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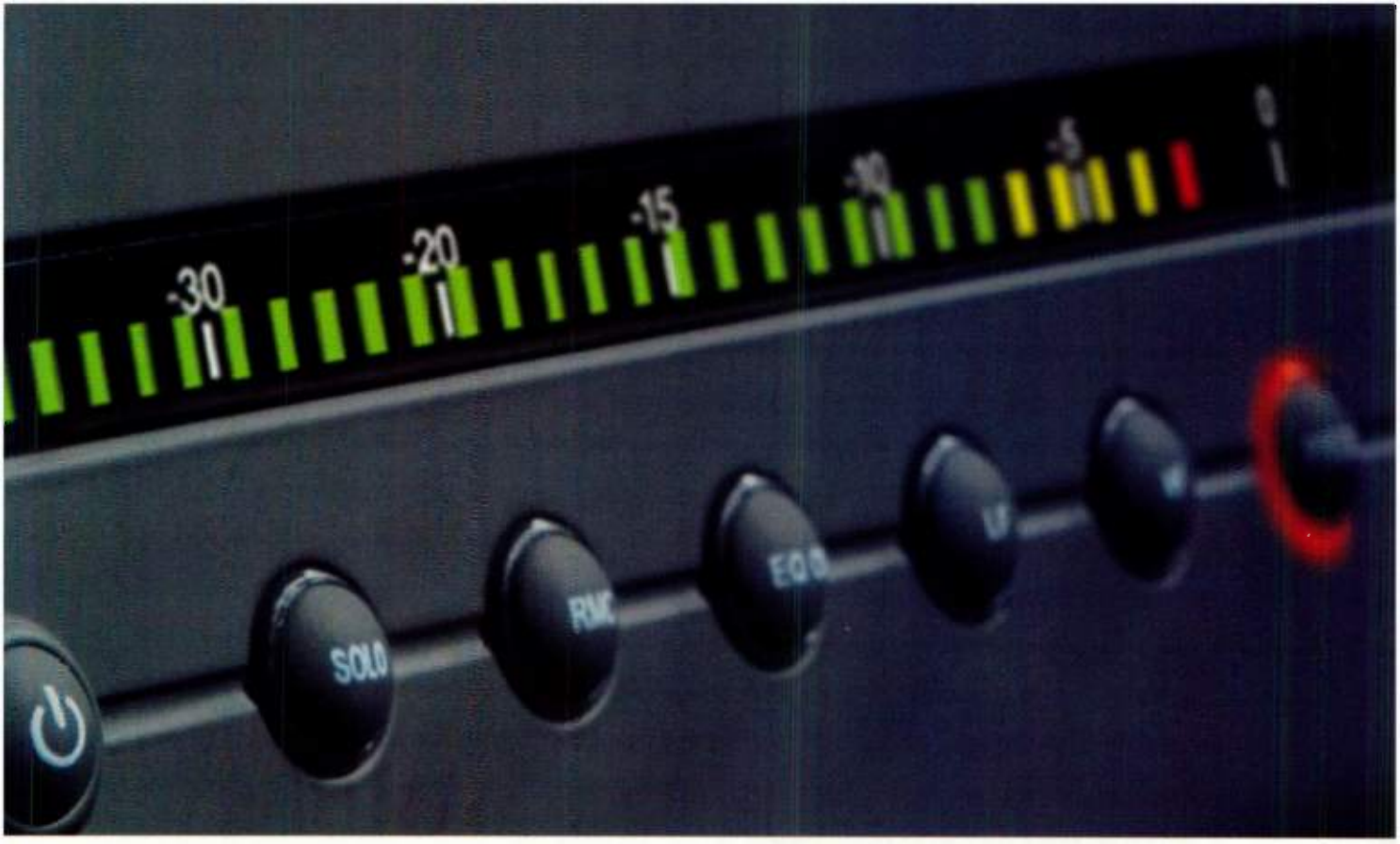

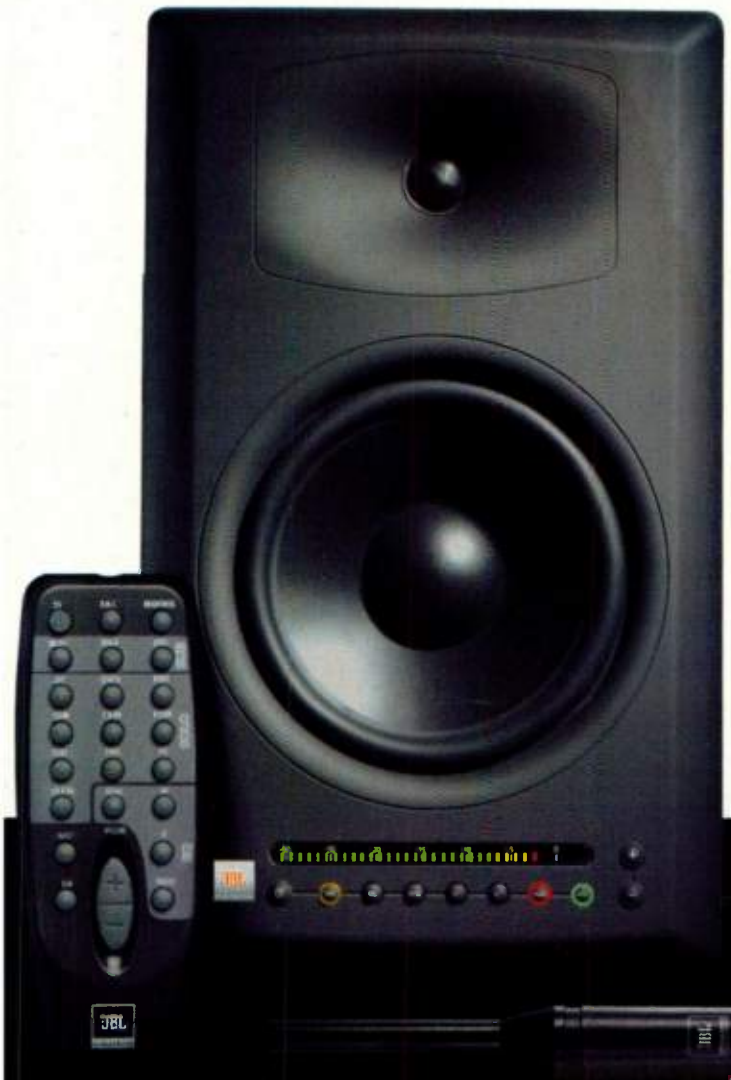

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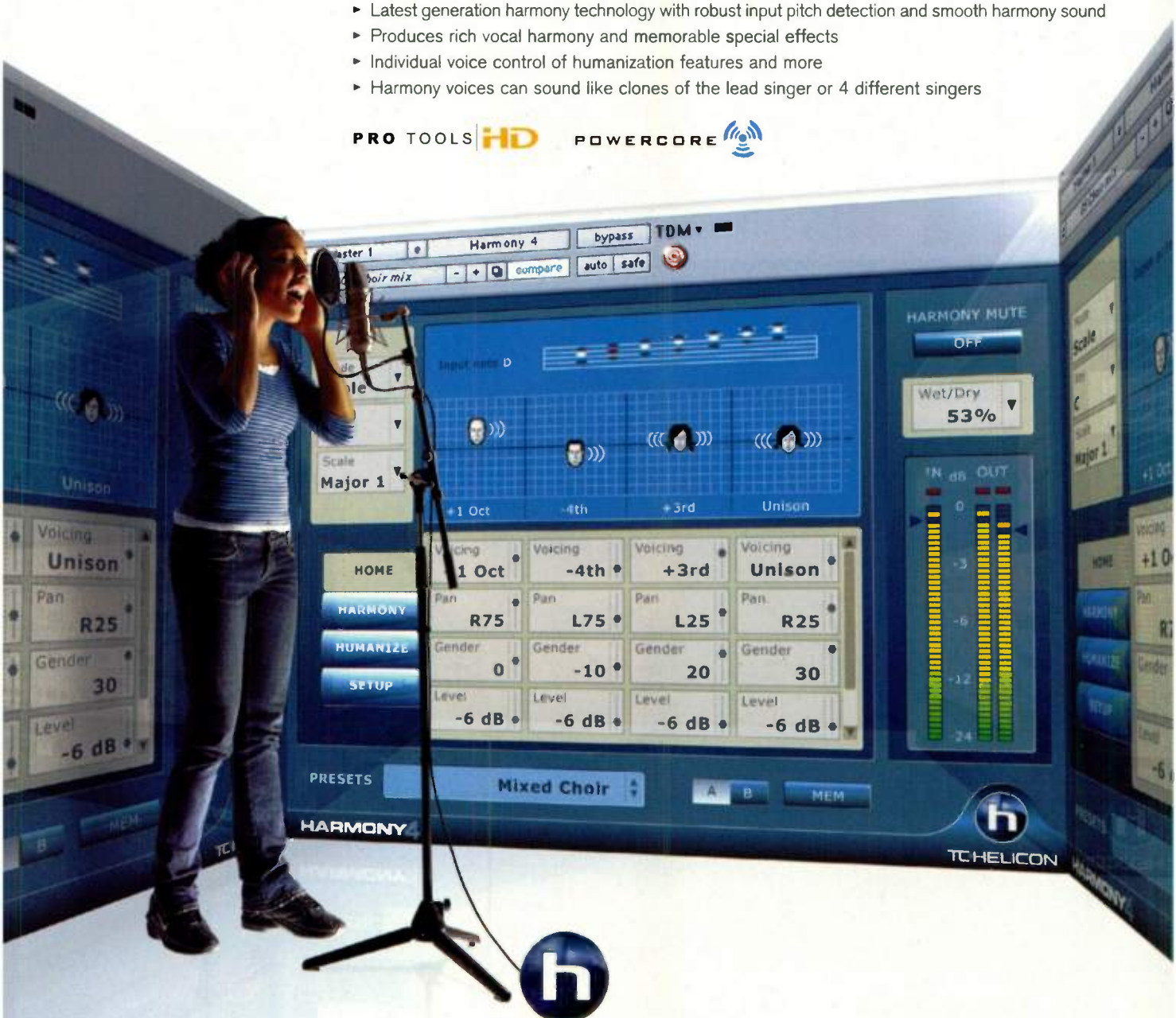

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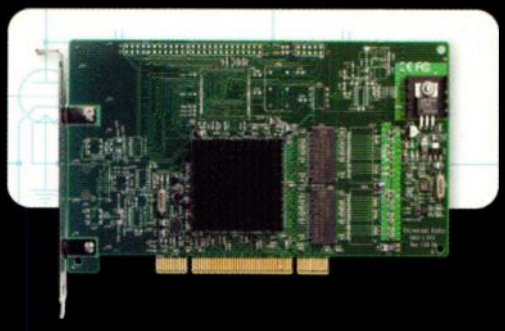

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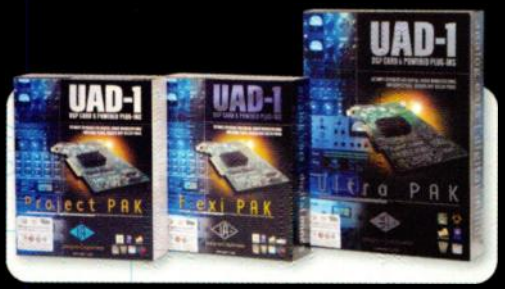

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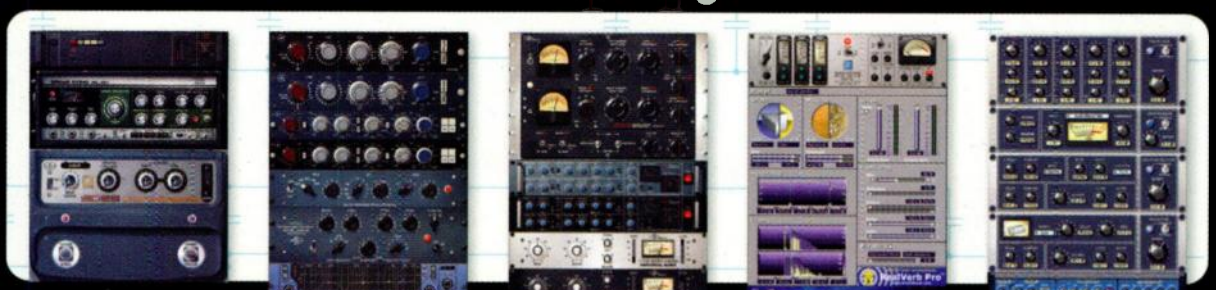

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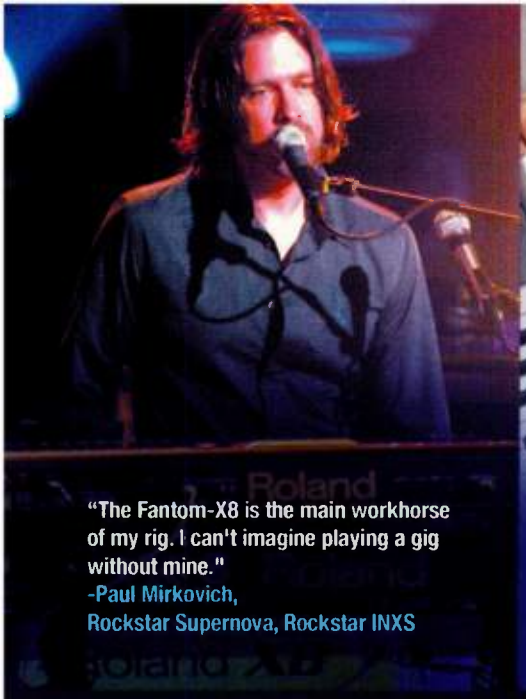

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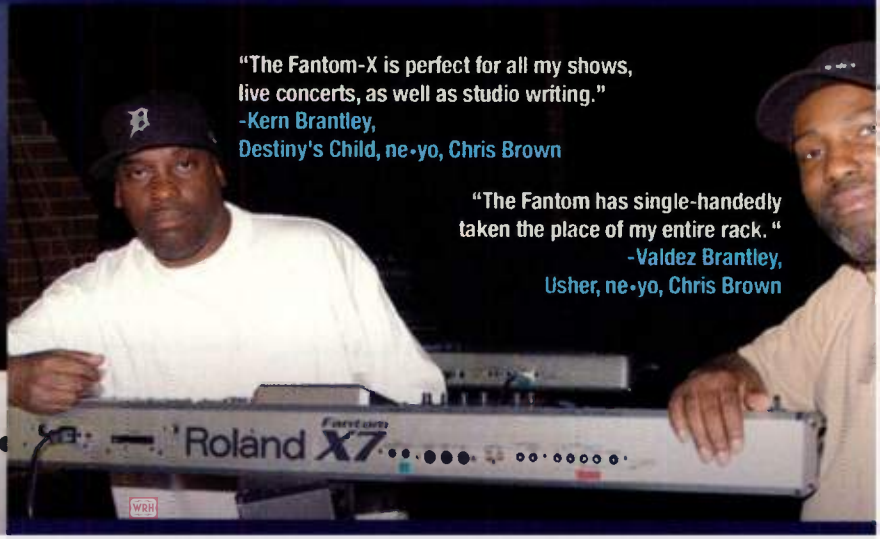

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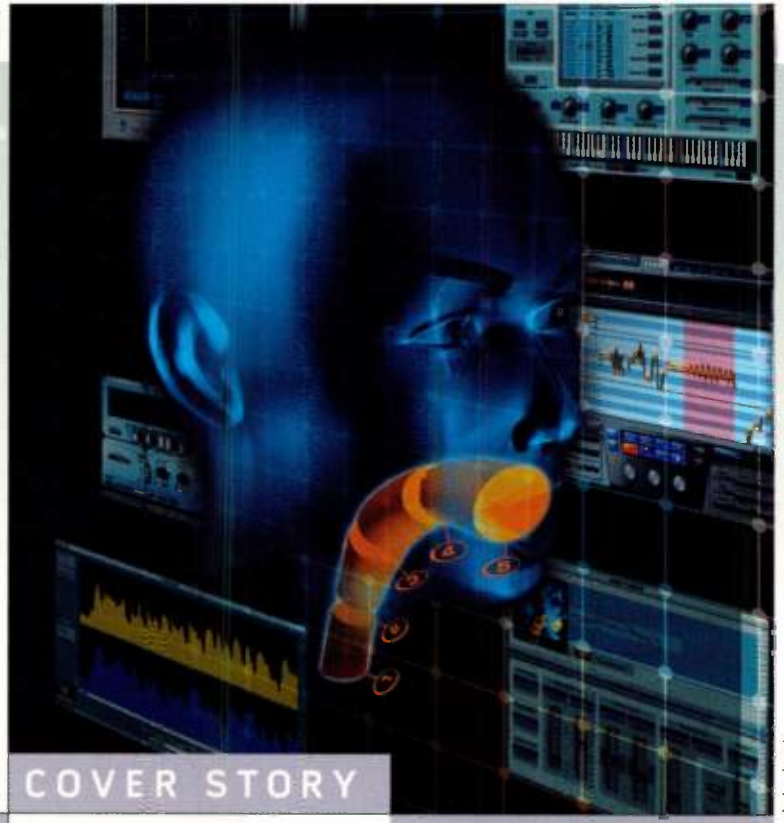

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Avant Electronics Avantone CR-14 ribbon microphone

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The Final Mix

The January 1998 issue was my first as editor of EM after ten years of working in other editorial positions at the magazine. One of my first decisions was to initiate a new opinion column by a freelance author that would appear on the back page and serve as a "bookend" to my "Front Page" (later renamed "First Take") column. Although I had a few possible columnists in mind, I had not yet selected one for the job.

So I called an editorial staff meeting and presented the qualifications I was looking for in an opinion columnist. I wanted someone whose writing was familiar to EM readers. We needed a musician who had produced and engineered a wide variety of projects. He or she should be an industry veteran who knew the business from the inside yet understood the problems and pleasures of personal-studio ownership. And, of great importance, I wanted a writer who wasn't afraid to express strong opinions but understood our responsibilities as the voice of, and information source for, personal-studio owners.

JULIE BIRUM

That was a tall order, but the staff had a simple and unanimous answer: it had to be Larry the O. There was no doubt in my mind that Larry would do a great job, and we work together very well, so that part was no problem. "But," I pointed out, "Larry is my brother. What about charges of nepotism?" That was not an issue, the editors insisted, because Larry had written for EM long before I was on the staff. In fact, he introduced me to the company. I took the idea and my concern about nepotism to then-publisher John Pledger, who had only one question: "Can you afford him?" Yes, Larry was willing to accept my financial terms.

So the "Final Mix" column was launched in the February 1998 issue of EM. And it has appeared monthly on the back page of our magazine ever since. Until now.

That's right, dear readers, the October issue of EM contained the final "Final Mix" column. After an eight-and-a-half-year run, we've decided to let the column go to make room for some new and different columns that I will announce in the near future. Larry will, however, continue to write for the magazine when his time permits, as he has since 1986.

The "Final Mix" column has been very well received over the years, so we did not make this decision lightly. In fact, we wrestled with it for well over a year. But we want to do new things, and given that magazine space is limited, we had to make sacrifices. We think that you will be pleased with the new columns when we are ready to unveil them.

So here's a hearty and most grateful thank-you to my brother and best friend, Larry the O, for his many words of wisdom in "Final Mix." He did a great job, and I will make sure that he continues to contribute to our pages as often as possible. And in case you missed any of his "Final Mix" columns, you can read all those that were published between September 1999 and October 2006 for free in the article archives on our Web site at www.emusician.com.

Steve Oppenheimer
Editor in Chief

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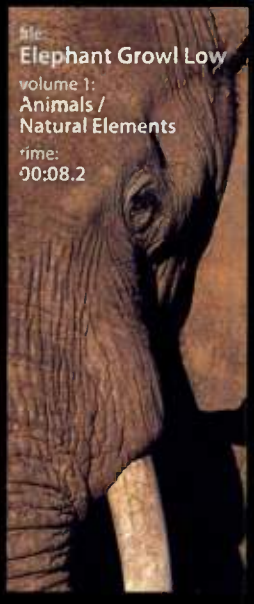

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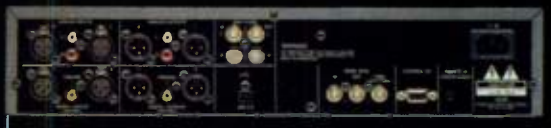
Easy transfer to computer. The DV-RA1000 creates UDF discs, a standard format read by Mac®, Windows® and Linux computers. Or you can stream your data directly via the DV-RA1000's USB 2.0 port.

DSD 2.822 MHz	1-bit	109 min.
192 kHz	24-bit	66 min.
172.4 kHz	24-bit	66 min.
96 kHz	24-bit	72 min
88.2 kHz	24-bit	133 min.
48 kHz	24-bit	267 min.
44.1 kHz	24-bit	290 min.

Mastering from any source. We have nothing against DAT and CD-RW recorders — TASCAM makes some of the best — but these formats simply cannot compare to the sonic quality of the DV-RA1000's 192 kHz/24-bit or DSD recording formats.

Get the details of this major recording advancement on our web site or visit your TASCAM dealer today.



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- Headphone output
- Supports UDF disk format for cross platform computer compatibility
- Wired remote control

TASCAM

25 YEARS

* CD recording is at 44.1 kHz/16-bit (Red Book spec) only.

The use of fatuous witticisms in our fine print has been temporarily suspended due to the Seriousness of this product. ©2005 TASCAM. All Rights Reserved. All specifications are subject to change without notice. All trademarks herein are the property of their respective holders.

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LAURA WILLIAMS

Letters

Peeved

I am writing with regard to the exchange about energy payback with photovoltaic (PV) cells (see the letter "Key Words" in the September 2006 issue of EM). Professor Grimes is selling an invention, and he either didn't work out the math behind his assertion or hoped that no one would notice. Let's work out how long it takes to generate 5 gigajoules with a PV module.

We'll start with an Evergreen P190, which produces 190 watts in full sunlight. It is 1.591 meters long and 0.951 meters wide (or about 1.5 square meters) giving 125 watts per square meter. For those who don't know about metric energy measurements, a joule is an amount of energy, and a watt is a rate of consumption equal to one joule per second. Our PV module will deliver 450,000 joules every hour, so it will take 11,111 hours to pay back those 5 gigajoules. The number of years of operation required to get those 11,111 full-power hours depends on local conditions. In the southern desert, which averages about eight hours per day of full sun, it takes less than four years. In parts of the country where the weather isn't as bright, it might take twice as long. It's hard to argue that there's a negative payback with those numbers.

But that 5 gigajoules number is suspect, too. It likely comes from the paper "Energy Pay-Back Time of Photovoltaic Energy Systems: Present Status and Future Prospects" (www.chem.uu.nl/nws/www/publica/98053.htm). More recent work by Alsema, cited in "What Is the Energy Payback for PV?" (www.nrel.gov/ncpv/energy_payback.html), indicates that the energy cost is closer to 2.2 gigajoules per square meter for single crystal substrate (rejects from the semiconductor industry) and 1.5 gigajoules per square meter for multicrystalline substrate.

Why would Grimes overstate the energy costs, and then make wild claims about the energy payback? Simple. He is backing thin-film photovoltaics, which don't actually work right now, but his idea might solve some of their problems. They have a long way to go—the work reported in the *Science Daily* and the *EE Times* has gotten to only 3 percent conversion efficiency compared with the 12.5 percent common with Si-crystal PV cells. They fall far short of the 20 percent that Grimes hypes in the articles.

What's the bottom line? First, current PV cells are cost effective and have a substantial positive energy payback. Second, if one is going to republish press-release puffery from trade publications, it's a good idea to dig deeper into the validity of the claims before risking your credibility. Third, interesting as developments in PV technology are, what the heck does it have to do with music?

John Ralls
via email

Contributing editor Scott Wilkinson replies: John—To answer your last question first, in an era when fossil fuels are becoming more expensive and harder to obtain, any new source of electric power is relevant to electronic musicians. In particular, new solar-power technology of the type I described could become important for field recording and performing in situations where conventional power is unavailable, such as certain outdoor gigs.

"Tech Page" articles are never based on "press-release puffery." I rely on sources such as Scientific American, *which is hardly a puff publication. I don't recall the source for the specific article mentioned here, but I assure you it was not a press release.*

As for the numbers cited in the article, I did accept Grimes's figures at face value. "Tech Page" is, after all, only a brief report on interesting new technologies that are not yet generally available. I'm glad you've taken the time to dig deeper into it.

Show Me an Example

I had been looking forward to Fran Vincent's article "Show Me Your License" ever since I got a hint from Steve Oppenheimer in February that the topic would be covered in a future issue (see "Working Musician" in the September 2006 issue of EM). I have been arranging for big band and orchestra for over 25 years and have always hit stumbling blocks when trying to get a special-arrangement print license to sell my arrangements.

I have always wished the procedure was as easy as procuring a mechanical license to put a cover song on CD. In that case, all one must do is contact the Harry Fox Agency and pay the appropriate fees, as stated in Ms. Vincent's article. Getting special permission for a print license, however, is not as easy and must be done through the music or print publisher. Further, for reasons unknown, those entities do not seem willing to cooperate.

Fast Forward

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Next Month in EM

COVER

Recording Acoustic Guitar

Engineers share their observations on recording acoustic guitar in various genres. Topics include mixing, miking, and signal-processing techniques.

FEATURES

Recording Electric Guitar Direct

EM looks at recording electric guitar direct using SansAmp and Line 6 interfaces with guitar inputs, Waves GTR, and more.

Monitoring for Success

Grammy-winning engineer Charles Dye shares tips for successful monitoring, including monitor choice and positioning, volume levels, and keeping your perspective during a session.

COLUMNS

Making Tracks: *Creating Convincing Synthesizer Bass Lines*

Make your synth bass lines sound fabulous with these handy tips.

Sound Design Workshop: *Programming Killer Synth Bass Sounds*

Learn to program great electronic bass sounds for several genres, including hip-hop, dance, and pop.

Square One: *The Secret Life of a Sampler, Part 1*

EM explores the components of a modern software sampler and discusses some advantages and disadvantages of using sampling to emulate the sound of acoustic instruments.

. . . and much more

Letters

This is my current method for attempting to get a print license:

1. Go to the U.S. Copyright Office's Web site (www.copyright.gov) and search for the song I want to arrange and sell as score and parts.
2. Determine the current publisher of the song.
3. Search for information on the Web about the publisher, Web site, and so on.
4. Contact the publisher to request permission to sell my arrangement/orchestration.
5. Wait for an eternity for nothing to happen.

There must be a better way of doing this. I would have liked to see an example of the steps needed to get a print license for a popular standard song similar to EM's step-by-step articles on topics such as "tweaking your digital delay." I hope that a future article will cover the topic in greater detail. "Show Me Your License" is, however, a great start.

Michael Zavoski
via email

Universal Updates

I'm writing with regard to Bob LeVitus's article "Should You Buy an Intel Mac?" in the September 2006 issue of EM. For the record, Symbolic Sound's Kyma software has been available as a Universal Binary since March 13, 2006, and was running well under Rosetta before that. This information was announced in press releases on April 6, 2006, and was reported in EM's eMusician Xtra newsletter (as well as online at Harmony Central, Sonic State, and other sites). The Universal Binary version was made available to our customers as a free update.

Carla Scaletti
President,
Symbolic Sound Corporation

Bob LeVitus's article on Intel Macs was thoughtful and insightful. One point the author mentions is that there is much software still in the process of being upgraded by software companies.

I've discovered the hard way that although you may purchase the PowerPC software versions now, there may be no free upgrade for some of those products. Take, for example, Native Instruments' current Komplete 3 plug-in package that integrates beautifully with Kore on a PowerPC machine. I purchased Komplete 3 and NI Kore recently, only to discover that the plug-in products were PowerPC based and would not run in Kore on an Intel Mac. The manufacturer charges $29 per plug-in update. When you have a product like Komplete 3 that runs around 13 plug-ins, the updates become quite expensive. NI has a Komplete Care 2006 package that covers the "free" Universal Binary updates for about $300. Why should anyone want to pay for that type of update because they cannot use the current plug-ins straight out of the box on an Intel-based machine?

Peter Buchta
Prince's Bay, New York

An Oldie but a Goodie

I just wanted to say that I still enjoy reading the article "Build a Desktop Studio on Any Budget" (see the July 2005 issue of EM). I appreciate your willingness to stand up for—and against—certain manufacturers. I hope your desktop article will be updated soon, because many different ideas and products are always coming onto the market.

John C. Tiller
via email EM

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The new Studiophile **BX10s** subwoofer delivers innovative features such as a footswitch function so you can easily A/B your mixes with and without the sub–no more fumbling around under your desk. With 240 watts of power and an active crossover, it delivers accurate bass you can really feel. The **BX10s** is designed to work with the critically acclaimed Studiophile **BX5a** and **BX8a** active bi-amped reference monitors, among the best selling monitors in the industry. If you're looking for a monitoring system that tells it like it is–and really kicks it in the low end–M-Audio's BX line has you covered from top to bottom.

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BX5a

- 70 watts
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- 5" Kevlar LF driver
- 1" natural silk HF driver

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EMspotlight

Java Fuels Doctor Nerve

Since 1989, composer-guitarist-programmer Nick Didkovsky has used algorithmic techniques to create complex, driving scores for live ensembles, including his rock band Doctor Nerve. In this interview, Didkovsky talks about composing with JMSL (Java Music Specification Language) and the notational functions he added to the program to complete his composition *Slim in Beaten Dreamers* for the Meridian Arts Ensemble brass quintet. By Gino Robair. emusician.com/em_spotlight

On the Home Page

EM Web Clips

A collection of supplemental audio, video, text, graphics, and MIDI files that provides examples of techniques and products discussed in the pages of *Electronic Musician*.

EM Guides Online

Get detailed specs on thousands of music-production products with our free online Computer Music Product Guide and Personal Studio Buyer's Guide.

EM Show Report

The Audio Engineering Society (AES) convention is one of the largest annual pro-audio expos in the United States. Visit emusician.com for an exclusive look at the new recording gear and music software unveiled at this year's show.

EM get on the bus

The Bus is the exciting new blog by EM editors Steve Oppenheimer, Mike Levine, Gino Robair, and Geary Yelton. Found exclusively on emusician.com, the Bus will include tips and tricks on a variety of recording topics, cover the latest technologies and industry trends, and offer a behind-the-scenes look at trade shows, product demos, and the creation of *Electronic Musician* magazine.

http://blog.emusician.com/the_bus

EM news

A weekly update on new hardware and software releases, manufacturer contests, and pertinent industry news.

emusician.com/news

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Sign up for our free online newsletter, eMusician Xtra, for up-to-the-minute information about new products, software upgrades, and more.

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By Geary Yelton

Digidesign Strike

Following up on the successful launch of the synthesizer plug-ins Xpand and Hybrid, the Advanced Instrument Research group of Digidesign (www.digidesign.com) has begun shipping a virtual drummer for all versions of Pro Tools 7 and later. Strike (Mac/Win, $299) is an RTAS plug-in that lets you create and control realistic drum performances. By combining an intelligent, humanized virtual player with a selection of high-definition, multimiked drum kits recorded on an acoustically optimized stage, Strike delivers the sound and feel of a world-class studio drummer.

According to Digidesign, Strike's proprietary performance engine eradicates the mechanical artifacts often associated with sample-based drums. The plug-in gives you total real-time control of the drummer's complexity, intensity, timing, dynamics, and groove. Take advantage of Pro Tools' automation features and make adjustments on the fly with MIDI controllers. Use the onboard Style Editor to create custom variations of more than 1,500 preset patterns. Strike features five high-resolution drum kits—each assembled from a dozen drum sounds, and with 3-band EQ and two insert effects per channel.

CME Bitstream 3x

In cooperation with French audio-product designer Wave Idea, CME Professional (www.cme-pro.com) is now shipping a 3-axis control surface called the Bitstream 3x ($399). Featuring 35 knobs, 8 sliders, 16 buttons, a joystick, a crossfader, and an infrared controller—all user programmable—the Bitstream 3x is a multipurpose device that functions as a DAW controller, an arpeggiator, an 8-track motion sampler, and more. Why 3-axis? Because you can simultaneously control the *x*-axis and *y*-axis with the joystick and the *z*-axis with the infrared beam.

The Bitstream 3x comes with more than 13,000 presets that give you immediate hands-on control of popular synths, samplers, and software such as Propellerhead Reason, Ableton Live, and Steinberg Cubase. The included configuration software (Mac/Win/Linux) lets you graphically access the user-programmable mode. With 100 scene memories to instantly call up saved configurations, the Bitstream 3x's unique automation capabilities can enhance your work flow onstage or in the studio. Additional features include USB power, four MIDI ports, a 128 × 64–pixel LCD, a Sync-24 output, and an assignable footswitch jack. And if you're among the first 999 people to register your Bitstream 3x, you'll receive a free aluminum road case.

Native Instruments Audio Kontrol 1

Just to prove that Native Instruments (www.native-instruments.com) is deadly serious about building innovative hardware (and serious about its long-standing association with the letter *k*), the company has unveiled its first dedicated audio interface. The Audio Kontrol 1 ($299) is a compact, portable device that has Cirrus Logic A/D/A converters and supports 24-bit, 192 kHz sound. Its third-generation USB 2.0 driver technology ensures latency as low as 4 ms for Windows- and Mac-based audio applications. Housed in a solid aluminum enclosure, the 2-in, 4-out Audio Kontrol 1 is completely bus powered and designed for many types of studio and mobile recording scenarios.

On the unit's top panel are three assignable buttons and a controller knob that give you hands-on control of software parameters. The rear panel has four TRS outputs, MIDI In and Out ports, a button for 48V phantom power, and the USB 2.0 port. The front panel has a TRS/XLR combo input with a mic/line-level button, a TRS input with a button to enable high-impedance operation, a ¼-inch headphone output, and buttons and knobs for changing inputs, outputs, monitoring, and levels. Bundled with the Audio Kontrol 1 is a software suite that includes Xpress Keyboards, Guitar Combos, and Traktor 3 LE.

Hi Five!

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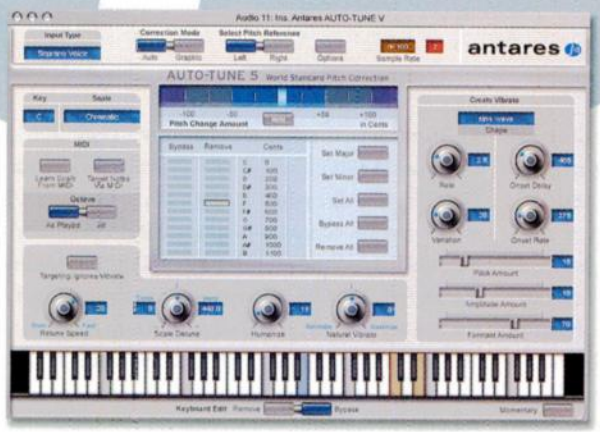

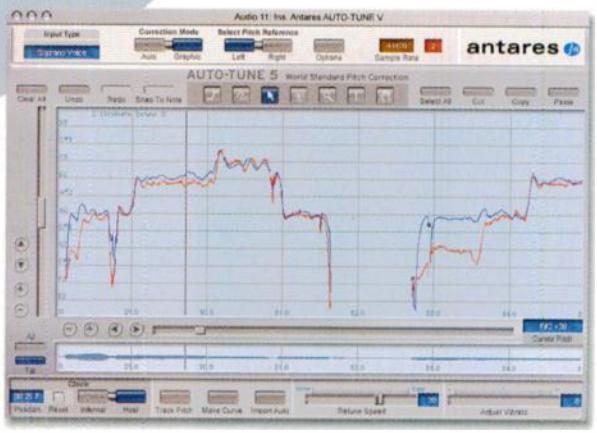

Once again, Antares raises the bar. (Unless, of course, it's sharp. In which case we lower it.)

FOR NEARLY A DECADE, AUTO-TUNE has stood alone as the overwhelming tool of choice for professional pitch correction. Combining transparent processing and superb audio quality with a clear, easy-to-use interface designed to let you get the job done with a minimum of hassle, Auto-Tune is used daily in thousands of studios around the world to save editing time, ease the frustration of endless retakes, save that otherwise once-in-a-lifetime performance, or create unique special effects.

Now, with Auto-Tune 5, we have once again raised the bar. Featuring even better pitch detection, a slick new interface, and a host of productivity enhancements, Auto-Tune 5 is the best sounding, easiest-to-use pitch correction tool in the history of the (known) universe.

Key New Auto-Tune 5 Features Include:

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Auto-Tune 5 is available in TDM and Native formats for Mac OS X and Windows XP. Upgrades are available for registered Auto-Tune owners.* Check it out at your local Antares dealer or come to our website for more details and a fully functional 10 day trial version.

*If you purchase any version of Auto-Tune 4 after September 15, 2006, you will be entitled to a free upgrade to Auto-Tune 5. See our web site for details.

antares

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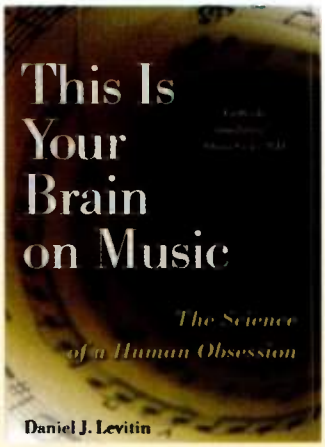
Sample Logic A.I.R.

Brooklyn-based startup company Sample Logic (www.samplelogic.com) has released A.I.R. (Mac/Win, $299)—one of the first virtual instruments to incorporate Native Instruments Kontakt Player 2. A.I.R., which stands for Ambience, Impacts, and Rhythms, draws on a 6 GB sample library. This outstanding collection furnishes more than 300 original ambient instruments, 300 rhythmic loops, and 100 percussion hits and kits. Most instruments feature a choice of key ranges and transposition, and the loops have adjustable tempos that automatically sync to your host application.

A.I.R. organizes its sounds by genre, timbre, and mood. Within each of the four main groups—Ambience, Impacts, Rhythms, and Combination Platters—are subcategories ranging from Blissful, Ethnic, and Sacred to Frightening, Metallic, and Piercing. A.I.R. is well suited to many styles of music, and its evocative atmospheres make it an excellent choice for soundtrack composition. Because it's built on Kontakt Player 2, it affords all the advantages that platform has to offer, including full MIDI automation, 64 simultaneous parts, standalone operation, and compatibility with AU, DXi, RTAS, and VST plug-in formats.

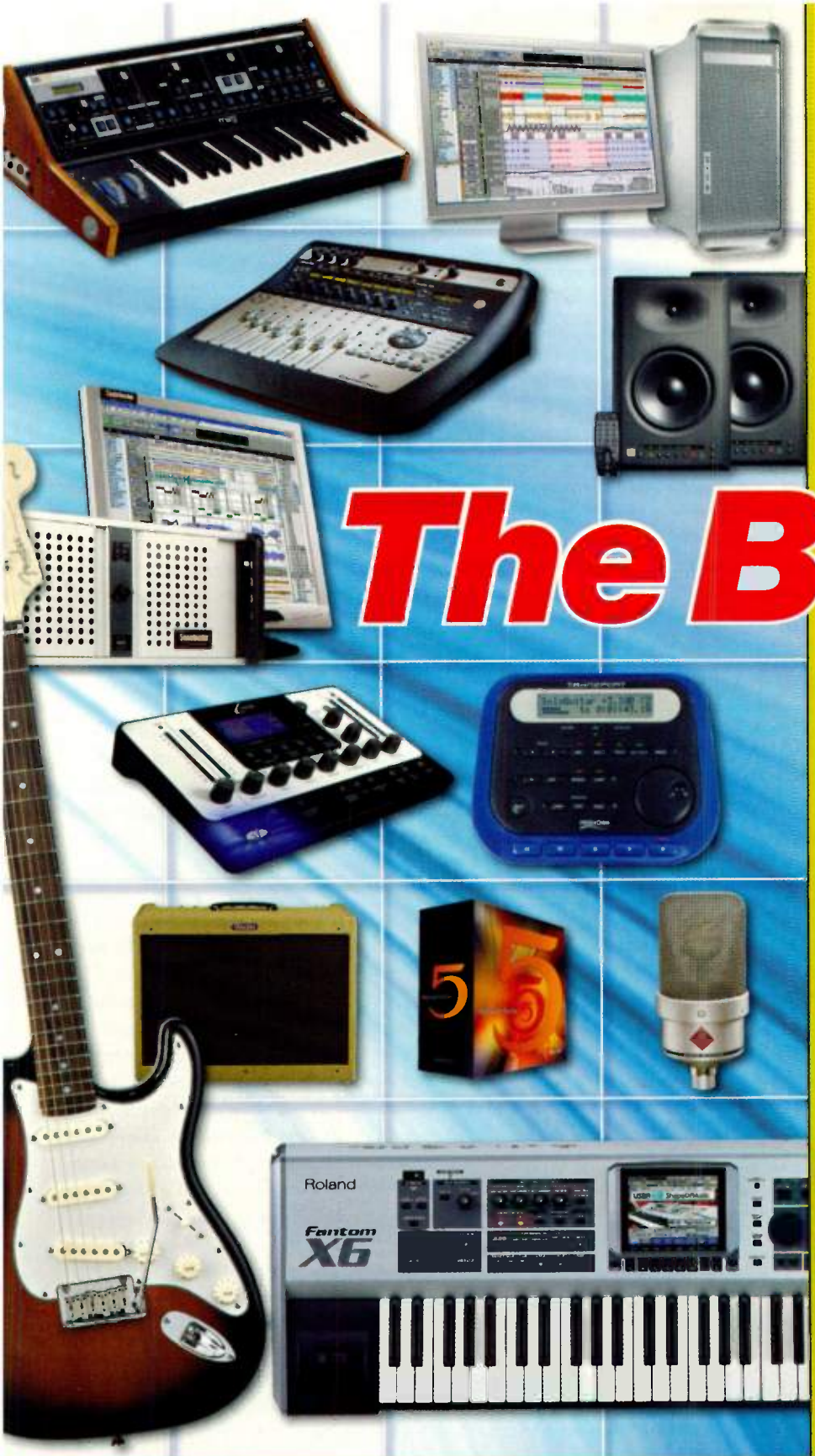
Get Smart



Author Daniel J. Levitin is an award-winning engineer and producer, an accomplished musician and composer, a former EM author, and an associate professor of psychology, neuroscience, and music at McGill University. His roster of achievements in cognitive science and the music industry make him uniquely qualified on the subject of musical perception. Is music instinctual? Is talent acquired, or are you born with it? Have portions of the human brain evolved with regard to creating and listening to music? Do successful composers exploit the way our brains are organized? Levitin's book *This Is Your Brain on Music: The Science of a Human Obsession* ($24.95) examines the latest research to present a comprehensive description of how humans experience music and its role in our lives. Beginning with pitch and rhythm and progressing to explanations of how the brain processes musical information, Levitin argues that music may be more fundamental than language. The 314-page hardbound book is published by **Dutton**, an imprint of the Penguin Group (www.penguin.com).

If you use Apple Logic Pro, you probably recognize the potential of Sculpture, a powerful synth plug-in that physically models strings and bars of nylon, wood, steel, and glass. To help you master its use, **MacProVideo.com** has published a 135-minute tutorial DVD entitled *Logic 205: Synthesis with Sculpture* ($39.50), which is also available as a direct download ($35.55). The disc supports standard video for DVD players, and either version supports high-resolution video for Windows and Mac OS X using the proprietary application Nonlinear Educating Device (NED). In 23 lessons presented by certified Apple instructor Steve Horelick, you'll advance from the basics to designing timbres from scratch. Topics range from modulation generators and control envelopes to customizing tools and morphing sounds. In addition, registering on the MacProVideo.com Web site authorizes you to download free tutorials.

In *Acoustic Design for the Home Studio* ($19.99), Mitch Gallagher plunges into a subject that concerns anyone who records audio at home. He identifies room acoustics as the weakest link in most home studios and offers simple and often inexpensive solutions for upgrading your recording environment. The 246-page book, published by **Thomson Course Technology PTR** (www.courseptr.com), begins by explaining essential acoustic principles and quickly progresses to problem solving: how to analyze a potential studio space, control reflections and standing waves, and maximize isolation. The book's Studio Gallery section gives detailed recommendations for treating four types of rooms: a bedroom, a basement, a detached home office, and a bonus room above a garage.



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TC-Helicon Harmony4

Voice-modeling pioneer TC-Helicon (www.tc-helicon.com) has announced the availability of Harmony4 (Mac/Win; $745 for PowerCore, $995 for TDM), a plug-in that adds vocal harmonies to existing voice tracks. Borrowing algorithms from VoicePro, VoiceLive, and VoiceWorks hardware, Harmony4 can generate from one to four voices in a single pass, each with individual gender, vibrato, and other timbral characteristics that promise to breathe life into its virtual singers.

You can select a key and a scale for harmonies that use fast and accurate pitch recognition to automatically follow your melody, or you can enter MIDI chords in real time to complement a lead vocal. Harmony4's user interface makes it easy to create parts that sound like different singers or like overdubs of the same singer. A visualization area displays faces showing each voice's gender, pan position, volume level, and pitch-shift interval. The Humanize tab accesses controls for style, portamento, randomization, scoop, and other parameters.

Download of the Month

KARMAFX SYNTH (WIN)

If you're curious about modular synths but all those knobs and wires leave you reluctant to dive in, KarmaFX Synth might be just the way to get your feet wet. Although it doesn't make patching your own sound a no-brainer, it does make it accessible and fun. KarmaFX Synth is a VSTi plug-in for Windows. It's the result of eight years of effort by programmer Kaspar Nielsen. It is donationware, meaning that you can download a free, fully functioning copy from his Web site (www.karmafx.dk). If you find it useful, a donation of $10 or more would be greatly appreciated.

You can create modules at will, drag them to any location on the synth's work surface, and connect them with cables by selecting source modules from drop-down contextual menus on the destination module. For control routings, the contextual menus are attached to knobs and sliders, whereas the audio-input menu is attached to the module's title bar. KarmaFX Synth's user interface incorporates a number of conveniences: collapsible module control panels, optional knob and slider animation in response to modulation, and a global panel with 32 assignable knobs (4 banks of 8). You can route each of the knobs to control multiple module parameters and assign them to external MIDI controllers. The global panel also manages preset loading and saving, and to save space, you can shrink the interface to display only the global panel.

Each synth module—Generator, Filter, Amplifier, Controller, Effect, and Modulator—is actually a placeholder for a class of processors. You use a drop-down menu in the module's title bar to select among processors from its class. For example, a Generator module can house an oscillator, a dual oscillator, a sample player, a noise source, or an external audio input, and a Modulator module can house a step sequencer, an LFO, an envelope generator, an envelope follower, or a MIDI-message generator. That arrangement makes for great flexibility and speed because you can patch together a basic structure and then swap in different processors for different sounds.

To get you started, KarmaFX Synth comes with two banks of 128 presets, conveniently categorized by sound type (see **Web Clip 1**). The presets sound great and make excellent starting points for your own experiments, which is always the best way to get a handle on do-it-yourself soft synths. So download KarmaFX Synth, call up some presets, and start swapping modules.

EM WEB CLIPS

—Len Sasso

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Ableton Live 6

Just out from Ableton (www.ableton.com) is an upgrade that's sure to put smiles on the faces of real-time audio sequencing fans. Live 6 (Mac/Win; $599 boxed, $499 download) adds loads of new features, such as drag-and-drop QuickTime video support, customizable instrument and effects racks, and a comprehensive library of multisampled instruments. Live 6 also answers user requests with better MIDI control, multicore and multiprocessor support, and project-management tools to improve your work flow.

Organize your Live Sets, clips, samples, presets, and movie files and archive them into project folders with the updated project-management tools. Deep Freeze conserves your computer resources by allowing you to cut, copy, paste, duplicate, and consolidate clips without thawing and refreezing. New and improved devices such as EQ Eight, Dynamic Tube, and Saturator expand Live's creative capabilities. Operator has additional FM algorithms and 24 dB filter modes.

The boxed version of Live 6 ships with the Essential Instrument Collection, a sample library developed by SoniVox (formerly Sonic Implants) that includes keyboards, guitar and bass, mallet percussion, and orchestral instruments. Upgrades from full versions of Live 1 through 5 are priced from $99 to $279.

Sonicprojects OP-X

Introduced in 1979, the OB-X was a legendary analog synthesizer and the first of Oberheim's OB series of pre-MIDI polysynths. Although it was the electronic inspiration for dozens of hits, the OB-X has never been emulated in software—until now. OP-X, a VST plug-in (Win, $99) and a Reaktor 5 Ensemble (Mac/Win, $49), is the first software offering from Swiss developer Sonicprojects (www.sonicprojects.ch). Both versions duplicate every function and control of the Oberheim OB-X, rev. 2.

OP-X digitally re-creates the analog oscillator waveforms, SEM filters, ADSR generators, polymod, and every parameter of the original. It adds a second LFO, new modulation routings, a step sequencer, and an arpeggiator. To duplicate analog circuit behavior, OP-X introduces differences in the OB-X's six voice boards and provides four global buttons to detune the oscillators, envelopes, filters, and portamento times. All controls support sequencer automation and MIDI remote control. For demos and audio clips, visit Sonicprojects' site.

RME Fireface 400

Now shipping from Synthax Audio (www.synthax.com) is the RME Fireface 400 ($1,199), a FireWire audio interface with a software-controlled internal mixer. The half-rack device has two premium mic preamps, SteadyClock active jitter control, extensive I/O capabilities, and a 648-channel matrix router with 42-bit internal resolution. Monitor as many as 9 independent submixes and route 18 input and playback channels to any of the 18 physical outputs, and then save your settings to internal flash memory. You'll have total control from your computer, from a MIDI controller, or from the unit's front panel.

The Fireface 400's small size belies its wealth of I/O options. It has two XLR/TRS combo inputs with 48V phantom power, four TRS line inputs, two switchable TRS line and instrument inputs, and six TRS outputs—all of them servo balanced. It also has Toslink ports with S/PDIF or ADAT Lightpipe I/O, coaxial AES/EBU-compatible S/PDIF I/O, 32-channel MIDI I/O, and a ¼-inch stereo headphone jack. A second FireWire port affords hub functionality, so you can connect additional Fireface 400s and 800s. The Fireface 400 is Mac and Windows compatible and supports 64-bit operation. EM

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Mind Reader

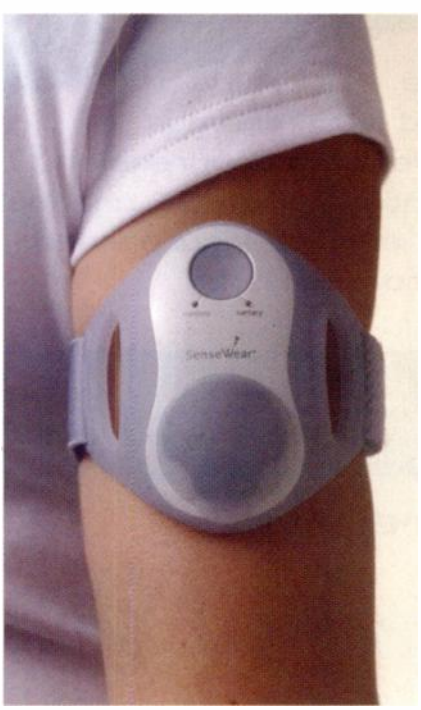
By Scott Wilkinson

A system that always selects the right tunes.

Mobile music players such as the Apple iPod have changed the face of our industry for good or ill, depending on who you talk to. But one thing's for sure—people love to listen to these devices during almost every activity, from exercising to relaxing and everything in between.

For users with rudimentary computer skills, the process of acquiring, encoding, and selecting a seemingly endless stream of content can be daunting. To simplify some of those issues, a team at the University of Maryland, Baltimore County (www.umbc.edu), is working on an interesting project called XPod that automates some of the interaction between the player and its user.

A key component in the system is a physiological sensor called the SenseWear from BodyMedia (www.bodymedia.com; see **Fig. 1**). This armband is designed to monitor a variety of parameters, such as skin temperature, heart rate, and galvanic skin response. Previous experiments have demonstrated that such data can be used to determine emotional states (such as sadness, anger, surprise, fear, frustration, and amusement) with a high degree of accuracy—typically in the 70 to 90 percent range.



COURTESY BODYMEDIA

FIG. 1: The team at UMBC uses the BodyMedia SenseWear armband to monitor the wearer's physiological state. This information is used to select the appropriate music for the current situation.

The SenseWear armband also has an accelerometer, which, as you might guess from the name, measures acceleration. That information is used to determine the user's level of activity: sitting, walking, running, and so on.

The XPod system "learns" the user's preferences, activities, and emotions and selects the most appropriate music to accompany any given situation. Using a client-server configuration, the server processes the incoming data from the SenseWear, combines that with the information entered by the user about what music they prefer under which conditions, and selects the tunes that would best fit the current situation.

The experimental setup includes a Windows laptop, which wirelessly receives the data from the SenseWear, executes all processing, stores all song data, and sends the selected songs to a PDA client that plays the music and provides the user interface. The laptop and PDA communicate via Wi-Fi, which also lets the user rate the music, skip to the next song, and otherwise control playback.

When the user presses Play, the server begins examining the data from the SenseWear. Using a series of algorithms, it determines the average and standard deviation of the incoming values and compares the results with predetermined ranges that correspond to active, passive, and resting states. Once the user's state is known, that information is passed to a neural-network engine, which compares the user's current state to states for which song preferences have been specified. Finally, it makes a musical selection and sends the data to the PDA.

Users can continually update the system by indicating their satisfaction with a given selection. That preference can be applied to the song being played as well as to the artist and genre as indicated by the song's metadata. The neural network learns the user's preferences by monitoring which songs are skipped under what conditions, eventually leading the system to skip songs it believes the user would skip anyway.

Initial experiments included monitoring several test subjects of different genders, ethnicities, and athletic abilities while the subjects were lying down, sitting at a desk, walking, and running. The values obtained during those trials allowed the UMBC team to develop algorithms that accurately determine any user's activity level.

This research is in its infancy, and the XPod currently selects music based on activity rather than emotion. Future versions could expand the selection criteria and become more sensitive to the user's state, automatically supplying just the right music for any situation. In addition, advances in miniaturization, such as those often featured in "Tech Page," will eventually allow the server to be incorporated into the player. Soon, mobile music players could truly provide the soundtrack for our lives. EM

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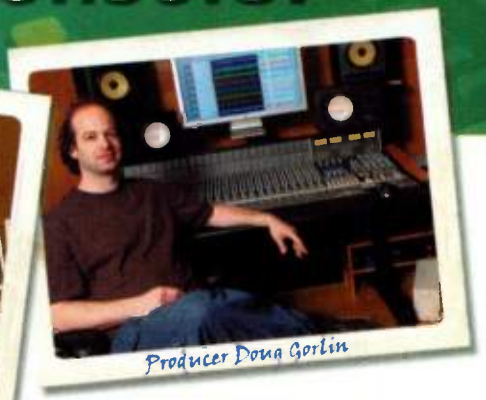
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LAURA WILLIAMS

Drum Replacement Primer

By Alec Tabak

How to salvage mediocre drum tracks.

Imagine that you have finished tracking your latest project, and the time has come to mix. You've got the vocals sounding clear and lively, the guitar and bass tones are just right, but no amount of processing makes the drums sound like you want them to. Although the drummer's performance was fine, you might be wishing you had captured it differently. Wouldn't it be great if you could change the drum sounds without rerecording the track?

Drum replacement, a technique that Roger Nichols pioneered in the studio with Steely Dan in the late '70s, has long helped engineers and producers fix problem drum tracks in pro studios (see the sidebar "Meet Wendel"). Drum replacement is invaluable when your original choice of drums and miking techniques leaves you with sounds that don't quite fit the final mix.

The idea of drum replacement is to double, or sometimes replace, a subpar drum track using a second track of high-quality samples. In this introduction, I'll show you how to replace kick and snare tracks manually, semiautomatically with MIDI, and with an automatic replacer plug-in. Although the kick and snare aren't the only replaceable drums in the kit, their sounds are often the most prominent in mixes: replacing these drums is often enough to bring the rest of a drum mix in line.

Like any fix-it-in-the-mix technique, drum replacement is more time-consuming than recording the instruments right the first time, and some problems are just too big for it.

Nonetheless, the following tools and techniques are worth learning to use, particularly if the physical limitations of your personal studio make drums tough to record well.

Replacement Done Right

A natural sound is the hallmark of successful drum replacement. No one who listens to your song should be able to tell you've replaced the drums. That means you must retain a part's groove and the dynamics of the drummer's performance. The simpler the drum part is dynamically and rhythmically, the easier drum replacement is to perform. However, even somewhat intricate parts may be replaced using the right tools and a little patience.

Your replacement track must blend seamlessly with the other tracks in your drum mix: each drum sample should sound like it was part of the drummer's original kit. The best way to do this is to combine the original and replacement drum audio in the final mix. This reinforcement approach preserves some of the leakage that is characteristic of live drum recording and often helps replacement tracks sound natural.

For the purpose of drum replacement, all drum sounds have two basic elements. First, there is the attack transient produced by the drummer's stick or bass drum beater striking the head. Second, a resonant tone with sustain and decay characteristics follows the transient. The volume peak can coincide with the transient or it can be part of the tone, depending on the type of drum, hit, and recording method.

The first step in drum replacement is choosing the right replacement sounds. These may come from your own sessions or a drum sample library. Whatever the source, your replacement kick and snare should complement the tracks you want to replace, particularly if you adopt the reinforcement approach. Solo the kick or snare track, listen to it along with the rest of the drum mix, and then listen to it in the context of the main mix.

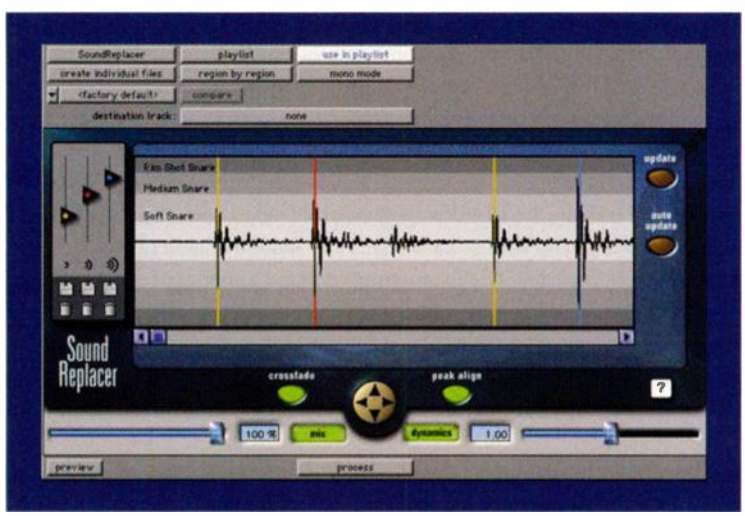


FIG. 1: In the Pro Tools AudioSuite plug-in Sound Replacer, you can see that three different snare drum samples are assigned to corresponding threshold levels. Notice that a rim-shot sample is assigned to the highest threshold.

FIG. 2: Drumagog's main screen offers a variety of controls to let you fine-tune the plug-in's response to your audio track.

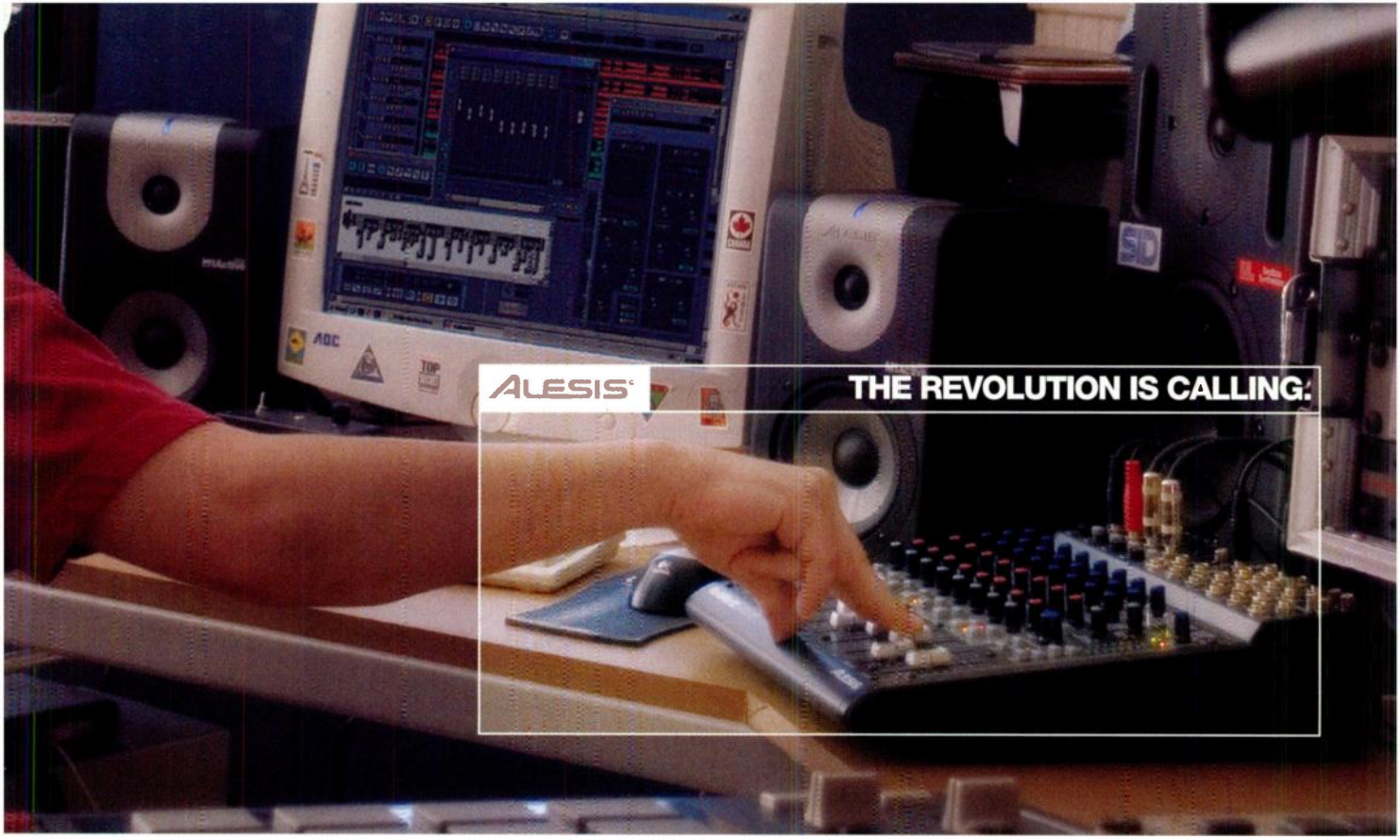
Focus on what you got right when tracking the drums. Do individual hits come through sharply? If so, select a replacement sample that enhances the drum tone and doesn't have too sharp a transient. Does your kick or snare sound good when you solo it but fail to cut through the main mix? In this case, the best replacement sample will have a sharp attack but will decay rapidly. If neither the attack nor the decay of your drum track sounds good to you, select a replacement sample that has it all, but try to use some of your original track to keep things sounding natural.

Kick and Snare Characteristics

Kick drums and the sounds they produce vary widely between different musical genres. A jazz drummer's kick may be tuned as high as a rock drummer's rack tom and sustain as long; a heavy-metal drummer's kick is sometimes heavily dampened and tuned so low that the sound is not much more than a transient with zero sustain.

Typically, the attack transient of a kick drum has a frequency range between 2.5 and 6 kHz, while the tone may range anywhere from 50 to 100 Hz. The tone's decay time can range from 15 ms to several seconds.

Two aspects of kick drums merit special attention in drum replacement. First, hard kick hits are slightly brighter than soft ones. If the drummer's kick dynamics vary, you'll need two or more replacement samples that reflect the timbral differences that harder hits produce. Second, the kick drum in a song almost always has a special relationship with the bass instrument. Whether



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the kick and bass lock into a single groove or are relatively syncopated, the interaction of these instruments' frequencies is critical. Choose replacement kicks that complement the song's bass parts and tone.

In pop and rock songs, the snare drum regularly forms the centerpiece of the drum part. Whether the drummer plays a simple two-four backbeat or a more complex pattern, the sound of the snare may be the most prominent and distinctive part of your drum mix. While snare sounds vary as widely as kick sounds, the frequency range of snare transients is narrower, tending to fall between 4.5 and 5.5 kHz. The snare's fundamental tone can be anywhere from 100 to 300 Hz, but most of the snap and sizzle is above 6 kHz.

Drummers hit the snare drum in several different ways. Each hit has a unique sound, which your replacements should mirror. If the drummer plays a rim shot, for example, your replacement sound should be a rim shot as well (see Fig. 1). A snare's timbre may become brighter as it's hit harder, but not as much as a kick drum's.

Give Yourself a Hand

There are several ways to add replacement drums to your songs. The part you're replacing will often dictate the best approach. You can replace simple kick and snare parts in any digital audio sequencer using nothing more than its built-in editing tools. For instance, a rock song with a basic backbeat, even dynamics, and few fills or fast-repeating hits on the kick and snare is a strong candidate for replacement by hand. If you want to replace a drum sound in just one section of a song, you can also do that manually.

Create a new audio track for your replacement samples beneath the original drum track. If your sequencer doesn't automatically compensate for plug-in–induced latency, turn off any plug-ins that may cause playback timing problems on the original track.

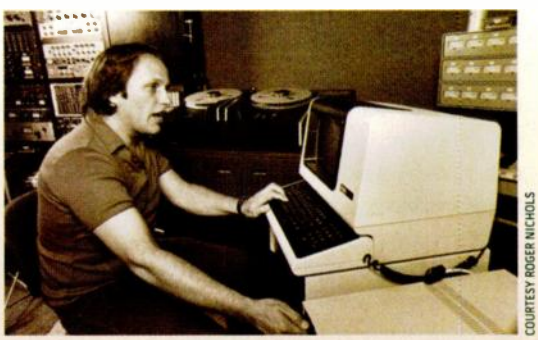
Your goal is to align one replacement sample with each transient on the original track. Transients should be easy to spot in the original audio waveform, although an original track with excessive leakage can make this a little tricky. Audition the original track while looking at its waveform and get a sense for what the hits you're replacing look like.

In Digidesign Pro Tools, you can use the Tab to Transient feature. Steinberg Nuendo offers hit-point detection functions for locating transients. With sequencers that lack a comparable feature, use the Strip Silence feature on a copy of the original track to separate the transients from surrounding leakage. This method works in most sequencers, such as Steinberg Cubase, MOTU Digital Performer, Apple Logic (but be sure to strip silence within the Arrange window), and Cakewalk Sonar.

MEET WENDEL

On January 17, 1978, Roger Nichols used a COMPAL-80 computer as a 12-bit, 125 kHz sampling sequencer to build the rhythm track for Steely Dan's "Hey Nineteen," using samples from the kits of Jeff Porcaro, Rick Marotta, Steve Gadd, and Bernard Purdie. He called his invention Wendel (see Fig. A). "The drum pattern for the song was based on an eighth-note click track," recalls Nichols. "The audio from the click track was fed to Wendel, where it was converted to digital for triggering. The computer would count the clicks and figure out where each of the sampled drums should be played." Later, the session drummers whose kits Nichols recorded returned to the studio to record fills for "Hey Nineteen" and the rest of *Gaucho*.

Nichols developed a second-generation Wendel while working on Donald Fagen's *Nightfly* three years later. By 1985 computer technology had advanced to the point where he was able to build a 16-bit, 50 kHz automatic drum replacer into a single-rackspace unit. Giving it the name Wendeljr, Nichols built 700 boxes, selling every one of them except the three that are still in his rack today. "MIDI was the new rage then," he explains. "Everybody wanted Wendeljr to be MIDI triggered. I said, 'Wendeljr is 1,000 times faster than MIDI. It will never have MIDI.' The pressure to add MIDI grew greater, so I quit building them. Once in a while I see one on eBay for triple what they sold for new."



COURTESY ROGER NICHOLS

FIG. A: Roger Nichols and the Wendel drum-replacement computer.

However, by early 2007 Wendel drum-replacement technology will be easier to come by. Nichols and his company, Roger Nichols Digital, are set to unveil the Wendelizer plug-in, which will support VST, AU, RTAS, and TDM formats. "There are a few things not taken into account in current drum-replacement software," says Nichols. "I have been fine-tuning the process for 28 years. I'm not giving up my secrets, but everyone will get to use the Wendelizer when it comes out."

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Loop the first bar of the song where the drum you want to replace is hit. Next, paste a replacement sample at the first transient, solo the original and replacement tracks, and click on Play. Panning the original and replacement tracks apart will make it easier to hear whether the hits sync up. With your program's window resolution high, nudge the replacement until you hear it double the original hit. Note that the original and replacement hits may sound best a few milliseconds apart. If that's the case, maintain this offset when positioning the rest of your replacement samples.

Listen carefully for phase artifacts between the original and replacement samples. To correct phase problems, begin by inverting the phase of your replacements. If that doesn't help, insert a sample delay on the replacement track and adjust it one sample at a time until both tracks are in phase.

If you're replacing a drum part in which the drummer plays a roll or a quick succession of beats, you'll need to build small crossfades between your replacements. If you let the replacement samples cut each other off, the effect will often sound unnatural and drum machine–like. Building dozens of crossfades may be tedious, but the extra effort will pay off in the final mix.

MIDI Me

Back when automatic drum replacement was a luxury available only in elite studios, MIDI provided a relatively economical way to replace drums without rerecording them. Today, MIDI drum replacement remains a viable option for fixing your drums before mixing, even if you didn't have the foresight to put piezo triggers on the kit you tracked.

Writing MIDI data from audio drum tracks works the same way as recording MIDI simultaneously with audio. All you need is a trigger-to-MIDI converter such as the Roland TMC-6 or a drum brain that accepts trigger inputs. Send the audio drum track you want to replace out of your DAW and into the trigger-to-MIDI converter. The device will have sensitivity settings—chiefly, a triggering threshold and several Velocity curves—but your trigger-to-MIDI converter will need extra help in order to respond accurately to your audio tracks.

To improve tracking, gate the original drum track, setting the gate's threshold just below the quietest transient and use as short an attack time as possible; you'll arrive at properly short sustain and release times after a bit of experimenting to find your trigger-to-MIDI converter's sweet spot, where each hit on the audio track yields a single MIDI note. Once you've created a complete MIDI track, you can use it to drive the drum sample playback software or hardware device of your choice, having saved yourself hundreds of mouse-clicks.

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time-consuming or impracticable. An automatic drum replacer plug-in can speed up your work tremendously because it listens to an audio track for transients and uses this data to trigger replacement samples.

To optimize the plug-in's performance, you will want to prepare special duplicate versions of your original tracks that emphasize the transients (see the sidebar "Planning for Replacement"). For example, you can use sharp EQ cuts to get rid of as much drum tone as possible. A gate with a fast attack and short hold and decay times may be inserted after the EQ as well. It doesn't matter how these tracks sound at this point, because you'll be replacing their contents completely.

In the following example, I will use Wavemachine Labs Drumagog for automatic drum replacement (see **Fig. 2**). It is available as an AU, RTAS, and VST plug-in, and it supports WAV, AIFF, SDII, and GIG audio formats, as well as samples in its own GOG format. However, the basic principles are the same with other automatic replacer plug-ins, such as Digidesign TL Drum Rehab, Digidesign Sound Replacer, and apulSoft aptrigga2.

Speedy Snare Surgery

In almost every style of music, the snare drum is the most challenging drum to replace. No other drum in the kit is capable of producing a greater number of distinct sounds depending on where, how hard, and how frequently it is hit. A snare replacement track may easily require a dozen discrete samples to sound realistic if the drummer's part is even moderately complex. An auto replacer plug-in is perfect for such a big job.

To get started, insert Drumagog on your replacement track, select a multisampled snare drum from the sample bank, set the blend knob to 50 percent to hear an equal amount of the original and replacement audio, and click on Play. If things sound a little off, adjust the Sensitivity control (or the threshold parameter in other plug-ins). Every hit that exceeds this threshold triggers a replacement sample.

If drums other than the snare are louder on the snare track than the quietest snare hit, you probably haven't done enough prereplacement preparation. However, you may still be in luck if the nonsnare hits are not too close to the snare hits: by adjusting the Resolution (or attack) control, you can delay replacement retriggering. A 100 ms attack time is a good starting point.

PLANNING FOR REPLACEMENT

If you get into the habit of replacing your kick and snare tracks, it makes sense to anticipate the drum replacement you may eventually do when tracking. By starting out with drum tracks that are as replaceable as possible, any replacement method you adopt can be less time-consuming when you prepare for mixing.

Start by close-miking the snare bottom to create a transient-heavy signal with minimal bleed from the rest of the kit. Any kick drum leakage this mic picks up can be removed easily with a highpass filter. For the kick, try placing a mic inside the drum a few inches off the batter head where the beater strikes. In my experience, condensers are usually better for this application than dynamic mics, but experiment with different types and placement techniques to find the combination that yields the strongest, fastest transient response with the least amount of leakage.

An unorthodox but effective way of recording replacement-ready drum tracks is to record the output of drum triggers rather than converting the signal to MIDI data. Use these audio files to line up replacement samples by hand or feed them to an auto replacer. Triggers are a boon to any personal studio: they take only seconds to set up, are small enough not to interfere with the rest of your drum miking scheme, and cost less than a set of decent dynamic mics.

Drumagog also has a pair of neat features for dealing specifically with bleed. Let's say you didn't mic the drummer's hi-hats separately, and you like the sound of the hi-hats bleeding into the snare mic, but not the snare sound itself. Select Stealth mode and listen as Drumagog passes the original hi-hats through, crossfades in with a replacement snare, and crossfades back to the hi-hats.

What if you hear too much of the old snare sound in your overheads? Put Drumagog on the overhead tracks and set it to autoduck when the snare hits. This lets you use the plug-in like you would a sidechain on a compressor.

No Substitute

Drum replacement can be a lifesaver in your personal studio, but it will always behoove you to plan and record your projects in such a way that you don't have to use it. For one thing, there are drum parts that even the most sophisticated replacers can't handle. An elaborate cross-sticking pattern, for example, is something you need to get right the first time.

Indeed, there are no true replacements for a skillful drummer, a well-tuned and great-sounding kit, and good recording chops. That said, drum replacement can certainly help you out of a jam as well as open up myriad creative possibilities. **EM**

Alec Tabak produces records on the Lower East Side of Manhattan with his team Thunder, Lightning & Lightning. An email sent to alec@tllaudio.com cues Traveling Wilburys, *vol. 1, on his phone as of this writing.*

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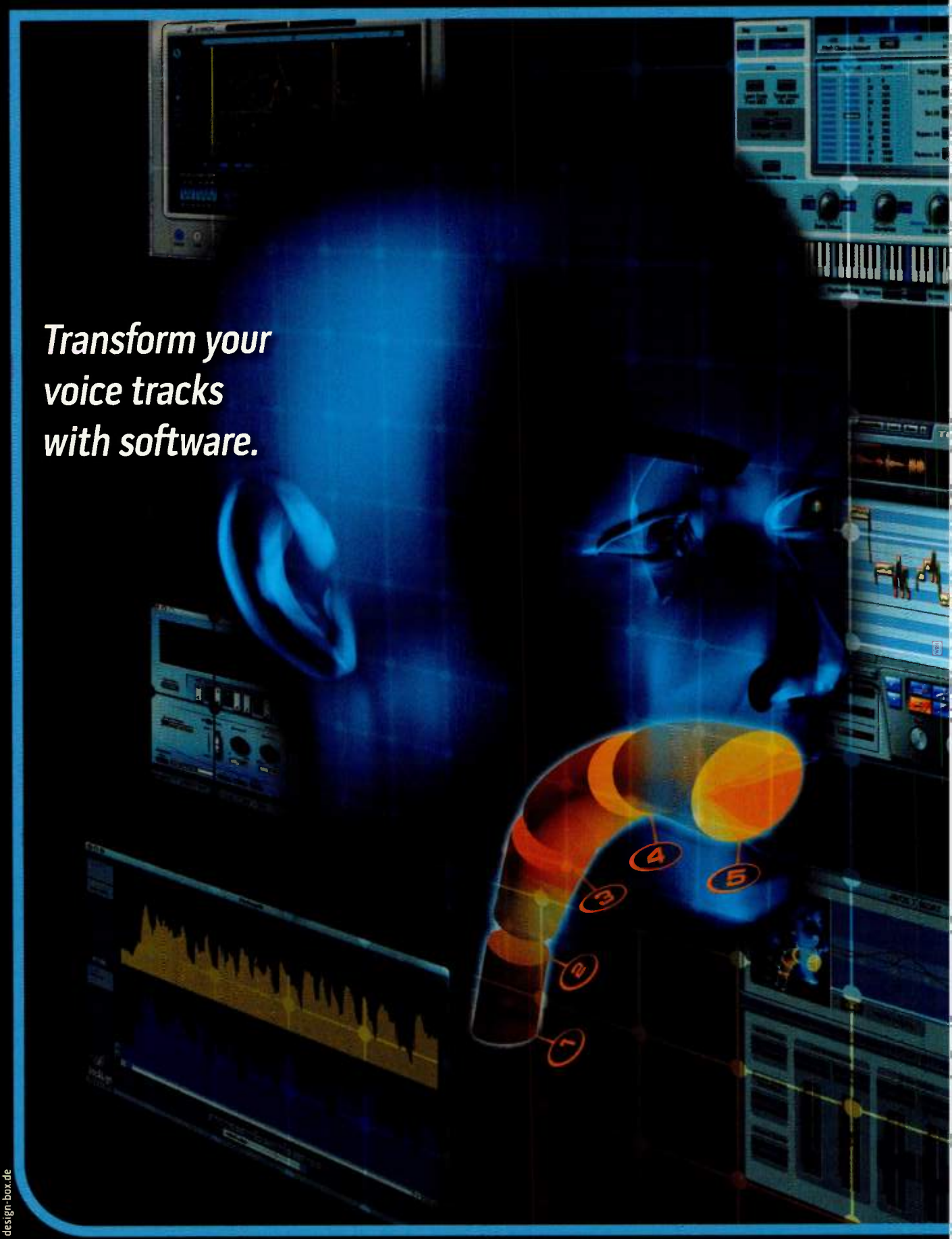

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Adventures in Vocal Processing

By Geary Yelton

For as long as people have been singing, many have hoped for some miracle that would make them sound like better singers than they really were. Powerful computers and recent advances in audio software have given new life to such hopes by making it possible to correct and enhance vocal tracks that might otherwise be unsalvageable. In a modern studio, software-based tools extend an audio professional's ability to capture less-than-perfect vocal performances and turn them into first-rate recordings that surpass physical reality.

No matter what type of music you record, at one point or another you'll probably want to record the oldest musical instrument in existence, the human voice. The vocal track is usually the most important component of any song that isn't entirely instrumental. Virtually every studio, large or small, processes vocals to enhance their appeal. By adding reverb, compression, and other traditional forms of sweetening, recordists give vocal performances a professional polish that overcomes lackluster sound. Digital recording, however, has given rise to a new generation of tools that go beyond sweetening.

In this article, I'll survey some applications and plug-ins that are best suited for treating vocals, and I'll investigate the types of processing they provide. These products fall into categories that encompass physical modeling, pitch correction and transposition, time expansion and compression, breath and sibilance control, and simulating multiple voices. I've selected eight products (including bundles) from six developers: Antares Auto-Tune 4 and Avox, Cakewalk V-Vocal, Celemony Melodyne Studio 3.1, Synchro Arts VocALign Project 2.9, TC-Helicon Intonator HS and VoiceModeler, and Waves Vocal Bundle.

Melodyne and VocALign Project are standalone applications. Avox and Vocal Bundle are plug-in suites, but most of their plug-ins are also available separately. Auto-Tune, Intonator HS, and VoiceModeler are individual plug-ins, and V-Vocal is a dedicated vocal processor within Sonar 5 and 6 Producer Edition. All except the TC-Helicon plug-ins run native and require no DSP acceleration, and all except V-Vocal are cross-platform and run under both Mac OS X and Windows XP.

Voices in My Head

Complex audio processing consumes lots of CPU cycles and needs plenty of RAM, especially when using multiple plug-ins. I ran everything except V-Vocal on my desktop computer, a dual-processor 2.3 GHz Power Mac G5 with Mac OS X 10.4.7, 4 GB of internal RAM, and a MOTU PCI-424 card connected to a 2408mk3 audio interface. To run V-Vocal in Sonar 5, I recruited my notebook computer, a Dell Latitude D610 with a 2 GHz Pentium M, 1 GB of RAM, and Windows XP Professional, connected to an M-Audio Ozonic by means of a StarTech FireWire card.

For the plug-ins, my host applications were BIAS Peak Pro 5.2, Digidesign Pro Tools M-Powered 7.1, Steinberg Cubase SX 3.1.1, and MOTU Digital Performer 4.61. Because Melodyne Studio 3.1 also hosts AU plug-ins, I occasionally used it for that purpose as well. Additionally, I borrowed a TC Electronic PowerCore FireWire, which was necessary to run the TC-Helicon plug-ins.

For source material in my explorations, I used recordings of my own voice, audio examples included with the software, and vocal tracks taken from studio recordings. Because of copyright issues, however, I was unable to use any of the studio recordings as **Web Clips**. Consequently, I also recorded and manipulated samples from Zero-G's virtual instrument Vocal Forge, which pairs 1.25 GB of phrases sung by studio singers with Native Instruments Intakt Instrument.

Antares Auto-Tune 4

When the original Auto-Tune was released in 1997, its impact on pop music was almost immediate. Since then, its influence has grown to such an extent that it has become almost ubiquitous in recording studios, on CDs, and on the radio. Quite simply, Auto-Tune processes a monophonic vocal or instrumental performance and automatically corrects any flat or sharp notes. Rather than rerecording a good take plagued by bad notes, you can process it with Auto-Tune and get perfect intonation. The AU-, DirectX-, MAS-, RTAS-, TDM-, and VST-compatible plug-in has been a boon to marginal singers and a tremendous time-saver for recording engineers and producers everywhere.

FIG. 1: Auto-Tune's Make Auto function gives you the best of both modes, automatically correcting pitch to a predefined scale and displaying a pitch contour that you can edit as needed.

FIG. 2: Scheduled for imminent release, Auto-Tune 5 will feature an improved detection algorithm, an updated user interface, and several additional enhancements.

Auto-Tune 4 (Mac/Win; native, $399; TDM, $599) provides two pitch-correction modes, Automatic and Graphical. Automatic mode continuously analyzes an input's pitch and corrects it to match one of 29 preset scales. An onscreen keyboard visually indicates pitches that Auto-Tune detects in real time; you can use the keyboard to select notes to bypass or remove from the scale. In addition, you can use a MIDI instrument to enter scale data or to select notes to be corrected in real time, effectively transposing the source audio to track whatever you play. And although Graphical mode offers numerous parameters for controlling vibrato, Automatic mode's vibrato functions give you greater flexibility.

Graphical mode continuously analyzes an input's pitch too, but rather than correcting it to a predefined scale, it relies on the Pitch Graph display, which plots pitch against time. You begin by clicking on the Track Pitch button and playing the track to detect its pitches. The original pitch contour will display variations in pitch, with grid lines visually referencing fixed pitches. You then create a target pitch contour, either by clicking on the Make Curve button to duplicate the original, by clicking on the Make Auto button to draw a new contour that conforms to the current Automatic mode settings (see **Fig. 1**), or by drawing new targets from scratch using the curve- and line-drawing tools. You can then edit the target pitch contour using an assortment of cursor tools. Audition the selected audio and click on the Correct Pitch button to finalize your changes.

Either mode lets you specify the sampling rate, input type (low male voice, for example), Retune Speed,

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and Tracking. The Retune knob controls how quickly pitch correction will be applied to the input; its highest setting produces instantaneous correction and usually results in characteristic artifacts you've probably heard on the radio (see **Web Clip 1**). The Tracking knob adjusts Auto-Tune's pitch-detection algorithm to compensate for any noise in the signal; its proper setting depends on whether the vocal track is free of extraneous sounds such as breath or background instruments.

Although Auto-Tune 4 was the current version when I wrote this article, a major update should be available soon (see **Fig. 2**). Auto-Tune 5 will feature a revised user interface, host transport synchronization, full-time correction mode, a Natural Vibrato function, and a dedicated Snap to Note button. Additional enhancements will include a Humanize function that allows different Retune Speeds for short and sustained notes, and a real-time pitch-tracking display.

Antares Avox

Avox (Mac/Win, $599) is a suite of five vocal-oriented plug-ins that are also available separately from Antares Audio Technologies. They support RTAS and VST formats in Windows XP and Mac OS X, and AU on the Mac. Avox specializes in altering a single voice so that you can either change its character or make it sound like two or more voices.

Throat. Avox's most complex and processor-intensive plug-in is Throat ($249), which Antares calls a physical modeling vocal designer. Throat processes monophonic vocals through an emulation of the human vocal tract and lets you specify a set of modeled vocal characteristics. A graphical Throat Shaping display helps you visualize changes as Throat adjusts the position and width of five numbered points along the vocal tract, beginning with the vocal cords and ending with the lips (see **Fig. 3**). It also provides points you can click-and-drag in any direction to manually reshape the vocal tract. Below the display are sliders, buttons, and pop-up menus for telling Throat about the source voice and the voice you want to model.

FIG. 3: Antares Throat models the human vocal tract. Not surprisingly, it is most convincing when you use it to make subtle rather than drastic changes to vocal characteristics.

You begin by specifying the source's Vocal Range (Soprano, Alto/Tenor, or Baritone/Bass) and Voice Type (Soft, Medium, Loud, or Intense). Voice Type is expressed in terms of loudness because the amount of pressure applied to the vocal cords affects timbre. The Precision setting (Subtle, Medium, or Extreme) lets you indicate how accurately Throat translates the source voice, which affects the realism of the modeled voice and helps avoid undesirable artifacts; use trial and error to find the best setting. In the Add Breathiness section, Mix and Highpass Frequency sliders let you dial in filtered noise and determine its character. Manipulating the two parameters quite effectively makes a voice sound raspy or turns it into a whisper (see **Web Clip 2**). In the Model Glottal section, you can use a slider to adjust the waveform's pulse width and a pop-up menu to specify the modeled Voice Type. Another pair of sliders changes the length and width of the entire modeled vocal tract.

FIG. 4: Although Duo's vocal-modeling parameters are less complex than Throat's, it can make one voice sound like two. Like all components in the Avox plug-in bundle, Duo is also available separately.

Rather than producing radical effects or gender-bending illusions, Throat's 42 presets concentrate on enhancing vocal quality and are designed to be starting points for user settings. Presets include Clarity, Shorter Throat, Larger Mouth, Softer Breathy, Nasalvox, Hoarse, and the like. Because the range of its parameters extends beyond human physiology, though, Throat can produce extreme effects if you desire.

Duo. As its name suggests, Duo ($199) turns a monophonic voice into a mono or stereo pair of voices. Unlike autodoubling processors that merely duplicate a vocal track, Duo lets you apply modeling parameters to the duplicated voice. The modeling controls are much more straightforward and easier to understand than Throat's controls. Four sliders affect the model's Vocal Timbre, Vibrato, Pitch Variation, and Timing Variation (see **Fig. 4**). By simultaneously affecting several modeling parameters, the Vocal Timbre slider makes the modeled voice less similar to the source as you change its value from the center position. Raising the slider lengthens the modeled vocal

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tract, and lowering the slider shortens it (see **Web Clip 3**). Additional sliders let you control each voice's output level and panning.

Choir. Choir ($199) is a more ambitious vocal multiplier that turns a monophonic voice into a vocal ensemble singing in unison with the source. A pop-up menu lets you select 4, 8, 16, or 32 modeled voices. Instead of accessing parameters that control timbre, however, you can adjust only three variations for the modeled voices: pitch, timing, and vibrato. As you raise the sliders, each voice becomes increasingly different from the others while still retaining the vocal qualities of the source voice (see **Web Clip 4**). A single Stereo Spread slider lets you widen the stereo field.

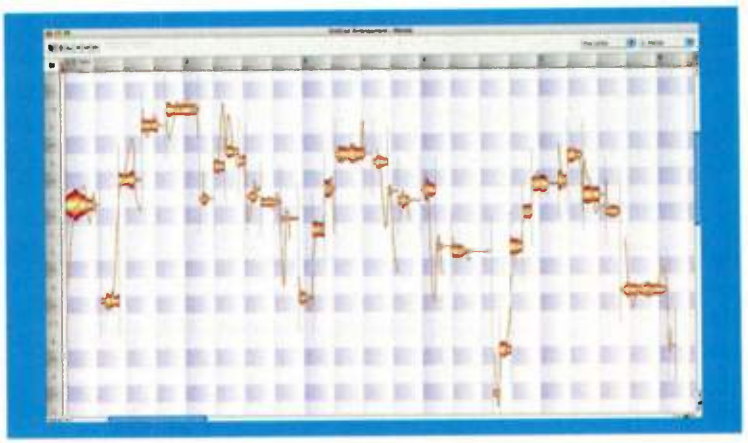

FIG. 6: Celemony Melodyne displays audio events as Blobs on a grid and lets you manipulate them as if they were MIDI events.

Punch. The remaining Avox plug-ins are meant to improve the sound of vocals in a mix rather than alter their number or character. Antares calls Punch ($129) a vocal impact enhancer, and you can apply it to either mono or stereo vocals. Punch combines compression and limiting to give a track the power and clarity it needs to cut through a dense mix, though extreme settings can produce distortion effects. The most crucial slider controls Impact, which makes variations in level more equal across the frequency range that vocals occupy. Two other sliders, Gain and Ceiling, allow you to increase the input level and attenuate the output after processing, respectively. Input Level and Output Level meters help to minimize clipping.

FIG. 5: V-Vocal is the first appearance of Roland's VariPhrase technology in a digital audio sequencer, Cakewalk Sonar 5 Producer Edition. Because it isn't a plug-in, V-Vocal lets you resize its window using normal Windows techniques.

Sybil. Sybil ($99) emulates a traditional studio de-esser, which lessens the problems caused by certain consonants when recording vocals. Sybil uses a highpass filter and a sidechain-controlled compressor to reduce a track's overall level when it detects *s*, *t*, *sh*, *th*, or *ch* sounds. Sliders control the compressor's threshold, compression depth, attack time, and release time, as well as the sidechain's highpass frequency. A Gain Reduction meter displays the amount of compression being applied.

Cakewalk V-Vocal

Since Roland launched the VP-9000 in 2000, its groundbreaking VariPhrase technology has been acclaimed and admired for its effective audio-stretching algorithms. When Cakewalk released Sonar 5 last year, it became the first native computer software to incorporate those same algorithms in the form of a processor called V-Vocal. Specifically developed for processing vocal tracks, V-Vocal gives you wide-ranging control over pitch, tempo, loudness, and formant structure. You can use it to correct pitch, adjust phrasing, add or subtract vibrato, create harmonies, and perform other feats of studio magic.

In Sonar 5 and Sonar 6 Producer Edition (Win, $619), you activate V-Vocal by selecting some audio data in Track View, and then either pulling down the Edit menu or right-clicking and selecting Create V-Vocal Clip. V-Vocal's window will appear containing a variety of controls and a graphical representation of the selected audio (see **Fig. 5**). Below the display are controls for mode selection, pitch correction, formant shift, and other tasks, with a tool palette on the left and buttons that control transport and other functions across the top.

When you enable Pitch mode, V-Vocal displays a 2-dimensional graph plotting the original variations in pitch as a red squiggle, overlaid by a pitch curve you can edit, shown as a yellow squiggle. You can adjust pitch manually, click on a button for instant pitch correction, or constrain pitch to follow a scale. Each audio event (typically

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a word, syllable, or legato phrase) has a horizontal line drawn through it called the Center Pitch; dragging it up or down will transpose the entire event's pitch. Double-clicking anywhere on the pitch curve creates a break-point called a Node, which you can click-and-drag up or down to transpose pitch at that location. If you use the Arrow tool to select a portion of the clip and then drag the Center Pitch, new Nodes appear and you can shift only the selected portion. You can redraw pitch using the Line or Curve tools and delete Nodes using the Eraser tool. You can also affect vibrato and other variations in pitch, amplitude, and formant content by using the LFO tool; dragging up from the Center Pitch increases the variation from Center Pitch range, and dragging down decreases it.

Clicking on the Time button replaces the Pitch graph with a more traditional waveform display that plots amplitude against time. You can click near the center axis or double-click between events to divide them into regions, with each division indicated by a green line. Dragging the green line to the left or right expands or compresses the duration of the region.

In Formant mode, a red line appears on the waveform's center axis. Dragging the line up or down shifts the entire clip's formant structure (see **Web Clip 5**). You can select regions and create Nodes as if you were shifting pitch. In a similar fashion, you can also change amplitude in Dynamics mode.

Celemony Melodyne Studio 3.1

Melodyne Studio 3.1 (Mac/Win, $699) is the most comprehensive program for manipulating the pitch and rhythm of vocal tracks. The application lets you transpose and correct pitch; shift formants; alter tempo, rhythm, and duration; automatically create harmony voices; and otherwise edit audio as if it were MIDI data. Melodyne comes in three versions to suit your needs and budget; the top-of-the-line Studio 3 version works with polyphonic as well as mono files, making it an indispensable studio tool.

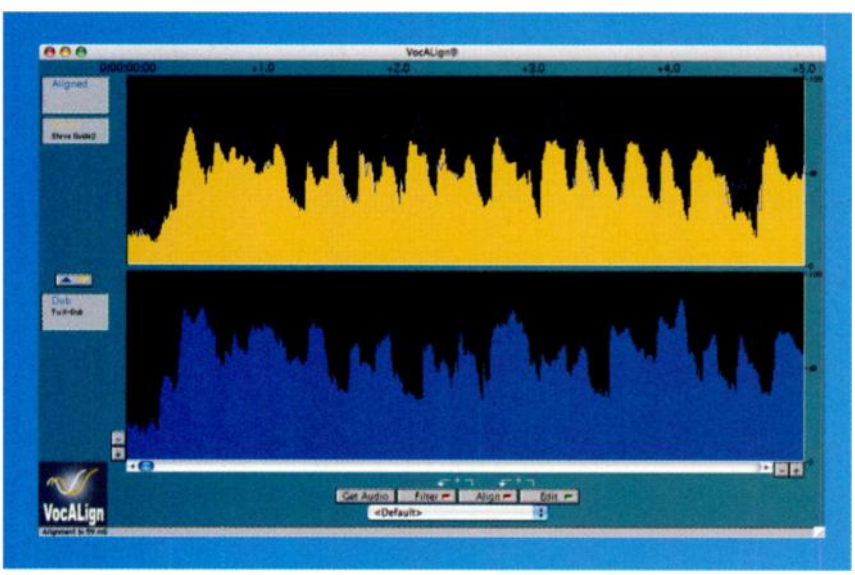

FIG. 7: The first time you open VocALign Project, it will appear as a small window. Change its size, and it will retain that appearance the next time you open it.

FIG. 8: TC-Helicon Intonator HS transposes pitch so it matches whatever scale you select. Presets include chromatic, major, minor harmonic, Mixolydian, Hawaiian, Javanese Pelog, and more than 40 others.

Most of the action occurs in Melodyne's Editor and the Arrange window. The Editor, which opens when you load an audio file, furnishes all the time-stretching, pitch-shifting, and related functions. The Arrange window resembles a traditional multitrack digital audio sequencer, and in fact, Melodyne can function as a rather basic audio sequencer. Double-clicking on any track in the Arrange window opens the Editor for that track. For the purposes of this article, then, the Editor is the more interesting window.

In the Editor, individual audio events are shown as Blobs on a grid that has a note ruler on the left (see **Fig. 6**). Each Blob's alignment with the note ruler indicates its pitch center. Its shape indicates its amplitude envelope, and its length indicates its duration. If you click on a Blob and drag it up or down, you transpose its pitch by semitones. If you also hold down the Alt (or Option) key, you can transpose it by cents, which is necessary for manual pitch correction. A scrub function allows you to hear the changing pitch as you drag the Blob. If you select Correct Pitch from the Edit menu, Melodyne automatically repairs any pitch errors by aligning pitches with any preset or user-defined scale.

You can also select more than one Blob at the same time and transpose them as a group. That technique is useful for generating harmony parts; just select the notes you want to harmonize and drag them up or

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down while pressing Shift + Alt. If you like, Melodyne can automatically introduce slight random pitch and timing variations, which helps to prevent comb filter effects and make harmonies sound more natural. Unless you want parallel harmony, you then select and transpose individual notes and groups of notes to adjust their intervals. If you first enable the Scale Snap function, however, the harmonies conform to whatever key you specify.

If Always Show Pitch Curve is enabled in the View menu, you'll see pitch curves superimposed on the Blobs. You can zoom vertically or horizontally to get a better look at a selected audio event or group of events. Zooming is especially handy when you're dealing with a large file or an entire song.

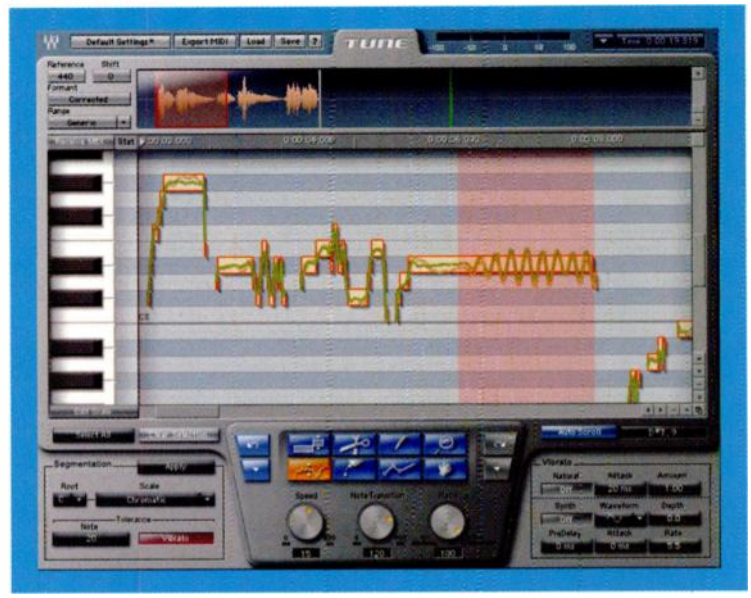

FIG. 10: Waves Tune is a multiformat plug-in that can scan and manipulate pitch and tempo for tracks as long as ten minutes. Pitch changes appear as a series of blocks and curves.

By default, Melodyne preserves an event's formants and amplitude so that its timbre and loudness don't change when you transpose its pitch. If you prefer, however, you can transpose formants, change amplitude, and modify other parameters just as easily as pitch, either by selecting the appropriate command from the Edit menu, by selecting one of several tools from a palette, or by right-clicking and selecting a tool from a contextual menu.

Melodyne offers numerous techniques for changing duration without affecting pitch or formant structure. If you enable Autostretch in the Transport Bar and change the entire file's tempo, all durations will be scaled accordingly. You can import tempo from a MIDI file, halve or double tempo from the Edit menu, and quantize an entire file. You can move a Blob's start or end point, which changes its duration, by clicking-and-dragging its left or right edge. If the audio is contiguous and one event leads immediately to another, manually changing duration affects the duration of events before or after the edited Blob. Changing the duration of a single event that has a rest before or after, however, has no effect on the duration of other events.

One of the most exciting features of Melodyne Studio 3 and later is the ability to work with polyphonic audio files, even an entire mix. When you load a mono or stereo audio file containing vocal harmony, Melodyne displays it as a series of Blobs lined up as if they were all one pitch. Transposing the pitch of any Blob keeps all harmony parts intact; when you pitch-shift an ensemble singing a chord, Melodyne transposes the entire chord rather than the individual voices (see **Web Clip 6**). Transposing polyphonic material is useful for correcting the pitch or changing the key or tempo of an entire song, or for introducing a tempo or key change at some point during the song.

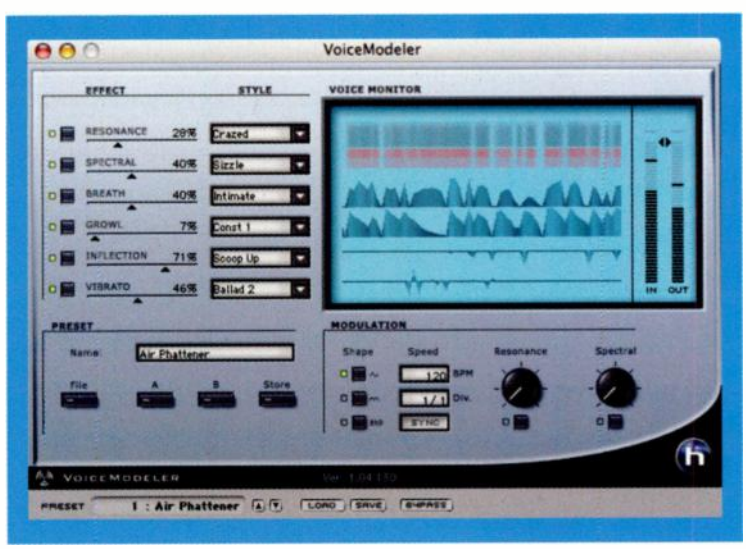

FIG. 9: VoiceModeler Styles include not only physiology-oriented presets such as Narrow Neck, Nosy Vox, and Wide Mouth, but also character-oriented presets like Teen Pop, Like a Child, and Purple Dinosaur.

Synchro Arts VocALign Project 2.9

Just as some software automatically corrects tuning, VocALign Project (Mac/Win, $375) automatically corrects timing discrepancies between two tracks. It works by performing a spectral analysis of both tracks and then applying variable time compression and expansion to make one line up with the other. Syncing tracks after they're recorded saves time by allowing a singer to concentrate on a good performance during an overdub,

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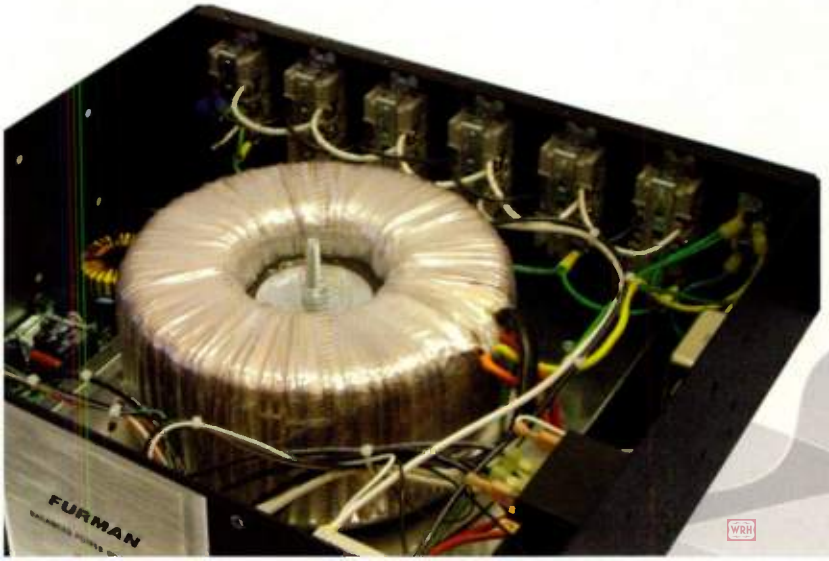

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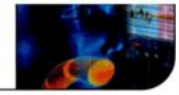

rather than on trying to duplicate a previous performance's timing.

VocALign matches the energy pattern variations of one track, called the Dub, to those of another track, called the Guide. You begin by dragging the Guide file into the upper display and the Dub file into the lower one (see **Fig. 7**). Because VocALign works with audio files no longer than two minutes, you're often better off working with small clips rather than song-length tracks. The Play menu lets you audition either file or both simultaneously. Clicking on the Align button superimposes an outline of the realigned Dub's pattern over the Guide's pattern. You can then audition the two synchronized tracks or the realigned Dub alone. Six presets let you choose how tightly the Dub will be aligned to the Guide. When you're happy with the results, click on the Edit button to save the realigned Dub as a new audio file (see **Web Clip 7**). VocALign automatically names it and places it in a folder of your choosing.

Thanks to cooperation between Synchro Arts and MOTU, VocALign Project also works from within Digital Performer (DP). First select an audio track, and then open the VocALign submenu in DP's Audio menu to specify it as the Guide. Select another track as the Dub, and then realign the Dub by choosing Align and Spot Audio from the same submenu. Two additional versions of VocALign are available as plug-ins for Pro Tools users, the AudioSuite plug-in VocALign Project for Pro Tools (Mac/Win, $375) and the RTAS plug-in VocALign Pro 4 (Mac/Win, $629 download, $699 boxed).

TC-Helicon Intonator HS

To use Intonator HS or VoiceModeler, you'll need a TC Electronic PowerCore, a hardware-based DSP accelerator that's available as an expansion card or as an external processor. Intonator HS (Mac/Win, $249) is a plug-in that specializes in pitch-correcting vocal tracks. Borrowing algorithms from TC-Helicon's respected line of voice-modeling hardware products, Intonator HS can shift pitch a maximum of six semitones up or down so that it conforms to a preset scale or to your real-time MIDI input. It uses a Hybrid Shifting algorithm (hence the *HS* in the name) to effectively retain a natural vocal sound even when transposing as much as half an octave.

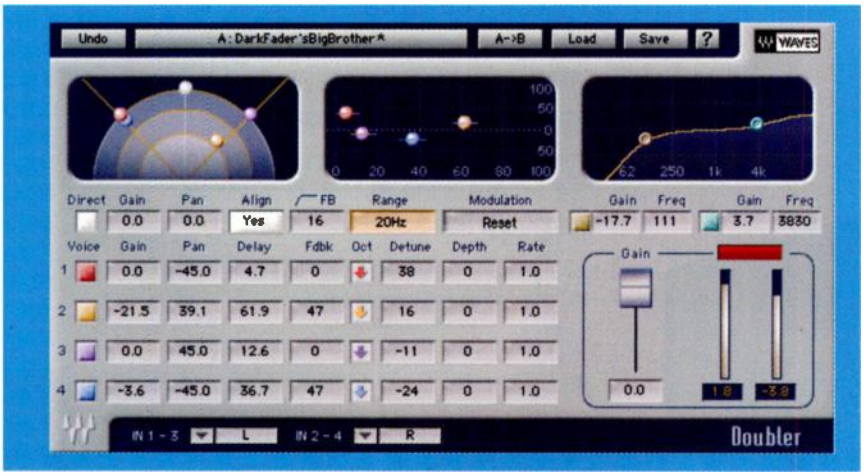

FIG. 11: Doubler can add two, three, or four voices to a source voice, each with its own delay, detuning, pan, and additional user parameters.

Intonator HS's pitch meter indicates the input signal in red and how sharp or flat it is by its deviation from the center (see **Fig. 8**). When correction is enabled, it indicates the amount of correction in blue. You can select optional meter views, such as only the output pitch or the amount of correction. The keyboard has 12 buttons for selecting the key signature, the notes of a custom scale, or a single note in Manual mode. Other controls let you vary the amount of correction, control the speed at which correction is applied, and remove rumble and hum with a low-cut filter. A unique manual pitch-bend wheel lets you vary pitch in real time, but you can't assign your MIDI controller's pitch bender to control it, nor can you change the wheel's 12-semitone range.

The Scale/Mode pop-up menu determines the pitches that the corrected notes will adhere to; you can choose from 47 preset scales and specify 3 user-defined scales. The Custom Scale setting allows you to select which of 12 pitches to include. In Manual mode, you can select a pitch to be corrected by clicking on the keyboard, which is most useful when only a single pitch is causing problems.

Intonator HS's straightforward user interface makes it easy to quickly see and control what's going on. Probably because it's optimized specifically for vocals and has a limited range of pitch-shift, the plug-in does an outstanding job of minimizing audible artifacts and glitches (see **Web Clip 8**).

TC-Helicon VoiceModeler

Another PowerCore plug-in from TC-Helicon, VoiceModeler (Mac/Win, $249), also duplicates specific capabilities of TC-Helicon's voice-modeling hardware. VoiceModeler can alter voices either subtly or dramatically, making a male voice sound female, for example, or a thin voice sound throaty. The singer's vocal dynamics can control parameters such as breath and growl, allowing you to change a performance's expressive qualities at will. You can dial in a variety of vocal personalities and build an entire choral ensemble from a single voice. VoiceModeler lets you transform a voice's timbral qualities in much the same way you use a synth plug-in to manipulate instrumental sounds.

The best way to discover VoiceModeler's capabilities is to explore its 16 presets. You can easily modify their settings and save your edits as new presets, or you can create your own presets from scratch. VoiceModeler's most essential settings are in the Effect section, which has a Bypass button, a Style menu, and sliders that control depth for

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Inspired by the music of such artists asThe Beastie Boys, De La Soul, Trick Daddy, Missy Elliot, Lil John, Jay-Z, Lil' Kim, Junkie XL, Busta Rhymes, Roc Raida, J-Kwan, , and many others. HIP HOP CITY features tons of programmed drums, hundreds of turntable loops, bass, funk guitar, keyboards, synth leads, horns and percussion and more.

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A head-banging collection of construction kits covering a variety of styles, including Nu Metal, Metalcore, Death Metal, and Industrial Rock. Inspired by the music of such artists as Slipknot. Korn, Anthrax, and Nine Inch Nails, NU METAL CITY features live and programmed drums,screamin' guitars, electric bass, synths, turntable FX, and atmospheres. If you're looking for butt-kicking loops with a hardcore attitude, welcome to NU METAL CITY.

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If you're looking for the most current and popular hip-hop sounds out, then you got to pick up this new joint. With blazin' beats, thick bass lines, nasty synth, tight horns, strings and more, these kits are pushin it to another level. You'll get more than 1900 loops in 50 construction kits ranging from 70 - 140 bpm. That's over 4 gigs of content in WAV, REX, and Apple Loops to blow up your tracks. Next time you head into the studio... bring the heat with you.

Off The Hook Hip Hop: West Coast

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Electro Magnetic Fury

$99.95
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Acclaimed producer Perry Geyer is back at it again with Electro Magnetic Fury. Whether you're making hard hitting house, nu school breaks, big beat or electro you'll find just what your searching for with this surge of furious beats over menacing atmospheres. Nearly 100 construction kits of punishing drums and beats, basses, pads, FX, atmospheres, distorted grooves, massive percussion and more will bring the Fury.

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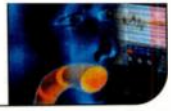


each of six Effect parameters: Resonance, Spectral, Breath, Growl, Inflection, and Vibrato.

Resonance controls harmonic content by emphasizing positioning within the vocal tract; some Styles exhibit a deep chest resonance, for instance, and others resonate in the throat or the sinuses. The Spectral parameter is intended to emulate a singer's natural tone control. You can modulate the Spectral and Resonance parameters using VoiceModeler's Modulation section, which supplies independent depth knobs for both destinations and an LFO that can sync to tempo.

Breath presets range from relatively subtle Styles such as Natural, Soft Air, and Medium Rough to the more extreme Dark Whisper, Phlegmy, and Tracheotomy. Growl lets you impart a voice with graininess and grit. The Inflection control is multifaceted, offering gender-bending effects, randomization, and various types of scooping (see **Web Clip 9**). Vibrato adds periodic variations in pitch and amplitude and furnishes presets for different musical genres.

A graphical display takes up about a third of VoiceModeler's control panel. It provides a continuous visual representation of each parameter's effect on the source, allowing you to quickly grasp how each of the six Effect parameters contributes to what you hear (see **Fig. 9**).

Waves Vocal Bundle

Waves Vocal Bundle (Mac/Win, $1,000) is a suite that comprises five plug-ins: Tune, DeBreath, Doubler, Renaissance Channel, and Renaissance DeEsser. All but one are native and TDM compatible, and Tune is native only. Three of the plug-ins are available separately, but Renaissance Channel and DeEsser are available only in bundles. And if you happen to own one of several other Waves bundles, you may be entitled to download Tune LT, a lite version of Tune, at no additional charge.

Tune. Treading territory similar to Auto-Tune's and V-Vocal's, Tune ($600) corrects pitch errors and lets you graphically manipulate the pitch of monophonic instruments and vocals on mono or stereo tracks. Tune uses ReWire to synchronize with your digital audio sequencer, ensuring that its display always matches what you hear during playback, allowing you to listen to all your tracks simultaneously, and letting you control transport functions from within Tune.

Tune's piano-roll Edit window, a grid that plots pitch against time, dominates its graphical user interface. After you've set parameters such as your track's vocal range (Bass through Soprano) and indicated its root and scale type, simply play the track, and Tune will detect and transpose every sharp or flat pitch to the nearest correct pitch and display notes as a series of Segments (see **Fig. 10**). The original pitch curves will appear as orange squiggles, with the corrected pitch curves appearing as green squiggles. Speed, Note Transition, and Ratio knobs let you tighten or loosen the correction. Although formant correction is enabled by default, you can disable it if you'd prefer an unnatural sound.

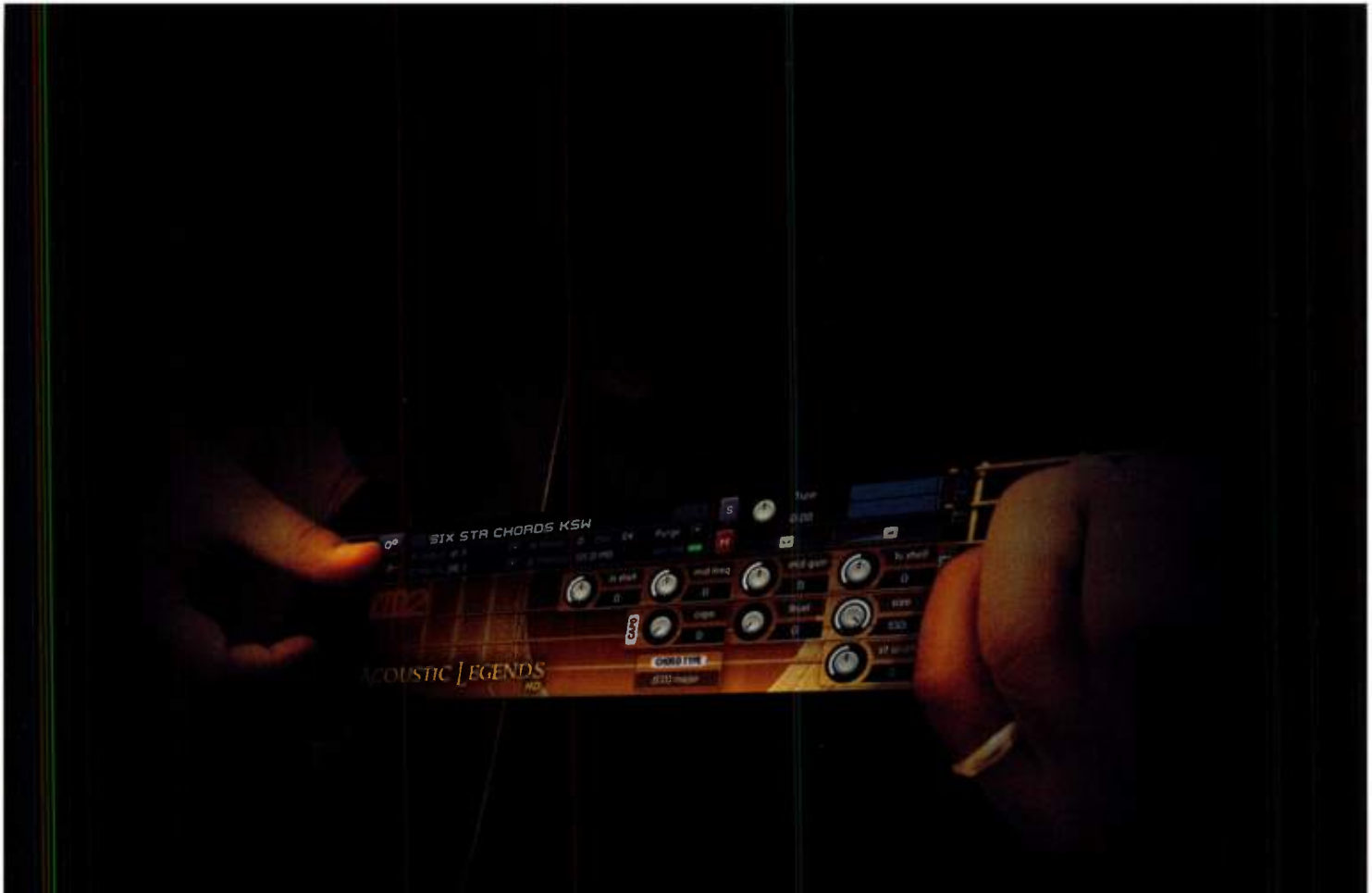
After scanning, you can use the Note tool to select any Segments you want to manipulate further. Additional tools let you split and join Segments, move around in the Edit window, zoom in or out, and redraw any portion of the pitch curves. Controls in Tune's Segmentation section let you specify conditions for segmenting correction curves into notes. If you select a Segment and then click on the Vibrato button, Tune will highlight any part of the selection it perceives as vibrato. You can then apply any changes you make using controls in the Vibrato section—even adding vibrato that sounds natural or synthetic (see **Web Clip 10**).

DeBreath. DeBreath ($350) automatically and selectively removes or attenuates the sound of inhaling and exhaling from monophonic vocal tracks. Unlike more traditional techniques that rely on noise gating, DeBreath is based on an algorithm that detects breaths by comparing them to a library of templates and then separates them from the rest of the signal.

Although DeBreath's defaults are all you need under most circumstances, several controls let you customize its settings. A Breath Graph tracks the similarity between the audio track and the library's templates; anything above its threshold is considered a breath. The Energy Graph displays the signal's total energy; anything above its threshold is not considered a breath, even if the Breath Graph sees it as one. Sliders let you change either threshold to fine-tune the breath-detecting process. You can specify how quickly a breath fades out from the voice path and how quickly it fades back in again. You also control the amount of gain reduction applied to breaths, ensuring a natural sound that doesn't leave gaps in the vocals. You can choose to monitor either the voice or the breath individually.

Renaissance DeEsser. Like other de-esser plug-ins, Renaissance DeEsser is a compressor that uses sidechain filtering to attenuate sibilance—*s, t, ch, sh,* and *th* sounds. Its crossover, like those in other Waves compressors, compensates for phase modulation that would otherwise color the sound. Renaissance DeEsser's threshold setting dynamically adapts to the input signal, also contributing to more natural results. A graph helps you visualize your settings, with colored lines representing the crossover's active and passive ranges, the gain's attenuation range, and frequency-dependent attenuation.

You can choose to monitor either the audio or the sidechain. After you've aurally identified the problem frequency, simply adjust the threshold to attenuate it. Use the Range slider to set the maximum gain



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reduction, which determines how much de-essing is applied. Additional controls let you specify highpass or bandpass filtering for the sidechain, the filter's cutoff or center frequency, and a compression mode. Renaissance DeEsser comes with several presets appropriate for male or female voices or for a full mix.

Renaissance Channel. Renaissance Channel furnishes 4-band EQ, compression, and other channel-strip functions. Although it is part of Waves Vocal Bundle, Renaissance Channel has no features that make it vocal specific. Consequently, there is no need to discuss it in any detail as part of this article.

Doubler. Despite its name, Doubler ($200) offers more than simple voice doubling; it adds as many as four voices to vocal tracks. Doubler is actually six plug-ins, comprising 2- and 4-voice mono, stereo, and mono-to-stereo versions. Every version supplies a control strip for each of the doubled voices. You can specify each voice's gain, delay, feedback, and tuning parameters, as well as enable or disable voices. Shift any of the voices an octave lower and specify the depth and rate of LFO modulation. Stereo versions also let you govern the panning of each voice, including the original.

Three displays give you visual feedback and allow you to change parameters graphically (see **Fig. 11**). One shows the relative gain and stereo positioning of all voices. Another lets you individually change each voice's delay time and detuning, with each voice represented as a colored ball surrounded by moving lines that represent modulation. In the EQ display, you can apply high- and low-shelf filtering to all the doubled voices and graphically change the equalization curve.

Doubler is quite effective at thickening vocal tracks and giving them a nice studio sheen (see **Web Clip 11**). It's also capable of LFO-controlled panning, pitch-bending, and delay effects ranging from flange to echo. Waves furnishes 19 Doubler presets for a variety of applications and effects.

Turn Geese into Songbirds

As you can see, vocal-processing software can accomplish many transformations that were previously impossible. Only a few years ago, you couldn't change a recording's pitch without affecting its duration or change its duration without affecting its pitch. How well vocal-processing software will perform, though, depends a lot on your expectations. It's still very difficult to begin with a recording of someone who can't sing and turn it into a passable performance. With sufficient effort, you can seemingly cure a bad sense of pitch and a worse sense of rhythm. You can modify a singer's vocal timbre, enhance his or her breathing technique, and turn one singer into as many as you need. You can even add richness and tone to a voice that has none; just don't expect it to sound real.

When the original performance is lacking, you often have to push software to extremes. When that happens, audible

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artifacts introduce an unavoidable artificial quality to the sound. The problem must be in the nature of digital audio, because whenever I exceeded limitations that were instantly obvious, all the software I tried exhibited a tendency toward making human voices sound synthetic. Of course, a voice that sounds like a machine is desirable for some types of music, and nothing makes a voice stand out like destroying its organic nature.

To effectively process vocals and retain their natural qualities using any of the software surveyed here, the trick is to immediately recognize when something begins to sound artificial and pull back a bit. Admittedly, that can be difficult when you're so wrapped up in an editing session that you lose perspective. If you're correcting pitch, try lowering the speed setting. If you're transposing a harmony part, use the smallest interval you can get away with, and accept that an octave is simply too far. If you're compressing or expanding time, never go beyond halving or doubling tempo, and avoid going that far whenever you can. The difference in one person's voice and another's may be subtler than you imagine. It also helps to bury vaguely synthetic-sounding voices deep in the mix or smear them with reverb. Believe it or not, such techniques can work very well and still sound good.

Don't forget that singers rely on audio professionals to make them sound good, and sounding good is more important than a flawless recording. Achieving natural results depends on using your ears and accepting any limitations your ears recognize. Unless you or your client are willing to accept vocal tracks that sound unnatural, you will often encounter instances when it's preferable to record another take rather than waste time trying to process tracks into submission. The key to successful vocal processing, then, is to know when enough is enough. EM

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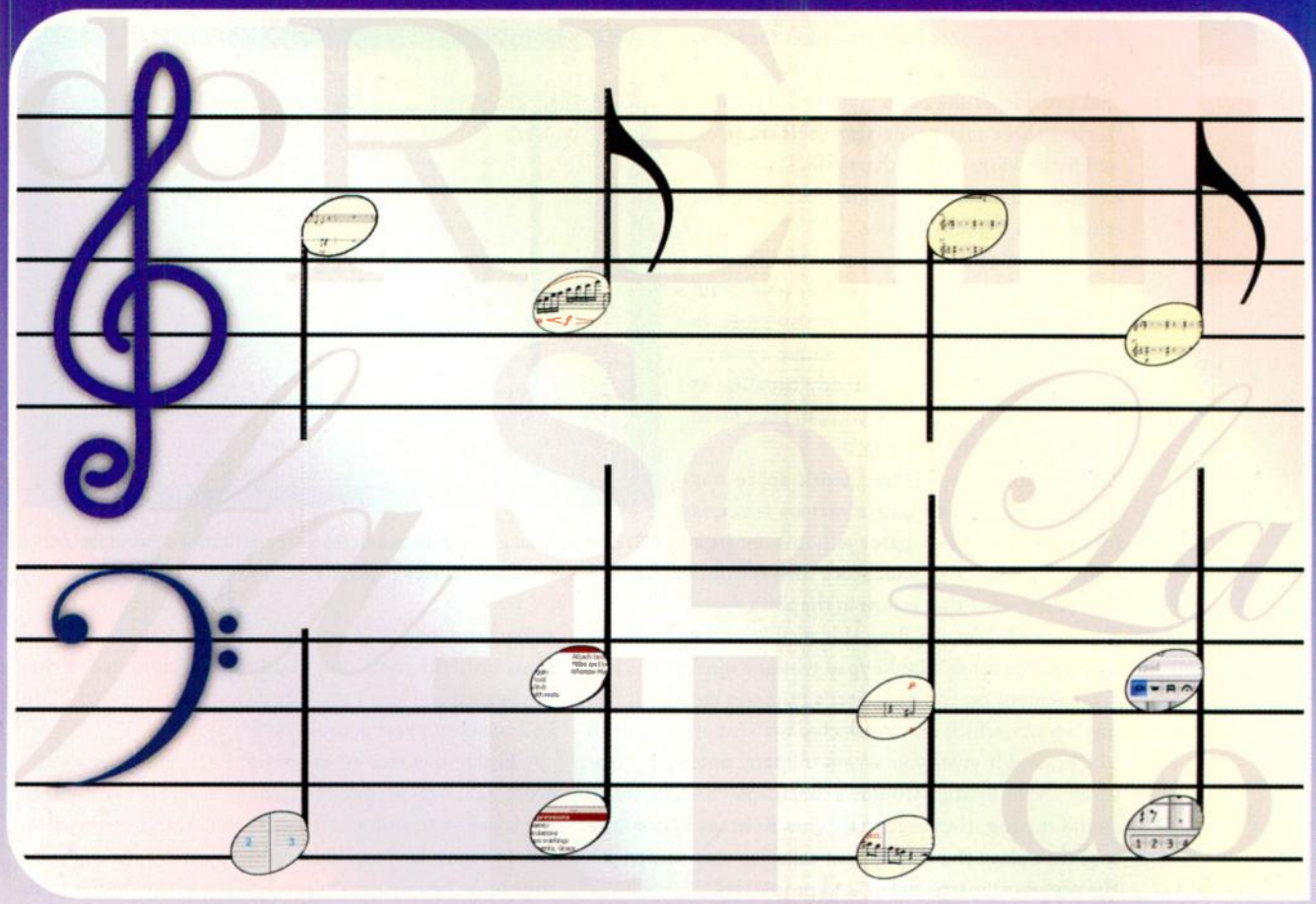


LAURA WILLIAMS

What's the Score?

By Peter Hamlin

We compare and contrast the leading music-notation programs.

Music-notation software has become a must-have tool for musicians who work with written scores. It dramatically speeds up the work of composing and arranging, eliminates or reduces the need to pay music-copying fees, and creates professional-quality scores with a few mouse-clicks. This software eliminates much of the tedium of working with notation and reduces errors as well.

Music-notation programs have come a long way over the years, and there are many to choose from. I'm going to focus on the three most-used programs: Avid Technology Sibelius 4.1, MakeMusic Finale 2006, and VirtuosoWorks Notion 1.5.5. All three programs run on both the Windows and Macintosh platforms, include their own integrated sound playback library, and satisfy the most sophisticated notation needs.

Space constraints prevent me from thoroughly describing the operation of all three programs. Therefore, I will focus on those features that differentiate them and that might be reasons to choose one program over another. For an overview of three other notation programs worth considering—Adept Music Notation Solutions Nightingale 4.5, GenieSoft Overture 4.0.2, and NoteHeads Igor Engraver 1.7—see the sidebar "Also Noteworthy."

Work Space

Each program has a work space for entering notes and editing your music. Notion, the newest program, presents a particularly approachable work space for someone new to notation software

(see Fig. 1). You get a large score area for working on the music, and a sidebar with menus that provide all the tools you need. The sidebar has three menu palettes: Tools, Entries, and Expressions. A fourth palette, Properties, expands when there are properties that can be edited for a selected feature.

In Notion's work space, the cursor appears in the shape of whatever object will be created when you click on the score (a note, a time signature, a dynamic symbol, and so on). Notion has a handy timeline at the top of the page, which you can click on to navigate through the score.

Sibelius's uncluttered work space has floating windows to access various features (see Fig. 2). The Navigator window shows a miniature version of your score with the portion of the score that is now in the work space highlighted. You can drag this visible area to navigate through the score. The Keypad window mirrors the key arrangement on the computer's numeric keypad. It has five layouts, which can be selected with function keys F8 to F12, and it gives you access to many note-entry features. Other floating windows control playback features, sound mixing, Native Instruments Kontakt Player (the tool that plays the instrument samples that come with the program), parts, video, and properties.

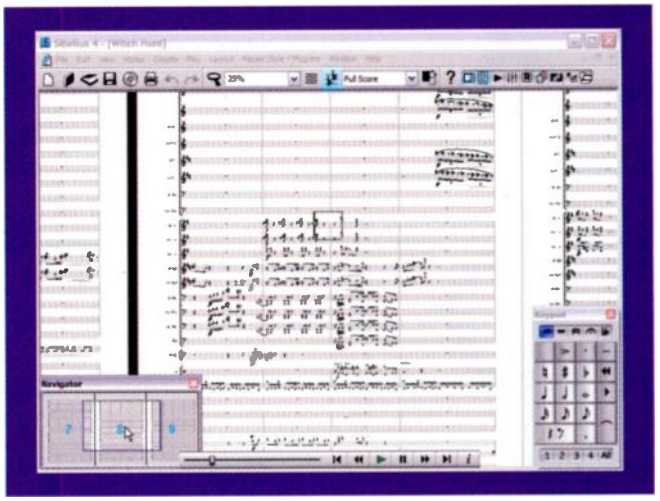


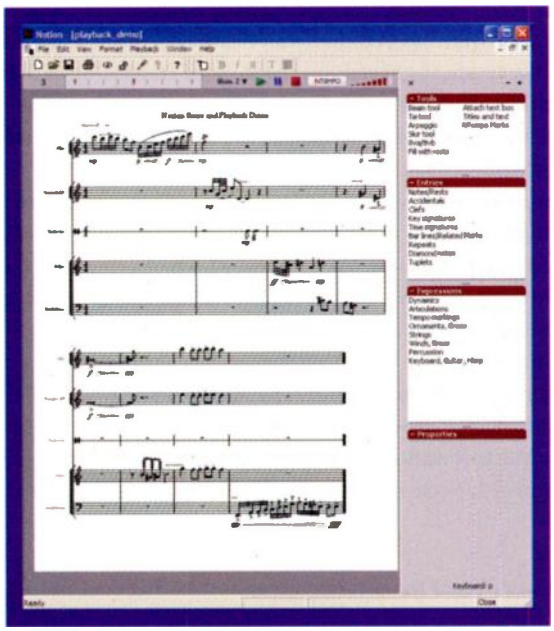
FIG. 2: Sibelius has a large work area for the score and floating windows for special functions. The Navigator window (lower left) helps you navigate the score.

Finale has a toolbar across the top of the work space with icons for accessing specific tools. The score work space is located below the toolbar (see Fig. 3). Twenty-nine tools give you access to features such as staff editing, key-signature editing, note entry, and so on. You can customize the toolbar to show only the tools that you use. You can select a tool by clicking on it, and you can assign function keys F2 to F12 to select specific tools.

FIG. 1: Notion's score area dominates the screen, with a sidebar for the Tools, Entries, and Expressions palettes. You can click on the timeline above the score to navigate to any measure.

Finale has two score views: Page View shows the score as it will be printed, whereas Scroll View shows the score as an unbroken continuous staff flowing from left to right. In Page View, you can move through the pages one by one or you can type in a page number. In Scroll View, you can type in a measure number or scroll forward and backward with the mouse.

Notion's simple, straightforward interface is a big plus. Sibelius has an elegant integrated work space that is a pleasure to use, and the Navigator floating window is especially handy. Finale's Scroll View is an appealing option that I especially like for viewing a score in the early stages of composition.



Time and Key Signatures

To enter a time signature in Notion, you select Time Signatures on the Entries palette in the sidebar. The resulting Time Signatures palette presents a choice of the most common time signatures, but it's easy to create specialized time signatures with any beamed grouping. Key signatures are similarly easy to enter using the Key Signatures palette. You select traditional key signatures from a list of choices. You can create custom, nontraditional key signatures and even have microtonal accidentals (see Fig. 4).

In Sibelius, you select Time Signatures from the Create menu. You can select standard time signatures, or you can open a separate window to create your own, complete with custom beam and rest groups. You use the Key Signatures menu to choose traditional key signatures. Nontraditional key signatures are not supported, but they are so rarely used that they will probably not be missed.

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In Finale, you can right-click on a measure while the Time Signature tool is selected and choose from a menu of common time signatures (including alternate groupings for asymmetric time signatures). If you need to create an unusual time signature that isn't on the list, you can do that by separately choosing the number of beats and beat duration. Finale's Key Signature tool lets you select a standard key signature or create a nonstandard one of your own design. As with the Time Signature tool, it is a bit cumbersome to create nontraditional key signatures, but right-clicking provides quick access to common choices.

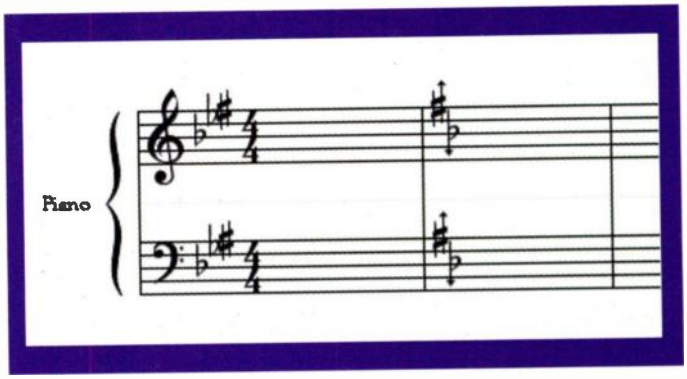

FIG. 4: Notion offers nontraditional key signatures (left) and microtonal accidentals (right), which play back microtonally.

Notion is the most flexible for selecting and creating time and key signatures and is very easy to use. Sibelius is also easy to use but not quite as flexible, whereas Finale is flexible but somewhat cumbersome in how it handles nonstandard time and key signatures.

Note Entry

You'll probably spend the most time in a notation program entering notes. A good set of note-entry tools is a particularly important feature in terms of work flow. Music-notation programs offer several ways to enter notes—for example, selecting note values from a palette of choices or playing the music in real time—but in my experience, the most efficient is step entry. That is called Step Time Input in Notion and Sibelius and Speedy Entry in Finale, and it's the method I'll discuss in detail.

The Sibelius work space includes a floating window that depicts a computer's numeric keypad. Keys on the numeric keypad represent different rhythmic values. The center key, 5, for instance, selects a half note. One hand selects rhythms on the numeric keypad, while the other hand plays the desired pitches on a MIDI keyboard. Finale's Speedy Entry uses a similar technique (see **Fig. 5**).

In Notion, instead of using the numeric keypad, you use letter abbreviations for the rhythmic values. Type Q to select a quarter note, E for an eighth note, W for a whole note, and so on. These letters are much easier to learn than the number codes of Finale and Sibelius, but the keys are not as conveniently spaced under one hand (think, for example, of the distance between Q and H on the keyboard).

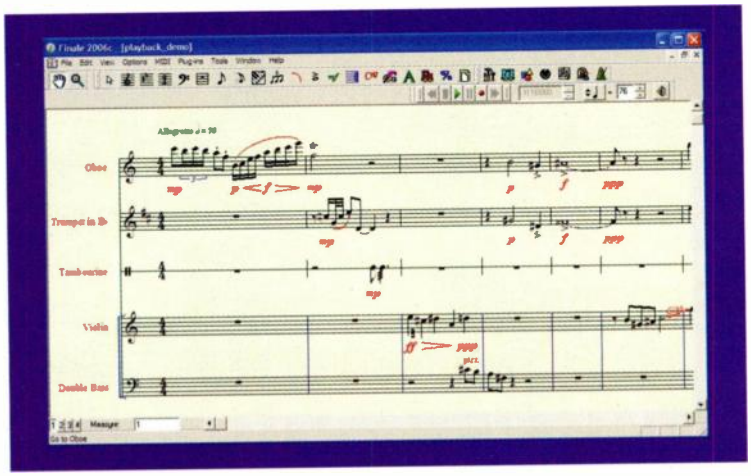

FIG. 3: Finale's tools are found just below the menu bar. The score work area is in Scroll View mode. Nonprinting color coding helps distinguish different types of symbols.

Articulations and Expressions

Once you have entered notes, it's time to add articulations (staccato dots, accents, and so on), dynamics (such as piano and forte markings and crescendo hairpins), expressions (tempo indications such as allegro), and other symbols. All three programs have a large set of standard symbols and allow you to customize their symbols or create your own. I'll compare how the three programs handle dynamic markings and hairpins.

In Notion, you select dynamics from the Expressions palette or use a shortcut key. For some keyboard shortcuts, Notion toggles through several values as you repeatedly press the key. When you press F, for instance, the cursor changes to *mf* (mezzo forte). Press F again, and the cursor changes to *f* (forte). Continue pressing F to cycle through *ff*, *fff*, *ffff*, and *fffff*, and then back to *mf*. That's a very efficient system because you have to learn only one shortcut key rather than six.

To enter a crescendo hairpin in Notion, type the shortcut key Comma (easy to remember because that is also the key for the < symbol on the standard QWERTY keyboard), click where you want to place the hairpin on the score, and drag it to the right until it is the correct size. Conveniently, when you enter crescendo hairpin symbols, other dynamic markings are automatically repositioned to avoid collisions.

In Sibelius, you add dynamic markings and other symbols through the Expression Editor, which is easily accessed by pressing Control + E (Windows)

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or Command + E (Mac). You can then right-click to get a customizable Word menu with a large palette of symbols, or you can type a keyboard shortcut (Control + F for *f*, for example). To add a hairpin, select the note above or below which you want to attach the hairpin and press the keyboard shortcut H. The keyboard shortcuts are well thought out, but you can change them if you want.

You use the Expression tool to enter dynamics in Finale. Double-click on the note above or below which you want to attach the symbol, and then select the desired symbol from a palette of choices.

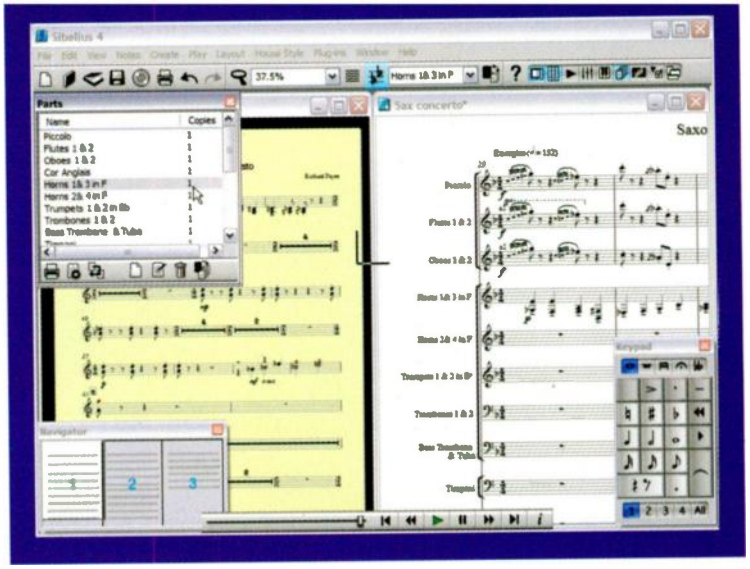

FIG. 6: Sibelius's seamless integration of parts with the full score is a significant convenience for anyone working with ensemble pieces.

Finale's Metatools give you single-keystroke access to any Expression symbol, and you can reprogram these keystrokes if you'd like. For instance, if you've assigned the F key to the *f* forte symbol, all you need to do is hold down the F key and click on every note where you want to place a forte symbol. This system lets you add dynamic markings very quickly. To enter hairpin dynamics, you select the Smart Shapes tool, select the hairpin from the Smart Shapes palette, double-click on the score where you want the hairpin to be located, and drag to where you want the hairpin symbol to end.

Entering articulations is similar for each program. In Sibelius, you can enter those symbols while entering notes in step-time input, which offers a speed advantage to experienced users.

Finale, with its 1-click Metatools, is the fastest for entering dynamics. Sibelius's time-saving integrated interface lets you enter articulations while you're entering notes. Notion's strength is its straightforward and easy-to-learn interface. Its toggle system can slow you down, but you don't have to remember as many shortcut keys.

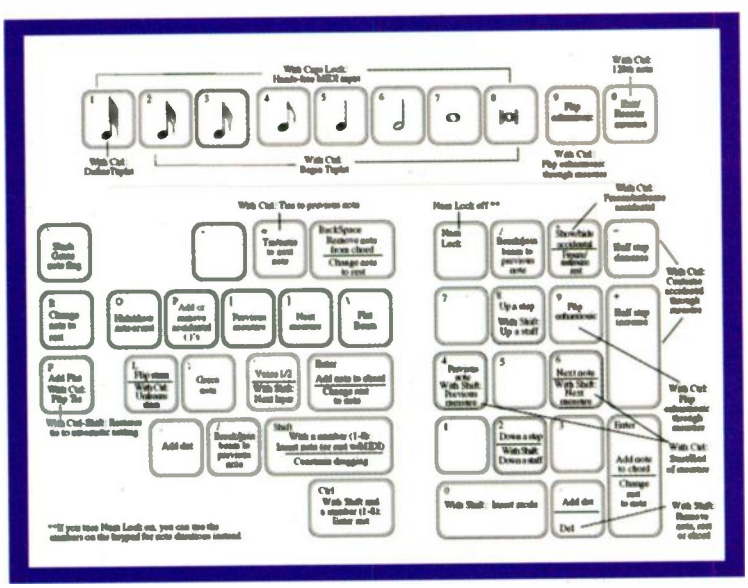

FIG. 5: Finale's Speedy Entry provides keyboard access to a variety of commands.

Score Playback

Notion's developers have given high priority to playback. Notion comes with recorded samples from the London Symphony Orchestra, and the sample playback is tightly integrated into the program. If you enter a trill, for example, you don't get a synthetic trill created by switching back and forth between two instrument samples; you get a beautifully realistic sample of an actual trill being performed. Not all articulations are supported in this way (for instance, a string harmonic articulation won't play back as a string harmonic), but enough common ones are available to make a difference in the sound.

VirtuosoWorks has been creating additions to the sample library at a fast pace, and expanded libraries are available for strings, percussion, harpsichord, woodwinds, and brass, with prices ranging from $29 to $69. The realism of Notion's playback is stunning, and it will only improve as more sample libraries become available. For added realism, you can use Notion's Ntempo feature to conduct your score and make subtle changes in the tempo.

Finale comes with the Finale Edition of Garritan Personal Orchestra, and you can purchase the full version for an additional $189. Sibelius comes with a basic instrument set called Kontakt Player Silver, and for $149 you can purchase additional instruments in Kontakt Player Gold. Sibelius also offers the complete Garritan Personal Orchestra and its own Rock and Pop Collection as options. In Sibelius, there are noticeable delays in loading the instrument library for a large orchestral score. **Web Clips 1 through 6**

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compare score graphics and playback for Notion, Sibelius, and Finale.

Score Layout and Parts Extraction

Notion gives you an excellent-looking score layout. It requires very little adjustment but has fewer options for customizing the score's appearance. You can't change the appearance of a staff for a few measures, nor can you move or resize individual staves. For example, you can't make one staff smaller than the others, as is commonly done. On the other hand, Notion will automatically adjust the distance between staves to avoid conflicts between very high and very low notes. Fewer features and greater simplicity will appeal to users who don't need to deviate from a standard layout.

By contrast, Sibelius and Finale give you almost limitless flexibility. Sibelius uses a concept of House Styles that lets you define or change your score's appearance quickly and easily. In Sibelius, it's extremely easy to move staves around. If you move the top staff, the entire score shrinks, maintaining the same proportions between staves. If you move a lower staff, you create a gap between that staff and the one above.

Finale's Page Layout tool offers extensive options for score layout. With the Staff tool, you can apply Staff Styles to an entire score or to any selection. Sibelius and Finale provide excellent default layouts, so you don't have to dig into all of these options if you don't want to, but the possibilities for changing score layout are endless.

Generating a set of parts from a full score is one of the most important time-saving aspects of notation software. In handwritten scores, this is a tedious, time-consuming, and error-prone task. Not having to copy parts for just one short orchestral piece is worth the price of any music-notation software. Notion and Finale both have a command to quickly extract the parts and automatically create separate files for each of them.

Sibelius offers the most elegant way to handle parts. With its Dynamic Parts (see **Fig. 6**), you can view any part at any time, then easily switch back to viewing the full score. You can make changes in a part that will be reflected in the score (correcting a note error, for example), and you can also make a change that will appear only in the part. (Sibelius helps you keep track of this by color coding.) Dynamic Parts is a significant advance in notation-software part handling, and a similar feature is now available in Finale 2007.

ALSO NOTEWORTHY

Igor Engraver, Nightingale, and Overture are all worthy of consideration as you shop for notation software. Nightingale is Mac only, which disqualifies it for our roundup, and the manufacturers of Overture and Igor Engraver did not provide timely review copies. My comments here are based on the demo versions of those two programs. All three programs cost about half as much as the software in the main text, although in the case of Overture, you must pay for the sample library if you need it, and neither Nightingale nor Igor Engraver offers a sample library for playing their scores.

Overture has an attractive and easy-to-use interface. In addition to score entry, it offers a piano-roll view typical of MIDI note editors in most sequencing software. Guitar tablature is also supported; you can select any group of notes and create a tablature staff automatically. Overture allows you to build a score manually, staff by staff, or load a preconfigured template that's close to what you want and add or subtract staves as necessary. You can manually change the spacing between staves, but you can also invoke a Respace Staves command to automatically resolve conflicts between notes on adjacent staves. Overture is a full-featured VST host and can play and adapt your scores to any VST orchestral library you own.

Igor Engraver has a different approach to scoring from other notation programs. Instead of entering staves one by one, you select musicians from a drop-down list. You then select the ones you want in your piece and click on a Score button to create a score for those musicians. Parts and scores are dynamically linked, allowing you to create several versions of the same piece. Editing any musician's part automatically updates all versions using that musician. The parts are also smart—layout and performance decisions take into account the instrument that will be playing the part. You'll find a review of Igor Engraver 1.6 in the August 2002 issue of EM, available online at www.emusician.com.

Nightingale offers several unusual features to Mac users. The entire collection of symbols is always visible rather than being parceled out among several palettes as in other notation software. Nightingale will print directly to a PostScript file, which can then be converted to a high-quality PDF using Apple Preview. Nightingale doesn't force your notation into a standard format by, for example, restricting the number of notes in a measure or dictating the way beamed notes are grouped. However, it can force your score to conform to standard notation format if you want. Finally, Nightingale takes full advantage of OS X features such as mouse shaking, which toggles between the current tool and the selection tool. You'll find a review of Nightingale 4.0 in the September 2001 issue of EM.

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Other Cool Features

Each of these programs has advantages you'll want to consider. If you are working with microtonal notation and playback, Notion has a particularly easy-to-use implementation (see **Web Clips 7 and 8**).

Sibelius, Finale, and Notion all allow you to type in lyrics as you go, and they have many helpful options for editing lyrics as well as for displaying them just the way you want. I especially like the Edit Text option in Finale. You type the lyric in a text editing window (using hyphens for syllable breaks), and then use the Click Assignment feature to align the text with notes. You can return to the text editor at any time to make changes, and those will apply wherever the same lyric appears in the score.

A free, basic version of Finale, called NotePad, can read any Finale file, which means you can share your score files with someone who doesn't own a copy of Finale. Sibelius provides a free Web plug-in called Scorch that allows anyone to view your scores on the Web using most popular Internet browsers.

Sibelius lets you play videos and synchronize music to them, a perfect tool for anyone scoring to picture. MakeMusic has added video support in Finale 2007, including the ability to send SMPTE and MIDI Time Code. Both Sibelius and Finale can scan sheet music into the program. Sibelius sells a nifty color-coded computer keyboard optimized for use with the program for $99.

Sibelius allows music teachers and students to create worksheets to prepare materials for music lessons and classes. A Web site (www.sibeliuseducation.com) contains numerous resources for educators.

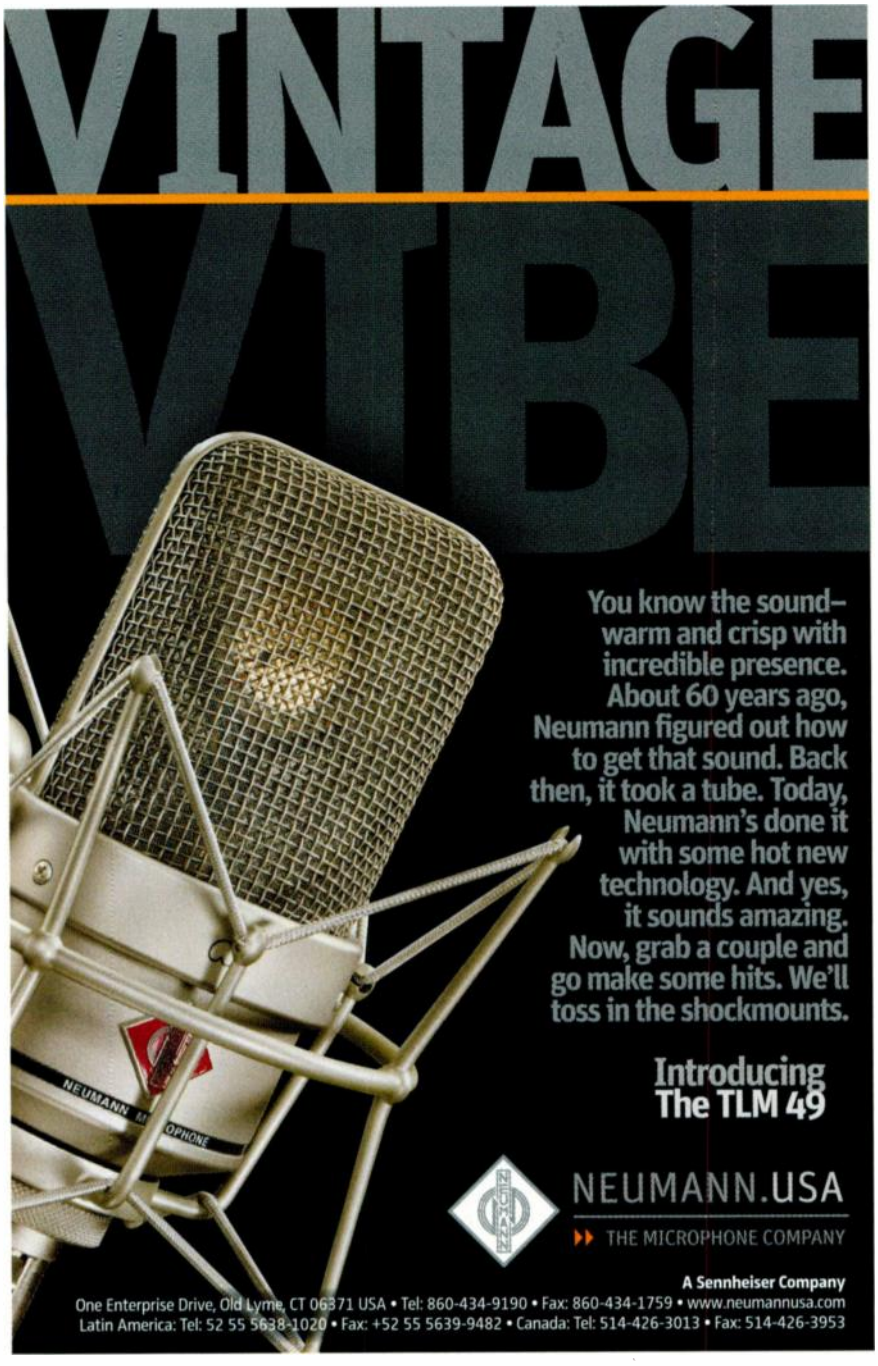
Finale has a number of remarkable education tools. For example, you can generate custom lessons or drills for your students, and there are plug-ins to automatically create accompaniments. Finale also sells a tool called SmartMusic for performing to an accompaniment. It actually listens to your performance and adjusts to changes in tempo. You can generate SmartMusic accompaniments in Finale, but you need to buy SmartMusic separately to use them.

Finale can read MIDI, MusicXML, Encore, MidiScan, Rhapsody, Score, and SmartScore formats. Sibelius can read MIDI, MusicXML, Score, and Finale files. Notion can import MIDI and MusicXML files. A few tests importing Score into Finale were successful, but I was not always able to import Score and Finale scores into Sibelius. Notion, Sibelius, and Finale can all render a score as an audio file.

Recommendations

Notion, Sibelius, and Finale list for around $600 each, with street prices a bit lower. Academic prices for students and teachers are about two-thirds of the list price, so check into that option if you qualify. All three programs sell expansions of their sound libraries.

You can't go wrong with any of these



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programs, but I do have a few general recommendations. If your main priority is high-quality traditional orchestral playback, Notion is the top choice. In that case, you might want to budget for some of the expansion sound libraries. I'd also recommend Notion if you want a program that is easy to learn, although the trade-off is that you have fewer features, less flexibility, and a somewhat slower work flow. If you are interested in microtonal music, Notion has an easy-to-use and great-sounding implementation.

I believe an experienced and intensive user will be able to create professional-quality scores faster with Sibelius and Finale. After some initial training, the user will also appreciate the wider range of capabilities of those programs. Deciding between them is a tougher call. Both are magnificent. The difference is mostly a matter of work style. Sibelius presents a clean, integrated interface, and all options are usually available.

Finale generally operates in a more segmented way. When you initiate a tool in Finale (the Speedy Entry tool, for example), you can enter notes, but you can't enter dynamic markings or edit staves. You would normally enter your notes first, select the Articulation tool to enter articulation marks, select the Expression tool to enter dynamic markings, select the Smart Shapes tool to enter crescendo hairpin marks, and so on. (You can, however, use Finale's Simple Note Entry tool for basic entry of all symbols except Smart Shapes, and the Selection tool conveniently allows you to edit all symbols without having to select each tool.) If you prefer one or the other of these styles, the choice is clear. Otherwise, you can't go wrong with either Sibelius or Finale. EM

EM WEB CLIPS

Peter Hamlin teaches music at Middlebury College in Vermont. In addition to being a composer, he is a member of the live-electronic improv band Data Stream.

Six Degrees of Quantization

By Len Sasso

Synchronizing MIDI and audio to bars and beats.

There goes the groove. That's what first comes to mind when I hear the word *quantize*. But quantizing is about more than moving notes to the bars-and-beats grid; it can be used to align that grid to the notes without affecting the groove. In this article, I'll describe how to apply those techniques to both audio and MIDI.

Start with a freely played audio or MIDI clip that you want to work on in your sequencer. For purposes of following along, record a MIDI clip without reference to a click or other rhythm track. Make the clip fairly long—a complete chorus of a song, for instance—and export it as both an audio and a MIDI file. For the examples in this article, I use Apple Logic Pro 7.2.1, which has a particularly robust set of tools for moving the grid around. You can, however, use most of these techniques with any full-featured digital audio sequencer.

Finding the Tempo

Whether you do it by hand or by using one of Logic's tools, aligning the grid to a freely played audio or MIDI clip amounts to time-locking the clip, and then adding tempo changes to shift the grid lines in time. That means creating a tempo track that matches the tempo changes in the audio or MIDI clip.

Creating a detailed tempo track is much easier when you trim the clip so that it starts and ends on a downbeat. If that cuts off material at the beginning or end of the clip, you can expand the clip at both ends to include that material after creating the tempo track. Once the clip is trimmed, note the number of beats it contains and its time signature. If there are changes in time signature, slice the clip into regions with no time-signature changes and align each region separately.

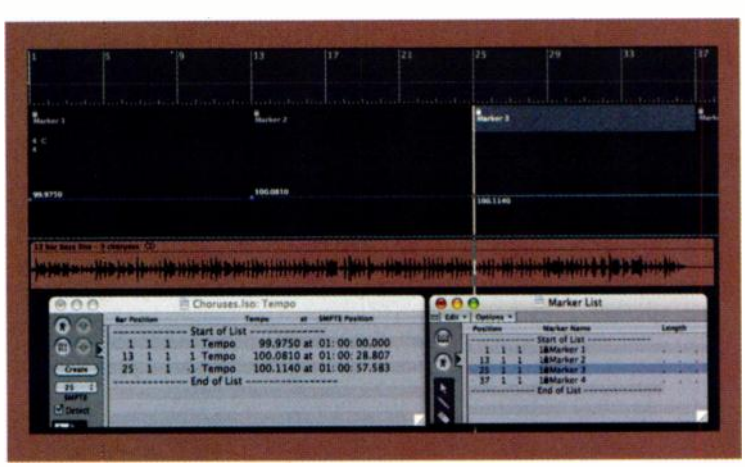

FIG. 1: The timeline markers delineate 12-bar sections of an audio file. The tempo event at each marker aligns the next marker to the bars-and-beats grid.

Place the trimmed clip at the beginning of a track, set Logic's time signature appropriately, and in the case of MIDI, set Logic's tempo to the recording tempo (if you know it). The recording tempo may have no relationship to the actual tempo of the MIDI clip, but it will allow you to recapture the actual tempo. If you're working with MIDI, also time-lock the clip by selecting Lock SMPTE Position from the Region menu. You don't need to time-lock audio clips, because their length remains fixed when you change Logic's tempo.

Before proceeding with finer alignment, place Logic's Left Locator at the beginning of the clip and set the Right Locator so that the cycle encloses the correct number of bars and beats. Then use Logic's Adjust Tempo feature using the Region Length And Locators command to calculate an average tempo for the clip. That will also adjust the grid so that the clip fits the cycle exactly.

The next steps change depending on the degree of refinement you need. If you want to align the grid in only a few places (say, to mark the choruses of a song for rehearsal or overdubbing purposes), it's easiest to proceed manually, and I'll describe how to do that first.

Marking Choruses

Ensure that Logic's Global Tracks are displayed and that the display includes the Marker and Tempo tracks. Place a marker at the beginning of each chorus and be sure to place one at the beginning of the clip. Logic's Create Marker Without Rounding key command is handy for dropping markers on the fly as the clip plays.

Open Logic's Marker list, and then time-lock all markers. Open Logic's Tempo list and adjust the tempo of its only tempo event until the second marker is at the correct grid position. The easiest way to zero in on the exact tempo is to click on individual digits of the tempo value, working from left to right, and then use the computer's Plus and Minus keys to increment and decrement each digit.

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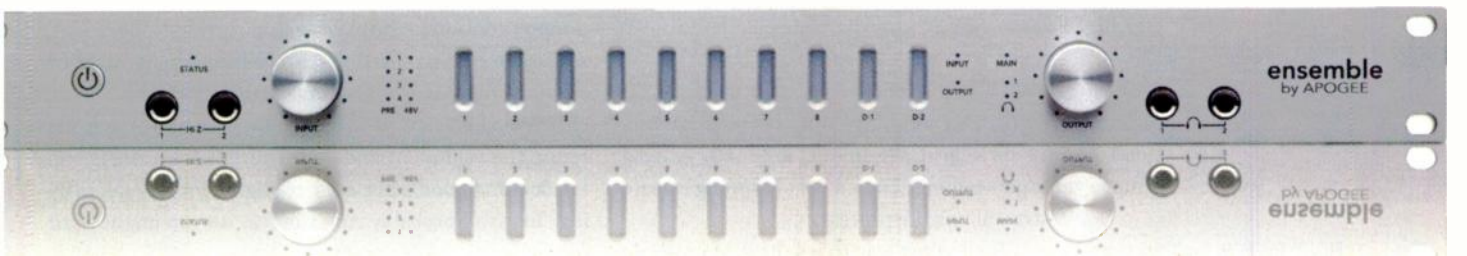

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Next, move Logic's Song Position Line (SPL) to the second marker (the one you just aligned) and click on Create in the Tempo list to create a new tempo event at that location. The Go To Next Marker and Go To Previous Marker key commands are handy for moving the SPL between markers. Repeat this process for each marker. When you're done, the choruses will start at the correct grid positions, although within each chorus the grid probably won't line up exactly (see **Fig. 1**).

Marking Smaller Sections

Markers are great for aligning choruses or large sections, but for finer grid alignment, manually editing tempo events gets tedious. Logic's Beat Mapping feature streamlines the process.

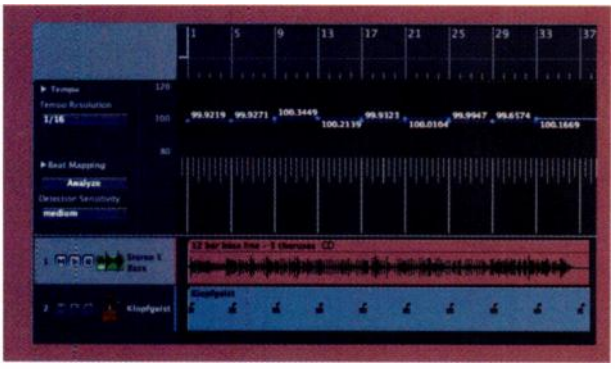

FIG. 2: The MIDI tap track places notes at 4-bar intervals. Logic's Beat Mapping tool was used to align the taps to the correct bars-and-beats positions.

The easiest way to use Beat Mapping is to create a MIDI *tap track*. Logic's Klopfgeist (metronome) virtual instrument and the Capslock MIDI keyboard are handy tools for that. Create a Klopfgeist track and press the computer's Caps Lock key to display and activate the Capslock keyboard. Then start recording on the Klopfgeist track and play a note at the start of each of the desired sections. Finally, select the resulting MIDI clip, display the Beat Mapping Global track, and connect the taps (displayed at the bottom of the Beat Mapping track) to the appropriate grid lines (displayed at the top of the Beat Mapping track). Each new connection creates the necessary tempo event to align the tap with the grid line (see **Fig. 2**). If your taps are regularly spaced and no more than a bar apart, you can use the Beat Mapping track's Beats From Rgn button to connect them to the grid automatically rather than doing it manually.

There are two alternatives to creating a tap track manually. If you're working with audio, you can click on the Beat Mapping track's Analyze button to create transient markers along the bottom of the Beat Mapping track. For aligning sections that are a bar or more apart, however, ferreting out the correct transients can be more trouble than it's worth.

When working with a MIDI clip, you can often identify notes in the clip that mark the beginnings of sections. Copying those to a new MIDI clip and adding missing notes as needed is faster than creating a tap track from scratch.

The MIDI Edge

Aligning an audio clip to the grid helps make metric sense of the audio for transcribing, scoring, rehearsing, and overdubbing. You have several more options with MIDI clips, and if you convert an audio clip to Propellerhead REX file format, you can apply the same techniques to the resulting slices.

For scoring purposes, it's essential to have MIDI aligned with the grid. Depending on the amount of tempo variation in the playing, a fairly rough alignment, such as 4- or 8-bar sections, is often sufficient. Start by aligning the natural sections within the piece. Next, examine the score; if it needs more than a touch-up, refine the alignment and look again. If the score is still not looking good after a 1-bar alignment, try quantizing. That will probably ruin the feel, so you might want to save a copy of the original.

You can often use quantizing to tighten the feel after you've aligned the grid to 1-bar sections. You can quantize the entire clip using the Arrange window's Region Parameters box, and you can set the quantize strength, range, and other options in the Extended Region Parameters. Alternatively, you can quantize selections of notes in any of the note editors. In either case, quantizing is nondestructive, so you can change your mind later (see **Web Clip 1**).

Modifying the tempo map that results from grid alignment is another way to smooth things out. You can use that to reduce tempo variations and reduce or increase intentional speedups and slowdowns such as a ritard at the end of a piece. If you want to preserve the original tempo map, copy all the tempo events to a new tempo alternative and use that for the tempo alterations.

To reduce or increase tempo variations, open the Tempo Operations window, select Scale Existing Tempo Changes from the menu at the top, make note of the first tempo value, and then choose a negative scaling percentage to decrease variation and a positive percentage to increase variation. Next, select all tempo events and set the tempo of the first tempo event to the original value. That leaves the overall tempo unchanged while increasing or decreasing the tempo variations.

Once an audio or MIDI clip is aligned to the grid, you can often use step-entry and step-sequencing tools as well as tempo-synchronized effects. For example, you might find that you can use a drum sequencer to add percussion. As with quantizing, a 1-bar alignment works best with step-entry tools. The important point is that aligning the grid to a freely played clip brings a host of sequencing tools into play that would otherwise be unusable. EM

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Sounds in Motion

By Jim Aikin

Create morphing mayhem with multiple filters.

Filters are handy tools for shaping the frequency content of sounds so that they sit better in a mix. They're also a potent resource for producing creative sound design. Filters can have especially tasty results when you use more than one, modulate the cutoff frequency, and combine them with effects such as distortion and delay. Filters can add punch to ho-hum drum loops, rhythmic activity to sustaining pads, and ethereal colors to vocals.

Filters are found in most synthesizers, but they're also available as plug-in effects. With software such as Antares Filter or U-he Software Filterscape, you can filter a drum loop or a vocal in radical ways.

Route 66

When more than one filter is available, you can route them in series or parallel. With a series routing, you'll hear only the portion of the frequency spectrum that passes through both filters. For instance, a lowpass filter in series with a highpass filter will produce a bandpass response. In that case, the width of the band will depend on the relative cutoff frequencies of the two filters.

Putting two lowpass filters in series and setting their cutoff frequencies to the same or nearby values will produce a steeper rolloff slope than either filter would have by itself. Be careful when cranking up the resonance of filters in series, though; when the resonant peaks are at the same frequency, the output can be quite loud.

Antares Filter (see **Fig. 1**) has four filters and half a dozen signal-routing algorithms—for instance, filters 1 and 2 in series along with 3 and 4 in parallel. **Web Clip 1** shows what can happen to a simple drum loop when processed by three parallel filters. If you're using a plug-in such as Camel Audio CamelSpace, which has only one filter, you can create a series routing by using two instances of the plug-in as inserts or a parallel routing by placing the instances on aux-send channels (see **Web Clip 2**).

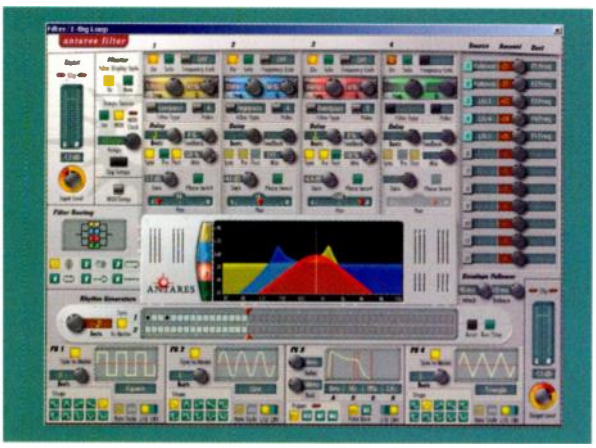

FIG. 1: Antares Filter incorporates four resonant multimode filters with delay lines and various modulation sources.

With parallel filters, panning each one to its own point in the stereo field will give the composite sound more breadth. Balancing the output amplitudes is also helpful. The ear is most sensitive to sounds in the midrange, and you can often get good results by backing off on bandpass filters that have a center frequency of around 1,000 Hz.

Hitch a Ride

When using a filter as an effect, it's normal to modulate the cutoff frequency (and other parameters). Some filter plug-ins have step sequencers, with which you can move the cutoff in a rhythmic pattern. Synced LFOs are also good modulation sources. When using more than one LFO, I usually set the LFO rates to different rhythmic values in order to create polyrhythms. For instance, one LFO might cycle in a 3-beat pattern while another cycles every 5 beats.

An envelope follower is a great modulation source. With a drum loop as an input, the envelope follower will output a rhythmic contour that tracks the beat. Depending on the features of your audio sequencer, you may be able to input the drum loop as a sidechain and use the envelope follower to modulate an entirely different signal.

Drive, She Said

Adding overdrive distortion before a filter gives the filter more overtones to work with, which adds character to the filtered sound. By adding distortion after a narrow bandpass filter, you can pick out one element of a track (such as the ring of the snare drum) and turn it into a new rhythmic element whose character is completely different from the original sounds.

If the cutoff is being modulated by a step sequencer or synced LFO, inserting a stereo delay line after the filter will create more-complex rhythm patterns. The delay should also be synced to the master clock.

Specialized filtering plug-ins are used for exotic effects. The bands in Equo, a graphic equalizer in Image-Line FL Studio, can be morphed or used as sends to other effects. Native Instruments Spektral Delay contains as many as 1,024 stereo bandpass filters—each with its own delay line. In **Web Clip 3**, a drum loop is turned into an audio collage, delaying different filter bands in Spektral Delay by different amounts of time. EM

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Jim Aikin composes and records in a home studio whose PC is well supplied with filters. He is a frequent contributor to EM.

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A Change Is Gonna Come

By Brian Smithers

Get to know the world of transducers.

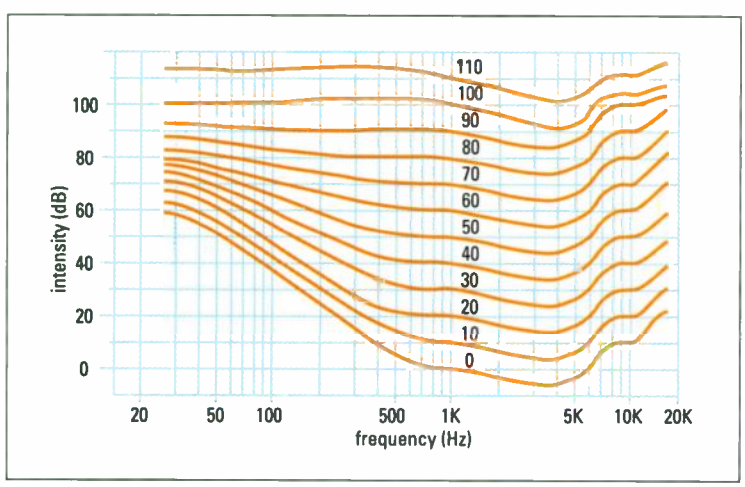
As the term implies, an *electronic musician* depends on electrical devices to produce, capture, manipulate, and deliver musical ideas. At some point, the electric signals that electronic musicians create must be transformed into acoustic energy that then excites, tickles, or assaults the ears of listeners—hopefully producing the desired emotional effects. Similarly, if you want to record an acoustic instrument or voice, you need to transform acoustic energy into electric energy.

Transforming between acoustic and electric energy is the job of a *transducer*. Several types of transducers are used in producing any given musical work. In this article, I'll look at transducers, their various types, their functions in the musical process, and the factors that determine their quality.

Ch-ch-changes

As noted, a transducer converts energy from one form to another. Think of the various forms of energy that musicians deal with—electricity, acoustics, mechanics, light, magnetism—and you will see the potential uses of a transducer.

Just making a field recording might require three types of transducers. A microphone converts acoustic energy into electricity, a tape head converts electricity into magnetism, and headphones convert electricity to acoustic energy so we can monitor the recording. Playing a CD requires a laser pickup to convert the light energy of the laser reflecting off the pits and lands into electricity. And your inner ear has specialized hair cells called *cilia*, which convert the mechanical energy of the vibrating eardrum into electrical energy that is transmitted to your brain via the auditory nerve.



CHUCK DAHMER

FIG. 1: A theoretically perfect transducer would have uniform response across all frequencies at all amplitudes. The equal loudness curves show how our personal transducers, our ears, deviate from that ideal.

Truth or Consequences

The ideal transducer would produce an output signal that has characteristics identical to those of the input signal. In other words, the result should be a perfect *analog* of the impetus. A transducer is judged by how near it comes to that ideal.

A transducer must be sensitive to a wide range of intensities and frequencies. A perfect transducer would have a flat response, producing the same output-to-input ratio at all frequencies and at all input levels. Our ears, by contrast, are much more sensitive to frequencies between 1 and 6 kHz, and their frequency response changes with volume (see **Fig. 1**).

A perfect transducer adds no noise and does not distort the signal. A transducer's response is said to be linear (undistorted) when its output level is directly proportional to the input level so that, for example, a doubling of input level results in a doubling of output level.

The speed of a transducer's response to a stimulus is important in preserving the attack and release of a sound. A large mechanical transducer such as a loudspeaker must therefore be sufficiently powered to give it quick transient response and properly damped to counteract its momentum.

Always having perfect transducers, however, is not only unrealistic but often undesirable. That pretty presence peak in your favorite vocal microphone is a technical imperfection, but it may be the perfect choice artistically. Similarly, the revered warmth of analog tape is actually a type of distortion.

Transducer Triangle

Many of the transducers that we depend on function as a result of the interaction of three properties: electricity, magnetism, and motion. Current flowing through a wire, especially a coiled wire, creates a magnetic field. Conversely, changing the magnetic field around a wire produces electric current in the wire. Two magnets physically repel or attract each other depending on the relative orientation of their poles. Therefore, if a wire

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and a magnet are brought into close proximity, a change in any one of those properties while a second remains constant will induce a proportional change in the third.

Fig. 2 illustrates that principle. A wire is positioned between the poles of a magnet. If the wire (or the magnet) is moved, electric current flows through the wire relative to the magnitude and direction of the motion. If instead a current is introduced into the wire, a magnetic force is created that pushes and pulls against the magnet, causing either the wire or the magnet to move. Varying the properties of the magnet will induce either current or motion in the wire.

With dynamic microphones, a coil of wire is attached to a thin membrane that is called a *diaphragm* and suspended between the poles of a magnet. A singer shouts into the microphone, creating changes in air pressure that move the diaphragm back and forth, causing the coil to oscillate within the magnetic field. A corresponding voltage is created in the wire and subsequently amplified through the sound system to the delight of screaming fans.

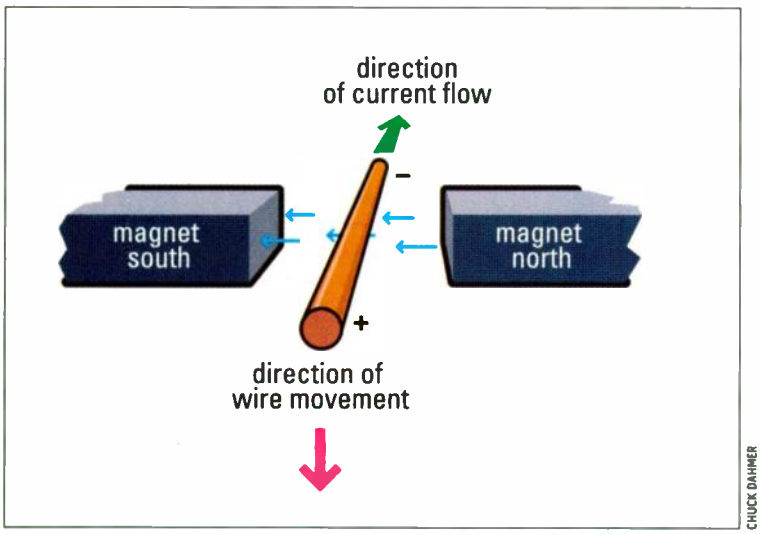

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FIG. 2: When a wire is moved within a magnetic field, current is produced in the wire that corresponds to the direction and magnitude of the motion.

A ribbon microphone suspends a thin strip of metal in a magnetic field. A cello, for example, creates fluctuations in air pressure that move the ribbon within the field, inducing current in the ribbon itself. That signal is then carried along a wire to a recording device that captures the performance for posterity.

Speakers depend on the same principles as microphones, but the flow of energy is reversed. Replace the diaphragm of a dynamic microphone with a speaker cone, apply voltage to the coil, and the current flowing through the wire within the magnetic field causes the coil-cone assembly to move, pushing on the surrounding air to create acoustic energy. Similarly, ribbon speakers reverse the behavior of a ribbon microphone.

With tape recorders, electricity flowing through a wire wrapped around a metal core creates an oscillating magnetic field that realigns the magnetic domains of the tape's emulsion. In playback, the variations in orientation of the domains create corresponding variations in the magnetization of the metal core, which induces a corresponding current in the wire.

Try This Instead

Condenser, or capacitor, microphones have a diaphragm that is suspended close to a stationary backplate. Connecting the diaphragm and the backplate to an opposite lead of a voltage source (either a battery or phantom power from the mic preamp) turns the assembly into a capacitor. The vibration of the diaphragm in response to acoustic energy changes its spacing relative to the backplate, changing the assembly's capacitance and thereby creating a voltage proportional to the vibration.

Piezoelectric pickups depend on the characteristic of certain crystals and ceramics to produce voltage in response to physical pressure. The deformation of the crystal caused by acoustic energy disrupts the internal electrical balance of the material, and voltage results in proportion to the deformation. Conversely, electricity applied to piezoelectric crystal causes physical deformation—the speaker in your watch or phone may take advantage of that to vibrate the surrounding air. Phonograph cartridges were originally piezoelectric devices (ceramic cartridges), but nowadays they are ordinarily electromechanical transducers (magnetic cartridges), functioning like a dynamic microphone that tracks the undulating record groove instead of air pressure.

The light-emitting diode (LED), which converts electricity into light, is a transducer with surprising utility for musicians. With a classic opto-compressor, the detection circuit is a light source (the LED) whose intensity follows the signal voltage. The light controls the behavior of a light-dependent resistor (LDR), which attenuates the output voltage. The slew rate, or response time, of the LED and LDR determine the attack and release characteristics of the compressor. Such compressors are sought after for the unique character of their response.

Similar use of light to control musical signals is found in the vibrato circuit of a Rhodes Suitcase piano and in some oscillator and filter designs. It is even the basis for the optical isolation of a MIDI In jack, which prevents ground loops in a daisy chain.

Musical creativity is all about transforming an abstract idea into an audible work. Until we can make that transformation directly, we will continue to depend on all sorts of transducers to help us with the process. EM

Brian Smithers is Course Director of Audio Workstations at Full Sail Real World Education and the author of Sonar 5 Ignite! *(Thomson Learning, 2005).*

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Enter the details of your client communications in your database and have a plan for following up. Use the information that you jotted on the back of those business cards to start filling in the notes section. What did you talk about when you met? Is he or she working on a new project? If so, how imminent is it? Did you mention that you're going to send them your latest demo? Put everything down in your database; the potential client might not remember everything you discussed but will be impressed if *you* do. Supplement your notes with pertinent data about the client that you can find online.

If you're sending a demo, you can use the database program to create your letter, the label for your CD, and the mailing label. Set up these layouts once, and they will make your life much easier when you need to send out 100 more.

Tactful Persistence

Initial contact is one thing; keeping in contact without driving a prospective client crazy is another. Email is cheap, easy, and unobtrusive. Within a week of meeting a work contact, send a follow-up email. Has he or she started looking for recording studios? Did the demo you sent arrive? Has a decision been made about whether your band can audition? Include news about your latest projects in your emails, because that shows you're working. Keep it short and sweet, and then sign the email with a signature line that contains your URL and phone number.

Be constructive with phone calls. Telephone a client (or potential client) if contact has waned for a while or if you know there is an imminent project. When you speak on the phone, take cues from the person's tone of voice. If he or she sounds rushed, ask if there's a better time to call back. If you're told that a decision on who to hire for the job will soon be made, find out what it would take for you to be chosen. If no decision will be made for a while, find out when one is expected. If you're getting the vibe that there is no interest in your services, say thank you and move on. Don't waste time pursuing dead ends.

The key is to think about who might potentially hire you.

Building Trust

As you work on one project, keep in mind that you are also "interviewing" for the next one. Don't be late, don't act overly familiar, and don't dress or act like a slob. You can look cool, but your demeanor should always be professional.

Make sure to meet any and all deadlines. Ask leading questions to ascertain that you're delivering what your client needs. Focus on the current project but also keep your ears open for other possible projects. A film producer might need sound design in addition to the score you're writing. Or a producer that you're playing a session for might have another project that could use your talents.

Develop relationships with your competitors. If they have a gig they can't fulfill, they might recommend you. Clubs and festivals often have multiple bands on one date. Split the contact information with another band in your genre, and you can hit twice as many festivals. Better yet, find a band from another city in which you want to tour. Open up for each other in your respective hometowns. If you have a small studio but some great mics, find a larger studio that can refer smaller clients to you in exchange for letting them borrow your mics.

Finally, get feedback from your clients. That can be as simple as asking how the project went. Find out how well you fulfilled their needs and what you could do better in the future. Listen to such feedback and act thankful for the comments, even if you disagree. If possible, get a testimonial from a satisfied client to put on your Web site and ask if you can use that person as a reference.

Reputation Is Key

Developing and nurturing relationships is a long-term process. The time you invest in them is as valuable as the time you spend practicing, writing, or learning to use your studio gear. By carefully developing your rapport with your peers, your name will be at the top of the list when a job becomes available.

Your clients will remember how you treat them. If they trust you and know you'll provide what they need, you'll get the gig. EM

Stuart Ridgway is the owner of Pyramid Digital Productions, Inc., which is located outside of Washington, D.C. For more information, visit www.pyramidmusic.com.

CLIENT-DEVELOPMENT TIPS

Act and look professional at all times. Never miss a deadline.

Ask for, and learn from, client feedback.

Develop a database system to track your contacts. Enter contact information and details of any interactions you've had.

Exchange business cards with as many potential clients as possible. Write down pertinent information about your conversations on the back of their cards.

Follow up after meeting with a potential client by sending them an email within the week.

Look for potential clients by frequenting the places they congregate: groups, organizations, open mics, and so on.

Treat your musical peers well; today's colleague could be tomorrow's client.

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JBL PROFESSIONAL LSR4326P

A monitor that adjusts itself to your studio.

By Rusty Cutchin

Following the trail blazed by its LSR6300 active monitors, JBL has released the LSR4300 series, which offers similar technology at a more affordable price. Like the 6300s, the 4300 models include Room Mode Correction (RMC) circuitry to tailor the speakers' response to your studio's acoustics, computer-based speaker control and status monitoring using JBL's Control Center software (Mac/Win), built-in EQ, switchable digital and analog inputs, a handheld remote control, and many other features.

FIG. 1: JBL's LSR4326P powered monitors feature the Room Mode Correction (RMC) system, which adjusts their EQ response to your studio's acoustics.

Fully Loaded

The LSR4326P (see **Fig. 1**), a powered 2-way monitor with a 6.25-inch low-frequency (LF) driver and a 1-inch silk-dome tweeter, is the smaller of the two models in the 4300 series. (Also available are the LSR4328, which features an 8-inch LF driver, and a subwoofer, the LSR4312SP.) The 4300-series monitors can be purchased in pair packs that include the LSR4300 Accessory Kit, which provides a measurement microphone (with custom clip) for use with the RMC calibration feature, a handheld remote control, a USB cable, and more.

The woofer and tweeter are recessed into a cavity and waveguide, respectively, which aid the monitor's dispersion characteristics. The JBL logo in the bottom left corner of the front panel glows when the monitor is powered up. A horizontal 31-segment LED bar is labeled numerically from –60 to 0 dBfs. Below the bar are the Power, Solo, RMC, EQ on, LF (500 Hz shelf), HF (2 kHz shelf), Preset Recall, and Input Select buttons. (Presets can be stored using the Control Center software.) At the far right are increment and decrement buttons.

The monitor's unique rear panel (see **Fig. 2**) contains a conical 4-inch port cut into the middle of the heat sink and positioned on a direct line with the high-frequency (HF) driver. One ¼-inch TRS jack and one XLR jack are provided for analog input. Digital in and out (24-bit resolution with multiple sampling rates) are available in both S/PDIF and AES/EBU varieties. A USB port facilitates connection to a computer running the Control Center software, and you

GUIDE TO EM METERS

5 = Amazing; as good as it gets with current technology
4 = Clearly above average; very desirable
3 = Good; meets expectations
2 = Somewhat disappointing but usable
1 = Unacceptably flawed

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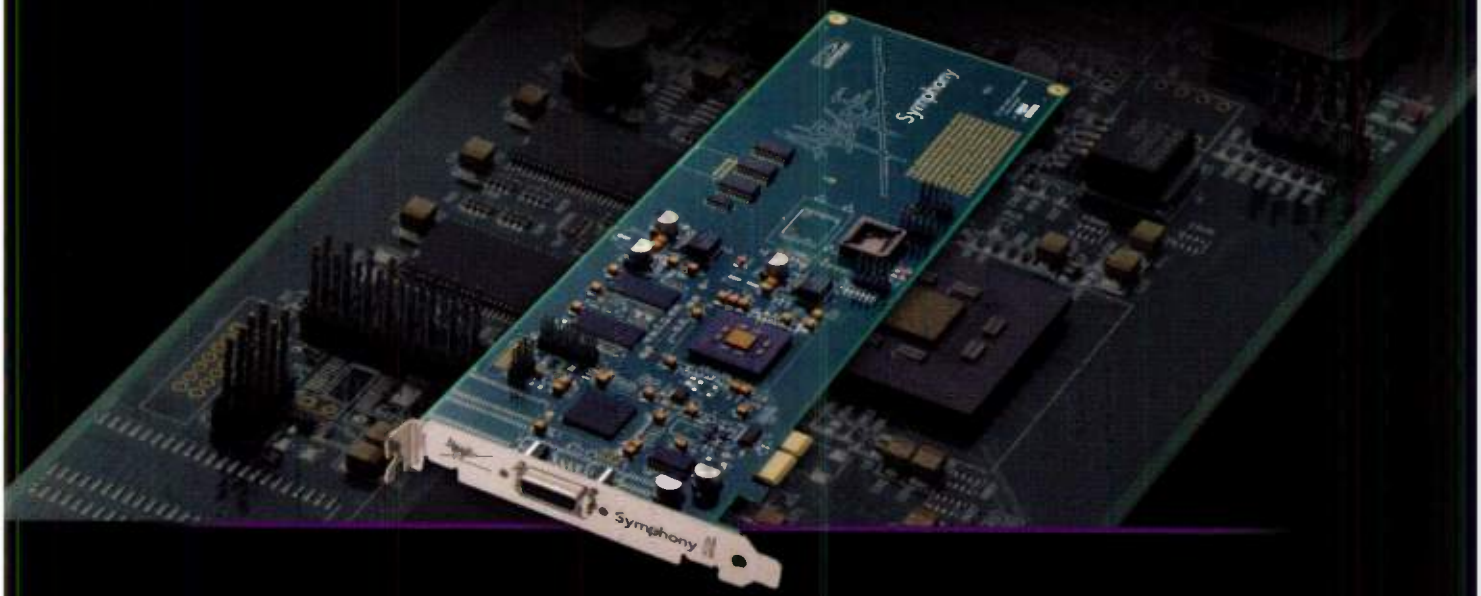

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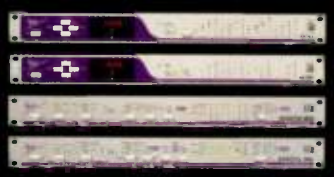

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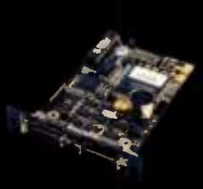

X-Symphony Card

Like other Apogee option cards, X-Symphony fits into any X-Series or Rosetta Series converter, providing a simple and rock solid connection to the Symphony PCI Card and leaving other digital I/Os available.

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As a bridge between Apogee converters and your Mac Pro, the Symphony PCI card offers the connectivity, scalability and performance that makes the Symphony System the most professional native audio solution available.

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also get a 15V phantom-powered ⅛-inch jack for the RMC mic.

Five dedicated LEDs indicate the active input (analog, S/PDIF channel A or B, or AES/EBU channel A or B). A bank of DIP switches sets the speaker ID, which can be Left, Right, Center, L Surround, R Surround, C Surround, Left Extra, or Right Extra. Fortunately, there's one DIP switch for each ID; you don't have to set eight different configurations of switches if you have eight monitors.

You must choose between the XLR or TRS inputs for receiving analog signals, but you can keep a S/PDIF and an AES/EBU source connected simultaneously with the analog source and switch between the three signals using the front-panel, the handheld-remote, or the Control Center software controls. You use the S/PDIF or AES/EBU output on the first monitor (usually L) to pass the second digital channel to the second monitor (R).

Connecting the monitors with a CAT5 cable (included) enables what JBL refers to as Harman HiQnet, which gives you more control options. It lets you change settings on all monitors from one front panel and adjust additional settings using the Control Center software (see **Fig. 3**).

The software lets you mute individual monitors or the entire system, and gives you finer control over levels than is available on the monitors themselves. You also get the ability to create and store custom EQ presets. The software also allows you to change the corner frequencies of the high and low shelving EQs, which are preset at 2 kHz and 500 Hz, respectively, with 2 dB of boost or cut for each band. The EQ can't be set differently for different monitors when they're connected to the network.

PRODUCT SUMMARY

JBL PROFESSIONAL LSR4326P

active monitor
$699 each
LSR4326P Pak (two LSR4326Ps and LSR4300 Accessory Kit)
$1,399

FEATURES	4
EASE OF USE	4
AUDIO QUALITY	5
VALUE	5

RATING PRODUCTS FROM 1 TO 5

PROS: Excellent sound. Room Mode Correction tunes speakers to room acoustics. Multiple monitors can be controlled from one. Built-in networking. Software control over USB.

CONS: Sensitive to power fluctuation.

MANUFACTURER
JBL Professional
www.jblpro.com

They Sound Good Too

Setting up the system is easy; JBL provides all the essential components—except the mic stand—that you'll need for RMC calibration. I connected a pair of LSR4326Ps to the analog Control Room outs of a Mackie Onyx 1620 mixer using TRS cables. After making sure the correct DIP switch was engaged on each monitor, I played some contemporary CDs through the system, comparing the sound to three other sets of quality, midpriced monitors.

FIG. 2: The LSR4326P's rear panel provides XLR and TRS analog connections, AES/EBU and S/PDIF digital connections, and USB and Ethernet ports for control functions, as well as a phantom-powered input for the RMC measurement mic.

It was apparent from the beginning that the LSR4326Ps sounded great. They exhibited good definition in the mids, excellent stereo imaging, and superb clarity across a wide range of source material. The acoustic guitars and fiddles in the Dixie Chicks' *Taking the Long Way* had the requisite balance of attack and tone.

At the other end of the fidelity scale, the monitors reproduced every distressed crackle of Gnarls Barkley's "Crazy," and they showed that they could pump up the bass like bigger-woofer competitors. The 6.25-inch drivers produce a low-end frequency response that extends to 47 Hz (–3 dB), so for most projects, the monitors will provide more than enough bottom, while sounding mud-free at high SPLs. The LSR4326Ps definitely sounded as good as any other monitors I've tested in their price range, none of which offer the same wealth of features.

Later I drove the LSR4326Ps from the S/PDIF out of a Lexicon Omega audio interface. Both the Onyx mixer, with its FireWire interface, and the Omega were receiving source audio from my dual-processor Apple Power Mac G5. The audio processed at the monitor's S/PDIF port was virtually indistinguishable from the sound coming through its analog input, once levels were matched.

Command and Control

After my initial listening tests, I interconnected the stereo pair using the supplied CAT5 cable and inserted the two supplied terminators into the unused Ethernet ports on each speaker. (In a surround system the terminators would go on the first and last speaker connected.) I confirmed that all functions of the right speaker could be accessed from the left speaker's control panel and from the handheld remote. (You point the remote at the

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WRH

left speaker—that is, the one with the Left DIP switch engaged—regardless of the number of monitors connected.)

With the Harman HiQnet facilitating communication between the monitors, and a USB cable connecting the L monitor to my Mac, I launched the Control Center software. The CD supplied with the review package was a Windows disc, but it was a simple matter to download the Mac version from www.jblpro.com/lsr/downloads.html.

The software gives you another level of control that becomes more useful the more monitors you connect to the system. Using the software is the fastest way to switch inputs. If the monitors were connected directly to your computer's audio interface, and you were to lose the handheld remote, then the software would be the fastest way to mute the whole system in the event of sudden feedback or other errant-signal noise.

FIG. 3: The Control Center software gives you finer control over levels, input switching, EQ, muting, and more. It also displays the specific parameters of the RMC EQ curves (as shown here) that the system has generated.

Tune to the Room

You create the RMC curve by plugging the supplied measurement mic into the RMC Mic jack on the L monitor's rear panel, positioning the mic vertically on a stand at the mixing position, and holding down the RMC button on the monitor's front panel. A series of momentary (and fairly loud) swept sine-wave tones will emanate from the speakers as the monitor measures the low-frequency response from the mic. A few seconds later you have a stored master EQ that you can keep, delete, or defeat.

The RMC EQ curve for my studio featured about a 10 dB cut at 50 Hz. The software displays a representation of a graph that tells you the RMC calibration has been completed. If you click on the graph, a table comes

LSR4326P SPECIFICATIONS

Analog Inputs	(1) balanced XLR, (1) balanced ¼" TRS, (1) ⅛" RMC mic
Digital I/O	S/PDIF, AES/EBU
Other Ports	USB, HiQnet (Ethernet RJ45) in, out
High-Frequency Driver	1" neodymium, silk-dome diaphragm
Low-Frequency Driver	6.25" neodymium, polymer-coated paper-fiber cone
Frequency Response	55 Hz–20 kHz ±1.5 dB
THD + N (½ Power)	<0.02%
Digital Input Sampling Rates	96, 88.2, 48, 44.1, 32 kHz
Digital Input Word Length	24-bit
High-Frequency Equalization	2 kHz shelf, ±2 dB, ¼ dB increments (default); 104 corner frequencies between 1 kHz and 20.2 kHz accessible through software
Low-Frequency Equalization	500 Hz shelf, ±2 dB, ¼ dB increments (default); 137 corner frequencies between 19.7 Hz and 1 kHz accessible through software
Highpass Filter	80 Hz in/out, second-order slope
Power Rating	70W (HF amplifier); 150W (LF amplifier)
Dimensions	9.3" (W) × 15.25" (H) × 10.3" (D)
Weight	28.5 lbs.

up showing the precise settings for frequency, depth, and Q set in each speaker. My RMC EQ curve made the monitors sound clearer in the low mids, and although I hadn't previously had a problem with overcompensating at those frequencies, I found that I preferred the mixes made with the new EQ curve. They sounded somewhat meatier but not muddier.

Tough but Sensitive

So with all these features, pristine sound, and an excellent price, what's not to like about the LSR4326P? The monitor does have one characteristic that may be a deal breaker for studio owners on tight budgets. It has a shutoff mechanism that disables all of its controls in the event that incoming power drops below 98 VAC. That means that if you live in an area where power fluctuates, even momentarily, and falls below that voltage, the monitor will shut down to prolong the life of its components.

In my case, several times a day I would look up to see one or both monitors shut down, even though the rear-panel LEDs would still be lit. The only way to get the monitor back online was to unplug and reinsert the power cables. The wiring in my studio, by the way, is only a couple of years old. None of my other studio gear, including two computers and multiple sets of powered monitors, has ever reacted to my studio's normal day-to-day power supply the way the LSR4326Ps did.

According to JBL, the simple solution is a power conditioner. The company says that very few complaints have come in regarding this issue, despite thousands of units in use. A power conditioner is a good investment in any case, and you may need to get one if you plan to use these monitors and your electric service is not rock solid.

The Right Stuff

Though you may need to make adjustments to your setup to keep the monitors powered up, I recommend them highly. They sound great, and purchased in pairs with the LSR4300 Accessory Kit, they provide the ultimate in monitor control, whether you work in stereo or surround, and whether you drive your speakers from a full-blown mixing console or a computer interface with a single analog or digital stereo output. The LSR4326P may be sensitive to power fluctuations, but it's tough to beat on features and sound quality.

Rusty Cutchin is a former editor of EM and a producer, engineer, and music journalist in the New York City area.

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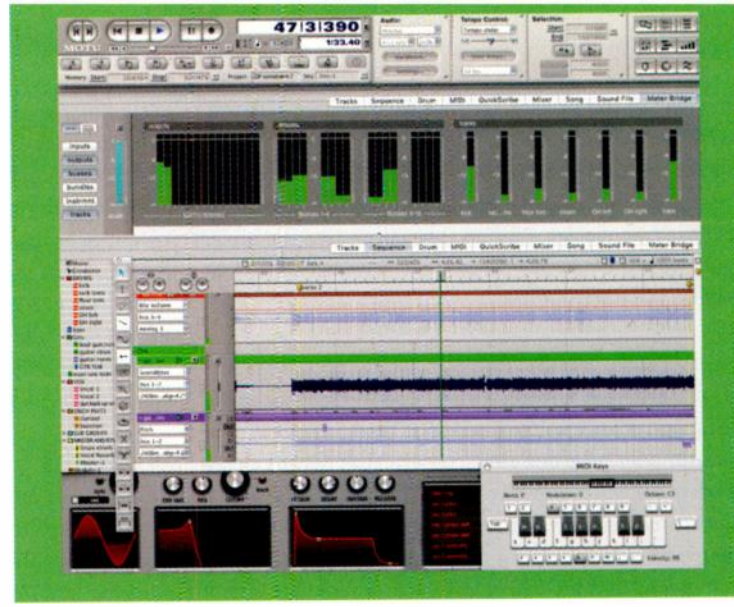

FIG. 1: Digital Performer 5.1 includes a suite of virtual instruments and a bevy of useful new features.

MOTU Digital Performer 5.1 (Mac)

Six new synths and a lot more.

By Mike Levine

When MOTU previewed Digital Performer 5 at Winter NAMM this year, most of the buzz was about its new suite of six virtual instruments. Although these instruments are the sexiest additions, everyday users of DP may find productivity enhancements like Track Folders, new editing tools, new video-scoring features, the Meter Bridge, and improved click and count-off options to be even more significant.

I installed DP 5.1 (see **Fig. 1**) on my dual-processor 2 GHz Power Mac G5. My audio interface was a MOTU 828mkII. As usual with DP, installation was a breeze. Version 5.1 is a Universal Binary release, so it will run on both Intel and PowerPC-based Macs. The update to 5.1 is free for those running DP 5 or 5.01, and the optimizations in it are the same for both Intel and PowerPC machines.

This review will focus on what's new in DP 5. To find out about previously released features, go to www.emusician.com. (DP's Pitch Automation feature was added in version 4.6, after EM's last review of the program. See **Web Clips 1 and 2** for coverage of Pitch Automation and examples of it in action.)

Six-Pack

DP 5's suite of six soft instruments gives users access to a range of synthesized and sampled sounds (see **Web Clip 3**) and makes DP more self-contained. Clearly, these instruments were added, at least in part, in an effort to keep up with archrival Apple Logic Pro and its formidable instrument collection. Kudos to MOTU for adding the instruments without raising DP's price.

As a whole, the DP 5 instruments sound good and are extremely easy to program. Disappointingly, though, most have only a small selection of presets. (According to MOTU, additional user presets should be available as a free download from the company's Web site by the time you read this.) Here is an overview of the new instruments:

Bassline. This simple analog-modeling, single-oscillator, monophonic synth successfully delivers dance-music bass tones.

Sounds are based on either a square wave or a sawtooth wave, and the Waveform knob lets you choose one, the other, or any combination in between. Dial in a little of the Detune control, and you get a wide stereo spread. You can edit the Filter, Filter Modulation, Amplifier Modulation, and Amplifier sections (the last features Volume and Overdrive controls).

Model 12. This drum module is the most fully featured of the six instruments. It comes with a substantial library of electric and acoustic drum and percussion samples. You can also load and save your own samples.

Each instantiation of the plug-in can hold up to 12

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samples. You can tweak a sample's Start, Volume, Pan, and Stretch (time-stretch) parameters. An adjustable filter can be assigned to each sample. You can alter a sample's tuning, using either standard pitch-shifting (akin to playing the sample from a lower note) or MOTU's PureDSP processing, which is formant corrected and doesn't change the timbre as much.

The output defaults to DP's main stereo out. However, you can route individual samples through one of the plug-in's two sends to an aux track for separate processing—a very useful feature.

Modulo. A 2-oscillator synth that offers crisp and complex digital tones, Modulo (see **Fig. 2**) is reminiscent of MOTU's MX4 synth. Easy-to-use graphical controls make changing envelopes (amplifier, filter, and modulation) and filters (lowpass, bandpass, and highpass) a breeze, and you get a whopping 58 waveforms to choose from.

Modulation options abound; you can use Modulo's two LFOs, the Mod Wheel, the modulation envelope, and Velocity. Mono, Legato, and Poly modes (up to 16 voices) are offered. All six of DP's instruments are MIDI controlled, but Modulo is the only one with a MIDI Learn feature, which lets you assign external MIDI controllers to its parameters.

The scarcity of presets is particularly noticeable in Modulo. A synth capable of producing such a range of tones should have a lot more than 21 presets. According to MOTU, the new presets it's planning to post to its site will include a good selection for Modulo.

Nanosampler. This instrument (see **Fig. 3**) lets you quickly and easily load in a sample, edit it (it offers envelope, filter, LFO, pitch, loop start/end, and crossfade parameters), and trigger it from any note on your MIDI controller.

Perhaps its coolest feature is that you can drag-and-drop a sample out of a Finder window right into its display, and it's instantly loaded and ready. Because it can't play back multisamples, Nanosampler's usefulness is limited. It does come with some presets featuring sampled instruments like basses and vibes that sound decent with a single sample stretched across their range. I see it being most useful when you want to insert a sound into a sequence and experiment with its pitch, or trigger a particular sound from a MIDI note.

FIG. 2: Modulo offers two oscillators and plenty of modulation options.

Polysynth. This synth was designed to sound similar to analog synths from the '80s such as the Roland Juno 106. Its DCO (digitally controlled oscillator) section gives you a range of waveforms that you can mix and match. You also get Detune and Noise sliders; LFO, Filter, and ADSR envelope controls; and two effects: Chorus and Distortion (which is really sensitive and adds a lot of volume to the sound). Although Polysynth doesn't produce a particularly wide range of tones, it's warm sounding and quite usable.

FIG. 3: Nanosampler makes it easy to add a MIDI-triggered sample to your project.

Proton. This 2-operator FM synth has a cool-looking blue-and-white interface (see **Fig. 4**), easy-to-use graphical envelope controls, and a clean sound. You control the level of the Modulator and the Carrier and the amount of frequency modulation (FM). Other parameters include Glide, Velocity, Detune, FM LFO Rate and Amount, Vibrato Rate and Amount, Volume, Transpose, Polyphony, and Bend (range).

You have to be careful when programming Proton, because extreme settings can lead to harsh sounds. But it's capable of producing a range of tones, including the mellow electric-piano-like sounds that FM synths are known for.

Overall, DP 5 provides you with a wide variety of instruments, but for the most part, they are not nearly as full-blown or comprehensive as those bundled with Logic Pro. This appears to be due to a difference in marketing strategy. That is, Apple includes its flagship instruments in Logic Pro, and the product's higher price reflects this. Conversely, MOTU sells its best instruments—MX4, MachFive, and Ethno Instrument—separately but sells DP for a considerably lower price.

DP retails for about $200 less than Logic Pro, and its street price is typically $400 to $500 lower, because Logic is rarely discounted. Given that, users who can afford Logic could purchase DP and still have a lot left over to buy some of MOTU's flagship instruments or whatever third-party instruments best fit their situations.

To the Bridge

Beyond the instruments, the improvements in DP 5 are significant. The program now has the best metering I've

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seen in any digital audio sequencer, thanks to its flexible new Meter Bridge display. You can open and view it in the center section (the Main Body) of DP's Consolidated window—or pop it out and place it elsewhere (like in a separate monitor) and easily configure it to show any combination of Inputs, Outputs, Buses, Audio Bundles, Tracks, or Instruments.

You can also adjust the height and width of the meters and their scale. In past versions of DP, you needed to use the rather small Audio Monitor window to observe input levels. With the Meter Bridge, you can set up a much larger display—a real boon during tracking. When a signal clips, the corresponding channel on the Meter Bridge turns red and stays that way for several seconds.

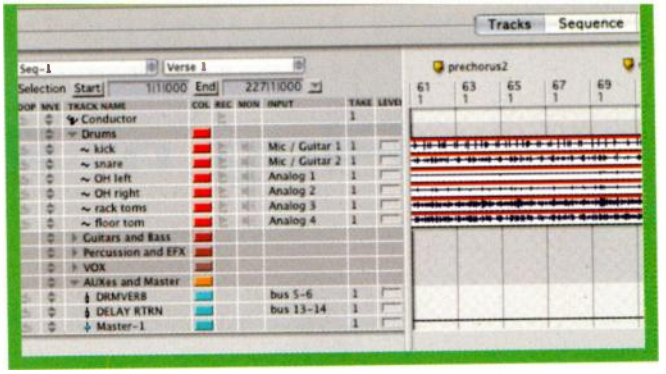

FIG. 5: The new Track Folders let you contain and show or hide groups of tracks, reducing clutter in DP's edit and mix windows.

Know When to Fold 'Em

Many digital audio sequencers offer track folders to contain and organize a project's tracks. DP 5's introduction of such a feature is a welcome development.

Once created, DP's Track Folders (see Fig. 5) are visible in the tracklists of any window that shows multiple tracks. This even includes the Mixer window, in which the folders are handy for showing and hiding particular groups of instruments or vocals. Getting started is easy: go to the Track Folders entry in the Project menu, from which you can choose to create (or delete) a Track Folder—either an empty one or one containing tracks you've selected.

You can add tracks to an existing folder by dragging-and-dropping them into folders in the Tracks and Sequence windows. If you don't carefully aim the track for the lower part of the folder before releasing the mouse (which isn't mentioned in DP's generally excellent documentation), it will end up above or below the folder instead. The task is easier to accomplish in the Sequence window, where you can also drag a track both vertically and horizontally to move it in and out of a folder.

FIG. 4: Proton gives you easy-to-program FM synth sounds.

Once inside a folder, the tracks can be easily shown or hidden using a show/hide triangle just like in Mac OS X's folder windows. The Track Folders themselves can be named and given a color. Inside the Track Overview in the Tracks window or Sequence Editor, a closed Track Folder appears as only an opaque gray line, with no indication as to where in it the MIDI or audio data (or both) resides.

When a Track Folder is closed, the data inside it can still be edited using DP's time-range selections. However, the folders cannot be cut up and edited graphically, as they can in Steinberg Cubase.

All Keyed Up

If you travel with DP in your laptop, you'll appreciate the new and well-thought-out MIDI Keys feature. Available from the Studio menu (or by pressing Command + Shift + K), it allows you to use your QWERTY keyboard as a small but functional MIDI keyboard. The MIDI Keys keyboard maps MIDI notes to 18 computer keys in a logical manner and lets you switch octaves at will.

The keys are not Velocity sensitive, but you can switch the keyboard between seven different preset Velocity levels and increment or decrement those levels with the Comma and Period keys. There are keys for applying Pitch Bend and Modulation, and the Tab and Backslash keys give you a virtual Damper pedal.

Take a Bite

The new Bite Volume and Bite Gain parameters provide additional flexibility for level adjustments. Bite Volume is like volume automation within a specific Soundbite (piece of audio). You can draw automation into it with the Pencil tool or one of DP's other drawing tools. If you move the Soundbite somewhere else, its automation goes with it.

The Bite Gain parameter governs the overall level of a Soundbite. You can change the Bite Gain from the Audio menu, but the fastest way is to assign it a key command in the Commands window. The Bite Volume and Gain submenu in the Audio menu lets you trigger such actions as clearing the volume or adding or subtracting 5 dB from a selected Soundbite.

Instant MIDI

The Add Instrument Track feature, which is found in the Project menu, makes adding virtual instruments to your projects much easier. In prior versions of DP, you had to separately add both the instrument and a MIDI track. Now you simply go to Project→Add Track→Instrument

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Everything Under control

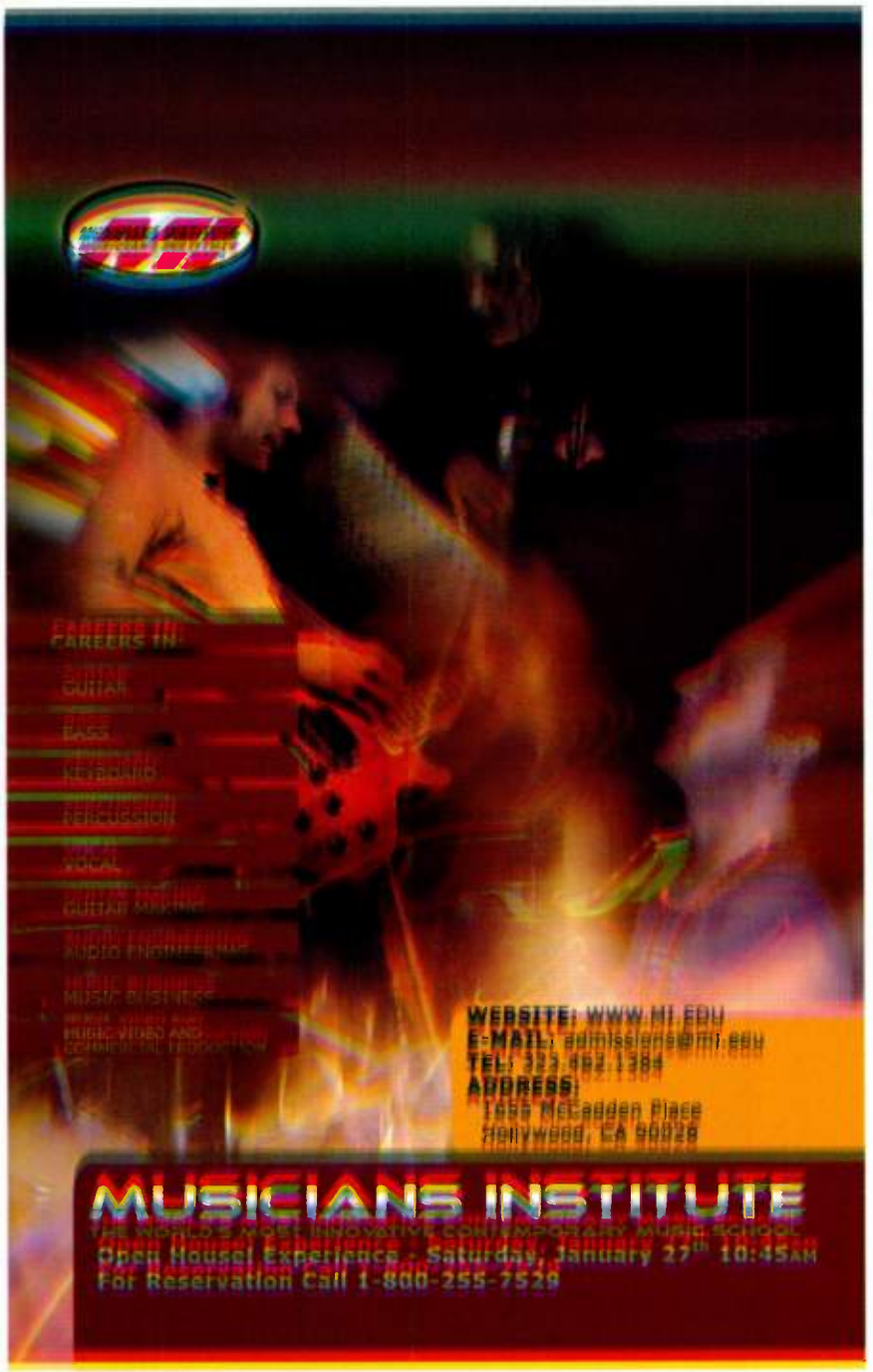
Another useful addition, which applies to all audio tracks, is the Enable/Disable function. It lets you turn a track and its associated plug-ins on and off. In the Tracks window, a new column labeled ENA has a blue circle that designates that it's an active track. Clicking on the circle turns it gray, signifying that it's been disabled; it won't play back or use up any CPU resources. The ENA column replaces the audio Voice column from

in the audio-editing department, DP 5 vaults past its competition with the addition of several new editing tools. The Trim tool lets you click within a soundbite and instantly lop off everything that's either to the left or right of it (within that soundbite).

The Roll tool allows you to slide back and forth to find the right edit point at the junction of two abutting soundbites. It can be particularly useful for setting the edit point to a zero-crossing. The two soundbites must be right up against each other, though, or the tool won't engage.

The Slide tool lets you slide the contents of a previously shortened soundbite, leaving its start point and length unchanged. Dragging right or left slides the soundbite's content horizontally. Whatever part of the soundbite is uncovered when you are done dragging is what will be audible.

The Slide tool also works only on a



PRODUCT SUMMARY

MOTU Digital Performer 5.1

digital audio sequencer

$795

upgrade from version 4.6 or earlier

$195

FEATURES
EASE OF USE
DOCUMENTATION
VALUE

RATING PRODUCTS FROM 1 TO 5

PROS: Six virtual instruments included. Mixer Bridge greatly enhances level monitoring. Improved control of soundbite volume. Additional click and count-off options. Better editing tools. Improved video scrubbing, including Streamers, Bunches, and Flutters. Track folders make organizing tracks easier. MIDI keys allow note entry from computer keyboard.

CONS: Not enough presets provided with instruments. Only one instrument lets you assign external MIDI controllers to it. Track folders don't show contents.

MANUFACTURER
MOTU
www.motu.com

QUICK PICKS

ideal for placing in the music room next site indicates that the Solo/110's gain

Listen Up

Another significant addition is the new audio-input monitoring scheme. You'll find a new Monitor icon on every audio track in the Tracks, Sequence, and Mixer windows. Clicking on it arms the track for monitoring. You can choose from one of the four new monitoring modes available in the Audio Patch Thru menu.

The Off mode allows no input audio to be heard. The Input Only mode lets you hear your input signal, but not any audio previously recorded on that track. Auto mode lets you hear disk audio before and after a punch-in/out region, and the input during the punch. Blend mode lets you always hear both the input source and the disk audio.

MOTU has enhanced DP's click and count-off features. You can now save custom clicks that can automatically be applied to specified meters and tempos. You can also choose different types of count-offs (for instance, two quarter notes followed by four eighth notes) from a selection of presets or program your own.

and Flutters, which are visual cues that can be directly displayed in the Movie window or applied to external video using third-party hardware devices. These features were formerly only available using external hardware and obscure MIDI programming. They make it easier to cue live talent when working with picture.

Other new-feature highlights include the ability to control transport in the Waveform editor, and improved marker creation and naming.

Upgraded Value

Digital Performer 5.1 is a significant upgrade over DP 4.6. The instruments and the other new features have appreciably expanded its capabilities. If you're already a DP user, moving to version 5.1 is a no-brainer. If you're considering purchasing a sequencer or switching from a competitor, you're sure to find DP's combination of features, power, price, and ease of use to be quite compelling.

Mike Levine is an EM senior editor.

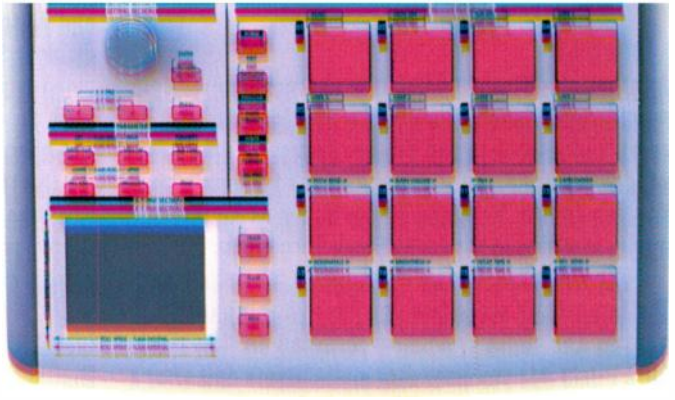


FIG. 1: Add some Kaoss to your beats with the padKontrol's unique x-y touch pad. It transmits Control Changes or rapid note bursts for flam and roll effects. All of the buttons light up to confirm triggering, and the two large controller knobs turn smoothly.

KORG padKontrol

Is this percussion controller the one to beat?

By David Battino

One of the coolest jobs I've had was alpha testing the classic Akai MPC3000 drum machine. Every morning I'd drive over the hills to designer Roger Linn's house, pound out patterns on the prototype's pads, and try to make it crash. Back home at night, I'd make more music on my keyboard setup. But even though my sequencer had a quantization template named Linn, the drum parts were never as satisfying. There's just something about MIDI drum pads that gets you in the groove.

In 2003 Akai finally offered MPC-style pads in a standalone USB MIDI controller, the MPD16. But it was fairly expensive, lacked a display, and provided only a single slider for gestural control. Worse, the pads no longer transmitted Aftertouch.

Then last year M-Audio released the Trigger Finger, which added knobs, sliders, Aftertouch, and a basic LED display to the MPD16 concept—for $150 less (see reviews of both controllers at www.emusician.com). Akai recently countered with the MPD24, adding even more sliders and knobs. Korg has taken a different approach, producing what may be the most playable percussion controller of all: the padKontrol.

FIG. 2: The padKontrol's back panel offers a small antitheft cable slot, USB interfacing with two virtual output ports, MIDI In and Out, and a footswitch input. You can power it with USB or an optional DC adapter.

Up and Drumming

The padKontrol is about an inch deeper and 1.5 inches wider than this magazine (see Fig. 1). Its thin plastic case initially gave me pause, but its rubber feet kept it firmly anchored on my desk despite my enthusiastic pad pounding.

At the bottom left corner of the padKontrol is a 3 × 3.5-inch x-y touch pad. You can set either

The results are often stunningly realistic: and other parameters specific to each well beyond the world of traditional

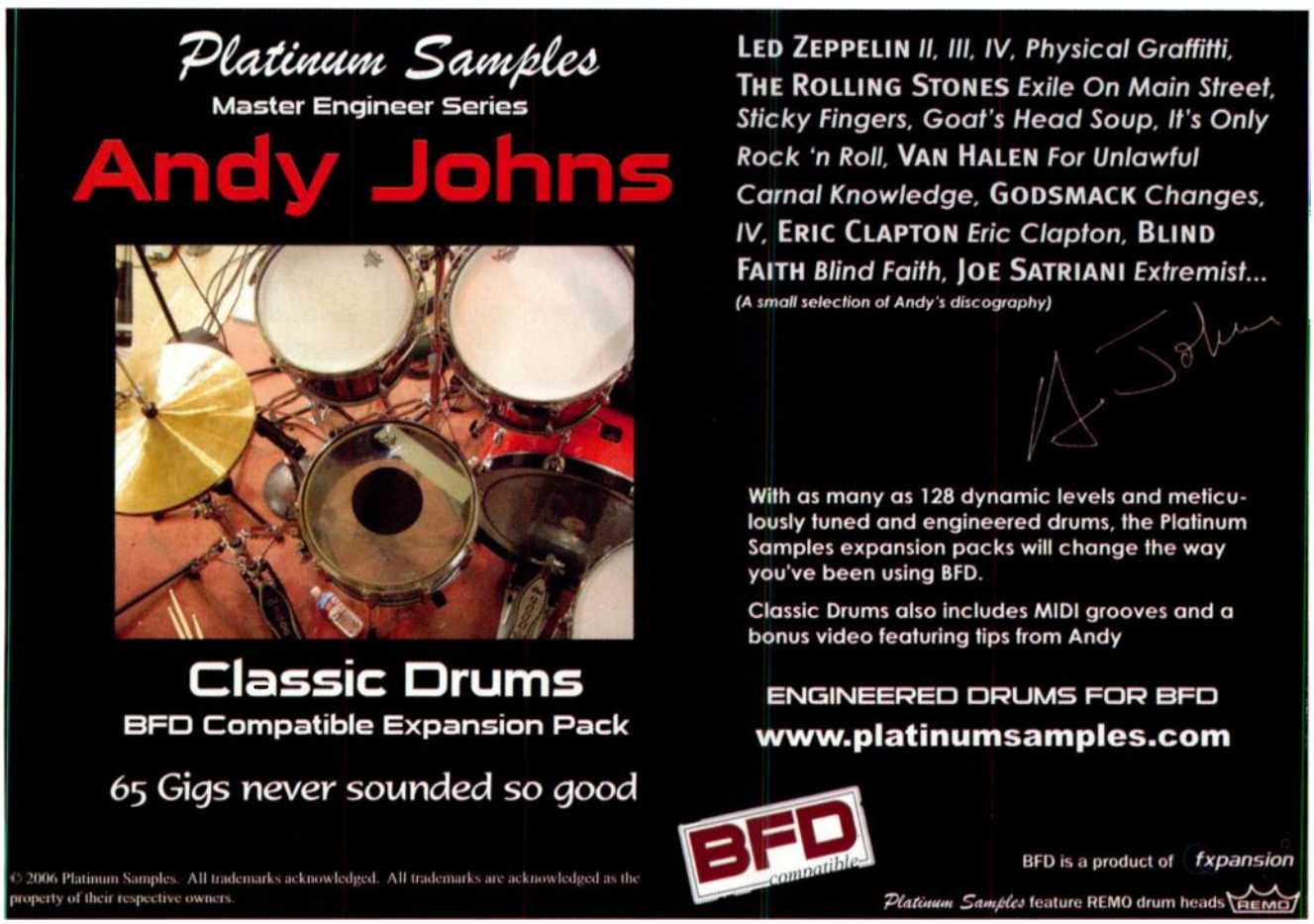
PADKONTROL SPECIFICATIONS

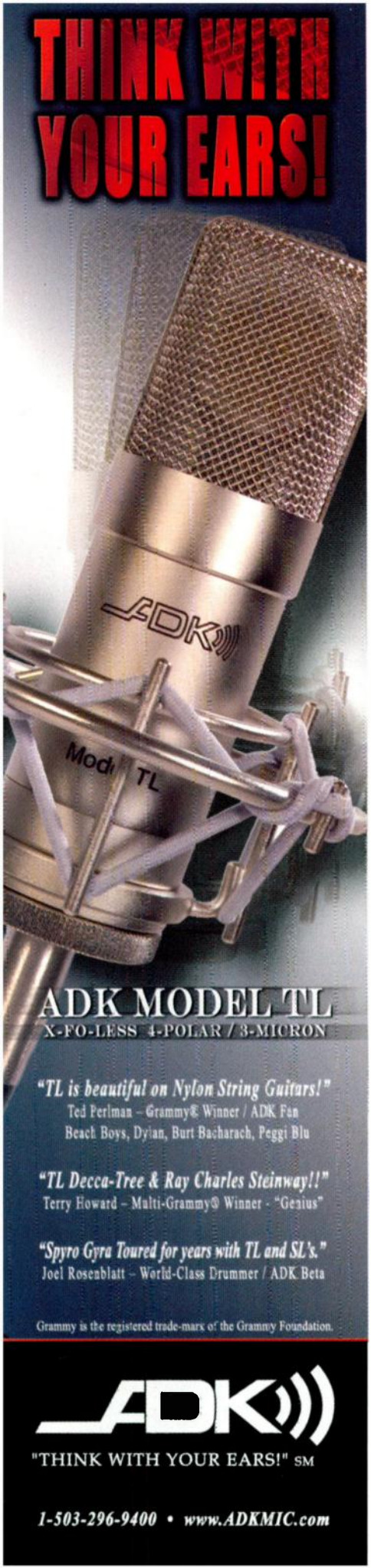
Pads	(16) Velocity-sensitive, illuminated, 1.06" × 1.06"
Data I/O	(1) MIDI In, (1) MIDI Out, (1) USB 1.1 with (2) virtual ports
Memory	(16) user scenes, (30) included scene templates
Controllers	(2) knobs; (1) *x-y* touch pad with Roll, Flam, and Hold buttons; (1) assignable ¼" TS footswitch input
Display	7-segment, 3-digit LED
Dimensions	12.36" (W) × 2.17" (H) × 9.21" (D)
Weight	2.1 lbs.

axis to transmit Pitch Bend, Aftertouch, or any MIDI Control Change message (CC 0 through 127). Press the adjacent Flam or Roll buttons, and the pad will transmit MIDI notes instead. In Roll mode, the axes control Note Velocity and speed; in Flam mode, they affect the timing and Velocity of the second hit. It's an ear-catching feature, and I'll share some performance tips in a moment.

Like the touch pad, the two big, smooth-turning knobs at the padKontrol's top right can transmit Pitch Bend, Aftertouch, or CCs. I would have liked more knobs, but it's easy to connect an external MIDI fader box to the padKontrol's merging MIDI input to create a composite control surface.

To the left, a detented rotary encoder lets you dial up data values quickly. If you hold down the Prog Change button while turning the encoder and then release it, the padKontrol will send a Program Change. With the straightforward editor-librarian software (Mac/Win), you can assign Program and





Bank Change presets to as many as five pads (see **Web Clip 1**).

Pad-tastic

The bulk of the panel houses the 16 drum-trigger pads, which light up when you hit them. Unlike some other pads I've played, they respond beautifully all the way out to their corners and don't produce double triggers. You can assign each pad its own MIDI channel, virtual output port, and Velocity curve. The eight curve choices are linear; compressed linear (two types); slow- and fast-rise logarithmic; and 2-, 3-, and 4-level (see **Web Clip 2**). You can also set any pad to a fixed Velocity level. I chose compressed curves for sounds I wanted at a constant level, like kick drums. (The Trigger Finger has only global Velocity curves.)

A Fixed Velocity button temporarily sets all pads to a preset level without editing the individual settings—a handy feature. You can also emulate Akai's 16 Levels mode—assigning the same sound to each pad, but with a slightly higher Velocity value on each successive pad. That's helpful when step entering parts in a sequencer.

The pads can transmit Control Changes instead of notes—one value on key down and another on key up. That's not as expressive as the continuous Aftertouch that the Trigger Finger and MPD24 send, but as I'll explain, the *x-y* touch pad compensates for that.

The padKontrol also has a 17th pad in the form of the footswitch input on the back (see **Fig. 2**). Because footswitches are not Velocity sensitive, notes or CCs have a constant value. However, I loved how assigning the footswitch to a kick drum or CC 64 (sustain) freed my fingers for playing. You can set each pad to be a trigger or an on/off toggle. I wish that pads in their On state would remain lit to give you visual feedback when you're gating a loop.

Programming pad and knob assignments on the padKontrol is easy once you peruse the manual; the buttons flash in sequence to guide you. The instant-assign shortcut is brilliant: if you hold down a Knob Assign or X-Y Pad button and press one of the bottom eight pads, the padKontrol will map a common CC type to that knob or axis. The eight choices include Volume, Pan, Reverb Send, and Filter Cutoff and Resonance. You can store as many as 16 scenes of button, knob, and touch-pad assignments and then recall them by holding the Scene button and pressing the appropriate pad.

The 30-page manual is dry but clear. It lists basic operations in the table of contents and in step-by-step form, but I would have liked more interfacing detail and performance tips. Because the padKontrol has many hidden features, reading the entire manual is well worth your while. I also recommend watching the video demo on Korg's Web site.

USB interfacing worked flawlessly. The padKontrol was ready

PRODUCT SUMMARY

KORG padKontrol

USB MIDI percussion controller
$299

FEATURES	4
EASE OF USE	3
DOCUMENTATION	3
VALUE	4

RATING PRODUCTS FROM 1 TO 5

PROS: Responsive, light-up pads. *X-y* touch pad with roll and flam control. Generous software bundle. MIDI and footswitch inputs. Assignable Velocity curve for each pad.

CONS: Pads don't stay lit in toggle mode. Lightweight housing. No octave-shift buttons.

MANUFACTURER
Korg
www.korg.com

to go as soon as I plugged it into my Mac. On my PC, I first had to install a driver. The padKontrol presents the computer with three input ports: two directly from the padKontrol and one from its MIDI In. You can also address the unit's MIDI Out from your computer, which lets you control external MIDI instruments from your sequencing software. When USB is not connected, the padKontrol addresses its MIDI Out jack directly.

X-Y Action

One of my favorite features on the Akai MPC-series is Note Repeat, which retriggers the current pad's sound at increasingly higher Velocities as you press down; it's a great way to produce rolls. So I was initially disappointed that the padKontrol's trigger pads don't produce Aftertouch. I soon realized that punching the padKontrol's Roll button and sliding my finger up the *x-y* touch pad produced the same crescendoing roll effect. Add the *x*-axis (roll speed), and the creative possibilities explode. Because you can jump to the middle of the range, the *x-y* pad is also easier to control than a pressure pad.

I discovered several performance techniques while becoming acquainted with the *x-y* pad (see **Web Clip 3**). First of all, the realism of a roll depends on the path you trace and the sound; longer decays and Velocity cross-switching help. With the *x*-axis set to Pitch Bend, you can press a finger on the touch pad and wiggle it sideways for vibrato. I also found that setting the axes to control filter cutoff and resonance and then drumming your fingers on the touch pad creates sample-and-hold effects.

Normally, the touch pad sends two CCs at once, which will confuse the MIDI Learn mode in most music programs. To transmit a single CC, you can run your finger along the very edge of the touch pad. To transmit one varying CC value in addition to the middle value of the other, just move two fingers along parallel edges of the touch pad. And if you play melodic parts on the trigger pads, the physical relationships will suggest new directions.

The Hits Keep Coming

The padKontrol currently comes with a terrific promotional software bundle called Creative Kontrol Pack, vol. 2, on DVD-ROM. Not only does the disc give you entry-level versions of Propellerhead Reason, Ableton Live, and IK Multimedia SampleTank 2, but you also get Korg MDE-X (a great-sounding multi-effects plug-in) and UVI Korg Edition, a virtual instrument from Ultimate Sound Bank with tons of useful, Velocity-switched drum kits.

The Creative Kontrol Pack bundle inspired me to add an extra point for value, but Korg wasn't sure how long the promotion would last. The basic package comes with only the editor-librarian, MIDI drivers, and a drum plug-in from Toontracks called dfh Superior Korg Edition. The plug-in's user interface is not very intuitive, however, and this version can't legally be used for commercial music.

If you're looking to create more expressive MIDI drum parts, today's controller choices are better than ever (see **Web Clip 4**). The Korg padKontrol stands out for its responsive triggers, versatile *x-y* touch pad, and enhancements that range from programmability to inputs to software. A couple of more knobs as well as octave-transpose controls (as on the Trigger Finger) would have been helpful, but they probably would require a price increase. At present, though, the padKontrol is the one to beat. EM WEB CLIPS

David Battino (www.batmosphere.com) is the coauthor of The Art of Digital Music *(Backbeat Books, 2005) and the editor of the O'Reilly Digital Audio site (http://digitalmedia.oreilly.com).*

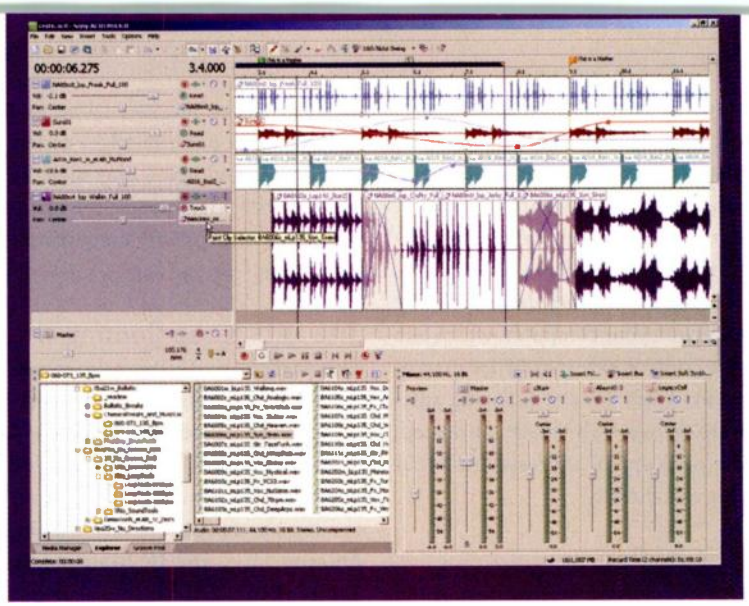


FIG. 1: Acid's main screen includes a file browser and database display (bottom left) and a mixer (bottom right). The lower area can be resized to show more tracks. Note the in-line display of track envelope data and the crossfade between overlapping clips.

SONY Acid Pro 6.0b (Win)

New features bring this legendary looper closer to platinum.

By Jim Aikin

Every manufacturer of high-profile music software is on the upgrade treadmill: each new release of a respected product has to ratchet up the feature list and satisfy musicians' lust for power and convenience. Version 4 of Acid had fallen well behind the curve technologically, but that was before Sony bought Sonic Foundry. Acid Pro 5 was a significant improvement, but although I was able to find a number of things to be enthusiastic about in my review of it (see the July 2005 issue of EM, available online at www.emusician.com), I still felt a bit lukewarm.

Fast-forward: Acid Pro 6.0b is out, and the enhancements are even more striking. In spite of a few rough edges, Acid is now fully capable of competing with other digital audio sequencers.

Three huge improvements are immediately apparent. First, Acid can now assign two or more different clips to a single track, a feature that every other digital audio sequencer has always had (see Fig. 1). That makes arranging and overdub recording much easier. Second, the MIDI sequencing features have been brought up to a professional level. Third, automation data no longer has to be created using graphical envelopes (though that mode is still available). You can now record automation in real time with the mouse or a control surface. The method for doing so is largely undocumented, however; more on that in a moment.

Thumbnail Sketch

Acid's specialty is high-quality time-stretching of loops, and the Acidized WAV file has become an industry standard. Numerous loop libraries are available for Acid, from Sony and elsewhere, and if you want to use a loop that hasn't been Acidized, you can add markers to the audio file within Acid.

Acid hosts VST and DLS soft synths and VST and DirectX effects, but not DirectX synths. (Because most Windows plug-ins are available in VST format, this is not a big problem.) You can apply groove-quantization templates to either audio or MIDI, and a generous set of grooves ships with the program. Sony also includes Media Manager, which provides a powerful way to categorize and organize your loop library (see Fig. 2). Acid supports a single video track for soundtrack work and includes a good selection of basic effects, though not all of them are automatable.

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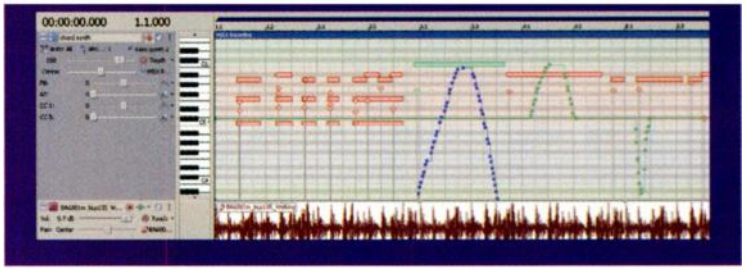


FIG. 3: Acid's in-line MIDI editing shows note Velocities as diamonds on stems and controller data as squares connected by contour lines. Shown here are a mod wheel move (blue) and a couple of pitch bends (light green). You use the sliders in the track header (left) for recording controller data or adding offsets to existing data.

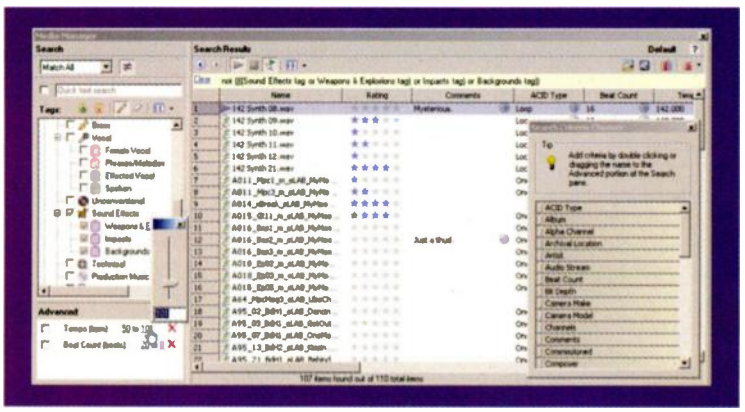
When you drag clips around in the tracks, you'll be pleased to find that their automation-envelope data moves with them. Dragging one clip over another automatically cross-fades between them, which is very convenient. The contents of a clip can be slipped left or right without moving the boundaries of the clip, allowing you to easily align sampled drums to the time grid.

The new Sectioning utility is quite handy for trying out different arrangements. Sections, which appear as colored labels above the time ruler, can be given names and moved around freely. Sections normally snap to the grid but can be placed anywhere if snapping is disabled. Acid's Chopper utility is ideal for adding fills, stutters, and polyrhythms to sampled drum loops.

Acid Pro 6 has no track-freeze command, no CPU-usage meter, and no MIDI-input meter. These features are standard on most pro-level digital audio sequencers. Sony recommends using Windows Task Manager for monitoring CPU usage, but it occupies a fair chunk of screen real estate, so that is not an ideal solution.

Installation requires serial-number entry and online registration. I had no problems installing Acid on my 3 GHz Pentium 4 PC, and the upgrade from 6.0 to 6.0a was trouble-free. Acid supports dual and multicore processors and is capable of 24-bit, 192 kHz recording and playback. Included in the boxed package is an Acid-specific version of Native Instruments Kompakt, which offers 2 GB of instrument samples. Most of the popular instrument sounds are covered, and Sony is already expanding the Kompakt library with additional sounds that are available to registered owners as free downloads.

FIG. 2: Acid's Media Manager makes it easy to find the clips you want. The pop-up window (right) adds checkbox items to the Advanced search criteria field (lower left). Clicking on a tempo field brings up a slider box. Comments and ratings are added by the user.



Ready, Aim, Mix

All tracks in Acid have their own level and panning sliders in the track-controls column along the left side of the main window. If you're working in 5.1 surround, you'll see a little square speaker diagram instead of a pan slider. You use the diagram to position the track's output. Acid also has a mixer panel, which contains the main output bus, any effects-send or group-send buses you create, and audio-output buses for soft synths and ReWire devices. Soft-synth mixer channels can use insert effects, but because they have no sends, their signal can't be routed into effects or group buses.

When you create the first send bus for a project, each track acquires an extra multipurpose slider for controlling the send levels routed to the various buses. Each bus output for each track can be either pre– or post–volume fader. Prefader sends are not shut off by the track-mute buttons. I feel this is a serious design flaw, but Digidesign Pro Tools operates the same way, so I guess some musicians aren't bothered by it.

Each track in Acid has two independent volume faders, a fact that may not be apparent at first, as they occupy the same screen space and only one is displayed at a time. One fader, which displays a small icon of a gear-toothed wheel, can be automated; the other can't. You can record a level-automation envelope and still use the nonautomatable trim slider to adjust the overall level of the track's output without having to edit the automation envelope. You can also use the Envelope tool to select points on an envelope and move them up or down as a group.

Acid's automation features interact with the track-mute buttons. If a track is set to read automation data of any kind, the track-mute button is disabled. Thus, each time you need to mute or unmute an automated track, an extra mouse-click is required to shut off the automation reading for the track. If the track has a prefader send, a few more clicks will be needed to switch the send temporarily to postfader. To unmute the track, the whole process has to be reversed. This implementation is conceptually clear, but the resulting user interface is needlessly complex.

Not Fade Away

Acid provides templates for controlling parameters on the Mackie Control Universal and the Frontier Designs Tranzport hardware devices. In addition, software hooks allow a generic MIDI controller surface to be used for external control of the mix, including automation recording. I didn't have a Mackie available, so I hooked up my ancient Peavey slider box (don't laugh, it still works) and tried assigning Peavey sliders to Acid's faders.

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NATIVE INSTRUMENTS

THE FUTURE OF SOUND

REV

After hours of frustration and several emails back and forth with Sony's support staff, I finally succeeded in getting Acid to record automation data from my control surface. Among the things the manual doesn't explain is the fact that assigning MIDI data types in the Preferences box to control specific functions isn't enough. The External Control item must also be switched on in the Options menu. Also, wiggling the physical slider won't do anything until it crosses the stored value of the automation envelope. And automation must be switched on for the control surface itself as well as for the individual track. The state of the control surface is never displayed on the computer screen—Acid relies on the surface to have its own data display. Also worth noting: effects parameter envelopes cannot be addressed by the external control surface. (Sony says the Mackie Control Universal fully supports effects control and automation but that generic control surfaces do not.)

PRODUCT SUMMARY

SONY Acid Pro 6.0b

digital audio sequencer
$399.96 boxed, $374.96 download

FEATURES	3
EASE OF USE	3
DOCUMENTATION	3
VALUE	3

RATING PRODUCTS FROM 1 TO 5

PROS: Audio tracks can now contain multiple clips. Full-featured in-line MIDI editing. MIDI overdubbing. Real-time automation recording. Includes NI Kompakt.

CONS: After 60 days, tech support is not free. No sends or effects automation for soft-synth tracks. No track freeze. MIDI control surface implementation is poorly documented.

MANUFACTURER
Sony Media Software
www.sonymediasoftware.com

MIDI on the March

The expanding world of software synthesizers has made MIDI sequencing a must-have for serious computer-based music production. In contrast with earlier versions, Acid Pro 6 qualifies as a real MIDI sequencer. It provides in-line MIDI editing (see Fig. 3), in which a piano-roll display of notes, Velocities, and other MIDI data appear directly in vertically expanded tracks in the track window.

The switch that displays the MIDI data in piano-roll format is global for Acid, so after recording a number of MIDI tracks, you'll find that you might need to rearrange the window by hand to view the data you want to edit. Acid also has a floating piano-roll edit window, which displays one MIDI clip at a time. This window works fine for quick-fix edits, but its time ruler doesn't show the position of the notes in the project, only their position within the clip.

Overdub recording into MIDI tracks is now handled as in other sequencers. Control Change, Aftertouch, and Pitch Bend data can be cut and pasted, edited with a pencil tool, and so on, using the same tools that are used for track-automation envelopes.

I tried a number of plug-in VST synthesizers with Acid, and they all worked well. With multioutput synths, the program lets you add mixer channels only for the outputs you're actually using, a considerate touch that's necessary because Acid is limited to 32 bus channels. (Note that ordinary audio tracks don't require bus channels, so this is not a track-count limit.)

When I first tried using Propellerhead Reason as a ReWire client under Acid, I was dismayed to read in the manual that Acid wouldn't transmit MIDI via ReWire. This turned out to be an error in the manual. MIDI tracks in Acid can indeed send to ReWire clients. Trying to use ReWire with Acid 6.0a consistently crashed my computer, but just before press time I downloaded version 6.0b and verified that the ReWire

implementation had been fixed. This will be great news for anyone who likes using Reason and Acid as a team.

Support Hose

A card in the Acid Pro box offers three options for technical support. The Single Solution costs $14.95 and includes support by email only. The Platinum Support Plan entitles you to 180 consecutive days of phone and email support and costs $99.95.

Sony's Web site indicates that purchasers of its pro-level products, including Acid Pro, receive a free Gold Support Plan (60 days, normally $49.95). The time period begins the first time you use the support, so you may want to save up questions for a few days before your first call.

I'm not happy to see a music-software company charging for support. If a company is going to charge for support, however, I feel it's incumbent on them to also provide a thorough, well-written manual so that users who have the patience to read it will be able to resolve most or all problems without having to shell out extra money. The Acid manual, though it's by no means the worst I've seen, fails this test. A number of operational problems I ran into while working on this review are not covered adequately by the manual, and it sometimes skips over important details.

Want to See My Etchings?

When I first installed Acid Pro 6 and looked at the huge improvements in MIDI sequencing and the assignment of multiple clips to audio tracks, I was pumped. When I found that I couldn't use ReWire because of a major bug and couldn't figure out how to make a MIDI control surface work because of the poor documentation, I was worse than frustrated. Ultimately, however, I got the control surface working, and Sony has now fixed the ReWire problem. On balance, Acid Pro is a fine program that's fully capable of meeting the demands of audio professionals.

I'm hoping to see some loose ends tied up in the next revision. The program needs to be able to bus soft-synth channels to aux sends and groups. Track freeze should be implemented for soft synths and audio tracks with CPU-hungry inserts. And if Sony is going to charge for technical support, it needs to provide a much better manual.

Initially, Acid was the only multitrack program that could time-stretch loops. But today, most digital audio sequencers have similar features. With version 6.0b, Sony has taken huge steps toward making Acid competitive.

Jim Aikin has seven digital audio sequencers on his computer (eight if you count Reason) and deeply regrets that he doesn't have time to make music using them all.

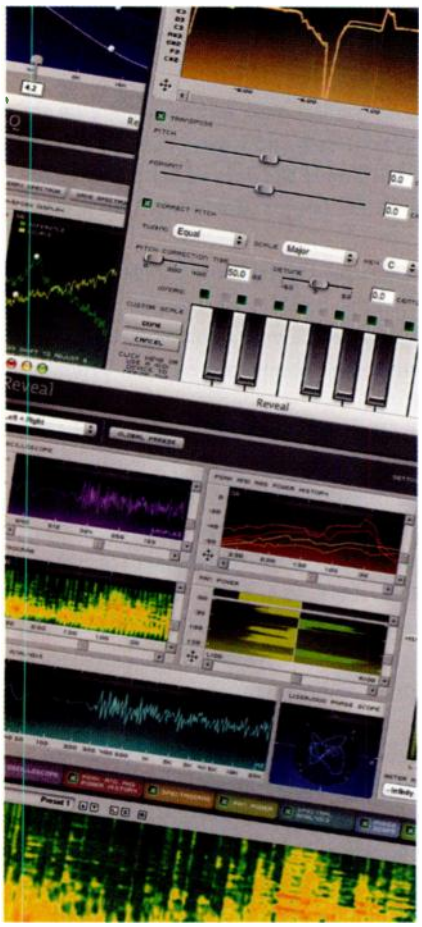

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FIG. 1: The Fusion is a versatile synthesizer, a sampler, and an 8-track audio recorder, all in one convenient package.

ALESIS Fusion

The keyboard workstation scales new heights.

By Jim Aikin

Alesis has long had a reputation for giving musicians more power than expected at very competitive prices. The Fusion continues that trend by serving up two features never before seen in a keyboard workstation in its price range: a built-in 8-track audio recorder and a choice of several types of onboard synthesis, including physical modeling, analog modeling, and FM. Only the Korg OASYS (which costs about three times as much) has comparable features.

The Fusion is available in two models: the 6HD, which has a 61-note semiweighted keyboard, and the 8HD, which has an 88-note fully weighted keyboard. When I unpacked the Fusion 6HD that I received for review, I was impressed by its futuristic front panel. I immediately plugged it in and started enjoying the huge variety of factory sounds, but there's a lot more to the Fusion than playing the presets. As I dug deeper, my opinion of the instrument became more nuanced.

Surfin' the Board

The Fusion's top panel has angled button arrays and a raised data wheel that looks like a miniature hubcap (see Fig. 1). The large LCD in the middle of the panel is the main programming interface. Six buttons for selecting menu items are on the left, and another six are on the right. Buttons labeled Prev and Next, positioned in the lower-left quadrant beside the data wheel, let you navigate among the numerous parameters within a given LCD page.

I was pleased to see the Fusion's Category button, which makes it easy to find the patches you're seeking. The Fusion has no effects bypass buttons, though, an omission of something I sorely missed while programming sounds.

The Fusion displays three CPU usage meters in Global mode, but the manual doesn't explain why there are three. According to Alesis, the Fusion has two independent voice engines; two meters are for those, and the third is for the audio record/playback engine. In Program mode, the Fusion plays only a single preset, so only one voice engine is used. In Mix and Song modes, both engines are used, with odd-numbered parts assigned to engine 1 and even-numbered parts assigned to engine 2.

The pitch-bend and mod wheels (which light up in blue when you move them) are positioned on the panel above rather than to the left end of the keyboard, making the Fusion a couple of inches shorter than comparable instruments. I didn't mind the wheels' position on the 6HD, but it might be a bit of a reach on the 8HD.

I can

:: record
:: arrange
:: edit
:: process
:: mix

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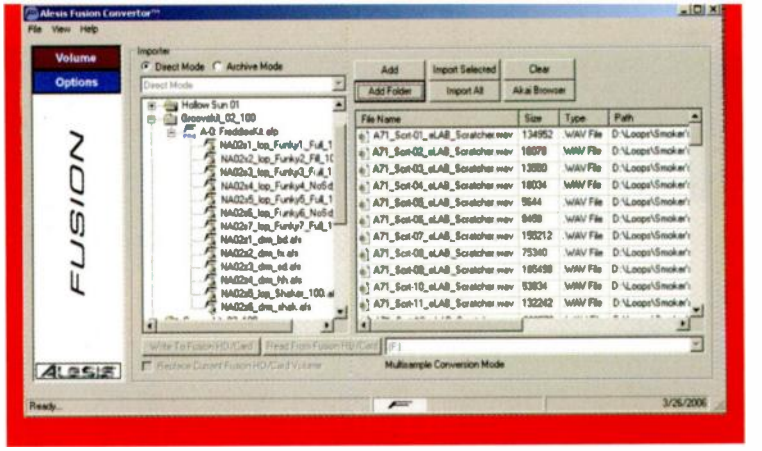


FIG. 3: With the free Fusion Convertor software for Mac and Windows, you can create new Fusion multisamples from WAV files, SoundFonts, or Akai-format multisamples.

To the right of the wheels are four knobs for controlling the arpeggiator, filter, EQ, song mix, and other assignable functions. Buttons let you choose which row of four functions the knobs will have at any given time. Below the knobs are six assignable buttons—four momentary (for triggering) and two toggles.

On the Fusion's rear panel are eight inputs for the audio recorder, two inputs for sampling, two main outputs, two aux outputs, and a ¼-inch stereo headphone output (see **Fig. 2**). All except the headphones are balanced ¼-inch TRS jacks, though the sampling inputs offer 21 dB of gain, making them suitable for low-level signals such as guitars and some dynamic mics. If you want to record audio using microphones, therefore, you'll need a mic preamp. Flanking the CompactFlash slot are a USB 2.0 port; expression pedal, assignable footswitch, and sustain pedal jacks; MIDI In, Out, and Thru ports; ADAT Lightpipe and coaxial S/PDIF outputs; and a serial ATA port (see the **Web Clip called "Making Connections"**).

Inside the Fusion is a 40 GB hard drive for storing song data, audio tracks, patch banks, and so on. You won't find any drive maintenance routines in Global mode, but you can carry out operations such as defragmentation and directory creation using your computer.

The 292-page owner's manual contains only menu-by-menu explanations of the parameters, with no information on how to perform musically useful tasks. It fails to explain some important features and includes outdated information. Furthermore, its layout is jumbled, and it has only a sketchy index. The accompanying 33-page Quickstart Guide could profitably have been ten times as long. Alesis is working on some new tutorials for the instrument; the first should be available by the time you read this.

Sounds Up

Describing the Fusion's hundreds of great-sounding presets would take many pages. The instrument ships with more than 950 Single programs and about 150 Mixes, and more are available as downloads (a Mix is a multi or combination program). One of the high spots is the Holy Grail Grand Piano that Alesis licensed from Q Up Arts. It's an excellent all-purpose piano with 3-way Velocity crossswitching. The electric pianos and Clavinets are also excellent, and some of the drawbar organs feature realistic monophonic percussion (a term that will be meaningful only to Hammond players).

The drum kits are very good, and most include a pattern (programmed as an arpeggio) triggered by unassigned notes, making it easy to audition them quickly. The kicks and snares are available in the kits, in menu presets containing numerous hits of one type, and as individual sound presets. The selection of percussion sounds is more than adequate for many styles of music.

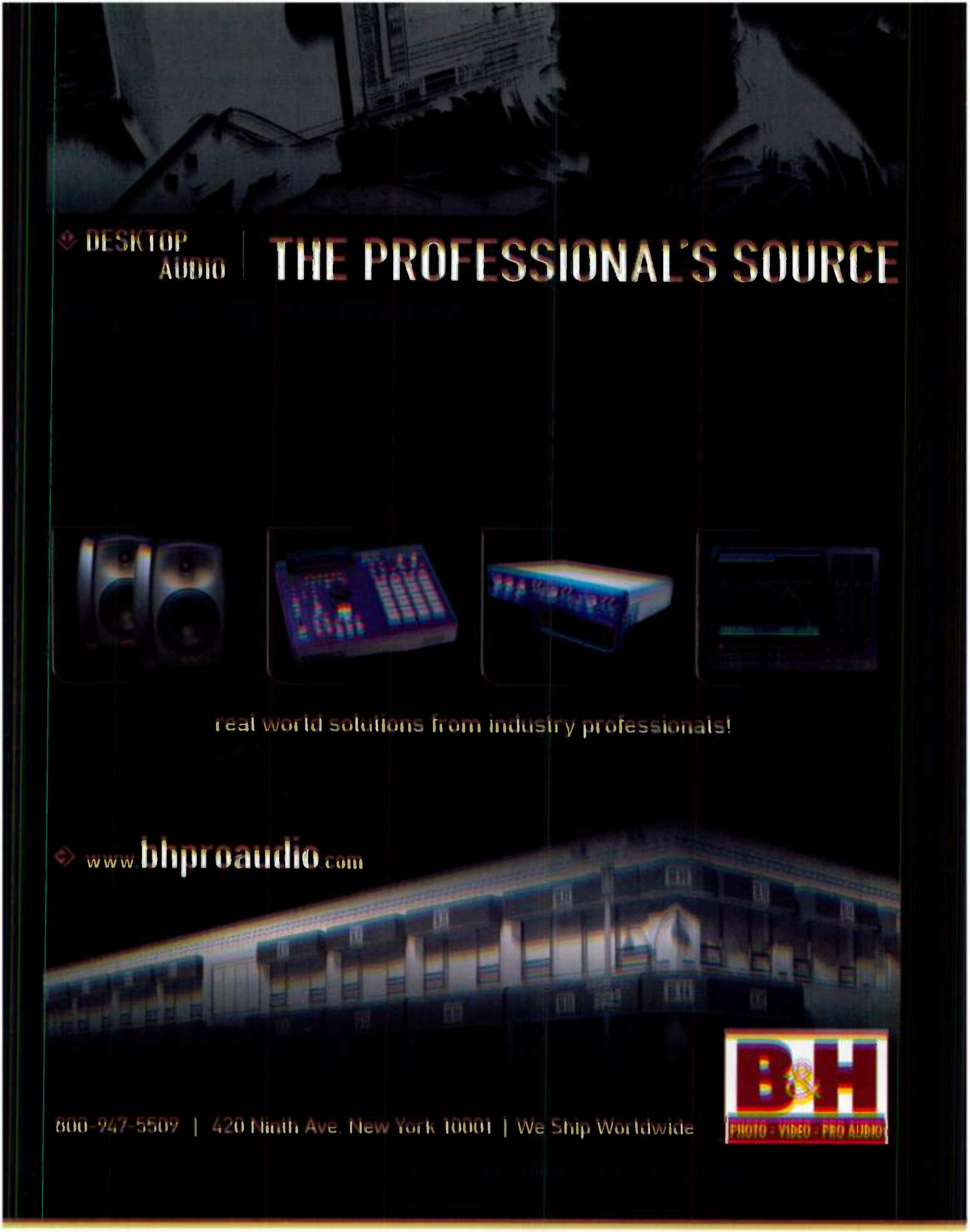
My favorite Fusion sounds are the analog and FM presets. The Lead and Pad categories have more than a hundred presets each, all of them good. The orchestral instrument presets are typical of many keyboard workstations; they're adequately sampled, but as a symphonic musician, I found them stiff and unconvincing. The Reed and Wind (flute) models give the Fusion an edge in the solo wind category, but the physically modeled presets are only marginally better than sampled solo winds.

The Groove Mix bank shows off the kinds of full arrangements the synth can generate in a variety of styles (see **Web Clip 1**). The arpeggiator-based multitrack patterns could easily inspire new tunes or get audiences moving in a nightclub. Many are aggressively dance oriented (see **Web Clip 2**). The Fusion's arpeggiator provides hundreds of cool patterns; it's not just an up-and-down note generator. The Split-Layer bank is more utilitarian, but the Mixes are excellent starting points for your own keyboard layouts.

Choose Your Poison

If you enjoy cooking up your own sounds, you'll appreciate the Fusion's comprehensive voice-programming features. Analog-type voices can have up to three oscillators; sampled voices can have four; and FM programs, as many as six. Signal routing for the FM algorithm is

FIG. 2: The Fusion's rear panel supplies ¼-inch analog audio I/O, ADAT and S/PDIF outputs, footswitch and pedal inputs, MIDI I/O, a USB 2.0 port, a CompactFlash slot, and an unimplemented connection for a serial ATA drive.



Legendary drummers

Exquisite grand pianos

ter). Most synthesis types offer only one multimode filter per preset, but sample playback also adds a single-pole filter for each oscillator.

I discovered a problem when adjusting the filter's cutoff frequency. Most synthesizers will start at the cutoff's current parameter value when you begin changing it, to prevent a jump in the sound. When you initially call up a program on the Fusion, the knob's value is 0. As long as it's 0, the filter will use whatever cutoff frequency is stored in the patch. But when you move the knob from 0 to 1, the filter cutoff jumps from its programmed value down to an extremely low value (see Web Clip 3).

The same thing happens with the filter envelope's amount knob. Because most analog-style patches already have a filter envelope, moving the knob from 0 to 1 shuts down the envelope's output, thus causing the sound to stop playing.

You can create as many as eight envelopes and eight LFOs for each preset. The advantage of creating them as needed is that if a sound needs only one envelope, you can save a bit on the DSP required to make the sound, thus increasing the Fusion's available polyphony. The envelopes are DADSRs with an extra sustain-decay setting.

Each preset can use as many as 32 modulation routings. Sources include most of the usual MIDI data types and the front-panel switches, assignable knobs, and trigger buttons. However, MIDI Control Change messages (other than those coming from the knobs) are not available as sources. The choice of destinations is fairly comprehensive and includes individual envelope segments. You can modulate the depth of one modulation routing from another, which is an essential feature. You can select either additive or multiplicative modulation depth—a forward-looking feature I'd like to see on more synths.

The downside of all this flexibility is that programming a new sound entails a lot of jumping back and forth between pages. For example, to create a modulation routing that uses velocity to control the envelope amount, you must go to the Mod page, create a new modulation routing if necessary, and then go to the modulation routing's Settings page to edit the depth. Because the six oscillators don't have their own dedicated envelopes, programming a standard FM patch requires that you create both an envelope and a modulation routing for each modulator and then assign them to the required source and destination.

Sample-playback synthesis offers a few extras, such as FM (audio-rate modulation) of one oscillator by another and the ability to trigger a sample on key up. Oscillator outputs can be panned individually, but they lack separate effects sends. The manual provides no list of factory waveforms, nor any indication of which of them may reside in ROM and which may be loaded from the hard drive. According to the list I received from Alesis, the Fusion has 783 ROM multisamples and 87 more on the hard drive. You can't edit the factory multisamples, but you can create your own from scratch using the Fusion's sampling capability.

The Fusion has four insert effects and two bus effects, though in Program mode only one insert is switched on by default. The inserts include the usual chorus, flange, phaser, rotary speaker, tremolo, and filtering, as well as several types of amp-simulator distortion algorithms and some bit decimators. All of the insert effects sounded very good to me except the chorus, which could be richer.

Fortunately, there's a fatter-sounding chorus in the bus effects area. Many of the insert effects are duplicated there. In place of the amp simulators, the bus effects algorithms include a variety of reverbs and delays. Because you can turn down the dry signal on the bus, bus effects can function as insert effects in Program mode. Overall, the Fusion is well equipped in the effects area—other than the fact that the delay times can't sync to anything, which is a perplexing omission.

While It's Hot

Setting up and recording samples in order to create your own multisampled instrument is quick and easy. You can assign as many as 512 samples to one multisample. The Fusion provides audio-through monitoring, so you can hear the signal you're about to sample, as well as view the incoming signal's level in a meter displayed in the LCD. All sampling is done from the rear-panel inputs. Unlike some other workstations, the Fusion isn't set up to resample its own internal audio.

The Fusion provides most of the sample-editing utilities you'd expect. You can cut, copy, and paste,

PRODUCT SUMMARY

ALESIS Fusion

keyboard workstation
6HB, $2,399
8HB, $2,999

FEATURES	3
EASE OF USE	2
QUALITY OF SOUNDS	4
VALUE	3

RATING PRODUCTS FROM 1 TO 5

PROS: Multiple synthesis types. Powerful modulation routings. Integrated 8-track audio recorder. Comprehensive user sampling. Release Velocity sensing. Large hard drive.

CONS: No XLR mic inputs. No audio mixdown. No bounce with effects. No internal audio resampling. Jumpy filter-cutoff knob. Delay effects don't sync to tempo. No undo for audio recording. USB port doesn't provide MIDI I/O. Poor owner's manual.

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loop itself. You'll hear changes in the loop as you make them—no need to restrike the key.

Getting rid of the dead air at the start of a sample after you've recorded it is awkward for two reasons. First, you can't zoom the waveform display vertically to see exactly where a low-level signal begins. Second, the data input wheel transitions quickly and almost uncontrollably from fine movement to broad movement. I spent several minutes trying to zero in on the beginning of a waveform that was somewhere around 2,500 samples into the file, and found that the data wheel jumped from 2,000 to 3,000 (or back from 3,000 to 2,000) if I twisted it even a tiny bit too fast. Thirty seconds of wheel twiddling were required to locate to the start of the waveform. A 10-key data-entry pad would have sped up sample editing considerably.

Track Masters

The Fusion's large, well-organized display makes the process of recording songs fairly painless. A song can contain as many as 32 MIDI tracks and 8 audio tracks. The MIDI tracks are always routed to the instrument's MIDI output; if you want to sequence tracks for an external module, just turn the internal synth track's audio output level down to zero. Audio tracks can't use the four insert effects, but you can send the tracks to either of the bus effects.

The Fusion's software lets you specify no count-in or a 1- or 2-bar count-in prior to recording, as well as the metronome volume, program, note value, and velocity. Automated punch-in and -out are not supported, but manual punch-in and -out worked as expected on both audio and MIDI tracks. Unfortunately, audio recording offers no undo command. You can define 16 locate points for navigation purposes. In Song mode's Mixer page, you can conveniently use the Fusion's four left-hand knobs and buttons to adjust the level, bus sends, panning, and muting and soloing of any four adjacent tracks at a time.

The MIDI track editing is on a par with what you'll find in most keyboard workstations, with quantization, event editing, and so on. You can cut and paste regions in audio tracks, adjust their gain up or down, and create data-altering fade-ins and fade-outs. However, the Fusion lacks virtual tracks, a feature I've come to expect from full-function audio recorders. At least two XLR mic inputs with phantom power are standard on most hard-disk recorders too, but the Fusion's recorder has only line inputs.

More problematical, there is no way to bounce eight audio tracks (or audio and synth tracks together) to create a stereo mix of a finished song. Bouncing would also for both audio and synth tracks. The manual gives no information on how to do that, but it's easy: Just click on the Enable Mixer Automation check-box in the Song Edit→Song→General page, and then record knob moves in the Mixer display.

The Outside World

Alesis provides a free software utility that is called Fusion Converter (Mac/Win), a Fusion-specific version of Chicken Systems' well-known sample-translation software (see Fig. 3). The program communicates with the Fusion over USB and allows you to create a new multisample by importing a folder full of WAV-format drum hits with a few quick mouse-clicks. You can also import SoundFonts, as well as Akai S1000, S3000, and S5000 multisamples direct from Akai-format CDs inserted into your computer. Note, however, that Fusion Converter is not an editor-librarian.

Fusion Converter will attempt to approximate the settings of Akai presets in the new Fusion Programs it creates, but the results inevitably vary. By upgrading to Chicken Systems Fusion Converter Pro (Win, $79.95), you can import sampler programs from a wide variety of formats, including GigaStudio, Kontakt, and HALion.

The Fusion Factor

The Fusion's excellent sound and wealth of features are bound to attract a lot of keyboard players. No other workstation in its price range provides an 8-track audio recorder, and perhaps it's not surprising that the Fusion's recorder lacks amenities such as virtual tracks, track bouncing, and XLR mic inputs.

The instrument's user interface is a mix of good features, such as the big LCD and sequencer locate memories, and features that need improvement, such as the filter-cutoff knob's response. I was perplexed by the absence of certain functions found in other keyboards, including resampling the internal audio, syncable delay times, and USB MIDI I/O. Fortunately, most or all of the Fusion's problems can be remedied by revised documentation and operating system updates, so I'm cautiously optimistic about its future.

All things considered, the Fusion's pluses and minuses balance out. It's not head and shoulders above the competition, but it offers musicians another good option in the workstation category. EM

Jim Aikin is a regular contributor to EM and other music-technology magazines, a cellist, and an author. You can visit him online at www.musicwords.net.

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QUICK PICKS

UNIVERSAL AUDIO

Solo/110

By Eli Crews

The bar is set fairly high for new products from Universal Audio, the company run by the offspring of Bill Putnam, perhaps the best-known American gear designer in the history of the recording industry. Most Universal Audio products are analog or digital replicas of vintage designs by Putnam and others. The newly designed 110 Precision series of ultra-fidelity preamps is an exception.

Until recently, the only way to get your hands on one of these Class A, discrete, solid-state microphone preamps was as part of the 4110 and 8110 4- and 8-channel preamps, which sell for $3,000 and $5,000, respectively. At $799.99, the Solo/110 gives engineers and musicians on a lower budget a chance to get in on the action.

Universal Audio's entry-level Solo/110 is compact, versatile, and of the company's typical high quality.

I'll Take That to Go

One advantage the Solo/110 has over the 4110 and 8110 is its portability. The shoe box–size 5.25 × 5 × 14–inch unit has a comfy rubber handle and is surprisingly light (5.4 lbs.). A direct injection (DI) input with a Thru jack, a Ground Lift switch, and a switch for determining whether the XLR output jack is at mic or line level are other advantages of the Solo/110. Furthermore, its small footprint and sturdy rubber feet make it ideal for placing in the music room next to an amplifier.

The controls on the Solo/110 are labeled clearly and laid out simply. You can use the oversize Gain and Level knobs to drive the input stage without overloading the input of the next device downstream. Illuminated blue buttons activate phantom power, polarity flip, a 100 Hz highpass filter, mic or DI input, and low or high input impedance (500Ω to 2 kΩ for mic and 47 kΩ to 2.2 MΩ for DI).

For starters, I set up the Solo/110 as a DI unit between a Rickenbacker guitar and a Fender Twin amp. I first tried running it directly to tape at line level, but found myself constantly running back and forth between the control room and the music room to reset the levels. To avoid that, I chose a level that didn't distort at the guitarist's highest volume, switched it to mic-level output, and ran it into another preamp so as to have a level control within easy reach in the control room. Both setups produced pleasant and highly usable direct guitar sounds. Blending the guitar with a miked-amp signal added necessary clarity and presence to the parts.

To the Bridge

Next, I tried the Solo/110 on both nylon- and steel-stringed acoustic guitars. I used the Solo/110 for my body mic, a Royer R-121 pointed at the bridge, and set up another mic and preamp on the neck. The Solo/110 performed extremely well, providing the fullness of sound I've come to expect from this particular mic and placement. The Solo/110 has more than enough noise-free gain to readily handle a ribbon mic recording a medium-volume source.

I also used the Solo/110 to record a male vocalist singing loudly into a vintage U 87. In that situation, I found that the amount of gain drastically changed the quality of the sound, more so than in my guitar tests. At higher gain settings, with the tricolored signal-indicator LED getting into the orange and red zones, the voice acquired a huskiness in the low midrange that it didn't have when I used my reference preamps. Information on the UA Web site indicates that the Solo/110's gain structuring allows for some of the tonal variety that you get from the 4110 and 8110's Switched Shape feature. I definitely felt that the Solo/110 emulated the Saturation setting of the 4110 and 8110 units in a warm, fuzzy way.

A similar phenomenon occurred with a Fender P-bass plugged directly in and the Gain knob pushed toward the max—the high midrange dulled a bit, giving a woofier sound. However, when the gain was pulled back, the clarity and air of the bass shone through nicely. I preferred the Lo-Z setting for picked bass and the Hi-Z setting for finger-plucked bass. That preference highlights the usefulness of the Lo-Z/Hi-Z button.

With some really nice extra features, overall solid construction, and excellent sound, the Solo/110 does everything it's supposed to do quite well. Does it live up to the Putnam legacy? That's a tough one. The Solo/110 won't change your life the way a UREI silver-face 1176 might, but it is definitely worth the price.

Value (1 through 5): 4
Universal Audio
www.uaudio.com

HARM VISSER

Creative Physical Modeling Toolbox for Reaktor 5

(Mac/Win)

By Dennis Miller

Noted sound designer Harm Visser has released an impressive set of Reaktor Ensembles that use physical modeling in a variety of ways. *Creative Physical Modeling Toolbox for Reaktor 5* ($189) includes instruments from all the traditional symphonic families (woodwind, brass, percussion, and string), several prebaroque and non-Western instruments, and many other imaginary sound-making devices. The models are based on analyses Visser performed on recordings of actual acoustic instruments, for which he determined the various resonant frequencies of the instruments, then built Ensembles tuned to those frequencies.

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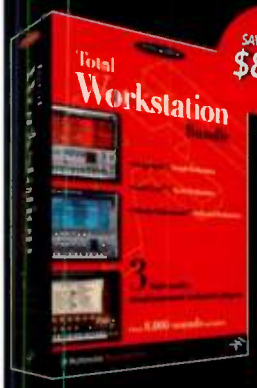

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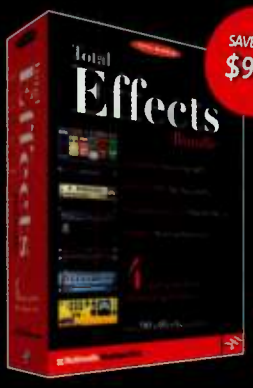

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The results are often stunningly realistic.

Most of the roughly 130 Ensembles have only a single Snapshot; perhaps some of the Ensembles that cover similar instrumental families could have been grouped. And Visser won't win any awards for graphic design, as the Ensembles' interfaces are very basic and don't use any modern-looking graphic elements. But the sonic potential of this set is vast, and the opportunity for experimentation is unlimited.

The collection is divided into 14 groups. In the acoustic family, you'll find three separate woodwind sets (Western, Medieval, and Ethnic); two percussion groups (Mallets and Percussion); Bowed, Plucked, and Plucked Ethnic Strings; Keyboard and Dulcimer sets; and a Brass set. The FOF group focuses on vocal models, and Bounce Roll Scrape includes Ensembles that model a variety of playing techniques on both real and virtual instruments. The MovieSounds set mixes components from the other groups, and a miscellaneous category called Various includes a number of bowed and blown models. (You can find a complete list of the instruments in each group at Visser's Web site.)

Tune Up

Most of the individual Ensembles include several tunable resonators that are fed by either a noise source or an excitation source, as well as one or more ADSRs, an occasional filter, master volume and tuning controls, and other parameters specific to each model. In some cases, Visser gives intuitive names to the individual Modules, such as Lips, Breath, Mouthpiece, and Overblow, but in others, there is no indication as to what aspect of the instrument's makeup you are adjusting (Timbre, for example). Rollover help explains the functions of some Modules, but again, this is not consistent across Ensembles or over parameters within an Ensemble. (A manual in PDF format gives a good basic explanation of the parameters of most of the models.) But with very little effort—a few twists of a knob—you can determine the role any parameter plays.

If you're up for a little experimentation, you can easily change the included excitations for many of the Ensembles to one of your own. For example, I changed the exciter in one of the MovieSounds from the default to a sample of a human voice; the result sounded similar to what you might get using a cross-synthesis method such as LPC or convolution (see **Web Clip 1**). And by simply lowering the Pulse Transposition value and raising the Breath Noise amount in the FOF synth, I morphed a pitched female-vocal sound into a repeating series of low glottal pulses with a steamy hissing ambience (see **Web Clip 2**).

Keeping It Unreal

Visser's technique for creating physical models has nearly unlimited potential: any sound that can be analyzed can be modeled using his approach. Though a few of the acoustic-instrument Ensembles are not particularly compelling—the brass models are often too buzzy and overly thin and are the least effective overall—the vast majority are very musical and could be useful in numerous settings. Moreover, his convincing medieval and non-Western Ensembles bring editable models of often rare and exotic instruments to the desktop.

But even more exciting are the hybrid virtual instruments that explore realms well beyond the world of traditional instruments. There aren't too many other places you'll find a plucked flute or trombone! (To be fair, Visser has created similar models for Applied Acoustics' Tassman.) You can also easily create your own hybrids by mixing and matching the Resonance Ratio values of the individual instruments (real or imaginary). Visser's *Toolbox* is an outstanding demonstration of the potential of physical modeling and one of the best I've ever seen. This collection fills in a huge gap in the otherwise excellent Reaktor sound universe.

EM WEB CLIPS

Value (1 through 5): 4

Harm Visser

www.hvsynthdesign.com

Harm Visser's *Creative Physical Modeling Toolbox for Reaktor 5* includes more than 130 Ensembles that use physical modeling to create real and virtual instruments.

AVANT ELECTRONICS

Avantone CR-14

By Rich Wells

Avant Electronics is a new company offering a variety of Chinese-made microphones and mic accessories, from tube and FET condensers to the subject of this review: the Avantone CR-14 dual-ribbon mic. What's immediately striking about the CR-14 is its price—at $249, it's one of the lowest-priced ribbon mics on the market. Nonetheless, the CR-14 comes with a padded wooden box, an aluminum carrying case, a spider-style shockmount, and a five-year warranty.

The mic fits tightly into its padded, spring-loaded clamp. The black grille and red body, encased in chromed edging, gives the CR-14 a pleasant appearance, and it looks well built.

According to Avant Electronics, the dual-ribbon design should yield a stronger output—and therefore a better signal-to-noise ratio—than a passive single-ribbon design, as well as provide a smoother frequency response. (The overall frequency response is 40 Hz to 15 kHz, ±3 dB.) As far as the signal-to-noise ratio is concerned, the CR-14 is fairly quiet, though I found it still exhibits the lower output you'd expect from a passive ribbon design, based on my experience with older beyerdynamics

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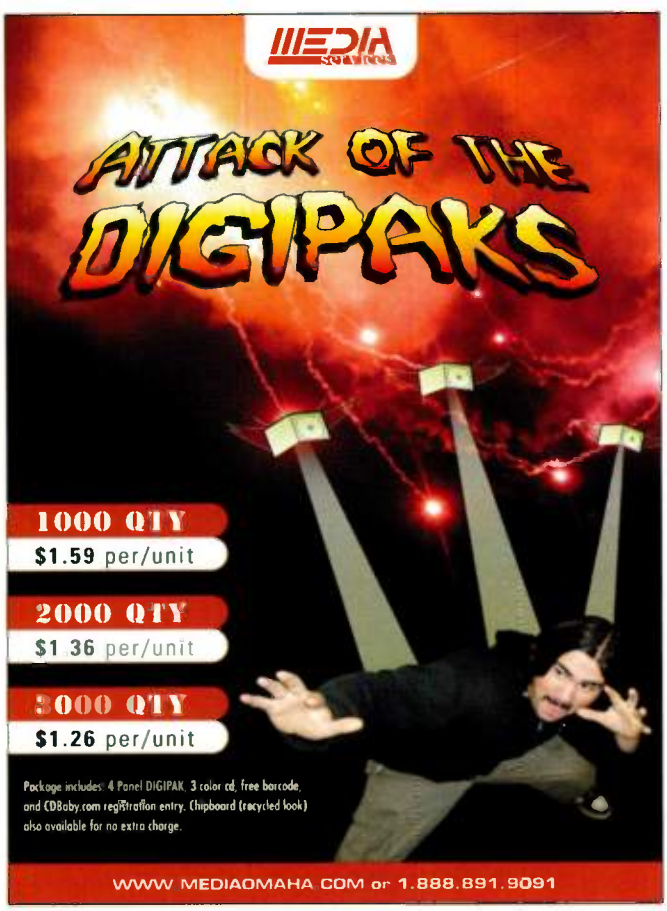

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Build Your Intel-Powered MOTU Studio

Run Digital Performer 5 and the rest of your Universal Binary MOTU studio on Apple's new Intel-Xeon Quad Core Mac Pro Tower for unprecedented virtual studio power and performance.

Meet Mac Pro. Running at speeds up to 3GHz, Mac Pro not only completes the Mac transition to Intel processors but delivers advanced performance, expansion and audio I/O configurations for your MOTU studio. The Mac Pro's 64-bit Dual-Core Intel Xeon "Woodcrest" processor — in double dual-core "quad" configuration — makes Mac Pro one of the fastest desktop computers on the planet. At 3GHz, the Mac Pro runs up to 2x faster than the Power Mac G5 Quad, allowing you to run an astonishing number of [illegible] and [illegible], together with a wide array of third-party instruments and plug-ins. Add up to 4 Terabytes of internal hard drive storage for massive track counts. Install up to 16 GB of RAM for optimal virtual instrument performance. Connect [illegible] via three PCI Express slots, four Firewire ports and five USB2 ports. Your MOTU Studio is now faster then ever.

Bus powered Firewire I/O

The ultra convenient MOTU UltraLite connects quickly to your Intel Mac Pro or Macbook and instantly delivers 10 inputs and 14 outputs, including two mic / line / instrument inputs with pristine preamps. Mix and match condenser and dynamic mics with individual 48V phantom power, 20 dB pad and Precision Digital Trim™. The UltraLite is the only interface of its kind to offer complete seven-segment front panel metering for all inputs, plus full front-panel LCD programming. The LCD also gives you full access to the UltraLite's 8x20 CueMix DSP mixer, which can also be controlled from the convenient CueMix Console software for PC and Mac. The UltraLite is a sturdy all-around interface with ASIO, WDM, Wave, GSIF, Core Audio, and Core MIDI drivers and support for all popular Macintosh and PC audio software. Mix and match the UltraLite with other MOTU interfaces as your studio needs grow.

Waves native processing

With 24 State-of-the-art sound processors, Waves Gold Bundle is a comprehensive set of audio processing tools for DP5. Now fully compatible with the new Intel-Based Macs, the New Gold Bundle is bigger and better than ever, including IR-L Convolution Reverb, Waves Tune LT, Doubler, and RenAxx. IR-L Convolution Reverb: The world's best rooms at your fingertips. Grand Ole Opry. Sydney Opera House. Birdland. Trinity Church. Want to record in the world's greatest venues? Now you can. IR-L puts the meticulously captured sound of these and many other renowned spaces and hardware devices in your hands. Waves Tune LT: Advanced dynamic pitch correction with formant correction, natural vibrato detection, MIDI and ReWire compatibility, and ultra-powerful real-time editing capabilities. Doubler: Fat tracks with richness and texture. RenAxx: The ultimate compressor for guitar. For tracking, mixing, and mastering, the Gold Bundle is an ideal DP5 companion.

The MOTU experts at Sweetwater can put together the perfect Intel DP5 rig for you. We'll help you select the right components to build a system that seamlessly integrates into your workflow, and we can even install, configure and test the entire system for you. Why shop anywhere else?

Legendary drummers

Submersible Music Drumcore delivers access to twelve world-class drummers, such as Terry Bozzio, Matt Sorum, Sly Dunbar and Zoro. The perfect tool for songwriters and composers who need drums quickly in a multitude of styles. Features include an Audio and MIDI librarian (quickly find that perfect groove), "GrooveSets" (for easier songwriting), MIDI instrument (loaded with each drummers' MIDI drumkits) and the "Gabrielizer" (groove generator). Simply drag-and-drop from Drumcore to your Digital Performer 5 tracks or Clippings window.

Exquisite grand pianos

Synthogy's Ivory set a soaring new standard for virtual pianos. Now, you can expand Ivory's three-piano repertoire with the Italian Grand expansion pack, a 16 GB, 12 velocity masterpiece of exquisite playability. Load up the Italian Grand, and Ivory becomes far and away the most powerful virtual piano for Digital Performer 5. Once you lay your hands on Ivory, you'll agree with the pros at Sweetwater: "Ivory isn't just a virtual instrument... it's an experience."

Advanced waveform editing

Your DP mastering and processing lab awaits you: BIAS Peak Pro 5 delivers award winning editing and sound design tools, plus the world's very best native mastering solution for Mac OS X. With advanced playlisting. Superb final-stage processing. Disc burning. Plus PQ subcodes, DDP export (optional add on), and other 100% Redbook-compliant features. Need even more power? Check out our Peak Pro XT 5 bundle with over $1,000 worth of additional tools, including our acclaimed SoundSoap Pro, SoundSoap 2 (noise reduction and restoration), Sqweez-3 & 5 (linear phase multiband compression/ limiter/upward expander), Reveal (precision analysis suite), PitchCraft (super natural pitch correction/ transformation), Repli-Q (linear phase EQ matching), SuperFreq (4,6,8, & 10 band parametric EQ) and GateEx (advanced noise gate with downward expander) — all at an amazing price. So, when you're ready to master, Peak Pro 5 has everything you need. It's the perfect complement — and finishing touch — to Digital Performer 5.

Universal plug-in control

As a Universal Sound Platform, Native Instruments KORE operates not only as a plug-in within Digital Performer but also as an instrument host application. It allows you to integrate all your VST- and Audio Units-based software instruments and effects into a single, unified interface. KORE provides greatly increased control, overview and ease of use in all creative situations. Both Native Instrument's own range of instruments and effects as well as third-party products are supported. The seamless integration with KORE's advanced hardware controller gives hands-on control with unprecedented analog feel, finally turning today's software synthesizers and samplers from applications into true instruments.

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Build Your Intel-Powered MOTU Studio

Advanced compact controller

Digital Performer 5 gives you unprecedented control over your MIDI and audio tracks. And what better way to take advantage of this hands-on control than the new M-Audio Axiom 25, which kicks off the more advanced Axiom line of MIDI controllers. Built around an even more rugged chassis, the Axiom 25 includes 25 semi-weighted velocity-sensitive keys with assignable aftertouch, eight MIDI trigger pads, six reassignable transport buttons, 20 non-volatile memory locations and more. And if you need more keys and controller options, the 49-key Axiom 49 and the 61-key [illegible] complete the new line. Don't let the compact size of the Axiom 25 fool you. This advanced 25-key USB mobile MIDI controller features both semi-weighted action and assignable aftertouch, plus eight rubberized trigger pads that put drum programming and performance at your fingertips.

Rich Lexicon reverbs with plug-in convenience

Lexicon is noted for reverbs, and now the new MX400 and MX400XL dual stereo/surround reverb processors bring that classic Lexicon sound to your MOTU desktop studio, without the taxing CPU overhead associated with high-end software-only reverb plug-ins. The new single-rackspace, 4-in, 4-out MX400 combines an intuitive front-panel design with Lexicon's "Hardware Plug-in" technology, a unique USB connection and AU plug-in interface that lets you control and save your MX400 reverb settings directly from within your Digital Performer projects, just like your other plug-ins, while offloading the intensive reverb processing the MX400 hardware. Featuring a wide array of rich, complex reverb algorithms, delays, effects and dbx dynamics, the MX400 series also offers 4-channel surround algorithms that dovetail perfectly with Digital Performer's state-of-the-art surround mixing. A 4-in, 4-out design, the MX400 series offer pro connectivity through XLR balanced I/O (MX400XL), or TRS I/O (MX400). Both products also offer . In any application, the MX400 series products provide versatility and sound that is unmistakably Lexicon.

Control room monitoring

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 enhance the creative process and ease mixing and music production.

Power conditioning

A large-scale MOTU-based multitrack studio is not only a finely-tuned instrument, it's an investment. Protect that investment — and get the best possible performance from it — with the Monster Pro 2500 and Pro 3500 PowerCenters. Many so-called "power conditioners" only protect against random power surges and/or voltage spikes. But AC power line noise and noise from other components is an equally harmful and constant threat to your gear's performance. To prevent this, Monster's patented Clean Power™ filter circuitry (U.S. Pat. No. 6,473,510 B1) provides separate noise isolation filtered outlets for digital, analog and high-current audio components. The result is high quality sound that's free from hums, buzzes and other power line artifacts, revealing all of the rich harmonics and tone in your recordings. Get All the Performance You Paid For™. Get Monster Pro Power.

Automated mixing & control

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 Universal 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 DP itself.

Accurate monitoring

The Mackie HR-Series Active Studio Monitors are considered some of the most loved and trusted nearfield studio monitors of all time, and with good reason. These award-winning bi-amplified monitors offer a performance that rivals monitors costing two or three times their price. Namely, a stereo field that's wide, deep and incredibly detailed. Low frequencies that are no more or less than what you've recorded. High and mid-range frequencies that are clean and articulated. Plus the sweetest of sweet spots. Whether it's the 6-inch HR-624, 8-inch HR-824 or dual 6-inch 626, there's an HR Series monitor that will tell you the truth, the whole truth, and nothing but the truth.

The MOTU/Intel experts

When it comes to building your Intel-based MOTU recording system, nobody does it better than Sweetwater. Whether you're building a simple portable recording rig with an UltraLite and a new MacBook or a 200+ track powerhouse Digital Performer studio centered around the latest Quad Mac Pro tower, Sweetwater can help you select the perfect components for your MOTU system, from the specific MOTU audio interface model, to control surfaces and hard drives, to plug-ins and studio monitors. Even better, we can install, configure, test and ship a turnkey system straight to your door — all you'll need to do is plug in the system and start making music. Why shop anywhere else? Call the experts at Sweetwater today!

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Groove Thyself

By Rich Maloof

SonnyBoy plays all the tracks—yet stays funky.

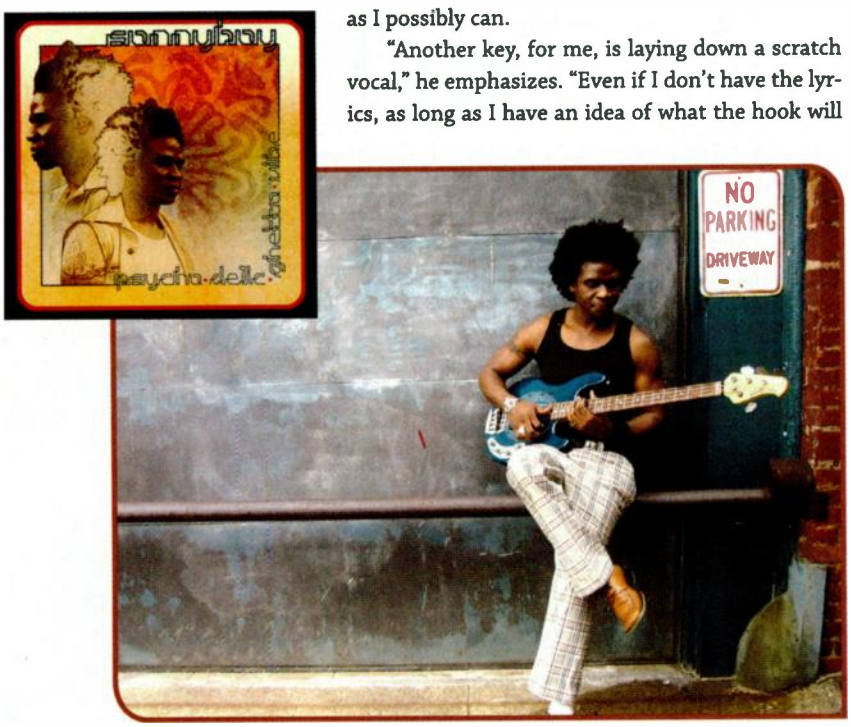
"Player player, won't you sing yourself a simple song?"

So goes a hook-laden lyric from *Psycho-Delic-Ghetto-Vibe* (Artform Entertainment, 2006), the new release from SonnyBoy. Anyone who records as a one-man band knows that the art of sounding simple and natural can get complicated fast. Digital audio technology has incredible capabilities, but one thing that no workstation can offer is the gift of groove. Even players with an excellent sense of time and feel can have difficulty building a convincing groove outside of a group setting.

So how is it that SonnyBoy (aka Shel Riser) managed on his own to sound like the hippest soul outfit this side of Paisley Park? He wrote, recorded, mixed, and mastered *Psycho-Delic-Ghetto-Vibe* almost entirely himself, and it's as genuine as a Motown record and as warm as a crushed-velvet sofa.

"I've been able to nudge my way toward getting it somewhat right," Riser says with a dose of humility. Describing his process, he says, "If I sit down at the kit, I try to keep that bass line in my head. I try to get into the other instrument as well as the one I'm playing so that I know where they both should be. I always focus on how to make my drums and bass feel as natural as I possibly can.

"Another key, for me, is laying down a scratch vocal," he emphasizes. "Even if I don't have the lyrics, as long as I have an idea of what the hook will be, that's what I try to build around. The flow of everything needs to be right before you start making things permanent."



ANDERS JONES

Psycho-Delic-Ghetto-Vibe/SonnyBoy

RIFFS

SonnyBoy

Home base: Brooklyn, New York

Sequencer of choice: MOTU Digital Performer

Favorite bass: MusicMan StingRay

Web site: www.sonny-boy.com

If this all sounds earthy and retro, note that Riser and his coproducer, Jinsoon "Dr. Jay" Kim, are heavily entrenched on the digital side. Beyond the vocals and a modest set of time-honored instruments—a Nord keyboard, a MusicMan StingRay bass, and Fender Teles and Strats—almost everything was laid down with Propellerhead Reason. "That program is a monster," says Riser, who used it ReWired to MOTU Digital Performer on an Apple Power Mac G4. He and Kim recorded strings and horn parts with Reason and wired up drum pads to trigger the flexible kits in Redrum.

Sometimes the trick behind an effortless sound is using what you need from programs like Reason and DP without getting caught up in all they have to offer. When things aren't working, it can be tempting to stop recording and search for a fix in the pull-down menus—even before you know what the problem really is. Riser finds it better to play through the part and listen back patiently.

"I try to give a track some air and let it breathe," he says. "I know that I can get caught up in overanalyzing a track if I don't give it time. I'll never understand why it isn't working if I don't give it time and space; that way, I can go figure out later what's wrong with it." It's like the DAW police are speaking through a megaphone: "Take your hands off the keyboard and step away from the computer. Step away from the computer!"

"We have a way of getting things to flow naturally so we don't overprocess a track in the course of trying to make it sound organic," Riser concludes. "Otherwise, it takes away from songwriting. It's one thing to add after a song is built. But before I start adding tricks, I just want to make sure that a song says what it needs to say." EM

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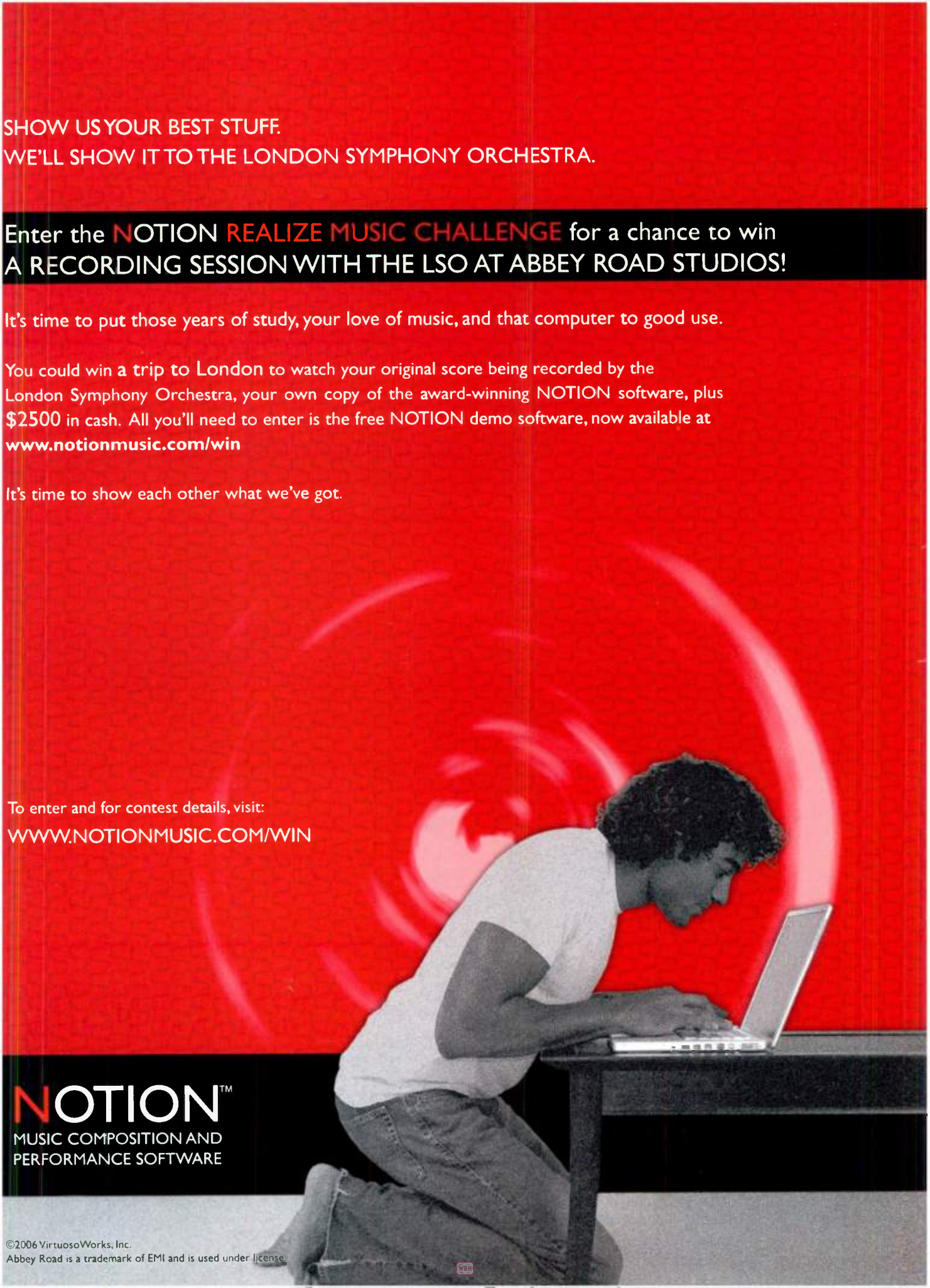

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