, check the company's Web site for specific system requirements (see the sidebar "Manufacturer Contacts").

THE SOFTWARE

We've organized our program summaries by type, splitting them into two categories: generic plug-ins (VST, AU, MAS, RTAS, DirectX) and host-specific tools, alphabetized within each group.

You'll notice that we've included retail prices for each of the individual software write-ups. When comparing prices, bear in mind that in a number of cases, the convolution feature is integrated within a larger host-software program. Therefore, the only price we can provide is for the entire program.

GENERIC PLUG-INS

The following plug-ins run within any compatible host program. As with any plug-in, the performance you'll get is a function of the host and your computing platform.

Audio Ease Altiverb 4.0, $495 native, $795 HTDM. On the market longer than any other convolution reverb software, Audio Ease Altiverb combines great sound, ease of use, excellent IRs, and a simple-but-effective set of parameter controls. Depending on how your sequencer is configured, it can run in a number of channel configurations, including mono-to-mono, mono-to-stereo, stereo-to-stereo, mono-to-quadraphonic, and stereo-to-quadraphonic. The latter two are designed for use in a surround-sound mix.

Altiverb gives you separate wet and dry knobs; a button to mute the direct sound completely, which is handy when using Altiverb as a bus effect; a predelay control (up to 200 ms); and high- and low-frequency EQ knobs (see **Fig. 1**). A large knob controls reverb time, but it only allows you to decrease it, not increase it. (Audio Ease reports that Altiverb 5 will include more editable parameters.)

Altiverb supports snapshot automation, offering ten slots for storing various IRs. You can automate them with your sequencer, which makes it possible to change IRs mid song. However, loading an IR is processor intensive, and it takes about a quarter-second or so on a dual G5/2 GHz Mac. As a result, setting an automated patch change to happen on a beat is problematic, because there's sure to be an audible pause before it loads. The snapshot feature will work well if you can set up the IR change to happen during a pause or a rest in the track. Altiverb also responds to automation of its various knobs just as any other plug-in would. Be aware that the AU version currently doesn't support any of the automation features, including the snapshots.

You will also find buttons that switch Altiverb between high- and no-latency settings (in the RTAS and HTDM versions, the choice is between high- and low-latency settings). The high-latency setting reduces the processor load and works well when using Altiverb as an insert. If you use that setting when Altiverb is functioning as a bus effect, the latency can be quite pronounced.

Previous versions of Altiverb were known for being processor intensive, but Altiverb 4 is substantially more efficient. When comparing its CPU usage to IR-1 and Space Designer—using OS X's Activity Monitor—Altiverb consistently used less CPU than IR-1 (with both set to their full settings) but more CPU than Space Designer. In its high-latency/low-processor load setting, Altiverb was about equal to IR-1, with the latter set to its most efficient setting.

Altiverb comes with an excellent library,

FIG. 1: Although it has relatively few adjustable parameters, Altiverb is a powerful convolution reverb.

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Roland VS Plug-In

WWW.ROLANDUS.COM/VS2000CD

which includes IRs from studios (the Cello Studios echo-chamber IRs were particularly impressive), stadiums, stairways, concert halls, cathedrals, and classic reverb units. A number of the IRs in the library offer you choices of multiple mic positions within the same venue.

Altiverb is not so user friendly when it comes to importing IRs. It requires that you use noninterleaved SDII files rather than WAV files. Other plug-ins let you import IRs directly through their interface while the plug-in is running. But with Altiverb, you have to put them into a specific folder and then restart the host program.

Altiverb does encourage users to come up with their own IRs, and Altiverb IR Preprocessor 2.1, a utility program that helps you make your own, comes bundled with it. You also get a sweep file (used in the IR creation process) and a number of how-to PDFs.

Pros: Easy to use. Great-sounding IRs. Useful built-in help feature. Excellent display of information and venue pictures. Help provided for making your own IRs.

Cons: Automation not supported in AU version. Audible pause when switching between Snapshots. Latency can be a problem when using low CPU-load settings. Loading other audio files as IRs is cumbersome.

Compatibility: Mac OS 9—VST, MAS, and RTAS; Mac OS X 10.2 or greater—AU, VST, MAS, and RTAS.

Christian Knufinke SIR 1.008, free. Although SIR is the only freeware plug-in in this roundup, its tool set is both powerful and unique in several respects. The program can load fairly long IR files—it tops out at a length of around 30 seconds—and a graphic display of your IR provides an intuitive aid as you edit.

Working in SIR's single screen, you'll access several parameters that can dramatically change the sound of your audio source (see **Fig. 2**). The Length function, for example, stretches and compresses the IR from 50 to 100 percent, and the Stretch function raises or lowers the IR's sample rate. You can also taper the onset of the IR using a combination of the Attack and Time sliders.

Other features more closely resemble traditional reverb software. The Predelay feature alters the time between the onset of a sound and the first reflections; like the other controls, it updates almost instantaneously even while a sound is playing. Two of SIR's sliders affect stereo width: Stereo In works on the source signal, and Stereo IR works on the impulse. The Reverse button does what its name implies. The large FFT EQ display at the bottom of the screen allows you to manually tweak the frequency response of the IR using as many as eight filter points.

SIR's CPU Consumption option automatically adjusts the amount of CPU power the program uses so that you can continue to work with other tasks. The automatic Gain Compensation features helps keep your impulses from clipping. Other handy features include a list of all the files in the directory from which you first load a file, separate wet and dry level sliders with on and off buttons for each, and buttons that apply –6 dB cut or +12 dB boost to dry and wet signals, respectively.

The sound of the plug-in is excellent, and its feature set gives you lots with which to work. The only downside is a hefty fixed latency of 8,960 samples, although you can find automatic latency-compensation options in some programs (such as Nuendo) or adjust your tracks manually as needed.

SIR has a huge following among members of the convolution community and is in active development. A new version claims to provide zero latency. SIR makes a great introduction to convolution, both for reverb and for other purposes. At this price, how can you go wrong?

Pros: Free. Intuitive parameters.

Cons: High latency.

Compatibility: Windows—VST.

FIVE TIPS FOR BETTER CONVOLUTION

1. Try to use IRs and source files that have overlapping frequencies. Using a bass drum IR with a piccolo won't garner much of a response.
2. Always work with your software's gain setting and your mixer's level control turned down. Convolution can produce huge spikes in amplitude.
3. Apply filters liberally to your final sounds. Like any reverb, convolution can dull the high end.
4. IRs—especially long ones—can produce massive buildups of sound, the product of feedback and endless delays. Use the envelope feature in your convolution software to limit the amount of IR that is applied to prevent buildups from occurring. You can also try tweaking the wet/dry mix.
5. Experiment with convolution—it can produce unexpected and incredible results. Despite what is written in tip 1, it can't hurt to try any two files in combination.

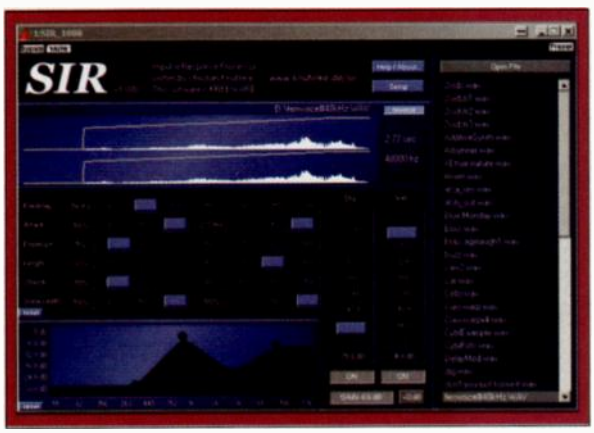

FIG. 2: SIR is a freeware convolution plug-in that is very efficient for creating reverb and offers less-traditional convolution effects.

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DelayDots SpectrumWorx 1.1, $99. Unlike the other plug-in convolution tools in this roundup, DelayDots SpectrumWorx offers convolution as part of an extensive toolkit that includes several dozen spectral-mangling tools (morphers-blenders, combiners, pitch shifters, and the like). In fact, this kit is one of the most extensive spectrum processors we've seen. The plug-in works as an effects insert, and once you load an IR (WAV format only), you're live and ready to tweak.

The SpectrumWorx interface resembles a hardware rack. Although there are not a lot of sliders or knobs to work with, the available controls are manageable and fairly easy to adjust (see **Fig. 3**). You can also use MIDI Control Change messages to modify any of the parameters in real time.

There are four settings for modifying the convolution process, and it's clear that SpectrumWorx has more than just reverb on its mind. First is the thd setting, which can be used to gate the IR signal or to function as a blend factor, depending upon which convolution module you are using. The values range from 0 dB to –99 dB in increments that start at 0.1 dB and rise to several dB as the value increases.

Next are the lband and rband controls, which are found in all of the program's modules and determine to which range of frequencies the processing will be applied (lband controls the currently loaded file and rband controls the IR). Although the parameters of these controls are not completely intuitive (the range is 0 to 100 percent), they work effectively.

The final convolution control is op, and it offers different types of convolution processing, including conv, which multiplies the respective files' magnitudes (powers) and adds their phases; and rconv, which does just the opposite. There's also cmagn, which multiplies only the magnitudes of the two signals; and separt, which performs convolution on the magnitudes and phases of the two signals independently. Another option is slowco, which (according to the manual) is an "experimental mix of the above." It's pretty hard to predict what each type will result in, but if you're open to experimentation, you'll have a lot with which to work.

There are global in, out, and wet-dry mix controls along with dedicated buttons to access presets and IR files. Like some of the other programs, SpectrumWorx also has its own browser that lists all of the files in the drive in which the currently loaded file resides and from which you can quickly pick a new file for use as an IR. If you want, you can use the program's Use Sampler feature to load an IR file from your system and tweak it with the program's numerous other processes in advance of using it for convolution (for example, vocoded IRs).

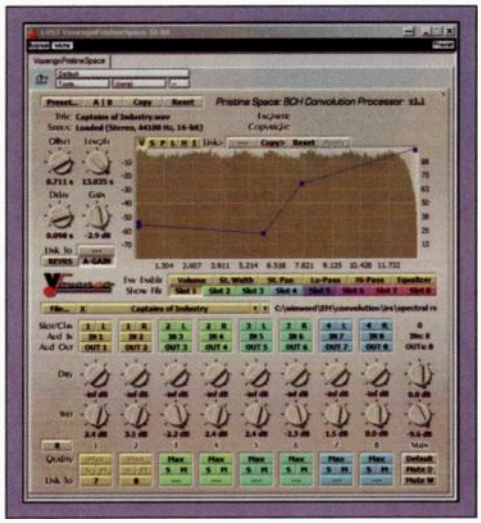

FIG. 4: Voxengo Pristine Space supports up to eight discrete channels of convolution. Its main screen features an envelope that can control six of the program's parameters.

Right-clicking on the main info window displays a drop-down menu from which a number of additional options can be set. Here you can adjust the window size for the processes that rely on spectral analysis (larger windows give more frequency resolution but less temporal accuracy), pick a window shape (windowing is used to help the analysis routine better determine the frequency of any given chunk of samples), and even choose from several skins. You can also select whether the processes will use the two channels of the file currently loaded in your host software (Sidechain mode) or whether the IR should be a file you load from your drive (External mode).

SpectrumWorx comes with a bunch of presets (you can't tell which ones load the convolution module simply by looking at them), and you can also save your own. The PDF manual includes an introduction to audio processing in

FIG. 3: SpectrumWorx is a modular program that includes nearly 50 spectral-processing tools. The convolution module offers several unusual options for applying an IR to a source.

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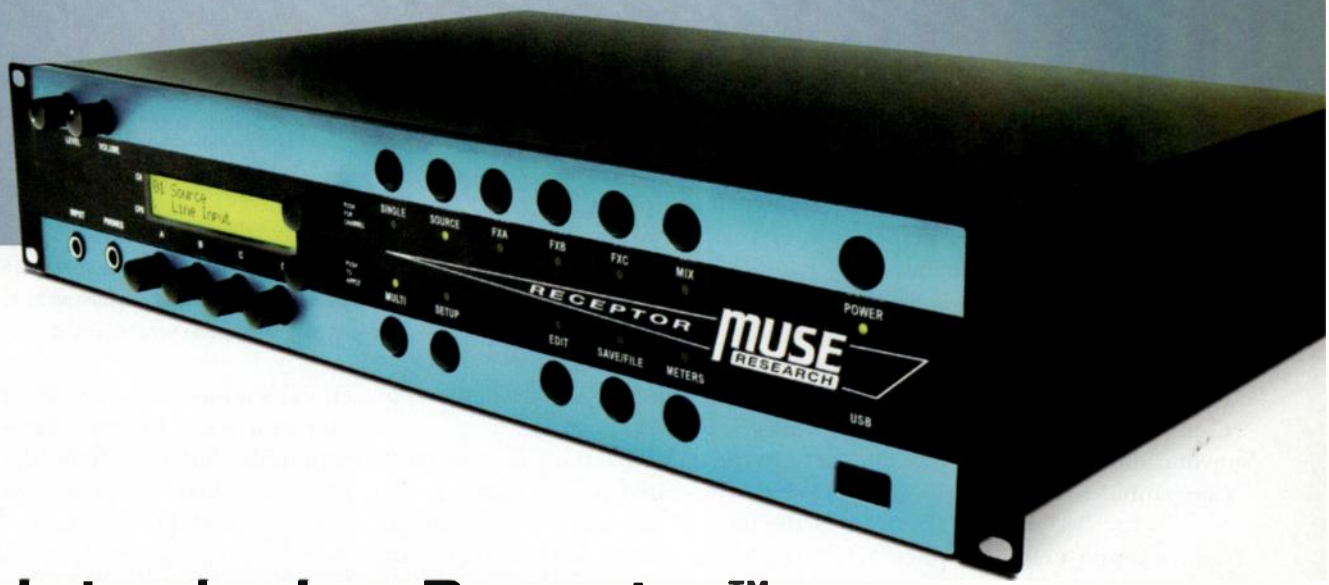

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the spectral domain (the phase vocoder in particular) that can help focus your experiments with the different modules. According to the manufacturer, a new release, with an updated graphical user interface (GUI), new modules, assignable LFOs, and more, will be available by the time you read this.

Pros: Unusual spectral-processing options. Modular configuration.

Cons: Nonintuitive parameters for convolution.

Compatibility: Windows—VST.

Voxengo Pristine Space 1.1, $139. Pristine Space offers a whopping eight independent channels of convolution processing. You can configure the channels as eight mono or four stereo pairs. You could also use all eight channels in series to process a single audio source. This might be useful, for example, if you wanted to apply a variety of mic positions to the same file.

The program uses a simple and efficient patching system to assign any of the eight potential audio inputs to as many as eight outputs. Pressing the "?" icon at the top of the screen (see **Fig. 4**) takes you to a setup page where you can configure the number of ins and outs as well as tweak other aspects of the program for best performance on your system (such as assigning a latency value). The setup area provides access to the help file, which is also available as a program-group shortcut.

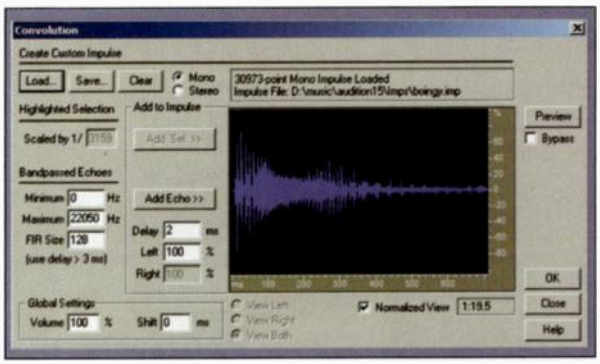

FIG. 6: Adobe Audition's convolution tool runs in both real time and as a destructive process. Its parameters are optimized for tweaking the original room in which an impulse was recorded.

In the middle of the screen you will find color-coded buttons representing the ins and outs that you've enabled. Click on a button, and you'll see a list from which you can choose the desired destination for a channel. Each of the eight slots has its own wet- and dry-mix parameter as well as an independent quality-control setting (low or maximum).

At the top of Pristine Space's screen is a window in which you can draw envelopes (linear only) to control six of the program's main parameters: Volume, Stereo Width, Stereo Pan, Lo-Pass, Hi-Pass, and Equalizer. You toggle the envelope window to access the parameter you want by clicking on the appropriate button underneath the display. The program shows a waveform of the currently loaded impulse, which helps you to accurately fine-tune envelope times. When you've created the envelope that you need, you can copy it to the same parameter of any of the other slots.

Four knobs—Offset, Length, Delay, and Gain—provide additional control over the IR file. You can fine-tune settings by clicking and dragging the right mouse button, but you can't type in an exact value.

There's an auto-gain control, which is especially useful if you are loading IRs that produce different output gain levels, as well as a Reverse feature for reversing the IR file. To cut down on the amount of tweaking you might need to do with multiple impulses loaded, you can link the Offset and Length controls of one slot to those of one or more other slots.

Once you load a WAV file into the Impulse slot (according to the manufacturer, AIFF format will be supported in the next release), Pristine Space detects any other files that you might have in the same directory and lets you move among them by clicking on left- or right-pointing arrows. That's just one of many nice touches that make Pristine Space useful for trying out a variety of impulses on the same source material.

If you go to the Voxengo Web page, make sure to take a look at Voxengo's Impulse Modeler. Like a CAD program,

FIG. 5: Waves IR-1 is the only convolution plug-in that supports both Mac and Windows. It also has the distinction of providing the most complete control of traditional reverb parameters such as size, density, and predelay.

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Impulse Modeler allows you to design virtual spaces and to output IRs in WAV format that represent the signatures of those spaces.

Pros: Eight discrete channels. Flexible envelope control. Handy patching/routing system.

Cons: Can't type in values for parameter control.

Compatibility: Windows—VST.

Waves IR-1 1.0: $1,200 HTDM, $800 native. IR-1 is one of the most full-featured convolution plug-ins on the market, albeit the most expensive. It is the only cross-platform plug-in in this roundup, and it is compatible with virtually all of the major plug-in formats.

What sets IR-1 apart from the other convolution products is its array of editable reverb parameters, which give it more of a conventional reverb feel than its competitors (see Fig. 5). It offers parameters such as reverb time and reverb size (both of which can be increased or decreased), a control for density, and one for resonance. The predelay section is particularly flexible, offering time (up to 500 ms), gain, and on/off controls for the direct sound, early reflections, and the reverb tail. IR-1 gives you more predelay control and more predelay time than Altiverb, Space Designer, or GigaPulse.

You also get low- and high-frequency damping and a 4-band paragraphic EQ to tailor the frequency response of the reverb. The EQ controls are reminiscent of those in the company's plug-in equalizers and offer the most options of any of the convolution reverbs in this article. Other features include a graphic control on the reverb/decay envelope, a wet/dry control, a reverse button, and output meters with output control sliders.

IR-1 sounds great, especially when used with one of the IRs from its included library, which is both large and meticulously recorded. There is a huge range of sampled spaces and devices, from famous concert halls (including the Sydney Opera House and the Ryman Auditorium in Nashville) to recording studios, car interiors, and classic reverb units.

There are also a number of options in terms of channels and processing usage, including mono-to-mono with one convolution; mono-to-stereo with two convolutions; stereo-to-stereo with two convolutions (Efficient Stereo); and stereo-to-stereo with four convolutions (Full Stereo). (According to Waves, a new version with surround-reverb capabilities is expected to ship sometime this fall.) To further save processing

power, you can toggle IR-1 into Low-CPU mode using a switch in the upper-left-hand corner. Another option for cutting processor load is to shorten the length of the convolution using Direct Convolution Length Control.

But even with all the choices offered for lowering CPU usage, IR-1 can still be quite processor intensive. It's not a big problem on a fast computer such as a Mac G5, but on slower machines, you'll need to be careful not to overtax your CPU. Using IR-1 in Efficient Stereo mode and running it as a bus effect is a good way to get the most from the program without maxing out your computer.

Latency was never a problem with IR-1, at least not on the dual G5/2 GHz Mac on which it was tested. Even with the plug-in set to its most CPU-efficient settings, the latency remained at a virtually undetectable 11 ms (when working on 44.1 and 48 kHz files).

If you want to open up your own IRs, or those you have found from third parties, IR-1 lets you do so, provided that they are in WAV format. Unlike other programs, IR-1 doesn't offer utilities for making your own IRs. The focus seems to be more on using IR-1 as a reverb processor, and for that purpose it is a formidable product. But don't sell it short as a sound-design tool: its wealth of sonic options also make it well suited for that kind of work.

Pros: Full-featured reverb-parameter editing. Excellent IR library. Well-designed interface. Solid documentation. Cross platform. Wide range of formats. Low latency.

Cons: Pricey. CPU intensive.

Compatibility: Mac OS X 10.22 or greater—AU, AudioSuite, MAS, RTAS, VST; Windows (Service Pack 3), XP—AudioSuite, VST, DirectX.

HOST-SPECIFIC TOOLS

The next group of convolution processors are part of specific host programs. Most are features of larger, multifaceted applications.

Adobe Audition 1.5, $299. The convolution feature in Adobe Audition 1.5 may not be as extensive as some of the others in this roundup, but it has unique aspects that you won't find elsewhere. The tool is aimed at tweaking the original space in which the IR was measured by adding echoes to the IR file. There's a lot of control over the echoes that get added, from picking the size of the Finite Impulse Response (FIR) filter that is used to generate them to adjusting the high- and low-frequency ranges in which echoes are allowed to build up. Although it's not your average convolution processor, Audition can produce interesting results.

Audition's convolution works in both Edit (destructive) and Multitrack (non-destructive) modes. Load a file into a track in Multi view, then drag the convolution icon from the Effects tree onto the audio track. A dialog box will open with all the settings displayed in a single screen (see **Fig. 6**). If you've got any IMP

files on your drive (a few are included with the release), then you can open them. But you'll probably end up making your own, especially if you want anything out of the ordinary.

To make an IR, you must first load the file that you want to sample, then highlight the range that will become the IR. Audition has a fairly low limit on IR duration (about five seconds), so keep it short at first. Once the range is selected, click on the Add Sel. button, and the IR will be loaded. By default, the amplitude of the IR is heavily attenuated (often reduced to only a fraction of the original), so you may have to enable and adjust the Normalized View switch to see the waveform in the display. After you adjust the Shift (for timing compensation) and Global Volume setting (if needed), you can save your file to disk for future use.

Unlike most of the other software, Audition allows you to make your own IRs from scratch. To do so, however, you'll need to know a few things about room acoustics. You'll have to create echoes one by one and choose their attenuation level individually. Although you can get nice comb-filtering effects without much effort (add a full-strength echo every millisecond for 10 ms or so), simulating a convincing reverb is a complex thing.

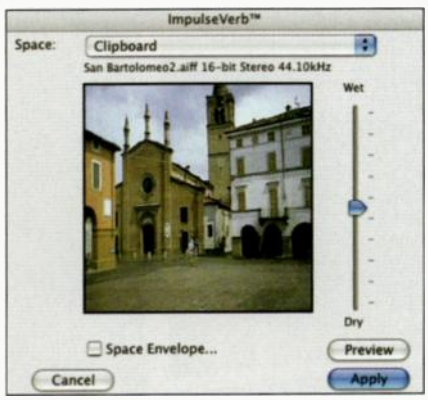

FIG. 7: Although ImpulseVerb doesn't have real-time processing, it does give you a preview function for checking the sound and balancing the wet/dry level of the convolution before writing it to disk.

While using the Audition convolution plug-in, an error message appeared repeatedly that said there was a problem "in the envelope." Adobe is currently looking into that problem. Regardless, if you're an Audition owner, take a look at the convolution option and see how it can expand the program's already sizeable audio arsenal.

Pros: Unique room-design feature.

Cons: Limited file-format support. Maximum five-second IR length. Nontraditional parameters.

Compatibility: Windows XP.

BIAS ImpulseVerb, $499. BIAS Peak, the premier 2-track editor on the Mac, has always offered a menu full of DSP features in addition to its editing functions. The program has had a convolution feature called Convolve since version 1.0. But the processing power of the Altivec velocity engine in the G4 and G5 made it possible for BIAS to include ImpulseVerb—a full-fledged convolution reverb—into Peak, starting with version 4.0.

Although ImpulseVerb doesn't offer real-time processing like a plug-in would, it does provide a real-time preview function with a wet/dry control (see **Fig. 7**) that allows users to listen to the reverb and experiment with the mix level before writing the results to disk. (By using the Save As or Save a Copy As commands, you can apply ImpulseVerb while leaving your original file untouched). Be aware that the preview function uses a huge amount of CPU resources, much more than those of the real-time convolution plug-ins mentioned in this article. That said, during the testing for this review, the preview feature worked flawlessly on a relatively slow G4/733 MHz and a speedy G5/dual 2 GHz.

Using ImpulseVerb couldn't be simpler (which is good, because Peak's PDF manual devotes only about one page to it): you open an audio file, select ImpulseVerb from Peak's DSP menu, and a window opens with a pull-down menu from which you can choose to use the clipboard's contents as your IR, or pick from a library of over 100 included IRs. Although that number is small compared to what you get with most dedicated convolution-reverb plug-ins, it's still a nice collection considering that ImpulseVerb is only one feature among many in Peak.

The IR collection is broken up into five categories: Acoustic Modeled Spaces (physically modeled rooms of various materials), Grand Spaces (cathedrals), Intimate Spaces (bedrooms, bathrooms, elevators, and hallways) Medium Spaces (ballrooms, theaters, churches, and even a quarry), and Misc (reverb units, synthetic IRs, and effects IRs). Overall, the IRs sound good.

Using a third-party IR, or any audio file as your IR, is easy. As long as Peak can open a file—and it opens many file types—you can use up to 5.9 seconds of it as your IR. Open the file, select and copy a portion of it, click back on your source file (to make it active), and then open the ImpulseVerb window and choose Clipboard.

ImpulseVerb doesn't offer much in the way of parameter control, except for the ability to change the volume envelope, which opens in a separate window.

If you're already a Peak owner and you haven't checked out ImpulseVerb, do yourself a favor and try it. It produces some very impressive reverb and sound-design effects. Given that it's not a real-time processor, it isn't likely to become your main reverb. However, for sound designing and adding reverb to 2-track material, or if you're a Peak owner and don't want to spend the money for a separate convolution processor, it offers a lot.

Pros: Easy to use. Reads many different file types as IRs. Real-time preview function. Reverb sound on par with convolution plug-ins. Decent IR library.

Cons: Preview function is CPU intensive. Not much parameter control. Scanty coverage in the Peak manual.

Compatibility: Mac OS X 10.2 or greater.

Emagic Space Designer 1.1, $999. Included in the Emagic Logic Pro 6

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bundle, Space Designer is a convolution plug-in that's robust enough to compete with third-party plug-ins such as Altiverb and IR-1; however, it runs only in Logic. Space Designer can be opened in mono-to-mono, mono-to-stereo, or stereo-to-stereo configurations, and it includes a number of controls to shape and mold reverb sounds. Although it doesn't have as many traditional reverb parameters as IR-1, Space Designer gives you plenty with which to work (see **Fig. 8**). There are separate sliders for direct sound and reverb level; a predelay control (up to 200 ms); low-shelving EQ (20 Hz–4 kHz ± 18 dB); and graphic control of the volume, density, and filter envelopes.

The filter offers lowpass (6 dB and 12 dB per octave), bandpass, or high-pass filtering, which can substantially change the tonal character of the reverb. If you want a more unconventional sound, you can turn on the filter's resonance control, use the Reverse button, or use the Crossfeed slider, which allows the left side of a stereo IR to be processed on the right and vice versa.

The Sample Rate control lets you reduce the frequency response of the IR. (In cases where the IR's sample rate is lower than that of the song's audio, you can actually increase the IR's sample rate.) Each time you lower the rate, the pitch of the reverb drops an octave, and the length of the IR doubles. If you'd prefer it not to increase the length, you can click on the Preserve Length button.

Perhaps because it's designed expressly for Logic, Space Designer was consistently more CPU efficient than IR-1 and Altiverb—its Mac plug-in competitors.

Space Designer's IR library is split into a number of categories: Delays, FX Reverbs, Indoor Emagic Rooms, Outdoor Forests and Fields, Reverb Units, Synthesized IRs, and Vintage Gear. Together, there are over 1,000 IRs. The library doesn't have IRs of well-known cathedrals, concert halls, and recording studios the way some of the other collections do, but it does give you a lot of choices, including IRs that were sampled from well-known reverb and delay devices.

If you want to open third-party IRs or use other audio files as IRs, Space Designer makes it easy because it can handle several different file formats, including SDII, WAV, and AIFF. Overall, its sound quality is good and it holds its own against the other Mac convolution plug-ins.

Space Designer also has a unique feature that generates what Emagic calls synthesized IRs, based on the parameter settings. They can be generated at will and give you random IR variations. Although you can't create an actual audio-file IR from these, you can save the settings and open them in Space Designer at another time.

Pros: Flexible, lots of parameters. Good for both conventional reverb and sound design. Sample-rate control for IRs. Unique Synthesized IR feature. CPU efficient.

Cons: IR library lacks well-known cathedral, concert hall, and studio IRs.

Compatibility: Mac OS X 10.2 or higher.

FIG. 8: Space Designer shines in both reverb and sound-design applications.

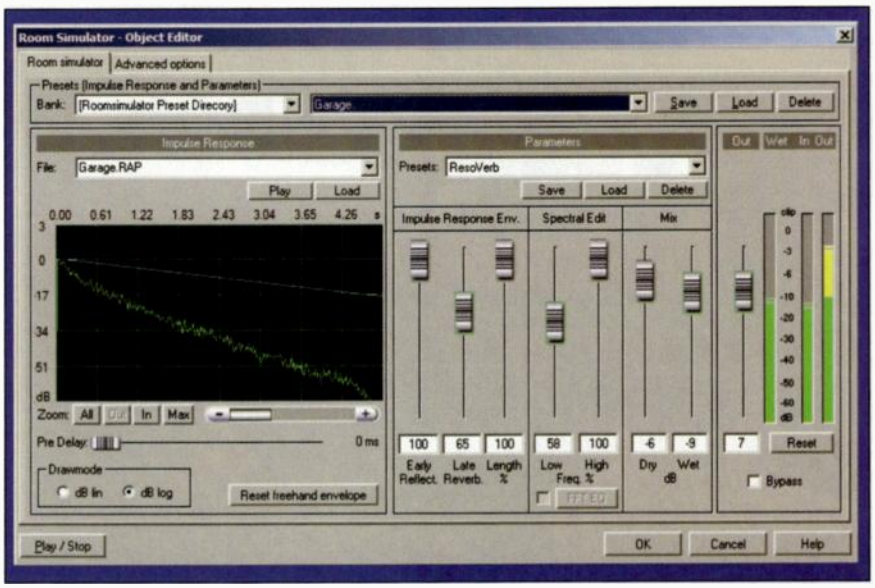

FIG. 9: Samplitude Room Simulator offers a number of controls for adjusting both the IR and its interaction with the source. It can be run as a track insert, as a destructive process, or on an individual object.

Magix Room Simulator: classic version, $629; professional version, $1,249. Room Simulator, found in Samplitude 7.0, is one of the most powerful and flexible tools in this roundup. The feature runs in a variety of modes, including as an Object effect (Objects are the individual audio clips that make up a track), a track or

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aux insert (professional version only), and as a destructive DSP effect. Its main interface includes a graphic display of the impulse and three sets of sliders for adjusting various parameters (see **Fig. 9**). A second window offers advanced settings for even more detailed control.

You can start your exploration by using one of the large number of included IRs in Samplitude's RAP format, among which are a substantial collection of files sampled from the TC Electronic M3000 processor. Some of these are used in the presets (Cool Room, Garage, Tunnel), and for traditional reverb, they are the best starting points. You can also use your own WAV files as IRs, including those on your drive and any that are currently loaded in a project.

Of course, half the fun is tweaking an IR for your own purposes, and Samplitude has lots to offer here. You can reverse or time-stretch the IR to create a variety of effects or use the drawing feature to make manual adjustments, such as adding or removing early reflections. There are separate sliders for boosting or attenuating the early and late portions of the IR. A third slider, found in the Advanced window, is for adjusting the envelope's attack portion. And because Samplitude is a powerful multitrack audio editor (like Nuendo and Audition), you'll have endless resources for manipulating your IRs before you apply them to your source.

Room Simulator offers separate controls for wet and dry levels and has a level meter for keeping track of the effect on overall gain. (It's a good idea to keep your levels low when experimenting with different IRs.) Another screen offers a filter graph on which you can make fine adjustments to the frequency response of your virtual spaces. This screen shows a real-time display of the IR's frequency response, so it's easy to tell where any problem spots might be.

Like most aspects of Samplitude, you can customize a number of the Room Simulator's interface elements. For example, the impulse display can be toggled between logarithmic or linear, and you can adjust the IR display's zoom level. There's also a control to adjust the quality of the convolution process and another to determine how much CPU power is devoted to the process. The Samplitude manual offers an excellent overview of the Room Simulator and includes solutions to common problems.

An entirely separate feature, called Convolution, is also part of the Samplitude arsenal. It has a minimum of controls and works only with files that are currently loaded in the program—you can think of it as Room Simulator Lite. The forthcoming release of Samplitude 8 will feature 5.1 surround real-time room simulation.

Pros: Flexible implementation. WAV and native-format file support.

Cons: No IR-extraction option.

Compatibility: Windows.

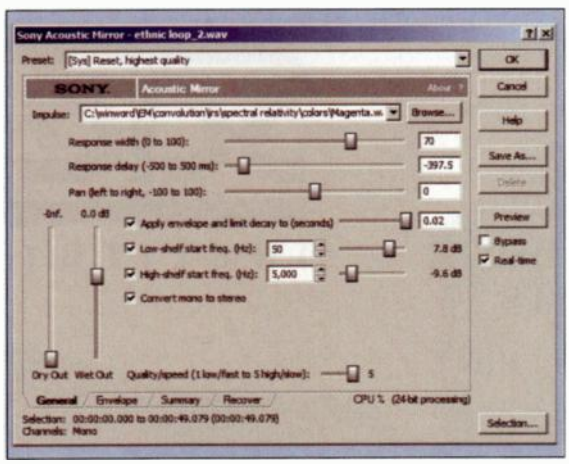

FIG. 10: Acoustic Mirror, integrated into Sony Sound Forge, offers five quality settings and allows you to change IRs even as a sound is playing.

Sony Acoustic Mirror, $499. Available at one time as a standalone effect and included as a feature in Sound Forge since version 5.0, Acoustic Mirror is one of the more senior convolution tools in this group. You won't find slick graphics, skins, or 3-D buttons here. Instead, you will find a straightforward interface with several sliders, clear text, and intuitive parameters driving a fast and powerful convolution engine.

Dedicated windows provide access to the four main work areas of the program (see **Fig. 10**). Load a sound file into Sound Forge, and then open the Acoustic Mirror menu option (Effects/Acoustic Mirror)—you'll find a variety of controls for tweaking the interaction of the loaded file and the IR. You can use any WAV or Sound Forge Impulse (SFI) file as an IR by selecting it in the Browse dialog box, and once you click on Preview, you can swap an existing IR for a new one without stopping playback.

If you don't want the effect to begin with the start of the file, adjust the Response Delay slider to offset its start time from -500 to 500 ms. (Use a negative number if you want the impulse to be in progress when the source begins to play.) There are high- and low-shelving filters on hand to modify the spectral content of the resulting sound. Boosting the highs will sometimes be necessary (convolution can produce dull-sounding results if you're not careful). You can also adjust the wet and dry mix settings individually. Adding a bit of dry signal might be useful when you don't want to lose the character of your source completely.

Because convolution can often produce sounds that build up into utter chaos, an envelope is available to determine how much of the impulse is used. This is a good parameter to explore when you want only a little of the IR interacting with your source. You can choose to enable the envelope and limit the decay time directly from the main window. But if you want to tweak the envelope itself, click on the tab at the bottom of the interface to access the Envelope screen. Here you'll see a graphic display of the IR, which makes it easy to tweak the breakpoints and levels for the type of time-varying control that

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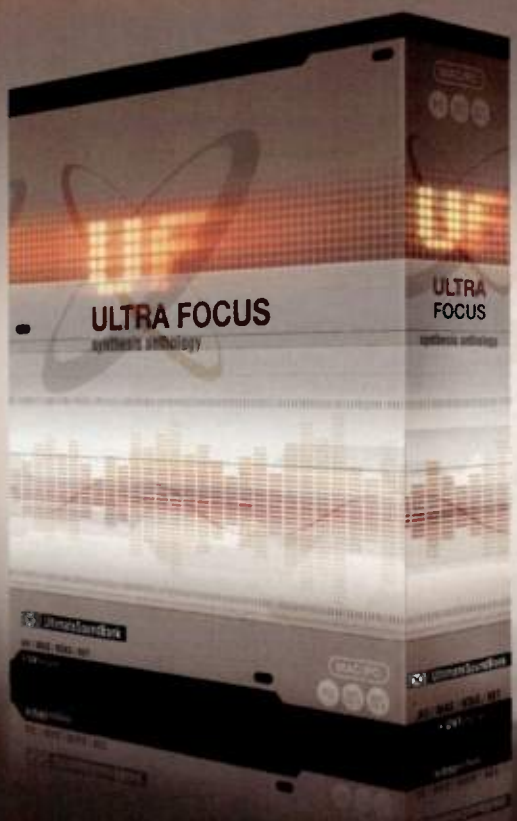

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you want. You'll also find a button to create a preset of the current settings.

The Summary screen is a sparse window that has only three sliders—Dry Out, Wet Out, and a slider (also found in the General window) to adjust the quality-versus-speed ratio of the convolution process. The Summary window also displays information about the IR, including its length, sample rate, and number of channels, as well as any other comments you want to add. More significant is the Recover window, from which you can extract your own IRs. The process is quick and painless, and if you have any trouble, there are tips in the help file.

Be sure to grab the huge collection of IRs that Sony has available at its Web site. It's one of the best sources for real-space ambiences that you'll find.

Pros: Quick, near-real-time updates. Simple and logical interface. Built-in extraction tool.

Cons: No parameter automation. Aging interface.

Compatibility: Windows.

SoundHack 0.892, free. If you're a Mac user who's looking to get into the convolution game but you don't want to spend any money, check out Tom Erbe's SoundHack, a standalone sound-processing program that has been around for a long time. SoundHack is not a convolution reverb per se: it doesn't come with any IRs, and its interface is fairly basic. On the other hand, you can't beat the price.

The process of applying convolution in SoundHack is somewhat convoluted. First, open a file (SoundHack can open numerous file types). Then, choose the Convolution command from the Hack menu and browse to an impulse file. Set the length of the IR (the longer you set it for, the longer it will take to process) and select from various preferences and parameters (see **Fig. 11**). Click on the Process button, and SoundHack will open a dialog box, asking you to name your processed file. (SoundHack's editing is nonreal time, and it writes a new file to disk for each edit.) According to Erbe, it is best to save the file in the 32-bit floating-point AIFC format, because the format's large dynamic range can handle the unpredictable nature of the file after convolution.

When the processing has finished, use the Gain Change command, which finds the peak amplitude and then normalizes the file. Now you can save it as a 16-bit linear file. Once you get used to it, applying the convolution effect is a relatively quick process.

There isn't a preview function, so if you don't like the result of the convolution, you'll have to try it again with different settings. According to Erbe, the only way to adjust the relative levels of the IR and the source file is to mix the processed file with the original file using a multitrack audio editor.

SoundHack performs a number of other DSP processes, including Spectral Mutation—which gives you similar results as convolution—and pitch shifting. For that alone, SoundHack is worth the download. According to Erbe, VST plug-in versions of the SoundHack processors—including convolution—are on the way.

Pros: Free. Useful for sound design.

Cons: Cumbersome interface. Several steps required to complete convolution process. Few user-adjustable parameters. No IRs included.

Compatibility: Mac OS 8, OS 9, OS X.

FIG. 11: The freeware sound-processor SoundHack offers convolution as one of its many DSP options. The topmost window shown above is the dialog box from which you can set parameters before starting the convolution process.

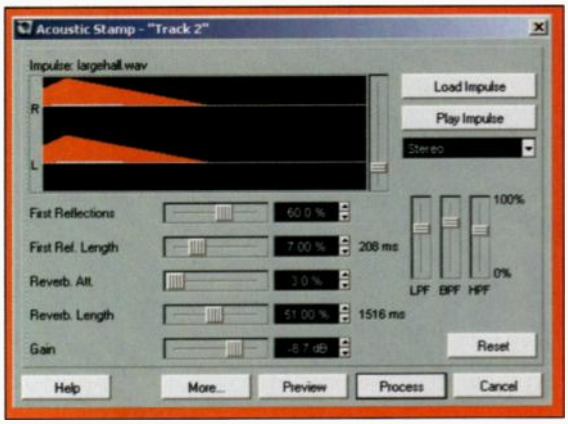

FIG. 12: Nuendo Acoustic Stamp lets you use WAV, SDII, and AIFF files as impulses. The waveform display, which updates as you adjust controls, makes editing easy.

Steinberg Acoustic Stamp, $1,499. Acoustic Stamp, found in the Process menu of Steinberg Nuendo 2.1, has many features that make it well suited for producing virtual reverb, but it's equally at home with other types of convolution as well. At the top of its single window is a display of an envelope that is superimposed over a waveform of the impulse. A vertical zoom slider is on hand to ensure that the IR is viewable, regardless of its amplitude level (see **Fig. 12**). The envelope updates in response to changes in several of the parameters, so you've got lots of visual feedback as you edit settings.

Clicking on the Load Impulse button brings up a file browser along with an option to play files from disk, a feature that all manufacturers should adopt. The maximum impulse length is 12 seconds, and you can choose whether to

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use left, right, or both channels of the IR. Nuendo ships with only a few impulses—three halls, opera, shower, and stage IRs—but you can also use files in WAV, AIFF, and SDII formats.

Five controls at the top of the screen are used to adjust the impulse envelope. You can fine-tune the length and level of early reflections using a combination of the First Reflections and First Reflections Level sliders and set the reverb length using the parameter of the same name. There's also an attenuation control that affects the portion of the impulse after the early reflections and an overall-gain setting. You can control many of the parameter values with sliders, with scroll arrows, or by typing directly into the data fields.

To the right of the envelope are three sliders to filter the IR: Lowpass, Bandpass, and Highpass. (Increments are 0 to 100 percent for each.) A second area of controls becomes accessible when you press the More button. Two of these, Pre-Crossfade and Post-Crossfade, can be used to gradually fade the convolution in or out from 0 to 10,000 ms (in 1 ms increments). The Wet and Dry sliders are linked by default; however, by using the Alt key, you can move them independently. There is also a Tail Length control for when you have a reverb time that is longer than the original file's length.

The Preview command lets you hear how the processed file will sound, but even on the Pentium 4/3.02 GHz machine used for this article, audio playback was intermittent during preview. (Because you can undo the processing using the offline Process-History feature even after saving, you might want to simply skip the Preview command entirely.) Actual processing time was quick, however, and the finished file sounded as anticipated. Also, subsequent parameter changes won't update until the next time you playback the file from the beginning. (Playback of the loaded audio file automatically loops). Overall, Acoustic Stamp is a handy destructive-convolution tool that complements Nuendo's other processing features nicely.

Pros: Support for multiple file types.

Cons: Maximum 12-second impulse.

Compatibility: Windows 2000/XP, Mac OS X 10.2.5 or greater.

Tascam GigaPulse Pro, $599. Tascam has raised the bar for virtual sonic reality with its GigaPulse Pro convolution software. More than any of the other programs in this roundup, GigaPulse gives you options to place your sound in precise room locations with great accuracy. With some of the included IRs, you can, for example, pick from one of 18 different instrument placements in the sampled room. By using the Perspective control, you can adjust the perceived distance from the performer to the selected mic. In effect, you become the recording engineer and can re-record your instruments (or other samples) in the room.

But GigaPulse is not just about mic positions and room ambiences. In fact, it offers features that closely resemble physical modeling. You can use the included impulses of instrument-body resonances, which allow you to, for example, cross a trumpet with a cello. And because you can run multiple instances of GigaPulse simultaneously, you can use it for several tasks at once. Cascade Mode allows you to run two impulses in series, and it is more efficient than using two instances.

GigaPulse has a highly graphic interface, which allows you to view an image of an instrument with two mics hanging over it and pick the mic from which you want the convolution processing to emanate. Its controls are easy to adjust, and the interface is clean and well organized.

GigaPulse is tightly integrated within Tascam's GigaStudio 3 sampling software (different versions of GigaStudio include one or both GigaPulse versions—Pro and SP). That allows developers to create Giga libraries containing instrument samples with convolution as one of their parameters.

Bundling convolution properties with a sample has the benefit of cutting down on the number of individual samples you'd need a library to have: rather than record a piano in ten different rooms or mic positions, you can create

FIG. 13: GigaPulse includes features that resemble mic- and physical-modeling applications. It is also available in a VST version.

that effect by applying the proper IR. Or, instead of sampling a variety of pedalings, you can include pedal models that were created using convolution, such as those included in the new GigaPiano II.

This article looks at GigaPulse Pro from within GigaStudio 3, in which it resides as an NFX effect (see **Fig. 13**). (A standalone VST version should be shipping by the time you read this.) Opening the interface reveals a set of controls that include familiar reverb parameters such as predelay, left, right, and master level (with bypass); and wet/dry mix. A large window that resembles a surround application is on the right side of the screen, and a seven-channel surround routing matrix is located below that window.

Under the matrix is a dialog box that you won't find in your average reverb software program. The Mic Replacement feature lets you impose the characteristics of one mic model (there are many models, including Neumann U47 and Shure SM57) in place of the original. In addition, the Original Mic feature lets you neutralize the sound of the mic used in the recording, as long as the specific mic model appears in the list of options.

GigaPulse Pro has an option called Tail Model that can synthesize the tail portion of an impulse. Although some may prefer the naturalness of a longer IR to the synthetic model, Tail Model is an efficient and good-sounding alternative that cuts down on the length of the IR you would need for long reverbs, as well as the processing time that they would require.

GigaPulse ships with a number of impulses, including a variety of concert halls and Hollywood soundstages. Some were recorded using multiple mics—often as many as seven—in multiple positions. One group was made by sampling a surround-reverb-processing unit. All told, GigaPulse's ambitious feature set and tight integration with GigaStudio makes it a force with which to be reckoned.

Pros: Extensive feature set. Built-in mic modeler.

Cons: Current release requires multistep process to open third-party WAV files.

Compatibility: Windows XP.

IMPULSE BUY

As the breadth of this article demonstrates, there are plenty of convolution choices available on both Mac and Windows platforms. If you have not experienced this technology yet, do yourself a favor and try it. Chances are good that you will find it to be useful and inspirational. EM WEB CLIPS

EM *Associate Editor* **Dennis Miller** *tested and wrote about the Windows software for this story.* EM *Senior Editor* **Mike Levine** *tested and wrote about the Mac side.*

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Scoring Fit for a King

MAUREEN DRONEY

Gary Chang's formula for success combines analog synths, digital-audio software, and a keen sense of melody.

By Maureen Droney

With his cerebral style and ivory-tower electronic music education (Carnegie Mellon, Cal Arts, and NEA Jazz grant), composer Gary Chang might have ended up the quintessential mad-sonic scientist, locked away in a lab producing experimental projects. Instead, he's turned his passion for creating unusual sounds and music into a successful career in film and television scoring. Chang's clients know they can rely on him to compose innovative, original music on time and on budget.

Maybe it's a left-brain/right-brain thing. Chang always gets the job done, effectively communicating the proper emotions and atmospheres to move a plot along. He does that with singular cinematic style music that far exceeds the quality of the generic soundtracks endemic to network TV. That's probably why Stephen King, the master of horror, chose Chang as composer for four of his television projects. King knows that Chang will deliver the nuts and bolts, along with some tasty surprises, in a way that perfectly complements King's scripts.

Chang has said, "To compose music, you have to be both a painter and a plumber." He has various projects under his belt, including feature films *The Breakfast Club*, *Under Siege*, and *The Island of Dr. Moreau*; Emmy Award–winning television shows *Storm of the Century*, *The Burning Season*, *Andersonville*, and *George Wallace*; and musical projects with artists such as Barbra Streisand, Robbie Robertson, and Herbie Hancock. I met up with Chang at his Calabasas, California studio (see **Fig. 1**) where he spends his time multitasking on music. On the morning I stopped in, he was scoring Episode 9 of King's ABC Television series, *Kingdom Hospital*.

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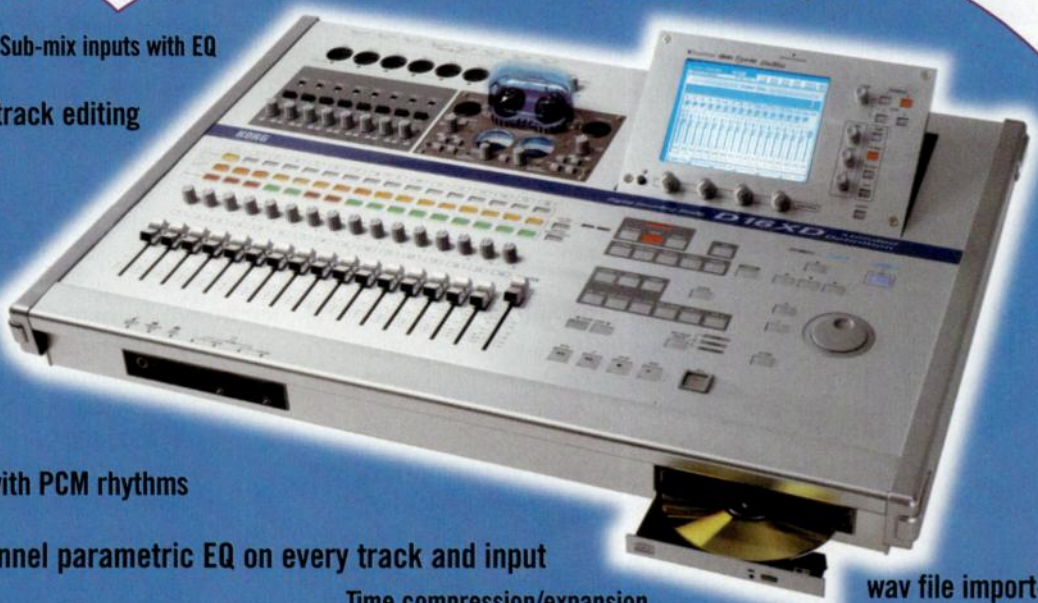

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Working out of your home studio seems to suit you.

If I were trying to do all this in a commercial studio, there wouldn't be enough time. Even spending an hour a day commuting would take too much time away from what I'm doing. And besides, I spend most of my creative time in my pajamas!

It's also true that I'm comfortable doing everything myself. Back when I was studying with Morton Subotnick at Cal Arts, no one ever talked about the categorization of the recording industry. Basically, you were a composer. You walked into a room, there were tape recorders and synthesizers and other equipment, you took all of those things, put them together, and made music with them.

After I got my MFA and was doing my first studio work, it was strange for me to walk into a situation with a producer, an engineer, a tape operator, and a music arranger in which they would say "No, no! Don't touch the reverb unit. That's not your job!" Reverb is to a synthesist like an amp is to a guitarist: they're part of your tool set.

Now it's come full circle, and I'm more comfortable working that way, like Daniel Lanois or Brian Eno—they make music using a reverb unit, a guitar amp, and a microphone. Those kinds of artistic processes don't exist if you have rigid guidelines for job descriptions.

You're not a sound-effects designer, but there's something "sound-effects-like" in a lot of your music.

Generally, the sound-effects designers on a project love me. They're surprised at how much of what I do adds to what they do.

You like using analog synthesis. Do you think it sounds better than digital?

Oh yes. A sine wave output of an analog VCO [voltage-controlled oscillator], even with a noticeable amount of distortion, sounds better than most digital gear sine waves. Part of it is the way in which our ears are constructed. When you compare CDs to vinyl records, there's very little high end on vinyl. But with vinyl, you're listening to frequency information that really matters to the ear. You're able to turn up the volume and get a big, full sound; you don't get that same sound when you turn up the volume on digital gear.

You've become partial to the Wiard synthesizer, developed by Grant Richter.

Grant's Wiard is one of the pivotal instruments (see **Fig. 2**), along with my Synclavier, in the music for *Kingdom Hospital*. While studying at Cal Arts, I worked with a gigantic Buchla synthesizer. I always wanted to get back to it. Some years ago I called Cal Arts and asked if they still had those instruments. As it turned out, they'd just sold them to Grant. Now I have what's essentially a modern-day version, which I'm excited about. The difference is that this millennium's analog circuitry doesn't give off any heat, so it's as stable as a rock and is much faster to work with.

I don't know of that many people right now who are interested in the art of being a synthesist—that is, combining sonic parts and elements to create entirely new sounds.

What's wonderful about being a film composer is that, ultimately, clients want the end result. They don't sit there and hammer me about my process. So I get to use different types of equipment to create my sounds (see **Fig. 3**). And, whether mainstream musicians and composers know it or not, this is really the golden era of analog synthesis. There are more manufacturers out there and more interesting things going on in analog modular synthesis right now than at any other time—even the '60s and '70s. And the instruments have stability and repeatability.

Do you mean "more" in an esoteric way or for the mass market?

Some of both. For instance, Grant's latest, the [Wiard Model GR1211] Joystick Access Generator, is one of the more interesting products on the market. You can plug two inputs into a joystick, and it gives you ten outputs. It costs only $200.

There's also the PSIM-1 by Brice Hornback. It's basically a microprocessor with a flash ROM. You can


GARY CHANG

FIG. 1: From this angle you can see the bulk of Chang's studio, including monitors for his PCs and Macs, a large video display, a Digidesign Pro Control, Meyer Sound HD-1 monitors, and, of course, lots of synths.

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LISTEN

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patch a Windows computer to it and download basic programs. It's a programmable, nonlinear function generator [a circuit that lets you create voltage fluctuations] with four voltage inputs and four outputs. You program it with code. Soon it will have expander modules with a more extensive graphic interface and maybe more inputs and outputs, such as MIDI in and out. It's a mini computer, and it's inexpensive.

Soon you're going to be able to put together an extensive analog synthesis setup with components that cost $200 to $500. It's the direction in which I thought electronic music was going before polyphonic synthesizers came in and took over. There are some really smart people involved in this technology.

So we won't have to hear the same stock or sampled sounds all the time.

Exactly.

After school, you started getting hired to work on sessions. What were you doing, and how did it lead to being a composer for hire?

While in school I played in bands, and I noticed that when there's a musical problem, the resolution tends to come from the first person with a solution, who was usually the guitar player. With the processes I like to use, as you can imagine, I was seldom that person. So most of the time I found myself in subservient positions to solutions that weren't necessarily the best.

Eventually, I got a job as product specialist for Fairlight USA, and ended up programming the Computer Music Instrument (CMI) in the midst of some of the coolest artists and engineers in the business. That got my foot in the door—first as a freelance synthesizer programmer and then as an electronic music arranger, rendering composers' music as electronic music. I worked for [producer-composer] Giorgio Moroder, who was instrumental in my working with [producer-composer] Keith Forsey on *The Breakfast Club*. When Keith left the project to work with his usual bands at the time [the Psychedelic Furs and Billy Idol], I got to finish the underscore. And it just went on from there.

MAUREEN DRONEY

FIG. 2: Chang is shown here with his extensive setup of Wiard 300-Series analog synth modules, which he described as "pivotal" to his work on *Kingdom Hospital*.

How does labor get divided up on the music for *Kingdom Hospital*?

The music group here in Los Angeles is me; my old friend and production manager/researcher/bassist/composer Jack Daro; my regular music editor Sherry Whitfield; and music editor Hal Beckett, who lives in Vancouver.

On *Kingdom Hospital*, I composed most of the original music and did most of the final editing and sweetening of recorded elements. Jack contributed a cue or two each episode, while Sherry did most of the rough assemblages. I did all the final mixes. Filming, by the way, is done in Vancouver.

How much music is there to compose?

Kingdom Hospital has over five hours of original score. A lot of the songs are chosen by Stephen. In Episode 8, for example, there were 24 minutes of score. That's substantial. It will probably stay on that level, so it's going to be quite intense. It's interesting when people create budgets for films. They understand how long and how much money it will take to produce music, but they don't factor in the writing time.

For the last episode we did, we had seven days to turn it over. I spent four days writing, so I had to stay up all day and night for three days to deliver the final product.

What are you working from in terms of visuals? Where does your direction come from?

We [the music team in Los Angeles and the production team in Vancouver] spot the movies via the Internet using iChat. We're online once a week, and we talk about it [while watching the visuals] with the executive producer, the editor, and the director.

Isn't there a delay with iChat?

It's about two seconds.

I've heard that when using iChat, people feel a need to have their ideas and comments well organized so that they can speak rapidly to compensate for the delay.

It does make a big difference in the

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respect that if you are all in the same room, it could take three hours to spot a 90-minute show. With iChat, it takes maybe an hour and a half. It goes like this: "Is there something wrong with this? No? Then let's move on." The conversation moves quickly as opposed to us getting into long discussions.

So when you spot, you're looking at the visuals. What else helps you decide the areas in which you need to write music?

There's a temporary score that Stephen and ABC have already signed off on. That score has been rendered by an assistant editor using my music and other resources.

You are currently working on the score for Episode 9. For the first episode, was there much more music for you to create?

Kingdom is my first series; up until now I'd done predominantly feature-length projects or miniseries. But in creating the music, it's like working on a giant feature, where the theme writing happens up front. I had enough time to write some of the themes and to get the producers and the studio to sign off on them. Then the schedule gets so tight that there's no more time for feedback except for "That sucks! We have to redo it!" Fortunately, that doesn't happen very much on this project.

Now that we are on Episode 9, there are issues here and there. But generally speaking, it's easier. Some composers feel that temporary scores can be daunting. And they can be, but in a lot of ways it's good to have a reference. Especially if you have a client who really doesn't understand music, it's much easier to deal with. You can have someone say, "I like this," rather than "I want some sort of rock thing," and 20 versions later, they decide it's still not right.

It's not like that on *Kingdom*. I've worked 5 times with this executive producer, 4 times with Stephen King, and 13 times with the director.

Those kinds of relationships must make the work a lot easier.

Return work is the heart of film music. The clients have confidence that when there's a music moment, it's going to be good, and that's always an asset.

Do you ever work with Stephen directly?

Not really, he's kind of aloof to the process. But I have the original scripts, which are great. There are occasional specific requests, but these are usually passed to me through the director or the producer, who are in direct and constant contact with Stephen.

People often ask me how I like working for Stephen King's horror genre. To me, King uses horror like other authors use war—as an external force that directs people. It's about the resolve of the characters. The horror device forces the motivations and exposes the kind of person that he's trying to examine in the story. So there's a lot of musical meat in there for me. Stephen King is an evocative fellow for this day and age, one of the major storytellers of our time. I am pleased to have worked this much with him.

What's your technical setup?

I record to Pro Tools, and I have two computers on one monitor, with GigaStudio on one and Acid on the other. Acid, in my opinion, is the pivotal change that has allowed me to use these modular instruments again.

Because you can make sounds and digitize them into Acid?

SELECTED CREDITS

(featuring music composed by Gary Chang)

Kingdom Hospital, ABC series, 2004
Word of Honor, TNT feature, 2003
Path to War, HBO feature, 2002
Rose Red, ABC miniseries, 2001
The Crossing, A&E feature, 2000
Storm of the Century, ABC miniseries, 1999
George Wallace, TNT miniseries, 1997
Andersonville, TNT miniseries, 1996
The Island of Dr. Moreau, New Line theatrical feature, 1996
Against the Wall, HBO feature, 1994
The Burning Season, HBO feature, 1994


GARY CHANG

FIG. 3: In addition to the Wiard 380-Series modules, this corner of Chang's studio houses a pair of Wiard Joystick Axis Generators (sitting on keyboard), a Wiard Noise Ring (ring modulator), and a Waldorf Q Rack (yellow module in back) sitting next to a Waldorf MicroWave XT Rack.

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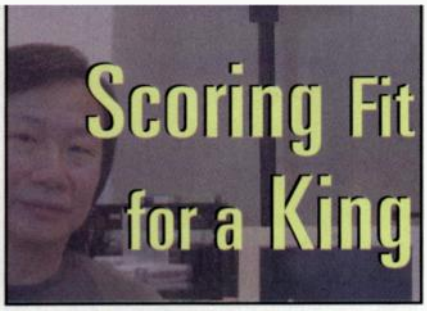

One of the beautiful things about Acid is that when I get an idea, I can database my patches. Instead of waiting for the moment when I need something and trying to create it then, I can come up with something in the middle of the night if I want and throw it into Acid. It's a lot of fun, because it's completely plastic. I just construct it in Acid, it sounds great, and then I go on. No more sync insanity.

What about traditional orchestral sounds? I hear some of them in the *Kingdom* soundtrack.

A lot of them are from GigaStudio, especially the strings, which are from the Vienna Library. I use the Synclavier, which still sounds fantastic, even now. But I also have a lot of live performances stockpiled in Acid. Many were written and recorded by me—along with various musicians—for the show. Acid has also enabled me to use a lot of these live performances differently. I hardly ever record with a click anymore, because I can synchronize what I've recorded. I'm just looking for the musicians to play as musically as they can, which is rather a wild way of doing it.

To sync up after the fact?

Exactly. I can have people come in and actually perform in the tempo that's comfortable, and then I stretch them into synchronization later.

The click doesn't have to dominate the composition process anymore.

With sequencers, the click ruled. As soon as you start thinking about the click, you erase a whole palette of creativity. You're too busy figuring out, "Now, when this comes down, how does it coincide with the other part?" Not having to think about the technical crap while playing is fantastic. So I thank Sonic Foundry for Acid. It's an amazing program that allows me to take gestures—musically valuable entities—and integrate them into pieces of music.

With so many tools and sounds available, how do you decide where to start for any given cue?

Fundamentally, I'm a thematic composer. I learned this working with [director] John Frankenheimer, who loves melodies. He asked me to score a Civil War movie, and suddenly all of the technology that I'm used to working with disappeared, and we were in choirs and orchestra. That's when I discovered that I'm good at thematic writing. When the themes are right, the show shines. There are other functional pieces of music, of course, like action and suspense. But I love it when music paints subtext in a scene. It's

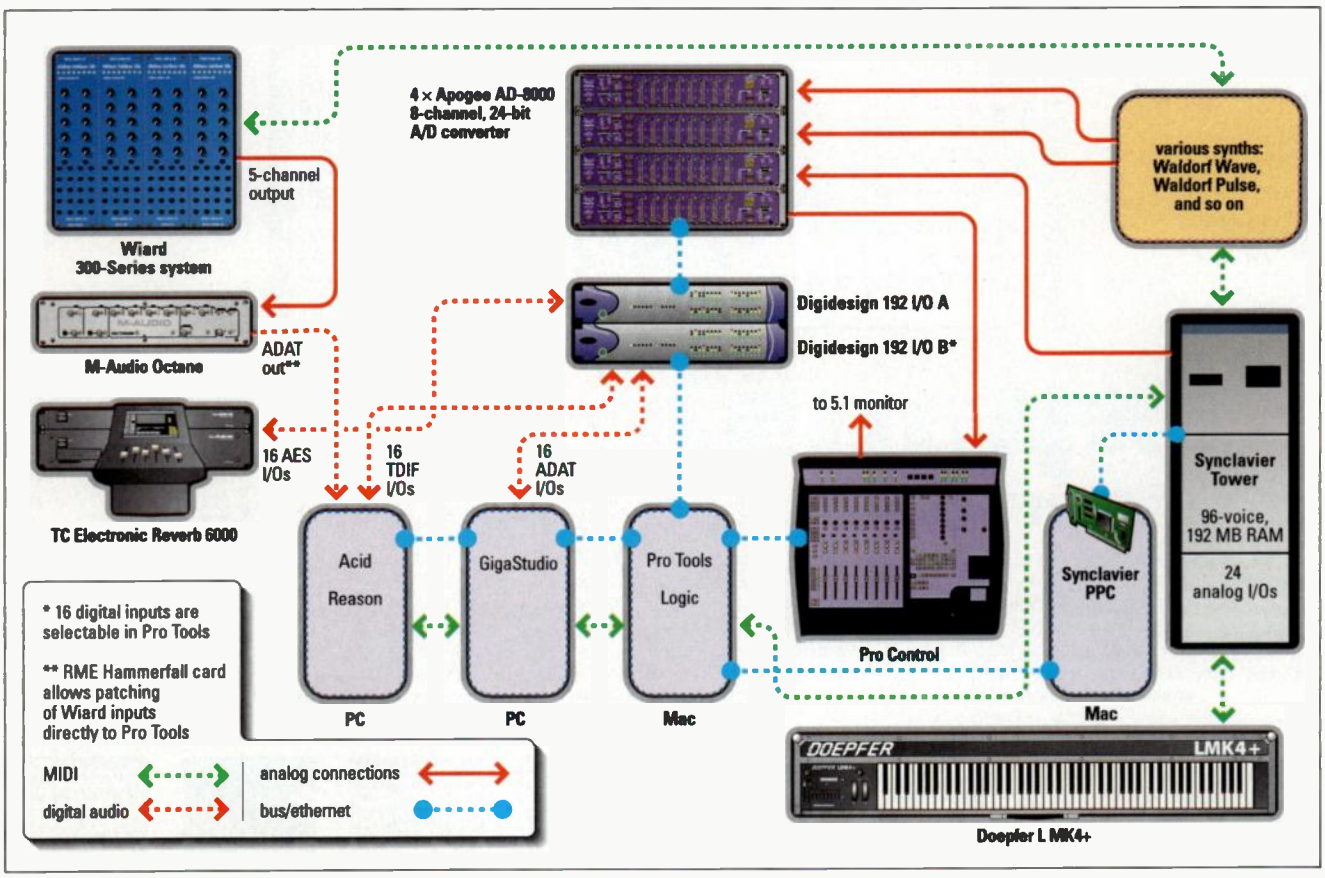

FIG. 4: This diagram shows the signal flow and major components in Chang's personal studio.

like whispering into the audience's ear while they're watching the show.

Do you record much at your home studio?
I record and mix everything at home, with the exception of orchestral scoring sessions.

There's a piano in the living room, and with an Apogee Mini-Me [preamp and A/D converter] and my Schoeps M/S pair [mics], I record piano parts or sound effects into my laptop. I have a guitar speaker cabinet and a Leslie [amplifier] in isolation rooms above the garage, so I can crank it up late at night. The studio is floating double wall-ceiling construction. I've recorded drums at 2 a.m. without the police knocking on the door.

I have instruments all over the house: a 52-inch pow-wow drum in the living room that I sampled for Episode 2, and tons of ethnic hand percussion. I call it guerrilla recording—finding sounds and little gestures, and then recording and compiling them to make new composites. I'm not interested in libraries with 5,000 drum loops. I like to make the sounds myself.

For example, for one of the episodes I created an eerie brush loop. Drummer Billy Ward, who lives in New York City, is a friend who I've worked with for over ten years. He puts together a bunch of random parts and sends them to me on CD. For the brush loop, I took something he played and heavily futzed around with Amp Farm and delay. Once you become proficient at making your own sounds, it's just as fast as trying to thumb through 2,000 drum loops in a library. And—best of all—it's unique.

Are you trying to send the mixers a "straight-line" mix—where they just put all the faders at zero and they get your mix?
Yes, exactly.

What are some other pieces of gear that you're using a lot lately?
M-Audio's Octane [preamp and A/D converter] is the perfect input device for the 5-channel input of the Wiard. Instead of 12 feet of XLR connectors to get to the patch bay, I patch to the Octane, which then connects all eight of its channels via Lightpipe (see **Fig. 4**). It also has a built in M/S decoder, which is handy for my Schoeps M/S pair.

Peter Grenader [synthesizer designer and composer] has created the Milton, a 16 × 4 analog sequencer that pays homage to the Buchla 200 Series sequencers. That is another fantastic limited production analog synthesizer module in my Wiard setup.

The Apogee Mini-Me is fantastic because it has mic or line inputs and AES or S/PDIF outputs. I just take my laptop somewhere, record a sound, and turn it into Acid fodder.

Last, but certainly not least, is the TC System 6000. To me, that reverb is like what a Dumble Amplifier is to a guitar player. It makes my electronic music sound live. The 5.1 multiband compressor allows for very subtle mix control—for instance, like bringing out a French Horn melody from a dense orchestral texture. It's an essential tool in my book.

How do you feel about surround sound?
All of Stephen's productions have been in 5.1. Unfortunately, on primetime TV, everyone—except those viewing on HDTV—hears it in stereo. It will, however, be recorded in 5.1 for the DVD. I'm a big advocate of surround. But what I see right now is that 5.1 audio, except in film, is an elitist hobby.

Do you have any parting thoughts about being a composer in 2004?
If you just want to make money, go to business school. This is a terrible business to make money. People tell me I'm nuts, and that they would never work as hard as I do. But the truth is I adore what I do—all of it, from composing, playing, and patching things in to working with new gear, creating sounds, engineering, and mixing. I raised my family doing something I absolutely love, and I feel very fortunate.

Maureen Droney, *whose engineering credits include projects for Carlos Santana, George Benson, John Hiatt, Whitney Houston, and Aretha Franklin, among many others, is the Los Angeles editor for* Mix *magazine.*

Colors of the Rainbow

A by-the-book look at CD standards and formats.

By Gary S. Hall

The Compact Disc—that integral piece of our music and data lives—is governed by a series of published specifications named for the colors of their book covers. The first specification—the venerable Red Book—defines the physical characteristics and data format of the CD, as well as its use for music (which originally was its only use).

As other applications were developed, the practice of naming the specs after colors was continued to include yellow, orange, green, white, and blue. Eventually that practice was discontinued, presumably because no one wanted to be responsible for the Mauve Book. The six books named after colors (see **Fig. 1**) define the core technologies of CD, CD-ROM, and recordable CD, as well as the application formats CD-I, Video CD, and Enhanced Music CD (also called CD Extra). These standards, and additional specifications (no longer named after colors), are maintained by Sony and Philips Electronics, the originators of the CD format.

LAURA WILLIAMS

You may be wondering if you can go to Amazon and order the Red Book and other CD specs. The answer is no—access to the books is carefully controlled. General access to the specifications requires a $5,000 fee up front to Philips Intellectual Property and Standards (www.licensing.philips.com) and a stiff confidentiality agreement. However, the original Red Book eventually became ISO/IEC standard 60908. The PDF version can be purchased at www.iec.ch for 263 Swiss Francs (around U.S. $200).

For this article, I will cover the Red, Yellow, Orange, Green, White, and Blue books. Super Audio CD (SACD) will

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not be covered because it is not considered a CD format. SACD is truly a different beast and deviates from the physical spec of formats derived from Red Book.

RED BOOK (CD DIGITAL AUDIO)

Red Book defines the physical parameters of the CD as well as data formatting and track addressing for audio CDs. Audio CDs are often referred to as Red Book discs; however, all CDs must conform to the Red Book definitions of format and basic storage. Physical parameters defined by Red Book include dimensions of the disc, the size and spacing of pits, and the requirements for the optical pickup to read the disc.

Red Book also defines how data is stored on the disc. You might think a CD contains data bits and bytes arranged in a straightforward manner. In fact, data is arranged according to a carefully defined scheme, called 8-to-14 modulation, wherein each 8 bits of original data becomes 14 bits on the disc and includes redundancy and check codes.

Data bytes are shuffled so that sequential bytes are placed on nonadjacent sectors of the disc. This ensures that a scratch or other physical defect will not wipe out a large contiguous block of original data, which would make the disc unusable.

That processing is designed to compensate for the inherent limitations of reading dense data at a high speed. Any optical disc, in any particular drive, exhibits a *block-error* rate. Damaged discs or media that are marginally compatible with the drive have a high block-error rate. Red Book specifies the maximum block-error rate before reading problems become evident to the user.

Subcode information is also embedded in the data stream. On audio CDs, subcodes are used to carry timing information as well as optional embedded graphics and text.

Red Book defines the storage format of audio for playback on standard CD players. That includes the now-familiar digital-audio coding parameters—linear pulse code modulation (LPCM), sample resolution of 16-bit stereo, and a sampling rate of 44.1 kHz.

Red Book provisions for low-level formatting have proved to be both a boon and a bane. Data is contained on a single spiral track, like the groove on a phonograph record, with a table of contents that contains pointers to every track. That method of track addressing is inadequate for computer applications. In addition, the original provisions for error detection, error correction, and sample interpolation (called concealment) are not suitable for critical data.

YELLOW BOOK (CD-ROM)

As the audio CD gained market acceptance, technologists went to work creating a comparable standard for CD-ROM. That standard became Yellow Book.

It was decided to keep the basic physical and data storage formats of the disc from Red Book. To provide the extra data protection needed for CD-ROM, Yellow Book redefines the arrangement of data on the disc, splitting it in to sectors of 2,352 bytes compared with 2,048 bytes for audio CDs. The additional 304 bytes of each sector are dedicated to error correction and addressing.

CD-ROM data may be stored as Mode 1 or Mode 2 data. Mode 1 provides the extra error detection and correction that is needed for software and critical data. Mode 2, without the additional correction, is better suited to media because the increased sector size makes it faster to read in a stream of data. Mode 2 is also more easily adapted for use on dedicated, non-computer hardware.

Yellow Book defines data formatting for CD-ROM applications, but it doesn't

FOR FURTHER INFORMATION

Web Links

The Internet offers a wealth of information on CD standards and specs. Below are links to get you started:

www.licensing.philips.com/information/cd
The official source for all of the CD specification documents, colored and uncolored.

www.disctronics.co.uk/technology/index.htm
An excellent information site from Disctronics, a major replicator based in the UK. There are links to separate pages for CD Audio and CD-ROM, as well as DVD and other formats.

www.cdpage.com
Consultant Dana Parker maintains this site that has information and history about all optical media formats.

www.ncf.carleton.ca/~aa571/cdtext.htm and **www.jbum.com/jbum/sware/cdg_revealed.txt**
These sites have information about two related areas: CD Text and compact disc and graphics.

www.uwasa.fi/~f76998/video/svcd/overview
An excellent article on the history and politics behind the Super Video CD specification.

Books

A search for books about "compact disc" at Amazon.com yields 11,825 items. Below is a list of recommended titles. Those that are out of print or out of stock are often available used.

The Compact Disc Handbook, by Kenneth C. Pohlmann (A-R Editions, 1992)
Compact Disc Technology, by Heitaro Nakajima (Ohmsha, 1992)
The CD-ROM and Optical Disc Recording Systems, by E.W. Williams (Oxford University Press, 1994)
The CD-ROM Book, by Jeff Sloman, Steve Bosak, and Joel Sloman (Que, 1994)
Digital Audio and Compact Disc Technology, by L. Baert, Luc Theunissen, Guido Vergult, and Jan Maes (Books Britain, 1995)

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address file systems and data retrieval in a computer environment or multimedia application. Two specifications that are not named after colors address those topics. CD-ROM XA is a Yellow Book extension that defines video and audio data interleaving and is the first CD spec that provides information regarding the use of data-compressed audio. It also defines how to place Red Book CD audio on a separate track of a CD-ROM disc.

CD-ROM XA became the basis for the CD-i Bridge specification, adding an ISO 9660 file system and providing for compatibility with set-top players. Several other extended-media CD formats are based on CD-i Bridge.

ORANGE BOOK (CD-R, CD-RW)

Orange Book (see **Fig. 2**) Parts II and III are multivolume documents that govern writable and rewritable CD formats. Part I describes Magneto-Optical CD drives, which never became as popular as CD-R. Orange Book Part II covers write-once CD-R, while Part III covers rewritable CD-RW.

Orange Book focuses on the physical aspects of a writable medium that is compatible with the original CD specification. It includes specifications for pregrooved blank discs that provide tracks for recording data. It also includes definitions of spot dimensions, tolerances, and reflectivity, as well as definitions for data organization and linking in multisession and hybrid discs.

In Orange Book Part II, CD-R discs are defined as compatible with standard replicated CD audio and CD-ROM discs. Orange Book Part III specs require that the drive be adapted to the CD-RW format, as are most CD-ROM drives manufactured today.

Physical compatibility of recordable CDs has turned out to be an ongoing vexation. Data can be written on a disc in many ways, utilizing different materials and writing methods. Each produces a different set of tolerances in spot-track dimension and before-after reflectivity.

GREEN BOOK (CD-I)

With the multimedia-optimization definitions of the CD-ROM XA spec in place, the CD technology community (Philips especially) became enamored with the possibilities of standardized interactive media. The result was the Green Book CD-interactive (CD-i) specification, which defines not only the disc format and data coding, but also the CD-i content and programming details. Green Book is the forerunner of the video Application Layer concept used in DVD Video.

CD-i was launched with great fanfare in 1986. Philips put tremendous energy into promoting the medium and in creating systems for content development. However, the first players did not hit the market until 1990, and even then there was a lack of compelling content. Philips and its partners kept up the fight for several years, but the format eventually sank from view as a consumer medium.

WHITE BOOK 2.0 (VCD, SVCD)

The Video CD (VCD) defined by the White Book 2.0 specification is the most successful consumer product of which no one in North America has ever heard. A forerunner to DVD, Video CD provides 74 minutes of MPEG-1 video and audio, with a menu for track selection.

When VCD came into existence, DVD was already on the drawing boards. Because VHS was a mature product in North America and Europe, the market makers concluded that Video CD offered little to attract Western viewers. The picture quality is not as good as moderate-quality VHS (despite claims to the contrary), and the limited playing time results in a lot of disc changing.

At the same time, VHS had not penetrated Asia, and there was a huge CD production capacity available in that area. Asian consumers thought VCD looked fine since they had less with which to compare it. VCD players and discs could be produced for much less than VHS. Track jumping and menu selection—two VCD features—also made it well suited for karaoke, which is massively popular throughout Asia.

VCD became a major hit in China and other East Asian countries. Even today, it is the video medium of choice in that market, while DVD is a premium format and VHS is scarcely present.

The hold of VCD on the Far East market has been strengthened by Super Video CD (SVCD). The development of SVCD was backed by the Chinese government, and although it is not part of the White Book specification, it is supported as a Sony-Philips standard. SVCD takes Red Book one step further by defining variable-speed playback, which allows the disc to carry medium-resolution MPEG-2 at bit

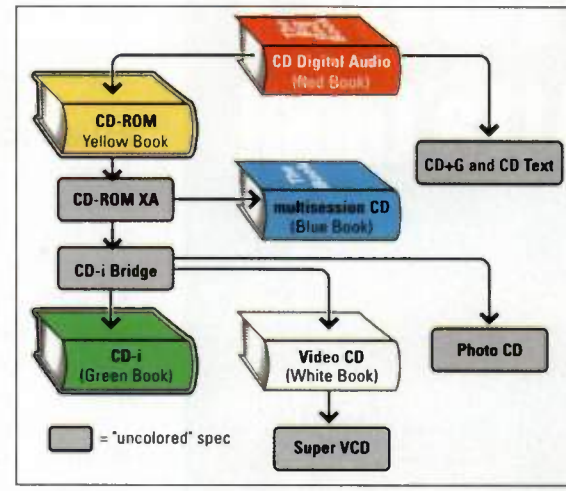

FIG. 1: The diagram above shows the family tree of audio CD and CD-ROM formats that are licensed by Sony and Philips Electronics. Any format in this diagram can be stored in an Orange Book CD-R or CD-RW disc or in a mass-replicated disc.

rates of as much as 2.6 mbps. (The DVD rate is typically 5 mbps or higher.)

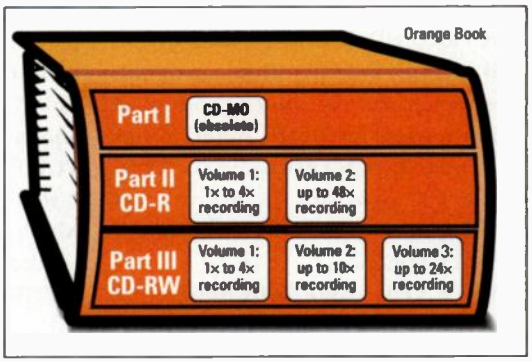

FIG. 2: The Orange Book spec for CD-R is divided in to three parts, the first of which is obsolete. Recording at higher speeds in CD-R and CD-RW are different enough to require individual specifications, which standardize the recording methods to ensure compatibility.

BLUE BOOK (CD EXTRA)

In the '90s, record labels and recording artists wanted to add CD-ROM data to their music CDs. While CD-ROM XA made it possible to combine audio and CD-ROM data tracks, it also created problems of player compatibility.

Orange Book included specifications for multisession recording. Red Book audio can be recorded in a first session, playable by standard audio CD players. A second session can consist of multimedia data that is readable by a computer or by a suitable dedicated player.

Although Orange Book defined multisession capability for recordable discs, the Red and Yellow books only provide for the mass manufacture of single-session discs. A new specification was needed before such enhanced CDs could become a medium of distribution, and thus the Blue Book was born. Blue Book is a specification for a stamped version of the Orange Book recorded multisession disc.

At first, there was great enthusiasm for Blue Book, but the effort ultimately foundered. Multisession discs required major changes to the mastering equipment, and it took time for the makers of production components to catch up.

In addition, when Blue Book was released, most drives could not read multisession discs. Eventually, interest waned as other means of combining high-fidelity music and multimedia came to the forefront. As a commercial product, Blue Book is now effectively dead.

RED BOOK EXTENSIONS (CD+G, CD TEXT)

From the beginning, Red Book defined a type of auxiliary data on the CD disc called subcode. That extra data accompanies the audio payload of every audio CD.

Subcode data is available in two areas of the disc. The lead-in provides about 5,000 bytes of subcode loadable when the disc begins to spin. A larger amount of data (approximately 31 MB total) is available in the program area, but it can be extracted only on the fly as the disc is read.

The first use of subcodes to carry extra information was CD+Graphics (CD+G), which included low-resolution graphic information readable by a suitably equipped player. The application for which it was most commonly used was karaoke, and many CD+G players were sold in Asia. In addition, an extension to the spec provided for MIDI data, but I don't know of any instance in which it is being used.

CD Text has more recently come into existence. Since 1997, every disc produced by Sony Music has included CD Text information, including album and track titles as well as the artist's name. Today, more and more audio CD players (hardware and software) read and display this information. CD Text is now an established part of the audio CD world.

The Photo CD is also worth noting, if only because its parent, Kodak, has made it available at almost every photo counter in the world. Photo CD is a content definition sitting on top of the CD-i Bridge format. The format is now somewhat dated, but Kodak's ubiquitous presence has given it a long life.

Gary S. Hall *lives in the tropical paradise of Hua Hin, Thailand. You can by visit his Web log at http://garyinthailand.blogspot.com.*

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RECORDING MUSICIAN

Finding the Sweet Spot

Successful mic positioning can be as easy as closing your eyes.

By Brian Knave

Many years ago, not long after I got serious about recording, a friend and fellow musician played me a song that she had just recorded. I remember being knocked out by the sound of her acoustic guitar. I had heard her guitar before because I had recorded it myself, but I had never been able to make it sound like *that*.

What was the secret? Did the engineer have a special microphone that worked magic on acoustic guitar? Was it something he'd done in the mix? What was it that made that guitar track sound so delicious?

MIKE CRUZ

A few months after hearing that recording, I got a call to play drums for a session. As luck would have it, the same engineer who had recorded my friend's song was behind the board. After the session, I asked him about what he'd done to get that amazing sound from her guitar. To my surprise, he said he'd used a microphone that I owned at the time and compressed the track with a compressor that I also happened to own—and it wasn't a particularly notable one, either. He insisted that the mic preamp was nothing special, nor was the recording space.

Now I was really stumped. What had he done to get such a great sound?

Then he let me in on a little trade secret. "The trick," he said, "is in finding the *sweet spot*. You have to fiddle around with mic placement. Sometimes a small change can make a big difference."

A big difference, indeed. Since that day, "find the sweet spot" has been my guiding principle in recording. I've explored that principle for many years now, and I'm still exploring it. During the course of that exploration, my recording chops have improved considerably. What follows are some

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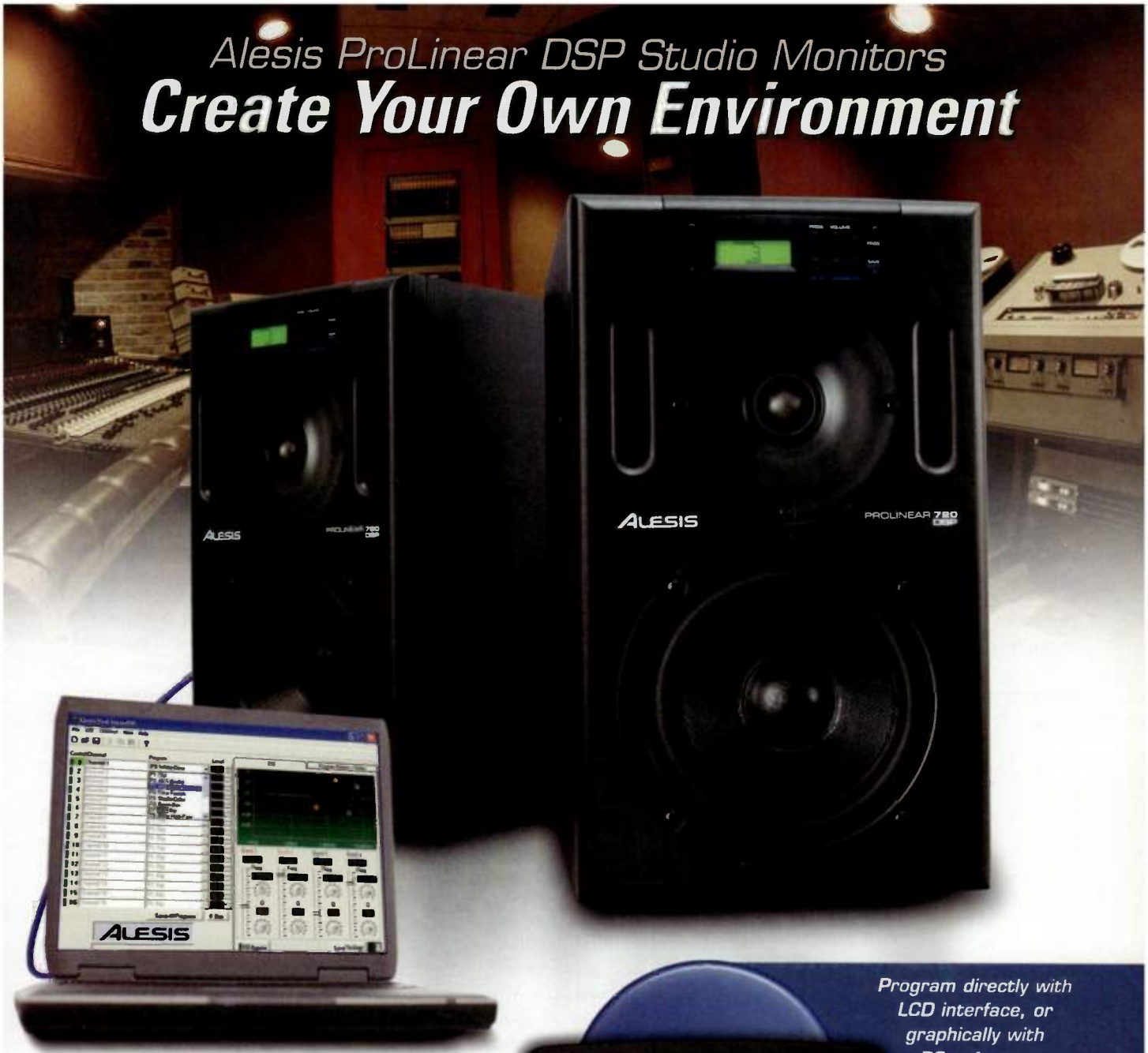

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thoughts, tips, and techniques based on what I've learned about finding the sweet spot.

WHAT IT MEANS

Let's start by identifying terms. What exactly is a sweet spot?

The definition is fairly self-evident: the sweet spot is the spot where the sound is the sweetest, or the best. More specifically, it's the location from which the ear can hear the most favorable balance of sound elements: lows, highs, and mids, as well as ambience and dynamic qualities.

The sweet spot is not merely a fixed location awaiting discovery—if that were the case it could be found by a machine. The sweet spot represents an artistic choice. By finding the sweet spot, you are defining what you consider to be the most desirable balance among multiple interrelated ranges of sonic elements. In fact, that is something you might intentionally vary from song to song, depending on the arrangement and the mood you're trying to create.

FOUR STEPS TO LOCATE SWEET SPOTS

1. Find the spot where the instrument sounds best in the room (the instrument-room sweet spot).
2. Make sure the musician you're recording is playing the same (or similar) part—and at a similar volume—as what will be recorded.
3. With the instrument in place and the musician playing, find the spot in the room where it sounds best (the instrument-mic sweet spot). Listen with both ears, and then cover one up to get a more monolike sound.
4. Using headphones to monitor the sound, set up the mic in that area, and then close your eyes and move the mic around on its stand until you find the best-sounding spot.

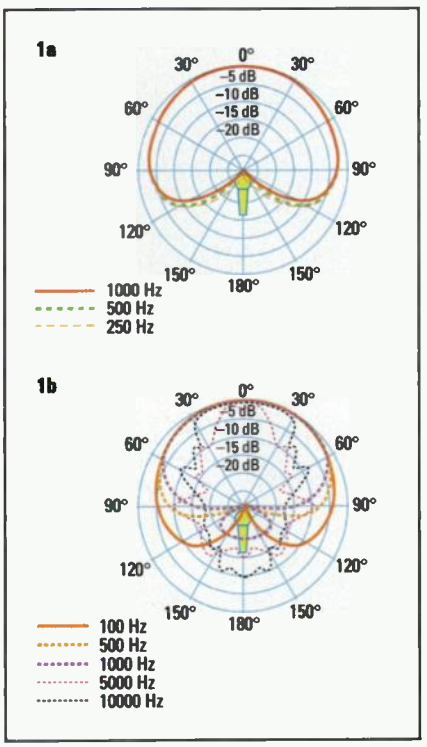

FIG. 1: Off-axis coloration is one of the key factors that determines how much tone control a directional mic permits its user. The top graph shows a mic with good off-axis response (low off-axis coloration). The bottom graph shows a mic with poor off-axis response (excessive coloration). Although the second mic might not sound as good as the first, it provides a more radical tone-shaping capability.

MIC ISSUES

Every mic has its own way of picking up sound: what sounds sweet to one might not sound sweet to another. It helps to be familiar with your tools, particularly any special qualities that they may have that will affect finding the sweet spot.

A key factor is the mic's polar pattern, which determines the shape and size of its pickup area, as well as its null-point zone (the region where the mic rejects sound). In general, the more directional the mic, the more finicky it will be about close positioning. When I say that a small change in mic positioning can cause a big change in sound, I'm mainly referring to directional (cardioid, supercardioid, and hypercardioid) and bidirectional (figure-8) mics. That's partly because directional and bidirectional polar patterns naturally exhibit bass boosting from the proximity effect. Within a certain range (usually less than a couple of feet), the proportion of low-frequency content increases—often dramatically—as the mic is moved closer to the source. Bidirectional mics are the most prone to the proximity effect, followed by hypercardioid, supercardioid, and cardioid.

The proximity effect can be both a blessing and a curse: on the one hand, it can be used to enhance low end, which is helpful in the case of a thin-sounding source; on the other hand, it might hamper your efforts, for example, at close-miking an especially boomy-sounding acoustic guitar. A directional mic at close range acts as an equalizer, allowing you to fine-tune the proportion of low-frequency content in the signal. The mic's null area is a potential ally, allowing you to block out, or at least minimize, sound coming from other parts of the recording space.

Another potential aid in directional mic positioning is off-axis coloration (see **Fig. 1**). Although it's generally regarded as a shortcoming in a microphone, off-axis coloration is commonly exploited to equalize the sound. When you turn a directional mic just a little bit in different directions, you're making adjustments to equalize or improve the sound. Such incremental moves are the heart of mic positioning. Some manufacturers have even been inspired to offer rotating-head mics (see **Fig. 2**). Given the combined power of proximity effect and off-axis coloration, it's not far off the mark to think of a directional mic as a giant tone knob.

EQUAL STATUS

By definition, omnidirectional mics pick up sound in the same way in any given space. The capsule's pickup area is all around the cap, much like a human ear's; it has not been "shaped" to pick up sound from only one direction while blocking out the rest. Because omnis don't distort the surrounding sound field, there's typically little or no off-axis

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axis coloration and proximity effect. (For more about omnis, see the sidebar "Know Thine Omni.")

The result is that omnis tend to be less finicky about positioning than directional mics: sweeping an omni in small increments from side to side yields less tonal change than what you get from a directional mic. You can position an omni as close as you want to the source with little or no unwanted bass buildup. I have captured stunning acoustic-guitar tracks using an Earthworks QTC1 omni (see **Fig. 3**) positioned only an inch or two from the strings and aimed directly into the sound hole of an acoustic guitar—a position that would hardly qualify as "sweet" for any directional mic.

SENSITIVITY TRAINING

Although a mic's polar pattern generally exerts the greatest influence, other factors can also affect finding the sweet spot, such as whether the microphone is a dynamic or a condenser. Dynamic and condenser mics don't behave so differently in terms of positioning. Given equivalent polar patterns, a directional dynamic and a directional condenser will track the same way in close-miking situations, providing the same kind of tone control as you move and turn either mic.

But there are other differences that can figure into the equation. Dynamics are less sensitive than condensers and have more limited frequency responses: they can pick up sound neither as fast nor as far as their condenser counterparts. But sometimes those limitations can be advantageous. For example, the pickup patterns on dynamic mics don't extend as far as those on condensers, and dynamics provide better rear rejection, which is a godsend when you're attempting to record several musicians playing at once in the same space. In such cases, finding the sweet spots becomes as much about strategy as it does about tone: you listen

FIG. 2: A mic tweaker's dream, the Blue Dragonfly features a rotating grille-ball/capsule assembly that allows for even greater fine-tuning of the sweet spot.

not only for where each mic sounds best, but also for where each mic picks up the least amount of sound from the other instruments.

Now that we've considered key mic variables that affect mic selection and positioning, let's get back to finding the sweet spot.

LISTEN UP

My big revelation about mic positioning was slow in coming, due in part to my reliance on a variety of "instructional" photographs that presumably depict the best place to put the mic. For longer than I care to admit, I dutifully positioned mics as these photos instructed and lived with the results.

But there are a couple of problems with instructive photographs. One stems from the nature of photography: it's difficult to take photographs that accurately convey distances and angles. In my opinion, spatial exactitude can't be properly represented in a photograph. While photos are still useful in showing the general idea, don't rely on them for the critical task of finding the sweet spot.

The other problem is that microphones cannot see. That may seem obvious, but this fact led me to a profound discovery. During my formative years of information gathering—watching other engineers position mics, reading descriptions of mic placement, and poring over photos of miked instruments—I developed a visual orientation to microphone placement. In my experience, most people position mics using visual cues, based on the direction in which the mic is aimed.

FIG. 3: When it comes to finding the sweet spot, omnidirectional mics are more forgiving than directional models, thanks to a lack of proximity effect and off-axis coloration. Pictured above is Earthworks QTC1, a single-diaphragm omni.

The problem is that even if you're monitoring a mic while positioning it,

the visual information interferes with the auditory information, obfuscating what you're hearing. I experienced more gratifying results when I closed my eyes and relied solely on my ears to position a mic. That's the secret: use your ears, not your eyes. Only then can you really concentrate and let the sound guide your hand.

If you're working alone, you can monitor the mic signal using a pair of high-quality closed headphones. After the preamp gain is set, loosen the mic stand or boom a bit so that the mic can be moved freely. Then close your eyes and listen for the sweet spot as you move the mic around in small increments. The perfect sound can sometimes come from the most unexpected place.

After you lock the mic into that magic position, note that it may visually appear odd or wrong. But don't mind how it looks, all that matters is how it sounds.

STARTING POINTS

Although finding the sweet spot often comes down to moving the mic in tiny, precise increments, that's not the whole picture. The recording space has a sweet spot as well—the "instrument-room sweet spot."

Unless I'm familiar with the space, I always start a recording session by trying to find the best-sounding spot for the instrument. To do that, have the musician play in different parts of the room while you both listen for the location that brings out the best from the instrument. Note that this is a relationship: the room's sweet spots exist only in relation to the sound coming from the instrument.

After finding the instrument-room sweet spot, start listening for the instrument-mic sweet spot. Some engineers recommend covering one ear so that your other ear hears a more mono-

▼

The sweet spot is not merely a fixed location awaiting discovery.

like sound. I often listen first with both ears and then with one. The idea is to find the area (or areas) from which the instrument sounds best. That will be your starting point when placing the mics.

Once you've found the sweet-spot area, fixed the mic to the stand, set the gain, and monitored the sound using headphones (or monitors if you have a control room and an assistant), make certain that the musician plays the exact part that's going to be recorded and at the proper volume level. Sweet spots are contextual not only to the instrument, the mic, and the space, but also to the mood and arrangement of the song. If you're recording a cello part for a song, and the part requires only a few quietly sustained, closely grouped notes, then the last thing you need is for the cellist to be whipping through scales from

KNOW THINE OMNI

If you're trying to find the most favorable positioning for an omni mic, it's good to be aware of certain strategic differences between the two common types: dual-diaphragm and single-point (one diaphragm) mics. Technically speaking, omnidirectional mics do not exhibit null responses. However, in practice they do, if only because of structural interferences from the mic bodies. A single-point omni (such as the Earthworks QTC1) will exhibit a bit of nulling directly behind the mic body. Likewise, a dual-diaphragm omni (such as an AKG C414 in omni mode) will exhibit nulling below the mic body, as well as around the imaginary plane separating the two capsules. (That is due in part to interference from the piece of metal joining the two sides of the grille cage.)

If you want to reduce sound coming from behind the mic—for example, when miking an acoustic guitar—a single-point omni would be a good choice. On the other hand, if you want to capture lots of room sound along with the guitar, a dual-diaphragm omni will capture sound equally from front and back.

Another point about single-point omnis is that they are the closest, both structurally and operationally, to the human ear. That makes them a natural choice for room miking—especially when you're after a natural sound. It's a subtle yet audible difference.

low to high while you're trying to make subtle sweet-spot tweaks.

SWEET NOTHINGS

The sweet spot can be elusive, but it's always worth your best effort to find. It's not simply a location awaiting discovery; it exists at an intersection of relationships—between the room and the instrument, the instrument and the mic, and even the vision and the capabilities of the recordist. You have an active hand in shaping the sound.

Tools are best used in accordance with their capabilities. When it comes to fine-tuning mic positions, close your eyes—the sweet spot is much easier to find in the dark.

Brian Knave, *former* EM *senior associate editor, has found some really sweet spots in his time.*

REVIEWS

KORG

LEGACY COLLECTION 1.0 (MAC/WIN)

A major synth maker embraces the virtual studio.

By Geary Yelton

As the 20th century drew to a close, Korg entered into computer-based music production in a big way by introducing the Oasys PCI. Oasys is an audio interface and DSP expansion card that was bundled with dozens of high-quality synthesis and effects algorithms.

Fewer than five years later, Korg has reentered the virtual-studio arena in an even bigger way. Korg Legacy Collection is a software and hardware bundle that features detailed emulations of three vintage Korg synths, a virtual effects processor, and a fourth synth that serves as a framework for combining one or two synths and effects into a single virtual instrument. Legacy Collection also includes a device called the MS-20 Controller (or MS-20iC), which combines a USB keyboard with a control surface, offering all of the functionality of a synthesizer's front panel.

In all, Legacy Collection has four standalone synth programs as well as VST and Audio Units (AU) versions of

FIG. 1: Korg MS-20's Main view displays a graphic representation of the classic Korg MS-20 synthesizer. Using your computer's mouse or the MS-20 Controller (MS-20iC), you can play sounds, make patch-cord connections, and control every parameter.

emagic

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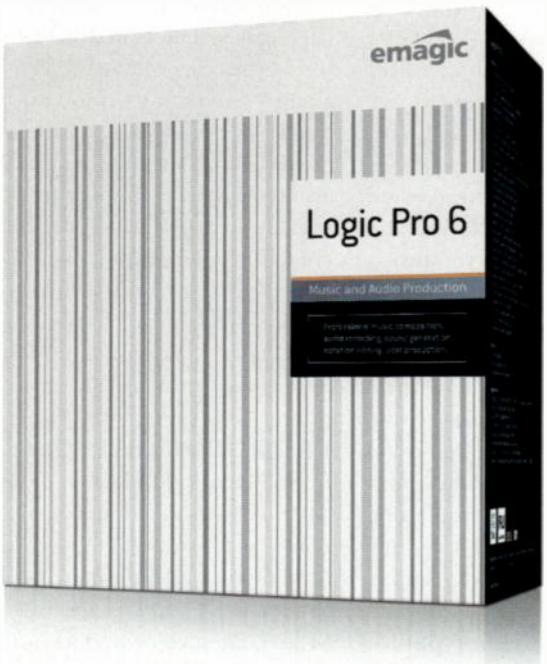

The most widely used program of its kind for professional music creation and audio production is now more attractive than ever before. The new Logic Pro 6 contains all Emagic's superb plug-ins and software instruments, making it not only the best-equipped music production software available, but also the one with the most unbelievable price/performance ratio. Emagic's considerable expertise and experience in music composition, audio recording, sound generation, notation editing and publishing, post production, and film scoring is now all in one box – in Logic Pro 6.

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all four synths and two effects plug-ins. MS-20 is a software emulation of Korg's original MS-20, a flexible monosynth introduced more than 25 years ago, whose popularity has never completely waned. Polysix replicates a pioneering 6-voice polysynth that Korg first produced in 1981. Legacy Cell lets you load one or two MS-20s, one or two Polysixes, or one MS-20 and one Polysix into a soft synth that is greater than the sum of its parts. Wavestation resurrects Korg's original Wavestation family of wave-sequencing synths.

As if those four synths aren't enough, MDE-X is a versatile effects plug-in that you can use with any VST or AU host. In addition, the MS-20FX plug-in lets you process any audio source through MS-20's virtual electronics.

TURN ON, TUNE IN

For this review, I used a dual-processor Power Mac G4/1 GHz with 1.5 GB of RAM running Mac OS X 10.3.4. My audio interface was a MOTU 2408mkII with a PCI-424 card. I ran the AU plug-ins in MOTU Digital Performer 4.1.2 (DP4). The software I reviewed was version 1.0.

Installation and authorization were quick and painless. After I ran the installer and restarted my computer, running any Legacy Collection application opened a License Authorization window, which provided a locking code and linked to Korg's Web site in my Internet browser. I typed in my personal data along with an authorization code printed on the CD-ROM package, and the site displayed my license code, which I typed into the Authorizer. Once authorization was complete, setup required specifying an audio output and MIDI input for each software module individually.

MS-20/20 VISION

Two of Korg's first big successes in the portable-keyboard market came in 1978 with the release of the MS-10 and MS-20 synthesizers. Both models were monophonic and, much like the ARP 2600 a few years earlier, were hard-wired but featured a patch bay for reconfiguring their signal pathways. The MS-20, the more sophisticated and more expensive model, offered sample and hold, a ring modulator, and a few other goodies that many of its competitors lacked. A few years ago, Korg paid homage to the MS-20 with the introduction of the MS2000, a virtual analog synth that built upon its predecessor's capabilities. By realizing the MS-20 as software in Legacy Collection, Korg has again updated a classic to fit modern needs and expectations.

Unlike its hardware-based forerunner, MS-20 is 32-note polyphonic. The standalone and plug-in versions of MS-20 are identical, as they are for all the Legacy Collection synths. At the bottom of the user interface are buttons for scrolling though a list of Programs, for selecting from four views, and for writing your program changes to disk.

In the Main view, a 3-D diagram of the entire instrument furnishes access to all the controls and the keyboard (see **Fig. 1**). The function and value of every knob and jack is displayed when you hold the cursor over it, and the value readout changes when you turn a knob. As with other virtual patch panels, you make a patch-cord connection by clicking and dragging from one jack to another, and you break the connection by clicking and dragging away from either jack.

The Edit view fills MS-20's user interface with only the control panel. Using a scroll bar or by clicking and dragging, you can slide the window's contents from right to left, revealing additional controls that determine polyphony, pitch-bend range, and other parameters that the original MS-20 lacked. You can specify how many voices will play in unison and their relative detuning and stereo spread. Two strips in this section, labeled External Modulation, allow you to select from eight sources (such as Velocity and Modulation) to control any or all of five sources (such as filter cutoff, pulse width, or pitch). Sliding the scroll bar or clicking and dragging in the opposite direction lets you access the patch bay. By enlarging the control panel without enlarging the window, Korg offers an elegant solution to mass-parameter access that other software developers would do well to adopt.

Minimum System Requirements

Legacy Collection

MAC: G4/800 MHz; 256 MB RAM; Mac OS X 10.2.6; Core Audio–compatible audio interface; VST or AU host software

PC: Pentium 4/1.5 GHz, Centrino/1.3 GHz, Celeron/1.8 GHz, or AthlonXP/2000+; 256 MB RAM; Windows XP; ASIO- or DirectSound/MME-compatible audio interface; VST host software

Clicking on the Config button reveals the Configuration view, in which you can specify four external modulation sources (such as Modulation Wheel or footpedal) and their polarities, filter certain MIDI data, and create up to 13 user scales. The fourth and final View button reveals MS-20's list of 32 Programs—not a lot when you consider MS-20's capabilities, but I trust that more will be available soon. You can also load and save individual Programs and banks of 32 Programs. The included Programs are evenly divided between monophonic and polyphonic sounds. Eleven are basses, and the rest are a mix of leads, pads, and electronic effects (see **Web Clip 1**).

UP TO YOUR OLD POLYSIX

Before Korg released the Polysix, polyphonic synthesizers were considerably more expensive. When it was launched, the Polysix was the first true polysynth that had a street price of less than $1,000. Each voice had its own voltage-controlled oscillator (VCO), suboscillator, lowpass voltage-controlled filter (VCF), voltage-controlled amplifier (VCA), and ADSR generator. The Polysix stored 32 Programs and had a reasonably flexible arpeggiator and an onboard effects processor—very hip features in 1981.

The software version of Polysix replicates its namesake in fine detail, expanding polyphony to a maximum of 32 notes. It supplies the same corresponding views as MS-20—Main, Edit, Config, and Prog List—in a window the same size as the one in which MS-20 appears. In Edit view, however, the

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10 Second Violin Section
Solo Viola
3 Violas for Ensembles
10 Viola Section
Solo Cello (Three Solos)
3 Celli for Ensembles
8 Celli Section
Solo Double Bass
3 Basses for Sections
7 Double Bass Section
Harp 1 (Venus)
Harp 2 (Wurlitzer)

BRASS

Solo Trumpet (Two Solists)
6 Trumpets for Ensembles
Hall Trumpet Overlay
Piccolo Trumpet
French Horns (Two Soloists)
6 Horns for Ensembles
Hall Horn (2 Overlays)
Solo Tenor Trombone
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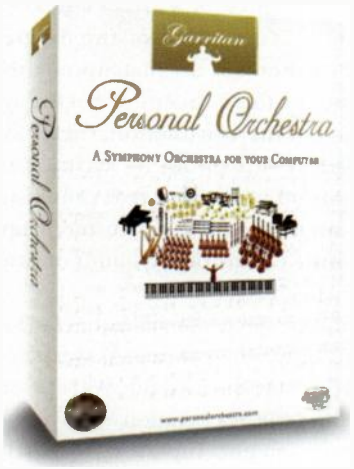

WOODWINDS

Piccolo
Solo Flute
3 Flutes for Ensembles
Alto Flute
Bass Flute
Oboe (Four Soloists)
3 Oboes for Ensembles
Oboe D'Amore
English Horn (Two Soloists)
Solo Bb Clarinet
3 Clarinets for Ensembles
Eb Clarinet
Bass Clarinet
3 BClar. for Ensembles
Contrabass Clarinet
Solo Bassoon (Two Soloists)
3 Bassoons for Ensembles
Contrabassoon (Two Soloists)

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FIG. 2: To make efficient use of onscreen space, Polysix's Edit view presents all of its front-panel controls in a different arrangement than in the Main view.

controls are rearranged so that they fit more compactly in the window, without the need for scrolling (see **Fig. 2**). One knob that's unique to the virtual Polysix is labeled Analog; increasing its value introduces slight random variations in pitch and filter cutoff to simulate the parameter drift of analog circuitry.

Like MS-20, Polysix has a Unison mode that the hardware version didn't have; that's a great help for thickening up its single-oscillator voices, which were a bit thin on the hardware-based Polysix. Polysix's Modulation Generator (another name for a sine-wave LFO) and arpeggiator sync to your sequencer's tempo, something else the original could not do. Like MS-20, Polysix has two user-programmable modulation routings.

Also like MS-20, Polysix includes only one bank of 32 Programs. I assumed that they would be the same sounds that shipped with the original Polysix, but they're a new collection that includes basses, leads, pads, chords, arpeggios, and synthy emulations of a Clavinet and a Wurlitzer electric piano.

Unless you're a previous Polysix owner who fell in love with your synth, you'll probably find Polysix the least exciting software module in Legacy Collection, as I did. Its real value is as a component of Legacy Cell, in which you can add effects that bring it up to modern standards.

PERMANENT WAVESTATION

When I first heard about Legacy Collection, I was most excited about Wavestation. I've owned a Wavestation SR longer than any rackmount synth in my studio, and I couldn't wait to see if a software version could effectively replace it. The Wavestation's forte has always been purely electronic timbres rather than more traditional instrumental sounds.

Every Wavestation is a direct descendent of the Sequential Prophet VS, an instrument that pioneered the concept of vector synthesis. On the Wavestation, vector synthesis lets you smoothly shift among four sound sources in real time using a joystick controller. The technique is useful for adding dynamic motion to synthesized sounds.

The Wavestation family lasted for four generations: the original Wavestation, the Wavestation EX, the Wavestation A/D, and the Wavestation SR. The software version encompasses the capabilities and sounds of all four models, except that it doesn't process external audio as the Wavestation A/D does.

Wavestation has the same 11 banks found in the Wavestation SR, each containing 50 Performances. It also provides the same 11 banks of 35 Patches, 10 banks of 32 Wave Sequences, and 515 individual waves. The SR stores 32 16-channel Multis, whereas Wavestation has none. The most significant difference between Wavestation and a Wavestation SR is that Wavestation is not multitimbral.

Wavestation's user interface is a tremendous improvement over the single-rackspace SR's. Although it's more akin to working in a good synth-editing program, it's better than any software I've seen for editing the Wavestation. The main display is the Performance Select page, which shows the keyboard, the pitch-bend and mod wheels, the Vector Position control, a list of 50 Performances in the currently selected bank, and buttons for maneuvering to other banks and pages. The File button summons more buttons for loading, saving, and importing programs, and the Preview button plays one of five phrases so that you can hear changes without touching the keyboard. Because you can import files from the original Wavestation, you can keep using all those Performances you've so meticulously handcrafted over the years.

The Vector Position control is a small ball you click-and-drag within a circle to change the balance of four oscillators—hence the term *vector synthesis*. Double-clicking between two corners places the vector halfway between two oscillators. Assigning MIDI Control Changes (CCs) to control the vector's *x* and *y* axes allows you to change the oscillator balance with a real joystick, a touchpad, or a pair of knobs or sliders.

The Edit button takes you to a page that displays details of the current Performance, including its constituent Patches, transpositions, effects-bus routings, and so on. On the same page, you can edit Key Zones and Velocity Zones graphically. Pressing the Patch button opens a page in which you can edit the selected Patch's programming details (see **Fig. 3**). If a Patch contains a wave sequence, you can go to a page in which you can edit

FIG. 3: Wavestation's Patch Edit page provides access to oscillators, filters, envelope generators, and various other basic building blocks of vector synthesis.

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its waveforms and crossfades.

You can create wave sequences by chaining waveforms to play in succession, one step after another. Each wave sequence can contain as many as 255 steps and repeat as many as 126 times. Using the Vector Position control, you can dynamically crossfade among four wave sequences (see **Web Clip 2**). The WaveSeq Edit page lets you specify a sequence's beginning and ending steps, loop direction, modulation parameters, and so on, as well as edit each step by selecting its waveform, duration, level, tuning, and crossfade time. You can also set the duration, level, and crossfade parameters graphically using Wavestation's Step Display, which is convenient for visualizing the entire step sequence. The WaveSeq Edit page makes editing wave sequences much easier than with previous Wavestations.

The Effects button takes you to a display that shows all the parameters for either one or two insert effects. Clicking on an effect's name summons a pop-up menu showing 55 Wavestation effects, which are identical to those on the hardware version. They range from stereo harmonic chorus to stereo vocoder and delay. As you edit, a handy Back button toggles between the two most recent pages.

AS GOOD AS IT GETS

When I compared Performances played on Wavestation with those played on the Wavestation SR, I was surprised to discover practically no audible differences. After all, I've grown accustomed to playing soft synths that sound *almost* like the instruments they emulate. It certainly helps that both hardware and software are digital synths that use the same sampled waveforms, but I expected to hear at least some difference in the D/A conversion. But as I switched back and forth in my sequencer between playing hardware and software, I quickly lost track of which Wavestation was which (see **Web Clip 3**). After spending some time searching for a Performance that was noticeably different, I found only a few in which the modulation parameters varied slightly, but the sounds themselves were indistinguishable.

Now that Korg has successfully emulated Wavestation in Legacy Collection 1.0, I hope to see its capabilities go beyond the original's in future versions. For instance, I'd love for Korg to include all the sounds available on Wavestation expansion cards, in addition to those in the SR's RAM and ROM banks. I also want to be able to load user waveforms into its oscillators, and I'd like a larger selection of filter types than those that the original offered. For that matter, I wouldn't mind seeing expanded oscillators and filters in all of Legacy Collection's synths.

MDE-X FILES

Because Legacy Collection's effects are available as plug-ins, you can use them in any VST or AU host. MS-20FX allows you to route audio tracks and inputs

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through its audio pathway as if they were MS-20 voices. MS-20FX includes 31 Programs such as 2Band AutoWah, LPF Sweep, and S&H Filter, which do a good job of demonstrating the kinds of effects you can achieve by processing audio through a synthesizer.

MDE-X, on the other hand, is a dedicated effects plug-in in the traditional sense. In addition to a nice variety of meat-and-potatoes effects such as reverb, compression, and 4-band EQ, MDE-X has algorithms such as Multitap Chorus/Delay, Talking Modulator, and Polysix Ensemble. You can select an algorithm from a pop-up menu on the left side of the plug-in window. In the same section, you can set input and output levels with sliders, set the dry/wet mix with a knob, and enable bypass with a button.

The name of the selected effects preset appears above the name of the current algorithm. When I clicked on it, I expected to see a pop-up menu for selecting additional presets, but none appeared. I consulted the manual and learned that in order to choose from the list of 127 presets, I needed to Control-click (or right-click in Windows). It would be more intuitive if clicking on the preset's name produced the preset list without the need for a modifier such as the Control key or the right mouse button.

MDE-X's parameter controls, which appear on the right side of the plug-in's window, are fairly extensive and easy to access. The choice of controls depends on the currently selected algorithm. For example, the 4-band EQ operates much like a dedicated EQ plug-in; in addition to toggling between peak and shelf types, it has four graphic breakpoints that you can click-and-drag to define your equalization curve. The compressor offers look-ahead and trigger monitor functions, four sidechain types, a choice of RMS or peak detection, and other useful features.

Automation and external MIDI control are handled differently in MDE-X than in Legacy Collection's synths. Only certain parameters, indicated visually by a ring around the corresponding knob, respond to MIDI control. Instead of clicking on the knob to reveal a pop-up menu, you assign MIDI CCs by double-clicking on the knob. That opens a small Dynamic Modulation window that offers a choice of control sources, including Note On and Off events, Note Number, Velocity, Aftertouch, Pitch Bend, and any of four MIDI CCs you specify in global settings. I'm glad that Dynamic Modulation allows automation for certain parameters, but I wish that more simultaneous parameters were available to control. Some algorithms, particularly reverb, don't offer any real-time parameters at all. I realize that editing reverb parameters in real time consumes CPU cycles, but a user with a powerful computer might want that option.

Nonetheless, I was impressed by

MDE-X. Every effect sounded superb, equaling or exceeding the performance of Korg's Oasys PCI card—which is quite an accomplishment for software that runs native. Although I wish that MDE-X's user interface offered a larger view, I have to give Korg two thumbs-up for creating such an excellent effects plug-in.

LEGACY CELL BLOCK

Legacy Cell is a framework that combines a maximum of two synthesizers with effects processing, resulting in a new software instrument with plenty of new sounds. Because it's a 21st-century synthesizer rather than a direct emulation of a vintage instrument, Legacy Cell is almost as flexible as Wavestation.

A Legacy Cell patch is a Performance, and each Performance contains its component synths, effects, and associated parameters. Legacy Cell is organized into four pages, each accessed by clicking on a button in the window's top bar. In the Performance page's top-right section is the Program Display, which shows a list of 32 Performances. You can see the three other groups of 32 Performances by clicking on numbered buttons below the list.

When you select a Performance by

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EASE OF USE	4.5
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VALUE	5.0

RATING PRODUCTS FROM 1 TO 5

PROS: Lots of great sounds and effects. Realistic emulations. Intuitive graphical user interfaces (GUIs). Versatile hardware controller. Stunningly low price.

CONS: Heavy CPU demands. No Undo command. No Save prompt.

Manufacturer
Korg USA, Inc.
tel.: (631) 390-6500
Web: www.korg.com

FIG. 4: Legacy Cell combines synths and effects to create a new virtual instrument. In the Performance page, you can easily view and control all of its primary elements.

clicking on its name, its category is displayed above the list. A pop-up menu contains 16 categories such as Synth-Hard, Motion, Key/Pluck, and Hit/Chord. An Info button opens a display that contains the author's name, most recent modification date, and other text pertaining to the selected Performance. A block diagram of the Performance's components appears in the Connection area to the right of the list (see **Fig. 4**).

Two master effects appear below the Program display and the Connection area. Both virtual processors are identical to the MDE-X plug-in and offer the same selection of algorithms and parameters. If Legacy Cell contains only one synth rather than two, you can access every preset on both processors.

Below the effects, Legacy Cell's control panel contains eight strips—each with a knob and a slider—and closely resembles the layout of the MicroKorg controller. In fact, Legacy Cell has a native mode that lets you use the MicroKorg to control its functions. You can also use the MS-20iC's knobs to control Legacy Cell's knobs and sliders, but I had an even more convenient control surface sitting in front of my computer display. By clicking and holding the cursor over the onscreen controls, choosing Learn from each control's pop-up menu, and turning a knob on my Evolution UC-16, I very quickly assigned Legacy Cell's eight knobs to the UC-16's top eight knobs and the eight sliders to its lower eight knobs—very convenient.

Next to the MIDI controls is a mixer for two synths, two master effects, and the master output. It lets you specify synth and effects levels, panning, and whether effects sends are pre- or post-fader. Each strip also has a Mute button and a stereo level meter. A keyboard, complete with Modulation Wheels and Pitch Bend, is located below the strips.

At the top of the window are two buttons for selecting the synths used by the

current Performance. When you click on either button, it displays a Synth page. Click on the MS-20 button, for example, and you'll see the same MS-20 window you saw in the MS-20 application, complete with a choice of four views. Two insert effects appear at the bottom of the Synth page. Both are functionally identical to MDE-X, but they're a little larger and black rather than silver.

Clicking on the Combination button opens an edit page in which you can graphically set Key Zones and Velocity Zones, as well as independently transpose the two synths and specify different MIDI controller responses. A graphic Velocity curve lets you add and edit breakpoints that affect each synth's Velocity response.

It's obvious that a lot of programming effort went into Legacy Cell's Performances. Two banks feature 127 Performances each—many more new programs than Legacy Collection's other synths. Because Legacy Cell holds only one bank at a time, you must load the other bank from disk. Overall, the Performances are excellent, providing electronic timbres of every description (see **Web Clip 4**). Most of them sound modern, even cutting-edge. I've always felt that Korg hires some of the best synth-programming talent in the world, and Legacy Collection demonstrates that quite effectively.

SET THE CONTROLS

Software is only part of the Legacy Collection. The MS-20iC looks exactly like the original MS-20 but slightly smaller (see **Fig. 5**). It is a USB-powered keyboard controller that furnishes every knob and patch jack found on its namesake. The keyboard has the same 37 Velocity-sensitive minikeys found on Korg's MicroKontrol. To its left are a control wheel and a momentary switch, both of which you can assign to control various functions. All that's on the rear panel is a USB port for connecting the controller to your computer, which supplies its electrical power. The device showed up in my MIDI software like any other controller and added a 3-octave minikeyboard to my studio setup.

MS-20iC is the perfect controller for

FIG. 5: Although the MS-20iC looks just like a slightly smaller version of the original MS-20 synthesizer, it is a USB keyboard and control surface that is handy to use with almost any soft synthesizer.

MS-20. Everything that appears in the software's Main view appears on the controller's front panel. As on the original MS-20, controls are divided into sections for two VCOs, two VCFs, two envelope generators (EGs), and so on. The upper-right section contains a patch panel populated with 35 mini-jacks. Korg includes ten patch cords, each almost 14-inches long, to connect these patch points. When you make a hardware connection to reroute control and audio signals, that connection instantly appears onscreen. Such modular-synth-like flexibility was one feature that made the original so popular for so long.

Korg calls the patch panel the External Signal Processor (ESP), so I assumed it would accept external audio signals for processing. In fact, one jack is labeled Signal In. However, the manual warns, "Never input an external signal . . . to the patch panel jacks. Doing so will cause a malfunction." Apparently the ESP is intended only for its own patch cords.

When you're controlling MS-20 with its controller, turning the power off and then back on sends all of the controller's settings to the software, so that the real knobs and patch cords determine the current sound. Consequently, MS-20 can operate exactly like a real MS-20, with all the same tactile and visual feedback. Unlike using a real MS-20, you can save any Programs you create. Better still, because the software reflects the hardware's settings, you can automate your changes in a sequencer. For anyone who prefers to control a synth manually rather than relying on presets, using MS-20 with its controller is ideal.

Because all the knobs send MIDI CC data, you can use them to control any software or device that responds to CCs. That means the MS-20iC's 32 knobs and four 4-position rotary switches are available not only to control Korg's software, but also to control whatever else you need. Best of all, because they're labeled by section, it's convenient to use the VCO knobs to control any soft synth's oscillators, the VCF knobs to

control its filters, and the EG knobs to control its EGs. (Okay, one EG has three knobs and the other has five, but it's easy enough to assign the eight knobs to control two ADSR generators.) As I was writing this review, I assigned all the controls in Arturia Minimoog V to respond to the MS-20iC's knobs.

THE SUM OF ITS PARTS

Legacy Collection's CPU demands are rather hefty, as you can see by its minimum system requirements. With all four synth plug-ins open, DP4's Performance window indicated that I was using more than half of my computer's processing power, even when nothing was playing. When I tried to play tracks using the four synths simultaneously, my processor immediately overloaded. Therefore, unless you have a very fast, late-model computer, you'll need to avoid playing more than two or three synths at a time. Running the standalone versions is much less demanding, of course, because you can play only one synth at a time. The manual also mentions that some Legacy Cell programs can't run with less than a Mac G4/1.25 MHz.

Over the course of about five weeks, I experienced no crashes or other malfunctions that I could attribute to Korg's software; that's quite an accomplishment for version 1.0 of any software that is as complex as Legacy Collection. On several occasions, though, an instrument lost its Preferences, and I had to reenter the MIDI settings as soon as I ran it. When that happened with Legacy Cell, I also had to redefine the MIDI CCs to get it to work with my control surface.

None of Legacy Collection's programs have an Edit menu, so I assumed there were no Undo, Cut, Copy, or Paste commands. On consulting the manual, I discovered that MS-20, Polysix, and MDE-X allow you to copy and paste programs using a pop-up menu that appears when you click on the Korg logo—not exactly intuitive, but it worked just fine. Still, I missed Undo most of all. I also found it unsettling that quitting a program didn't prompt you to save your changes.

Legacy Collection ships with four printed manuals: one each for installation, MS-20iC, Wavestation, and

everything else. They are well written and relatively complete, though it would be helpful if the printed manuals were indexed or if PDF versions were included so that you could search the text when you had a question. (According to Korg, PDF manuals should be available on www.korguser.net by the time you read this.) PDF manuals for the original vintage synthesizers are also included. That's a nice touch, but because the documents are scans, you can't search the text for a particular word or phrase. Then again, the only way to search the original manuals was manually.

BACK TO THE FUTURE

I love virtual instruments, especially when they sound good and they're as intuitive to use as the synths and effects in Legacy Collection. Using MS-20 in combination with the MS-20iC feels like using a classic MS-20, except that the software is polyphonic and it responds to Velocity and other additional modulation sources. Anyone who knows how to use almost any soft synth will quickly learn his or her way around Polysix. Unless you have experience with the original, plumbing the depths of Wavestation might take a bit more time, but the results should be worth the effort.

▼

I'm extremely impressed with Legacy Collection.

I'm extremely impressed with Legacy Collection. I expect to keep using it for as long as my computer will run it, and I hope that's a long time. One of the greatest differences between software- and hardware-based synths is that when computers and their operating systems are updated, old software can get left behind. In contrast, hardware lasts until it breaks down and replacement parts are no longer available.

I predict that Korg will have a hit on its hands, and Legacy Collection could be around for decades. Where else can you get four brilliant soft synths, two excellent effects plug-ins, and a minikeyboard combined with a versatile control surface for much less than what any of the original synths cost when they were new?

Legacy Collection gets my highest recommendation. I hope that Korg continues its development and, in time, introduces new software instruments. Korg has a rich history of making great synthesizers. I applaud the company's first native software product, and I can't wait to see what Korg comes up with next. EM WEB CLIPS

Associate Editor **Geary Yelton** *has been reviewing synthesizers for* EM *since its first issue in 1985.*

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SYMBOLIC SOUND

KYMA X (MAC/WIN)

A super system takes it up a notch.

By Dennis Miller

The Kyma system from Symbolic Sound has long been recognized as the most powerful and versatile sound-design workstation around. Combining an elegant and flexible graphic programming language and a black box full of reconfigurable DSPs, Kyma is a sampler, a synth, an effects box, a hard-disk recorder, and a live-performance environment. Version X, almost two years in the making, adds a number of enhancements to nearly every area of the system.

In this review, I'll focus on the new features in version X and the enhancements that were introduced since my review of Kyma 5.0 in May 2001. First, though, I'll give a quick overview of the system.

AROUND AND ABOUT

Kyma couples a graphical sound-programming interface (called the Kyma Language for Sound Specification) with a 3U hardware accelerator called the Capybara (see **Fig. 1**). The Capybara comes with 4 Motorola 56309 processors and 96 MB of RAM, and can be expanded to as many as 28 processors with a total of 672 MB of RAM. The Capybara does the processing for the system, taking the load off the host computer. Kyma runs under all recent Mac and Windows operating systems. The newly released Flame FireWire interface (included with the base system) enhances communication between the host computer and the Capybara, which allows you to play more disk tracks at the same time, among other things. OS X, Windows 2000, and Windows XP require the Flame interface, and Windows 98 SE and Mac OS 8.6 through 9.2.2 can still use the new software with a PCI slot or a PC Card.

Kyma's interface is modular and highly configurable (see **Fig. 2**). The areas you would use most often during a work session are the Prototype Strip (shown at the top of Fig. 2), which has access to nearly 170 basic sound-producing modules (which Kyma calls Sounds) and the Sound Browser window (on the right side of Fig. 2), where you'll find more than 1,000 preset examples (as well as your own Sounds and all supported audio files on your system). Typically you will use the multi-track Timeline (shown in the middle of Fig. 2) to arrange a sequence of Sounds or to configure Kyma to transition from one function to another.

Kyma's other important work area is the Sound Editor, which is the window you use to edit Prototype Sounds or to configure new Sounds. The Sound Editor reveals the internal structure of a Sound and shows the specific parameters it contains (see **Fig. 3**). A single icon can represent a network of many individual Sounds, and it's easy to expand an icon to see what it's made of. Loading Sounds into an Editor is much easier in the new version: just double-click on a Prototype, and it will automatically open in a new window. (In the past, you had to create a new Editor window and drag a Prototype into it.) In addition, you can now easily zoom in or out in the Editor. That is especially useful when you are working on a complex structure that extends past the current window.

Kyma can be used in real time under MIDI control like a traditional synth or sampler, and it can record its output to the hard drive as a WAV, AIFF, or SDII file at a variety of sampling rates and bit resolutions. The system can be configured for as many as 8-channel analog or digital output, and both S/PDIF and AES/EBU digital I/O are supported. Although you can't use Kyma's hardware with other audio applications, Symbolic Sound hopes to release drivers that will have that capability later this year.

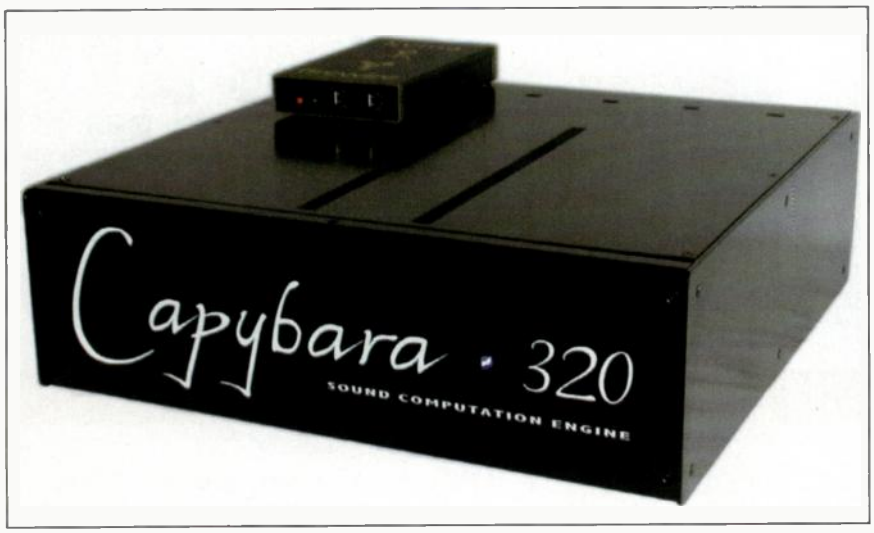
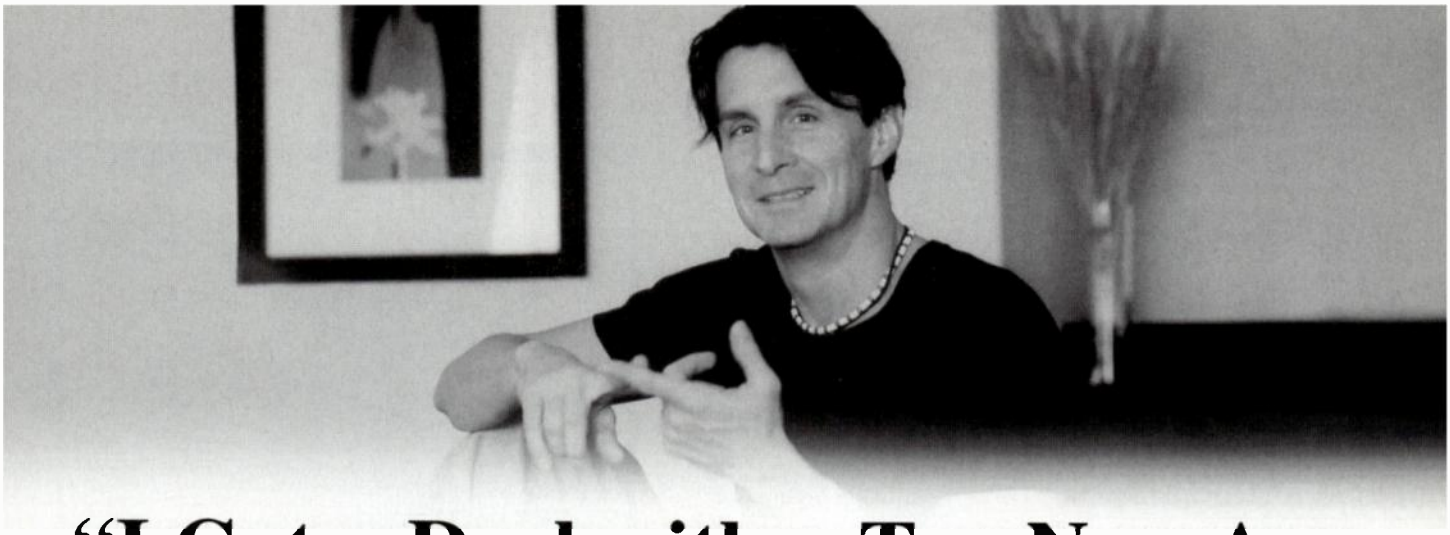


FIG. 1: Symbolic Sound's Kyma X includes the 3U Capybara sound accelerator and the Kyma graphical programming language. The new Flame FireWire interface enhances many aspects of the system's performance.

HAVE A LOOK

The first thing you'll notice when you load Kyma X is the interface's new look. The icon for a Sound more accurately displays its purpose. For example, a Sound that accepts another signal as input has an icon that is indented on the left. A Sound with no input has a flat left edge (see Fig. 2).

Other new graphical elements offer a clearer picture of what's happening in your designs and improve functionality. For example, if you have a noise generator feeding a filter and you want to mix a sample into the filter's input as well, just drop the Sample Sound onto



"I Got a Deal with a Top New Age Label Because I Joined TAXI."

Chuck Henry – TAXI Member

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the "+" icon that appears to the left of the filter icon. Kyma will add a Mixer Sound that accepts both the noise generator and the sampler as input. A variety of other small enhancements—such as new icons, clearer text, and better spacing of the icons in the Sound Editor—all contribute to a more modern look and feel as well as better ergonomics.

SOUNDSATIONAL

There are only a few new Prototype Sounds in Kyma X, but when they are combined with the Sounds released since our last review, they are important additions. Analog enthusiasts will appreciate the new voltage-controlled filter (VCF) Sound, which you can use to build "legacy" synths. The VCF has amplitude, cutoff frequency, and resonance controls, and you can modulate its cutoff and amplitude at audio rate. (When's the last time you generated AM or FM with a filter?) The VCF is also characterized by a nonlinearity in its feedback loop that models the resonance of an analog filter.

Another important addition is a synthesis method called Aggregate Synthesis. Aggregate Synthesis resembles additive synthesis; however, it extends additive synthesis by summing not only sine waves, but also more complex sounds. Like additive synthesis, you can derive the control data for your aggregate sounds from a spectral analysis of a preexisting sound (see **Web Clip 1**). Imagine a trombone broken into hundreds of harmonics, and upon resynthesis, each harmonic controls not just a single sine-wave oscillator, but an entire grain cloud. Sound interesting? You'll find a preset included with the system. Among the other examples are Sounds that combine oscillator banks, filter banks, and formant banks. The range of sounds you'll get from the examples is broad, and like everything else in Kyma, you can tweak every Sound's parameters and customize them to your liking.

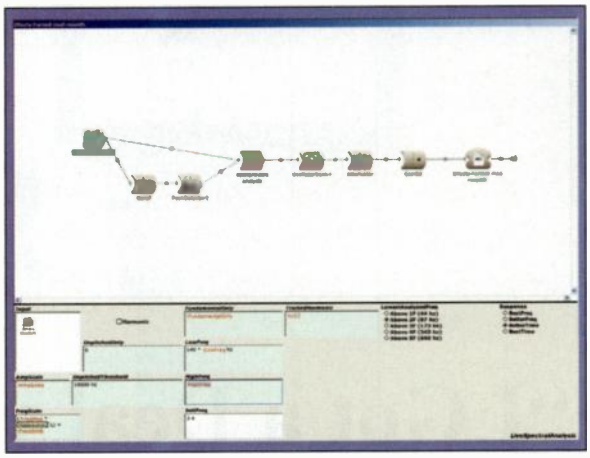

FIG. 3: The Sound Editor is used to modify Prototype Sounds, all of which are ready to play out of the box.

Kyma has always had the most powerful morphing capabilities I've ever seen, but the new Morph (Stereo) Prototype makes it even easier to cross the spectrum of two sounds by offering a separate oscillator bank for the left and right channels. The data for Morph is typically generated when doing a spectral analysis on a stereo file.

The old Gain and Attenuator modules have been combined into a single module called Level, and there's a new InputOutput Characteristic Sound, which serves as an arbitrary transfer function for whatever needs you might have, such as making your own compressor or nonlinear keymappings. In addition, several new modules in the spectral realm give you even more ways to process analysis data. There are also new I/O Sounds that better manage Kyma's eight audio ins and outs.

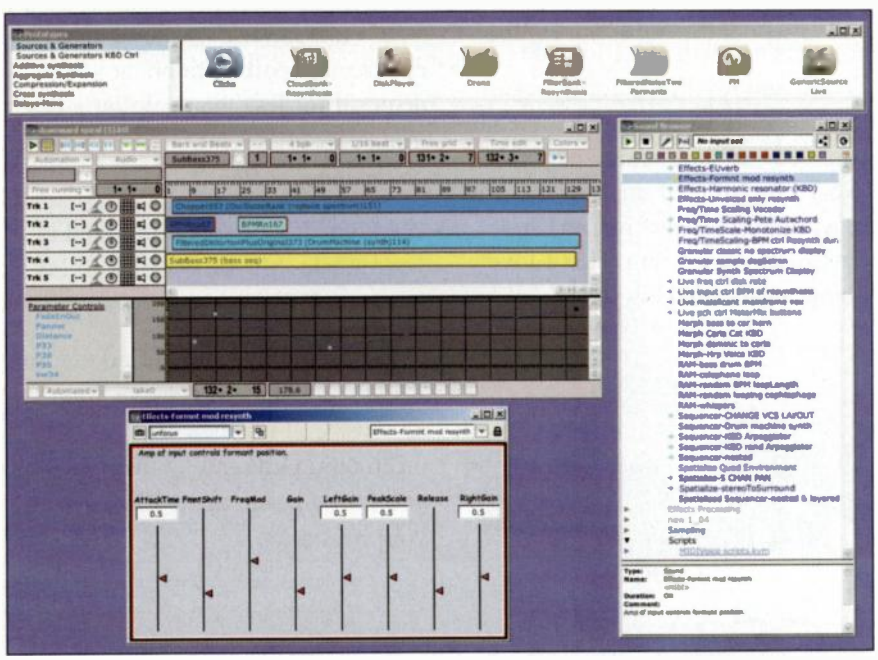

FIG. 2: Kyma has several dedicated work areas that are suited to a variety of tasks. The Sound Browser allows access to all the examples that come with the system.

IN ACTION

To get a sense of how the Prototypes can best be put to use, check out the included presets—there are 1,000 of them, many of which are new or enhanced. The Kyma Overview library is a comprehensive collection that makes for a good starting point. Here you'll find examples that demonstrate time-stretching, filtering, granular effects, beat munging, and almost every type of synthesis and sound-processing method you can think of. There are sequencers, vocoders, and presets that use the amplitude of an incoming audio signal to determine the playback rate of a disk file, dopplers, distortions, and morphs, among other things (see **Web Clips 2, 3,** and **4**).

The Scripts folder is full of tools for

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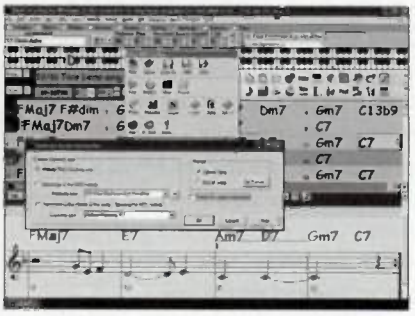

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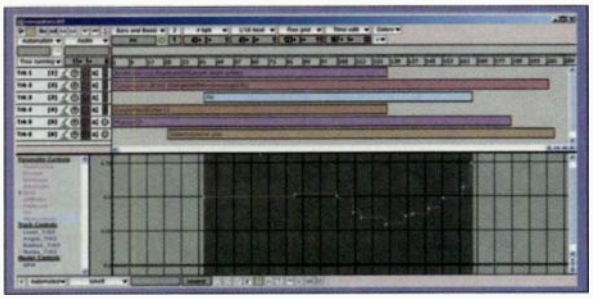

FIG. 4: Like a sequencer, Kyma's Timeline is where you arrange Sounds that will occur over time. But Kyma's Sounds can change the entire configuration of its hardware.

generating lots of sound with little effort. For example, Scripts can generate a large number of MIDI events, pick randomly from a list of sample files, and convert an ASCII text file into a series of control parameters for anything you want. In some cases, Scripts have variables that you supply when you first run a Sound. These could be the number of filters you wish to use in a process or the length of time that you want a process to run. The variables allow you to create endless variations on the results of the processes that the script is running.

One of the Scripts presets, called One Sound File Follows Another, is a clever playlist-style example that prompts you for a number of files when it runs, and then opens a file-browser window for you to pick the number of files you've designated. It then plays all of the files in succession. Another preset, called Random Sound Builder, will combine any number of source Sounds that you give it in random permutations (see **Web Clips 5** and **6**).

Expressions (found in the Expression Library folder) are somewhat like Scripts in that they can provide control data for any parameter you choose, but they're also useful for processing existing controls. In some ways similar to the Functions feature of the Kurzweil K2000-series instruments, Expressions include various types of random-number generators, arrays, tools to manipulate tempo or beats per minute, and other types of function generators. The big news here is that you no longer have to type "Expressions" into a parameter field, because you can drag them directly from their folder to a field.

Expressions offer great potential for experimentation. For example, I made several Sounds that used the new nextChaotic Expression to play back random segments from a sample. The first example chose a new segment on every beat, and the second picked a new segment every time a MIDI Note On was received. In both cases, the length of the segment was under the control of a parameter that could be updated in real time.

Kyma's Replaceable Input feature is not new, yet it is still worth a mention. The Overview Library includes hundreds of effects, and if you want to hear how one of your samples will sound when processed by the effects, simply designate your sample as the substitute input by selecting it in the Browser. Then, as you go through the effects, they will all use your sound in place of the sound they process by default. You can also designate Kyma's live audio input as the substitute sound.

Kyma's developers have included libraries from earlier versions, giving you even more ready-made patches to play with. Fortunately, the lion growl morphing into a Harley-Davidson engine sound—one of my all-time favorites—is still around (see **Web Clip 7**).

TELLING TIMELINE

Kyma's Timeline has been a central feature of the program for several years, and a number of enhancements make it an even more powerful environment for building your compositions (see **Fig. 4**). For starters, you can now render only a selected range across selected tracks, which makes previewing sections of longer works much more efficient. Of course you can still solo or mute entire tracks.

The Disc Caching feature is now built into the Timeline, which makes it even easier to access. Disc Caching prerenders a section (typically a complex one) to disc and automatically plays it as an audio file. That significantly lightens the real-time load on the processors and can be useful when you're using Kyma in live performance.

Navigation in the Timeline has also been improved. You can now drag markers around more easily, and you can associate Timeline markers with MIDI Program Change messages. This gives you nearly unlimited ways to move around within a long composition while you are composing or performing in a live setting.

Kyma includes a number of prebuilt Timelines, which are, in many cases, large-scale works for which you can substitute your own source Sounds or samples. Some of the examples feature synthesis processes that crossfade into others over time, and you can easily change the values of any of the default parameters to customize the processes.

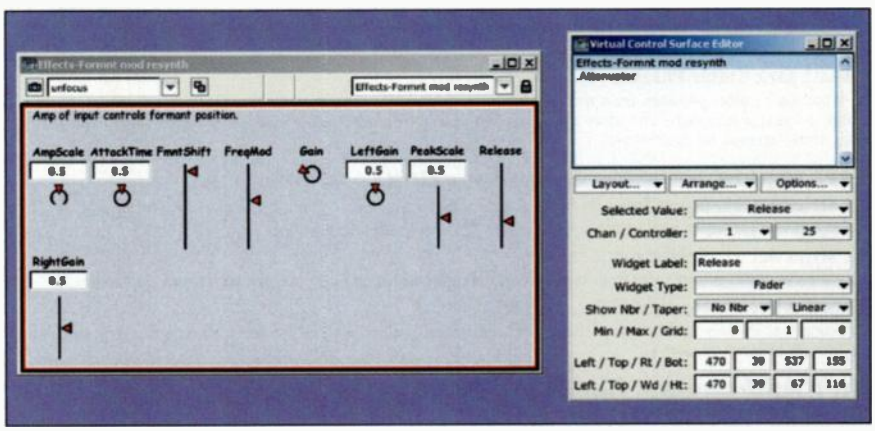

FIG. 5: The editable Virtual Control Surface panel contains whatever knobs and sliders you choose to include.

(Shown Actual Size)

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Like Iannis Xenakis's UPIC system, you can build a Timeline that sequences a large number of events, and then alter the time it takes to run the entire set of processes.

UNDER CONTROL

One of the keys to real-time control in Kyma is the versatile Virtual Control Surface (VCS), a panel that pops up any time you play a Sound that has a parameter that can be adjusted while the Sound plays (see **Fig. 5**). New enhancements to the VCS include the ability to copy and paste controls from one VCS to another and manipulate the size of the VCS window more easily. New keyboard shortcuts are included for several VCS features as well as some tweaks that make using the VCS Editor easier. Like the Timeline, VCS presets can now be selected with Program Change messages.

Buttons and knobs can be color coded for easier identification. If you have two Sounds on two different MIDI channels, both containing a control with the same name, color coding them will help you to differentiate between the two.

TOOL UP

Kyma's Tool menu includes some of the most interesting features in the program. Here you'll find functions to build microtuning tables, "bundle" a Sound and all the sample files it might contain for saving or moving to another computer, record external audio to disk (the 24-bit converters sound excellent), and perform a variety of analysis functions.

One of the new Tools, called mouseToEventValues, allows you to control two parameters by sweeping your mouse around an *x*-*y* grid. Although that is fairly commonplace in other synthesis environments (Reaktor comes to mind), this feature gives Kyma a much-needed enhancement in the realm of graphic real-time control, an area that I hope will continue to evolve. Although you can't record your mouse

PRODUCT SUMMARY

Symbolic Sound
Kyma X
sound-design workstation
basic workstation $3,570
audio I/O upgrade $995
expansion card $595

FEATURES	5.0
EASE OF USE	4.0
QUALITY OF SOUNDS	5.0
VALUE	5.0

RATING PRODUCTS FROM 1 TO 5

PROS: Huge library of examples. Nearly 170 basic prototype modules. Extensive real-time control. Excellent printed manual and tutorials.

CONS: Hardware not accessible by other audio software.

Manufacturer
Symbolic Sound
tel.: (800) 972-1749 or (217) 355-6273
email: info-kyma@symbolic.com
Web: www.symbolicsound.com

movements directly into the mouseToEventValues interface, you can record them using the Timeline.

Current users might not be aware that you can create graphical envelopes for any parameter by dragging the Graphical Envelope Sound and dropping it directly into the parameter field of your choice. Graphical Envelopes can have numerous segments, and their scale and rate values can be altered in real time.

Another new tool, called Logistic Map, produces repeating rhythmic patterns that can be sent into total (or controlled) chaos with the push of a slider. It generates a real-time animated visualization of the chaotic function, leading me to wonder if graphics will become a larger part of Kyma's repertory in the future (one can only hope).

Kyma remains the most powerful analysis/resynthesis environment around. Where else can you do a real-time spectral analysis on an incoming audio signal and perform a cross-synthesis of the live sound with a sound on your hard drive while tracking the amplitude of the live sound and using it to scale the level of the disc file? Try doing *that* with your favorite VST plug-in.

Version X enhances Kyma's analysis capabilities by giving the Spectral Analysis Tool the ability to automatically guess the fundamental frequency in any sound you use as input. This can make the analysis routine more accurate than the trial-and-error method formerly required. You can also analyze stereo files, and Kyma now uses more oscillators in the resynthesis stage than in the past. (You can reduce the number of oscillators being used if you find that the resynthesis is taxing your system.)

An extensive tutorial in the documentation tells you all you need to know about creating your own Tools. Custom Tools give you a great way to build your own unique interfaces to existing Sounds, design interactive installations, and create recording or file-playback control surfaces.

MODEL THE PHYSICAL

Although it has all of the requisite tools for building physical models, Kyma doesn't include many examples that use this synthesis method. However, a large number of physical-modeling Sounds submitted by Kyma users have recently appeared on Kyma's Web forum (in the Community section at www.symbolicsound.com).

Among the best physical models are David McClain's plate and membrane simulations, which use various combinations of delays, attenuators, noise generators, and oscillators to create effective real-world simulations. By tweaking the parameters (and using Kyma's Roll the Dice parameter randomizer), I created a range of sounds from sharp metallic and delicate twinklings to struck bamboo (see **Web Clip 8**). Other user-contributed models are examples of plucked strings and analog synths. A massively powerful gem called the Articulator produces a vast range of vocal timbres. Contributed by an anonymous user, the Articulator is not

Kyma X Specifications

Analog Outputs	(4) XLR (expandable to 8)
Digital I/O	(2) XLR AES/EBU or (2) RCA S/PDIF (RCA)
Other Connections	MIDI In/Out/Thru; (1) BNC word-clock input; (1) BNC house sync; (1) RCA VITC In/Out; (1) RCA LTC In/Out
Output Level	+14.5 dBu
Input Clipping Level	+14.0 dBu
Resolution	24-bit
Internal Processing	24-, 48-, 56-bit (algorithm dependent)
Sampling Rates	all standard rates between 32 and 100 kHz
Dynamic Range	A/D: 110 dB (unweighted); D/A: 107 dB (unweighted)
Frequency Response	20 Hz–20 kHz (+0.04/–0.26 dBu @ 44.1 kHz)
Input Impedance	10 kΩ
Crosstalk	–110 dB
Noise	A/D: 110 dB; D/A: 105 dB
Tuning Resolution	0.0026 Hz
Prototype Algorithms	170 unique basic modules
Factory Patches	> 1,000
Dimensions	16.5" (W) × 5.5" (H) × 17" (D)
Weight	15 lbs.

pure physical modeling (it uses a sample at its core), but it imposes a convincing vocal-like timbre on whatever sample you use as a source. Other examples include an interface for linking Kyma with Cycling '74's Max/MSP and filter-building toolkits.

WHAT'S UP, DOC?

Kyma has always had extensive printed documentation, but the previous manual was a bit advanced for the average user. The printed manual for Kyma X is more appropriate for those just learning the system, walking the user through a vast number of areas and topics. The 400-page tome covers every major aspect of the program and has extensive reference materials. Though it may take you hours to get through the examples, it is well worth the effort.

Of course you don't need to be a computing guru or an accomplished electronic-music composer to take advantage of what Kyma has to offer. In fact, it takes only a short amount of time to go from installing the system to producing good results. With just a few mouse moves, you can configure a multilayered Timeline that lasts 2 (or even 20) minutes. Playing and tweaking the preset examples will keep you busy for hours.

THIS YEAR'S MODEL

Kyma remains the most mature, robust, and powerful sound-design workstation anywhere. For its price—about the same as a fully loaded hardware sampler—it is an unbelievable deal.

Although the world has mostly moved to the desktop for much of its synthesis, sampling, and recording needs, Kyma X is a perfect example of how hardware-accelerated tools can still beat software by a wide margin. There is no software or bundle of soft tools that can come close to the power, expandability, and flexibility that Kyma offers. If you haven't heard the demos at the Symbolic Sound Web site (www.symbolicsound.com/hearkyma.html), give them a listen to get a taste of the system's abilities.

Associate Editor **Dennis Miller** *rediscovered the joys of Kyma while doing this review and is now uninstalling all of his other software.*

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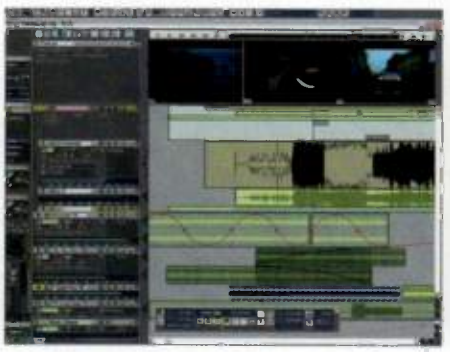

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KURZWEIL

RUMOUR AND MANGLER

Two versatile multi-effects processors.

By Kerry Rose

Kurzweil's Rumour and Mangler are two sibling stereo-effects processors that, despite their twinlike appearance, have a fraternal rather than an identical kinship (see **Fig. 1**). Although both are multi-effects units and have some degree of overlap, the primary function of each unit is distinct from the other. Rumour's main focus is on ambience, reverb, and other time-based processing such as delay and chorus. In addition to a few reverb and delay algorithms, Mangler emphasizes effects such as amp simulation and -distortion, bit crushing, rotary speaker, phasing, and compression.

Based on the architecture and DSP chip of Kurzweil's flagship processor, the KSP8 (reviewed in the February 2003 issue of EM), Rumour and Mangler offer the project-studio user access to some of the power and sound quality of their predecessor at a reasonable price. The sound quality of both units is good, attributable to 24-bit conversion, 128× oversampling, and KDFX algorithms ported over from the KSP8—the same algorithms that are found in the K2500 and K2600 processors.

SHARE AND SHARE ALIKE

Aside from some minor cosmetic differences, the units are physically identical. Each occupies a single rackspace and features stereo-balanced analog I/O on ¼-inch TRS connectors in addition to S/PDIF digital I/O on RCA connectors (see **Fig. 2**). Each also has MIDI In and Out/Thru ports and a ¼-inch footswitch jack. The power input is a nonlocking minicoaxial plug typical of low-voltage devices.

The nonlocking power connection is a minor disappointment because it can become easily disconnected if the cable is not well secured. The power supply is the lump-in-the-line type, which is preferable to a wall wart. You can select the MIDI Out/Thru port's function using a switch on either unit's rear panel; that might be a problem if you don't have easy access to the back of your rack and need to frequently change the port's status. A switch to specify a –10 dB or +4 dB output level is also on the rear panel. The switch's location in this case is less of a drawback, because you're less likely to need to change operating levels once you've set up the unit.

The front panels are laid out ergonomically, striking a good balance of tactile and visual elements including dedicated buttons, control knobs, metering, LED display, and a data wheel. On the left side are knobs to adjust input- and output levels and a 3-segment LED input-level meter. (I would prefer more detailed metering, but this seems to be standard for devices at this price.) Four buttons are dedicated to Bypass, EQ, Tempo Tap, and accessing the Master edit menu. The 2-by-20-character LED display shows the program name and number, the active parameter value, and the effects algorithm. I appreciated the dedicated contrast control on the front panel, which was easy to adjust without having to dig through pages of menus.

The detented Bank knob lets you select from 12 factory banks and 4 user banks. The Preset knob lets you select one of each bank's 16 presets, for a total of 256 programs. The Load and Store buttons are adjacent. On the right side of the unit are a Parameter Select knob and a big Parameter Value wheel that has a depression for your fingertip, allowing for rapid twirling. The lack of a power button makes me uneasy, but I can soothe that sensation by plugging the units into a power strip that I can readily turn on and off.

DOUBLE FEATURES

Both units have a programmable, defeatable, global 3-band EQ that's positioned pre-effects. Because effects are often overly bright and I prefer a slightly darker effected sound, I like adding EQ to the signal coming back into the mix bus though an aux return. Although you can't switch the EQ to post-effects, it still offers control over the overall sound.

The Rumour and Mangler follow or generate MIDI Clock, or you can access the tempo-tap function using the dedicated front-panel button or a footswitch. As an alternative to using a sequencer's tempo map to achieve a more human feel, I like being able to control beat-synced delays and other effects manually. The sampling-rate clock can be

FIG. 1: Kurzweil's Rumour puts the ambience and reverb algorithms of the KSP8 multichannel effects processor well within the reach of a project studio's budget. Mangler supplies effects such as chorus, flanger, phaser, ring modulation, distortion, and various combinations.

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FIG. 2: All connections are on the rear panel. From left to right are MIDI I/O, coaxial SPDIF I/O, a ¼-inch jack for a single or double footpedal, and stereo analog I/O on ¼-inch TRS jacks.

synced internally or externally, and you can use either box in the digital domain as master or as slave.

Another handy feature is a selectable global Wet/Dry mode. In addition to the output being fully wet, you can set up either unit to run in Insert mode, in which the wet/dry mix is saved with the effects program. That capability is useful if you lack the proper busing or routing that is necessary to use the effects in a send/return configuration.

One small complaint I have about Rumour and Mangler is that when you reach the last item in a parameter menu while editing, the list does not wrap around. Consequently, you must scroll backwards to get back to the beginning. My experience in shaping an effect is that because so many parameters interact with one another, I like to make a few passes through all of them fairly quickly to get things dialed in; reaching a dead end slightly interrupted my work flow.

Rumour and Mangler's MIDI implementations are extensive, and MIDI control is easy to set up. For each algorithm, the most commonly used parameters are set by default to Control Change numbers 1 through 16. I simply plugged in my Oxygen 8's MIDI Out to the Mangler's MIDI In, and I could tweak basic parameters quickly and easily. More extensive MIDI control is available, and you can back up settings by SysEx. Firmware updates, when they're available, will also be loaded using MIDI.

BEGGING TO DIFFER

Rumour and Mangler have some degree of overlap, as can be expected in most pairs of multi-effects processors. What distinguishes one processor from the other is each unit's primary focus.

Rumour is mainly an ambience and reverb unit with some additional effects included as part of the algorithms. At first glance, you might think that Rumour offers less bang for the buck because it has fewer effects types than Mangler, but Kurzweil has made a conscious choice to deliver quality over quantity. Proper ambience simulation requires significant DSP resources, and Rumour puts its processing power to good use.

The reverbs are thick and spacious, with good density, pleasant smoothness, and fine detail in the final decay or tail. As is often the case with factory presets, some of the settings are a bit heavy handed, but that's no problem. Such presets impart an instant impression of the effect, and they function well as a point of departure for tweaking to suit your own tastes or applications. I liked the beefy quality of the low-midrange in particular; still, you might want to make adjustments to the global EQ or to the program itself.

The ambience programs were subtle and tasteful. I used the Add Ambience preset to glue some overdubbed, close-miked keyboard parts together with a live vocal and acoustic-guitar performance that had a fair amount of room sound on it. I was pleased with the sound of the effect, as it was apparent in an almost subliminal way, but I definitely missed the effect when I bypassed it. The realistic nature of Rumour's effects should be helpful in a post-production environment in which Foley, ADR, and other non-production elements need to be blended in with ambient location recordings.

A reverb category called LaserVerb is fun, but it can be a bit much if used excessively. LaserVerb produces a chorused sound with a fair amount of movement in the stereo field. The effect works well on keyboards, guitars, and even backing vocals, and it's also well suited for horns and strings in urban, pop, rock, or electronic music styles.

Rumour and Mangler Specifications

Analog Inputs	(2) ¼" TRS (balanced/unbalanced)
Audio Outputs	(2) ¼" TRS (balanced/unbalanced)
Digital I/O	coaxial S/PDIF (RCA)
Word Length	16, 20, or 24 bits
Factory ROM/User RAM Programs	192/64
MIDI I/O	(1) In, (1) Out/Thru (switchable)
A/D/A Converters	24-bit, 128× oversampling
Maximum Input Level	+22 dBu
Frequency Response	20 Hz–20 kHz, ±0.1 dB
Dynamic Range	> 106 dB unweighted @ 1 kHz
Crosstalk	< –104 dB @ 1 kHz, +21 dBu
THD	+ Noise < 0.001% @ 1 kHz, +19 dBu
Display	2×20-character LED
Dimensions	1U × 8.1" (D)
Weight	5 lbs.

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Whole Step Trills
Staccato
Double Tongue "ta"
Double Tongue "ka"
Muted Legato
Muted Staccato
Muted Flutter Tones
Rips
Sforzando
Mute Sforzando
Stopped Horns
Horns Bells Up
Trombone Slides
Trombone Pedal Tones
Effects

Instruments:

French Horns
Solo Melodic French Horn
1st & 2nd chair French Horn Section
1st through 4th chair French Horn Section

Trumpets
Solo Melodic Trumpet
1st chair Trumpet
2nd & 3rd chair Trumpet Section
1st through 3rd chair Trumpet Section

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PRODUCT SUMMARY

Kurzweil
Rumour and Mangler
rackmount effects processors
$649 each

FEATURES	4.0
EASE OF USE	4.5
QUALITY OF SOUNDS	4.0
VALUE	3.5

RATING PRODUCTS FROM 1 TO 5

PROS: Great sound quality. Easy to use. Extensive MIDI implementation.

CONS: No power switch. Flimsy power connection. EQ unable to switch to post-effect.

Manufacturer
Kurzweil Music Systems/A N D Music Corp. (distributor)
tel.: (626) 964-4700
Web: www.kurzweilmusicsystems.com

THE WILD CHILD

Mangler has a lot to offer in terms of variety and quality. It has more of a wild side when compared with its subtler sibling. In addition to the standard chorus, delay, flanger, and phaser, Mangler has LaserVerb, rotary speaker, compression, distortion, and filter effects.

One preset that I particularly enjoyed was Clean Rotors Fast, which I applied to a real Rhodes keyboard part. It had the fun, swirly effect of sticking your face into a rotary speaker enclosure without the danger of getting the tip of your nose lopped off by a spinning speaker horn. Another useful preset was Tube Dist+Reverb, which sounded more like a stompbox than an overdriven tube amp, but in a good way. I used it on a meaty synth bass patch and on some drum loops with equally crunchy and savory results.

I was admittedly dubious about the quality of the compressor. I dialed up a few presets, and it sounded good on lead vocals and drums. Then I adjusted the threshold and other settings so the compression was fairly extreme, and I had to really push it hard to make it sound bad. You might argue that the compressor sounds a bit too clean, but I think that's a plus. You could grunge it up with some of the internal effects, or you could use a dedicated compressor if you need a specific sound. Overall, the compression is very usable, and I wouldn't hesitate to put it on individual high-profile tracks, across a bus, or on a full mix.

None of Mangler's effects banks were disappointing. All of the effects sounded good, and most were functional if not downright fun, with a minimal number of klunkers or filler presets.

Nonetheless, I was baffled by the high noise level in the distortion algorithms. Perhaps such noise is intentional for the sake of realism, or maybe it's just a necessary byproduct. Luckily, all of the guitar-oriented presets include a gate to control noise.

I'LL TAKE BOTH

Rumour and Mangler are solid contenders in the crowded less-than-$1,000 hardware-effects category. Their sound quality is high, and the units are easy to use. They offer a nice combination of simple, accessible MIDI control with more extensive implementation and deeper editing. Browsing and editing the effects is quick, easy, and fun. The printed documentation is sparse, but it's sufficient and nicely laid out, providing a quick-start guide at the beginning. You can download more extensive documentation of the effects algorithms from Kurzweil's Web site.

Both devices are attractive although they are slightly pseudo-retro. They appear to be well built and have a solid feel to them. I wish they offered more onboard storage for user banks, but I suppose that might up their price. Kurzweil has done an admirable job of putting two well-balanced packages together.

Kerry Rose *is an avid snacker and a lover of many delicious and exotic-sounding treats. He can be caught cooking up a sonic smorgasbord at kerry@edibleaudio.com.*

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By Len Sasso

In the early 1990s, composer and CalArts professor Tom Erbe created a suite of sound-mangling software tools called SoundHack. SoundHack was unique, powerful, and—best of all—free. The software became an immediate must-have for sound designers. But all of SoundHack's processing was offline—users spent a great deal of time tapping their fingers waiting for the software to work its magic. Many of SoundHack's processes can now be carried out in real time on a well-endowed music computer. Spectral Shapers is the first of several planned plug-in bundles based on and extending SoundHack's capabilities.

Available as either a download or on CD-ROM, Spectral Shapers includes VST plug-ins for all recent versions of Windows and Mac OS, as well as Audio Units plug-ins for OS X. Other plug-in formats are currently under consideration. All four Spectral Shapers plug-ins are CPU intensive, so you'll need a fast computer to make full use of them. Using one instance of each of the VST plug-ins in Ableton Live pushed the CPU meters on a dual-processor Mac G5/2 GHz to nearly 50 percent.

Two of the four Spectral Shapers plug-ins, +spectralgate and +spectralcompand, are dynamics processors. The third plug-in, +morphfilter, uses a tempo-syncable LFO to morph between two filters. The fourth plug-in, +binaural, uses filters that simulate the filtering effect of the head and outer ear to create LFO-driven surround panning. I'll start with a look at the dynamics processors.

UP AND DOWN

+spectralgate and +spectralcompand use a technique called Fast Fourier Transform (FFT) to divide the audio that is being processed into 513 frequency bands. Separate dynamic processing is then applied to each band, and the bands are recombined to produce the output. You have control over several global parameters (covered later in this review), as well as the threshold level at which processing is applied for each band. You set the threshold curve either by analyzing the audio being processed or by drawing in the plug-in's frequency display with the mouse.

Minimum System Requirements

Spectral Shapers 1.0

MAC: G3/500; 256 MB RAM; Mac OS 9 or OS X

PC: Pentium II/500; 128 MB RAM; Windows 98/XP

The red curve in the central portion of the +spectralgate control panel is the threshold curve (see **Fig. 1**). In this case, however, it was not drawn in. Instead, I used +spectralgate's Learn function to capture the frequency spectrum of a guitar loop, and I used that as the threshold shape for dynamic ducking of a drum loop. **Web Clip 1** illustrates the process, beginning with the guitar loop, which is followed by the unprocessed drum loop, which is then followed by the processed drum loop.

+spectralgate offers two dynamic processes: gating and ducking. Both of these processes involve changing the level of the audio being processed by the amount set by the Gain knob. The change can be positive (raising the level) or negative (lowering the level). The difference between gating and ducking is that gating applies the level change only when the signal level of the affected band is below the threshold, whereas ducking applies the level change when the signal level is above the threshold. Because of the large number of bands, when the threshold shape is captured by analyzing another audio clip, the process transfers some of its spectral characteristics to the processed audio.

You don't need to set the threshold

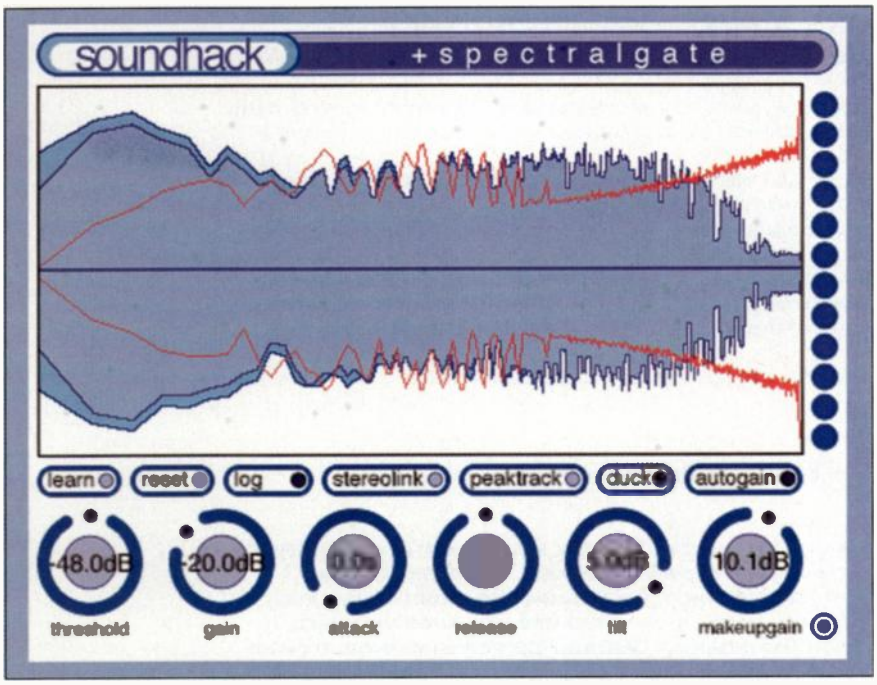

FIG. 1: The red curve in SoundHack Spectral Shapers +spectralgate displays the threshold settings across the frequency spectrum. The gray and blue shaded areas show the before and after audio spectrum. All processes are controlled by the knobs and buttons along the bottom.

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shape by capturing the spectrum of an audio clip. You can draw in your own shape, even a simple straight line, which will produce a 513-band noise gate that affects only those bands below the fixed threshold, as indicated by the straight line.

The +spectralcompand plug-in is similar to +spectralgate, but it offers compression and expansion instead of gating and ducking. Like ducking, compression is applied when the signal level is above the threshold, but the level is scaled rather than simply offset. The gain setting is replaced by a compression amount setting. Like gating, expansion applies when the signal level is below the threshold, but again the level is scaled rather than offset. The results tend to be subtler and smoother.

All the Spectral Shapers plug-ins have a minimum number of controls, with significant thought given to what controls will produce the maximum impact. Almost all tweaks produce a noticeable effect. All knobs are linear and have a large readout. You can't manually type in values, however, and the knobs are difficult to adjust at a high resolution. Plans for a modifier-key option for fine adjustments are in the works.

+spectralgate and +spectralcompand have Threshold and Tilt controls for adjusting all thresholds simultaneously. Tilt adjusts the thresholds for high bands in the opposite direction as those for low bands, allowing you to tilt the effect toward one end of the frequency spectrum. The Attack and Release controls let you determine how quickly the effect turns on and off once the signal crosses the threshold. The range is 0 (instant) to 1 second in 100-millisecond increments. A Gain control lets you compensate for overall level changes. +spectralgate also has an Autogain feature, which maintains unity gain by automatically adjusting the Gain control on the fly.

'ROUND AND 'ROUND

The third plug-in, called +morphfilter, morphs between two 513-band filters. As with the dynamics processors, you can draw in the filter shape or analyze incoming audio to capture its frequency spectrum. Unlike the dynamics processors, +morphfilter displays a shape that actually represents the filter's frequency spectrum (meaning the gain change for each band) rather than the threshold levels beyond which the gain change is applied. The difference is subtle, and you also can use the dynamic processors to sculpt one sound based on the harmonic content of another. Only +morphfilter, however, can morph between two spectra.

You can control morphing manually using a control-panel knob, remotely using MIDI to automate the knob, or automatically using +morphfilter's built-in LFO. The LFO rate ranges from 0 (off) to 4.0 Hz in increments of 0.1 Hz, but an accompanying LFO Divide control can split the LFO frequency by an integer between 1 and 11. Dividing the lowest LFO frequency by 11 results in an approximately two-minute LFO cycle. The LFO can be synchronized to the host's tempo, but in that case the fastest rate is one LFO cycle per beat; in other words, the LFO can go very slow but not very fast.

One of the more interesting uses for +morphfilter is to apply the spectral characteristics of one or more harmonically rich sounds to a relatively neutral sound. I created **Web Clip 2** by capturing the spectra of different-pitched guitar and string pads and applying them to a noise burst recorded in a stairwell (see **Fig. 2**).

Another interesting characteristic of +morphfilter is its ability to invert the spectrum of the applied filter. Processing a sound with the inverse of its own spectrum tends to flatten the sound's spectrum. Beyond simply reversing the spectrum, you can actually vary the amount of filtering continuously from –2.0 to 2.0, with 1.0 representing the filter exactly as drawn. Together with the Tilt control (which operates as it does in the dynamics processors), inversion gives you a dramatic range of coloring options.

The fourth Spectral Shapers plug-in, +binaural, uses filtering to implement surround panning. It allows you to place the sound at any position around the head at the same elevation as your

FIG. 2: +morphfilter morphs between two 513-band filters that can be drawn in manually with a mouse or captured by analyzing incoming audio. You can control the morphing by a tempo-synchronized LFO, by incoming MIDI, or manually.

PRODUCT SUMMARY

SoundHack

Spectral Shapers 1.0 (Mac/Win)
effects plug-in bundle
$150 CD-ROM; $125 download

FEATURES	3.5
EASE OF USE	4.0
QUALITY OF SOUNDS	4.5
VALUE	3.0

RATING PRODUCTS FROM 1 TO 5

PROS: Unique DSP effects. Excellent sound quality. Lots of room for creativity.

CONS: Knobs difficult to fine-tune. LFO ranges are limited.

Manufacturer

SoundHack
tel.: (858) 539-3933
email: contact@soundhack.com
Web: www.soundhack.com

ears. (Elevation control is planned for a future version.) The +binaural plug-in is most effective when used with headphones, but it is also effective when used with speakers.

Unlike the other Spectral Shapers plug-ins, you do not set up +binaural's filter shapes; it uses predefined filters that simulate the filtering effect of the head and outer ear at all angles. Two different filter models are provided; you can select the model to use and the position (in degrees from 0 to 360) to simulate.

+binaural has an LFO similar to +morphfilter's for automating the position. You can influence +binaural's LFO shape by means of a two-dimensional envelope editor that represents the LFO value (vertical) at eight time positions (horizontal). When you click in the editor, the closest of the eight points jumps to the cursor position. It's not terribly elegant, but it does provide you with some control over the panning automation.

▼

Inversion gives you a dramatic range of coloring options.

NO MATTER WHAT SHAPE

Spectral Shapers is an interesting and useful bundle of filter plug-ins. I don't know of any other plug-ins that perform the same exact functions as those of Spectral Shapers. The user interface is well thought-out, although the controls are somewhat limited in range and resolution. The documentation is clear, but it lacks many examples. The ticket here is clearly experimentation. If you're looking for something to spice up your DSP toolkit, Spectral Shapers is definitely worth a look.

Len Sasso *is an associate editor of* EM. *He can be contacted through his Web site at www.swiftkick.com.*

JASMINE

ONYX ARRANGER 2.1 (WIN)

This instant desktop orchestra offers style.

By David Rubin

MIDI-based algorithmic-composition programs have been around since the earliest days of desktop-music production, and many musicians have turned to them in an effort to break through a bad case of writer's block or to come up with a start for a new song. Venerable old favorites such as PG Music's Band-in-a-Box and SoundTrek's Jammer have remained popular because they offer unique approaches to generating new music, which allows them to fill specific musical needs. Jasmine Music Technology's Onyx Arranger 2.1, a relative newcomer to the field, offers some of the best features of both programs, while adding its own unique spin to the genre.

If you like experimenting with presets and variables, you'll love this program. It's packed with a plethora of parameters that will keep you busy for hours. The user interface bristles with toolbar buttons, drop-down presets and parameter settings, dialog boxes, and editing windows that let you fine-tune the program's output. But don't let the hundreds (possibly thousands) of parameter values and settings scare you away. You can also use the program at a basic level to quickly generate harmonies for your melodies and to add rhythm-section and instrumental accompaniments in a long list of styles.

Onyx Arranger's processing capabilities are based on three components: Musical Object Morphing, Intelligent Auto-Harmony, and Performance Modeling. Musical Object Morphing lets you transform a melody by applying a preset style template to it. You could, for example, have a classical melody by Mozart play back as a Brazilian bossa nova or in a big-band-jazz style. Intelligent Auto-Harmony analyzes a melody and generates chord changes based on different scales (major, minor, gypsy, blues, and so forth) and tonal centers. Performance Modeling goes beyond groove quantization by modeling the performance techniques of live players to yield a less-stilted sound.

Minimum System Requirements

Onyx Arranger 2.1

PC: Pentium II/500; 128 MB RAM; Windows 98SE/2000/ME/XP; 30 MB hard-disk space

These different but complementary processing algorithms are combined in Onyx Arranger to produce an array of interesting results. To see the level of control that the program affords, you need only to look at the program's main window in which myriad buttons, drop-down menus, and parameter fields await your command.

MAIN SHOW

Most of Onyx Arranger's primary functions begin in the main window, which is divided into seven sections, appearing beneath a collection of small toolbars that includes a set of undersized transport controls (see **Fig. 1**).

Resembling a typical Windows sequencer, the Main Track pane at the top shows MIDI track parameters on the left, while the Main Measure pane to its right has a graphic MIDI display for each track. Imported melodies appear here before being harmonized or otherwise processed. You can also record MIDI tracks directly into the program.

Beneath these two sections, the narrow Chords pane shows the current set of chord changes that the program has generated for the melody. Beneath the Chords pane, the Song Manager Control pane (in the left center with the large elapsed-time display) is where you begin the process of harmonizing and "arranging" your piece. The gray area to the right is called the Song Manager pane. It shows the keys and scales that are being used, the chords that are generated, markers for triggering user-designated fills (as opposed to automatically placed fills), and selected

FIG. 1: Jasmine Music Technology's Onyx Arranger 2.1 has a multipart main window that includes a track section at the top for the source melody, middle sections showing harmonization chords and related parameters, and a multitrack section in the lower half for the MIDI accompaniment parts.

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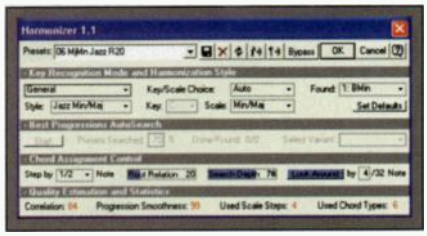


FIG. 2: With Onyx Arranger's Harmonizer dialog box you can let the program come up with its own chord progression, or you can specify several parameters such as key and scale type to control the results.

Orchestrator styles if you choose to arrange the piece after harmonizing the melody.

The Orchestrator Track pane in the lower left shows the MIDI tracks, patches, and parameters that make up the currently generated arrangement. The MIDI data (and adjustable controller envelopes) appear on the right—in the Orchestrator Measure pane—as miniature color-coded graphic displays.

Onyx Arranger is easiest to use if you set it up with a General MIDI sound card or a GM/XG/GS–compatible sound module. I often got muddy-sounding arrangements from my Yamaha MU-90R module, but it was easy to improve the sound by choosing better patches from the pop-up patch lists in the Orchestrator Track pane. You can also solo and mute tracks and adjust the volume, panning, Velocity, and other parameters to fine-tune the arrangement.

It takes a while to get comfortable with Onyx Arranger's multipane window, but if you're used to working with sequencers, much of the layout will seem familiar. Viewing and navigating the different areas is greatly aided by the excellent Zoom controls on several of the panes and by the pop-up labels for the buttons and parameters.

HARMONY CENTRAL

Although Onyx Arranger offers a number of exotic processing capabilities, one of its most basic, and arguably one of its most useful, is its ability to generate chord changes to a melody. The program's harmonizing algorithms draw from a large internal database of chord progressions that come from actual songs with different scales and styles. The program recognizes more than 100 chord types, so it has lots of material to work with.

After an imported or recorded MIDI melody is selected in the Main Measure pane, you begin the process by clicking the Harmonizer toolbar button, which opens the multipart Harmonizer dialog box (see **Fig. 2**). Several small drop-down menus let you guide the harmonizing process. You can, for example, specify different chord styles to use, from simple folk-song chords to complex jazz chords. You can also specify scale types to base the progression on, and you can control how many chords per measure are generated.

If you aren't sure what you want, pick the AutoSearch option, and Onyx Arranger analyzes the melody and generates eight chord-progression variations for you to consider. The AutoSearch harmonies are quite interesting; they ranged from simple, straight-ahead progressions to unusual, even enlightening, combinations that I wouldn't have come up with on my own. Some of the more "outside" progressions had clunkers, but you can easily delete or replace any chord to smooth things out. If you're stuck in a rut trying to harmonize, Onyx Arranger can offer some fresh ideas to consider.

The Harmonizer feature generally works quite well, although it does have a few shortcomings. For example, once you select a chord progression to audition, you have to close the Harmonizer dialog box to gain access to the transport buttons so you can play the piece. If you want to try another variation, you have to open the dialog box again and start all over. It's a rather cumbersome arrangement. As a workaround, you can loop the melody and start it playing before you open the dialog box. You can then switch between the variations in real time as the music plays. That works pretty well, but I'd much rather have a Play/Stop button in the dialog box for easy auditioning.

Another thing to remember is that Onyx Arranger can process at most only 64 measures at a time, so you can't plug in an entire song and harmonize it all at once. In fact, the documentation suggests that you work in even smaller chunks of 8 to 32 measures, and then string the sections together. In theory, the program could handle files of any length, but according to the developer, processing very large files would overburden all but the fastest computers.

BANDING TOGETHER

Once you've harmonized your MIDI melody, you can take everything to the next level and have Onyx Arranger generate a complete accompaniment. The process starts in the Song Manager pane where the OOStyle button's pop-up menu offers more than three dozen musical-style categories to choose from.

Each category has one or more variants (you can download hundreds more free from the Jasmine Web site), and as soon as you select one, Onyx Arranger instantly spits out a multipart accompaniment in the chosen style and with appropriate instrumentation. For example, the arrangements include an accordion part for the Gypsy style, a banjo for Bluegrass, congas for Latin, a synth bass for Techno, brass for Swing, a Hammond B-3 for Blues, and so forth. All of the arrangement styles use the program's Performance Modeling algorithms to help them sound more realistic by applying Modulation, Pitch Bend, and other characteristics. What's more, the

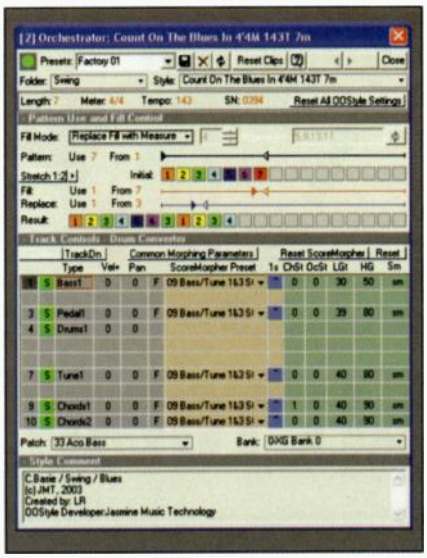
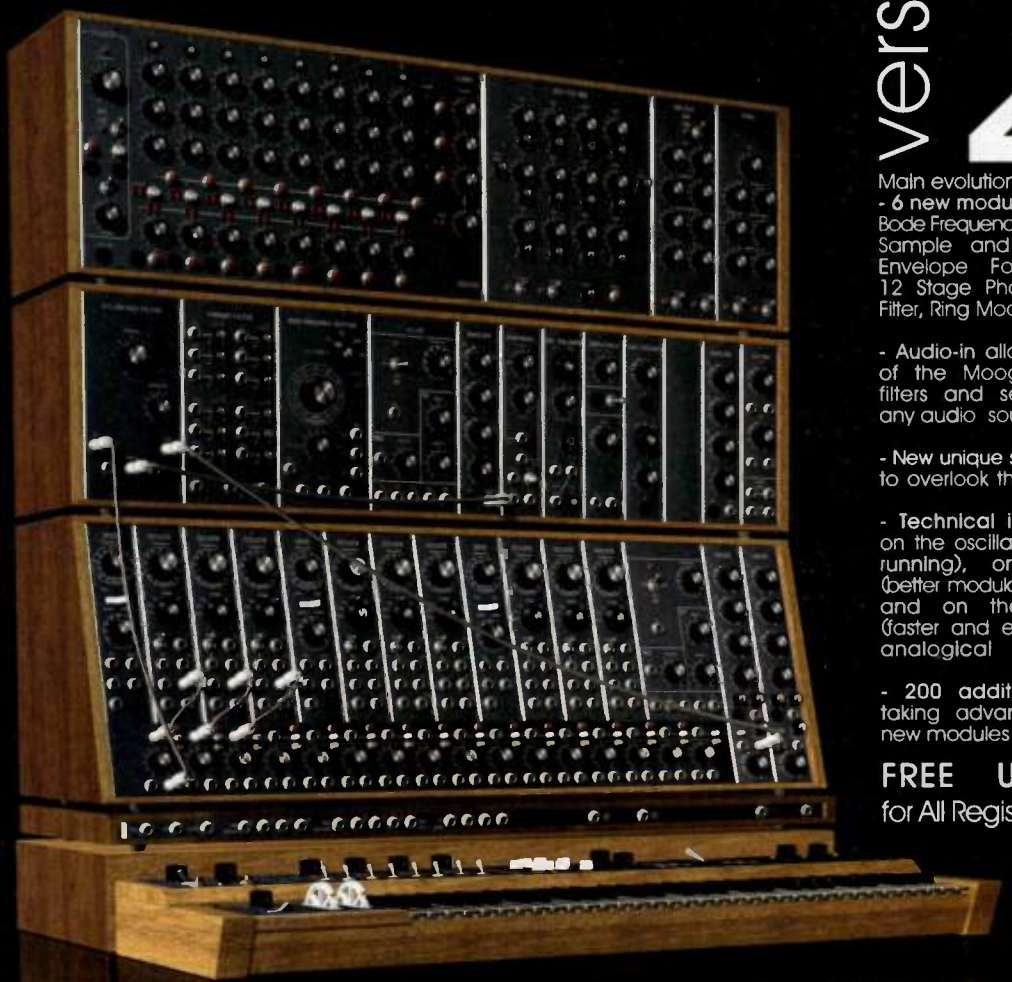


FIG. 3: In the Orchestrator dialog box, you can change musical styles in real time and edit various parameters for the instrument parts.



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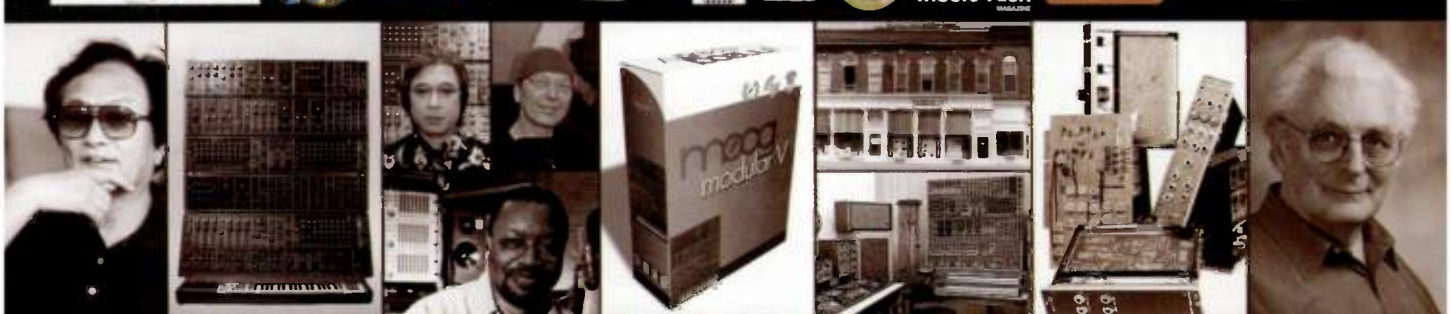

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styles can work in any meter, so even if a style was designed in a 4/4 meter, it can still be adapted to a 3/4 or 5/8 meter.

In spite of Onyx Arranger's sophisticated Performance Modeling algorithms, some of the accompaniments still sound a bit too mechanical for my taste. The drum fills, for example, often sound too much like drum-machine fills. On the other hand, many of the styles, such as Disco, Techno, Electronic, and Dance take advantage of the program's drum-machine-style rhythm parts. And a few of the accompaniments work well by keeping the arrangements simple. For example, one of my favorites is a Jazz style that uses only an acoustic bass, quiet drums, and a grand piano for a relaxed and intimate sound.

In general, the program's auto-accompaniments are best viewed as starting points and not finished products. To that end, Onyx Arranger provides plenty of tools to modify the arrangements. For starters, you can micromanage many of the performance characteristics by opening the Orchestrator dialog box (see Fig. 3). It lets you change the type and placement of fills, substitute drum sounds, control how the bass part is played, and specify which measures in the rhythm part to base the overall loop on. You can also change styles instantly from a pop-up menu as the music plays (you don't have to close this dialog box to start and stop the music), which is a great way to try out your melody with an assortment of different accompaniments.

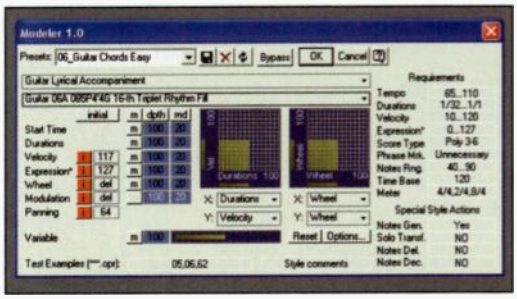

FIG. 4: The Modeler dialog box allows you to apply sophisticated performance-modeling algorithms, which are based on live performances, to any of the MIDI tracks.

MIDI MODELS

Among Onyx Arranger's most powerful features are its MIDI effects, which you can apply to any of the Orchestrator tracks to enhance the performances. For example, AutoPhraser lets you add phrasing to the instrument parts that sounds more natural (important for wind instruments), Event Filter deletes specified MIDI messages (such as controller data) on the fly, and Modeler applies live-performance characteristics to a track based on the program's performance models. (Hundreds of Performance Model styles are provided; others are available for purchase.)

The Modeler dialog box (see Fig. 4) is actually one of Onyx Arranger's most important tools, and you can apply it to any track (including the original melody) or to any part of a track. The results are sometimes unpredictable but seldom uninteresting. You could, for example, specify individual performance styles for the guitarist, pianist, and bass player in your virtual band or use Modeler to generate unusual playing effects. All of Onyx Arranger's MIDI effects, including Modeler, can be chained in various combinations for even more complex processing.

And finally, if you just aren't satisfied with any of the program's Orchestrator styles or you need a wider selection, you can create your own styles using Onyx Arranger's built-in StyleMaker feature.

When you're happy with your arrangement, you can render and save the whole shebang as a Standard MIDI File for exporting to another program, such as a sequencer. However, you may not need a separate sequencer to edit your piece; Onyx Arranger includes many of the features of an entry-level sequencer, including an event list, a SysEx editor, and a full-featured piano-roll window with step-entry capabilities and a graphical controller display.

OVER EASY

Onyx Arranger can be easy to use or surprisingly complex, depending on how you approach the program and how much you want to control its output. In this review, I've touched on just the main features; a full accounting of all the tools and parameter options would run on for many pages. Once you've spent some time with it, the user interface is relatively easy to work with. The 180-page spiral-bound User's Guide is, unfortunately, poorly written, unindexed, and badly organized, which adds to some initial confusion. (According to Jasmine, a new manual is planned.)

On the plus side, Onyx Arranger is lots of fun to play around with, and the program appears to be highly stable; it never once crashed during any of my tests. Moreover, Jasmine is to be lauded for offering hundreds of new Orchestrator styles for free from its Web site. (Several new styles are added each month.)

If you're looking for a tool to help you come up with new musical ideas or to resuscitate some older ideas, Onyx Arranger might just do the trick. You can download a demo version of the program from the Jasmine Web site and try it for yourself.

Contributing editor **David Rubin** *lives and works in the foothills outside of Los Angeles.*

PRODUCT SUMMARY

Jasmine Music Technology

Onyx Arranger 2.1 (Win)
algorithmic-composition software
$99

FEATURES	4.0
EASE OF USE	3.0
DOCUMENTATION	2.5
VALUE	4.5

RATING PRODUCTS FROM 1 TO 5

PROS: Easy harmonization of melodies. Hundreds of arrangement styles. Many parameters for controlling final results. Specialized MIDI effects for improving performances. Has standard sequencer tools for editing. Good bang for the buck.

CONS: Harmonization dialog box must be closed to access transport controls. Documentation is poorly organized.

Manufacturer
Jasmine Music Technology
tel.: (888) GET-ONYX
email: info@jasminemusic.net
Web: www.jasminemusic.net

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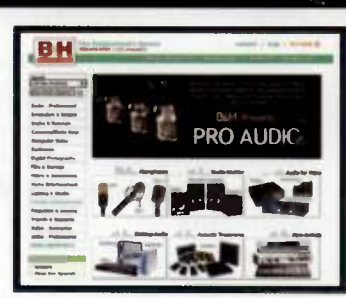


Quick Picks

NATIVE INSTRUMENTS

Intakt 1.0.3 (Mac/Win)

By Geary Yelton

Native Instruments (NI) offers several sample-playback instruments optimized for particular styles of music production. Intakt ($229) is a software tool for manipulation and playback of audio loops and phrases. It runs standalone and as a VST, DirectX, RTAS, or Audio Units plug-in. In addition to its native formats, it reads WAV, AIFF, REX 1 and 2, EXS, Akai, LM-4, SDII, SoundFont2, and other NI files. Intakt requires Mac OS X or Windows XP, at least 256 MB of RAM, and a minimum 500 MHz G3, Athlon, or Pentium III processor.

Intakt's main window contains Source Edit, Modulation, Effects, Keyboard, and Browser sections. All except Source Edit may be hidden to save onscreen space. The Loop Edit window, in which you set loop points and position Slice Markers, takes up most of the Source Edit section. The Modulation section supplies two envelopes and two LFOs, and the Effects section contains two filters and effects. You can search for samples and instruments in the Browser.

Like other Native Instruments software, Intakt doesn't quite conform to Windows or Mac OS user-interface standards. There's no Edit menu, which means no Cut, Copy, Paste, or Undo. All commands are located in Intakt's main window. Pop-up menus, buttons, knobs, and graphic displays yield access to all user parameters.

Native Instruments Intakt 1.0.3 is a software instrument that lets you manipulate and play back audio loops and other samples. Its user interface provides access to three separate sound engines: Sampler, Time Machine, and Beat Machine.

Sample, Stretch, and Slice

Intakt has three modes that determine its sample-playback engine: Sampler, Time Machine, or Beat Machine. Different notes of a single instrument can use any of the three modes simultaneously.

Sampler mode is traditional sample playback, which scales duration as it transposes pitch. Sampler mode works best for multisampled instruments. You can define loop points, and when you import samples, the loop points are preserved. Intakt did a beautiful job of importing the EXS instruments I tried.

Time Machine is Intakt's time- and pitch-stretching algorithm that works best with polyphonic sound sources. When I selected a loop and clicked the Timemachine button, it took a moment to calculate the necessary data. Then, by turning independent Tuning and Tempo knobs, I was able to smoothly transpose most loops an octave up or down without changing their tempo and convincingly half or double their playback rates without changing their pitch, all in real time. Beyond those limits, success varied with the source material.

Beat Machine is Intakt's beat-slicing engine. It works best for most drum and percussion loops, as well as bass and some other monophonic sources. You slice up a groove by simply turning the Sensitivity knob, which determines the number of slices. You can then map each slice to a different MIDI note, process each note separately, and seamlessly play back sliced loops at different tempos. Export the slice maps as a Standard MIDI File that includes the loop's timing information, and rearrange the slices in a sequencer to create new grooves. Beat Machine can also open REX files with all their markers in place.

In the Modulation section, a 5-stage envelope can control one of nine destinations, and a 3-stage envelope always modulates pitch. In the Effects section, one of two resonant multimode filters lets you drag a breakpoint to define response curves or three breakpoints to specify EQ curves—very nice.

Creating an Intakt instrument is truly drag-and-drop simple. Just drag any sample from the Browser to any note on the keyboard. Where you drop it determines its pitch range; drop it near the top of a key for an entire octave, near the bottom for a single note, or anywhere between for any range in between. You can also double-click a sound file to assign it to the next adjacent key, beginning with the lowest visible note. Quickly click your way through a list of samples to map an entire drum set in seconds.

Loaded with Loops

Bundled with Intakt is more than a gigabyte of excellent samples from EastWest and Zero-G. The library includes loops in musical styles ranging from hip-hop and trance to Latin and orchestral. Construction Kits give you an assortment of related loops for funk, jazz, rock, trip-hop, and other genres. I was particularly pleased with the harmonic loops and atmospheric effects, which supply some really lovely textures (see **Web Clip 1**).

Although Intakt is optimized for loop-based production techniques, it is quite versatile. It lacks a few basic features such as cut, copy, and paste editing. If you use a lot of audio loops and you don't mind editing waveforms in a separate program, you'll definitely get your money's worth from Intakt and have fun using it.

EM WEB CLIPS

Overall EM Rating (1 through 5): 3.5

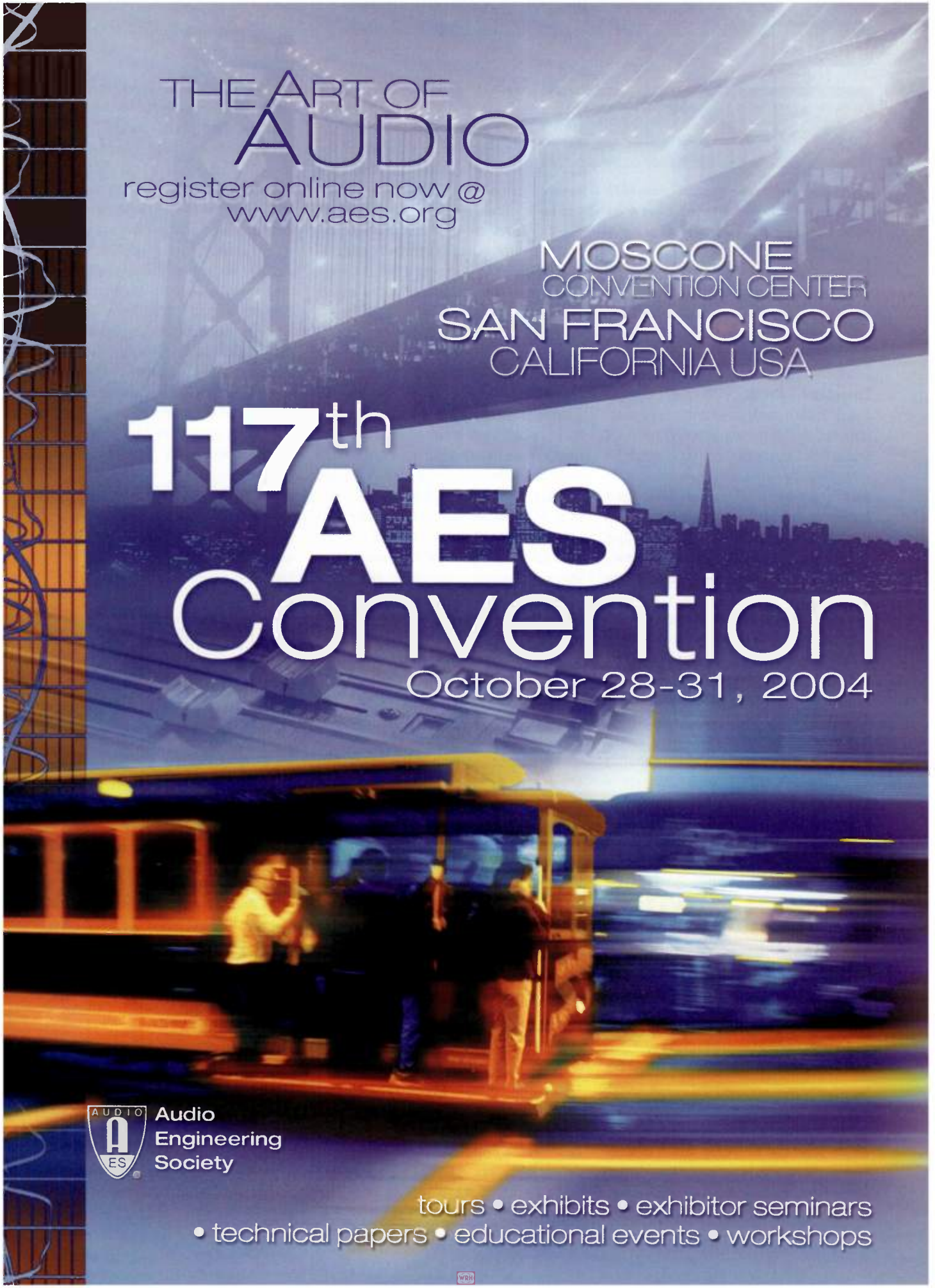
Native Instruments USA; email: info@nativeinstruments.com; Web: www.nativeinstruments.com.

ELECTRO-HARMONIX

Bi-Filter

By Doug Eisengrein

Electro-Harmonix's new Bi-Filter ($990) is an all-analog, dual-envelope, and LFO-controlled filter processor that was inspired by such classics as the original Mutron, Beigel Sound Lab's envelope controlled filter, and EH's Q-Tron. The 2U device is a single-channel processor with dual VCF filters that operate in either series or parallel. The unit was designed by Mike Beigel of Beigel Sound Lab fame, and according to Electro-Harmonix, "exquisite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The front panel of Electro-Harmonix mono Bi-Filter features independent controls for Filters 1 and 2, which can be accessed via serial or parallel routing.

tone was the bottom line" in designing this unit. Bi-Filter sports an attractive retro-modern look, with a brushed aluminum faceplate, deep blue and teal section panels, and '70s-style graphics.

Command Central

The Bi-Filter's front-panel layout is feature-rich yet straightforward, with four main areas. The Drivers section has controls for sweeping the filters. There are slider controls for Envelope Drive, Sweep Oscillator Rate, and Sweep Oscillator Shape. A red Over LED indicates envelope saturation, and a Log/Lin switch gives you alternate envelope tracking. Other switches select Audio Boost and LFO Shape, which has Triangle, Square, and Off positions.

The next two sections house the controls for Filters 1 and 2, which are identical but separately adjustable. Envelope Response sliders control Attack and Decay, accompanied by Envelope Amount, Oscillator Amount, and Filter Frequency sliders. Range switches apply to the frequency sweep of the filters, and Filter mode switches select lowpass, bandpass, or highpass. Finally, there is a Q control for resonance and handy LEDs that track frequency Over Range and Under Range.

The Output Mixer section has separate main mix sliders for Filters 1 and 2, along with Dry, which mixes in the unfiltered (post–Audio Boost selector) control signal. Below each Filter Output slider is a phase Invert switch, and below the Dry slider is a switch that selects between parallel and series for the signal path through the filters. To the right of the Output Mixer are switches for bypassing the filters and FX loop. The front panel also includes the power switch and its accompanying blue LED.

The rear of the Bi-Filter contains an ample selection of ¼-inch jacks. In addition to the Audio Input and Main Output jacks, the rear panel houses separate outputs for Filters 1 and 2. Prefilter Effects Send and Return jacks are included, and a Bypass Footswitch jack takes a TRS connector, where tip carries the filters and ring carries the FX Loop. The icing on the cake is the control voltage jacks: each filter has separate CV inputs, and each envelope has separate CV outputs. The CV inputs will accept a TRS-type expression pedal for controlling the sweep of the filters. If you plug only into CV Input 1, the pedal will control both filters.

All Analog, All the Time

Electro-Harmonix suggests that the Bi-Filter is great for all manner of soft synths, so I loaded up a bleepy 16-bar techno loop created entirely in a Reaktor drum machine. I thought this would be a good first test and contrast with the analog filters, because all the sounds in this percussive snippet were created entirely with software-based FM tone generators. The sounds cover the audio spectrum, from thick kick drum to sticks, bleeps, and square-wave tones. I patched the main output and both filter outputs of the Bi-Filter to separate channels on my console so that I could analyze them individually, but first I checked out the Bi-Filter's own output mixer. All sliders are sturdy, and the unit was sonically very smooth.

My initial impression of the sound was analog with a capital A. The Bi-Filter's output was fluid, organic sounding, and punchy, producing floorboard-rumbling lows and screeching highs. The unit was typically warm, yet easily driven into distortion. While listening to different mixes of the filtered signals with the dry signal, some sounds exhibited phase cancellation, but that was easily remedied with the invert switches. I tried all manner of oscillator, frequency, invert, and parallel/series settings and got interesting results. The Bi-Filter was fun, and I got sucked in. Several audio examples of Bi-Filter processing are online at emusician.com (see **Web Clips 1–20**).

I continued my tests by feeding solo acoustic-guitar recordings, spoken word, and finally an old analog synth (an Oberheim Matrix 6) through the Bi-Filter, with delightful results. A few of the more satisfying features were the Audio Boost switch, which amplifies the signal according to the Envelope Drive; the Q slider, which really does a number on the resonance; and the sweepable LFO Shape control, which has a subtle, silky crossfade.

All About Tone

The tone of the Bi-Filter lives up to Electro-Harmonix's goal of exquisiteness, and its many features, including CV control possibilities, are sure to please analog purists. I found the Bi-Filter to accentuate higher frequencies better than lower ones, but it may just take time working the unit to find the sweet spots. I would have liked a switch to swap the order of the filters in the signal chain, but that would be a cherry on top. The Bi-Filter sounds fat, and with this much control at this price, I'm not complaining. EM WEB CLIPS

Overall EM Rating (1 through 5): 4.5
Electro-Harmonix
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email: info@ehx.com
Web: www.ehx.com

PSPAUDIOWARE

Nitro 1.0 (Mac/Win)

By Len Sasso

Nitro ($149, $299 bundled with PSP 42 and PSP 84), a new multimode filter and multieffects processor from PSPaudioware, is the latest in the company's superb line of plug-ins. Like PSP's Vintage Warmer multiband compressor-limiter and the PSP 42 and PSP 84 Lexicon delay-line emulations, Nitro combines a realistic hardwarelike GUI with loads of under-the-hood parameters for more serious tweaking.

The plug-in is available in VST format for Mac and PC, DirectX format for PC, and Audio Units (AU) format for Mac.

Smooth Operators

Nitro is a 4-stage processor, and each stage can use any of 17 effects processes, or Operators. The signal path is freely configurable, allowing the stages to be arranged in any order. Eleven predefined paths are provided to get you started. Stages can also be turned off to save CPU power.

The Operators fall into two broad categories: filters and other effects. The filters include lowpass, bandpass, and highpass versions in three styles: state-variable (SVF), biquad (BQ), and Moog. The first two—typical of vintage synths—are 2-pole (12 dB per octave rolloff) with resonance, and SVF filters that can self-oscillate. The BQ category also includes a band-reject (notch) filter. The Moog filters are 4-pole and also capable of self-oscillation.

Other effects include Comb, a comb-filter; Phaser, a phase shifter, Lo-Fi, a downsampler and bitcrusher; SAT, a wave-shaping-based saturation algorithm; Wid/Bal, a stereo width and balance effect; Panner, a panning effect that gives you independent control of the left and right channels; and Glide, a stereo delay line with separate delay controls for each channel. There are no startlingly new effects here—it's the configurability of the signal path together with extensive modulation options that make Nitro explosive.

The Face of Nitro

Each Nitro operator has its own control panel with knobs for the chosen effect's two most important settings. There are also On, Solo, and Mid-Side buttons, and an output-level slider. Once you've set up a configuration or loaded a preset, you can do most tweaking with those controls.

If you want to get deeper into programming, most of the action takes place in Nitro's central LCD display, which is divided into eight pages: CFG (configuration), OP (Operators), LFO, ENV (envelope follower), ADS (ADSR envelope), MOD (modulation routing), LIB (preset and bank management), and GLB (global settings).

The MOD page allows you to route either of Nitro's two LFOs, the envelope follower, the ADSR envelope, and any incoming MIDI message to any of the Operator settings, any modulator setting, and amazingly, to any of the signal levels on the CFG page. That allows you, for example, to do a kind of ducking by using the envelope follower to lower the output level of one operator based on the output level of another, as in factory presets A-53 and A-56.

Configure It Out

The CFG page is the most complex and arguably the most important. It presents you with a matrix of 26 boxes. The top-left box represents Nitro's input, the bottom-right box the output, and the boxes on the diagonal represent the four Operators. Connections are made by click-dragging in one of the boxes to set the level of the signal routed from the Operator above or below the box to the Operator to the left or right of the box. (In the case of the left column, the signal source is Nitro's input, and in the case of the bottom row, the destination is Nitro's output.) That may sound complicated, but it takes only a few seconds of use to grasp fully.

Because there are no restrictions, you can create feedback loops, even directly back into an operator. The LCD contains a flashing feedback-warning indicator. Feedback can be useful in some configurations, for example to add feedback to the stereo-delay effect, Glide, such as in factory presets A-20 and A-53.

Nitro comes loaded with 192 factory presets, organized into 3 banks of 64. The LIB page provides complete preset and bank management, allowing you to load and save individual presets or entire banks. The factory presets range from typical filtering and delay effects to those that take advantage of Nitro's modulation and configuration routings. For an example of what Nitro can do, listen to the audio clip (see **Web Clip 1**) posted for this review at emusician.com.

If you enjoy reaching for the unusual in effects processing and don't mind getting your hands dirty, Nitro is a plug-in you should check out. You can download a feature-limited demo from the PSP Web site.

Overall EM Rating (1 through 5): 4
PSPaudioware
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TASCAM

Westgate Studios Woodwind Collection Expanded Edition (Giga)

By David Rubin

Tascam's new expanded edition of Westgate's original single-disc woodwind collection has all of the first version's samples and adds several new instruments and articulations. The two-CD *Westgate Studios Woodwind Collection, Expanded Edition* ($199), includes piccolo, flute, oboe, English horn, E-flat clarinet, B-flat clarinet, bass clarinet, bassoon, and contrabassoon. Although it's great to have an E-flat clarinet in the collection, I find it odd that Westgate chose to include that instrument while omitting alto flute (a much more useful instrument). As a nice bonus, *WSWCEE* also has a consort of solo recorders, a tin whistle, and a penny whistle.

PSPaudioware Nitro 1.0's control panel features controls for each of the four Operators, mixing and metering, and a simulated LCD screen for more program selection and advanced settings.

The orchestral instruments all give a variety of playing techniques, and most have keyswitching and mod-wheel patches to enhance real-time performance. The whistles and recorders were sampled at only one dynamic level, but the orchestral instruments mostly range from two to four levels depending on the type of patch. All of the samples are presented without loops, and most have little or no reverb, allowing you to add your own processing as needed.

To keep the library compact, none of the instruments is represented by a fully chromatic set of samples: most patches have a little more than half the notes as discrete samples. In many cases, that produces some noticeable transitions between neighboring groups of notes.

The *WSWCEE* library is offered without any significant documentation: the back label gives a basic summary of the patch types. You can, however, obtain a more detailed (although not complete) patch list from the Westgate Web site (www.westgatestudios.com).

Pitches and Patches

Most of the orchestral woodwinds have four-layer sustained patches with and without vibrato. The E-flat clarinet, bass

Tascam's two-CD *Westgate Studios Woodwind Collection, Expanded Edition,* has samples of nine orchestral woodwinds and several recorders and whistles.

clarinet, and contrabassoon are offered with only nonvibrato patches. Most of the instruments have three-layer staccato, marcato, and *portato* patches, along with two-layer whole and half-step trills. The flute and B-flat clarinet also provide a one-layer flutter-tongue patch, and several of the instruments include a fortepiano-crescendo patch.

In spite of *WSWCEE*'s varied patch list and its assorted keyswitching and mod-wheel setups, the library still has some inherent weaknesses. The lack of chromatic sampling, for example, is clearly evident in some of the patches, and the samples and performances are sometimes inconsistent.

The flute, for instance, has a highly prominent vibrato that seems a bit too forceful on some of the notes, and there are no mod-wheel patches that let you fade smoothly from nonvibrato to vibrato. The trills (which begin on the lower note) are uneven and very inconsistent, with some slow trills adjoining notes with unexpectedly fast trills. The piccolo fares better. It offers some clear and useable patches, although the top six notes (derived from a single sample) are quite piercing.

The oboe and English horn sound pinched and thin, especially in the upper registers. The B-flat clarinet's vibrato patches suffer from the same overemphasized vibrato as the flute; the nonvibrato patches would work much better in most arrangements. My favorite clarinet patch is the unusual Multiphonic FX, which could have some interesting fodder for sound designers and film composers. The bass clarinet also has a Multiphonic FX patch, and it's even better and more interesting than the B-flat clarinet's.

The bassoon is one of the better instruments in the library. It has a gentle, mellow sound that has a touch of woodiness. It is generally smooth throughout its range, although the top six notes are a little bright.

Just Whistle

One of the surprises in the *WSWCEE* library is its assortment of nonorchestral wind instruments. The collection has a sopranino recorder, two soprano recorders, an alto recorder, a penny whistle, and a tin whistle. The single-layer recorders all have clean, agreeable sounds, although their vibratos render them unsuitable for proper Renaissance performances. (Nonvibrato patches are not included.)

My favorite instrument in the entire library is the single-layer penny whistle with its various keyswitching patches. They let you switch quickly and easily between trills, bends, mordents, and grace notes. The penny whistle sounds great, and it's fun to play. It should come in handy for new-age, ethnic, and a range of other musical styles.

Price Is Right

Although not without flaws, the *Westgate Studios Woodwind Collection, Expanded Edition,* has gained a loyal following in part because it offers such a wide assortment of sampled woodwinds for less than $200. That could be good news for desktop musicians who need some woodwind samples but can't afford the more expensive top-of-the-line libraries from other developers. ❁

Overall EM Rating (1 through 5): 3
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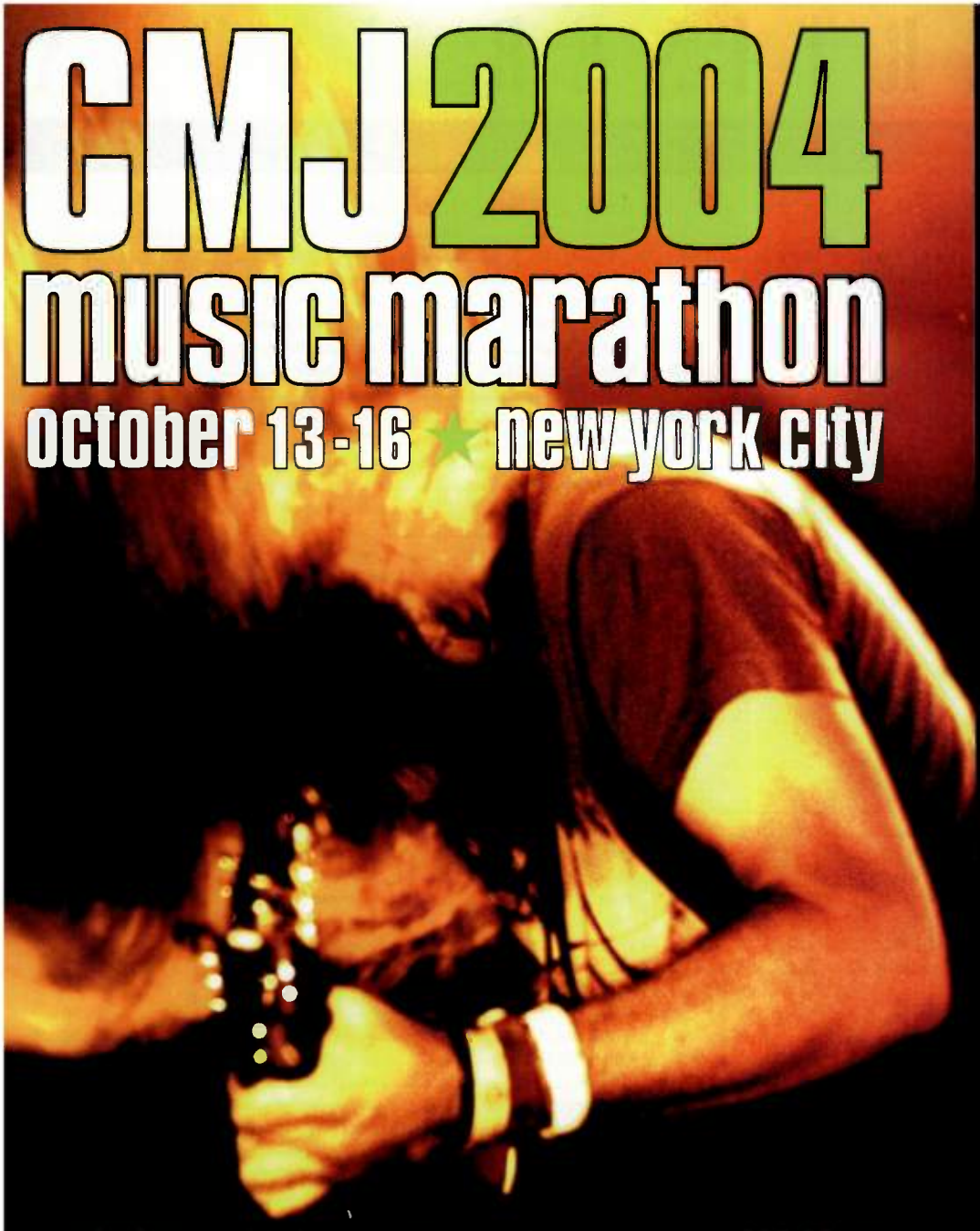

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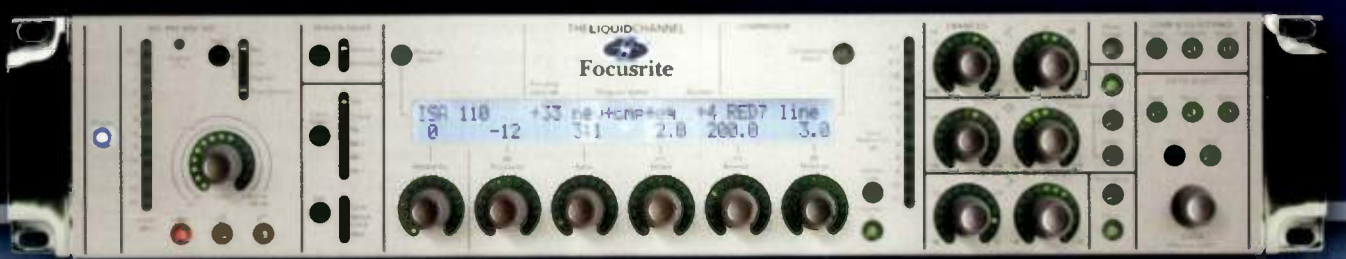

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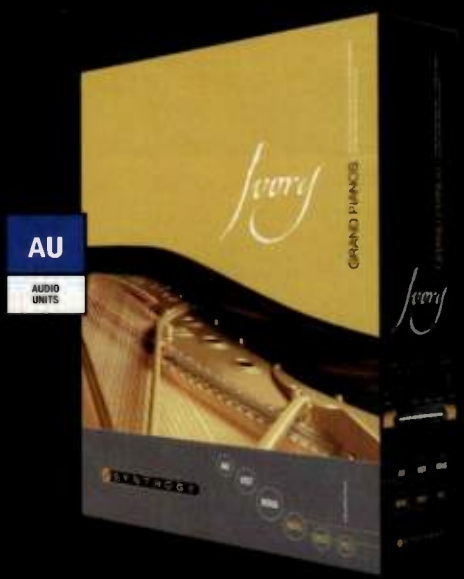

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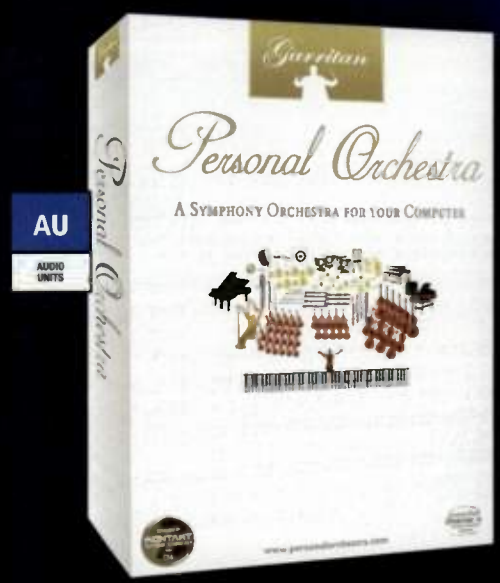

Native Instruments Guitar Rig

The Be All, End All guitar tone and effects rack for Digital Performer. This monster package (look at that effects rack to the left!) even comes with its own foot controller, which doubles as a Direct Input box for feeding your guitar signal into your MOTU audio interface — too cool! Guitar Rig is your one-stop solution for guitar effects, amp and cabinet emulations, and mic modeling.

TC Electronic MD3 Stereo Mastering Package for PowerCore

From the legendary System 6000, TC's most advanced flagship audio processor ever, comes two new mastering plug-ins for PowerCore (PCI and FireWire). This is your chance to own TC's most advanced multiband dynamics and brickwall limiter algorithms at an incredible price, applied directly to your Digital Performer master fader. And thanks to PowerCore's dedicated DSP, you'll have plenty of CPU power left over. Also available as a Windows VST plug-in for PowerCore PC hosts.

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Digital Performer captures every nuance of your MIDI performance. And this new 88-key hammer action USB powered MIDI controller delivers fine-tuned response to satisfy even the most demanding players. Add four zones, a stunning set of MIDI-assignable controllers all in a compact 40 pound package, and you have the most comprehensive product of its kind!

BIAS Peak 4.1 Mastering & Restoration Edition

Peak 4.1 plus SoundSoap Pro and SuperFreq. Imagine the world's most popular stereo audio editing, processing, and CD mastering program for the Mac, combined with unparalleled noise reduction and restoration technology — all at a jaw dropping low price. You get Peak 4.1 (including ImpulseVerb, Sqweez, Vbox SE, Jam 6, SFX Machine LT, and more), SoundSoap Pro (combines four state of the art restoration and noise reduction tools in a single plug-in), and the SuperFreq suite of mastering EQs all in one great package. Launch Peak directly from DP4 for more editing and processing power. Run SoundSoap Pro within DP4 or in Peak as an AU plug-in. For the very best in sample editing, batch processing, file conversions, loop creation, sound design, restoration, and Redbook CD mastering on OS X, pick up the Peak 4.1 Mastering and Restoration Edition today — the perfect mastering and restoration companion for DP4!

Monster Power AVS 2000 Pro

Often overlooked, voltage stabilization is an absolute must for the well-tuned MOTU studio experience. Dips in voltage caused by power-hungry appliances can seriously compromise your sound: loss of tone and clarity, spurious changes in gain structure, loss of peak power, and worse. The AVS 2000 Pro delivers the stability needed for peak power and performance.

Monster Power Pro 7000

Equally important, power conditioning is another must. The current that comes from most AC outlets is inherently unbalanced, causing high-frequency oscillations that get picked up by your gear in the form of performance-robbing hum, buzz and static. Only a power center with perfectly balanced power can fully remove this type of interference. The Pro 7000 is the answer, with 12 AC outlets and Tri-Mode™ 3145 joule rated surge protection. It's the perfect compliment to the AVS 2000 Pro. Get both units to deliver the world class power that the gear in your MOTU studio deserves.

Yamaha 01x Digital Mixer

For mixing "inside the box" or "outside the box" with Digital Performer, the Yamaha 01x gives you the best of both worlds. In fact, the 01x can serve triple duty in a MOTU-based studio as a mixer, control surface and audio interface. First and foremost, the 01x is a world-class 28-channel moving-fader digital mixer with 8 mic preamps, 24/96 A/D converters and total recall. Built on world-renowned 96kHz DSP technologies found in Yamaha's flagship DM2000, 02R96 and 01V96 professional digital mixers, the 01x has massive power under the hood, at an amazingly affordable price. If you choose to mix in Digital Performer instead, the 01x serves as a comprehensive control surface for Digital Performer's mixing environment, complete with motorized faders. And Finally, the 01x can serve as a multi-channel audio interface and multi-port MIDI interface via mLAN FireWire.

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Mackie Control Universal and Extender

Imagine the feeling of touch-sensitive, automated Penny & Giles faders under your hands, and the fine-tuned twist of a V-Pot™ between your fingers. You adjust plug-in settings, automate filter sweeps in real-time, and trim individual track levels. Your hands fly over responsive controls, perfecting your mix — free from the solitary confinement of your mouse. Mackie Control delivers all this in an expandable, compact, desktop-style design forged by the combined talents of Mackie manufacturing and the MOTU Digital Performer engineering team. Mackie Control brings large-console, Studio A prowess to your Digital Performer desktop studio, with a wide range of customized control features that go well beyond mixing. It's like putting your hands on Digital Performer itself.

Presonus Central Station

The PreSonus Central Station is the missing link between your MOTU recording interface, studio monitors, input sources and the artist. Featuring 5 sets of stereo inputs (3 analog and 2 digital with 192kHz D/A conversion), the Central Station allows you to switch between 3 different sets of studio monitor outputs while maintaining a purely passive signal path. The main audio path uses no amplifier stages including op amps, active IC's or chips. This eliminates coloration, noise and distortion, enabling you to hear your mixes more clearly and minimize ear fatigue. In addition, the Central Station features a complete studio communication solution with built-in condenser talkback microphone, MUTE, DIM, two separate headphone outputs plus a cue output to enhance the creative process. A fast-acting 30 segment LED is also supplied for flawless visual metering of levels both in dBu and dBfs mode. Communicate with the artist via talkback. Send a headphone mix to the artist while listening to the main mix in the control room and more. The Central Station brings all of your inputs and outputs together to work in harmony to deliver a powerful and affordable solution for Digital Performer that will enhance the creative process and ease mixing and music production.

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By Larry the O

Question Reality

My friend Dian Langlois has a classical-music recording client who, as with most classical artists I know, is interested in obtaining a pure and natural sound that's as close as possible to reality. He has discouraged Langlois from using EQ, reverb, and other "artificial" processing—thereby constraining her from achieving the very sound that he is looking for.

In the best of all worlds, the most natural sound is also the most pure and accurate, but sometimes the recorded sound needs help to sound right. Langlois's client's most recent recording date had been a concert performance hampered by poor acoustics, ambient noise, and audience noise, forcing her to close-mic the small strings-and-piano ensemble. If she hadn't done so, the sound would certainly have been accurate, but it wouldn't have been as pretty as it would had the ensemble been recorded in a better environment.

Many acoustic instruments are composed of multiple mechanical, acoustic systems whose individual sounds are intended to mix in the air, along with the room's reverb, before reaching the listener's ear. When you tight-mic an acoustic instrument, you lose that balance of elements and the possibility of a pure, natural sound as one would hear it sitting in the room. If you want a natural sound, you must perform some strategic processing to compensate.

Whoa! Did I say that sometimes you have to process sound to make it more natural? Now *that* is a dangerous concept. But it is so.

"Natural" in this case means a perceptual, more than measurable attribute. For the sound to be heard as natural, it must fit the listener's expectation of what it should sound like, given the specifics of the recording. A natural sound is attained not by providing a strictly documentary recording, but by meeting listeners' expectations.

Of course, exploiting the listener's sonic expectations is the essence of film, TV, and game sound design and editing. Even documentary movies often supplement or re-create sounds to make the soundtrack more believable.

For her recording to sound natural, Langlois needs to re-create the direct-to-reverberant ratio lost when the mics were set up close, and adding reverb is the way to accomplish that. She has to apply EQ to restore the proper tonal balance to the strings. She may even need to compress the signal, since close-miked instruments are more dynamically unruly.

Before we get too carried away, now is a good time to note that processing can make the sound more natural *in the right hands.* It is also possible to create a sonic embarrassment of tragicomic proportions if processing is applied indiscriminately or inappropriately.

Langlois's live-performance recording was continuous. Would it be most natural to leave the several minutes of readjustment by the players between pieces in the final CD? Generally, this is looked upon as a boorish practice, which brings us neatly to where the proverbial rubber meets that lonesome road in terms of reality versus expectations. Leaving the adjustment periods in the recording may indeed be the most accurate choice in a documentary sense, but taking them out better satisfies the sensation of an excellent classical concert. So now we set upon perhaps the slipperiest slope of all: editing.

Of course, editing is nothing new to the recording process in any genre of music. Glenn Gould, Miles Davis, and Frank Zappa were all razor freaks. But editing is also commonplace in more "traditional" orchestral recordings intended to sound natural.

Those who know me will be surprised to hear that I encourage moderation in applying processing and in editing, but I mean only that sonic repair and enhancement in delicate situations should be taken slowly, evaluating each change carefully. Having done so, however, if the situation calls for constructive extremism, by all means, go for it.

Naturalness and documentary accuracy can easily differ. Editing and applying processing is a tricky business, but the tools are there to meet these needs and can meet them excellently when used judiciously.

Last year, Langlois played her client a version of the recording enhanced with a bit of reverb and editing. The client was thrilled, demonstrating once again the reality that, in the end, the proof is always in the hearing.

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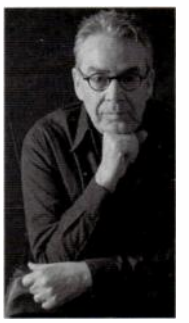
Digital Performer in the Movies

The Lord of the Rings Motion Picture Trilogy (New Line Cinema)

Howard Shore
Composer



"For me, film scoring is a combination of tradition and technology. I write my initial sketches with pencil and paper, but filmmaking today involves a digital world with frequent editing changes. Whether I need to tighten sync on a shot, or conform my original sketch to the latest version of picture, Digital Performer gets me there. At my desk and on the scoring stage, DP is there."

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Lord of the Rings: The Two Towers "Gollum" Digital Performer project courtesy of Howard Shore / Prince in New York Music and New Line Cinema.