Reviews: Mackie HDR24/96, Cakewalk Sonar 1.02, MBHO MBNM-622, A.R.T. DI/O, Kind of Loud RealVerb Pro 1.0

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October 2001

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- 4 track recording/8 track playback @ 24-bit mode
- 100 scenes/4 locate points per song
- 106 effects algorithms
- 24-bit optical S/PDIF I/O
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- Built-in tuner

I N S I

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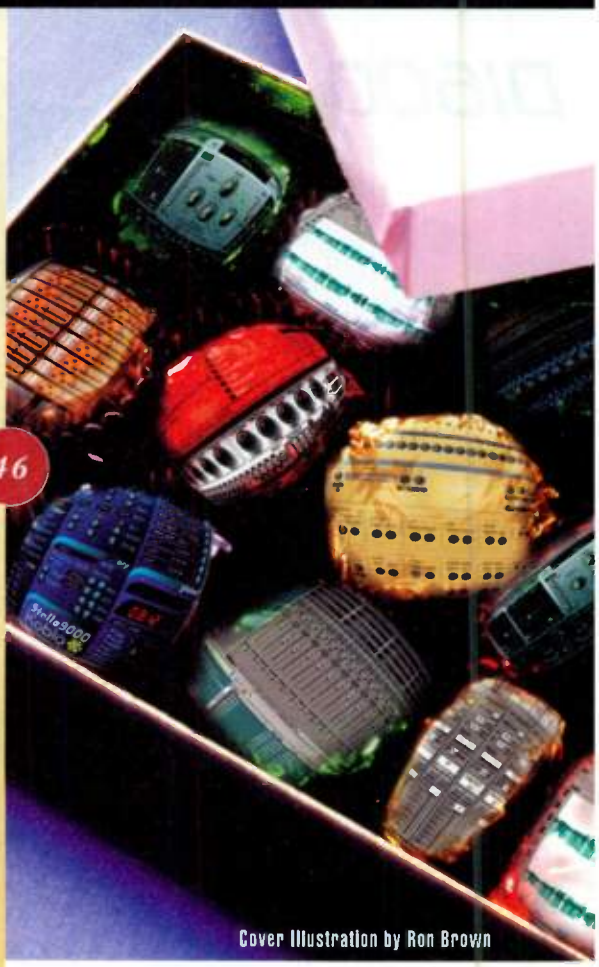
By Dennis Miller and Geary Yelton

88 PRODUCTION VALUES: CELLULAR ELECTRONICA

Guitarist, recording artist, sound designer, and producer David Torn creates cutting-edge electronic textures in his personal studio. His work can be heard in soundtracks for major movies such as *A Knight's Tale, Traffic, Three Kings,* and *The Score.* Torn gives the inside scoop about his production techniques, his pioneering work in loop-based music, and his new electronica identity, Splattercell.

By Matt Gallagher



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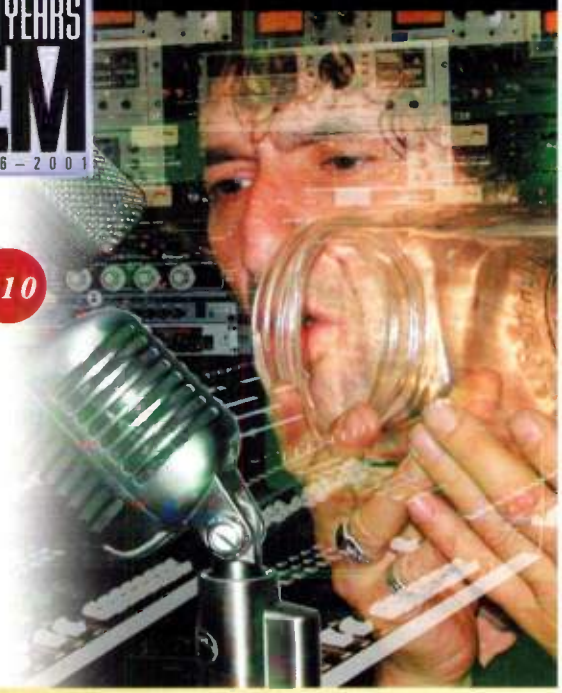
15 YEARS EM 1986–2001



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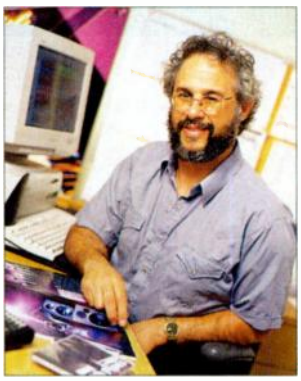
What? A Card?


ANTHONY PIDGEON

Few observers doubt that the advent of high-speed, dual-processor Power Macs and PCs is a significant boon for desktop-based music producers. Obviously, the arrival of still faster G4s and Pentiums or compatible CPU chips is only a matter of time. Unix-based, multithreaded operating systems such as Windows 2000, Linux, and Mac OS X are rapidly becoming practical for desktop musicians (see "Desktop Musician: Mac OS X for Musicians" on p. 100).

Until recently, DSP cards were the answer to limited CPU power, especially in the absence of multithreaded operating systems. Dedicated cards take a big load off the CPU, and some specialized DSP chips can do certain types of computation more efficiently than a general-purpose CPU.

Some people argue that inherently multiprocessor-capable operating systems and ever-increasing CPU speeds spell the end for dedicated DSP cards for audio applications. From the software side, it's simpler to write code for one or two standard CPU chips than to write for multiple products that use mutually incompatible DSP chips, drivers, or operating systems. Furthermore, writing code for the Motorola 56000–series DSP chips used in many DSP cards is a specialized skill that a lot of excellent programmers lack. And the fact that you cannot run, say, a Mixtreme plug-in on a Pulsar card reduces the end user's choices, especially when using plug-ins in multiple environments. Native processing has none of those limitations.

Furthermore, CPUs for desktop computers are mass-market items and are relatively inexpensive; currently, dedicated DSP cards for audio are specialty items and are usually more costly—in some cases, much more costly. Of course, that could change if some unforeseen consumer application were to drive the market for more-powerful audio cards, as the game market has done for video accelerators. But so far, consumer audio cards are relatively low-powered products.

On the other hand, if you want to run several heavy-duty reverb plug-ins and a few other effects at the same time, you can quickly put a hurt on your CPU, even if it is capable of supercomputer-level speeds. A DSP card guarantees a minimum amount of available computing power and allows your main CPU to run the basic OS and app. Go ahead and run that heavy-duty reverb. Heck, run three. You probably will still have DSP to burn on the more-powerful cards, and your main CPU won't feel at all pressured.

Another argument for DSP cards is that software written for a specific card as a closed system could theoretically mean a more efficient and stable system—whether that is consistently the case in practice is an open question. It makes sense that a company could write better software for its own custom hardware than it could for native processors. Writing for someone else's hardware could be another story.

The jury is still out, but it appears that native software is gaining ground, even if we agree that dedicated DSP cards provide superior specialized processing power. It will be interesting to see how manufacturers of such products respond.

We welcome your feedback. E-mail us at emeditorial@primediabusiness.com.

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Hot-Swappable SCSI Drives

Since the MX-2424 records to reliable, robust SCSI drives, there's another advantage: hot swapping. Unlike IDE drives, you don't have to shut down your recorder or computer every time you need to exchange SCSI drives...just pop in the drive, mount it and keep on working. SCSI is a time-tested, professional hard disk format that ensures the highest degree of compatibility with all DAW systems.

Using its native Sound Designer II and Broadcast Wave audio files, you can send audio to and from Pro Tools with sample-accurate time stamping. If the kazoo solo started at 3:12 in your original recording, it will still be there when you open the session in your DAW system... not at the start of the song.

You don't have to go through a lengthy process of converting files to get them between the MX-2424 and Pro Tools. Just record onto a removable SCSI drive with your MX-2424, then pop it into your Mac or PC. Your DAW system will open the files just as if they'd been originally recorded on the computer.

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While the power of nonlinear editing is a huge creative advantage of hard disk recording, the sonic fidelity of your DAW may not satisfy your highest expectations. With professional-quality 24-bit converters, audio pros have found the MX-2424 and its IF-AN24 24-channel analog interface module perfect for everything from audiophile classical and jazz recording to scoring feature films.

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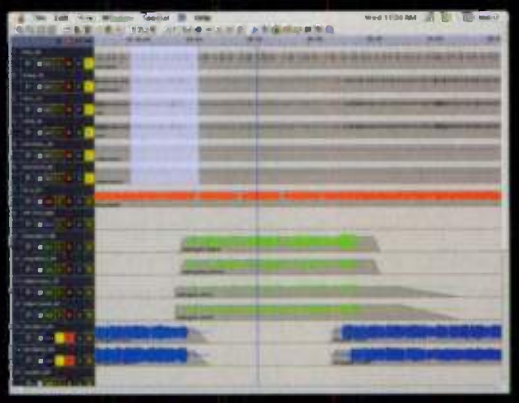

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24-TRACK 24-BIT HARD DISK RECORDER/EDITOR MX-2424

MIKE CRUZ

DIGITOTES?

As the owner of a commercial studio, I'm always amused by the "studio-in-a-box" claims of manufacturers, but now the media have fallen victim to their marketing ploys! Marty Cutler's assertion that these boxes "promise practically all of the features of a full recording studio" ("The Incredible Shrinking Studio," July 2001) makes me wonder when he was last in a full recording studio. In the article's 13 pages, he never discusses the audio performance of these units. Am I to assume that they all sound the same or that their features more than outweigh whatever sonic differences there might be between them? Part of being in the music-recording business is worrying about how things sound.

I can understand why folks want to buy these portable studios: they're powerful and inexpensive. However, they can't promise half the features of a professional studio. If you forget about high-end monitoring, mic and preamp choices, acoustic environments, regulated instruments (pianos, organs, and so on), and great-sounding ancillary gear from amps to outboard, don't forget that there's an engineer who knows how to run all the stuff. Do any portables come with expertise?

Can we call them "recording workstations" or "digitotes" so that people won't believe that a $2,000 investment in gear will make them studio engineers? Regardless of what music stores would have us believe, you can't buy your way into being an engineer (unless you're a second and you make the first an offer he or she can't refuse). Is it possible to make a good recording on a portable? Absolutely. But that depends on your engineering chops and the gear you put before the inputs and after the outputs. Unfortunately, that other gear doesn't come with the "studio" you buy in the store, and the good stuff doesn't come cheap.

What frustrates me is that the well-known companies that want to sell me professional gear are spending oodles of money telling people that a 30-pound box can do what an experienced engineer and brick-and-mortar studio can. It just isn't true.

I'd also like to correct Cutler's use of the term *dither*. One does not "dither to lower sampling rates"; one converts to lower sampling rates, quantizes word length, and adds dither (possibly noise shaped) if appropriate. Dither does not change word length or sampling rate.

Tom Eaton
Newburyport, MA

Tom—In my experience, each recorder provided clean, punchy, professional-sounding tracks. I am not saying they sound as good as high-end digital-audio workstations, but make no mistake: readers with professional-level skills can produce professional-level products with them.

You disagree? The fact is, these devices are used to create professional recordings every day, including an occasional major-label release. When Rob Shrock (Burt Bacharach's music director) was producing an album for Dionne Warwick, the band was on the road, so Shrock used the portable Roland VS-1680 to record part of the album. (Shrock reviewed the VS-1680 in the April 1999 issue.)

I never claimed that using a portable digital studio is the equivalent of renting time in a high-end commercial facility. Obviously, commercial studios have many advantages over personal studios, but that is completely beside the point. **EM** *is a magazine for musicians who record in personal studios, and these units are easily a match for some home studios our readers have used for years. The best portable digital studios are indeed complete studios in a box—except for transducers and sound sources. All of the other pieces are provided, and you can always upgrade by adding higher-quality outboard gear.*

My apologies for my misuse of the term dither; *I meant to say that the unit in question does not add dither when it is converting audio from 24-bit to 16-bit resolution.*
—Marty Cutler

SO KANT SAYS TO HEGEL . . .

Although "Final Mix" in the July 2001 issue was quite thoughtful, the subject matter at hand deserves at least one correction and one expansion from someone arguably more familiar with philosophical matters. First, the correction: the distinction between information and knowledge, though not drawn by the cited dictionary, is surely not one for which Larry the O may claim credit, though he may claim credit for his presentation thereof. Philosophers have long distinguished the mere facts of a matter, which Larry considers information, from the various beliefs one might form from them as well as the knowledge to which they might ultimately lead.

Second, the expansion: the subdomain of philosophy known as *epistemology* recognizes distinctions between kinds of knowledge, separating propositional knowledge (knowledge that something is the case) from working knowledge or

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FIFTEEN YEARS AGO IN EM

If you were a synth junkie in the 1980s and enjoyed contemporary classical music, you probably were a Philip Glass fan. Combining synths and samplers with voices, reeds, brass, and more, Glass pioneered new musical directions and by the time of our interview had at last been accepted by the music establishment. In an interview with John Diliberto for our October 1986 issue, the great composer discussed his evolving compositional style and his use of MIDI and synthesizers.

The October issue also offered interesting stories about music education, career advice, and the Apple II computer. Jan Paul Moorhead kicked things off with advice on planning your educational direction, including goal setting and school selection. Composer and educator Neil Waltzer discussed the curriculum at New York's Center for the Media Arts; his six-step approach to teaching bass-line composition is still worth checking out.

On the career front, Rosanne Soifer interviewed music-business experts about what musicians and school music programs needed to do to improve their approach to the business of music. Peter Stapleton offered a story on career opportunities presented by the emerging use of synthesizers in church music.

By 1986 the Apple IIe and IIc had become popular among electronic musicians, and Alan Gary Campbell's "The Musical Apple II" was a welcome overview of music-related Apple II software and peripherals. Apple II–equipped musicians also appreciated Andrew Newell's memory-dump program, which enabled data transfers between the computer and MIDI-equipped synthesizers.

In 1986 digital recording was still an expensive proposition, as were professional-quality tape decks. Tim Fluharty offered an affordable, high-fidelity alternative using the Beta Hi-Fi (BHF) audio circuitry in Beta VCR decks. (Fluharty also discussed recording to VHS Hi-Fi.)

Our October issue also had the first part of Thomas Henry's two-part story about how to build a mini-controller for standalone CV-based analog sequencers. We learned how to build a noise source and a lag processor, which slows down and rounds off a waveform so that a square wave becomes closer to a triangle wave and a triangle wave becomes more like a sine wave. It was used for portamento effects.

Three reviews were of sequencers for the Apple II series, including Roland's *Muse* and Syntech's *Studio II*. Far more important was former Youngbloods keyboardist Lowell "Banana" Levinger's review of Passport's *Master Tracks*, which quickly became one of the leading music programs of its time.

We also reviewed Dynacord's CSL222, one of the first reasonably convincing rotating-speaker simulators. Its main shortcoming was that it did not distort the signal the way a Leslie does, but otherwise, it was definitely a winner.

To top it off, we took a look at Casio's unbelievably affordable SK-1 sampling keyboard. The idea of getting even a limited 8-bit sampler for $129.95 was exciting, even if it was sold as a toy and lacked MIDI.

—Steve Oppenheimer

know-how (knowledge associated with a process or task), and so on.

For those intrigued by the points made in the column, I suggest picking up some basic texts about epistemology. One's beliefs and knowledge are quite literally the most important thing in life. As such, having some modicum of understanding of the issues involved therewith is as important as it is practical. Kudos for a nicely written and interesting "Final Mix."

John B. Williston
via e-mail

EARTH TO GEAR MAKERS

I enjoyed your wiring article ("Battling Medusa," June 2001). Now I have a bit of advice for the equipment manufacturers.

Every piece of rackmount gear should have the AC power cord/supply come out of the same side of the rack! Imagine how easy it would be to keep power lines separate from audio if all your gear had the power cables on the same side. It should be a standard, like 44.1 kHz. Regardless of make, model, or price, everything should be the same.

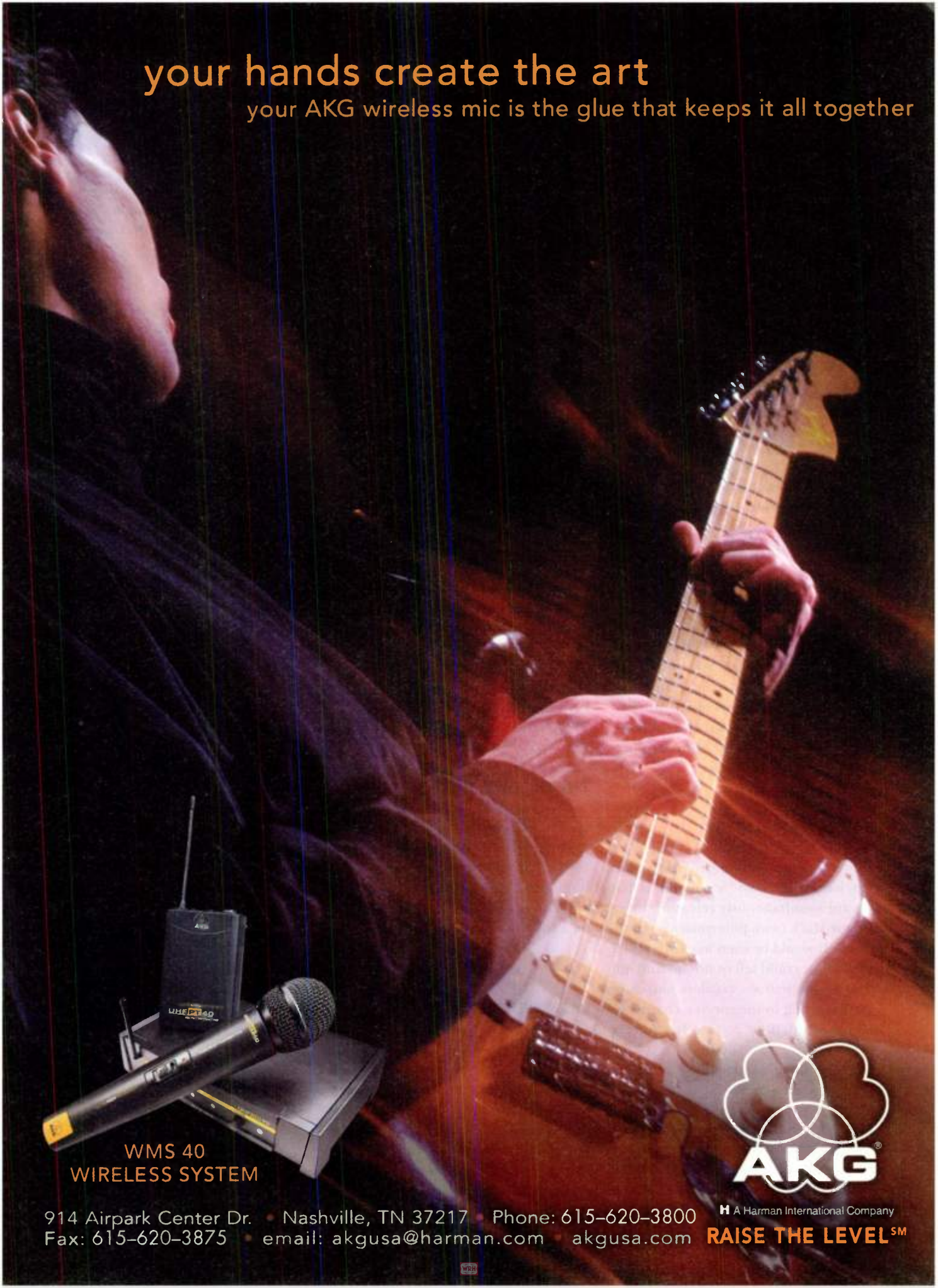
Michael Palmisano
Cincinnati

NOT JUST BLOWIN' SMOKE

On behalf of the International Wind Synthesis Association, thanks for Scott Wilkinson's excellent article "The Wind Cries MIDI" in the May 2001 issue. It nicely covers the field of wind controllers and wind synthesis and presents a balanced and accurate assessment of the art.

Readers interested in additional information about wind controllers may consider looking at the following Web sites: the Wind Instrument Synthesizer/Controller Page (www.ucs.mun.ca/~andrew/wind/); Ken Barry's site (http://kbspace.com); Art's Wind Synth Page (http://members.aol.com/whitfiel/artwind.htm); and Norton Music's WX5 Tips and Tricks (http://nortonmusic.com/wx5.html). Thanks again for the excellent article.

Art Whitfield
Boston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HANGING ON EVERY WORD

I am a professional guitar teacher, a performer, and a struggling songwriter, composer, and home recordist. My first subscription to **EM** was a gift from one of my students several years ago. At first, I assumed that the magazine was for keyboard players and that I wouldn't read it. I now eagerly await the arrival of each issue! It has something for everyone. The articles help me tremendously in my personal studio.

One recent article had a sidebar with a list of books and resources. It would be helpful to see more of those kinds of lists. I'm interested in finding books that would help me with compression, parametric EQ, songwriting, and so on.

Brian Moore
via e-mail

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SYNTH YOU ASKED

Two thumbs up for April's "Something Old, Something New" modular analog synth face-off. As someone who worked extensively with the Buchla 200s at Cal Arts and who owned a six-panel Serge for years, I surely appreciate Gino Robair's observations. I am considering the purchase of more modular equipment in the near future.

Peter Grenader
via e-mail

TERRA INCOGNITA

July's "Working Musician: Uncharted Territory" was timely in that we are simultaneously releasing three Jimmy Mack (www.jimmymack.com) albums. It would be even more helpful if the author could tell us how to find out which radio stations, retailers, and clubs are reporting to the specific charts—as recommended on p. 136. It's a great idea, but how do we do that?

John McIntosh
via e-mail

John—Sorry about the oversight. In every issue, CMJ publishes its reporting stations in the magazine's "Airplay" section. Gavin *sells a directory called* The Record and Radio A to Z Phonebook *($79.50; tel. (415) 495-1990; Web www.gavin.com), which gives the phone and fax numbers of reporting stations and the addresses and phone and fax numbers of many record labels.* Gavin *also has a mailing service that sends CDs to reporting stations. The price of the service varies depending on the charts you are interested in targeting.* Billboard *also makes its reporting stations available through its directory, the* Radio Power Book 2002 *($115; tel. (800) 344-7119 or (732) 363-4156; Web www.billboard.com).—Mary Cosola*

THE OL' ONE-TWO

Excellent article about studio monitors ("Good References," June 2001). It could be part of a textbook. With that article and April's "Mysteries of Mixing," it looks like Brian Knave is on a roll nowadays, doesn't it?

Paul Ferguson
via e-mail

LAZY NEOPHYTES

Recently, I made my way through the May issue (reading each issue thoroughly takes time, and I'm a few issues behind). One letter complained about the technical levels of the articles. The termination of your back section in which manufacturers and professionals answered reader questions is a true loss. However, filling the magazine with articles for novices would mean repeating information that the rest of the readers already know. Novices cannot remain neophytes forever; targeting a transitional demographic alienates the professionals and aficionados who enjoy the magazine as is.

With the abundance of online recording and electronic-music resources, there is no excuse for ignorance of terms and concepts. As a 23-year-old with no background in electronics, music theory, synthesis, or software design, I see no reason why the relevant concepts cannot be mastered merely by taking advantage of existing online resources.

Please don't change because some people are lazy.

Dan Steinbok
via e-mail

ERROR LOG

August 2001, "What's New," p.20: The correct e-mail address for Radial Engineering is info@cabletek.ca and the Web address is www.radialeng.com.

WE WELCOME YOUR FEEDBACK.
Address correspondence and e-mail to "Letters," Electronic Musician, *6400 Hollis Street, Suite 12, Emeryville, CA 94608 or emeditorial@primediabusiness.com. Published letters may be edited for space and clarity.*

MARK ISHAM, M-POWERED.

Includes Emagic's Logic Delta, a powerful 24bit/96kHz audio and MIDI program optimized for our audio cards.

If you go to the movies, you've heard his work. He's the man behind the scores for "Blade", "Kiss the Girls", "Quiz Show", "Nell", "A River Runs Through It", "The Moderns" and dozens of other films. Not one to be limited by genres, Mark's compositional palette includes orchestra, electronic, acoustic jazz, and everything in between.

Mark needs a digital audio card as flexible and diverse as his music. He uses Delta 1010's. The Delta 1010 has become a staple item in pro studios because of its ability to work well in so many environments. Mac or PC, from Gigastudio to Logic, from tracking to soft synth playback, the Delta 1010 is the card behind the scenes. To learn more about the Delta 1010 go to www.m-audio.com/em

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Ethno Techno

Presenting a **Groove Masterpiece** from world famous drummer/percussionist **Bashiri Johnson** and producer **Eric Persing**. Ethno Techno is a new kind of groove library, with sounds that are organic, metallic, deep and glassy. The grooves were created using a mixture of radical, welded instruments, some "junk" percussion, and more traditional skins and sticks. The instruments were played live by Bashiri and friends (including a member of STOMP) with an emphasis on modern dance/pop and urban styles. Persing then used these raw materials to create the remixes, flowing with spacious ambience, round impacts, and laid-back to aggressive feels. Mixes, Elements and Remixes, all **Groove Control** activated.

"...straight out of some futuristic drum circle, where handmade instruments, traditional drums, electronic drums, and effects processors collide to create a hybrid wash of rhythm... The grooves, the sounds, the creative blend of traditional and non-traditional instruments. This collection is nothing but first class... I can't think of a single area where Ethno Techno delivers anything less than perfection. The samples sound great and have plenty of vibe, and there's enough variety to serve a wide range of music styles... It really doesn't get any better than this..." –KEYBOARD Unprecedented Four 10s! ***Awarded Key Buy!***

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Includes sampler CD-ROMs and Data CD
Roland, Akai/Emu, Kurzweil

Skippy's Big Bad Beats

From producer/programmer **John "Skippy" Lehmkuhl**, one of the true gurus of groove, comes an explosion of unique, hi-fi, funkified drum loops. Skippy uses his wacky imagination to create **hip hop**, **trip hop**, and **dance** grooves that come in a variety of flavors, including smaller mixes, no-kick, no-snare, and even breakdown versions! Plus, this library is entirely **Groove Control®** activated, meaning you can load any of these grooves into your sampler and have completely **independent control** over **tempo**, **pitch**, and even the **feel** of the grooves, using just your sequencer and sampler.

★★★★★ *"If you're looking for some very 'now' sounding loops...Big Bad Beats will not only deliver, but might even represent the future of the sample CD." – SOUND ON SOUND*

CD-Audio (without Groove Control) $99

CD-ROM (with Groove Control) $199
Includes sampler CD-ROM and Audio/Data CD
Roland, Akai/Emu, Kurzweil

Analog Meltdown

Classic synths, tricked out and turned up! Introducing a new slant on synth sounds. Produced and programmed by synth sound design veteran, **Kevin Wakefield**, Analog Meltdown is a radioactive, protoplasmic adventure through unearthly terrain and solid-state high jinks. Don't expect a preponderance of presets. Every sound is handcrafted to sound totally fresh, with unique stacks, evolving waveforms and unusual element combinations. Sounds run the gamut from high impact to ambient, plucky attacks to swirling FX! All will inspire a raving dance mix or a high-tech soundtrack.

"Analog Meltdown not only captures the integrity of Analog synthesis but also the magic of the technology. This disc gives you all the analog sounds you remember, plus a grand assortment of amazing material that would have never been possible until now." –JORDAN RUDESS

CD-ROM $199
Akai/Emu, Kurzweil

Hot Steel Blues

From the producer of Fingerstyles comes a hot new library, full of sizzling electric and acoustic guitar riffs. You'll find over 800 phrases divided into Patterns, Melodies and Endings and arranged into Construction Kits that can be assembled and mixed to create complete, seamless tracks. Both "plugged" and "unplugged" styles traverse the entire Blues genre, from Waters to Clapton.

Guitars include vintage Gibsons, Fenders, Martin, Lap and Upright Slides. Great playing, recorded to ILIO spec! Put the sauce of real guitar in your remixes and tracks!

CD-Audio $99

CD-ROM $199 (includes Audio CD)
Akai/Emu, Roland, Kurzweil

Virtuoso Strings

The Virtuoso Series Strings by Kirk Hunter has already become a classic. Recorded in LA by top musicians, it offers a variety of articulations previously unavailable, like **grace-note slides** and **repeated notes**. Plus various **vibrato** styles, a true **Sordini**, **hard and soft attacks**, **half and whole step trills** and much more! It features Violins with 24, 8, 2 players, and solo, Violas with 16 players, Cellos with 10, 6, 2 players or solo, and Basses with 5 players. A whole new category of string library!

"These are the smoothest and most ambient sampled strings I've ever heard! The programming is really creative. I can now finally get some really expressive performances from a string sample library!"– David Newman, Academy Award Nominated Composer

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SONIC REALITY

All Acoustic Drum Kits with a mega multi-sampling of kicks, snares, toms, hats and cymbals, from old Ludwig®, and Gretch® sets to new top of the line Pearl®, and Drum Workshop® kits. All hits (no loops). These are extremely realistic drums that you can whack from your keyboard or with your drum pad/triggers. The vintage and custom kits were performed by some of the world's top session drummers. Interchangeable snare programs feature 20 to 50 hits per snare for realism from center, to edge, to rim!

"This is my new favorite drum sample collection...frighteningly realistic..." - KEYBOARD ***Awarded Key Buy!***

CD-ROM $199
Akai, Roland, Emu EOS, Kurzweil, Yamaha

Concert Grand Pianos

Brilliant renditions of the essential Yamaha piano sound. Features a Yamaha C7 recorded in-studio and a CFIII nine foot grand recorded in a concert hall, both with several dynamics. We've even included pedal down notes with resonating harp. These pianos respond beautifully to 88 note weighted controllers. Each dynamic is in stereo or mono and can be loaded together or individually for maximum flexibility with your setup. You get a slew of programming options for loud or soft music and a useful variety of memory sizes ranging from 8 megs to over 90 megs.

CD-ROM $199
Akai, Roland, Emu EOS, Kurzweil, Yamaha

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WRH

SPECTRASONICS

Hans Zimmer Guitars
Volume 2

This brilliant follow-up to Volume 1 raises the bar in recording, sampling and programming techniques, perfected by veteran sound designer, Bob Daspit. These instruments feature velocity switching for both up and down slides, and an intuitive new method for controlling vibrato with dynamics. It's beautifully programmed and a thrill to play. Volume 2 features Jazz Hollowbody Guitar, Lap Steel Slide Guitar, Electric Baritone, Flamenco Nylon, and a killer new Steel String Acoustic. Plus, check out the rare Middle Eastern, South American and other world instruments like the Charango, Mandolin, Cavaquiñho, Cuatro, Oud, Saz, Electric Sitar, Cumbus, and Yayli Tambur. All are amazingly captured in this stunning new release!

★★★★★ *"... a must-have disc for anyone needing first-class plucked instrument sounds... this collection deserves all five stars."*

– SOUND ON SOUND

CD-Audio $ 99
CD-ROM $299
Roland, Akai/Emu, Kurzweil, SampleCell

Liquid Grooves

Now, more "liquid" than ever!
The unique and inspiring grooves from the timeless library "Liquid Grooves" are now available a Groove Control™ version. This revolutionary new method allows you to mix and match grooves in any tempo, and will follow tempo changes from your sequencer! Groove Control also allows you to change the pattern, feel and pitch of the rhythms to your music. Imagine being able to tune the Wavedrum™ grooves to the key of your song in real-time, without changing the rhythm! Program your own original patterns and fills with the same sounds and mixes from this library!

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Spectrasonics takes Retro into the future! Producer **Eric Persing** has created a collection of Classic live drumming with serious feel, vintage sonics and a huge variety of original drum grooves and fills from four incredible drummers! These authentic sounding loops are ultra-flexible, bringing that magic "vibe" to any modern track. And with Groove Control, the grooves are at your command, effortlessly blending their timing and human feel to match your music.

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Intros, Fills, Breakdowns and Variations are provided along with separate Claps, Cymbals and funky live Percussion loops too!

★★★★★ *"... amazingly useful... infectiously musical... a fantastically wide range of drum sounds... amazingly tight and powerful..'must sample' sound quality... one of the best!" – SOUND ON SOUND*

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21st Century Grooves! Acclaimed producer **Eric Persing's** newest creation features an entire library of his trademark, cutting-edge loop manipulations. Each one of the hundreds of amazing remix grooves is truly unique in texture and feel. From floating, atmospheric Trip Hop pulsations, to experimental Euro-club beats, and all the way to intense, Drum 'N Bass fury, this is an extremely versatile library. If you're a fan of Persing's highly-creative groove processing, prepare yourself to be knocked out!

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Bizarre Guitar

Sound designer **Eric Persing** and guitarist **Peter Maunu** blaze a new trail of sound design via guitar. It features the extreme contrasts of breathtakingly beautiful **ambience beds** and **searing harmonic slashes, bowed guitar, strange funk and unsettling washes. Created** with tape loop techniques, e-bow, the Roland VG-8, and cutting edge signal processing tricks, you won't believe your ears. The CD-ROM version includes selected Groove Control™ loops.

"...The range of sonic ideas is vast...brings to mind the dreamlike soundscapes of Fripp and Eno...an aural addict's dream come true."
– KEYBOARD

"...meticulous attention to detail... perfectly suited to ambient and film music...Bizarre Guitar will appeal to those who like Distorted Reality, providing a wealth of strange and beautiful sounds."
– SOUND ON SOUND

CD-Audio $99

CD-ROM $199
Includes sampler CD-ROM and Audio/Data CD
Roland, Akai/Emu, Kurzweil, SampleCell

Distorted Reality 2
"Darkness & Light"

The completely new adventure in sonic dementia from producer **Eric Persing** is here at last! DR2 was created with the very latest in sonic sculpturing technology. Spinning metallic textures, singing oceans, vast amounts of unique loops (50-480 BPM!), impacts, pads, subsonic low-end and the many joys of feedback only begin to describe the wonderful noises in this collection. If you are a fan of volume 1, your sonic arsenal is simply incomplete without "Darkness & Light."

"Spectrasonics had a lot to live up to with DR2, and they didn't disappoint!"
–KEYBOARD ***Awarded Key Buy!***

★★★★★ *– SOUND ON SOUND*

CD-Audio $99

CD-ROM $199
Roland, Akai/Emu,
SampleCell, Kurzweil

Bass Legends

Marcus Miller, John Patitucci & Abraham Laboriel present their coveted electric and acoustic basses & grooves on this critically-acclaimed 650 meg collection.

TRIPLE ★★★★★ review
"...a truckload of great multisampled basses... Definitely put this one on your list of must-haves!"
–KEYBOARD

"... superb... well organized, exquisitely recorded, and brilliantly performed."
–ELECTRONIC MUSICIAN

CD-Audio $99 (grooves only)

CD-ROM $299 (basses and grooves)
Roland, Akai/Emu,
SampleCell, Kurzweil

Symphony of Voices

A massive FOUR CD-ROM SET, which includes a variety of multisamples, phrases & fx from some of the world's most prestigious singers.

- **The London Chorale.** 80 voice choir with multisamples and fx
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- **Gregorian Men's Choir** Multisamples and ancient Chants
- **Lush Multitracked Pop Stacks** "Enya-esque" pads

"... simply stunning... without a doubt the ultimate library of choral samples." –KEYBOARD 10 of 10 rating. ***Awarded Key Buy.***

★★★★★ *"... the definitive vocal sampling work."*
–SOUND ON SOUND

CD-ROM $499 4-disc set
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Vocal Planet

Spectrasonics is proud to announce that the eagerly anticipated follow-up to Symphony of Voices is now available! Vocal Planet is an epic Five Disc CD-ROM library produced by Eric Persing, that features both multisamples and phrases, an awesome variety of over 12,000 samples of authentic male and female singers. These are incredible one-of-a-kind sounds. Best of all, the samples have all been pre-cleared for your musical use without any additional licensing fees!

The main categories include **Gospel** with choir multisamples, shouts, hums, praises and phrases plus soloists - **Jazz/Blues** with Take-6 style vocal ensembles, scat singers and Delta Blues men - **World** with Tuvan throat singers, Colombian, Peruvian, Brazilian, Native American, Rasta, Indian, Serbian, Mid-East, Nordic, Balkan, Celtic, much more - **R&B/Dance** with Chromazone background licks, soulful phrases, dance hooks and shouts, "street corner" acapella, human synths, thousands of vocal percussion hits and **Groove Control loops!**

More than EIGHT HOURS of wall to wall vocals. Vocal Planet is the ultimate way to "humanize" your tracks!

Groove Control ACTIVATED

★★★★★ *"Breathtaking! This has to be the Encyclopedia Britannica of vocal samples!"*
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WHAT'S NEW

By Marty Cutler

MACKIE MDR24/96

Mackie's MDR24/96 ($1,995), the lower-priced sibling of the HDR24/96, has 24-track recording at a 48 kHz sampling rate. (The 96 kHz sampling rate requires third-party converters.) The MDR24/96 has a 20 GB hard disk that gives you 100 minutes of recording, a bay for removable hard drives or Mackie's Project cartridges, and a 3.5-inch drive bay for loading tempo maps or for upgrading system software.

The 4U MDR24/96 has random-access, nondestructive editing capabilities, but it's missing the HDR24/96's sophisticated graphical editing features. The front panel offers tape-machine-style transport controls, 24 LED monitoring-level meters, recording-status indicators, and track-arming buttons.

The MDR24/96 ships with three analog I/O cards that use DB25 connectors for inputs and outputs. The unit has a 100Base-T Ethernet port and MIDI In and Out jacks. Expansion options are available for digital I/O. Mackie Designs; tel. (800) 898-3211 or (425) 487-4333; e-mail sales@mackie.com; Web www.mackie.com.

AARDVARK DIRECT PRO Q10

The Direct Pro Q10 system ($999) from Aardvark combines a PCI card and 1U digital-audio interface, allowing you to simultaneously record ten channels of audio to your Windows computer. (Mac OS drivers are in development.) Recording resolution is 24-bit, and sampling rates of 32, 44.1, and 48 kHz are supported. Aardvark promises 96 kHz recording capabilities in a future software revision.

The interface includes eight combo jacks that accept XLR or balanced ¼-inch line inputs. Two inputs can be switched to accept high-impedance signals. The XLR inputs feature discrete, high-quality preamps and phantom power.

The front panel has a phantom-power button with an LED indicator, trim pots for the high-impedance inputs, a ¼-inch stereo headphone jack, and separate volume knobs for the monitor and headphone outputs.

The Q10's back panel has four unbalanced ¼-inch inserts, eight balanced ¼-inch outputs, and two balanced ¼-inch monitor outputs. The Q10 offers 24-bit digital I/O with coaxial S/PDIF connectors. To keep audio in sync, the Q10 sends and receives word clock through BNC in and out ports. You can install a maximum of four Q10 systems in your computer and run them in sync.

Aardvark bundles Cakewalk's *Pro Audio* 9 with the hardware. A software mixer with a drag-and-drop patch bay is also included. Aardvark; tel. (734) 665-8899; e-mail lovell@aardvark-pro.com; Web www.aardvark-pro.com.

NOVATION A-STATION

Novation's A-Station ($699) is a 1U, 8-note polyphonic analog modeling synth. Although it's a direct descendent of Novation's BassStation monophonic synth, the A-Station has technology used in the Nova and Supernova II.

The A-Station has 25 knobs for real-time control of voicing parameters, and each knob sends MIDI Control Change messages. You can process external audio signals using the 12-band vocoder or use the signals as an oscillator waveform source.

The A-station's three oscillators provide square, sawtooth, triangle, sine, and pulse waves. The Unison setting lets you double up waveforms to thicken the sound. Oscillator Sync, FM, and a noise source are also available. You can select a 12 dB or a 24 dB lowpass filter.

The A-Station has two ADSR envelope generators (EGs). The depth of Envelope 2 ranges from –100 to 100 percent. External audio can be used to trigger the EGs.

You can modulate pulse width using Envelope 2, LFO 2, or manually. LFO 1 and 2 offer sample-and-hold, triangle, sawtooth, and square wave shapes.

Onboard effects include distortion, chorus, reverb, and delay. Panning, delay, and the onboard arpeggiator can be synced to MIDI Clock, and LFOs can sync at different time signatures for polyrhythmic tempo-based effects.

Back-panel I/O includes MIDI In, Out, and Thru; two unbalanced ¼-inch audio outputs; and two unbalanced ¼-inch inputs for external signals. Novation USA; tel. (888) 782-3166 or 44-162-882-8880; e-mail salesusa@novationusa.com; Web www.novationusa.com.

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PORTABLE DIGITAL STUDIO UPDATE ▲▲▲▲

▲YAMAHA

Yamaha's AW2816 ($2,399) gives you 16 mono tracks and a stereo track of hard-disk recording. The unit can record 8 tracks or play 16 tracks simultaneously. The AW2816 supports 16- and 24-bit resolution and 44.1 and 48 kHz sampling rates. Internal processing is 32-bit with 44-bit EQ.

The unit offers almost four times the audio-processing power of Yamaha's AW4416 recorder. The two multi-effects processors include reverb, delay, distortion, filters, and dynamics processing. The mixer has nine motorized 60 mm faders (eight mono track faders and one master fader). Each channel provides 4-band parametric EQ and dynamics processing.

The AW2816 lets you store 96 scenes. It records all fader movement and parameter changes and transmits them as MIDI Control Change messages. The unit has bays for a 2.5-inch IDE hard drive (64 GB maximum) and a CD-RW drive.

For analog signals, the AW2816 has two combo jacks that accept XLR or balanced ¼-inch inputs, six balanced ¼-inch inputs, and one unbalanced ¼-inch high-impedance input. Analog outputs are two unbalanced RCA jacks for main outputs, two balanced ¼-inch monitor outs, four assignable unbalanced ¼-inch outs, and a ¼-inch stereo headphone jack. Two S/PDIF coaxial connectors handle digital I/O. Other connections include MIDI In, Out, and Thru and a ¼-inch footswitch jack. The AW2816 has a YGDAI card slot for expanding digital and analog I/O or for a Waves Y56K card. Yamaha Corporation of America; tel. (714) 522-9011; e-mail info@yamaha.com; Web www.yamaha.com or www.yamahasynth.com.

▼KORG

Korg's pocket-size Pandora PXR4 ($500) is a 4-track portable digital studio. Each track has eight virtual tracks, and there are three modes of digital-audio compression: High Quality, Standard, and Economy. The PXR4 uses SmartMedia cards from 4 to 128 MB in size. With a SmartMedia Card reader, the PXR4 can off-load stereo MPEG files to your computer.

You get four track faders and a master fader. The faders can also be used for editing. The four-way cursor and rotary encoder let you navigate the backlit LCD and change values. Editing functions include Bounce, Copy, Insert, Erase, Delete, and Time Compression and Expansion, with 99 marker points per song and one level of undo.

The PXR4's 100 preset effects programs include cabinet modeling, mic simulation, reverb, delay, and modulation. It has a built-in mic, 55 PCM rhythm patterns, and 32 metronome patterns.

Analog inputs are an unbalanced ¼-inch jack with a switch accommodating high- and low-impedance signals, and a stereo ⅛-inch minijack that accepts line or mic input. Outputs are an ⅛-inch stereo minijack, an ⅛-inch stereo headphone jack, and a USB port. The PXR4 runs on two AA batteries or the supplied AC power adapter. Korg USA, Inc.; tel. (516) 333-9100; Web www.korg.com.

▼ROLAND

Roland's CDX-1 DiscLab ($1,495) combines a CD burner and phrase sampler with an 8-track recorder. Two tracks can be recorded simultaneously to CD-R or CD-RW directly from the analog inputs. The CDX-1 supports 44.1 kHz, 24-bit recording.

The unit's eight pads trigger sampled phrases. Users get as many as 512 phrases divided into 64 banks. Samples can be loaded from WAV-format or audio sample CDs or recorded on the fly and then edited with tools such as time compression, bpm syncing, and trimming. Its 15 MB of sample RAM can be expanded to 128 MB.

Stereo effects include reverb, delay, and modulation as well as algorithms from Roland's Grooveboxes. The CDX-1's mastering toolkit gives you multiband dynamics processing and 4-band EQ.

Analog inputs are two XLR jacks, two balanced ¼-inch mic inputs, a high-impedance ¼-inch jack, and two RCA jacks. Analog outputs are two RCA jacks and a ¼-inch stereo headphone jack. Digital I/O is S/PDIF on coaxial connectors. Additional connectors are MIDI In, Out, and Thru ports and a ¼-inch footswitch jack. Roland Corporation U.S.; tel. (323) 890-3700; Web www.rolandus.com.

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02R LEVEL DIGITAL MIXER – Motorized fader automation accompanies an internal digital patchbay, providing infinite routing options

STUDIO-GRADE EFFECTS – Yamaha loaded the AW4416 with dedicated 4-band parametric EQ and dynamics on all channels, plus two patchable multi-effects processors

INSERT I/O – Patch your analog gear onto any track to augment the AW4416's capabilities

EXPANDABILITY – Dual card slots let you add analog and digital I/O options, Apogee® converters or the new WAVES® multi-effects processor card

YAMAHA CD BURNER ON-BOARD – CD mastering and backup are always available and easily accessible

DEDICATED METER BRIDGE – It's not a pricey option, it's included

MAXIMUM PORTABILITY – The AW4416 is small and light enough to carry on location in our new hardshell case*

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For literature, call (800) 937-7171 ext. 627, visit www.yamaha.com/proaudio or www.AW4416.com. *Case is optional **Estimated street price.

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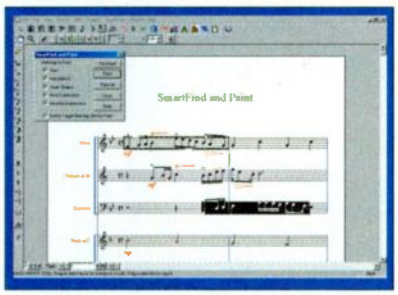
REV UP



▲ CODA MUSIC TECHNOLOGY

New features in Coda's *Finale 2002* (Mac/Win; $545; academic version, $245; upgrade from *Finale 2001*, $79; upgrade from earlier versions, $129) notation software include an Auto-Harmonizer plug-in ported from PG Music's *Band-in-a-Box*. *Finale 2002* creates two- to six-part harmonies in a number of styles. SmartFind and Paint let you select a range of notes and designate it as a style. You can use the style in any region and apply the same slurs, expressions, and articulations.

Finale 2002's Exercise Wizard creates music drills for anything from one instrument to an ensemble. More than 56,000 exercises are included.

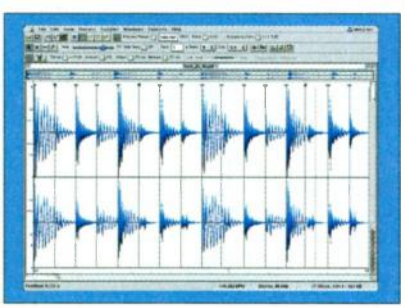
The improved Engraver Slurs will not interfere with stems, beaming, or accidentals, even after transposition or part-extraction. The new Simple Entry palette greatly simplifies the drag-and-drop entry of notes and rests.

You can generate musical ideas with the Composer's Assistant functions: the Rhythm Generator can create as many as six staves of percussion, Melodic Morphing provides transitions between melodies, and Chord Reordering rearranges chord placement. Mac users will need a Power Mac, 16 MB RAM, and OS 7.6.1. PC users will need a Pentium processor, 16 MB RAM, and Windows 95. Coda Music Technology; tel. (800) 843-2066 or (952) 937-9611; e-mail finalesales@codamusic.com; Web www.codamusic.com.

YAMAHA

Version 2.0 software upgrade for Yamaha's AW4416 boosts the unit's MIDI implementation considerably; you can completely automate mixer moves and parameter changes as well as send and receive bulk dumps. With assignable Control Change messages, the unit can act as a front end for external MIDI devices, including soft synths.

Other feature improvements include enhanced control of the Waves Y56K digital signal processing card and a simplified Quick Record screen. Frequently used functions can now be assigned user-programmable control keys. Yamaha will send a CD-ROM with the free upgrade to registered users, who can register on the Web at www.yamaha.com/proaudio.



▲ PROPELLERHEAD

Propellerhead Software's *ReCycle* 2 (Mac/Win; $199; upgrade, $49) adds support for stereo files, lets you preview settings before committing destructive edits, and allows you to move and delete slices from a loop. New real-time processing includes an Envelope Transient shaper and an equalizer. The software's new REX 2 file format lets you save files with lossless compression for size reduction as much as 50 percent.

ReCycle 2 supports ASIO, and the Akai S5000 and S6000 are now on the list of supported samplers. *ReCycle* 2 requires a Power Mac 604/166 MHz, 64 MB RAM, and Mac OS 8.6. Windows users will need a Pentium II/200 MHz; 64 MB RAM; and Windows 98, ME, NT 4.0, or 2000. Midiman/M Audio (distributor); e-mail maingate@propellerheads.se; Web www.propellerheads.se.

ROLAND

Roland has added a free software update for V-series portable digital studios. The update supports AKG's C 3000 B condenser microphone in conjunction with COSM Mic Modeling effects for the following units: VS-890, VS880EX, VSR-880, VS-1680, and the VS-1880. You can download the updates from the support section of Roland's Web site, www.rolandus.com.

▼ BITHEADZ

Phrazer 1.02 (Mac; $399; upgrade free) has new tools for managing loops, including a built-in sample editor. You can now fine-tune loop and sample split points. The new *Phrazer* engine adds *Acid* 2 import capabilities and improved beat detection. The new version updates factory-supplied third-party loops to work correctly with the program, and you can now sample audio into *Phrazer* to create content.

Version 1.02 supports QuickTime movies; you can sync a track's tempo to a movie with a single slider and merge new audio into the soundtrack. *Phrazer* requires a G3/300 MHz, 64 MB RAM, and OS 8.6. BitHeadz; tel. (401) 886-7045; e-mail info@bitheadz.com; Web www.bitheadz.com.

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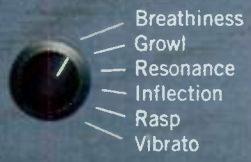

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KARMA Features:

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What makes this instrument truly revolutionary is KARMA. It's brilliant! This technology is versatile, innovative and always inspires me to come up with new ideas. I'm amazed by the control that it gives me and the way I can turn a few knobs to create a completely new part. KARMA certainly is the most unique system I've seen in a long time. I produce a lot of dance music, and this keyboard continues to breathe new life into my tracks. Plus, it saves me tons of time! But I'm afraid to bring it to a live gig because someone might figure out my tricks. (ha ha)

Karma is truly the most inspiring workstation I've ever played. Thank you for creating such an outstanding instrument.

Sincerely,

Chuck Johns

Chuck Johns

STORY #23

Chuck Johns Queens, NY

For a free copy of the Karma Video Intro, write to: Korg USA, Attn: Karma Video, 316 South Service Road, Melville, NY 11747. Or visit www.korg.com/karma and e-mail us your request.

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KARMA™(Kay Algorithmic Realtime Music Architecture) is a trademark and patented technology licensed from Stephen Kay, Karma Lab LLC. www.karma-lab.com

AKAI MFC42

Although it is optimized for use with Akai's MPC-series sampling drum machines, the MFC42 analog filter controller ($579) can process any audio signal. The MFC42 accepts a mono input and a stereo input simultaneously. Both inputs can be processed independently, or they can be linked so that changes made on one channel affect the other. In addition, you can invert the modulation of the linked channel.

You get a 2- or 4-pole filter on the stereo channel, and a 2-, 4-, or 8-pole filter on the mono channel. Filter types include lowpass, highpass, bandpass, and notch. The unit has a built-in phase shifter, distortion, and a 2-band EQ at the output stage.

The MFC42 provides real-time controls for cutoff and resonance. The Groove Modulator function combines Tap Tempo or MIDI Clock sync capabilities with the LFO and envelope generator to alter filter cutoff, resonance, or both. Most of the controls generate MIDI Control Change data. The Send Scene function can transmit all settings at once.

Analog inputs include an unbalanced ¼-inch jack for the mono input and a pair of unbalanced ¼-inch jacks for the stereo input. Two RCA inputs and a grounding screw are incorporated for using the MFC42 with a turntable. Outputs are on two unbalanced ¼-inch jacks. It has MIDI In, Out, and Thru jacks. Akai Musical Instrument Corporation; tel. (800) 433-5627 or (817) 831-9203; e-mail info@akaipro.com; Web www.akaipro.com.

PEAVEY KOSMOS

Peavey's Kosmos ($299.99) combines a subharmonic generator and stereo-image enhancer in a 1U box. Under the front-panel heading Seismic Activity, you can select one of two speaker settings using the Subterranean-Shift button and choose whether the processed signal goes through the main outputs or through the subwoofer.

The Quake knob adjusts the intensity of synthesized suboctave harmonics, which are added to the lower frequency ranges of the original signal. Thud is a bass-boost circuit tuned an octave higher than the subharmonic tone. The Xpanse control lets you increase perceived separation in the stereo field.

The Sub Woofer control sums the output of the Quake and Thud signals when the Cut Sub Bass from Mains button is on. The front panel also includes a Global Bypass button and an input-level control.

The rear panel includes XLR and balanced ¼-inch jacks for both channels of I/O and a balanced ¼-inch jack for the subwoofer output. Peavey Electronics Corp.; tel. (800) 821-2279 or (601) 483-5365; e-mail peavey@peavey.com; Web www.peavey.com.

ROLAND FANTOM

Roland's Fantom workstation has a 76-note keyboard and a 16-part multitimbral synth engine, and offers 64 notes of polyphony. The sound set includes stereo-sampled waveforms controlled by an extensive modulation matrix. The Fantom's memory holds 1,024 patches divided into 640 presets, 256 General MIDI programs, and 128 User slots. You also get 16 rhythm kits. The Fantom has enough room for one SR-JV80 ($295) and two SRX-series ($395 each) expansion boards.

The Fantom's sound set is expandable: the unit's waveform collection can hold more than 200 MB of sounds. The Fantom's multi-effects processor can dish up three simultaneous multi-effects in addition to chorus, reverb, and EQ. Effects can be configured as insert effects for individual parts.

Fantom has a 120,000-event sequencer with Realtime Phrase Sequencing, which can record and trigger phrases and MIDI continuous controller messages.

You can control arpeggiator performances and patch parameters in real time using the onboard D-Beam, four control knobs, and four switches. The Rhythm Generator helps you produce grooves, and the Variable Arpeggiator lets you create rhythmic variations using the controller knobs. Grooves and variations can be recorded into the sequencer, and the Fantom's sequencer is always active. You can store sequence and patch data using the built-in 3.25-inch floppy drive.

The Fantom has coaxial and optical S/PDIF outputs. The rear panel has two balanced ¼-inch mix outputs and a pair of unbalanced ¼-inch output jacks. Other connectors include MIDI In, Out, and Thru; a ¼-inch hold-pedal jack; and two ¼-inch inputs for assignable control pedals. Roland Corporation U.S.; tel. (323) 890-3700; Web www.rolandus.com. ●

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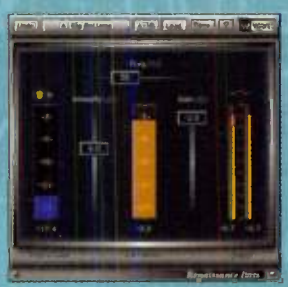

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WAVES

TECH PAGE

By Scott Wilkinson

Faster, Smaller, Better

New transistor technologies promise faster silicon chips.

At the heart of all electronic-music devices is a multitude of silicon-based integrated circuits (ICs), commonly called chips. At the heart of each IC are millions of tiny transistors that control the flow of electrons through the chip. The power to manipulate musical data ultimately depends on the number of transistors in each IC and the speed at which they switch on and off.

Several recent announcements by Intel and IBM bode well for the future of silicon chips. In particular, Intel has demonstrated the continuing veracity of Moore's law (postulated by company cofounder Gordon Moore in 1965). Moore's law states that the number of transistors in a single integrated circuit doubles every 18 months, and it has remained more or less true for the past 35 years. (Moore predicted that the trend would continue only through 1975.)

As transistors get smaller, they also get faster, which Intel demonstrated in its latest designs. The new devices are 30 percent smaller and 25 percent faster than today's transistors, and they include structures that measure a mere 20 nanometers (nm; billionths of a meter) across, with a 0.8 nm–thick gate-oxide base (used to build the transistors), which corresponds to only three atomic layers.

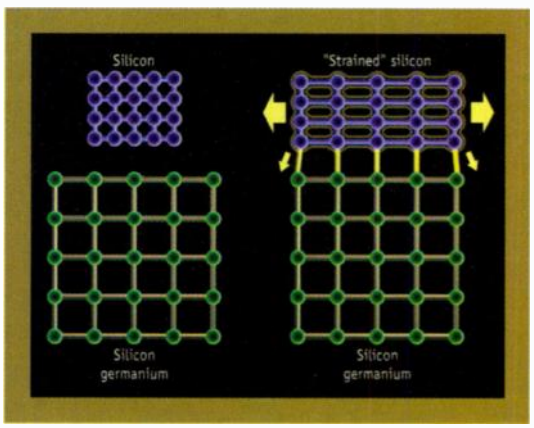
The new devices switch at 1.5 terahertz (THz), ten times the speed of the fastest current transistors. As a result of its experiments, Intel expects by 2007 to build microprocessors that contain 1 billion transistors and operate at 20 GHz. By contrast, the Pentium 4 has 42 million transistors and runs at speeds as fast as 1.7 GHz.

IBM has made several recent announcements regarding improvements in silicon transistors. One of the most fundamental developments is a combination of silicon and germanium (SiGe) in a design called a *heterojunction bipolar transistor*. In that design, which is specifically aimed at data-communications chips rather than generalized microprocessors, electrons move vertically instead of horizontally, as they do in standard transistors. That makes it easier to shorten the path they must travel, by reducing the thickness of the device rather than reducing its width or length. Those transistors have reached speeds of 210 GHz while drawing one milliamp of current, which is 80 percent faster and 50 percent less power-hungry than current designs. The company expects the new transistors to result in communications chips that operate at 100 GHz within two years.

Another IBM breakthrough is called *strained silicon*, a process in which silicon atoms are stretched, or strained, to align with the atoms of the substrate material, such as SiGe (see **Fig. 1**). That alignment causes electrons to experience less resistance and thus move as much as 70 percent faster through the transistor, without having to decrease the transistor's size. By 2003 that could lead to chips 35 percent faster than today's models and circumvent Moore's law.

IBM has pioneered additional innovations, such as the use of copper interconnects between transistors within a chip, which provides a better conductor than the more traditional aluminum. (The new Intel transistors also use copper interconnects, which are much more difficult to implement than aluminum.) *Silicon-on-insulator* (SOI) designs place a thin layer of silicon on an insulator base, which is said to speed performance and reduce power requirements.

Clearly, increases in the speed and power of silicon chips offer big benefits to electronic musicians, who rely on those chips to generate, process, and transmit musical data. The recent announcements from Intel and IBM mean that the electronic tools of the future will offer musicians ever-increasing capabilities with which to realize their artistic visions. ❦



COURTESY IBM

FIG. 1: IBM's strained-silicon technology "stretches" a layer of silicon so that its atoms align with those of the substrate material, letting electrons move faster because of lower resistance.

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Downtown Beats

AUDIO

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Breakz From the Nu Skool

AUDIO-WAV/AKAI

Breakz From the Nu Skool is the first of two sample CD's in BT's signature collection and features cutting edge breakbeats hand mangled through hundreds of plug-ins, stomp boxes, pressed to vinyl, you name it! Best of all this CD is sample accurate! No more flaming as you stack loop upon loop. Once you've busted some Breakz From the Nu Skool, you won't look back!! (ID#2039)

Twisted Textures

2 AUDIO/AKAI

It's time to unleash the power of art, spirit, and sound with BT's new sample CD, Twisted Textures - a massive two disc collection of sounds, pads, and waveforms, organized by emotion, that will lead you into all realms of the human condition and beyond. So no matter what project you are working on, Twisted Textures has a sound for you. (ID#2040)

Club Trackbuilders

2 AUDIO

Club Trackbuilders uses six producers from four different countries to create an unparalleled double cd of the latest breaks and samples of kicking club music. Construction kits in the 2-step, hard house, techno and drum&bass styles with plenty of extra breaks, loops and sounds (1200Mb+). A must have for dance/music producers working on the edge. (ID#2038)

Brutal Beats

2 AUDIO/1 WAV

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Groovemasters Bass

2 CD AUDIO

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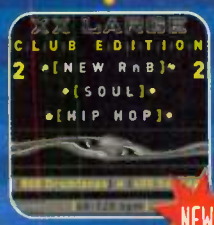

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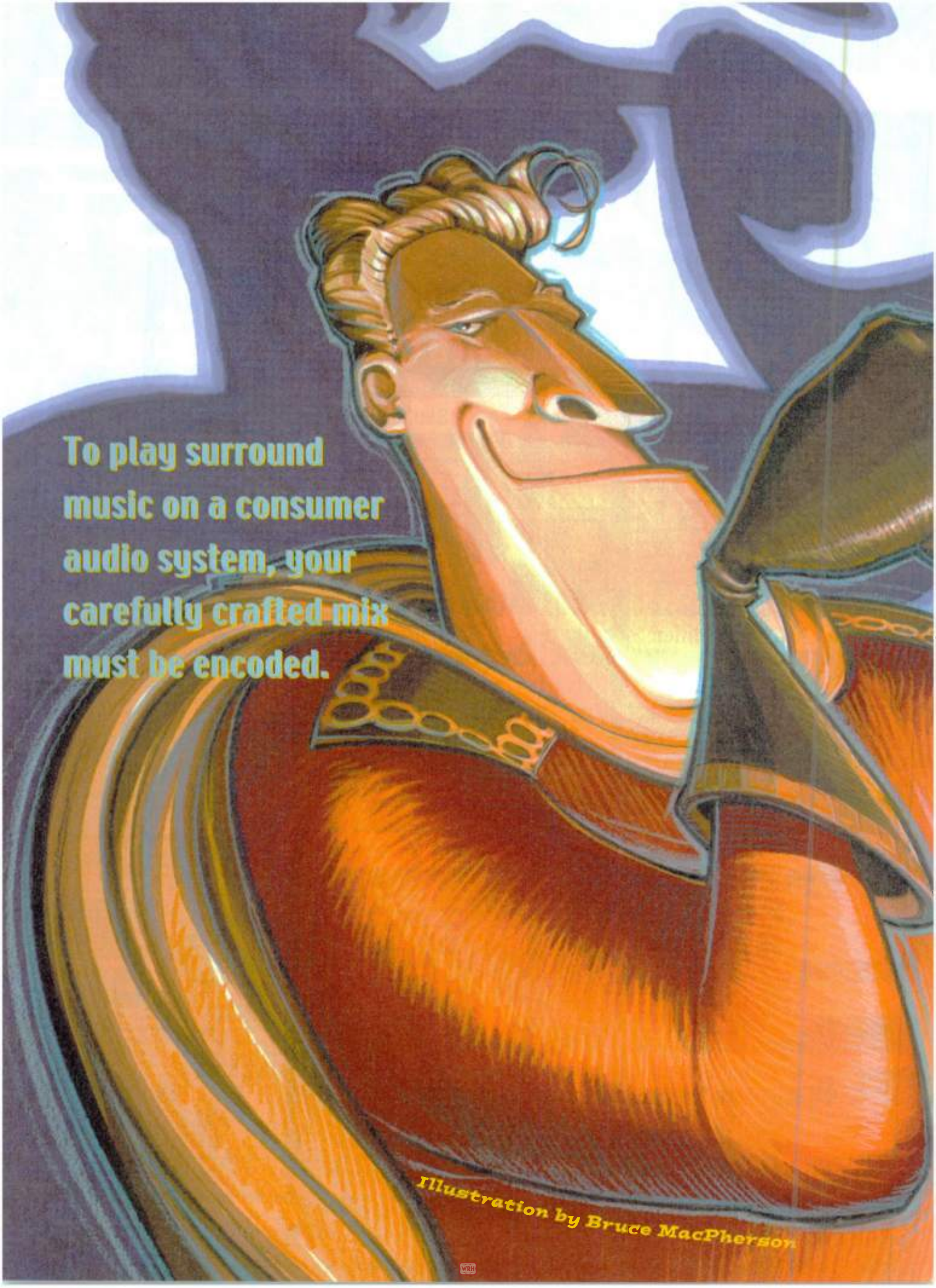
To play surround music on a consumer audio system, your carefully crafted mix must be encoded.
Illustration by Bruce MacPherson

Secret Encoder Ring

By Mike Sokol

So you've bitten the proverbial bullet and installed a mixer or workstation software application with surround panners, set up a 5.1 monitoring system, and actually recorded some surround music mixes on a Tascam DA-88 or ADAT. (See "Mixing in the Round" in the May 2001 **EM** and "5.1 Mixing on a Budget" in the June 2001 issue for more about mixing techniques and inexpensive monitoring solutions, respectively.) Now, how do you get anyone else to hear your surround opus? You can't play a DA-88 tape on a consumer system, and dragging a multitrack deck around isn't practical.

You need to encode your six discrete tracks into a format that will play on a consumer home-theater system. The process is not really that complicated, and it's thrilling to hear something you mixed in surround play back properly on a home system. This article describes the final part of the surround-production process.

CODEC THE HALLS

To easily distribute 5.1-channel recordings, you must encode them into a format that can be stored on common media, such as CDs and DVDs, and transmitted over common digital-audio interfaces, such as S/PDIF. In general, that requires the data to be compressed (reduced in size). Two types of 5.1 encoding are often used: Dolby Digital and DTS from Digital Theater Systems. DTS offers 5.1 and 6.1 formats, whereas Dolby Digital can be implemented in any format from mono to 5.1.

Both systems encode the six channels of a discrete surround mix into a single data file that can be transmitted through a standard AES/EBU or S/PDIF interface. Then, on the playback end, the file is decoded back into its original six channels before being sent to the speakers. (The entire encode-decode cycle is often referred to as a *codec*, which is a contraction of enCOde and DECode.) Think of encoded data as being like instant mashed potatoes. After the water is removed (encoded), the powder is compact to store and transport. Then, the end user just adds water and heats it to a boil (decoding) and *voilà* . . . instant mashed potatoes.

You don't have to cook a DVD or CD in boiling water (kids, don't try this at home), but all home-theater receivers do an analogous rehydration process. If you play a DVD with a Dolby Digital or DTS soundtrack, the receiver decodes the digital bitstream from the player's S/PDIF output as the disc plays back.

of as the average program level.) It provides a reference that defines a comfortable listening level, which can be matched between different program content.

Dialnorm's default value is –27 dB, which represents the average level with respect to the maximum level. Programs with louder-than-normal levels might get a dialnorm setting of –20, whereas programs with softer-than-normal levels might be set to –31 dB, dialnorm's lowest possible setting.

DRC lets the encoding engineer specify a set of dynamic-compression options that are activated in one of several situations. For example, listeners can put the receiver into Midnight mode. All Dolby Digital receivers include Midnight mode, which reduces the dynamic range according to the DRC metadata so that the material doesn't disturb others in the house. DRC is also applied to help preserve dynamic range and to prevent clipping when a multichannel program is downmixed to stereo.

DRC is generally adjustable in the receiver, allowing listeners to select the amount of dynamic-range compression for their specific listening requirements. In addition, DRC interacts with the dialnorm setting, which defines the "comfortable listening level" outside of which DRC becomes active according to the encoded and listener settings.

In the encoder, you can select six DRC Profiles: Music Light, Music Standard, Film Light, Film Standard, Speech, or None. Music Light is intended for music that only needs light processing because its dynamic range is under control to begin with. If you already compressed the tracks to limit the dynamic range, you might choose the Music Light setting. On the other hand, if your material includes large dynamic swings, perhaps Music Standard is more appropriate. The other Profiles don't contain the word *music* in their names, but they may suit your material better than the Music Light and Music Standard; audition them to see which one works best for you.

Downmixing is the process by which 5.1 channels of audio are typically reduced to stereo for listening on headphones, a TV's mono speaker, or any system that has less than 5.1 channels. A downmix from 5.1 to stereo basically mixes the left-rear channel into the left front, the right-rear channel into the right front, and the center channel equally into the left and right front. The encoding engineer can specify the relative levels at which the center and rear channels are mixed into the front channels, from –6 to +3 dB in 1.5 dB increments. Dolby Digital also provides an option whereby 5.1 discrete channels of audio are downmixed to a Dolby Pro Logic–compatible stereo signal for backward compatibility with older, pre–Dolby Digital home-theater systems.

It's important to understand how dialnorm, DRC, and downmixing interact with each other. As mentioned earlier, the dialnorm setting defines the program's average signal level, which is used as the center of a "null band" of dynamic levels. If the listener engages DRC in the receiver and the program level stays within that null band, nothing happens to it. If the level exceeds the band's upper limit, it is reduced according to the DRC Profile and listener setting; if the level drops below the band's lower limit, it is raised according to the DRC Profile and listener setting. The Speech, Film Standard, and Music Standard Profiles establish a null band of ±2.5 dB above and below the dialnorm setting. The Music and Film Light Profiles set a null band of ±10 dB above and below the dialnorm setting.

You can also prevent the listener from engaging Midnight mode or other optional dynamic-range controls by selecting None as the DRC Profile. In that case, if there is no downmixing (that is,

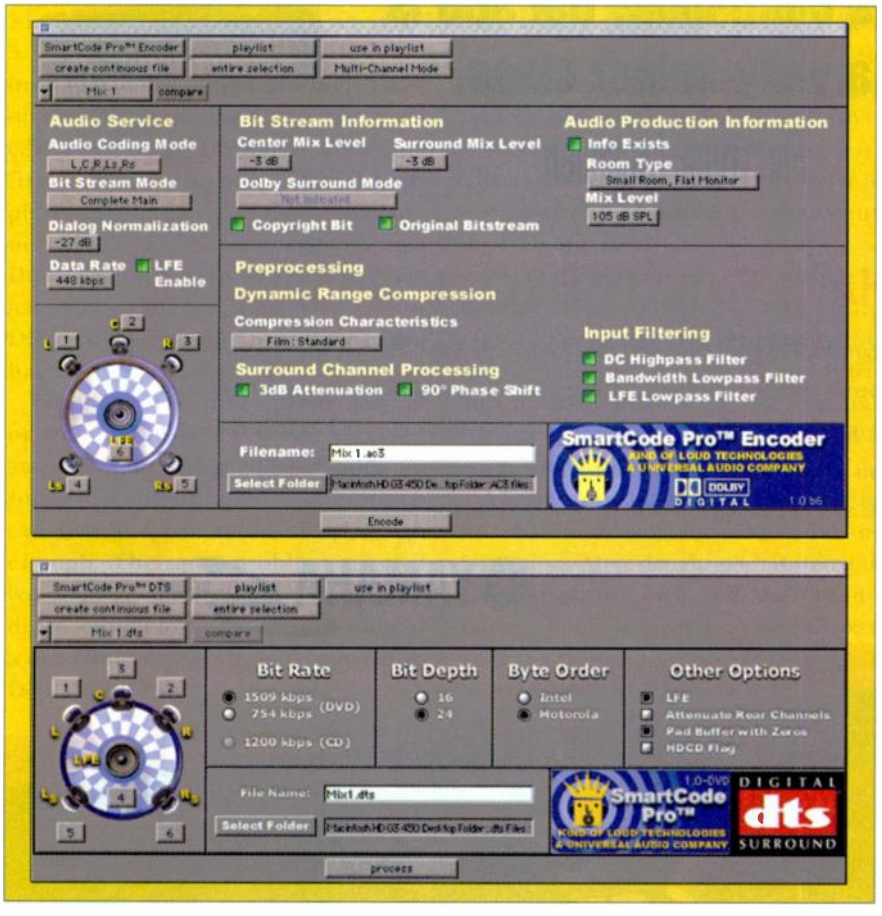

FIG. 2: Kind of Loud Technologies makes *Pro Tools* plug-ins for encoding Dolby Digital and DTS.

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the program is played on a full 5.1-channel surround system), the dialnorm setting simply adjusts the volume of the decoder to match other program content. However, if the program is downmixed, a set of DRC parameters is automatically engaged to prevent clipping, and those parameters use the dialnorm setting as a reference. The dialnorm setting is important because you never know what sort of system your music is going to be played on.

EASY AS 1, 2, 5.1

Here's a step-by-step procedure for creating and encoding a 5.1-channel music file in Dolby Digital or DTS.

Step 1. Mix multitrack program material into 5.1 surround using a mixer with surround panners or a digital audio workstation (DAW) with surround panners, such as Minnetonka *MX51* or Pro Tools.

Step 2. Record the six mix tracks onto six tracks of an 8-track tape deck and label them Left, Right, Center, LFE, Left Surround, and Right Surround. If the tracks will end up on a DVD, they should be at a sampling rate of 48 kHz; if they're going to reside on a CD, they need to be at 44.1 kHz.

Step 3. Load the surround tracks into a computer with a software-based DTS or Dolby Digital encoder.

Step 4. Assign the audio tracks to the appropriate encoder channels, which are labeled L, R, C, LFE, Ls, and Rs.

Step 5. Name the output file.

Step 6. If you're encoding in Dolby Digital for DVD (see **Figs. 3** and **4**), set the sampling/encoding rate to 48 kHz and select the proper file type (AC-3, Dolby's encoding algorithm); surround speaker levels (0 dB with respect to the front channels for music or –3 dB for movies); and the final bit rate (448 Kbps). If the Dolby Digital file is intended for a CD, the sampling/encoding rate should be 44.1 kHz, the file type should be WAV, and the bit rate can be any value, so you might as well use the highest possible rate of 640 Kbps.

Set the dialnorm value as close to the average level of your program as possible to avoid unintended processing by the receiver's dynamic-range processor, even if only during downmixing. For example, if the average signal level is –25 dB below the maximum possible level, dialnorm should be set to –25 dB. However, it isn't easy to determine the average signal level. You can do it by monitoring the signal through a Dolby DP570 Multichannel Audio Tool ($6,495) or a DP569/DP562 Dolby Digital hardware encoder/decoder pair ($5,000 and $3,600, respectively), but those are expensive solutions that few small studios can afford.

I talked with Minnetonka Audio about adding a scanning function to *SurCode Dolby Digital* that would determine an average program level and recommend a dialnorm setting consistent with the actual dynamics of the tracks prior to encoding. That would give engineers and producers a reasonable starting point that could be refined by trying a few tracks and listening to how they play back on home-theater systems.

Once dialnorm is set properly, preview the various DRC Profiles and choose the one that best suits your material. The downmix settings should

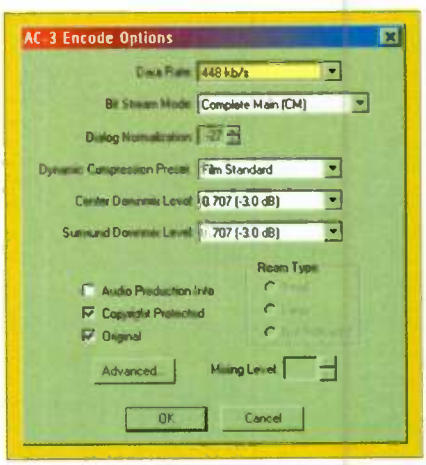

FIG. 3: In this screen from Minnetonka's *SurCode Dolby Digital*, you set the data rate, dialnorm, dynamic-range compression, and downmix parameters as well as a few other things.

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also be selected according to how your content behaves in downmix situations. In general, I prefer to set the downmix levels to –6 dB for the center and –3 dB for the surrounds.

If you're encoding in DTS for DVD (see **Fig. 5**), all you need to do is set the data rate (1.5 Mbps or 768 Kbps), sampling rate (48 kHz), and rear-channel attenuation (0 or –3 dB). Encoding in DTS for CD is much simpler because *SurCode CD Pro* presets everything: file type (WAV), sampling rate (44.1 kHz), rear-channel attenuation (none), and data rate (1.2 Mbps). (Of the 1.4 Mbps transfer rate, 1.2 Mbps are audio data.) The DTS encoding process is quite a bit easier than setting up to encode Dolby Digital, but DTS programs can't play back on audio systems without full 5.1 capability.

Step 7. Hit the encode button. On a modern desktop computer (for example, a Pentium/400 MHz), encoding in DTS takes about the same amount of time as playing the audio file itself, and Dolby Digital takes about five times as long.

Step 8. Play the encoded file from the computer's digital output to a digital input on your monitor receiver to make sure the encoding process worked properly.

FIG. 4: *SurCode Dolby Digital*'s Advanced screen lets you attenuate the rear surround channels by 3 dB, in addition to offering other advanced features.

Step 9: If you created a WAV file with a sampling rate of 44.1 kHz, you can simply load it in the CD-burner program of your choice and make a standard CD-R, just as you would with any stereo audio program. If you'll be playing the disc from a standard CD player with an S/PDIF output, a regular CD-R disc will be fine. However, many DVD players have difficulty reading CD-R media because of an incompatibility between the wavelength of the DVD's pickup laser and the dye in the CD-R. If you'll be playing back your CD on a DVD player, you can try a CD-RW, which will play back from most DVD players. Alternatively, you can get a new dual-pickup DVD player specifically designed to play back CD-Rs. The compatibility problem has nothing to do with the disc containing the encoded data; it's a playback issue even for standard stereo programs.

FUTURE POSSIBILITIES

By the time you read this, at least two computer systems will come bundled with a Pioneer DVD-R burner. It isn't a DVD-RAM drive (if it were, it wouldn't be able to make discs that are playable on a consumer DVD player). It's a DVD-R recorder, which can turn a $30 DVD blank into a disc that can be played in any consumer DVD player. The new high-end Power Mac G4 will come bundled with the Pioneer DVD-R drive for about $3,750—amazing when you consider that the cost of a DVD-R recorder is about $6,000 by itself. In addition, Compaq has announced the same DVD-R bundling deal. That means you'll be able to purchase the hardware to master your own DVDs for less than $4,000.

At least two software companies are taking advantage of that hardware windfall. Spruce Technologies will be offering a DVD-Video authoring system geared toward 5.1-surround audio authoring on a Windows platform. The new application will let you take Dolby Digital or DTS files and burn them onto a consumer-playable DVD-Video disc with menus, still shots, graphics, and video clips. Minnetonka Audio has already sent me the beta version of *MASS* 5.1, which is a DVD-Audio authoring system that integrates with its affordable *MX51* surround-mixing software. The process appears to be as simple as dragging the six discrete audio files into the appropriate boxes on the screen and inserting a DVD blank in the recorder. I can hardly wait to get my DVD-R burner. Both applications are Windows-based, but the Mac versions can't be far behind. In fact, at the recent National Association of Broadcasters convention, Apple showed a Mac-based DVD-authoring application in the $1,000 range, which certainly brings it within reach of many smaller studios.

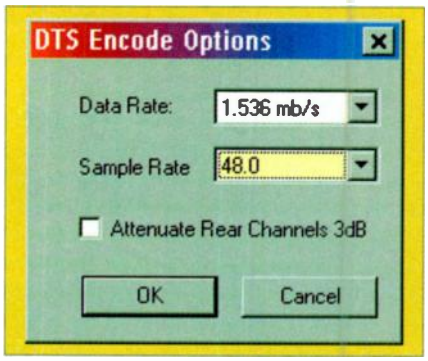
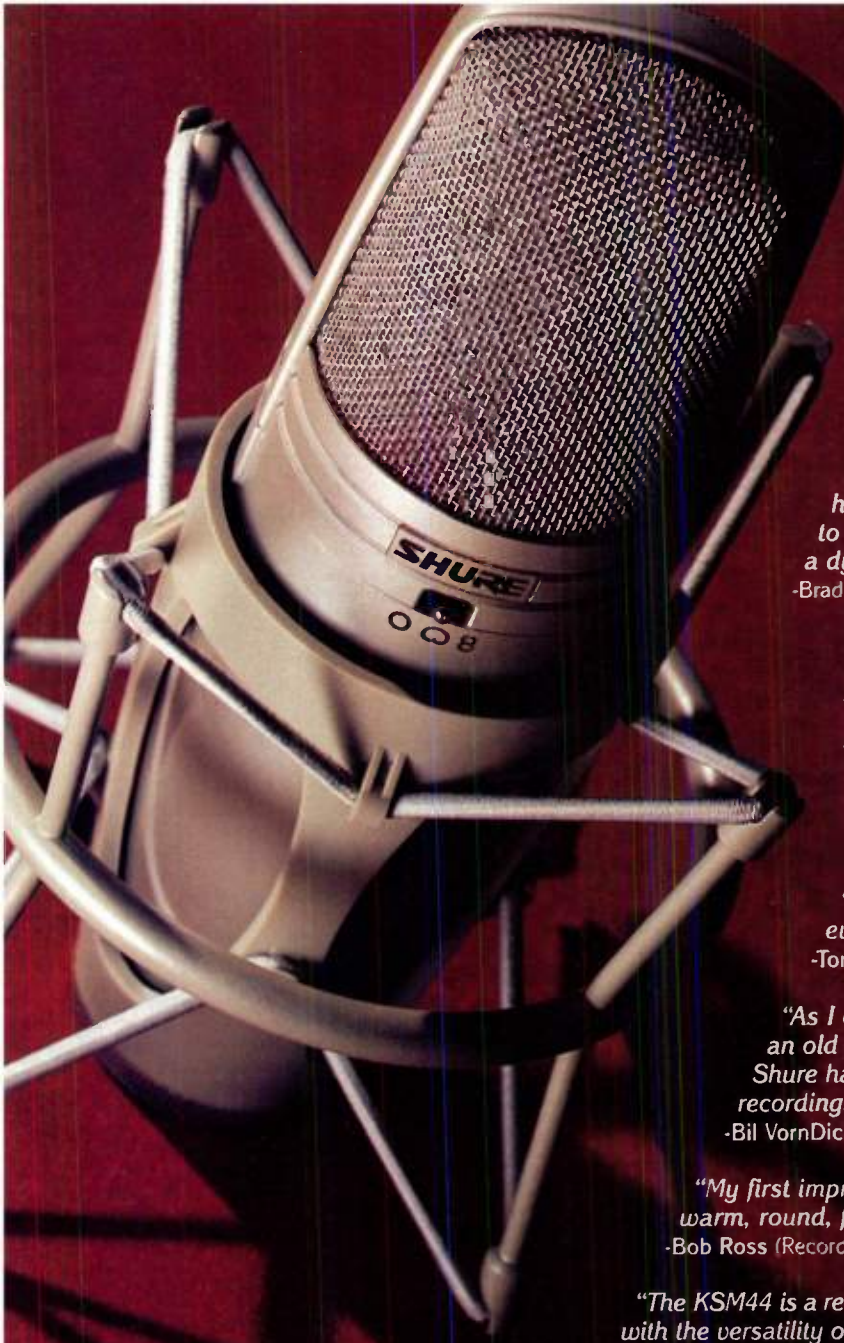


FIG. 5: Minnetonka's *SurCode DVD Pro* lets you specify a few parameters for DTS files destined for a DVD.

I've often said that truly innovative 5.1 mixes are going to come not from the megastudios but from the vast number of smaller project studios. Now that the encoding and authoring technology for 5.1 surround is becoming affordable, I'm looking forward to some head-turning mixes. You could be the one to do the next big thing, so get on with it.

Mike Sokol *is a human being with 2.0 ears, learning how to mix in a 5.1 environment. For some reason, no one takes seriously his suggestion of using gene therapy to add 3.1 more ears to surround-mixing engineers.*

We welcome your feedback. E-mail us at emeditorial@primediabusiness.com.



"The KSM44 has amazing presence on vocals. It's a great all-around condenser mic."
-Eddie Kramer (Jimi Hendrix, Led Zeppelin, Kiss, the Beatles, ...)

"I found the KSM44 to have an excellent natural quality with good presence and a nice open top end. This mic is so smooth in the midrange, even a banjo sounded good!"
-Joe Chiccarelli (Beck, U2, Elton John, ...)

"I tested the KSM44 on vocals, bass, guitar, and drums, and haven't stopped using it since. It's hard to describe, but there is an immediacy to the KSM44 that is very appealing – sort of like a dynamic mic, but more elegant."
-Brad Wood (Smashing Pumpkins, Liz Phair, Better Than Ezra, ...)

For a mic with such low self-noise, it sure creates a lot of buzz.

"The KSM44 is the quietest microphone I have ever used, and one of the best sounding too."
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-Bob Ross (Recording Magazine)

"The KSM44 is a remarkable achievement. I am especially impressed with the versatility of this microphone and have yet to find its limits."
-Steve Albini (Nirvana, Page and Plant, PJ Harvey, ...)

"I was given the KSM44 prototype early-on, not knowing its intended purpose - so I tried it on everything. Guess what, it worked on everything!"
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Take a good look at the MRS-1044. Its power and simplicity bring the spontaneity back to digital recording. While you may not be able to see many of the dozens of features that make it so incredible, its greatest asset is the way they all fit together. It's the Zoom of desktop recorders.

No manual required: The MRS-1044's logical control surface makes it simple to record, edit and mix your songs. Large, logical controls and clear displays make it quick to get around with no learning curve. But just in case, the owner's manual it ships with is brilliant.

Bonding experience: Working with the MRS-1044 feels like working with tape. But each of its ten tracks is supported by ten virtual tracks. Auto punch and "easy bounce" allow you to combine and comp tracks with no generation loss. Then there's the familiar scrub control that lets you locate precise edit points with your ears. Scene memory and point markers make it even easier to get around.

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Zoom audio quality: The MRS-1044 gives you Zoom's legendary audio quality with remarkably smooth, clean 24-bit A/D and D/A converters and 44.1 kHz bit resolution.

More questions? Obviously there's more than we're telling you here but we think we've already got your attention. With the MRS-1044 all you'll need is inspiration. Good luck.

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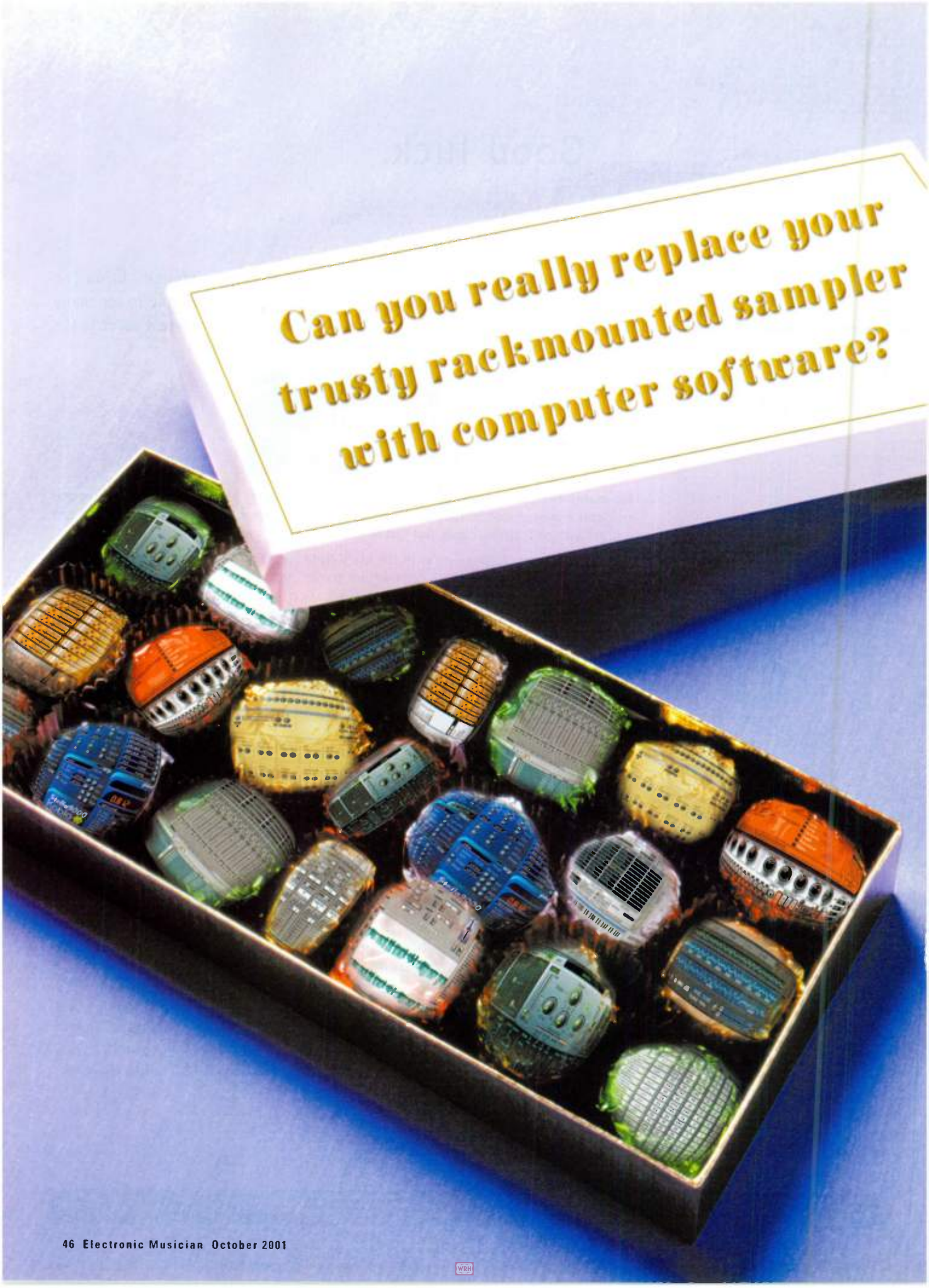
Can you really replace your trusty rackmounted sampler with computer software?



Soft Sampling

By Dennis Miller & Geary Yelton

With the enormous power residing in today's computers, much of the workload of traditional hardware devices has shifted to the desktop. One of the most common applications handled by the personal computer is sampling. Last year, **EM** examined a large number of software synthesizers and found that modern computers perform admirably as megavoice synthesis engines (see "Going Soft" in the July 2000 issue). In this roundup, we will survey 11 of the most popular software samplers for the Mac and PC platforms (see the table "Software Sampler Specifications" for a complete list of the programs).

We won't cover every soft sampler out there: although the soft-sampler market is modest compared with the soft-synth world, it still has too many programs to explore. We're going to skip programs, such as Native Instruments' *Battery*, that fall into the drum or rhythm category. We'll also pass over programs that play only samples and provide no significant editing, effects, or modulation options, as well as those that require dedicated hardware, such as CreamWare's Pulsar series. This roundup includes representative examples from every other category of sampling software available.

Illustration by Ron Brown

Software samplers come in several categories. Some work only as plug-ins—for example, IK Multimedia's *SampleTank*, Emagic's *EXS24*, and Nick Whitehurst's *SamplerChan*. Others, such as NemeSys's *GigaStudio* and Digidesign's *Soft SampleCell*, operate standalone only, whereas a third group—including Native Instruments' *Reaktor*, Speedsoft's *Virtual Sampler*, and Koblo's *Stella9000*—function as plug-ins or standalones. Among the plug-ins, most are VST Instruments, but using FXpansion's *VST–DX Adapter* (www.fxpansion.com) on the PC, you can load nearly all VST devices in a DirectX host, such as Cakewalk's *Sonar*. (Among the Windows programs, only CreamWare's *Volkszämpler* and *SamplerChan* do not work in that configuration.)

You'll also find many prices for sampling software, from a low of $39 to a high of $699. Logically, the plug-ins are far less expensive than the standalone programs, and in most cases, you get what you pay for. We were pleasantly surprised that several less-expensive programs turned out to be real bargains, offering far more features than we expected.

Soft Sampling

In researching this article, we quickly discovered that many software-based "samplers" aren't samplers at all, at least not in the sense to which we're accustomed. Of the group, all but three lack an internal recording feature, which makes sense because most users have other audio-recording software on their systems. That also reflects a primary difference between the hardware sampler and new software samplers. Yet it's curious that the term *sampler* has been adopted for this breed of software when *sample player* or *sample processor* might be more appropriate.

COMMONALITIES

Traditional hardware samplers can record sound and play it back under MIDI control. Between recording and playback, they provide a means to edit the sound—inserting loop points, for example—as well as a way to assign sound to individual MIDI notes and Velocity ranges. All the audio and MIDI assignment data held in a sampler's RAM can then be stored on a disk or some other permanent medium and later retrieved to RAM. Soft samplers have many features in common with hardware samplers, yet many also take new approaches to sample manipulation and playback.

FIG. 1: Reminiscent of a synthesizer's front panel, *EXS24*'s Editor view provides access to two ADSR generators, two LFOs, and a versatile lowpass filter.

The programs in this roundup share many features. All but one program loads samples into RAM, which limits you to your computer's available memory. *GigaStudio* streams samples directly from your hard drive, so a 400 MB piano sample isn't a problem. (*Virtual Sampler* 2.7, now in beta, also has that capability.)

The range of effects included with the programs varies widely. Overall, plug-in samplers have a major advantage in the effects category because they allow you to pass their audio output to whatever third-party effects you can access through their hosts. That capability opens up the world of VST and DirectX effects and gives you a massive number of sound-shaping options.

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Pete Leoni -Producer Engineer, Tech writer and reviewer

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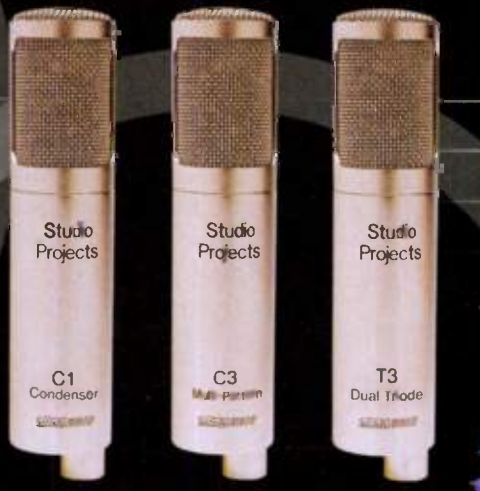

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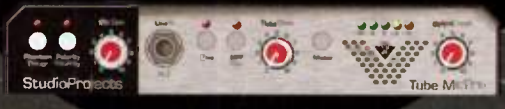

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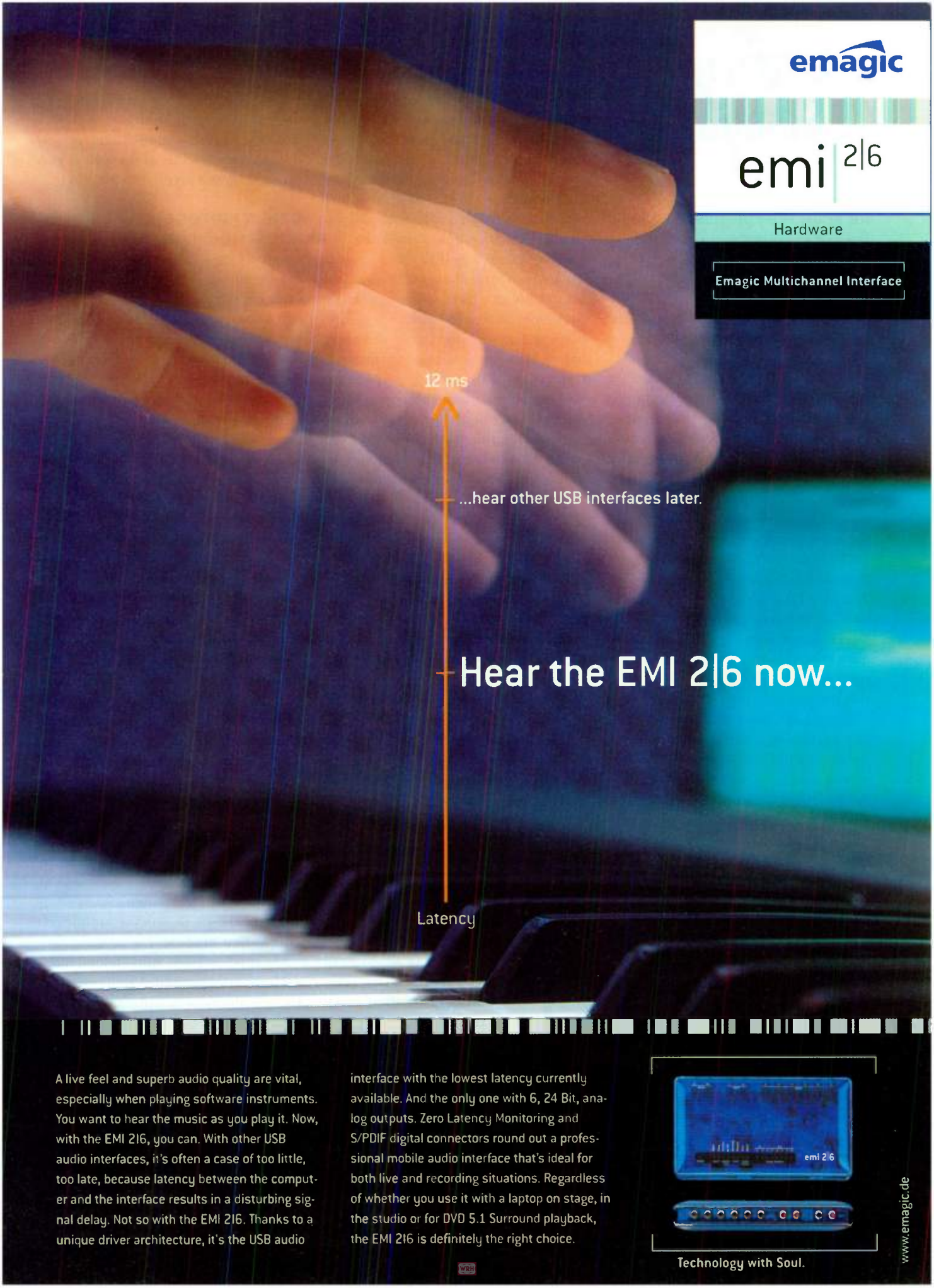
You'll find support for the most common audio-file formats that are native to both platforms, with the Mac applications far more generous in supporting Windows WAV format than Windows apps are in supporting AIFF. Many programs can load the ubiquitous Akai format, SoundFonts, or both. When all else fails, you can use a file-translator program to convert files from almost any format imaginable to something that works for the software you choose (see the sidebar "Have It Your Way").

Happily, most samplers are multitimbral and multichannel, though we were amazed at the vastly different approaches used to create a multitimbral configuration. In some cases, setting up a multi is almost automatic, but in others, that operation is buried beneath layers of options. Most of the programs we cover have only a few (sometimes, only one) screens, which simplifies navigation by putting the main working elements at your fingertips.

Many programs ship with various sample libraries. *SampleTank XL* wins the prize in that category with 2 GB of files ranging from standard orchestral instruments to special effects. NemeSys generously adds its renowned 600 MB piano sample to the *GigaStudio* bundle (talk about multisamples!), and many other programs include large sample or patch libraries to get you started.

FIG. 2: *GigaStudio*'s main screen is optimized for building multitimbral patches. Drag a GIG file from the directory at the bottom directly onto a channel slot to load it.

Here, then, is our roundup of software samplers. There are tremendous advantages to using your computer as a sampler, but sticking with a dedicated hardware unit is a good idea too (see the sidebar "Pros and Cons"). We tried to cover each program's most significant features and mention likes and dislikes in each case. We highly recommend that you check out the demo versions available



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for nearly every program and see for yourself whether they provide the features you need.

EXS24 1.0

Emagic's *EXS24* is a sampler plug-in that works as an Audio Instrument object within recent versions of *MicroLogic AV* and *Logic Audio Silver, Gold,* and *Platinum.* Depending on your computer's speed and available RAM, you can open as many as 24 simultaneous instances of *EXS24,* each with 64-note polyphony, without add-on hardware. Opening a *Logic Audio* file that contains *EXS24* Sample Instruments automatically loads the appropriate samples.

EXS24 supports any audio hardware that works with *Logic Audio.* Users of Digidesign's TDM hardware can open as many as 32 instances of *EXS24* using the *Emagic System Bridge (ESB) TDM. EXS24* has no sample-recording abilities, but you can use *Logic Audio* to record and edit samples for use in *EXS24.*

Using *Logic Audio,* you can automate any parameter changes you make in the *EXS24* plug-in window. When you record on an Audio Instrument channel assigned to an instance of *EXS24,* changing an *EXS24* knob or slider produces MIDI data recorded for subsequent recall.

The heart of *EXS24*'s user interface is the plug-in window's Editor view, which displays the main panel (see **Fig. 1**). With an appearance that emulates three-dimensional hardware, this view is the coolest-looking visual interface of the programs we surveyed. The window provides access to most sound-shaping capabilities, with a resonant filter, two envelope generators (EGs), and a pair of low-frequency oscillators (LFOs) as well as controls for tuning, panning, sample start time, glide, and Velocity response. Some sliders split into upper and lower halves, allowing you to specify modulation ranges. Poly, Mono, and Legato switches let you dictate how many notes will play and whether envelopes will retrigger when you press a key. At the top of the window is a pop-up menu for selecting from a list of Sample Instruments stored on your hard disk.

The lowpass filter has a choice of rolloff, with buttons to select 24 dB Classic, 24 dB Fat, 18 dB, or 12 dB modes. The Drive knob allows you to overdrive the filter for distortion effects, and the Key knob provides continuously variable keyboard tracking. At high resonance settings, the filter can self-oscillate.

The ADSR generators are "hardwired" to control amplitude and filter cutoff. You can modulate either envelope's attack time with Velocity; a split slider's two halves determine the minimum and maximum Velocity values.

Both LFOs offer a selection of seven subaudio waveforms. LFO1 is polyphonic, providing each note with independent modulation, and it restarts its cycle every time you play a note. LFO2 is monophonic; it runs continuously, simultaneously modulating all voices to which you assign it. That combination of LFOs offers maximum flexibility.

Switching from the Editor to the Controls view reveals a panel of fields and sliders and affords an alternate approach to editing the parameters displayed in the Editor. Values are shown in percentages or real-world numbers—decibels, milliseconds, and hertz. (In Editor view, you can see parameter values only as relative positions of sliders and knobs.) Although the Controls view doesn't look as spiffy as the Editor, you can quickly see precisely what's in it.

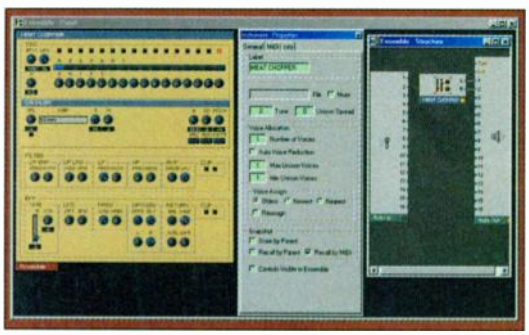

FIG. 3: *Reaktor*'s News Cool Meat Chopper, left, uses a built-in sequencer to play back samples. In the middle is Meat Chopper's Instrument Properties window, and on the right is its underlying structure.

OTHER EDITORS

In Editor view, pressing the Edit button opens *EXS24*'s Instrument Editor. Unlike the plug-in's Editor window, the Instrument Editor is shared by all instances of *EXS24.* In that window, you can assign samples to Zones, organize Zones into Groups, and assemble Groups into Sample Instruments. In each Zone, you can specify one sample's note or note range and enter its start, end, and loop points. Furthermore, the Instrument Editor lets you stipulate the volume, panning, Velocity range, and polyphony of all the Zones assigned to a Group.

If you put an Akai sampler disc into your computer's CD-ROM drive and select Akai Convert from the Instrument Editor's Instrument menu, a window will display the disc's contents. From there, you can easily convert programs, volumes, partitions, or entire discs into *EXS24*'s native format. Additionally, you can listen to individual samples directly from the Akai disc. *EXS24* automatically converts SoundFonts when you move them to *Logic Audio*'s Sample Instruments folder and SampleCell files when you move their aliases there.

From the Instrument Editor, you can also open *Logic Audio*'s Sample Editor for a selected sample; there, you can graphically position start, end, and loop points. You can also assign effects plug-ins and perform destructive sample editing in that window.

The small 58-page, spiral-bound manual has a brief tutorial. A well-rounded, 165 MB library of Sampler Instruments is also included to get you started. After registering *EXS24,* you'll get a CD-ROM with an additional 425 MB of samples, including duplicates from the 165 MB library. Emagic embedded *EXS24*'s code in *Logic Audio* rather than on the *EXS24* installation disc; the installer simply turns it on.

For users of programs other than *Logic Audio,* Emagic makes *EXSP24,* a sample

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player that runs with any VST 2.0 host on the Mac and PC. It converts SoundFonts, but not Akai or SampleCell files, into its native format. The Instrument Editor is missing, and you can't create Instruments without *EXS24* for *Logic Audio*.

GIGASTUDIO 160 2.2

If third-party sample-library support were the main criterion, NemeSys's *GigaStudio* would win the prize as the mother of all software samplers. Dozens of dedicated sample libraries are available for the standalone application, ranging from multi-CD timpani collections to extraworldly ambiences. In addition, *GigaStudio* has won the support of many PC sound-card manufacturers that have developed custom drivers providing near-zero latency for *GigaStudio* users.

GigaStudio comes in two versions: the top-of-the-line *GigaStudio 160*, which offers as many as 160 notes of polyphony, and the slightly scaled back *GigaStudio 96*, which has 96 notes. With significantly fewer features, the original *GigaSampler* series is also available at greatly reduced prices.

GigaStudio's opening screen is optimized for creating multitimbral and multichannel setups. Unlike most hardware samplers, *GigaStudio* lets you assign more than one patch to a MIDI channel. It also supports as many as four streams of 16 channels each, so you can easily layer four patches on one channel. Each patch can contain multiple layers, providing even more options for creating extremely rich textures.

LOAD IN

At the top of the Main Mixer screen are 16 channel slots for loading your samples and controls for adjusting each channel's volume, pan position, and tuning (see **Fig. 2**). You can reprogram the sliders to generate any MIDI controller, mute or solo a channel, and adjust the channel's routing to the internal effects engine and your sound card. Clicking on the small arrow to the right of the patch name opens the Info screen, in which you can pick any loaded Instrument, jump to the Instrument, and view performance parameters for that channel.

The middle of the screen has buttons to access the three other main work areas: Loaded Instruments, MIDI Control Surface, and Distributed Wave. *GigaStudio*'s basic structural element is called an Instrument, which is a set of keymapped zones that contain one or more samples. The Loaded Instruments screen displays all the Instruments that have been *precached*, which is a process *GigaStudio* uses to achieve near-zero latency (in brief, it loads a small chunk of each sample into RAM). Assign, at most, 16 controllers per channel in the MIDI Control Surface screen and bring new samples into the program in the Distributed Waves window.

An Explorer-style window in which you can access all the WAV files on your

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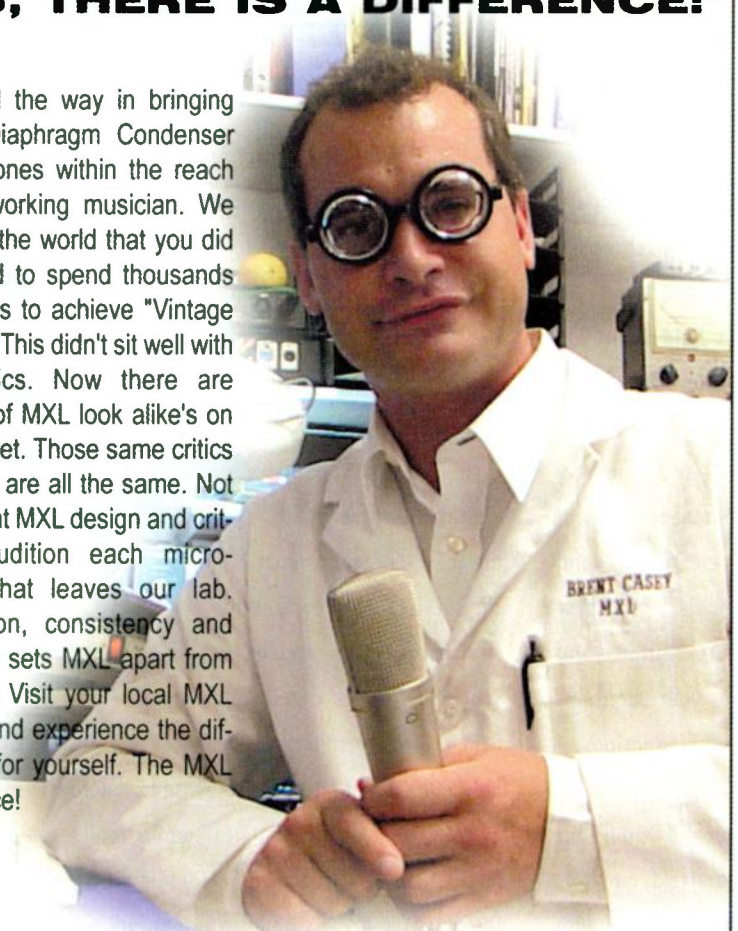

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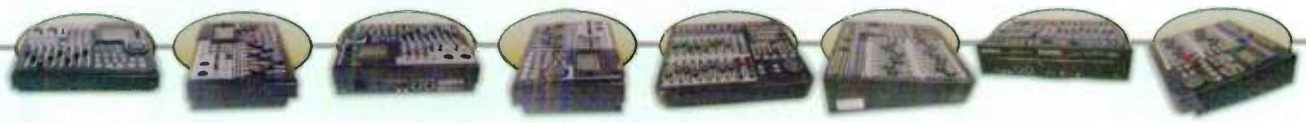

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system is at the bottom of the main screen. Grab one or more samples from your drive, drop them into the Distributed Waves window, right-click, and select Build Gig from Loaded Waves, and you have a new patch.

In the Instrument Editor (a standalone application that runs without loading the main *GigaStudio* interface), you can modify many patch parameters. You'll find screens to configure key and Velocity zones; set and enable loop points; and add amplitude, filter, and pitch envelopes. Some parameter values have limits—for example, the maximum attack time for a pitch envelope is 10 seconds—and the amplitude envelopes are ADSR only. Additional flexibility in those controls would be nice.

MAKE IT QUICK

Numerous features simplify your work flow. The QuickSound feature, for instance, scans your hard drive at startup and identifies any new sample files. The program can automatically build keymaps for samples QuickSound locates, which makes creating large collections of sound effects easy. Also, it is simple to set up links to the other applications—a sequencer and audio editor, for instance—that you will no doubt use in a *GigaStudio* session.

GigaStudio's small number of effects algorithms is one of the program's few drawbacks. If you're doing acoustic-instrument emulations, though, that shouldn't be an issue. The program ships with only three effects, and you receive a fourth, free, when you register. (NemeSys reports that other third-party effects are in development.) The effects sound great and are easy to apply and work with; the reverb quality is especially good. Creating effects automation is simple and lets you design interesting, time-varying sounds.

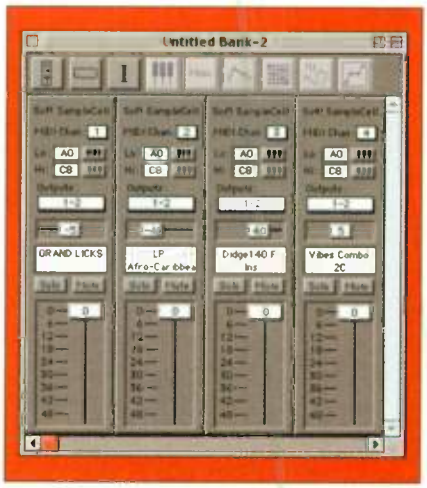
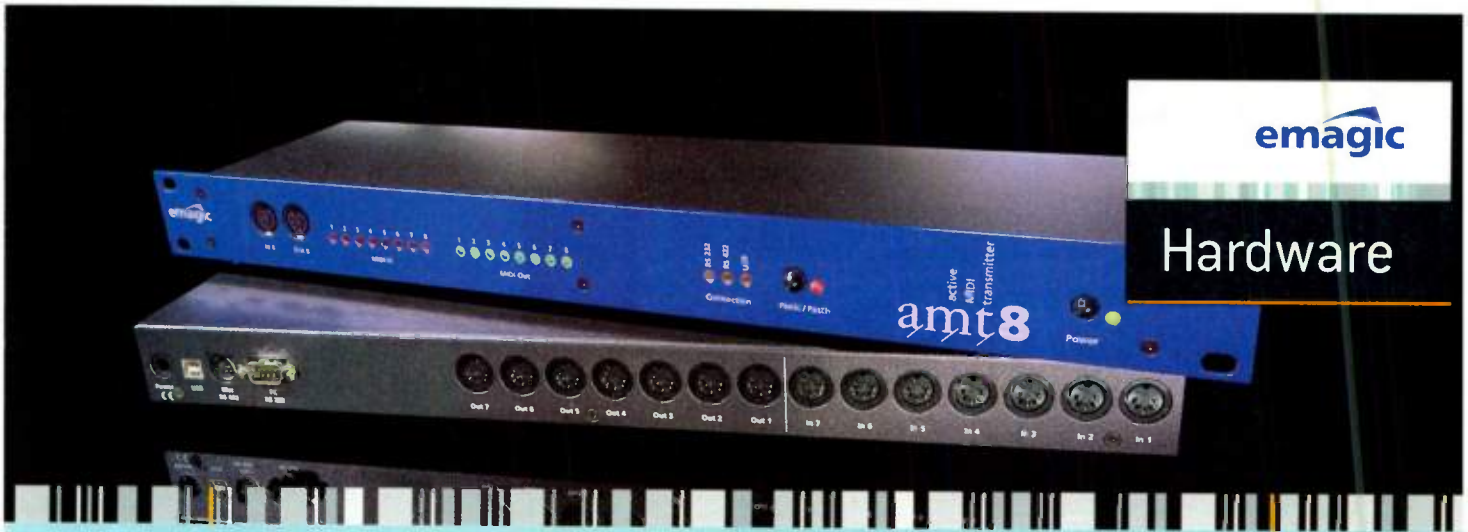


FIG. 4: It doesn't offer much visual excitement, but *Soft SampleCell* looks and works exactly like previous SampleCell versions.

GigaStudio is not the best option for creating avant-garde or alien soundscapes, though it is great for playing



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>> Stand-alone patchbay operation without computer

>> AMT (Active MIDI Transmission) for superb MIDI timing precision on the borders of perception

>> Uncluttered front panel with status indicators, plus Unitor8 Control software, for exceptional ease of use

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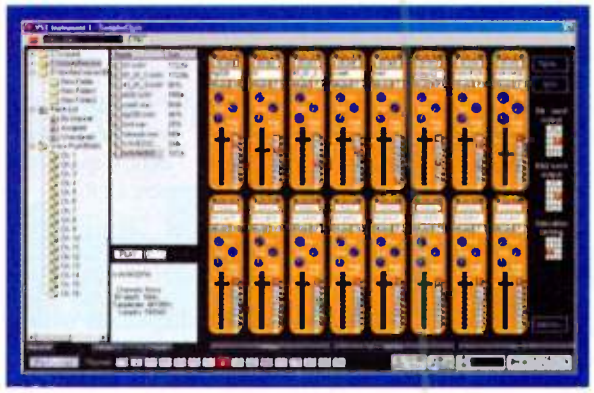
back samples you created elsewhere. It's an excellent choice for anyone experienced with hardware samplers and for novices as well. The manufacturer made arrangements with Hollywood Edge to create QuickSound-compatible versions of many of its best sound effects, and that will certainly make it one of the most efficient sound-effects and Foley platforms around. Rumor has it many Hollywood composers have dumped their hardware and added *GigaStudio* to their racks—not surprising, given the power and intuitiveness of the software.

REAKTOR 3

Native Instruments recently released version 3 of *Reaktor*, its flagship modular sound-design software, and processing and playing samples is an important part of the package. (*Reaktor* integrates two formerly separate NI products: *Generator*, a soft-synth builder; and *Transformator*, a dedicated sampling app.) *Reaktor* ships with several dozen example sample players that use the program's numerous sound-manipulation tools. Right out of the box, you will find time stretchers, sample granulators, as well as sample players that have been optimized for loops and drum sounds. You can substitute your own audio files for any files used by the existing players, mixing and matching components to create unique sound-design tools.



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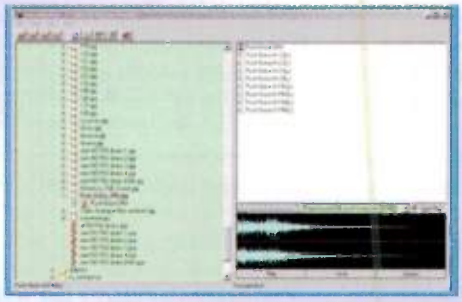

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They *laughed* when I said, "I know a simple secret that gives you **Perfect Pitch**"

David Lucas Burge

. . . Then I *showed* them, *and they heard it for themselves!*

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The true story behind the worldwide #1 best-selling ear training method

by **David Lucas Burge**

It all started as a sort of teenage rivalry . . .

I'd slave at the piano for five hours daily. Linda practiced far less. Yet somehow she always shined as the star performer at our school. It was frustrating. *What does she have that I don't?* I'd wonder.

Linda's best friend, Sheryl, bragged on and on to me, adding more fuel to my fire. "*You* could never be as good as *Linda*," she would taunt. "*Linda's* got *Perfect Pitch*."

"What's Perfect Pitch?" I asked.

Sheryl gloated about some of Linda's uncanny abilities: how she could name *exact tones and chords*—all BY EAR; how she could sing any tone *—from mere memory*; how she could play songs —after just *hearing* them!

My heart sank. *Her fantastic EAR is the key to her success.* How could I ever hope to compete with her?

But it bothered me. Did she *really* have Perfect Pitch? I finally asked Linda point-blank if it was true.

"Yes," she nodded to me aloofly.

But Perfect Pitch was too good to believe. I rudely pressed, "*Can I test you sometime?*"

"OK," she replied.

Now she'd eat her words . . .

My plan was ingeniously simple: When Linda least suspected, I challenged her to name tones—*by ear.*

I made her stand so she could not see the piano keyboard. I made sure other classmates could not help her. I set up everything perfectly so I could expose her Perfect Pitch claims as a ridiculous joke.

With silent apprehension, I selected a tone to play. (She'll *never* guess F♯!)

I had barely touched the key.

"F♯," she said. I was astonished.

I played another tone.

"C," she announced, not stopping to think.

Frantically, I played more tones, skipping here and there all over the keyboard. But somehow she knew the pitch each time. She was *AMAZING!*

"Sing an E♭," I demanded, determined to mess her up. She sang a tone. I checked her on the keyboard—but she was right on!

Now I started to boil. I called out more tones, trying hard to make them increasingly difficult. Still she sang each note perfectly on pitch.

"How in the world do you do it?" I blurted. I was totally boggled. (age 14, 9th grade)

I was totally boggled. "*How in the world do you do it?*" I blurted.

"I don't know," she sighed. And that was all I could get out of her!

The dazzle of Perfect Pitch hit me like a ton of bricks. My head was dizzy with disbelief. Yet from then on, I knew that Perfect Pitch was real.

I couldn't figure it out . . .

"*How does she DO it?*" I kept asking myself. On the other hand, why can't *everyone* recognize tones by ear? It dawned on me: people call themselves *musicians* and yet they can't tell a C from a C♯?? Or A major from F major?! That's as strange as a portrait painter who can't name the colors of paint on his palette! It all seemed odd and contradictory.

Humiliated and puzzled, I went home to work on this problem. At age 14, this was a hard nut to crack.

You can be sure I tried it for myself. With a little sweet-talking, I would get my three brothers and two sisters to play tones for me—to name by ear. But it turned into a guessing game I just couldn't win.

Day after day I tried to learn Perfect Pitch. I would play a tone *over* and *over* to make it stick in my head. But later I couldn't remember any of them. And I couldn't recognize any of the tones by ear. Somehow they all sounded the same after awhile; how were you supposed to know which was which—just by *listening?*

I would have done anything to have an ear like Linda, but it was way beyond my reach.

So, finally, I gave up.

Then it happened . . .

It was like a miracle . . . a twist of fate . . . like finding the lost Holy Grail. Once I stopped *straining* my ear, I started to listen NATURALLY. Then the incredible secret to Perfect Pitch jumped right into my lap.

I began to notice faint "colors" within the tones. Not *visual* colors, but colors of *pitch*, colors of *sound*. They had always been there. But this was the first time I had ever really "let go"—and *listened*—to discover these subtle differences.

Soon—to my own disbelief—*I too could recognize the tones by ear!* It was simple. I could hear how F♯ sounds one way, while B♭ has a *totally different sound*—sort of like "hearing" red and blue!

The realization struck me: THIS IS PERFECT PITCH! This is how Bach, Beethoven, and Mozart could mentally envision their masterpieces—and

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now tones, chords, and keys—all by ear!

It was almost childish—I felt sure that *anyone* ould unlock their own Perfect Pitch by learning this imple secret of "color hearing."

Bursting with excitement, I went to tell my best riend, Ann (a flutist).

She *laughed* at me. "You have to be *born* with 'erfect Pitch," she asserted. "You can't *develop* it."

"You don't understand Perfect Pitch," I countered. showed her how to isten. Timidly, she onfessed that she oo could hear the itch colors. With his jump start, Ann oon realized that he had also gained erfect Pitch for ierself.

We became nstant celebrities. Classmates loved to all out tones for us o magically sing rom thin air. They layed chords for us o name by ear. They quizzed us on vhat key a song was n. Everyone was ndlessly fascinated vith our "super- natural" powers, yet o Ann and me, it vas just normal.

Back then I never dreamt I would later cause such a stir in he academic world. But as I entered ollege and started o explain my discovery, many professors *laughed* it me.

"You must be *born* with Perfect Pitch," they'd say, "You can't *develop* it."

I would listen politely. Then I'd reveal the simple secret—*so they could hear it for themselves*. You'd be surprised how fast they changed their tune!

In college, my so-called "perfect ear" allowed me o *skip over* two required music courses. Perfect Pitch made *everything* easier for me—my ability to perform, compose, arrange, transpose, improvise, sight-read (because—without looking—you're sure you're playing the correct tones)—and my *enjoy- ment* of music skyrocketed. I learned that music is very definitely a HEARING art.

Oh, so you must be wondering what happened with Linda? Please excuse me, I'll have to backtrack . . .

It was now my senior year of high school. I was nearly 18. In these three-and-a-half years with Perfect Pitch, my piano teacher insisted I had made ten years of progress. And I had. But my youthful ambition still wasn't satisfied. I needed one more thing: *to beat Linda*. And now was my *final chance*.

The University of Delaware hosts a music festival each spring, complete with judges and awards. To my horror, they scheduled me that year as the *grand finale* of the entire event.

The day arrived. Linda gave her usual sterling performance. She would be tough to match, let alone surpass. But my turn finally came, and I went for it.

Slinking to the stage, I sat down and played my heart out. The applause was overwhelming.

Later, posted on the bulletin board, I discovered my score of A+ in the most advanced perfor- mance category.

Linda got an A.

Sweet victory was music to my ears—mine at last!

Join thousands of musicians who have discovered a new secret for success with The **Perfect Pitch Ear Training SuperCourse** these past 20 years:

● "Wow! It really worked. I feel like a new musician. I am very proud that I could achieve something of this caliber." *J.M.* ● "It is wonderful. I can truly hear the differences in the color of the tones." *D.P.* ● "I heard the differences on the initial playing, which did in fact surprise me. It is a breakthrough." *J.H.* ● "I'm able to play things I hear in my head a lot faster than ever before. Before I started the course, I could barely do it." *J.W.* ● "I hear a song on the radio and I know what they're doing. My improvisations have improved. I feel more in control of what I'm doing." *I.B.* ● "In three short weeks I've noticed a vast difference in my listening skills." *T.E.* ● "I can now identify tones and keys just by hearing them. I can also recall and sing individual tones at will. When I hear music now it has much more definition, form and substance than before. I don't just passively listen to music anymore, but actively listen to detail." *M.U.* ● "Although I was skeptical at first, I am now awed." *R.H.* ● "It's like hearing in a whole new dimension." *L.S.* ● "I wish I could have had this 30 years ago!" *R.B.* ● "A very necessary thing for someone who wants to become a pro." *L.K.* ● "This is absolutely what I have been searching for." *D.F.* ● "Mr. Burge—you've changed my life!" *T.B.* ● "Learn it or be left behind." *P.S.* . . .

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Imagine all the talents that Perfect Pitch can open up in YOU—to advance *your* playing, *your* singing, *your own* creativity and confidence. But then again, how will you ever know until you listen—and you experience the secret for yourself?

Are you ready to start? Then just lend us your ear, and let David Lucas guide you on an amazing new adventure—to discover YOUR OWN Perfect Pitch!

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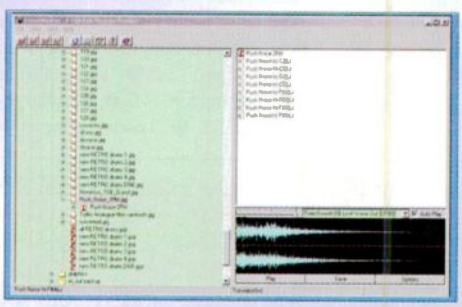

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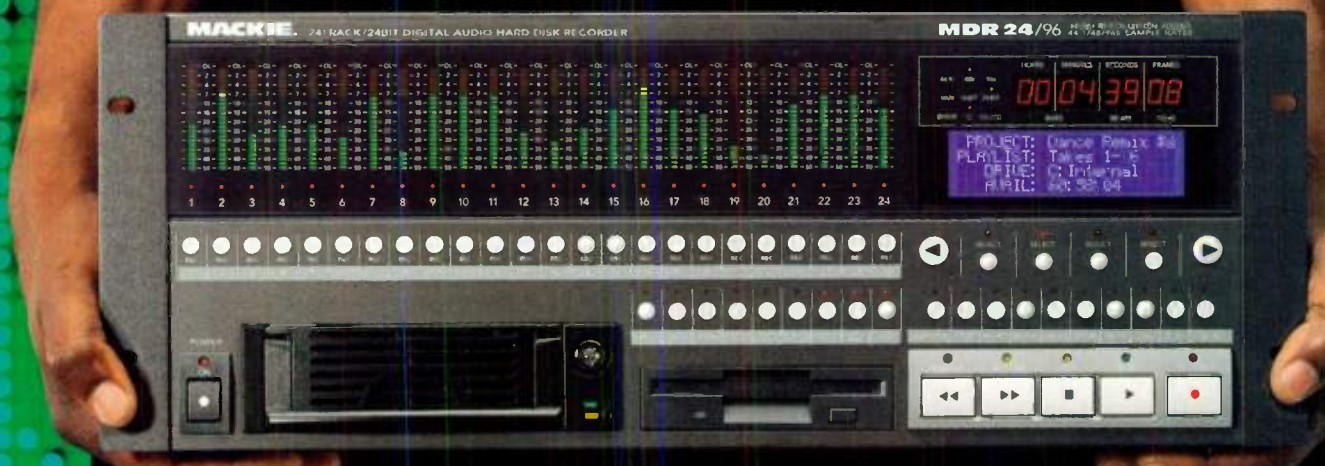

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When you open an example, you'll likely see a massive array of knobs and sliders with abbreviated identifying labels. For example, News Cool Meat Chopper presents a multitude of parameters (see **Fig. 3**). Some divulge their names and functions when you hold the cursor over them, and others don't. (If no text is displayed, the patch developer hasn't included any.) If you leave the Properties dialog open, you can make changes to the displayed parameters, which are reflected immediately in the open device.

Building a multitimbral sampler in *Reaktor* is a straightforward process. Beginning in the Structure window, select 1 or more of the 24 basic sample Instruments and paste it as many as 15 (if it's mono) or 7 (if it's stereo) times. Then, connect the outputs of each Instrument to the Audio Out. All of the sample Instruments include preloaded example audio files, so you should be able to hear audio as soon as you connect them.

Next, set the MIDI receive channel in the Instrument Properties panel for each instrument. If you have a multichannel sound card that supports ASIO, you can direct each sampler to a different physical output; if you don't, mix all the signals to one stereo output. Substitute your samples for the default ones, and you're set.

The number of processes you can add to your samplers is astounding. If you're interested in waveshaping, drag a WaveWarp module and insert it between the sampler and the Audio Out. How about a morphing vowel filter? That's also available to process samples, as are other filters and vocoders, dynamics processors, pitch and time shifters, chorus and delay effects, and more. Additionally, you can add, delete, or modify modules, even as a sample plays back. *Reaktor* automatically incorporates any adjustments you make in real time.

ANALYZE THIS

Many of *Reaktor*'s sample-transformation features are based on analysis and resynthesis techniques. Those features are among the program's most impressive and are unlike anything short of Symbolic Sound's hardware-assisted Kyma system. When you load a new file into a resynthesizing sampler, *Reaktor* performs a quick spectral analysis of it, which it then uses for controlling the sample's playback rate and pitch. You can save the analysis data, which makes it load more quickly next time, or you can discard it when you close the work session.

Among the modules that use the resynthesis process is the Sample Pitch Former. This versatile module lets you control a sample's pitch and formants independently. Like other *Reaktor* samplers, you can incorporate a map of as many as 127 sample files in the Sample Pitch Former and then configure the sampler to move through them automatically as it plays back. You can also slow down the sample-position pointer until it reaches a dead stop and freezes on a single sample. For manual control, assign the position pointer to a slider or fader, or use an LFO or even a random function to automate it.

One reason *Reaktor* has such a large and loyal user base is that Native Instruments has made it quite easy for users to share patches. Hundreds of user-contributed example files are at the company's Web site. Moreover, the thorough documentation—complete with tutorials and a reference entry for the more than 200 modules—makes getting started with the initially austere-looking program much easier.

Reaktor doesn't have as many ready-made templates as some other programs. Unlike *GigaStudio,* for example, *Reaktor* doesn't let you drag 16 samples to different channels on the interface to build a multitimbral configuration. Because *Reaktor*'s architecture is so open and flexible, however, with a little effort, you can create nearly any sampling process imaginable. *Reaktor* 3 is as close to the "endless sampler" as any you'll find.

SOFT SAMPLECELL 3.0

Digidesign's *Soft SampleCell* is the latest incarnation of a computer-based instrument that, until recently, required dedicated digital signal processing (DSP) hardware in one of your computer's expansion slots. Introduced more than a decade ago, SampleCell is a popular sampling platform for Macs and PCs. The first SampleCell, a joint project between Digidesign and Opcode, was a Nubus card with editing software only for the Mac. A PCI version was later developed for both platforms.

The latest edition, *Soft SampleCell* 3.0, works just like previous versions, but one element is missing: the expansion card. Consequently, *Soft SampleCell* costs $950 less than its PCI-based counterpart yet offers the same functionality and more, including a 4-pole resonant filter. Instead of dedicated DSP hardware, *Soft SampleCell* harnesses the power of your computer's processor. Now almost anyone with a modern Power Mac, a compatible floppy drive (for the authorization disk), and sufficient RAM to run OS 9.0.4 can run *SampleCell,* even on a computer without PCI slots.

Previous Coverage in EM

PRODUCT	ISSUE
***EXS24* 1.0 (review)**	5/01
***GigaStudio 160* 2.0 (review)**	1/01
***Reaktor* ("Master Class")**	9/00
SampleCell II (hardware; review)	12/93
***Stella9000* (as part of Studio9000 2.5 review)**	6/00
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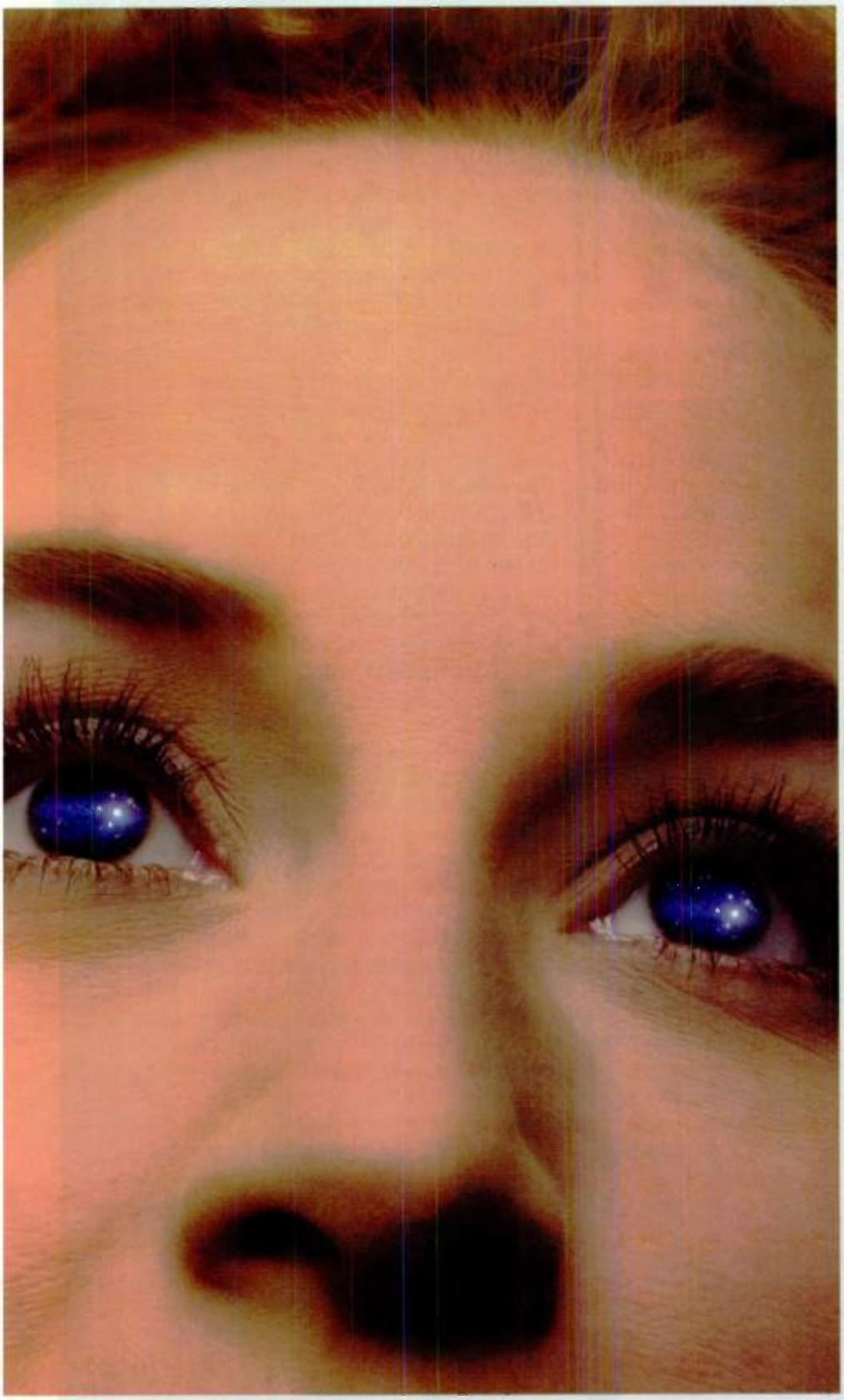

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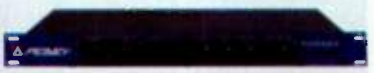

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PROS AND CONS

Like software synths, software samplers sometimes have distinct advantages over dedicated sampling hardware. On the other hand, there are reasons why software samplers can come up short when compared with external hardware. Consider some pros and cons of using software-based samplers.

ADVANTAGES

Larger display. Without a doubt, it's much more pleasant to edit sampler data on a computer monitor than on a hardware-based sampler's LCD, even if the sampler's display is a generous 5 inches wide. Because you can view more parameters simultaneously on a computer's display, you don't need to maneuver through dozens of pages as you would on a hardware sampler. Also, editing waveforms and envelopes graphically is much easier on a computer screen than on a tiny LCD on a module mounted in an equipment rack sitting on the floor.

More memory and storage. A hardware-based sampler requires its own RAM, hard disk, and CD-ROM, but a software-based sampler uses what's already installed in your computer. The amount of RAM and mass storage available for samples has a tremendous effect on the size and quality of your sample library. Although the maximum RAM in a sampler might be 128 MB, some virtual samplers can address as much as 1 GB installed in your computer. Memory and storage for samplers are often more expensive than their computer counterparts too. As a bonus, computer programs can often share audio files, so the loop you record in your sequencer program can be opened, edited, and played in your sampler program. What's more, you can often share one sampler's sound library with other virtual samplers installed on the same computer.

Easy upgrades. Upgrading your virtual sampler is often as simple as downloading a newer version from the developer's Web site. At worst, you might have to perform an installation from a CD-ROM—compare that with the surgery you're likely to perform on your rackmounted sampler to replace a ROM chip.

Lower cost. Once you invest in a fast and powerful computer, software is less expensive than a comparable hardware sampler. When you factor in the cost of dedicated RAM and mass storage, you can buy sampler software and upgrade your computer's hardware for a fraction of what a loaded hardware sampler costs. Furthermore, your virtual sampler can improve with age as you enhance your computer's performance.

Weightlessness. You can install dozens of software-based instruments on your computer, and it will weigh the same as before. In the hardware world, it's not unusual for a sampler module to weigh more than a computer. That is a special incentive if you use your soft sampler on a gig—gotta love those 5-pound laptops!

DISADVANTAGES

Inconsistent performance. When you own a hardware sampler that offers 64 notes of polyphony, it always plays 64 notes no matter how you use it; that's not always true of a soft sampler. Unfortunately, all computers are not created equal. Unless you own the fastest computer made and it's optimized for maximum performance, you might never attain the manufacturer's stated specs. Nor can you count on 100 percent repeatable performance from soft samplers; if your hard drive is completely fragmented or your computer checks to see if a disc is in your CD-ROM drive (as PCs tend to do), the software sampler's performance will be affected.

Configuration hassles. How does audio get to and from your virtual sampler? DirectX? ASIO? ReWire? Which plug-in format does it use? What if your audio card isn't supported? How about MIDI? What if your entire system is set up to work with FreeMIDI, and your sampler requires OMS? Configuring music software to exchange data is often more confusing than simply routing an output to an input with a MIDI cable or an instrument cord.

Format-translation errors. Even if your software supports a hardware sampler's file format, importing isn't always easy or comprehensive. The process of translating Akai programs to other sampler platforms is, at best, incomplete (though a good file-conversion program can definitely ease the pain of translating formats). Often, only multisamples and keymaps are imported, and parameters such as filter settings, envelopes, panning, and even loop points can be lost or altered in the translation.

Obsolescence. At some point, the sampler you use today will no longer be made or supported by its manufacturer. When a hardware-based sampler is discontinued, you can keep using it as long as it operates and MIDI remains a viable standard. If your computer's operating system is updated, nothing guarantees that older software will run on your new OS. Likewise, if you upgrade to a new computer, you might discover that your sampler program is no longer functional. At the very least, you might have to invest in a software upgrade to retain compatibility with a new computer or OS upgrade.

Virtual controls. Sometimes clicking and dragging just doesn't cut it. Changing a parameter by simply grabbing a knob and turning it definitely has distinct advantages. Even if you use a MIDI control surface with your software sampler, nothing beats dedicated knobs and buttons for speed.

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Soft SampleCell is a Mac-only application that requires Open Music System (OMS) for MIDI communication. If you're a Mark of the Unicorn *Digital Performer* user who refuses to give up FreeMIDI in favor of OMS, *Soft SampleCell* won't suit your needs. If you have Digidesign hardware, you have a choice of DirectConnect or Direct I/O for multichannel audio output; otherwise, you have to use Sound Manager, which limits you to stereo output. If you invested in expensive ASIO hardware with multiple outputs, you're out of luck.

Soft SampleCell can open AIFF, WAV, and Sound Designer I or II files, but it has no facility for directly recording samples. It doesn't import non-native sampler formats such as Roland or Akai; however, translation programs can convert sampler discs to SampleCell's native format. SampleCell is such a popular format that several other virtual samplers support it.

TAKE IT TO THE BANK

The main window in *Soft SampleCell* displays a bank of Instruments, each containing a sample or a multisample in mono or stereo (see **Fig. 4**). The number of Instruments in a bank determines the window's width. Each Instrument appears in what looks like a channel strip showing its name, MIDI channel, key range, audio outputs, panning, and level.

A button at the top of the Bank window opens the Sample Map window, in which you import samples, preview them with an onscreen keyboard, and define their Key Groups and Velocity Zones. Another button opens Misc Parameters, which contains controls for pitch-wheel range, tuning, and Velocity response. Also in the Misc Parameters window, you can specify the lowpass filter's frequency, resonance, and slope (either 6 or 24 dB per octave). The Resampling Quality pop-up, at its highest setting, helps to minimize audio artifacts when pitch is transposed more than seven semitones.

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Other buttons let you assign three EGs, two flexible LFOs, matrix modulation, and parameter response curves. In addition to the usual attack, decay, and release times, the EGs provide both a sustain level and a sustain decay time. Matrix modulation offers 18 sources and 24 destinations, adding flexibility that's missing from many samplers. You can use Velocity to control the sample start time, for example, or control filter resonance with Aftertouch.

A button in the Sample Map opens the Loop window, an editor for defining loop points and trimming audio. That integral loop editor is the only way you can edit the contents of sample files in *Soft SampleCell*, whether they're located in open Instruments or on disk. For each file, you can specify a single sustain/release loop or one loop for sustain and another for release. The program can create crossfades and automatically locate potential loop points. A Waveform Display shows the entire sample, and a Loop Display zooms in on the loop points. An especially welcome feature is the ability to adjust loop points as the loop plays.

It is disappointing that *Soft SampleCell* has no effects processor, but you can create auto-panning and simulate many effects in the modulation matrix. To add reverb or compression, you can assign plug-ins to SampleCell's audio track in *Pro Tools* or your sequencer application.

Soft SampleCell's 100-page manual comes in paperbound and bookmarked PDF versions, giving the advantage of holding a book in your lap while searching its contents in Adobe *Acrobat*.

Soft SampleCell appears to be optimized for use with a Pro Tools system; however, it should be useful with any sequencing program that supports OMS. Multichannel audio requires Digidesign hardware, so those users who do not use Pro Tools are limited to stereo output. Although the program doesn't support third-party audio hardware and Digidesign feels no need for multiple instances, *Soft SampleCell*'s well-conceived feature set makes it a flexible sample player.

SAMPLERCHAN 1.3

Nick Whitehurst's *SamplerChan* is the newest soft sampler on the market, having come out of beta just days before this writing. It operates as a VST plug-in but doesn't run using FXpansion's *VST–DX Adapter* within Cakewalk's *Sonar*. The program is 16-part multitimbral and supports samples as high as 32-bit, 44.1 kHz resolution. It provides special features for triggering samples and can automatically generate rhythmic and strumming note patterns.

SamplerChan's interface is split into three main work areas: Mixer, Editor, and Wave (see **Fig. 5**). Each has features and provides access to options related to different stages of your work flow. In the Mixer view, you set the levels for each of 16 MIDI channels; assign a Program Change and, if necessary, a Bank Change number to trigger the sound on the current channel; adjust the two effects-send levels; and perform various file-maintenance operations. The large graphic Mixer interface is nicely laid out, but you can't resize it.

Building a multitimbral setup in the Mixer is a breeze. First, drag a file from the Explorer-style window on the left of the screen directly into any of the 16 channel slots; then repeat as needed as many as 15 times, and you're set. If desired, you can specify a maximum polyphony (at most, 64 notes) for each channel. You can also enable the in-line limiter and route each channel to any of the eight possible outs on a per-channel basis. To patch a channel into the plug-ins provided by your host software, assign it to either of the two effects sends.

SENIOR EDITOR

SamplerChan, like many of the other programs, lets you work at various levels of its architecture, but some of the Editor's performance parameters are unique. For example, like the other samplers in this roundup, *SamplerChan*'s patches consist of samples assigned to parts containing

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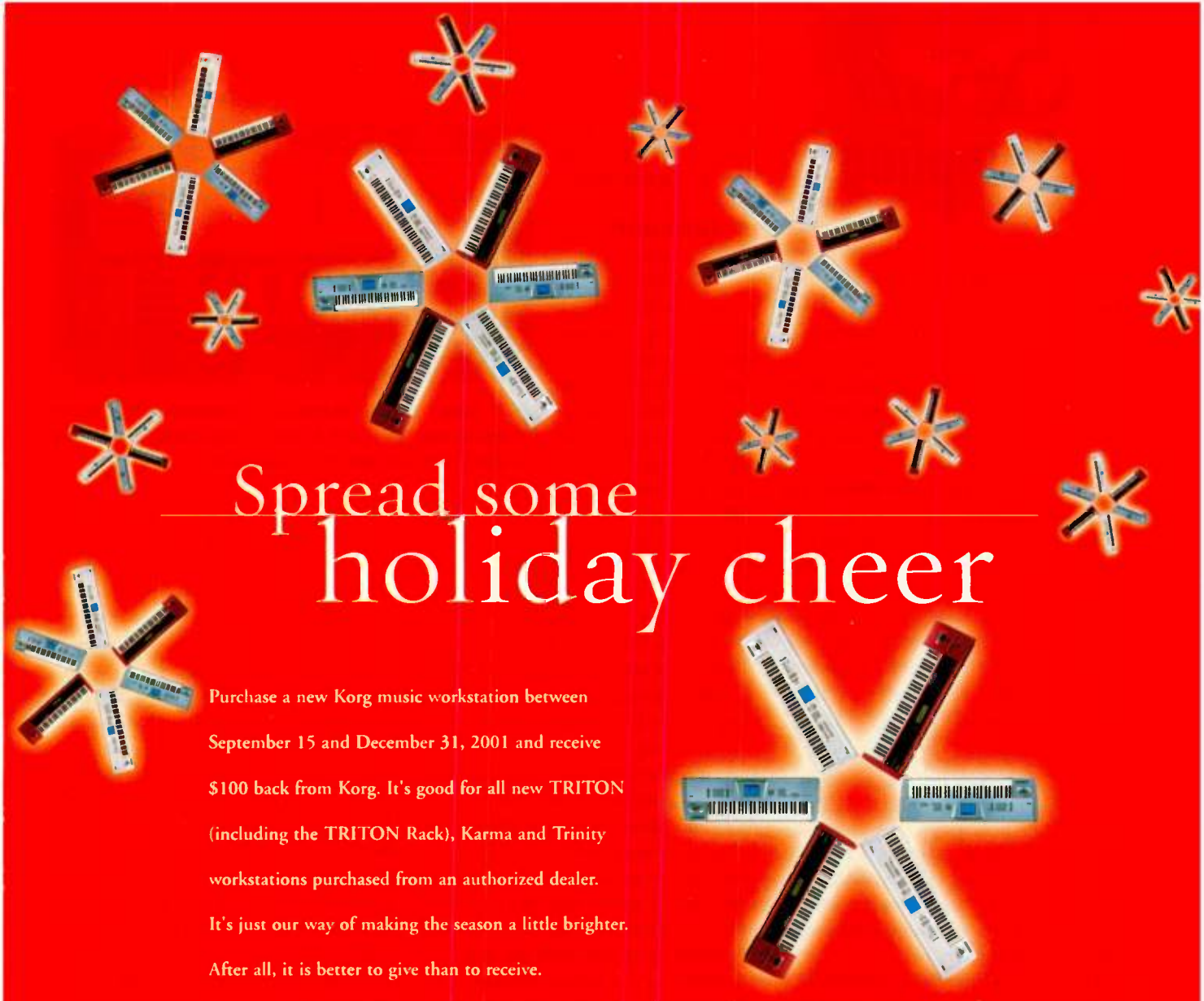

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various splits and layers. Parts are combined into instruments, which are stored in banks. In addition to the familiar tuning and volume controls that you can assign to a sample, the program offers numerous ways to add nondestructive rhythmic components that affect the way a sample plays back.

Using the tools under the Rhythm tab in the Editor, for example, you can build long sequences of note events that trigger your sample each time a MIDI Note On is received from the host. We grabbed a single bell tone from the hard drive, loaded it into *SamplerChan,* and then created a 24-note sequence that altered the sample's pitch and Velocity. When Steinberg's *Cubase* played a middle C, *SamplerChan* played the bell with the 24-note sequence we had created. We continued to add layers to the patch by loading other drum samples and building unique sequences for each of them. Before long, we had some elaborate, evolving polyrhythmic textures playing back in sync with the tempo of the *Cubase* sequence.

The Editor screen also provides features that are especially suited for working with drum sounds. Switch the display to Drum mode and drag any number of drum samples from the file area at the screen's left onto the Editor. *SamplerChan* automatically assigns each sample to a different key, and you have an instant multisampled kit.

SamplerChan offers robust matrix-modulation features. In addition to traditional modulation sources, such as three multiwave LFOs and three five-stage EGs, it has an envelope follower that tracks the sample's amplitude envelope and allows you to use it as a mod source. You can control the pitch of a sample with the amplitude-curve data, for example; as the source sample grows louder, the destination sample's pitch gets higher. A less-familiar modulation destination is the effects-send level; modulating it with an LFO, for instance, creates an effect that fades in and out during a recurring time frame.

IN THE LOOP

Access to *SamplerChan*'s extensive looping features is obtained in the Wave screen. You have options to automatically fade loop points in or out, fine-tune a loop's pitch and length, and set the loop direction (forward, backward, or bidirectional). Like Propellerhead Software's *ReCycle, SamplerChan* offers tools to slice a loop and manipulate the slices, letting you slow down or speed up the loop without changing its pitch. You can even assign each slice to a different key, providing options to completely modify or mangle the original loop or simply add a little swing to it.

By pressing the Extract Groove button, you can store a copy of the time markers associated with a sliced loop and reuse them elsewhere. Those and other loop-manipulation features remove *SamplerChan* from the standard soft-sampler world and add considerably to its value as a composition tool.

Perhaps more than most soft samplers, *SamplerChan* is a live-performance application. One useful performance feature is the aptly named Performer. The Performer's virtual joystick (and many other controls) lets you move among four quadrants. Like the physical joystick on certain Korg synths, you can map the joystick movements to numerous performance parameters, such as filter cutoff frequency, LFO depth, and the length of an envelope segment. You can even map the movements to the levels of different parts so that samples fade in and out as you move the stick around. You can record all joystick movements in your host software to re-create or automate the performance of your sounds. The Performer is a great feature that, by itself, is worth the sampler's price.

SamplerChan's Options screen offers various ways to customize the software. You can link to as many as three external applications directly within the program, optimize various aspects of its performance, and specify as many as 99 levels of undo. The documentation (in PDF only) does an especially good job explaining an audio signal's flow through the program, and it includes clear graphic flowcharts. Lucid explanations help you understand how best to exploit *SamplerChan*'s resources.

SamplerChan is the most unusual program in our roundup. It's an excellent choice if you're interested in working with loops and grooves but don't yet have dedicated tools for the job. It also makes sense for anyone who wants a more traditional soft-sampler experience. If the developer adds DirectX Instrument support and works out the bugs with *VST–DX Adapter,* DXi users will have a chance to use *SamplerChan.*

FIG. 6: *SampleTank* is a VST Instrument that provides all the basics needed for sample playback. Its knobs change identities depending on which instrument and effects you select.

SAMPLETANK 1.0

A sample player in the form of a VST Instrument, IK Multimedia's *SampleTank* comes in *DJ* ($199), *L* ($249), and *XL* ($499) versions; the main differences are the size and scope of the included sample libraries. *SampleTank DJ* and *L* are unable to open instruments found in only the *XL* library; you can upgrade by paying the difference in retail price. *XL* also includes *ST Converter,* a utility that converts Akai S1000 and S3000 files to *SampleTank* format.

SampleTank's installer disc has 289 MB of mostly multisampled instruments, in addition to 182 MB of third-party demo sounds. Installing *SampleTank DJ* from a second disc has an additional 323 MB of loops, electronic drums, and synth samples. Move up to the *L* level for a

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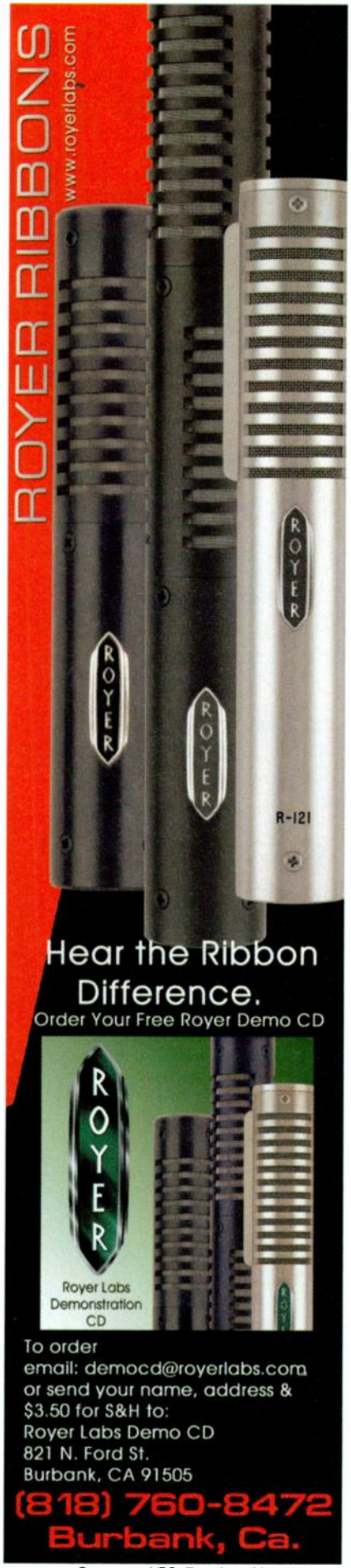


wider palette ranging from electric and acoustic guitars to orchestral and vocal sounds totaling 593 MB together with the basic and *DJ* instruments. *SampleTank XL* supplies another 613 MB and increases the variety of sounds even more, adding up to a grand total of 2 GB. The quality of the included sounds varies considerably, but most sounds we tried out are pretty good. All instruments and samples are in a proprietary format, so you can only open them in *SampleTank*.

Because it's a VST Instrument, *SampleTank* requires a VST 2.0–compliant sequencer program, though it loaded with no problem in *Sonar* using the *VST–DirectX Adapter*. Depending on CPU speed, its maximum polyphony is 128 notes. With enough processing power, you can run as many as 8 copies simultaneously in *Cubase VST* and 16 copies in *Logic Audio*. Each copy responds on 16 MIDI channels, with a different instrument on each channel.

SampleTank appears onscreen as a plug-in window with many knobs, buttons, and a display area (see **Fig. 6**). Choose specific instruments from a category list that appears at the center of the display area. Select one instrument for each MIDI channel, which you specify with a row of 16 buttons, and stipulate the instrument's volume and pan position. Clicking on an Info button reveals supplementary information for each instrument, such as multisample size and the copyright holder's name.

WRITTEN IN STONE

Instrument editing is minimal: because *SampleTank* is a sample player in the strictest sense, reassigning samples or key ranges isn't possible. Those capabilities would be a welcome addition to a future revision, along with user-defined envelopes and filters.

In any instrument, however, you can control as many as four real-time parameters using onscreen knobs or MIDI Control Change (CC) messages. Parameter names appear above the knobs and in greater detail on the display's left side, just below the current instrument name. If you click on the parameter value that appears just below each knob, *SampleTank* displays its MIDI CC number and its value. Because you can change parameters with MIDI messages, you can automate changes by recording them into your sequencer. You also can save any changes you make to an instrument's default parameter settings.

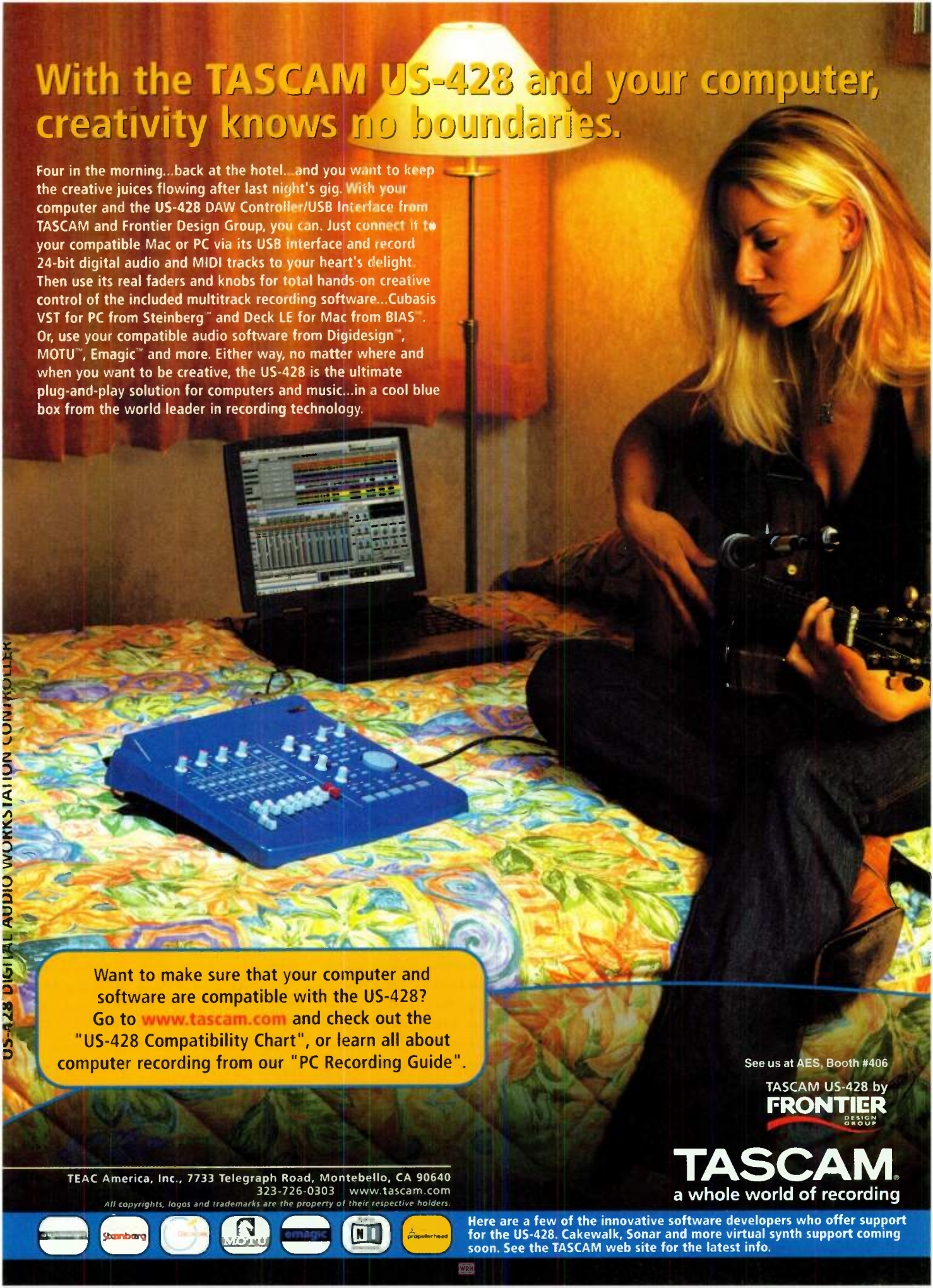
With pull-down menus containing 27 effects algorithms, you can assign as many as four effects to each instrument. Four slots for effects each have an On toggle button and an indicator LED. The first slot always provides compression and four bands of EQ; the other three are user-programmable and range from envelope filter and rotary speaker to Slicer bpm, an effect that transforms a sustained sound into a rhythmic phrase. When you click on a slot, four or five adjacent knobs are labeled with appropriate parameters. You can control all parameters with MIDI CCs and sync some of the effects to MIDI tempo.

SampleTank's Search function lets you enter keywords such as "Indian" or "180 bpm" to quickly find samples appropriate for your needs. You can specify the number of notes each instrument can play, thus controlling its CPU usage, and indicate whether an instrument plays polyphonically or monophonically.

SampleTank comes with a small stapled, 40-page manual that's also provided as an *Acrobat* file. Each *SampleTank* version includes a list of instruments in paper and PDF formats.

STELLA9000 2.5

Stella9000 is part of Koblo's Studio9000 suite of software instruments for Macintosh. Based on Koblo's Tokyo engine, Studio9000 includes three soft synths; a virtual drum machine; and *Stella9000*, an 8-note polyphonic sample player. *Stella9000* works as a VST plug-in instrument, as a standalone program, or with any software that supports OMS or FreeMIDI for MIDI input and output. For audio I/O, Tokyo supports ReWire, Sound Manager, DirectConnect, Direct I/O, and MAS in addition to VST 2.0.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Here are a few of the innovative software developers who offer support for the US-428. Cakewalk, Sonar and more virtual synth support coming soon. See the TASCAM web site for the latest info.

Stella9000's highlights include freestanding operation, an amazing multimode filter, three invertable ADSR generators, a sophisticated arpeggiator, and a modulation matrix with 16 sources and 28 destinations. On the downside, *Stella9000* is 8-note polyphonic, and each instance runs on a single MIDI channel. Surprisingly, it does not have an effects processor or facilities for editing samples or rearranging multisample keymaps, though you can control a sample's start point.

Stella9000 opens SampleCell instrument keymaps (as long as they're assigned to a single MIDI channel), and it reads AIFF and Sound Designer II audio files. (A WAV translator is available from Koblo as a free download.) You can select from more than 250 factory programs in the Presets menu; most are effects or other sounds oriented toward dance and techno music, and many sound a little out of date. It's been almost two years since *Studio9000*'s last release, and it's due for an update to compete with stiff competition.

SOUND-SHAPING TOOLS

Stella9000's architecture is synthlike; it's almost identical to *Vibra9000,* Studio-9000's most refined virtual synth. However, in place of the synth module's oscillator waveforms are samples and multisamples. All of *Stella9000*'s controls transmit MIDI, and you can control every parameter from your sequencer or any external MIDI source.

One of *Stella9000*'s especially welcome aspects is that it has only one window, which lets you see what's going on at all times (see **Fig. 7**). The onscreen front panel contains 68 knobs, 18 buttons, and many stylized pop-up parameter displays. Flashing LEDs provide plenty of visual feedback when data is sent or received. The panel is divided into sections labeled Sample, Filter, Env, LFO, Arp, Mod, and Global. The Sample section has controls for sample-playback offset, tuning, Velocity modulation, and pitch-bend range, as well as amplitude attack and release. Buttons turn on looping and reverse playback.

Stella9000 has the same Filter section as *Vibra6000* and *-9000,* and it's one of the coolest filters ever. In addition to balancing the output of simultaneously available lowpass, bandpass, and highpass filters, you can change their stereo positioning with the Spread knob. A pop-up menu reveals eight types of filters, including 2-pole, 4-pole, 8-pole, and a notch filter with two 4-pole filters. Two comb filters produce resonances at multiple frequencies, and there are combinations of two or four 2-pole filters. Additional knobs control cutoff, resonance, key tracking, Velocity sensitivity, and distortion.

FIG. 7: *Stella9000*'s bright-blue virtual brushed-metal panel offers an amazing filter and extensive modulation. Part of Koblo's Studio9000 suite, *Stella9000* is 8-note polyphonic, but not multitimbral.

Stella9000's three LFOs have separate unipolar and bipolar outputs and a choice of six waveforms. Each LFO has its own attack-decay envelope, and dedicated lowpass filters can reshape the LFO waveforms. You can sync LFO rate to sequencer tempo.

The modulation matrix provides eight source-to-destination routings, each with its own depth control. Modulators include envelopes, LFOs, note number, pitch bend up or down, and real-time controllers. Destinations can be nearly any front-panel parameter, including modulation depth.

Studio9000's minimum system requirements are more modest than some: you need 40 MB of free RAM, Mac OS 8.0, and 16 MB of disk space for installation. You decide which instruments—*Stella9000; Gamma9000;* or *Vibra1000, -6000,* and *-9000*—to install depending on your resources and requirements.

UNITY DS-1 2.1.3

BitHeadz's *Unity DS-1* was the first full-function virtual sampler available for Macintosh, and it's still one of the few virtual samplers that records samples. With comprehensive sample editing, extensive modulation routing, and the ability to work alone or with all popular sequencers, *Unity* goes beyond emulating hardware and embraces the advantages of software-based samplers. On the Mac, nothing else comes so close to reflecting a hardware-based sampler. A scaled-down *Unity Player* ($199) is also available from BitHeadz.

Unity is optimized for G4 and Pentium III processors, but it will also run on a 200 MHz PowerPC 604 or a Pentium II. On Macs with dual processors, *Unity* processes most voices on the second processor and leaves the main processor available for your multitrack audio-recording program. With sufficient CPU power, *Unity* plays as many as 256 phase-locked stereo voices. You can open as many as eight copies of *Unity* at the same time, providing 128 independent MIDI channels.

To make efficient use of memory, *Unity DS-1* is a suite of applications divided into *Unity DS-1 Editor, MIDI Processor, Keyboard,* and *Mixer.* At first, so many applications appear to be a hassle, but to play *Unity* as a standalone program, you only need to run one. When you use a sequencer, the *Unity* engine runs in the background, so you don't have to open any additional programs. Also included are a number of utilities for organizing sample libraries, playing

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Standard MIDI Files (SMFs), and accomplishing other tasks.

In the *Unity DS-1* Control Panel, you can specify parameters such as the maximum RAM (as much as 1 GB), maximum polyphony, sample rate, Velocity curve, MIDI and audio I/O devices, controller routings, and other details of *Unity*'s operating environment. The Control Panel gives you the most direct control of how the *Unity* engine functions.

For live performance, *Unity DS-1 MIDI Processor* lets you speedily select and play sounds, set up splits and layers, and use *Unity*'s sophisticated arpeggiator. You can modify tuning, panning, effects sends, and other real-time parameters as well.

The *Mixer* displays 16 MIDI channels, each as a different channel strip, with a master section for controlling overall volume and global-effects depth. You can select sounds, mute and solo channels, and control the same real-time parameters that you can with the *MIDI Processor*.

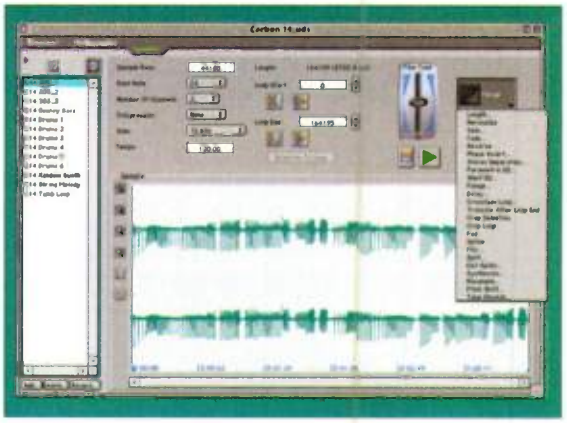

FIG. 8: *Unity DS-1*'s Samples page provides a stereo waveform display and a complete set of sample-editing tools. If you need a tool *Unity* doesn't offer, link it to an external waveform editor.

SAMPLE EDITING

Whether you're tweaking programs for a particular project, creating samples from scratch, or retooling a sample library created for another sampler, the heart of *Unity* is the *Unity DS-1 Editor*. The *Editor* provides tools to manipulate samples, multisamples, and programs.

The *Editor*'s Samples page is a full-fledged sample editor in which you can view and edit every waveform in the current bank (see **Fig. 8**). You can define sampling rate (as high as 96 kHz), bit rate (from 8 to 24), root note, fine-tuning, tempo, loop points, and other details. Converting mono samples to stereo (and vice versa) is easy using a single pop-up selection.

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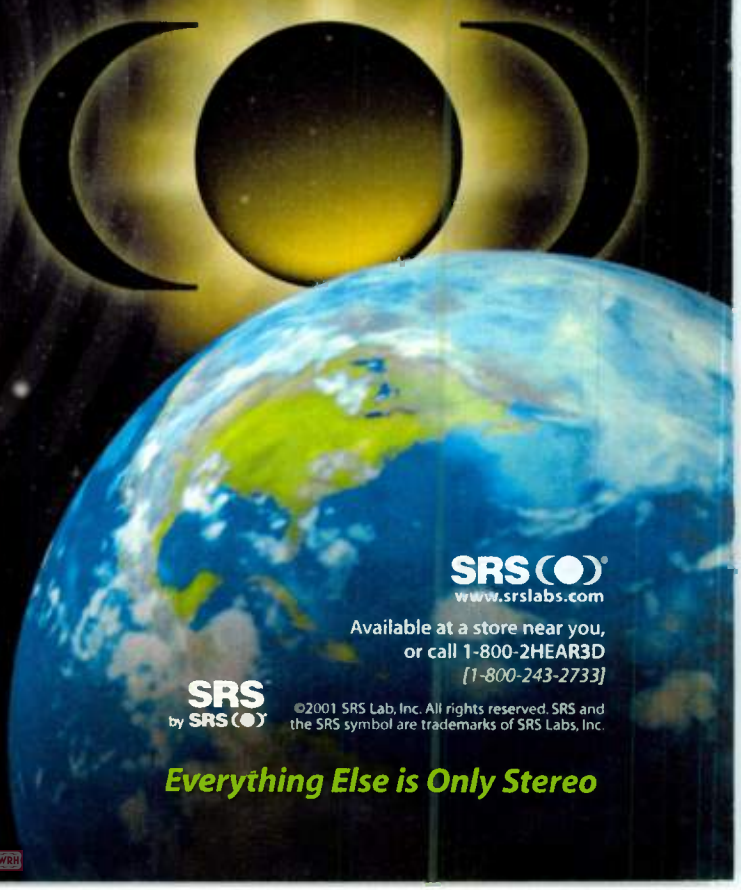

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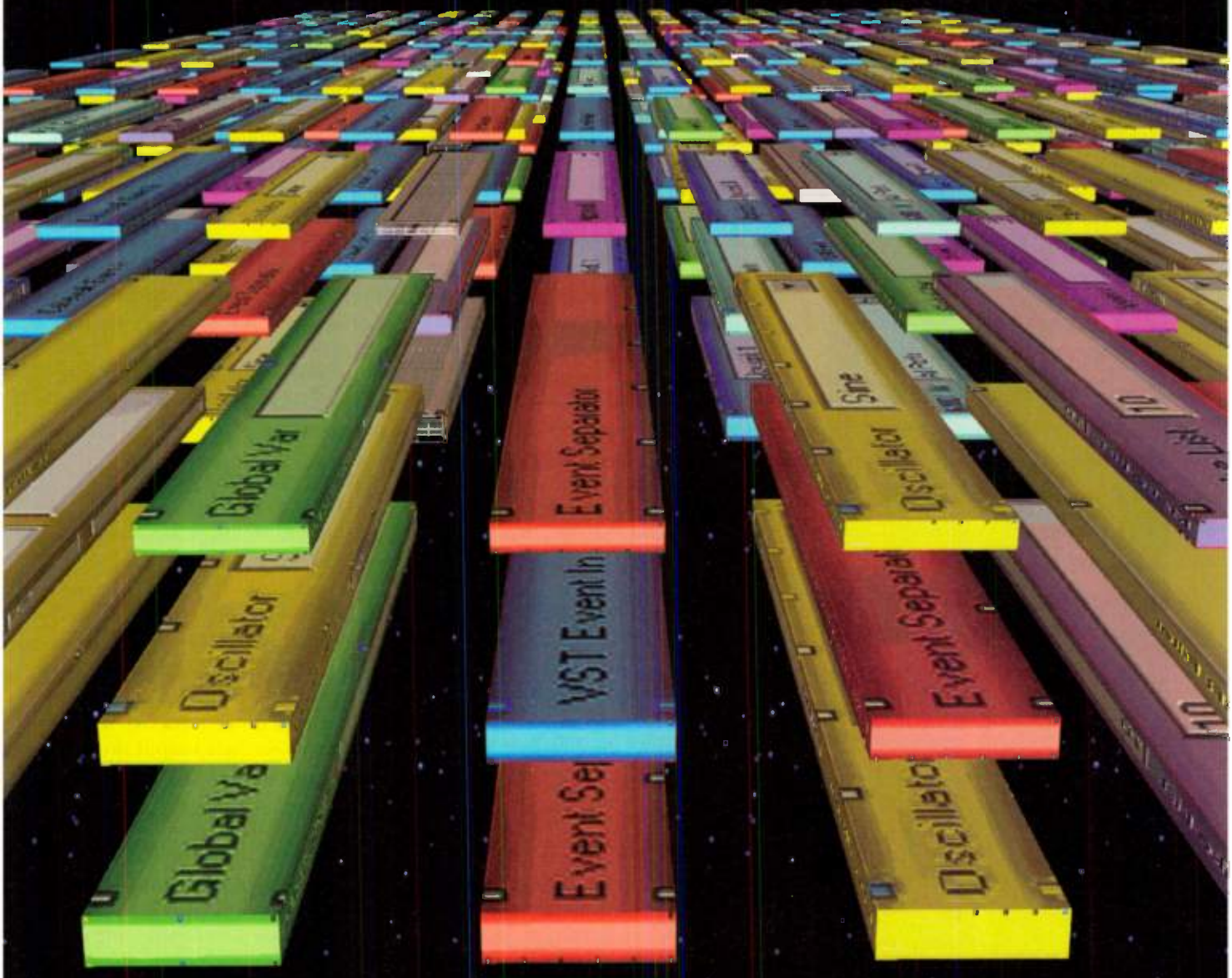

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The Samples page's Munge menu provides powerful audio-editing functions, including normalize, pitch shift, time stretch, change length, split, invert phase, and crossfade loop. Although there's no dedicated loop-editing window, an auto-loop feature lets you scroll through potential loop points. You can even play the sample continuously as you adjust loop points.

The Record button on the Samples page opens the Record window, where you record samples in stereo from your computer's audio inputs. Although you start sampling by hitting the Record button, you can't set a threshold that triggers Record as you can with most hardware-based samplers.

The Multisamples page is where you insert samples into the different zones in a multisample. Zones can be displayed in an onscreen keyboard or a list. You can designate each sample's key and Velocity range, start point, tuning, volume, panning, and so on. You can even define crossfades between zones, mixing a sample from one zone with another at the split points at which one zone ends and another begins. That helps to minimize transitions between zones.

The Programs page is divided into Configuration, Main, Modulation, Effects, and Global sections, each of which is accessed by clicking on tabs. On any Programs page, you can open, add, and delete programs from a bank. An overview of the program's algorithm appears on the Configuration page, where you can graphically route oscillators, filters, and effects to the output.

The Main page displays parameter controls for two oscillators and two filters. There are 16 filter types, including lowpass, highpass, bandpass, and allpass with varying characteristics, slope, threshold, and comb.

You can route 12 sources to 60 destinations on the Modulation page as well as program flexible LFOs and five-stage EGs. The number of modulation routings, LFOs, and envelope generators is practically unlimited, depending on your computer's horsepower. LFOs can sync to your sequencer's tempo.

The Effects page is divided into four quadrants containing controls for two insert effects and two global effects. Pop-up menus provide lists of effects types, with different sets of parameter sliders for each effect. Insert effects include everything from flanger and multitap chorus to parametric EQ and distortion. Global effects are limited to reverb, reflection, and delay.

The *Unity DS-1 Manual* is a 274-page PDF file that's clearly written and well indexed, though bookmarks would be nice. *Unity* comes with a well-rounded, 300 MB sample library that includes a 12 MB General MIDI (GM) bank. An abundance of Unity-format discs, ranging from classic keyboards to percussion hits and breakbeats, is available from BitHeadz and other manufacturers.

Unity DS-1 is a mature program with a lot of function and flexibility. If other samplers replicate its breadth of capability, many people will find replacing samplers with computer software much easier to accept.

VIRTUAL SAMPLER 2.56

Speedsoft's *Virtual Sampler* runs as either a VST or a DirectX Instrument and also functions as a standalone application. It's a surprisingly deep program considering its price and offers advanced features such as the ability to draw filter curves and LFO shapes by hand and employ any of 15 Velocity curves. As an added bonus, it can load VST Instruments and pass their output through its processing stages.

Virtual Sampler is available in two versions. The standard version ($40) has all the features of the professional version ($75) except ASIO support and the ability to import Akai samples. In addition, rather than functioning as a DirectX or VST Instrument, the standard version works only with DirectX.

Virtual Sampler provides as much as 64-note polyphony and 16 discrete outputs. Its main screen toggles among 12 work areas, only one of which can be

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open at a time (see **Fig. 9**). An onscreen keyboard appears at the bottom of the display, regardless of which work area you're in. Various icons, such as those for file management, are always accessible at the top of the display.

The program has the ability to manage enormous amounts of data. At the bottom layer of its architecture are Splits (keymaps) that define the range over which individual samples are triggered. Splits include various performance parameters, such as an amplitude envelope, two filters, two effects, two LFOs, and a setting for both pan and detuning. A single *Virtual Sampler* voice can have a maximum of 65,535 Splits, though it's unclear what you would do with so many.

A Preset is the next higher level and includes a MIDI Channel assignment, a discrete output route, and a location in a *Virtual Sampler* Bank. A Bank holds as many as 128 Presets, and each is assigned a Program Change number according to its location within the Program map. You can load a limit of 64 Banks during any work session. Like some hardware devices, *Virtual Sampler* uses the term *Multi* for a specific setup of 16 Presets, one per MIDI channel. You can store as many as 16 Multis and access them with a combination Bank/Program Change command. Fortunately, *Virtual Sampler*'s Bank Manager feature keeps track of the files that you'll accumulate.

FIG. 9: *Virtual Sampler* divides its interface into 12 work areas. Enter an area by clicking on one of the buttons directly above the piano keyboard.

TWEAKY CLEAN

A list of the currently loaded samples appears on the Sample page, with controls to set the sample start and end points, adjust loop points, and perform various DSP functions. A large graphic display of the selected sample appears, and though you can zoom in to a high level of magnification, no increments show you precisely where you are in

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Software Sampler Specifications

Program	BitHeadz *Unity DS-1* 2.1.3	CreamWare *Volkszämpler* 1.0	Digidesign *Soft SampleCell* 3.0	Emagic *EXS24* 1.0	IK Multimedia *SampleTank* 1.0
Minimum System Requirements	Mac: PPC 604/200; 64 MB RAM; OS 7.6.1 Win: Pentium II/200; 64 MB RAM; Windows 95/98/ME	Mac: PPC 604/200; 64 MB RAM; OS 8.5 Win: Pentium II/200; 64 MB RAM; Windows 95/98/ME/2000	Mac: G3 (blue and white, not beige), OS 9.0.4; Digidesign-approved floppy drive	Mac: PPC 604/200; 128 MB RAM; OS 8.6 Win: Pentium II/200; 128 MB RAM; Windows 98	Mac: PPC 604/200; 64 MB RAM; OS 8.5; VST host Win: Pentium II/200; 64 MB RAM; Windows 95/98/ME/NT/2000; VST host
Environment	Mac: OMS, FreeMIDI, native *Logic Audio* Win: Unity Device Driver	VST Instrument	OMS	*Logic Audio/ MicroLogic AV*	VST
Input and Native Formats	AIFF; WAV; SD I, II; Akai S1000, S3000; SampleCell I, II; DLS; CD audio; SoundFont 2.0	WAV; AIFF; Akai S1000, S3000; CreamWare STS DSP Sampler; SoundFont 2.0	SD I, II; AIFF; WAV	SD II; AIFF; WAV; Akai S1000, S3000; SampleCell; SoundFont 2.0	WAV; AIFF; Akai
Output Formats	DirectX; ASIO; Sound Manager; MAS 2.0; DirectConnect; Direct I/O; ReWire	VST Instrument	Sound Manager; Direct I/O; DirectConnect	*Logic Audio;* DirectConnect (TDM version); Direct I/O; ASIO	VST
Bit Resolution/ Sampling Rate	8-, 16-, 24-bit/ as high as 96 kHz	8-, 16-, 24-bit/ as high as 96 kHz	8-,16-, 24-bit/ as high as 48 kHz	16-, 24-bit/ as high as 96 kHz	8-, 16-, 24-bit/ as high as 48 kHz
Maximum Polyphony	256 notes x (8) devices	only limited by host CPU	64 notes	64 notes x (16) objects (32 objects w/ TDM version)	128 notes x (8) modules
Sample Recording	yes	yes	no	no	no
Sample Editing	loop; normalize; pitch shift; time stretch; resample; others	normalize; DC offset; loop; crop; mute; reverse; others	integrated loop editor	host-dependent	no
Filters	(2) multimode filters per voice; (17) filter types	(1) multimode filter; (3) filter types	(1) 24 dB/octave resonant lowpass	(1) 12, 18, 24 dB per octave resonant lowpass	no filters except as effects parameters
Envelopes and LFOs	multiple 6-stage EGs; multiple LFOs	(2) ADSR EGs; (2) multiwaveform LFOs	(3) multistage EGs; (2) multiwaveform LFOs	(2) ADSR EGs; (2) multiwaveform LFOs	no envelopes; no LFOs except as effects modulators
Modulation	matrix modulation	matrix modulation	matrix modulation	capacity to automate all controls via MIDI	(4) simultaneous real-time parameters
Effects Processing	(2) global; (2) insert; compression; EQ; reverb; distortion; delay; chorus; others	none	none	distortion	(20) effects: (4 per voice) compression; EQ; reverb; delay; distortion; others
Bundled Samples	300 MB library	70 MB of demos from commercial libraries	630 MB of demos	164 MB library	794 MB–2 GB (depending on version)
Manual	PDF	PDF	paper; PDF	paper	paper; PDF
MSRP	$449	$99	$345	$399	$199–$499 (depending on version)

Koblo *Stella9000* 2.5	Malcolm Haylock *VSamp* 3.2	NemeSys *GigaStudio 160* 2.2	Native Instruments *Reaktor* 3	Nick Whitehurst *SamplerChan* 1.3	Speedsoft *Virtual Sampler* 2.56
Mac: PPC 604/120; 40 MB RAM; OS 8.0	Mac: 68040; 8 MB RAM; OS 7.5	Win: Pentium II/266; 64 MB RAM, Windows 95/98/ME; GSIF/MME sound card	Mac: G3/200; 64 MB RAM; OS 8.6 Win: Pentium II/200; 64 MB RAM; Windows 98/2000	Win: Pentium II/200; 64 MB RAM, Windows 95/95/ME/2000	Win: Pentium II/200; 64 MB RAM, Windows 95/98/ME/2000
OMS; FreeMIDI; VST 2.0	OMS; FreeMIDI; VST 2.0	GSIF	Mac: OMS; FreeMIDI Win: Windows MIDI	PC	standalone; DirectX; VST Instrument
SD II; AIFF; SampleCell keymaps	AIFF; SD II; Mac Sound Resource; imports SampleCell 2, SoundFont 2.0 samples, keymaps	Akai S1000, S3000; SoundFont 2.0; DLS; CD audio; WAV	AIFF; WAV; Akai S1000; SDII	AIFF; WAV; SoundFont 2.0	16-, 24-bit WAV; AIFF; SoundFont 2.0; TTI; LM4 kits; Akai S1000, S3000, S5000, S6000
Sound Manager; Direct I/O; DirectConnect; ReWire; MAS; VST 2.0	Sound Manager	GSIF; MME	DirectX; ASIO; Sound Manager; MAS; DirectConnect; VST	VST	MME; DirectX; ASIO
16-bit/44.1 kHz	8-, 16-, 24-bit (+ VST 24-bit)/as high as 48 kHz (+ VST 96 kHz)	16-, 24-bit/ as high as 96 kHz	8-, 16-, 24-bit/ as high as 132.2 kHz	16-, 24-, 32-bit/ as high as 44.1 kHz	16-, 24-bit/ all rates
8 notes × (5) instances	64 notes	160 notes	64 notes × (16) devices × (4) VST instances	128 notes	64 notes
no	no	no	yes	no	no
no	no	no	loop; time stretch; pitch shift; others	loop; normalize; trim; beat slice; others	loop; gain adjust; normalize; others
(1) multimode; (4) filter types	(1) resonant lowpass filter per sample (as many as 128)	(1) multimode; (4) filter types; customizable	unlimited multimode;	(1) multimode; (4) filter types	(2) multimode; (6) filter types
(3) ADSR EGs; (3) multiwaveform LFOs	(1) 5-stage EG; (1) LFO	(3) 5-stage EGs; (3) LFOs	unlimited multistage EGs; unlimited LFOs	(3) 5-stage EG; (3) multiwaveform LFOs	(2) 5-stage EGs (per Split); (2) multiwave LFOs (per Split)
matrix modulation	no	amplitude; filter frequency; pitch	matrix modulation	matrix modulation	matrix modulation
(27) algorithms (4 simultaneously); EQ; reverb; compression; lo-fi; delay; filter; others	no	(32) global; (64) inserts; reverb; chorus; flanger; echo; auto pan; EQ	unlimited,customizable: compression; EQ; reverb; distortion; delay: chorus; vocoder; others	(2) VST effects buses	(2) effects per Split: delay; reverb; host's VST effects
481 MB library	downloadable from FTP site	600 MB piano sample; multiple demo CDs	no	no	(2) demo banks: (1) for sampler, (1) for analog synth; (15) DX7 banks
paper; downloadable PDF	PDF	paper; PDF	paper	PDF	HTML
$595 (sold in entire suite only)	$39	$699	$499	$99	$40–$75 (depending on version)

MIDI-triggered) occurs in the Sample Editor window as well. Before recording, you must assign *Volkszämpler* to an insert in your host software and create a new Program.

Volkszämpler packs enough features to make it a useful tool for adding sampling capabilities to your rig. Many features, though, are buried in sub- or even sub-subwindows, and keeping track of feature locations is often hard. Moreover, we ran into occasional display glitches, even with an update from the manufacturer.

Still, the program supports files with resolution as high as 32-bit, 96 kHz. It is also among the more efficient samplers in the group. We layered ten 16-bit, 44.1 kHz mono samples in a single Program using extensive modulation, and *Cubase*'s VST Performance meter bounced comfortably between 10 and 20 percent. With a bit of added development, perhaps including a little design rearrangement, *Volkszämpler* could be a good choice for your first soft sampler.

VSAMP 3.2

Malcolm Haylock's *VSamp* costs a fraction of what other virtual samplers cost, yet it probably performs most sampler functions that you need, and it's easy to set up and use. In addition to a standalone version that works with OMS or FreeMIDI, you also get *VSamp VST*, a plug-in instrument for VST 2.0 hosts. The 20-page PDF manual clearly explains every window, command, and function. *VSamp* runs on any Power Mac, Centris, or Quadra.

VSamp offers sample playback on 16 MIDI channels simultaneously, with as many as 64 notes and 128 samples per channel. On a fast computer, more than a thousand notes of polyphony are possible. Despite its benefits, *VSamp* doesn't record samples, and it has no effects processing. The program offers stereo output through the Sound Manager, and the plug-in version provides four assignable stereo outputs.

Samples are assigned to Instruments; Instruments are arranged in Banks. Samples must be in the same folder as their associated Instrument and Bank. *VSamp* provides windows for editing Instruments and Banks but has no sample waveform editor; setting loops requires a separate audio-editing program.

VSamp's appearance is utilitarian and not very exciting. Its Instrument Editor looks like a spreadsheet with all samples listed in a column and essential parameters displayed in rows (see **Fig. 11**). Each row shows a sample's name, file type, lowest and highest pitch, original pitch, pan position, and Velocity range. Click on the Sample field to insert a sample; you enter most parameter values by typing them into their appropriate fields, but you can enter pitch data by clicking on the field and playing a note on your MIDI controller. You can also copy and paste data between fields.

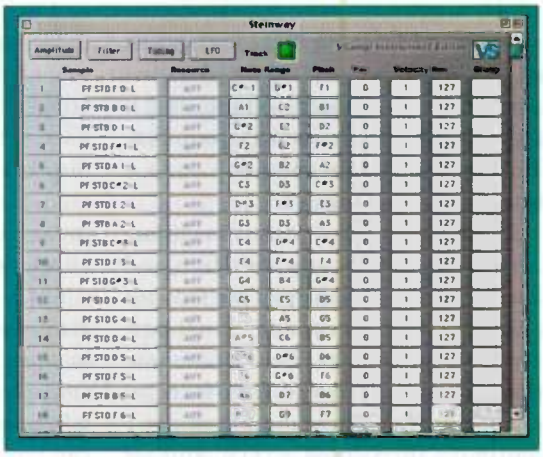

FIG. 11: Looking more like a spreadsheet than a musical instrument, *VSamp* delivers a lot of sample-playback functionality for an affordable price.

At the top of the Instrument Editor is a checkbox for Track, which allows all the Instrument's samples to change pitch in response to MIDI notes; uncheck it for unpitched drum samples. Amplitude, Filter, Tuning, and LFO buttons open another window each. The Tuning window lets you specify pitch offsets and pitch-bend range. The LFO window supplies four knobs for setting frequency, mod-wheel depth, and the amount of pitch and filter modulation.

OPEN WINDOWS

An AHDSR envelope is displayed graphically in the Amplitude window; view or enter values for each stage in five corresponding fields. Two knobs determine how the envelope responds to Velocity and Expression (CC 11). You can assign an amplitude envelope to either an entire Instrument or one sample at a time.

The lowpass filter has six knobs: Frequency, Resonance, Pitch Mod, Velocity Mod, Breath Mod, and Gain Trim. Click and drag to change their values or type in the corresponding fields. Values entered in the Filter window are applied to the whole Instrument. Regrettably, the filter has no envelope control.

The Bank Editor window contains a list of a total of 16 Instruments that you assign to MIDI channels and audio outputs. (Unless you're using *VSamp VST*, your only audio output is Output 1, the Sound Manager.) You can assign as many as four Instruments to the same MIDI channel. Add Instruments to a Bank by clicking on an Instrument field and selecting from a list in the file dialog.

When the Keyboard window is open, you can play notes with your mouse and play a range of 14 notes from your computer keyboard. Unlike onscreen keyboards in other virtual samplers, *VSamp*'s keyboard can't be used to specify key ranges while you're editing Instruments.

You can download trial copies of *VSamp* and *VSamp VST* at www.kagi.com/smaug/vsamp/. After paying a registration fee and obtaining an authorization number, you'll receive access to the *VSamp* FTP site, which has more than 160 MB of downloadable *VSamp* instruments and samples.

EM *associate editors* **Dennis Miller** *and* **Geary Yelton** *have been sampling everything in sight for the past three months and will be giving their computers a much-needed vacation soon.*

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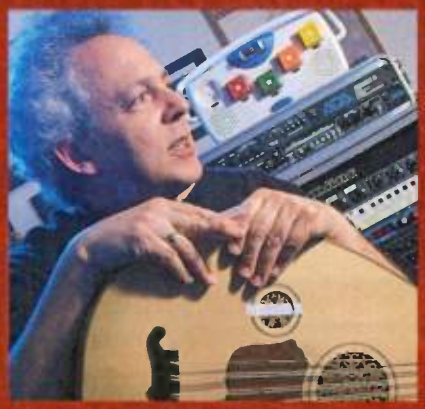

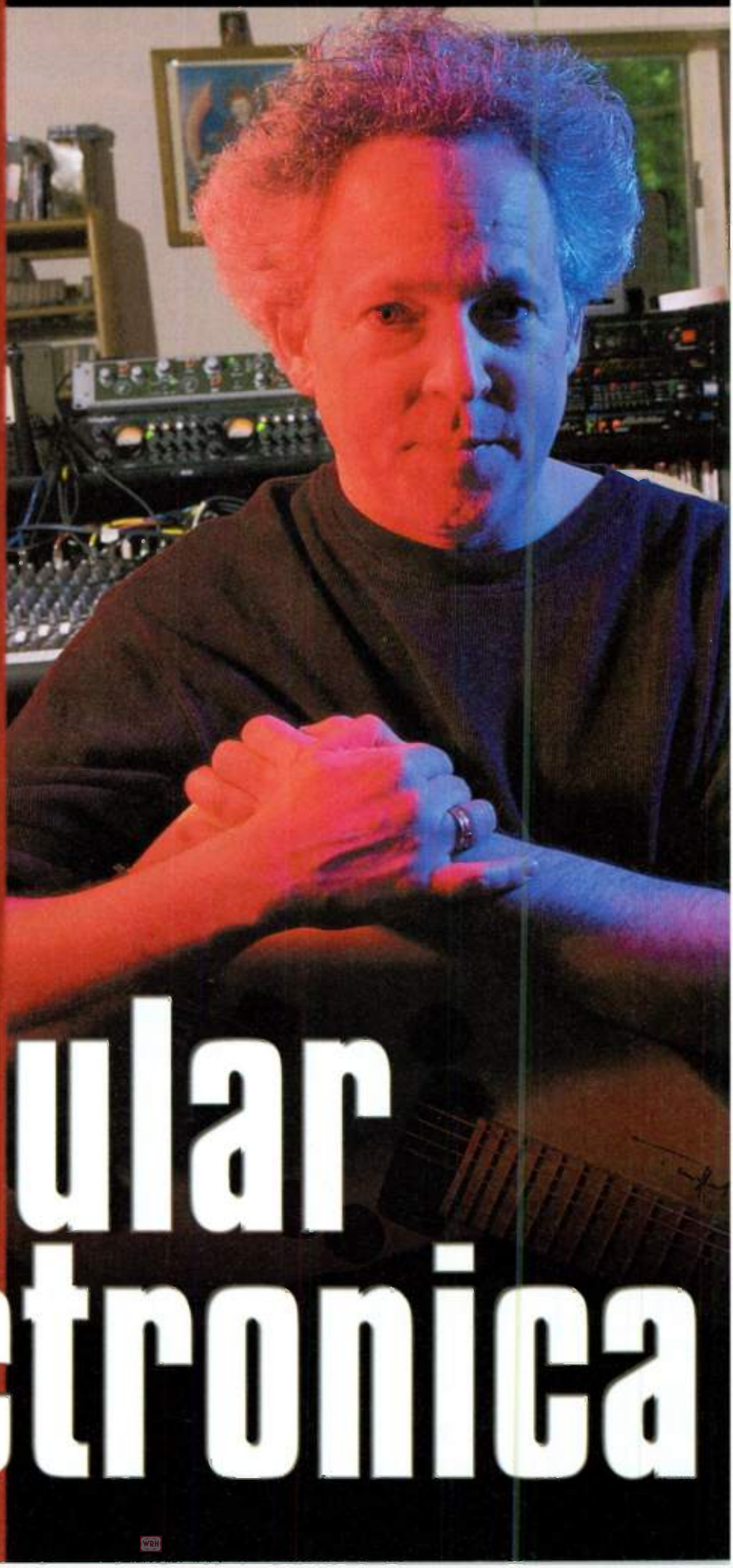

Cellular Electronica

PRODUCTION VALUES

David Torn's electronic noises spread far and wide from his home studio.

Veteran guitarist David Torn is busier and more widely heard than ever, contributing to albums, film soundtracks, and sample CDs. In many ways, Torn is a textbook electronic musician: he uses technology in creative, sophisticated ways and makes a living as a recording artist, sound designer, composer, and producer. Moreover, he works in a personal studio, Cell Labs, which he built at his Bearsville, New York, home in 1993 to accommodate his projects.

Torn's 30-year career is driven by his passion for adventurous, improvisational, left-field music. In pursuing that passion, he pushes the limitations of his gear. His musicianship and mastery of technology are broadly appreciated in the music industry and have always opened doors for him.

During the 1970s, Torn established himself in jazz-fusion and art-rock circles. His album catalog spans the '80s and '90s, and his solo efforts include *Cloud About Mercury* (1986), *What Means Solid, Traveller?* (1996), and *The David Torn Collection* (1998). Torn has also collaborated with Mick Karn, David Sylvian, Me'Shell Ndegéocello, Will Calhoun, Jan Garbarek, Tony Levin, Ryuichi Sakamoto, and k. d. lang, among others.

Torn produced his latest solo album, *Oah*, in Cell Labs and released it under the identity Splattercell on his Cell Division label last year. Torn devised the new name to distinguish his foray into electronic music from the progressive jazz-fusion style that defined his earlier career.

By Matt Gallagher

Photos by Randi Anglin

Cellular Electronica

Torn's brand of sonic mayhem has become a hot commodity in Hollywood. He helps noted composers score major releases, and his recent credits include *Traffic, A Knight's Tale, Three Kings,* and *Heist.* Torn also works with Human, a New York–based collective of Clio Award–winning composers. Torn's edgy, iconoclastic sounds can also be found on sample CDs by Q Up Arts *(Tonal Textures* and *Pandora's Toolbox)* and Sonic Foundry *(Textures for Electronica and Film Music).* A double-CD set for Q Up Arts is in the works.

At the root of it all is Torn's fascination with loop-based music. One could say that Torn is a pioneer in that genre. In the early '80s, he assembled a guitar-looping rig that he still uses today. It consists of two devices for looping guitar or any other instrument (including voice) and a rack of gear for processing those loops.

"Before I built this studio, the thing that interested me was the idea of treating audio data as people were treating MIDI data," Torn says. "When the opportunity arose to do it in an economically feasible way, I just jumped right in." These days, Torn routes the output of his looping rig into Emagic's *Logic Audio* on his Mac G3 to create what he calls "rhythmically organized materials," or *cells,* that serve as building blocks for his music.

Interestingly, Torn was once disenchanted with electronic music. "Many years ago, I had completely given up on anything MIDI," he says. "There was a dangerous moment with MIDI when everybody used the same sounds, grooves all felt the same, and people were making music to fit into a particular box."

However, Torn finds that today's electronica is fresh and inventive. "I'm enthused by Squarepusher, Aphex Twin, Amon Tobin, Talvin Singh, and Boards of Canada," he says. He adds that electronica "often comes from a forward-looking source, and then, all of a sudden, it's deep in the pop culture. TV commercials are musically more creative than anything you hear in film these days. I'm waiting for the next mind-blowing drum record, whoever makes it. Right now the technology is so wide open that I look forward to hearing more original music."

Torn graciously took time out from his busy schedule to discuss Cell Labs, the creation of *Oah,* his tracking methods, his looping rig, and his television and film work.

Looking at your list of credits, I can see that you have worked on an impressive number of projects in the past year alone.

We actually hit upon the single most active period of my career as a musician. I'm a working maniac. So many things are happening, and it all feels so good. I've taken to working in my project studio. The greatest thing that I did for myself and that a record company [CMP] did for me was to help me build this room in 1993; there's no going back now. I often do sessions for other people here—including big films—and I just don't leave home. *[Laughs.]* I'm very tool oriented and have been since day one. My abilities as a musician are more conceptual than skill oriented. I never considered myself a great guitar player and still don't. My skill has always been more sonic or textural. I feel good about using the studio as a barrier against outside pressures to create within certain boundaries. It's a positive thing to make music that is different from anything else around, that is personal. That's been the focus around here.

Is Cell Labs a room within your house?

No, it's separate from my house. We have a garage that is something like 46-by-22, and I commandeered a space that's about 16-by-22 within it. My big window looks out into the forest behind my house.

Is Cell Labs tuned?

Not at all. It was not designed acoustically; it's just a box, and I do whatever I can in here. There's a very small sweet spot for monitoring playback. If you play drums or electric guitar in here, it's pretty overpowering, and you have to work hard to control the sound because the room sings a little bit.

Taking that into account, how do you mic drums?

I pick two microphones and either have them on the sides of the kit—if they're matched microphones—or use an overhead with something placed a little bit higher than the bass drum and about a foot and a half to two feet away from the bass drum. In my room, it might be better to use more microphones so that you

Torn works on most of his recording and sound-design projects in his home studio, Cell Labs, a modest space in his garage.

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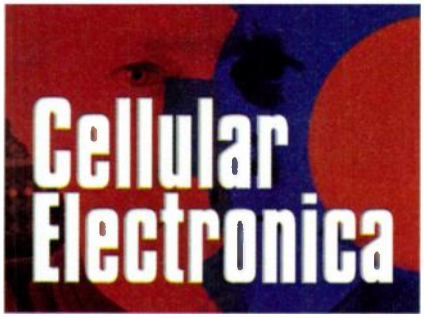
Top photo: Extasy Studios, North Hollywood, CA courtesy of Gibson, Inc.



get more detail and less of the room, but I've made a lazy man's decision to make the best out of the warts in the sound. I don't believe that you need a $3,000-a-day room with fully vintage equipment in order to get sounds that are musical.

So you believe in making the most with what you have?

Yeah! There are some strange and varied arguments for it. They run the gamut from Bruce Springsteen's *Nebraska*, which a lot of people feel is his most moving work ever, recorded on a 4-track cassette machine, to some of the great records of the hip-hop world. You have the Squarepusher paradigm, where there's a guy with an [Akai] MPC2000 and an Atari computer making some of the most incredible sounds in 15 years. I like to make the music feel like it's moving forward and not getting trapped in technical details. I'm an engineer's nightmare, I am. *[Laughs.]*

How else do you get drum sounds?

On basses and drum kits, I often use the dbx Subharmonic Synthesizer to get some tone out of that stuff that hangs between 38 and 50 cycles, because I like that impact. I listen on Genelec 1030As, and they tend not to reproduce those frequencies very tonefully, so I end up using the Subharmonic Synthesizer, which is the bane of my mixes when I take this stuff to a mastering engineer. We have to roll off the frequencies between 38 and 42 cycles because I've overdone it. Sometimes it starts masking the actual fundamental tone in the frequencies that are in the hundreds. I like that big overhyped bottom that's in a lot of dance tracks.

How do you mic guitars?

I record almost all electric guitars direct to disc. My Rivera amp head feeds an ADA Ampulator, which feeds the guitar rack, and the rack's outputs feed an ADA Microcab II. When I do use microphones, I use the [CAD] E-200 and attempt to get it as close as possible off-axis to the speaker. I usually move the microphone around until the capsule starts to shut down a little bit. It's either the E-200 or a Shure SM57, which I don't do the capsule-breaking trick with. One other microphone of choice is a Sennheiser 441, and that's it. In a big room, I will ask for ribbon mics as ambient mics if I have the opportunity. But in my own studio, I almost never use microphones—not for electric guitar. At the volume that I like to play guitar, I would drive my neighbors insane at five o'clock in the morning, not to mention the fact that my wife would have left me many years ago. *[Laughs.]*

In 1999 you completed *Oah*, a fierce electronic tour de force that you concocted within *Logic Audio*. How did you conceive it?

I work with music on a cellular basis. I use live looping to improvise textures, rhythms, or riffs, and I document them all. I set up inputs to a DAT or the computer and just let the playing side of me flow. I do the same thing when I'm working on samples that I'm creating on the computer. I've been working with live looping for so long that it has become more focused, working with what I call cells. I'm not one to take samples and use them verbatim. I usually mangle things pretty deeply. It's like mixing very disparate ingredients and trying to make them work together. When I sense a compositional role for something, I will work my ass off to make things fit together.

When I have an inspiration, I want my first reaction, so I move very quickly. Then, I listen to things over and over again before I'll play something, and in that listening process, I work on minutiae within the piece itself. I'll do stupid little things like move sliding rhythms around against each other, put delays on certain rhythms, or maybe program a synth. It's in service to the fact

that eventually I'm going to play on top. It's an odd attitude, but I think that it serves my ability to capture my own spontaneity. It doesn't matter to me if that spontaneity is noticeable to the end listener, but it's important for me to know that it's there.

This Splattercell thing is all over the map. The source material comes from different places. I'll give you a couple of examples. [Drummer] Matt Chamberlain was in town working on a record. He set up a bizarre little kit in this tiny room, and we put up two mics. I'd throw ideas at Matt; he would play; and I would process him live straight to DAT through fuzz boxes, wah-wah pedals, and stuff. After Matt split that day, I began to organize these pieces. As the album was falling together, I would see if I could find something from Matt's material that would suit the tunes. Then I would start chopping, splicing, and audio-mangling stuff until the tracks fit, either as overdubs or as beds.

On the other hand, I had Geoff Gordon do some stuff on a gubgubbi [a one-string percussion instrument from Bengal] and other Indian and Middle Eastern percussion instruments. He was in San Francisco, so I sent him to Kit Walker's studio up in San Rafael, California. I told him, "Do your recording in *Logic Audio*, and here are the tempos." I e-mailed him a list of feels, and he sent back 600 megs, following my loose directions. Then I did the same stuff with his material as I'd done with Matt's. For example, track 5 ["Busy Cutting Crap"] has this wonderful gubgubbi track in it that I processed, chopped up, and reordered like you might do in [Propellerhead's] *ReCycle*, except I don't use *ReCycle*. Kit did a good job of recording Geoff. I told Kit not to worry about it too much because everything was going to pass through some mangling; just make sure that the phase of the stereo tracks is coherent. Massive bands of frequency won't disappear in mono because, as you may or may not know, that's the way I listen, in mono.

Torn plunged into electronica with his debut as Splattercell in 2000 on his Cell Division release, *Oah*. Torn recorded most of the album in his home studio on a Mac G3.

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Cellular Electronica

100 percent deaf, so I'm sensitive to phase and phase relationships. I listen on near-field monitors that are pretty close together in stereo. Everything in my recordings that's in stereo is imagined in my head. I often have people, like one of my kids or my local friends, come by, and I say, "Does this seem pretty centered to you?" *[Laughs.]* I'm really careful about this stuff because I only hear in mono.

Track 9, "Chrysanthemum Bang," was a collaborative effort. How did it come together?

That was me, Zack Alford the drummer, and [bassist] Fema Ephron just jamming in a local studio, Applehead, live to 2-track. It was all improvised. There were a couple of great riffs, so I pulled them off the DATs. I liked this one set of grooves that we had played, and I slowed it down by about 40 percent. I processed it, chopped it up, formed it into a tune, and started overdubbing.

Torn's sound originates with this specially designed looping rig, which includes a modified Lexicon PCM 42 and an assortment of effects pedals and processors.

I credited [drummer] Abe Laboriel Jr. with the samples of his that I used because, well, it's respectful to do so.

My intention is to inject some organic materials played by skilled players with a lot of feeling into what we've begun to call electronica. I love hearing the technology used and abused, but for me, it needs to have people playing; it needs to feel like there's some sweat and some crap in it. Having the root of the cellular data be somewhat organic continues to be important to me because I've done a bunch of purely electronic things, and they often feel like they're missing something, something visceral.

Another example of this is the tune "Is Love," which was drummer Dean Sharp and I in this room together. He was playing a Taos drum kit, and I was playing this little Scandinavian pump-organ thing that I have. There was no microphone set up, so I turned on an Olympus microcassette recorder, which I always keep around, and recorded what we were doing. Within *Logic Audio,* I began to overdub a synthesized bass. I put a vocal in, and there are some scrunchy guitar textures.

When you process live tracks, do you look for something specific to build on, or do you accidentally discover things that work?

An improvised guitar solo on track 7, "A Dozen Books to Break the Fall," was pretty processed to begin with. I liked the feel of it, but I thought it wasn't fitting in. I used a rather severe automation process on that solo because I felt like the processing should flow in the same way that the solo itself flowed. I wanted the processing to match the music rather than say, "Put this plug-in on here" without any motion at all. I processed it in [Arboretum's] *Hyperprism* using automation within *Logic Audio.* Once I had done that and bounced the file, I threw it into [U&I Software's] *MetaSynth* and did some odd filtering on it to soften the blow, because it was a pretty harsh solo. The ring modulator/pitch changer that I used in *Hyperprism* created some jarring effects that were too jarring for the tune, so I used *MetaSynth* to soften the blow.

Your guitar-looping rig is at the root of your music, and you haven't yet touched on that. How do you typically process sounds?

The looping thing starts with an actual playing event. I have a number of instruments that I built myself, and they all have an optional output to the same processing devices. I have the option for other input devices: a microphone for feedback, microcassette recorders, radios, clocks, an analog drum machine from India. All kinds of odd devices are input through the same system. I can make a series of loops live without anybody hearing them, including myself, until I fade them in with pedals.

I might use some feedback. I may insert harmonica notes, my voice, or a different instrument, like a pedal steel—generally in real time, all in the same running loop—while I'm listening to a track or a click or watching the picture. I put the stuff into the computer and start tweaking further. It's hard to describe. They're improvised loops that I process like crazy.

I understand the rig has evolved during the past 15 years or so. Please describe it and how it works.

I have a very strange guitar setup: odd footpedals and even odder ways to make sounds on the guitar manually, in addition to the footpedals. There's a send from the guitar to an outside rack with two live looping devices: my old standby, which is a modified Lexicon PCM 42, and an unmodified Oberheim Echoplex Digital Pro. The PCM 42 was originally modified for me by Gary Hall to have more looping memory than the stock units. The PCM 42 sounds wonderful. You can alter the pitch using voltages, and it's nearly impossible to do anything of a recognizable rhythmic value. I approach it quite differently than the Echoplex, which is deadly for rhythmic looping.

TORN ON THE WEB

www.groups.yahoo.com/group/davidtorn
The David Torn Discussion List is a mailing list for Torn fans.

www.gaalore.com/davidtorn
Solid States includes news, articles, and a trading post for his recordings.

The loops are then processed by a Lexicon PCM 80, an Electrix Filter Factory, a Waldorf filter, and a Korg Electribe ES-1—it could be one or all or none of these things. I also have a Big Briar Moogerfooger pedal that processes the output of the loops. All of these processing devices are in a separate rack with a mixer that has a single stereo output. I control the sends and returns of the looping devices and processors so that I can make a mélange of two or three loops, process them all

differently, and set up feedback loops. That's what goes to all of the sessions. Sometimes the computer comes along, too, because people like the postprocessing thing. I can also do certain things in real time on the computer that are pretty interesting, especially with VST plug-ins and *Logic,* but specifically with some really screwy ensembles that I've built in [Native Instruments] *Reaktor.* My favorite program for the Macintosh is *Reaktor,* not only because of its ability to manipulate live input and samples but also for its ability to design your own sound generation.

Additionally, I can step sequence the output of the PCM 42 into the Korg. I can step sequence a gating effect so that what was once a completely ambient and nonrhythmic event can then be step sequenced live and then synced to a computer or to the Oberheim Echoplex Digital Pro, for example, which is my rhythmic looping device. It's a strange system. I rewire it every time I'm going to do something. It's a five-space rack with a lot of stuff on top.

Plus, I have the pre-beta version of the Electrix Repeater here, which I've been involved with for six to eight months now, and that's pretty exciting. It will become my featured looping device. With the Repeater, you can actually improvise a loop at the beginning of a session or a gig and then recall it at the end—at a different pitch, in a different time signature, and at a different tempo.

This rig has held up after all these years on the road?

Oh yeah. I started touring around '82 or '83, so it's banged around quite a bit. It hasn't altered that much over the years, funnily enough. All of the devices have changed except for the two Lexicon units, although the PCM 80 used to be a PCM 70.

Tell me about the film projects that you do.

I'm happy creating and working for people like [composers] Carter Burwell, Ryuichi Sakamoto, Howard Shore, Cliff Martinez, Pete Nashell, and Teddy Shapiro. Carter does a broad range of scores—really beautiful ones like *Kalifornia* or *The Chamber,* in which I'm mostly playing acoustic guitar. Carter wanted the acoustic guitar with all of the live processing that I track as a part of the sound so that the guitar would better meld with the orchestral parts. I would also texturalize the sound and do some live looping that would help marry that sound even further—the orchestral sound with this very sweet, low-volume acoustic guitar. Again, every situation is different. With Sakamoto, it's so far been all about noise and improvising to things that are completely written.

Often, some percentage of what I play for another composer is written, but it seems to be an increasingly smaller percentage. I'm not just a guy who creates ambient loops—I can read a score; I can see where the chord movements are; and I'm technologically proficient enough to get what might normally be a static, looping ambient texture to change keys along with the arc of a picture and score.

How do you contribute to a film score?

Every film has its own life story. Take *Traffic,* for example. [Director] Steven Soderbergh used a temporary score with Brian Eno tracks. Cliff Martinez called me and said, "How do I do this? It looks great, but it's not my style of writing. Jeff Rona said I should call you." Cliff sent me the script and some scenes from the picture. I would look at the picture; then, we'd talk about some specific elements that he needed and what kind of key signatures or chordal movements he wanted—but more in an emotional, painterly way than in a specific way. I looked at the picture with and without the temp score and started working here at home. I provided him with 400 or 500 megs worth of materials that I thought looked really good with the film, and he started using them as building blocks. He sent me a couple of cues that he asked me to overdub on, which I did here—again, using the guitar-based loops and some more extreme things that were based on guitar loops. I was to go to Los Angeles and finish everything up out there with him, but as it turned out, everybody was happy with the way things were going, so I kept working here by myself. Every film is different.

There is no longer a clear line between sound design and music. I think that's good. It represents a maturity in the installed listening base in the world; we expect to hear textural movement in our sonics, even if they're behind a piece of music that is somehow more classically composed or a song that has a standard pop structure or whatever. I think that's one of the reasons why I've become sort of in demand in the film world—I cross the boundary myself.

***Remiksis: Ah* is an album of *Oah* remixes by Charlie Clouser, Dan the Automator, Gareth Williams, Ryuichi Sakamoto, Tim Bowness, and others.**

You've also produced recording artists such as Tim Berne, Mick Karn, McKinley, Andy Rinehart, and Douglas September. How do you handle your role as record producer?

Most of the people whom I work with as a producer are independent, so we're always dealing with budgetary constraints and time constraints, which are good. Sometimes people should kick their own asses to get something done. I didn't mean to be an engineer; it's certainly not my forte! When you're as tool intensive and as sonically oriented as I am, the lines begin to blur between what is engineering and what is composition and arrangement.

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DIGITAL-AUDIO INTERFACES
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MOTU 2408 hard-disk recording system

GUITARS, STRINGED INSTRUMENTS, AND AMPLIFIERS
Baglama saz from Turkey
Crews Maniac Sound amplified guitar
Fender Mini-Strat (high-strung; manufactured in Japan and no longer in production)
Fender Mustang (1965 model)
Gibson ES350T (1957 model)
Ithaca Stringed Instruments (2) acoustics
Kapa Continental (1965 model)
Kikuyaes (with homemade motorized bowing bridges)
Klein electrics (2)
Magnatone lap steel
Najarian electric ouds (2)
National Delphi
National Resonator (1992 model)
Rivera M100 amplifier with compensated line-out
Sho-Bud pedal steel
Supro lap steel
Teuffel Tesla custom electric
Tokai Strat with Veillette Baritone neck

MICROPHONES
Astatic Model G crystal mics (2)
beyerdynamic M 500 ribbon mic
CAD E-200 condenser mic
MadCat SaltShaker crystal mics (3)
Shure KSM32 condenser mic
Shure SM57 dynamic mics (2)

MIDI INTERFACE AND PATCH BAY
MOTU MIDI Express interface/patch bay/synchronizer

MONITORS
Genelec 1030A powered monitors
Bose car-stereo system (for critical listening in his car)

OUTBOARD PROCESSORS
ADA Ampulator tube power amp/speaker-cabinet emulator
ADA Microcab II stereo-miked guitar-cabinet emulator
Big Briar Moogerfooger MF-102 ring modulator
Boss EV-5 expression pedals (3)
Digital Pro with software by Aurisis Research
DigiTech VCS-1 tube compressor
DigiTech DHP-55 digital harmony processor
Electrix Filter Factory analog filter
Electrix Repeater loop-based digital recorder (beta version)
Guyatone FB-X Funky Box
Guyatone MD-2 Micro Digital Delay
Guyatone WR-2 Wah Rocker
Lexicon LXP-15II multi-effects processor
Lexicon PCM 42 digital delay processor (modified by Gary Hall and Bob Sellon)
Lexicon PCM 80 digital effects processor
Lexicon Reflex digital reverb
Mesa/Boogie Formula tube preamp
Oberheim GM1000 guitar processor
Oberheim/Trace Elliot Echoplex
Olympus varispeed microcassette recorder
Prescription Electronics Experience effects pedal
Prescription Electronics Throb effects pedal
Prescription Electronics Vibe-Unit effects pedal
Retrospec Squeeze Box electro-optical tube compressor/limiter
Sony varispeed handheld cassette recorder
TC Electronic 12-stage phaser
TC Electronic Sustainer
Visual Volume pedal
Waldorf MiniWorks 4-pole filter
Z-Vex Fuzz Factory effects pedal
Z-Vex Seek Wah effects pedal

RECORDERS AND MIXERS
Ashly MX-508 mixer (modified)
Mackie 24-8 mixer
Otari OTR 8-S DAT machine
Rane SM82 mixer (modified)
Tascam CD-RW5000 CD recorder

SOFTWARE
Arboretum *Hyperprism* multi-effects plug-in
BIAS *Peak* digital-audio editor
Cycling '74 *Pluggo* VST plug-ins/patch converter
Emagic *ES1* software synthesizer
Emagic *EXS24* software sampler
Emagic *Logic Audio Platinum* digital audio sequencer
Emagic *WaveBurner* CD-burning software
MDA plug-ins (freeware)
Native Instruments *Reaktor* software synthesizer/sampler
Prosoniq *NorthPole* resonant-filter plug-in
Sonic Foundry *Acid Pro* loop-editing software
Sonic Foundry *Sound Forge* digital-audio editor
Sonic Foundry *Vegas Pro* multitrack media editor
TC Works TC Native Bundle plug-ins
TC Works *Spark* digital-audio editor
U&I Software *MetaSynth* sound-design software
Waves Gold Native Bundle plug-ins

SYNCHRONIZER
MOTU Digital Timepiece

SYNTHS AND SAMPLERS
Alesis SR-16 drum machine
Clavia Nord Lead 2 synthesizer
dbx 120XP Subharmonic Synthesizer bass synthesizer
Korg ES-1 Electribe-S Rhythm Production Sampler
Optigan optical sampler
Riyaz Master Pro tabla machine
Roland S-760 sampler

OTHER INSTRUMENTS
Capri Air-Organ
Kotar (homemade)

You recorded a Douglas September album [*Oil Tan Bow*, available from amazon.com, cdbaby, and douglasseptember.com] at Cell Labs and encountered some problems with the sound in your studio. Tell me about those sessions.

Douglas is a singer-songwriter from Canada whom Michael Shrieve introduced to me. Douglas's singing is somewhere between Bob Dylan, Tom Waits, and Don Van Vliet—Captain Beefheart. Douglas and guitarist Robby Aceto wanted to make a live record, but my studio is not set up for that because it's only one room. I was the engineer and the producer. I'd rather be the producer and not so much the engineer, so there are some really amazing flaws in the recording, some of which I fixed, and some of which I didn't. *[Laughs.]* I mixed it in a couple of days.

How did you make September's live tracks work?

I just make do with what's around. Robby was playing a hollow-body Kay electric guitar through my direct-to-tape rig going straight to the computer. On one song, just for a hoot, I put a mic on Robby's guitar. Douglas was sitting next to him with a mic on his voice and one mic on his acoustic guitar, banging his foot on the floor, singing, and playing with the most extreme dynamic range. Naturally, there was all this bleed from Robby's guitar into Douglas's mic; there was no way around it. I was listening to the bleed into Doug's mic. On a lark, I muted Robby's direct-to-tape tracks for the beginning of the tune, and it sounded like he was playing a nice old National guitar. The bleed of Robby's guitar into Doug's vocal mic created a nice space, or air, around Doug's acoustic sound. So for the entire beginning of the tune, I didn't use the electric guitar at all. At some point in the middle, the electric guitar crept in and then exploded.

I love when stuff like that happens and it's serendipitous. When you're trying to capture somebody's inspiration onto a recording medium, it's so valuable to be open to things. It's just like improvising when you're playing. Sometimes the best things that happen when you're playing are train wrecks. You think, "This can't possibly be worth anything." Then you go back and listen, and that's the best moment. The happy-accident paradigm, I think, is not to be dispensed with. That's maybe what makes some music great for longer periods of time. I probably won't listen to a Christina Aguilera record ten years from now. There's nothing wrong with it; it's just very controlled within boundaries that are rather narrow. I learned something working with my friend [producer] Craig Street: never let a moment go by in the studio that isn't recorded. I don't want to miss what happens with players if I'm producing, nor with myself if I'm playing. I just let it roll constantly, and then if I want to use the DAW, I'll edit it later.

I'll bet that those pleasantly surprising moments are what inspire you to go out to your studio every day.

Absolutely. These things make me feel enthusiastic, yet I know that it can all slow down. In a year, you might not be in demand, and you'll have to be extremely resourceful to try and get around those moments. That's why an insane person like me will do things like make sample libraries. I'm not just a guy who plays stringed instruments anymore: I'm a programmer; a remixer; a producer; a sample-library dude; and a guy who plays improvisational gigs in New York every couple of months for no money at all, just to do it. I try to get involved with manufacturers on new products that I think will help keep the progressive side of music actually progressive in some small way.

In the past couple of years, I have noticed that looping is sort of a hip thing to do. The kids think it's cool, and everybody does it. All of a sudden, there are magazines about looping and pieces of software like *Acid* or the new thing from Cycling '74, *Radial*, or boxes like the Repeater, which is an incredible breakthrough. It's pretty hip right now. For a guy like me, it's like, "Finally!" It's taken a while, but it's exciting to be active in some of this stuff. I'm planning on staying here for a while as well.

Matt Gallagher *is an assistant editor at* **EM**, Onstage, *and* Remix.

We welcome your feedback. E-mail us at emeditorial@primediabusiness.com.

DAVID TORN: A SELECTED DISCOGRAPHY

SPLATTERCELL

Oah (Cell Division75/Ark, 2000)
Remiksis: Ah (Cell Division75/Ark, 2000)

DAVID TORN

Cloud About Mercury (ECM, 1986)
Tripping over God (CMP, 1995)
What Means Solid, Traveller? (CMP, 1996)

COLLABORATIONS

David Sylvian, *Secrets of the Beehive* (Virgin, 1987)
Mick Karn and Terry Bozzio, *Polytown* (CMP, 1994)
k. d. lang, *Drag* (Warner Brothers, 1997)
Chocolate Genius, *Black Music* (BMG/V2 Records, 1998)
Ryuichi Sakamoto, *Discord* (Sony Classical, 1998)
Me'Shell Ndegéocello, *Bitter* (Warner Brothers, 1999)
Tony Levin, Chris Botti, and Bill Bruford, *B.L.U.E. Nights* (Papa Bear/DGM, 2000)
Ryuichi Sakamoto, *Cinemage* (Sony Classical, 2000)
David Sylvian, *Everything and Nothing* (Virgin, 2000)
Robert Creeley, Chris Massey, Steve Swallow, and David Cast, *Have I Told You All You'd Thought to Know?* (Cuneiform, 2001)

PRODUCTION CREDITS

Mick Karn, *Bestial Cluster* (CMP, 1993)
Tim Berne, *The Shell Game* (Thirsty Ear, 2001)

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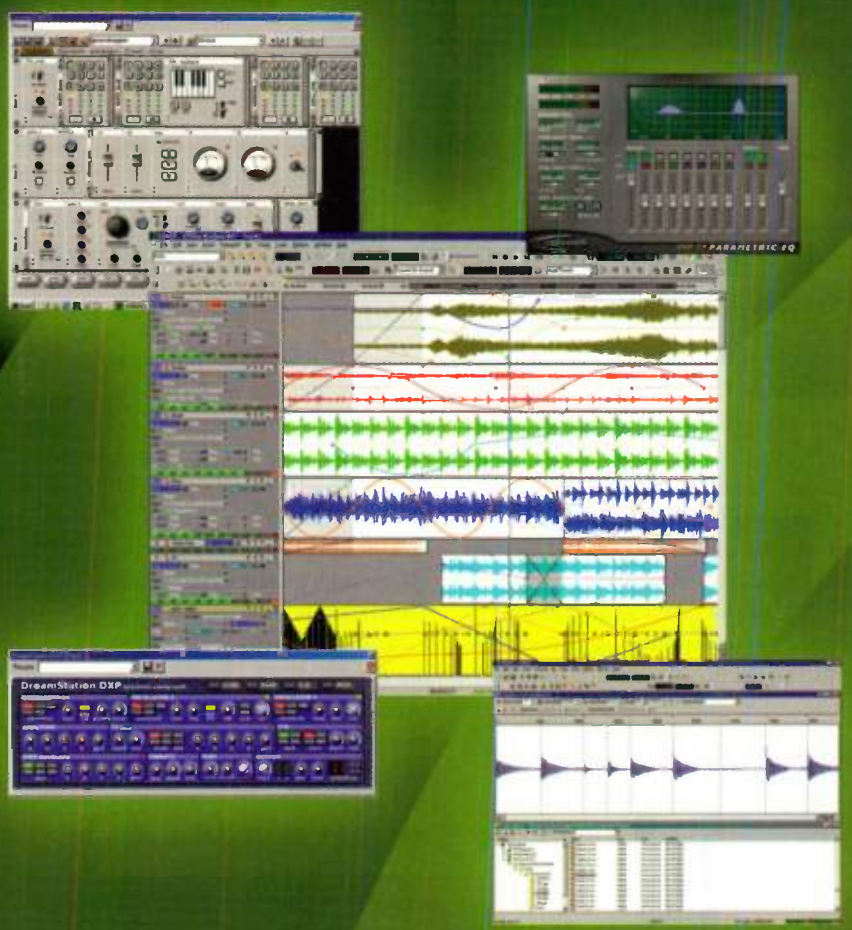

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DESKTOP MUSICIAN

Mac OS X for Musicians

A new operating system—and what it means for desktop musicians.

By Jim Rippie

If you're a Mac user, you've probably seen Mac OS X in action, but you may not know whether you can truly rely on it for ordinary tasks, much less your day-to-day music-production needs. If you use other operating systems, like Windows, you may be curious about what kind of wrench Apple has thrown into the gears in an attempt to reassert its dominance in the media-authoring platform war.

COURTESY OF APPLE

FIG. 1: Mac OS X forever changes the look and feel of the Macintosh user interface, but it may be some time before native Mac OS X music applications become commonplace.

Mac OS X is definitely alive and kicking. It is already in its fourth maintenance release (10.0.4) as of this writing, and all signs point to a significant release by press time. Apple planned to release version 10.1 in October 2001 and claims that the new version will offer much greater speed and stability. To help sort fact from fancy, here's a look at where things stand now; what the future may hold; and most important, what Apple has done to support a new generation of music-production tools for the Mac.

HISTORY LESSON

Apple didn't make Mac OS X from scratch. Many **EM** readers know the history behind Apple's 1997 buyout of Steve Jobs's NeXT and how the NeXT OS became the basis of Apple's next-generation Mac OS, so it's not worth belaboring here. If you're not up to speed, plenty of background information is available from online resources such as the Macworld Web site (see the sidebar, "Mac OS X Resources"). If you prefer a bit more intrigue, check out Owen Linzmayer's *Apple Confidential: The Real Story of Apple Computer, Inc.* (No Starch Press).

Thanks to its underpinnings as a modern Unix operating system, Mac

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OS X offers most of what experienced computer jockeys expect from a modern operating system: protected memory so applications can't crash one another, preemptive multitasking so computing processes can get attention if they need it, and a more secure environment so users can insulate their data from malicious interlopers.

Stapling a Macintosh façade onto Unix was a lot of work, but it's the prettiest face Unix has ever worn; Apple's plastic surgeons have worked overtime to disguise the scars and install a nice, healthy complexion (see **Fig. 1**). Apple's Darwin project makes the kernel, networking, and other portions of the OS open source and lets Unix developers benefit from Apple's improvements and contribute to its development. Although Darwin doesn't open the source for the Finder (the Mac's file-management interface) or other aspects of the Mac's graphical user interface (GUI), audio and MIDI developers surely will be pleased with the amount of accessible source code that Apple supplies for the core media engines.

KICKING THE TIRES

Every machine that Apple has sold since May 2001 comes with Mac OS X installed, so finding a machine that runs the new operating system isn't much of a challenge. The real challenge comes in finding a machine that runs Mac OS X well, because Apple's meaty OS requires some hefty hardware.

In theory, any Macintosh with a G3 processor or better will do (except for the first PowerBook G3, which isn't officially supported). In practice, users have had mixed results, particularly on the beige G3 tower computers. Whichever model you use, be sure you have at least 128 MB of RAM—according to some, it's not even worth thinking about using Mac OS X unless you double that amount. Mac OS 8 or 9 may run smoothly on your current machine, but Mac OS X raises the bar; a 500 MHz Titanium PowerBook G4 with 256 MB of RAM should feel ultrasnappy, but it doesn't. (Speed should improve significantly with Mac OS X version 10.1.) You may need to adjust your expectations accordingly.

Overall, your first Mac OS X experience shouldn't be overly jarring, although it won't be without a few speed bumps. Apple clearly made an admirable attempt to redefine the user experience on the desktop. Mac OS X seems remarkably different from earlier OS versions, yet it's reasonably easy to use after you get past the colorful widgets as well as things that blink, slither, and wriggle (see **Fig. 2**).

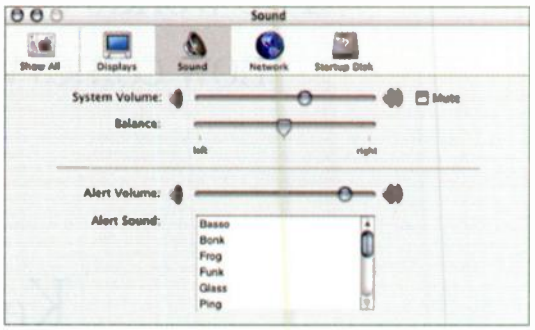

FIG. 2: If you're looking for places to configure your audio and MIDI in the system (in 10.0.4), look no further than the Sound Preferences dialog box. Seriously—that's all there is.

What may be less obvious at first is that Mac OS X probably won't run any standard Mac applications in your library, at least not in the ordinary sense. Apple provides a special compatibility mode called Classic for legacy applications; it essentially runs Mac OS 9.1 as a layer inside Mac OS X. (The included version of 9.1 is optimized for use with Mac OS X.) If you have used Connectix *Virtual PC*—which emulates, in software, a PC running Windows on a Mac—you're familiar with the principle. The Classic layer gets along reasonably well, though not perfectly, with native Mac OS X applications. The screen may occasionally redraw oddly, and the Classic layer occasionally hangs (or fails to start properly), but those kinds of problems have been a part of Mac OS life for years, and Mac OS X is still relatively new.

SOUND OF SILENCE

Everyone can live with a few glitches, but Mac OS X presents Mac musicians with a serious obstacle: hardly any music products work with it! Most of the usual combinations of applications and software drivers used to integrate audio cards and MIDI devices with applications don't run properly inside Mac OS X's Classic mode.

Even Sound Manager, the basic audio component built into the system, proves to be too problematic for serious editing and recording. Time spent going through contortions to get it to work is probably better used making music in OS 9. So what's a Mac-based desktop musician to do?

Sticking with older Mac OS versions has its own hazards—it leaves users standing in the shadow of a Tower of Babel that has existed for more than a decade. Software and hardware developers have largely been on their own in making sure that sophisticated MIDI and audio peripherals work well on the Mac.

For MIDI, users formerly looked to Mark of the Unicorn (MOTU) and Opcode to supply system software components that support MIDI interfaces and integrate MIDI instrument management in Mac OS applications. The risks of having developers alone manage that crucial task became all too real when Opcode shut its doors last year, taking active support of its Open Music System (OMS) software with it.

Audio support has arguably been even more confusing. Confronted with the Mac system's Sound Manager and its latency problems, lack of multichannel compatibility, and inability to handle full-duplex recording and playback, audio companies had to develop their own software interfaces. They did pretty well, creating low-latency audio systems such as ASIO and EASI to implement multichannel audio-card support without requiring a particular brand of hardware. (In fairness, however, ASIO and EASI exist to work around the limitations of Mac and Windows.) Other companies, including Digidesign, took a walled-garden approach that consisted of proprietary integrated hardware and software products for musicians who wanted an extra measure of performance and reliability.

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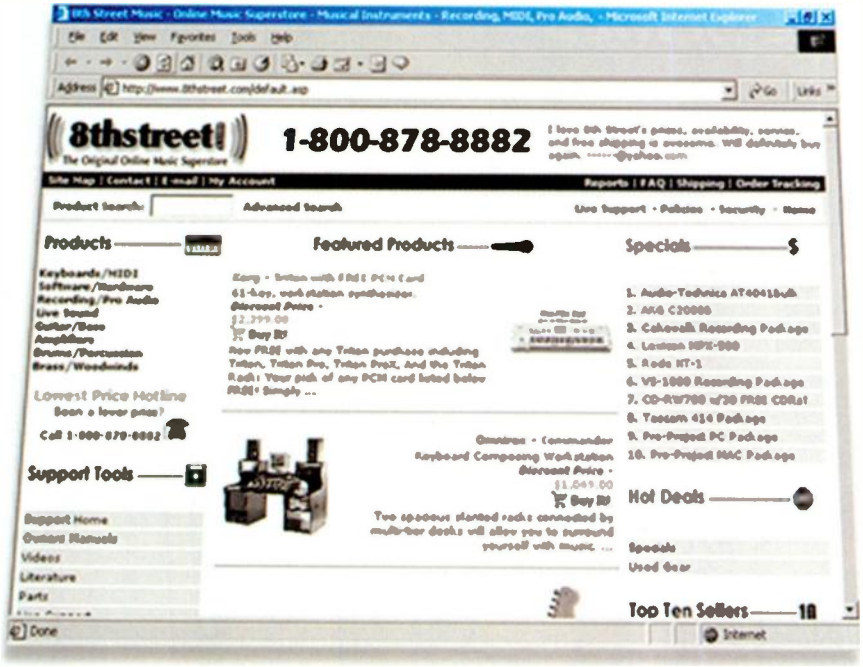

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Plug-ins for software effects were even more befuddling. Unlike Microsoft, with its DirectX format for Windows (leaving aside its particular pros and cons), Apple offered no systemwide software plug-in format. A sometimes bewildering array of mutually incompatible plug-in formats—including Steinberg VST, MOTU Audio System (MAS), and Digidesign Real Time AudioSuite (RTAS)—appeared to fill the vacuum. In general, they worked well, but many desktop musicians wondered why Apple didn't take a more active role.

At the risk of speaking too soon, those days may be over. Rather than make developers re-create the existing Tower of Babel, Apple added significant new MIDI and audio potential to the operating system, apparently taking time to listen to developers and to make smart choices.

ANTICIPATION

You can pick up some interesting clues about where Mac OS X is heading by exploring Apple's developer materials; you'll get the most out of the documents if you understand programming code. In addition, some materials are directly accessible on the Web (see **Fig. 3**), including a PDF called "Audio and MIDI on Mac OS X."

Every CD copy of Mac OS X also includes optional developer materials, so you can open some source files, such as audio.h, and get a taste for what Apple now supports.

MIDI MUSTER

By now it's widely known that Apple hired the MIDI engineering guru behind Opcode's OMS and that Apple is busy wiring a sophisticated system to support multiple MIDI devices and handle interapplication communication. The MIDI support includes highly accurate timing with very low latency; Apple's goal is to get a MIDI event into and back out of the system in less than 1 ms and with less than 0.2 ms inconsistency (jitter).

Apple is also making each Mac OS X machine a high-quality software synth right out of the box. The soft synth is compatible with Downloadable Sounds

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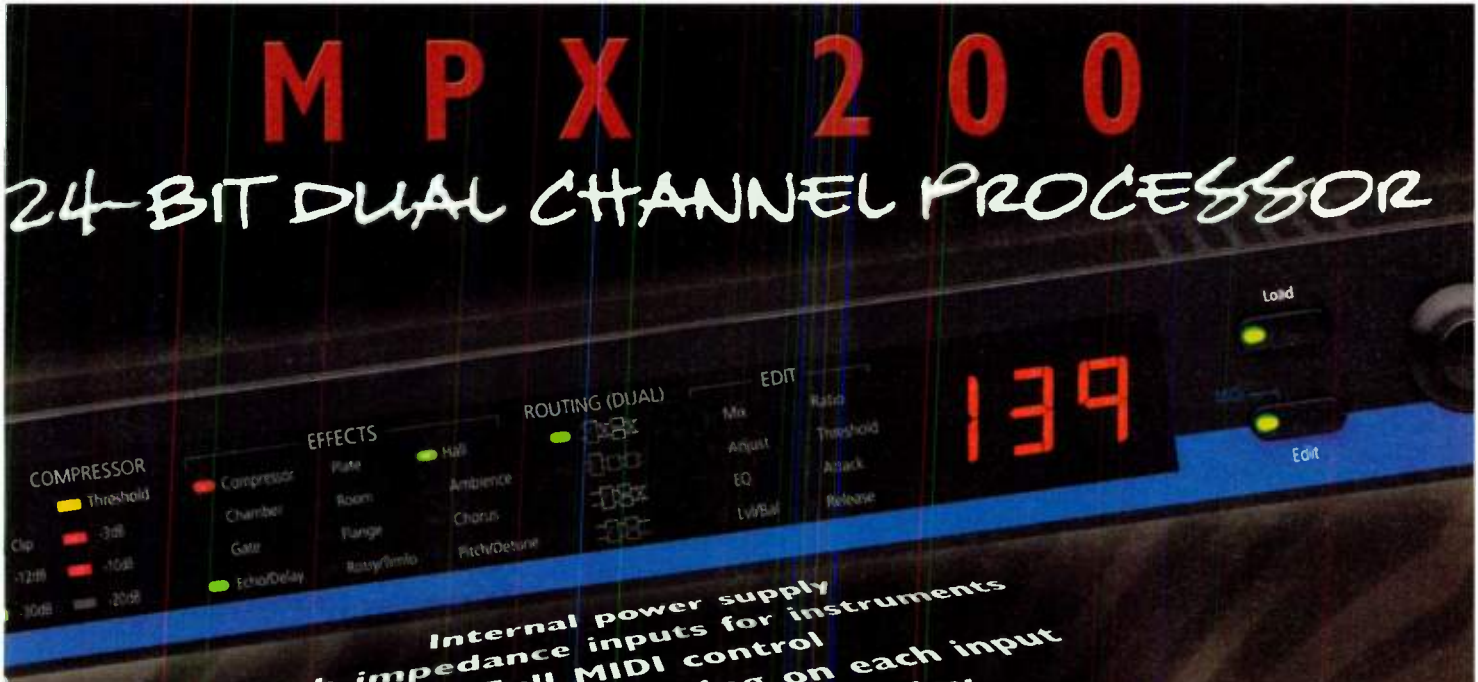

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(DLS2), so it acts more like a General MIDI keyboard or a sampler than a free-form synthesizer. It's no doubt less sophisticated than the high-quality products currently on the market, but it should sound much better than the QuickTime Music Architecture synth it replaces. It's a good sign that Apple is serious about professional audio.

I learned from several developers that Apple has created a simple application programming interface (API) for applications to use when communicating with external MIDI devices or software synthesizers in the system. It also has created a straightforward framework for hardware developers to use when writing a device driver. All drivers talk to a unified software layer, called the *MIDI Server,* which in turn talks to the applications, so in principle, you may be able to have several MIDI interfaces appear like one big one with no timing issues.

Connecting MIDI interfaces with no hassles is just one side of the coin—you also need an easy way to work with the instruments you have connected and to control the patch assignments. In the now-orphaned OMS, you used Studio Setup and the Name Manager to accomplish that.

Interestingly, Apple stops short of a promise in that area but drops some pretty big hints in describing the intent of Mac OS X's MIDI services. The developer materials state, "Another goal is to provide a single systemwide configuration, that is, knowing what devices are present, and being able to assign names to those devices, manufacturer names, and what MIDI channels they're receiving on, and so on."

FIG. 3: Apple's Audio Developer Web site provides plenty of information about Mac OS X's underlying MIDI and audio architecture.

Does that mean Apple will fill the gap in some future release (10.1 perhaps) with a unified Studio Setup control panel for all MIDI applications to share? Time will tell, but Apple certainly has to realize that a unique feature such as that would offer Mac OS X users tremendous advantages.

AUDIO OPPORTUNITIES

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This site provides "A Brief History of Unix," an article written by Charles Severance with Unix neophytes in mind.

www.macintouch.com
For a daily heads-up, visit this site for general Macintosh news with respectable attention to audio and MIDI issues.

www.mackido.com/History/AppleTimeline.html
This site offers a mostly accurate account of the business twists and turns that resulted in Apple's purchase of NeXT and Steve Jobs's return.

www.macworld.com
Macworld's site provides a good, searchable archive of reviews and features, including the history of Apple and NeXT.

INFORMATION FROM DEVELOPERS

http://connect.apple.com/WWDC2000/vid_175.html;
http://connect.apple.com/WWDC2000/vid_176.html
These sites offer slightly outdated but still interesting streaming video of the 2000 Worldwide Developers Conference, with Apple engineers commenting about what they're attempting to do and offering a few demonstrations of working code.

http://developer.apple.com/audio/index.html
This clearinghouse page provides links to recent enhancements in QuickTime and Mac OS X Core Audio.

http://developer.apple.com/audio/pdf/coreaudio.pdf
Download this PDF for an overview of all the underlying OS goodies.

www.freebsd.org;
www.netbsd.org
Within these two sites, you'll find everything you want to know about BSD Unix, Mac OS X's progenitor.

SNEAKY UTILITIES

http://eshop.macsales.com/OSCXenter
Here you will find information about *Unsupported UtilityX*, freeware that allows you to install Mac OS X on machines that Apple does not officially support.

frameworks are provided for implementing low-latency multichannel audio-hardware drivers (in professional formats such as 24-bit, 96 kHz audio), connecting them to applications in the system, and connecting applications to form signal chains.

By low latency, Apple means input-to-output latency of less than 10 ms in the system (in addition to latency that might be added by the hardware itself). Apple has more or less realized that goal already, and as it fine-tunes the system and shakes out the bugs, the latency specs can go much lower. The "hardware abstraction layer" also makes it possible for many applications to simultaneously share low-latency access to the audio hardware, something that current proprietary systems don't allow.

The same system that lets applications talk to the hardware lets them talk to each other, essentially solving the problem of how applications might work with plug-ins. In the system, each application or plug-in is an AudioUnit. Apple provides a way of linking those together in complex signal chains and lets developers organize the chains.

AudioUnits have a system for describing the parameters they need (sliders, button toggles, and so forth), so the rudiments of an entire plug-in system exist in Mac OS X's development kits. However, Apple could go even further in helping plug-in developers establish a common GUI implementation for AudioUnit plug-ins.

How each developer will implement its applications in Mac OS X remains to be seen, but it's possible that you may finally see the Holy Grail of a single software plug-in format establishing itself on the platform.

IN FOR THE LONG HAUL

Many basic developer materials have been in the hands of the most important Mac developers for some time, and that's beginning to bear fruit; music software and hardware developers are showing consistent appreciation for the increased attention that Apple has given them lately. Apple's recent efforts to put together the IOKit (the package of developer tools that manufacturers will use to make hardware drivers) is a significant step forward and removes a major roadblock to progress on Mac OS X. You can be sure that developers in the Mac market are taking a close look at Mac OS X and its built-in capabilities, with some staking an early claim.

Emagic reports that *Logic Audio* 5, long in development, will be shipping for Mac OS X about the time this issue hits the newsstands, with Mac OS X native hardware support to go with it. Public demonstrations at trade shows such as Summer NAMM have already begun. MOTU reports that it is "definitely porting *Digital Performer* to OS X." BIAS expects to ship Mac OS X native versions of *Peak* and *Deck* by the time you read this.

That leaves out other significant developers, such as Steinberg and Digidesign, though they may be making announcements soon.

At the very least, the enthusiasm some developers express is bound to be contagious. Apple may come out of the Mac OS X drought stronger than ever.

Jim Rippie *is a Boston-area technology consultant with a bad habit of working for music software and quixotic operating-system companies.* *Thanks to Steve Berkley and Doug Wright from BIAS; Markus Fritze from Emagic; Jim Cooper from MOTU; Ryan Demlow from Coda; and others, who shall regrettably remain nameless, for their gracious help.*

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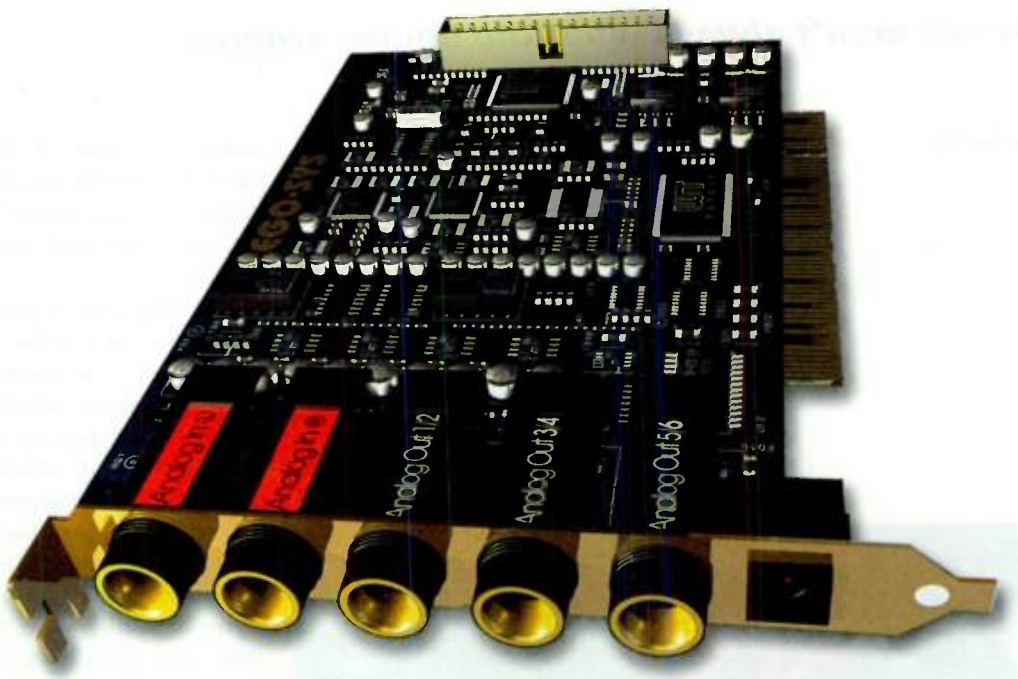

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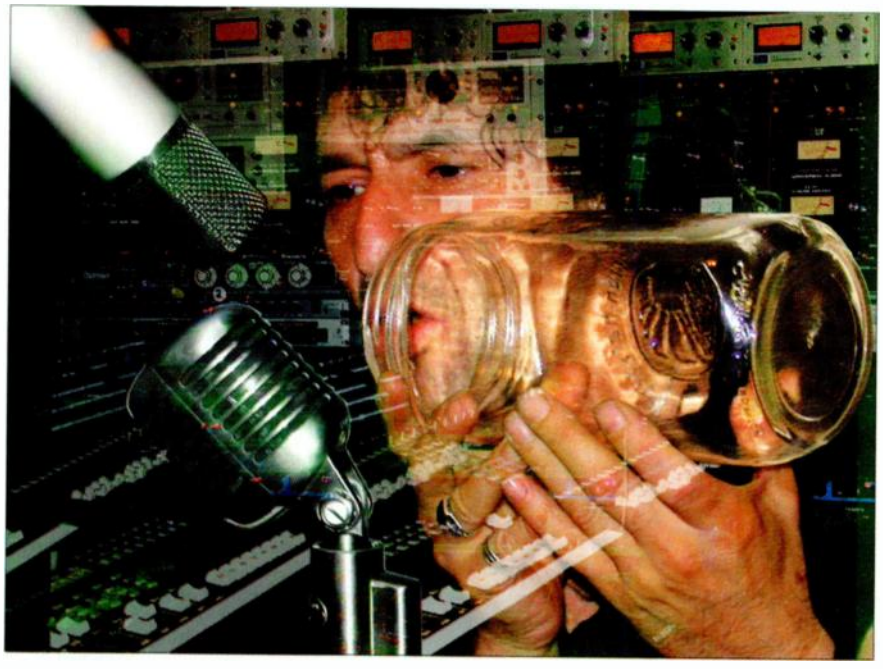
RECORDING MUSICIAN

Off-Kilter Vocals

Dulcet tones aren't always what the doctor ordered.

By Sean Carberry

How often have you agonized over a vocal sound? You audition mics, preamps, compressors, EQs, and even—for the ultimate anguish—mic cables. You strive for the perfect balance between presence and sibilance, warmth and muddiness. Size matters too: great vocals must be huge, full, and lush, not to mention several other four-letter words. You read articles and interviews, hoping to glean tactics that will make your cheap Neumann knockoff sound like a pristine U 47. You may even lie awake at night, puzzling over how to create the perfect vocal track, one that will make the whole world sit up and take notice.



URI VALOV

Well, forget about all that. Who cares about nice, clean, polite vocals? I don't, at least not at the moment. I'm interested in vocals that will alter bodily functions, scare the dog, and result in zoning violations. Vocals with attitude, edge, and a complete disregard for political correctness—that's what I'm after.

I learned long ago to think of vocals as just another instrument in the mix. Sometimes the song calls for a Martin D28, other times for a Les Paul Junior through a Marshall stack. You equalize, process, even mutilate instrument sounds to fit a song, so why hesitate to tamper with the vocal? Is it so sacred? I prefer to break the rules and go for what sounds cool rather than what sounds nice. I'm not talking about subtle doubling or chorusing, delays, or other common tricks; I'm talking about demented, twisted, Frankenstein vocals.

BEFORE, DURING, OR AFTER

Thanks to all the Beatles, Beck, Tom Waits, and Los Lobos music I've listened to throughout the years, I've developed a large vocabulary of unusual vocal

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sounds and discovered many ways to create them. My preferred strategy is to get the mutated sound on tape, which has several benefits. The obvious one is it simplifies mixdown—simply bring up the fader, and you're done. Another benefit is that the vocalist approaches the performance differently. A singer who hears a snarling, distorted vocal sound in the headphones instead of a clean, accurate sound will sing with more attitude. It's like that moment when a guitarist discovers distortion: suddenly, a nervous, out-of-tune D chord becomes rock 'n' roll.

Sometimes altering a vocal sound during the recording stage isn't practical. Or perhaps you're mixing a record that someone else recorded, and when you bring up a vocal track, it just sounds too wimpy or lifeless in the midst of the raging tune. Not to worry: in either case, you can do the off-kilter treatments later, in the mix.

You can undermine a good-sounding vocal in plenty of ways, whether in the recording stage or once it's on tape. I'll start at the mic, the beginning of the signal chain, and proceed from there through each link.

LO-FI TOOLS

As ever, using the right tool for the job is important. If you want large, lush, classic vocal sounds, look to the icons—the AKG C12, Neumann U 47, Telefunken Elam 251, and similar microphones. But if it's attitude you seek, try something less hi-fi.

One now-classic mic for capturing squawky, gritty-sounding vocals is the venerable Shure 520D, better known as the Green Bullet (see **Fig. 1**). This odd-looking microphone, prized among blues-harp players, has a narrow frequency response and rather drastic midrange peak. That makes it a powerful and easy-to-use tool for capturing off-kilter vocals—just sing into it, and you're done. The same holds true for comparable ceramic- or crystal-element mics such as the Astatic JT-30. Also, keep your eyes peeled at garage sales and junk stores for funky old school-P.A. mics, CB radios, army surplus items, and even toy mics. Although one of those mics on its own may not produce a sufficiently over-the-top sound, at least by my twisted standards, it can provide a great starting point for stirring up fringe vocal flavors. In addition, vocalists often enjoy singing into something that looks like a Star Trek phaser or a Flash Gordon accessory.

When I recorded Susan Tedeschi's album *Just Won't Burn*, she did the song "Found Someone New," which was meant to sound like a Beatles outtake. To get the sound she wanted, Tedeschi brought in an odd blue microphone that looked like a plumbing fitting. It had a weird resonance that made for a John Lennon–like "I Am the Walrus" vocal sound, and though the resulting track sounded horrible on its own, it fit perfectly in the mix. Unfortunately, Tedeschi wouldn't let the mic out of her sight, which is why it's not in my mic locker today.

SEAN CARBERRY

FIG. 1: The author's collection of mics for capturing off-kilter sounds includes (from left) a Shure 520D Green Bullet; a generic cassette-recorder mic; a cheap knockoff designed to look like an RCA 77; and two yard-sale gems, origins unknown.

CUSTOM SHOP

If the mic doesn't sound tweaked enough, try customizing it. You can come up with some unusual effects, and you will probably find that approach more satisfying creatively than using a stock electronic effect.

A favorite trick of mine is to cut the ends off of a water bottle and position the plastic tube over the microphone (see **Fig. 2**).

SEAN CARBERRY

FIG. 2: You can create strange resonances by shrouding vocal mics with tubular items. A water bottle positioned around a Green Bullet produces a truly tweaked tone.

That adds an additional resonance and an even lower-fi quality to the sound. Cardboard tubes from toilet-paper and paper-towel rolls are other good items for that application. I've obtained cool results from paper cups and the flexible tubing from the back of a clothes drier.

For a really outrageous sound, set up two mics about eight inches apart in a spaced-pair configuration. Have the vocalist hold the paper-towel tube and sing through it while sweeping back and forth in the stereo field. Although that can sound pretty silly on its own, it's a great effect for a background vocal pad of *oohs* and *ahs*. It's also a lot of work for the singer, so you need the right talent.

Once, I got carried away and had a vocalist sing while he held a lobster pot over his head and the mic. (Thankfully, he was amenable to anything I could dream up, which is not always the case with singers.) Although the sound didn't work for that song, it was definitely unique, and I expect to find a home for it someday.

HAIR BALL

Thus far I've addressed two approaches to capturing off-kilter vocal sounds: using unusual microphones and customizing the sound of a mic through external treatments. Another approach is to alter the sound by adding harmonics. I don't mean harmonics in the sense of musically pleasing overtones. I'm referring to distortion—what's known in my circle as *hair*.

For example, you can impart hair to

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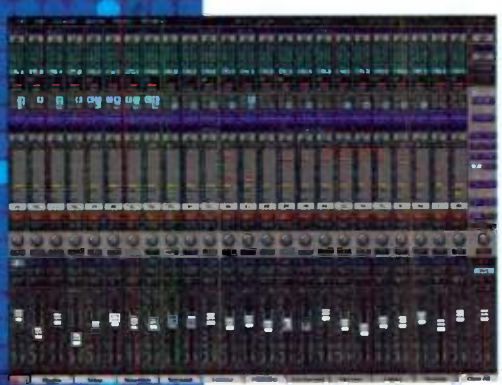

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a vocal sound by cranking up the mic preamp until it buzzes like a duck in a blender. But keep a couple of things in mind. First, if you turn up a mic preamp to 11, you will generally get distortion, but you will also generate an extremely hot output level. Therefore, you'll need to pad the output heavily or use a compressor with an input-level control so that you can turn the signal down.

Second, make sure the vocals are still intelligible. It's easy to get carried away and turn them into a seething mass of indistinct phonemes. (But if that's what you're going for, have at it!)

Some preamps work better than others for that application, and tube units tend to work best. I commonly use a Telefunken V78 tube mic preamp patched into a UREI 1176 compressor, which gives me thick distortion and all the level control I need. Another favorite for crunchy vocals is the Peavey VMP-2 tube preamp. But I've also had good luck with a number of solid-state preamps, including those in consoles. It all depends on the type of coloration you're looking for.

An additional note: when employing a mic preamp to get distortion, I often use a standard (that is, high-quality) vocal mic. I get good clarity up front, and from there I can dial in the amount of distortion I want at the preamplifier. However, if I'm in a particularly sinister mood, I may run a Green Bullet into an overdriven preamp for a completely screaming sound.

SEAN CARBERRY

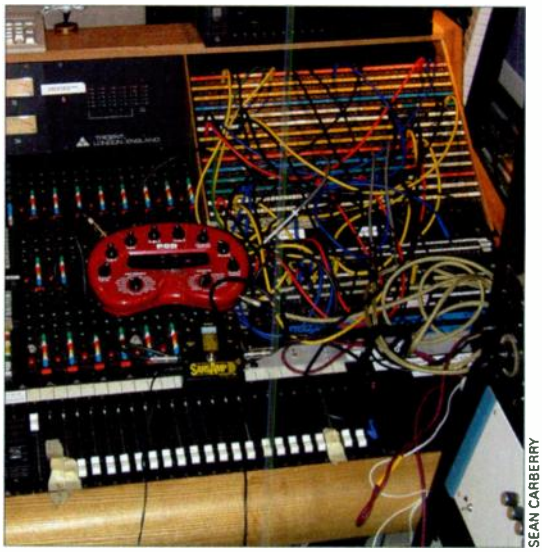
FIG. 3: A great way to capture small yet highly intelligible vocals is to mic the signal being played through headphones.

ALL AMPED UP

Another way to desecrate vocals is to run them through an instrument amplifier. Miking amplified vocals gives you certain qualities that just can't be captured any other way. Also, the options are endless in terms of amp choices, settings, and miking techniques.

For that application, I often use small or medium combo amps, such as Fender Deluxes, because they have a nice range of tones, from clean to extra crispy. A Shure SM57 about one or two inches from the speaker usually works well; if the mic is too far back, you lose articulation. Then again, I once ran a vocal through a tweed Deluxe sitting in a cement isolation booth with the mic positioned about five feet back from the amp. For good measure, I stuck a paper cup over the mic. The resulting vocal sound had a trashy, hotel-bathroom quality that worked great for the song.

One of my favorite vocal sounds came from a vocalist singing into a Sennheiser MD 409 (a somewhat arbitrary choice, but it looked cool) that was patched through a fuzz box at the singer's feet and into a Fender Deluxe Reverb just on the edge of distortion. I stereo-miked the amp with a pair of SM57s and angled the two mics differently to capture distinct tones on the two tracks. The fun part came when the singer kicked on the fuzz box during choruses, adding extra grit and crunch to the signal. One pass and a couple of punches later, we had a scorching vocal that one listener described as "erotic." The singer was close to the vocal mic, and the SM57s were near the amp, so there was an immediacy and intimacy to the sound in addition to the midrange bite. The amp's natural compression helped accentuate the breaths and between-lyric sounds, which added to the track's sensuousness.



SEAN CARBERRY

FIG. 4: Need to salvage a wimpy vocal? The author used a Line 6 Pod and a SansAmp GT1 to add attitude to lifeless vocal tracks and managed to save the songs from being excluded from the record.

In deference to Lennon, I would be remiss if I didn't mention the Leslie. At one time, Lennon was so enamored of the Leslie sound that he wanted every instrument recorded through one. On vocals (on anything, really), Leslies do amazing things: with proper miking, you can get tremolo, vibrato, chorusing, and dynamic panning, not to mention magic. (For tips about recording Leslies, see "Recording Musician: The Earl of Whirl" in the March 2001 issue.)

Many faux Leslies also work well on vocals, in case you don't have a real Leslie lying around. Most multi-effects units provide at least a passable Leslie patch, and many makers of guitar effects offer Leslie simulators, whether electrical or mechanical, that do an excellent job. You can run the outputs from the unit direct to tape or, better yet, through two separately miked guitar amps. Go nuts, but don't forget your motion-sickness medication. One final suggestion: if you begin to lose intelligibility, blend in some clean vocal signal with the Leslie vocal track.

BIGGIE SMALL

Size doesn't always matter; sometimes smaller is better. One of the easiest small-vocal flavors to concoct is the

Bottle™ PRODUCTION 2000

A classic modern vacuum tube microphone made the old-fashioned way, without compromise. In every industry – cameras, automobiles, audio, and more – there are a handful of small companies reputed for a rare blend of scientific precision and artistic passion. You know who these artisans are; their trademarks are synonymous with the ultimate in hand-crafted perfection. Our flagship "The Bottle" microphone parallels this vision, representing BLUE's highest achievement in quality and innovation. The Bottle is a precision recording tool, combining the low noise and superb transient response of top-grade electronics with the sonic magic of legendary vintage vocal microphones. The Bottle is not simply a microphone, but a fully featured microphone system with eight optional interchangeable capsules. In an instant, these bayonet-mount capsules can be exchanged to provide different tonal characteristics and pickup patterns, while the power supply is still turned on!

INCLUDED ACCESSORIES

BLUE #9610 Power Supply
ATA Flight Case
Blue B6 Cardioid capsule
Champagne Tube Microphone Cable ™

TECHNICAL DATA (w. B6)

Acoustical operating principle	Pressure gradient
Directional pattern	cardioid
Frequency range	20Hz–20KHz
Sensitivity at 1 kHz into 1 kohm	20mV/Pa
Rated impedance	200ohms
Rated load impedance	not less than 1khoms
Weight & Dimensions	1700 g 390x90

Bottle™ PRODUCTION 2000

Like the mics of yesteryear, the Bottle canister is not just for looks, but also holds a small fortune in precision electronics. The internal circuitry of The Bottle is thoroughly modern, of course, with an amplifier design utilizing a single hand-selected vacuum tube pentode EF86 in triode mode. The tube circuit is Class A and fully discrete. To this end, The Bottle utilizes electronic components of the highest quality (such as expensive metal-film resistors and a large custom-built transformer), and there is no pad or low-cut filter switches in the microphone circuit. In short, this is a signal path of the highest possible quality, allowing the user to get the maximum benefit out of the unprecedented capsule selection created by BLUE. The Bottle is finished in a luxurious blue lacquer paint with other colors available by special order. Additional capsules are available from your pro audio dealer.

OPTIONAL CAPSULES

"The Ultimate Big Vocal Sound"
B0: Cardioid large diaphragm single backplate.
"The Accuracy Plus Capsule"
B1: Cardioid small diaphragm.
"The Vintage Capsule"
B2: Figure of eight large diaphragm.
"The Neutral Capsule"
B3: Cardioid mid-sized diaphragm.
"The Big Omni"
B4: Perspex Sphere Pressure omni small diaphragm.
"The Presence Omni"
B5: Pressure omni large diaphragm.
"The BLUE standard – The Modern Presence Vocal Sound"
B6: Cardioid large diaphragm dual backplate.
"The Clasical Vocal Sound"
B7: Cardioid large diaphragm single backplate.

Cactus™ PRODUCTION 2000

At BLUE, quality is the driving force behind our company. We explore all aspects of design and manufacturing to take what we know to the next level. In this day and age there are host of possibilities to reap from. What we know from the past and what we have available to us today is astounding. Of course fusing this is not easy. This process is difficult but in the truest sense the most rewarding.
Our respect to this philosophy is represented by the Cactus Tube Microphone. A blend of the past with the cutting edge of the future. With detailed information in the midrange area and a soft silky response in the top end, the Cactus fills the need of detailing and mellowing the program material. The amplifier design is based on a single vacuum tube sub-miniature pentode in a triode mode. This tube is hand-selected by BLUE personnel for low noise performance. The BLUE power supply for The Cactus Mic is based upon our 9610 model and features a sophisticated, regulated circuit design.
A unique slow-start feature prolongs and protects the valuable tube life.

INCLUDED ACCESSORIES

BLUE #9610 Power Supply
ATA Flight Case
Series One Shockmount/Pop Filter
Our top end shockmount and pop filter assembly, unique in design and great in performance.
Champagne Tube Microphone Cable ™

TECHNICAL DATA

Acoustical operating principle	Pressure gradient
Directional pattern	Multipattern
Frequency range	20Hz–20KHz
Sensitivity at 1 kHz into 1 kohm	18mV/Pa
Rated impedance	150ohms
Rated load impedance	not less than 1khoms
Weight & Dimensions	800 g 250x50x30

Supply Cables

No other commercially available tube mic power supply offers the unique features of the BLUE model 9610. To assure the longevity of the vacuum tube and the stability of the tube microphone circuitry, BLUE has developed the 9610 power supply with the new SOFT START feature.

Blueberry Cable ™
A two conductor 22Awg cable using only BLUE's virgin proprietary materials. The twisted pair construction eliminates any noise caused by electromagnetic interference emanating from equipment used in the studio or stage environments.

Cranberry Cable ™
A rugged two conductor 20Awg twisted pair mic cable using BLUE's virgin proprietary materials. This cable is the perfect compliment for any type of radio, TV, or sound reinforcement applications. The twisted pairs reject any electromagnetic interference.

Kiwi Cable ™
The ultimate in quad mic cable design, the Kiwi cable uses BLUE's hand picked virgin proprietary materials. The quad design gives the cable an advantage when trying to achieve the highest quality recording where exquisite tonal quality is the utmost.

Champagne Tube Microphone Cable ™
BLUE Champagne is a microphone cable with a "sky's the limit" capability. The cable's design incorporates a complete seperated shielded mic signal path to achieve fullest transparency and deep seamless clarity.

"In only ten years, Baltic Latvian Universal Electronics has estabilished itself as one of the premier microphone builders in the world... with its innovative design and superb construction, the Dragonfly is not only worthy of a design award, but it may very well inspire singers to new heights... "

Electronic Musician

"The Blueberry had the same high level of craftsmanship as its big brother, The Bottle, with a clean circuit layout and an impressive-looking capsule.Our first session with The Blueberry was a male vocal, and we liked the sound of The Blueberry right away. On piano, The Blueberry was one of the few mics we've used that sounds more like music and less like a microphone. Transient response was excellent. The Blueberry is a very good, all-around microphone with excellent construction. Most studios would find it useful in many situations, and it's priced reasonably enough that they won't have to break the bank to buy it."

Steve La Cerra EQ magazine

"Not surprisingly, studio engineers covet the Bottle's sound and sensitivity."

Wired Magazine

From the Critics

The development and production of microphones is viewed as an artistic endeavor at BLUE. Our designs have been recognized not only by the professional end user but by the recording industry, architectural, high end audio and cutting edge publications throughout the world.

"To put it simply, the manufacturing quality of the Mouse is the best I've seen in 30 years. You should hold in your hands something that's as well made as human hands can craft. The industrial age hasn't produced many of these – Leica cameras, Ampex reel to reels, the Mouse belongs in that company; it's work of machine age art masquerading as a microphone."

Paul J. Stamler, Recording Magazine

"BLUE has always been an innovative company that does things differently." "The construction and workmanship are impeccable, and the parts used throughout are of the highest quality."

George Petterson, Mix Magazine

"With the Dragonfly, BLUE has produced a real winner, and contributed greatly to the personal-studio recordist's quest for high-quality sound and hip style at an affordable price."

Brian Knave, Electronic Musician

"We're talking the difference between Chevy and Rolls here! Never before have I seen such a beautifully built microphone and power supply."

Dr.Fred J. Bashour, Pro Audio Review

"But the loveliest things on the A.E.S. main floor were the creations of Baltic Latvian Universal Electronics (BLUE)." "It's microphones are stunning examples of Machine Age industrial art, deserving of a place of honor at San Francisco's Museum of Modern Art."

Stereophile

FOR THE USERS LIST OF BLUE PRODUCTS VISIT WWW.BLUEMIC.COM

Latvian

Baltic Latvian Universal Electronics

Founder of BLUE, Martins Saulespurens, at work in anechoic chamber in Riga, Latvia.

Founder of BLUE Skipper Wise with The Mouse.

BLUE microphones are more than just a recording tools...they are investment in value, quality, and expression. You will display them for their artistic beauty, covet and protect them for their investment value, and treasure them for conveying the heart and soul of any music recording.

BLUE stands for "Baltic Latvian Universal Electronics" – and for the ultimate in quality! Our work speaks for itself. You'll find BLUE microphones are beyond compare as a valuable investment and unsurpassed as a musical production tool. BLUE has its own facility located in Latvia (one of the Baltic states, located outside Russia). At BLUE, we are not interested in cost-effective mass production, which could jeopardize the design quality of our tube and solid state microphones and related products. We design and manufacture all capsules – the heart of the microphone – as well as precision parts, from the smallest screw to the large body shells used for our "Bottle" microphones. We've researched the needs of engineers and musicians alike, to create an exceptional collection of microphones. What makes BLUE microphones so unique, and so valuable?

BLUE microphone capsule assembly.

• Our unique formula. The mylar film of our BLUE hand-built capsules is sputtered with a special, unique-to-BLUE formula of 24-carat gold of absolute pure (99,99%) quality and aluminum. This special film is tensioned to our own handbuilt brass backplates, designed and manufactured in our Riga factory. Our formula allows us to achieve the fastest transient response without the sacrifice of low-end frequencies. BLUE considers the capsule to be the heart of the microphones. This most important element is manufactured solely by us and not sourced from another company. This process is crucial to achieving the unique sound quality that is the trademark of a BLUE microphone.

• BLUE builds and tunes each capsule by hand. The finished capsules are measured in our anechoic chamber for the optimum performance. Each microphone capsule is mounted with our molded, injected rubber stem, to isolate unwanted rumble. Our optional elastic shockmounts eliminate outside infrasonic interference.

• No integrated circuits. Our solid state and tube microphone amplifiers are based on a Class A, fully discrete circuit, in certain models a custom microphone transformer built and wound to BLUE specifications. This enables our hand-built microphone capsules to be optimum in their performance. When our mics are used with BLUE's high-definition mic cables, the sound has extreme presence..." as if someone is singing right next to your ear."

• Strict electronic and construction tolerances. Insured by the use of high-end quality components, these tolerances guarantee unsurpassed reliability and low noise. All our microphones handle loud sound pressure levels (SPL) and still capture the crucial dynamics that make recordings stand out.

• Our extensive research. We studied the frequency curves from scores of vintage, tube, and solid state microphones, from which we determined the most desirable sound qualities. The sonic design of our microphones was created by what we term TPO, or The Popular Opinion... the consensus of expert engineers and discriminating musicians on the type of sound that is needed in the recording process today.

Think you can't afford the best?

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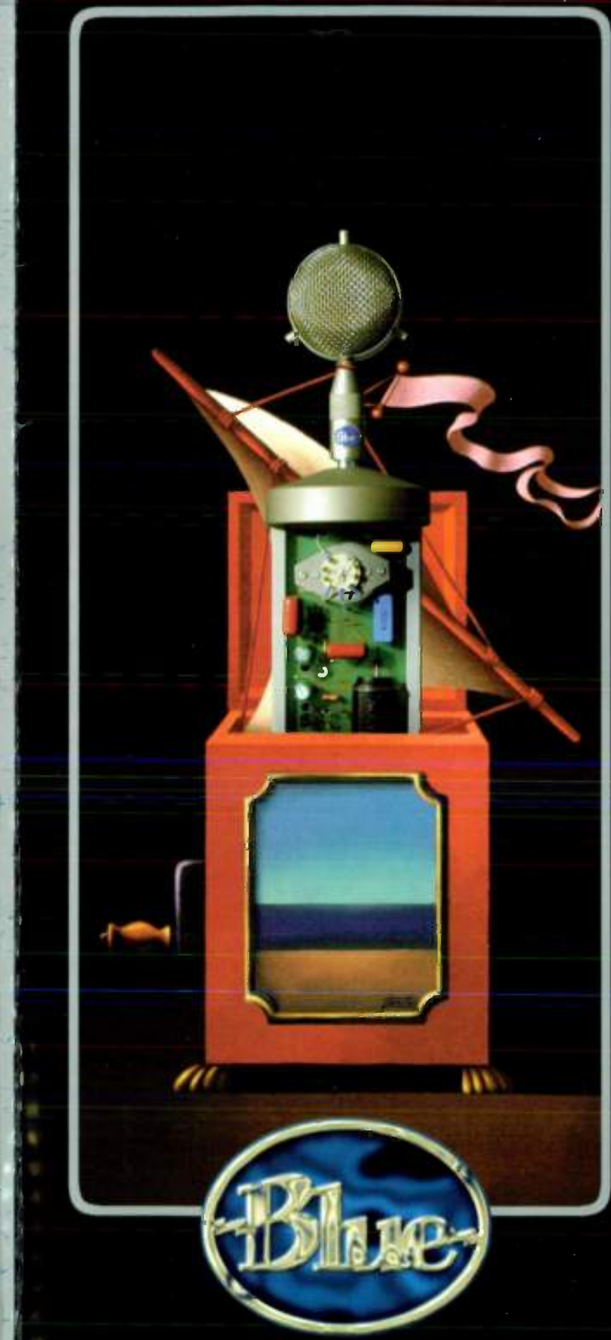


Baltic Latvian Universal Electronics

Dragonfly™ PRODUCTION 2000

Complete with an integrated elastic shockmount, The Dragonfly electronics are based on a class A discrete circuit, with a transformerless output. The result: what you hear is what you get! The Dragonfly's overall sonic character is neutral and always pleasing to the ear, making it an ideal microphone for recording vocals, drums and percussion, electric guitar, bass, and any acoustic instrument including "difficult" sources like saxophones and stringed instruments. The Dragonfly is a pressure-gradient cardioid condenser microphone, employing the BLUE single-membrane large diaphragm capsule. For this hand-crafted diaphragm we have selected a 6-micron mylar film, sputtered with a mixture of pure gold and aluminum. Enclosed within a rotating spherical grille, the capsule can be positioned and adjusted in the smallest of spaces. This innovative design offers fine-tuning and precise placement to please the most discerning recordist. The Dragonfly comes protected in a vintage styled linen microphone box embossed with a silver BLUE Logo.

A matched set of Dragonfly's can be specially ordered directly from BLUE. These uniquely colored mics are finished in a luxurious green lacquer with gold accented trim and housed in handmade cheerywood boxes.
Manufactured on a limited edition only basis, please contact BLUE directly for more information.

TECHNICAL DATA

Acoustical operating principle	Pressure gradient
Directional pattern	cardioid
Frequency range	20Hz–20KHz
Sensitivity at 1 kHz into 1 kohm	21mV/Pa
Rated impedance	200ohms
Rated load impedance	not less than 1khoms
Weight & Dimensions	630 g 165x60

Blueberry™ PRODUCTION 2000

Named Microphone of the year by Electronic Musician for 1999. The Blueberry consists of a Class A discrete transformer based microphone amplifier perfectly chosen to our single pattern, cardioid, handbiult large diaphragm capsule. First and foremost, the Blueberry has been designed to provide the commanding, intimate presence associated with the world's best (and most expensive) vintage vocal microphones. With its shimmering, detailed highs, smooth midrange, and minimized proximity effect (a bass boost inherent in all unidirectional mics), the Blueberry excels at delivering a vocal right to the front of the mix where it belongs. When processed with limiting and/or compression, as is standard practice for most pop vocals, tracks recorded with the Blueberry will be free of pumping, low end thumps. Acoustic guitar, hand percussion, drums, and other critical high end sources also shine in front of the Blueberry, gaining an extra measure of presence that enables the most delicate sounds to cut through a mix, even at very low levels. The Blueberry has been designed to fill the needs of the home musician and professional alike.

OPTIONAL ACCESSORIES

Series One Shockmount/Pop Filter
Our top end shockmount and pop filter assembly, unique in design and great in performance.
Series Two Shockmount
If a pop filter is not required, we offer a budget shockmount that delivers the same performance.
Blueberry Cable ™

TECHNICAL DATA

Acoustical operating principle	Pressure gradient
Directional pattern	cardioid
Frequency range	20Hz–20KHz
Sensitivity at 1 kHz into 1 kohm	20mV/Pa
Rated impedance	150ohms
Rated load impedance	not less than 1khoms
Weight & Dimensions	520 g 235x50x30

Mouse™ PRODUCTION 2000

The Mouse microphone amplifier consists of top grade quality components such as polystrene capacitors and metal film resistors. The single pattern, cardioid handbuilt capsule, manufactured in our Latvian factory uses only the highest quality mylar film and is sputtered with a special mixture of 24 karat gold (99.99%) of absolute pure quality and aluminum. The microphone capsule is shockmounted in two areas, internally in the grill assembly and within the rotating grill armatures. The Mouse is available with two different output circuitry's, transformer and transformerless. The main difference between these designs is that the transformer based Mouse allows the user the option to run extra long mic cables for special applications and provides the user with the utmost protection for outside interference such as radio type frequencies (RF). These models are also designated by their difference in body color. The transformer version styled in matte black and the transformerless finished in a dark royal blue.

OPTIONAL ACCESSORIES

The Pop Filter
A vintage look, for a modern microphone. A handbuilt stainless steel pop filter.
The Shock
Provides additional protection from unwanted low end and adds extra positioning to the microphone.
Cranberry Cable ™

TECHNICAL DATA

Acoustical operating principle	Pressure gradient
Directional pattern	cardioid
Frequency range	20Hz–20KHz
Sensitivity at 1 kHz into 1 kohm	21mV/Pa
Rated impedance	150ohms
Rated load impedance	not less than 1khoms
Weight & Dimensions	980 g 165x65

Kiwi™ PRODUCTION 2000

All of us are unique in our own ways. Our personalities and facial features let us stand apart from one another. At BLUE our goal is to achieve individual personalities for each of our microphones. Our top of the line Class A Discrete model, The Kiwi delivers just that. Capsule patterns of Cardioid, Figure of 8, Omni and selections in between for a total of nine different choices. This is achieved in a careful, unique manner using our BLUE double backplate capsule. These unique capsules are measured in the anechoic chamber for the optimum performance. Mounting of the Kiwi microphone capsule to the amplifier is provided by our mold injected rubber stem to help isolate unwanted rumble. Included with the Kiwi microphone is The Shock. Additional protection from low end rumble is provided by this elastic spider type shockmount. The Kiwi provides recordists with many options for the most critical of all recordings.

OPTIONAL ACCESSORIES

The Pop Filter
A vintage look, for a modern microphone. A handbuilt stainless steel pop filter.
Kiwi Cable™

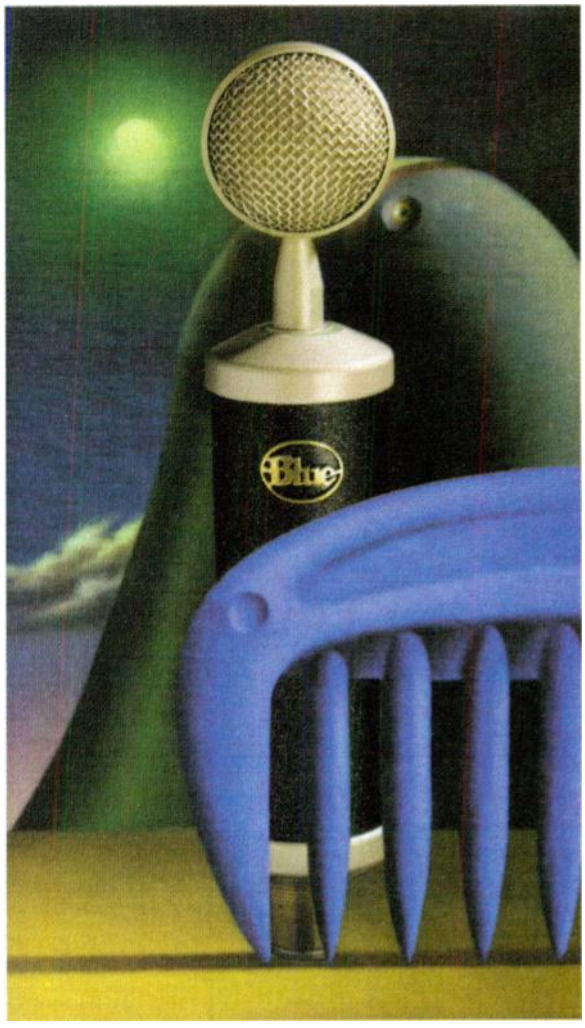
TECHNICAL DATA

Acoustical operating principle	Pressure gradient
Directional pattern	multipattern
Frequency range	20Hz–20KHz
Sensitivity at 1 kHz into 1 kohm	19mV/Pa
Rated impedance	50ohms
Rated load impedance	not less than 1khoms
Weight & Dimensions	900 g 220x60

Baby Bottle

Like Father, Like Son.

BLUE Microphones is proud to announce the birth of our newest and most affordable microphone to date, the Baby Bottle. Following in the footsteps of our acclaimed tube Bottle mic system, the Baby Bottle is truly a chip off the old block. Each and every part of this solid-state, class A discrete condenser has been hand selected to insure nothing short of a stellar performance. Enclosed in a Lollipop spherical grille is a precision-machined, gold-sputtered capsule with a fixed cardioid pattern. In the tradition of our award-winning microphones, the Baby Bottle employs the styling, attention to detail, and hand-crafted quality for which Blue has become famous. The Baby Bottle is ideal for recording vocals, percussion, or any acoustic instruments, and comes nestled inside a velvet pouch protected by a beautiful cherrywood box. You've heard the buzz and read about us in all the pro audio circles. Isn't it about time you tried one for yourself? Experience the next generation of Blue microphones; experience the Baby Bottle. Contact your local BLUE microphone dealer for a demo.



Come visit us at the AES show in New York, Sept. 21-24, booth #735, and meet Karina Zarins from Latvia, one of our capsule engineers — no kidding!

Blue
Microphones

Dragonfly

Blueberry

Mouse

Kiwi

Cactus

Bottle

Baby Bottle

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classic "telephone" sound. A telephone speaker's frequency response is limited to 300 Hz to 3 kHz—the critical range for human speech. Anything much above or below that is gravy as far as speech intelligibility goes. Simply run the vocal through a graphic EQ and nuke everything below 300 Hz and above 3 kHz. Cutting all that high end is likely to destroy the vocal's presence, so it's possible that you will also need to boost somewhere near 1 to 3 kHz, the area responsible for the telephone's characteristic squawk. Now hit the bandpass signal with a generous dose of compression, and you have a small vocal that will stand out in just about any mix. (If you're into authenticity, you could also modify a telephone to work as a vocal microphone.)

A more exotic trick is to run the vocal track through a set of headphones and then mic the headphones from about three to eight inches away (see **Fig. 3**). Again, make sure not to put the mic too far back, or you'll lose articulation of the vocal. The goal is a nice lo-fi sound that sits comfortably in the mix. Although the frequency content of that sound is in the same ballpark as a Bullet-miked vocal, it should have a distant, more detached quality.

Experiment with combining different techniques. Once, to evoke a Robert Johnson–like vocal, I positioned the singer a couple of feet back from a Green Bullet, which allowed for plenty of room reflections and a distant quality to the sound. I ran the signal through a drive-in movie speaker and miked that to tape. The combination yielded a small midrangey vocal with just the right resonance to sound absolutely spooky.

BREAK IT IN THE MIX

Recently, while mixing a record, I found that several vocal tracks needed more attitude. Recutting the vocals was not a practical option, so I brought out a couple of my not-so-secret weapons. I set up a Line 6 Pod and a SansAmp GT1 on the console and patched them through some aux sends (see **Fig. 4**). Consequently, when a vocal needed some kick, I had a whole range of off-kilter effects at my fingertips, from the sublime to the stupid. (Actually, I never use those boxes for guitar sounds, but I love them on vocals and drums.)

For three mixes on that album, combinations of amp sounds from the Pod and GT1 saved the songs; they were on the verge of being dropped from the record until I dialed in the missing edge. On another song, I ran the vocal through a tube mic preamp after first running it through an Empirical Labs Distressor to bring down the line-level signal to a point at which I could get distortion rather than a toe-curling square wave out of the preamp. The tube distortion layered under the clean vocal gave the track the perfect growl.

The one thing you can't do in the mix is alter the fundamental performance. You can dress it up, put some hair on it, crush it with compression, or whatever. But if the performance is weak, nothing can really save it. That's one reason I prefer to effect the sound going to tape; a bizarre vocal sound in the cans is more likely to inspire a great performance than something clean and colorless. It's like going to a costume party: arrayed in unusual attire, you can more readily step outside your normal personality and become anyone or anything.

The trick to creating off-kilter vocal sounds is to think of vocals as any other instrument; don't hesitate to sonically alter them to suit the song. Take my ideas and run with them, experiment with cheap mics and stompboxes, alter mic sounds with various props, and make your gear do stuff it's not supposed to do. Just remember not to get weird for the sake of getting weird—get weird for the sake of the music. There's a time and place for a dry, intimate vocal recorded through a Neumann M 49, and there's a time and place for a singer with a cold singing into a walkie-talkie while wearing a lobster pot over his head.

Only one crustacean died for this column. **Sean Carberry** *is the technical director of National Public Radio's* The Connection *and a freelance recording engineer in Boston. Check out his site at www.carpedonut.com.*

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What separates the best from the rest?

GLYPH FireWire

This is the only sign of excellence for the ultimate in FireWire storage solutions for digital audio & video.

Want to get the most from your Digi 001 or other DAW? Want to record, edit and mix 24 tracks at 24 bit & 48kHz? You want your DAW to perform and sound great, that's why the X- Project digital storage system is for you.

X Project

M Project is the new FireWire hard drive storage solution for your MOTU hard disk recording system from Glyph. M Project adds up to 75 GB of audio storage to your MOTU rig in seconds. M Project is the only MOTU-approved FireWire storage solution for the 828 FireWire interface and all MOTU PCI-324-based systems, including the 2408mkII, 1296, 1224 or 24i. M Project easily shares the FireWire bus with the 828. This is the ideal alternative to SCSI because it frees up a PCI slot.

WILDFIRE

The Wildfire is a plug and play solution for all types of studios. Backup, dupe a CD, check out the mix of your song, or demo your multi-media presentation. A Wildfire CD-RW is the answer for your FireWire system.

When your non-linear editing workstation hungers for mass storage and blazing speed, Glyph's DV Project FireWire RAID array is the only solution. DV Project is specifically designed for videographers who need massive disk space without sacrificing performance. Glyph's DV Project is optimized to achieve maximum throughput on any FireWire ready system.

DV Project

GLYPH

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MACKIE DESIGNS

HDR24/96

A multitrack hard-disk recorder that is both stable and friendly.

By Larry the O

Digital and analog mixers, sound-reinforcement speakers, studio monitors, the human user interface (HUI) control surface—only a handful of manufacturers cover as many bases as Mackie Designs does. The only thing missing in its stable of products was a recorder. Enter the Mackie HDR24/96, a 24-track hard-disk recorder that supports 24-bit resolution and sampling rates as high as 96 kHz.

The HDR24/96 combines the recording ease of a tape machine with the basic editing power of a digital audio workstation (DAW). The package is filled with goodies, including various I/O and removable storage options and the ability to serve as a file transfer protocol (FTP) server for transferring files to and from computers.

Mackie Design's HDR24/96 is a formidable hard-disk recording system. To take full advantage of its power, you will need a monitor, a mouse, and a keyboard.

FACE-TO-FACE

The front panel of the HDR24/96 is dominated by 24 meters and track-arming buttons (see **Fig. 1**). To the right of the channel meters is an 8-digit

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location counter, a small array of status lights (indicating sampling rate, bit depth, time code, clock, and error), and a 24-by-4-pixel backlit LCD.

Directly under the LCD are four Select buttons flanked by two large arrow buttons. Those buttons and the buttons in the row beneath them are used to navigate the HDR24/96's menu system from the front panel. The bottom row of buttons (Track, Project, Backup, Disk Util, System, Digi I/O, Sync) is for choosing a menu; the Select buttons are for choosing a parameter to edit; the arrow buttons are for moving between pages; and the Increment and Decrement buttons, also in the bottom row, are for adjusting values.

Standard transport buttons (Stop, Play, FF, Rew, Record) reside at the bottom right of the front panel; record and locate functions (Locate, Store, Time Code Chase, Autotake, and so on) are handled by a final bank of buttons under track-arm buttons 16 through 24.

The front panel also includes a drive bay for removable Mackie Media drives (fast IDE drives for real-time recording), a floppy drive for installing OS updates, and the power switch.

Although the front panel has a lot of controls, Mackie did its homework to determine which functions need to be there and how they should be laid out. Front-panel operation is surprisingly intuitive, and I almost never needed to dip into the manual to find a function. Clearly, Mackie is trying to retain as much of the tape-machine paradigm as possible while striving to provide the more complex, hard-disk-specific functions in a similarly straightforward presentation.

Powered by a 433 MHz Intel Celeron CPU, the HDR24/96 is stocked with 128 MB of RAM. That may not seem like much RAM for a desktop computer, but it's a healthy amount for a computer completely dedicated to music production.

REAR VIEW

A graphical user interface (GUI) is much better for exploiting DAW-style editing than the buttons-and-LCD interface. To that end, the HDR24/96's rear panel sports connections for an AT keyboard, a PS2 mouse, and an SVGA monitor (see **Fig. 2**). Using those devices gives you a DAW interface that duplicates all of the HDR24/96's front-panel functions while allowing other functionality, such as region and drag-and-drop editing. In general, the front panel permits recording, playback, and system configuration functions, whereas the GUI provides greater depth for those and other features that would be difficult to use with hardware alone.

The GUI software is integral to the HDR24/96's onboard operating system; you don't need external or optional software (see **Fig. 3**). I'm not sure why the keyboard connector is an AT type instead of PS2, but they are electrically identical, so a simple adapter (available at any computer store) will let you use your PS2 keyboard with the HDR24/96.

Mackie's recognition of the fact that the HDR24/96 is a dedicated PC doesn't end with the GUI. The rear panel contains a 100Base-T Ethernet connection, which, when connected to a Mac or PC, allows the HDR24/96 to act as an FTP server so that sound files can be transferred back and forth easily.

The Ethernet and video connections are on PCI cards mounted in two of the HDR24/96's rear-panel slots. The two other slot-mounted cards are MIDI and Sync cards. The MIDI connections are on a DB9 connector, like those found on every PC sound card, and use the standard pin out for such connectors. You can therefore use any run-of-the-mill sound-card adapter that breaks out the DB9 to standard 5-pin DIN MIDI I/O connectors. One such adapter is included with the HDR24/96.

The Sync card has BNC connectors for word clock in and out and a 75Ω termination button. It also contains a ¼-inch phone jack for reading SMPTE time code. Two slots, marked ACC1 and ACC2, are reserved for expansion.

The keyboard and mouse connectors, along with jacks for a footswitch and the

PRODUCT SUMMARY

Mackie Designs
HDR24/96
multitrack hard-disk recorder
$4,999

FEATURES	4.5
EASE OF USE	4.5
AUDIO QUALITY	4.5
VALUE	4.5

RATING PRODUCTS FROM 1 TO 5

PROS: Well-thought-out design. Provides strong functionality and quick usability right out of the box. Good removable-media scheme. Many professional features such as sampling rate conversion on AES/EBU inputs and FTP server capability. Stable.

CONS: Weak backup feature. Cannot freely map inputs to tracks and tracks to outputs. No analog to 96 kHz I/O. FTP can be tricky to set up.

Manufacturer
Mackie Designs
tel. (800) 898-3211 or (425) 487-4333
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FIG. 1: Most of the features you will need in order to use the HDR24/96 as a standalone recorder are accessible from the front panel.

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optional remote, are situated in the middle of the rear panel. The footswitch jack facilitates hands-free recording and playback and can be set up to punch in and out, start and stop the transport, or step through the locate points. Mackie's remote controllers for the HDR24/96 are the Remote24 ($299) and its bigger sibling, the Remote48 ($1,499).

Next to the cooling fan, which is fairly quiet, are three slots for I/O cards, each of which carries eight audio channels. The cards available are the the PDI-8 AES/EBU ($399), AIO-8 analog I/O ($399), the DIO-8 Lightpipe/TDIF ($449), and the OPT-8 Lightpipe ($99). The converters on the AIO-8 are 24-bit with 128× oversampling. The analog and AES/EBU cards use DB25 connectors, so budget for those extra costs for cables if you're buying the cards.

Inputs on the PDI-8 offer real-time sampling-rate conversion and the ability to switch the status bit for easy data compatibility between AES/EBU (pro) and S/PDIF (consumer) devices. The DIO-8 allows conversion between ADAT and TDIF formats and includes a BNC connector for TDIF sync.

The I/O slots are hard-assigned to their corresponding tracks: the card in slot 1 accesses only tracks 1 through 8; slot 2, tracks 9 through 16; and slot 3, tracks 17 through 24. My review unit was equipped with one each of the analog, ADAT/TDIF, and AES/EBU I/O cards, in that order. Only tracks 1 through 8 could be recorded or played to and from analog. I wish I had the flexibility to map the I/O cards to any track, even if that feature were available only in the GUI. To work around it, I had to drag regions from one set of tracks to another; however, Mackie says it will implement remapping capabilities.

While I'm listing I/O gotchas, I should note that the HDR24/96 can record and play back at 96 kHz only through the AES/EBU I/O or using ADAT or TDIF signals when connected to another HDR24/96 or a device that understands the proprietary data format. Extended sampling rates aren't available with the analog I/O, but Mackie says other options for high-sampling-rate I/O are in development.

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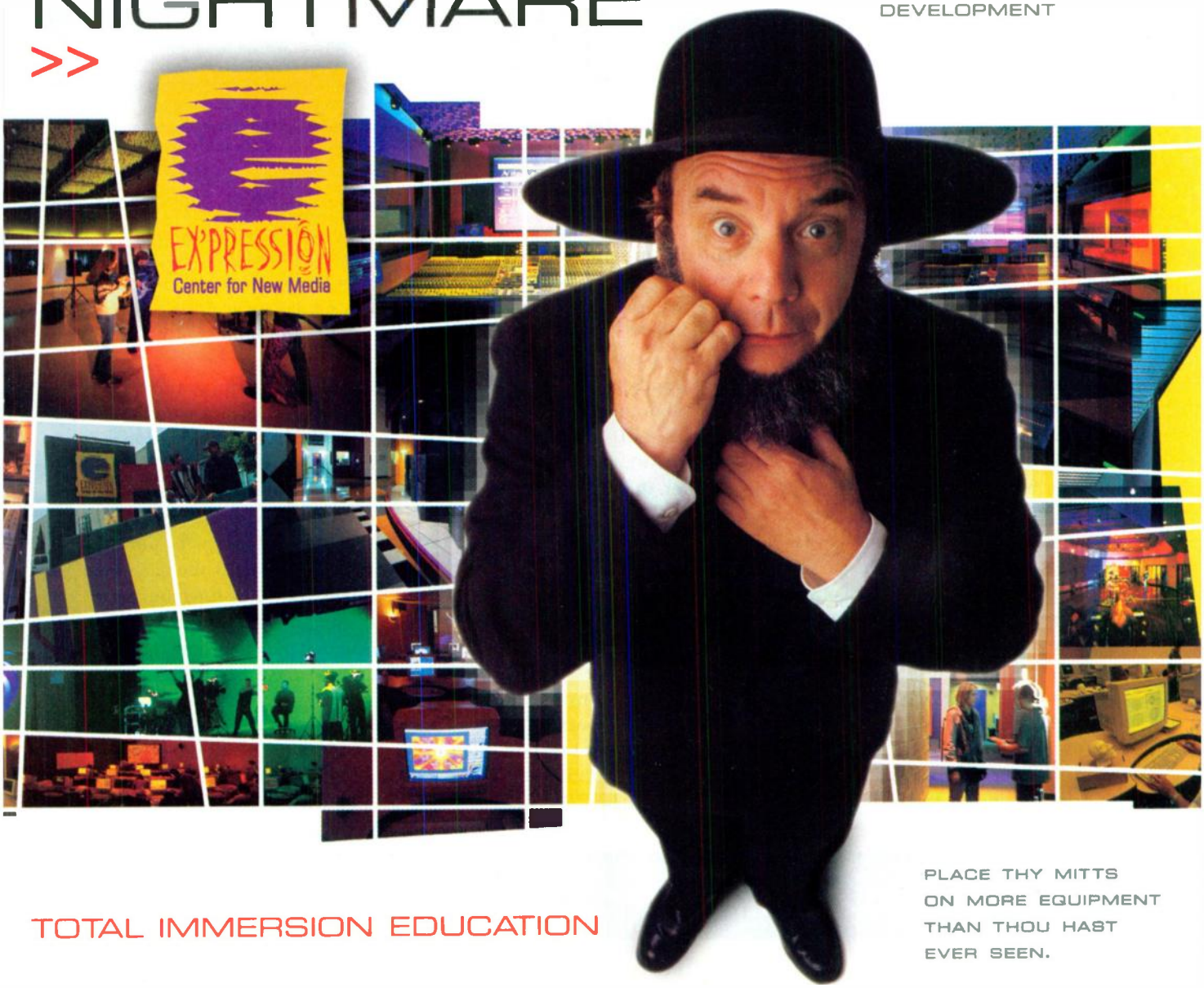

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To make use of the HDR24/96's high-sampling-rate capabilities, you need external 96 kHz converters that support the AES/EBU dual-wire standard that Mackie uses. Alas, I had no such converters and was unable to try the HDR24/96's high-sampling-rate recording. However, given that the cards, not the unit itself, would not be doing the A/D/A conversion, the HDR24/96 need only handle the digital data without corrupting it, which I'm confident it can.

FIG. 2: The rear panel has slots for three 8-channel audio cards, so you can mix and match analog, AES/EBU, TDIF, and Lightpipe I/O.

UP AND RUNNING

When you power up the HDR24/96, it loads its operating system and checks to see what storage is online. It then loads the default project, which is the last project you were working on (if available) or a new, untitled project. Configuration functions are accessed by pressing one of the menu buttons to enter a menu and then pressing a Select button to choose a parameter. If the menu contains more than four parameters, the unit prompts you to use the arrow buttons to reach them.

When you enter a menu, the Select button LED lights for each button that will access a parameter, and the parameter name appears in the bottom of the LCD. For instance, if you have a new project and want to set its sampling rate or bit depth, press the Sync button; then, press the Select button under Sample Rate (or Bit Depth, which is a page to the right) to access that parameter. As you can see from that example, the organization of the HDR24/96's menus is unconventional; I would expect those functions to reside in the System menu, though the Sync menu is not an entirely illogical choice.

Once you access the sampling-rate parameter, the LCD shows the parameter name in the top row, its value in the third row, and double arrows in the bottom row above the two left-most Select buttons (the LEDs are lit to indicate that they are active). Over the right-most Select button, the LCD shows "OK" while the LED blinks. Edit a value by pressing the Select buttons to raise or lower the value and press the OK Select button when the desired value is reached. Observant users will notice that the LEDs over the Increment and Decrement buttons are also lit when the parameter is selected; the buttons can be used instead of the Select buttons.

Using the Select buttons with the LCD arrows to edit values rather than using the arrow buttons (which are reserved for page navigation) is simple and intuitive; that method is implemented consistently throughout the system. The rest of the configuration functions follow a similar form. In the GUI, those functions are collected in the Setup window, which includes tabs to select different pages of parameters corresponding to the front panel's menus.

Once the basic configuration is done, recording is as easy as using a tape machine: press the track-arm buttons for the tracks you want to record; then, use the transport buttons to put the machine into record. All the standard tape-machine recording functions are there: All Input and Auto Input monitoring, one-button punch-in, auto punch-in and -out, loop recording, and so on. Some features, such as auto punch-in and -out and one-button punch-in, must be enabled from the GUI, though the actual record operations can be performed from the front panel.

Levels can be monitored visually on the front panel's 24-segment LED track meters or from the GUI's meters, which can be set to monitor peak values, average values, or both. The main body of the GUI is the track display, but at the top of the screen is an area that alternates between acting as the meter bridge and a tools palette. The functions are switched by clicking on a keyboard tab. To the right of the area, the GUI has onscreen transport controls and a location display.

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All recording is done into a familiar data architecture: the highest level

HDR24/96 Specifications

Tracks	24
Virtual Tracks	192
Frequency Response	2 Hz–22 kHz (±0.5 dB)
Adjacent-channel Crosstalk	–90 dBu
Sample Recording Resolution	24-bit linear
Internal Processing Resolution	24-bit
Clock Reference Sources	internal; external; word clock
Time-code Types/Rates	MTC; SMPTE/24; 25; 29.97 drop, nondrop; 30 drop, nondrop
Dimensions	4U × 13.25″
Weight	35 lb.

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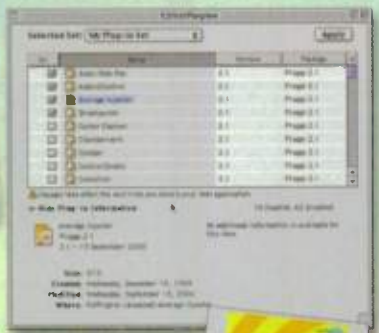

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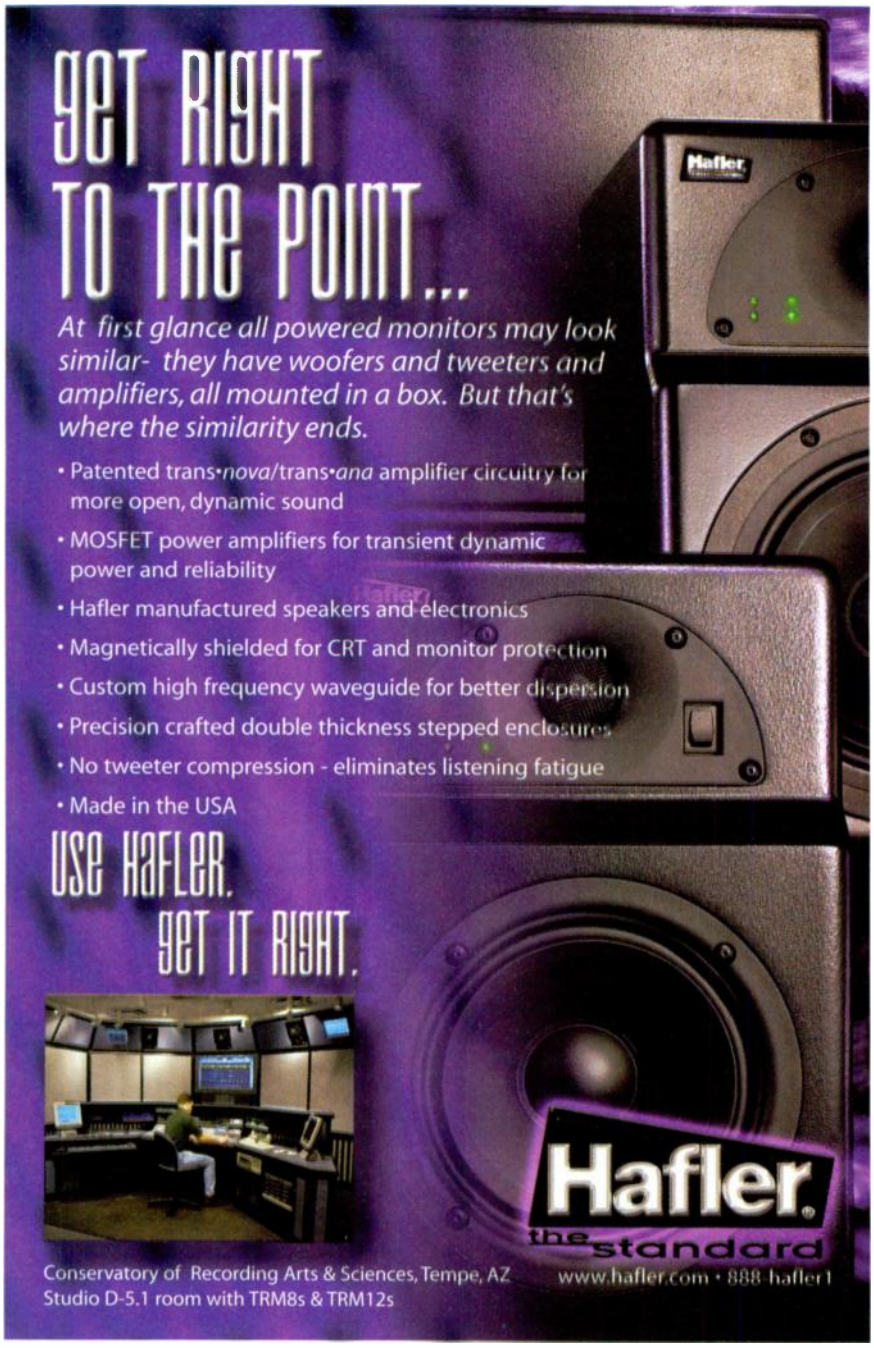
structure is the *project*, which contains 24 *tracks*. A recording pass onto a track creates a *take*, and some or all of a take can be designated as a *region*. Takes on a track that are not currently active are *virtual takes*. A complete configuration of regions on all the tracks is a *playlist*. Because playlists and regions are editing constructs and all editing is performed in the GUI, playlists and regions can only be created and managed from the GUI, whereas projects and tracks can be managed from the front panel or the GUI.

The recording media includes an internal 20 GB UDMA IDE drive and the front-panel drive bay, which holds Mackie Media removable media housings. The M-90 ($199) is a fast UDMA drive capable of real-time recording. You can purchase your own UDMA drive and a Mackie Media tray, install it, and get right to work. However, Mackie warns that not all drives are fast enough to record 24 tracks of 24-bit audio in real time. You can purchase qualified drives from Mackie, but if you choose to find your own, drives as large as 32 GB are supported. A software utility that tests the drive for its ability to perform real-time recording is onboard the HDR24/96.

In contrast, the Mackie Media Project drives ($299) are 2.2 GB ORB cartridges mounted in Mackie Media trays. They are too slow for real-time work and are solely for backing up data.

In addition to recording into a project, WAV and AIFF files from another project, or copied to the HDR24/96 using its FTP capabilities, can be imported. Importing does not reference the existing file but creates a new one, converting AIFF files to WAV and creating split stereo files from interleaved files in the process.



LOCATION IS EVERYTHING

Once you make your recording, the usual array of playback functions is there for your listening and locating pleasure. You can set up preroll (but not postroll), locate points, and auto play (which puts the deck into play as soon as it locates) as well as loop selected portions of regions. The front panel provides four locate points only; the GUI adds another locate point and a cue list that holds as many as 100 cues. Locate points 1 and 2 hold loop points when you are loop recording or playing (other than region looping), whereas locate points 3 and 4 hold the Auto-Punch points.

Note that the HDR24/96 always plays back at a 24-bit resolution, even if you recorded at 16 bits. In addition, if you record 16-bit files and edit in the HDR24/96, the fades will be at 24-bit resolution and will not be dithered down to 16 or 20 bits if you digitally transfer from the HDR24/96 to a 16- or 20-bit system. How a given lower-resolution system will react to receiving that 24-bit data is a good question; in most cases, it will probably be truncated.

So far what you've seen is a recorder with all of the functions you expect for recording and playing. The HDR24/96's editing features, however, are what set it apart from most hard-disk recorders.

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ON YOUR MARK

Editing on the HDR24/96 is performed exclusively in the GUI. Standard editing functions in the GUI include Cut, Copy, and Paste; region Edge editing; region nudging; discontiguous selection; dragging within and among tracks and from a Region List; scrubbing; and snapping to a grid. Most key GUI functions have keyboard equivalents, though they are not user-definable. The grid can be set to time or musical note values (for example, bar, beat, and tick).

The HDR24/96's GUI is well suited for working within a musical context. To do so, it must have a concept of tempo; you have three ways to give the HDR24/96 that information. The simplest is to set a Default Tempo (or Global Tempo) in the MIDI screen of the Setup window. The second method is to import a tempo map from a Standard MIDI File, a function also executed from the MIDI screen.

The last method is to use the Selection-to-Tempo command, which lets you define the number of beats contained in the current selection. The HDR24/96 then calculates and sets the Global Tempo. The unit's ability to import tempo maps and to define a tempo from a selection is slick. The only missing link is the ability to create a tempo map by repeatedly performing Selection-to-Tempo on different selections within a recording.

The HDR24/96 puts a 10 ms fade at the beginning and end of every region, which is convenient. The fade shape and duration can be set in the Region Editor dialog box. Similarly, whenever two regions overlap, a 10 ms crossfade is created. The Auto Xfade function, when activated, creates a crossfade over the duration of the overlapping portion between two regions.

Dragging the end of a fade-in or beginning of a fade-out changes the fade's length; dragging the other end trims the region's beginning or end and, in the process, moves the fade while maintaining its length. For crossfades, dragging the beginning or end trims the region boundary and alters the fade length. Some of that behavior is not consistent with DAWs like Digidesign's Pro Tools, but it is logical and efficient.

The fades have a few small limitations: there are only three fade shapes, and the feature that places fades at the head and tail of every region cannot be defeated. You will have to transfer tracks to a DAW for those times when extremely precise surgery is required.

One of the nicest editing features Mackie included in the HDR24/96 is a History list, a powerful system that allows for multiple undo levels. As with fades, there are areas in which a more robust implementation would be preferable, but remember that it's not a DAW but a pumped-up recorder. Having multiple undo levels at all is more than some big-time DAWs can claim.

Break-point volume automation can be constructed on a region-by-region basis, but not across an entire track. Here, I think the HDR24/96 does come up a little lacking in comparison with many popular DAWs.

Once you fully edit a track on the HDR24/96, you can bounce the whole thing to a new file with the Render Track function. That simplifies tasks like comping background vocals for a chorus or creating a percussion loop and then dropping it in on every chorus.

WELL CLOCKED

The HDR24/96 has plenty of clocking and sync functions. It can be clocked from an external word-clock signal, clocked internally, or locked to video black. It can be synced to SMPTE or MIDI Time Code (MTC) and can be controlled by MIDI Machine Control (MMC) commands. The HDR24/96 can generate time-code and MMC commands too.

If 24 tracks aren't enough, Mackie claims any number of HDR24/96s can be locked together with sample accuracy if you have enough connections to the same word-clock and time-code sources. As long as each HDR24/96 receives a solid word clock (which, for more than two units, means having a word-clock distribution system) and time-code signal, you can (theoretically) just keep stacking them.

BACK IT UP

Any computer system needs a method of backing up data, and the HDR24/96 has one, but it really amounts to nothing more than a copy facility. It does not offer any true computer backup amenities such as lossless data compression, incremental backup, and the ability to compare and verify written data.

One of the most interesting features Mackie included in the HDR24/96 is its ability to act as an FTP server. The HDR24/96 can function in a simple peer-to-peer network or on a hub as part of a larger network. Getting that to work is somewhat more complicated than getting MIDI to work, though some of the same basic principles of addressing are involved.

Over time, I suspect that Mackie and its users will provide a great deal of guidance on the HDR24/96's FTP capabilities. Mackie has a forum on its Web site and an HDR24/96 discussion board in Yahoo Groups, so you should

HDR24/96 Optional I/O Specifications

Analog I/O	8 channels on each board (44.1, 48 kHz sampling rates only)
AES/EBU I/O	8 channels on each board
TDIF I/O	8 channels on each board
ADAT I/O	8 channels on each board
Sampling Rate	44.1, 48, 96 kHz
Analog I/O Level	+4 dBu
Headroom	+22 dBu
Total Harmonic Distortion (A/D/A)	0.00001%
Dynamic Range	106 dB (analog); 144 dB (digital)

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FIG. 3: The HDR24/96's GUI software gives you DAW-like editing capabilities in addition to extra recording functionality not available from the front panel.

have plenty of ways to get help in addition to Mackie tech support.

IN SITU

I threw my usual test sources at the HDR24/96: vibes, drums, synths, guitars, and vocals. Put simply, the unit sounds every bit as good as you would expect. Vibes and cymbals are a good test for converters and clocks in digital devices. Many digital devices add a piercing quality to the strong and pure yet warm sound of the vibes. However, the HDR24/96 maintained the instrument's soft edges and kept the airiness and spatial definition of the Earthworks mics and mic preamp used to record the vibes.

Cymbals quickly reveal any kind of distortion at the top end of the spectrum, because they have substantial activity in their upper partials. The HDR24/96 preserved the complex spectral activity without adding the edginess heard on many cymbal recordings.

The HDR24/96 is clean and has a pleasing sound that is not fatiguing to the ears. It captured the positive attributes of each source I tried with it.

The HDR24/96 is somewhat of a hybrid system, which is a risky strategy for Mackie to undertake. Some users will always wish the HDR24/96 were more stripped down so that it would be even simpler to operate, and others will want to see it do everything a DAW can do. Mackie has done an excellent job of riding this line, and I expect the blend to improve over time. Some functions could obviously be put only in the GUI, but many others were difficult choices. Mackie has shown with the HDR24/96 that it is capable of finding a good balance in feature placement.

Figuring out how to use most of the HDR24/96's functions from the front panel and from the GUI is easy. The biggest exception is the FTP function, not because the feature is poorly implemented but simply because setting up a network is an involved process.

The HDR24/96 comes with three manuals: a *Quick Start Guide*, an *Editing Guide*, and a *Technical Reference*. Between them, the unit's functions are well covered. However, none of the manuals have an index, which costs the user some time midsession when desperately trying to find all references to a particular function. I am a constant index user and a strong believer that documentation should provide quick access to information; I would have liked to see indexes and, in the electronic (Adobe *Acrobat*) versions of the documents, bookmarks, given that the manuals are not hefty.

NOT FADE AWAY

The HDR24/96 can be used as a standalone for rudimentary tracking, but as a practical matter, a monitor, a keyboard, and a mouse should be thought of as necessities, not options. Once you experience the benefits of that hybrid, you'll be loath to work without them unless you're in a nonstudio situation, such as recording live.

The HDR24/96 does have a few rough edges, such as its inability to map physical inputs arbitrarily to tracks and the way that the cursor can sometimes become almost invisible against the GUI background. A few more DAW-type features would add a lot to the HDR24/96; for example, edit grouping would make it faster to cut and paste across a bunch of drum tracks.

Other wish-list items include the ability to put sampling-rate conversion with dither on outputs (even if only in the DIO-8) to transfer 24-bit, 96 kHz data to 16-bit, 44.1 or 48 kHz systems; more robust backup software; and more high-sampling-rate I/O options.

The HDR24/96 has several unused slots, and I'm guessing Mackie will put those to good use as it has in its D8B mixer. DSP cards could add some real bang to the HDR24/96 and seem a fairly obvious move, though Mackie declined to comment on the idea.

GREAT MIX

Mackie's HDR24/96 demonstrates why standalone hard-disk recorders have replaced the modular digital multitrack tape recorder in popularity. Although the HDR24/96 still has room to grow, it is mature enough to be stable and ready to use now.

The HDR24/96 sounds great, is full featured and easy to operate, and is slick in its design. It's a winner!

Larry the O *provides music and audio services with his San Francisco–based company, Toys in the Attic, and has been a contributor to* **EM** *since 1986.*

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01

CAKEWALK

SONAR 1.02 (WIN)

New features and a new name make for a tasty new Cake.

By Scott R. Garrigus

For the past several years, Cakewalk has released a new version of its flagship product, *Pro Audio,* every 12 months or so. **EM** has published numerous *Pro Audio* reviews (see the table, "*Pro Audio* Past and Present"), including an extensive review of *Pro Audio* 9 in the May 2000 issue. This year Cakewalk has replaced its topflight sequencer with a new application called *Sonar.*

Although Cakewalk is touting *Sonar* as a new product, it sports many of the same features as *Pro Audio* 9. Like its predecessor, *Sonar* is a digital audio sequencer that provides extensive tools for recording and editing MIDI and audio, essentially transforming your PC into a complete digital multitrack production system. *Pro Audio* 9 users will notice that the Piano Roll, Event List, Staff, Lyrics, StudioWare, Video, Big Time, Markers, Tempo, Meter/Key, and Sysx views are all included in *Sonar* and function the same way they did in the past. Moreover, *Sonar* is the only upgrade path for *Pro Audio* 9 users—there will be no *Pro Audio* 10. So in essence, *Sonar* is an upgrade.

Because of functional modifications and new features, however, the way users work with the program is significantly different. From that perspective, *Sonar* is new. Among the changes and new features in *Sonar* are a redesigned Track view, new Loop Construction and Loop Explorer views, new automatable DirectX 8 plug-in effects and DX Instruments (DXi), Slip Editing, Groove Clips, processed input-signal monitoring, vastly improved automation capabilities, and Windows Driver Model (WDM) support.

Sonar comes in two flavors. *Sonar XL* offers all of *Sonar*'s features and includes a collection of sound fonts and sample loops from a variety of manufacturers. With the *XL* version, you also receive the full version of *Tassman* 2.0, a DXi from Applied Acoustics Systems, and a special edition of Alien Connections' *ReValver* DXi.

Minimum System Requirements

Sonar

Pentium II/400; 64 MB RAM; Windows 98/98SE/ME/2000

TRACK WITH A VIEW

The first thing you'll notice in *Sonar* is the redesigned Track view (see **Fig. 1**). The Track view retains the Track pane for listing track parameters, but the configuration of those parameters has changed. Gone is the spreadsheetlike setup of *Pro Audio;* instead, you access parameters by vertically resizing a track and then clicking on various tabs at the bottom of the view. At first I found the new layout a bit disorienting, but after a while it became second nature. I discovered that if I made each track about one vertical inch, *Sonar* displayed the relevant parameters of each tab. Using smaller track sizes led to hidden parameters.

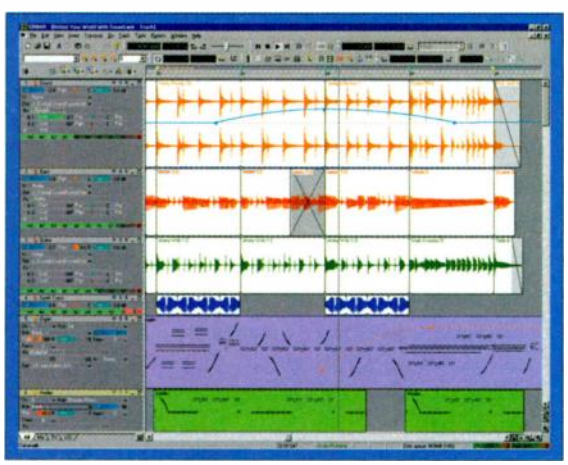

FIG. 1: *Sonar*'s new Track view lets you do all your recording, editing, and mixing in one work area.

The Clips pane, which shows the audio and MIDI data clips for each track, is still there; with it is a new Bus pane at the bottom of the Track view. The Bus pane gives you access to the aux and main buses for the current project. One of the Bus pane's major purposes is to display and manipulate automation data for aux and main buses. Having the Bus pane in the Track view also means you no longer need to open the Console view when it's time to mixdown. If you prefer a more traditional mixing interface, though, the Console view is still available.

A new toolbar contains tools for selecting, editing, and scrubbing data. Those tools aren't new; they migrated from the Audio view, which no longer exists, because now you do all audio editing in the Track view. On the one hand, that change is nice because you can do all recording, editing, and mixing (except detailed MIDI-data edits) within one view. On the other hand, having a separate Audio view was also nice because you could have multiple instances with different track configurations open simultaneously. For example, you were able to have your percussion tracks open in one window and all the vocal tracks open in another, each with its own zoom settings. In the next version of *Sonar,* I hope that Cakewalk adds a track-configuration snapshot feature to the Track view to make navigating and editing multiple parts of a project easier.

WDM DRIVERS

Sonar offers some significant under-the-hood enhancements, including support for Microsoft's new WDM technology. If your sound card offers WDM audio drivers, you can achieve extremely low latency, which lets you use real-time effects when monitoring live input. WDM also improves performance when you play software synths from an external controller.

Sonar still supports the older Windows Multimedia Extensions (MME) audio

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drivers for compatibility, but the WDM drivers clearly make a difference. I tested the MME and WDM drivers for the Sound Blaster Live card on my Pentium III/700 MHz PC running Windows 98 SE. The results were quite astonishing. Like *Pro Audio* 9, *Sonar* lets you adjust for latency using the Mixing Latency parameters in the Audio Options dialog box. With the MME drivers installed, the lowest buffer size I could achieve was 62.5 ms, resulting in an effective latency of 187.5 ms for 44.1 kHz stereo audio. With the WDM drivers installed, the buffer size and effective latency were reduced to 10 ms. Amazing!

FIG. 2: *Tassman* 2.0 includes dozens of modules for designing synthesizers. It offers an attractive screen for manipulating parameter settings.

As with all new technology, however, there are some caveats. WDM drivers are supported only under Windows 2000, Windows ME, and Windows 98 SE. If you're running Windows NT, you're out of luck; *Sonar* won't even install under Windows NT. Sound-card manufacturers are still playing catch-up too, so don't be surprised if you find that WDM drivers are not yet available for your hardware. Fortunately, the vast majority of *Sonar*'s features work fine without WDM drivers. You'll just miss out on optimal input monitoring and live performance of software-based instruments.

INPUT MONITORING

In *Pro Audio*, you could apply real-time effects only during playback because of the latency issues I mentioned earlier. With the adoption of WDM drivers, *Sonar* eliminates that problem. You can now apply real-time effects during recording as well. That capability is nice for musicians accustomed to hearing a processed signal during their performances.

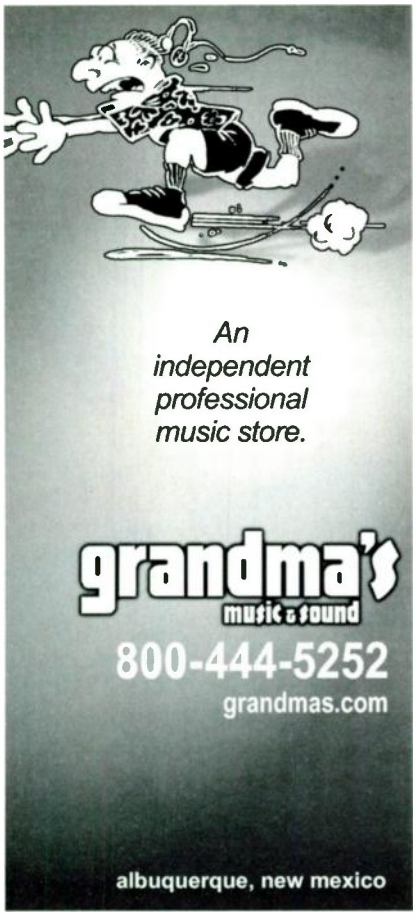
To avoid problems, though, reduce the effective latency down to at least 10 ms (or lower if possible). Cakewalk says that anything between 6 and 10 ms should be imperceptible. I didn't have any problems during tests at the 10 ms setting.

You should also assign a track's input and output to the same sound card, or you'll run into some nasty feedback, distortion, or both. All monitoring should be done through *Sonar*, so mute the playback of the line-input connection on your sound card to avoid annoying echoes in your monitored signal. For example, if you use a Sound Blaster Live card, open the Windows Mixer, set Line In as your recording source under the Recording Controls, and mute Line In under the Playback Controls. That will ensure that your recorded signal goes to the line input, through *Sonar*, and then to the line output. Otherwise, the recorded signal would go through *Sonar* and directly to the line output simultaneously, giving you two distinct signals and causing echoes.

INSTRUMENTAL DX

One of the most significant new features in *Sonar* is support for DX Instruments. Like VST Instruments, DX Instruments emulate MIDI devices such as synths, samplers, and drum machines. To use a DXi, you load it as an audio plug-in and then assign one or more MIDI tracks to control it. With WDM drivers, you get responsive performance when playing a DXi live with an external MIDI controller.

A DXi's output is routed through *Sonar* just like a normal audio track, letting you put a DXi on an audio track or even on an aux or main bus. Then you can apply real-time effects to its output. Because Cakewalk integrated DX Instruments into *Sonar*, their audio output has the same bit depth and



sampling rate as the current project. If you use 24-bit, 96 kHz audio, for example, the instruments use the same specs. The number of simultaneous instruments and the total polyphony are limited by your CPU's power.

Four DX Instruments are included with *Sonar:* Live Update's *LiveSynth Pro* 1.1, Audio Simulation's *Dream Station* 1.0, Roland's *Virtual Sound Canvas* 1.0, and Applied Acoustics' *Tassman* 2.0. *LiveSynth Pro* is a sample-playback module that lets you use sound fonts even if you lack a sound-font-compatible sound card. Unfortunately, the included version is only a trial: you can use it for 30 days, then a 1 MB sound-font limit kicks in; most good sound fonts are larger than that.

Dream Station (reviewed in the November 2000 issue) is a software simulation of an analog modular synthesizer. It offers an envelope generator, an amplifier, a filter, an LFO, and three audio oscillators as well as vibrato, portamento, and output controls such as volume and panning. Using those tools, you can create original synth sounds as you would with a hardware-based analog synth. Although *Dream Station* produces some of the best analog sounds you'll ever hear, it isn't multitimbral. That's not a serious limitation, however, because you can open multiple instances. On my Pentium III/700 MHz, a single *Dream Station* instance occupied a modest 6 percent on *Sonar*'s CPU meter. At one point, I had nine instances running, and I could have easily launched more even while running without WDM drivers.

The *Virtual Sound Canvas (VSC)* is a General MIDI (GM) and GS tone generator that emulates Roland's popular Sound Canvas hardware module. The *VSC* provides 902 sounds covering the GM1, GM2, and GS Format sound sets, in addition to 26 drum sets. It also offers as many as 128 notes of polyphony. It also responds to most available MIDI messages as well as RPN, NRPN, and SysEx, letting you control many otherwise inaccessible parameters such as individual drum panning and effects levels.

The *VSC* uses a bit more processing power than the *Dream Station,* about 16 percent for one instance on my machine, but with all those notes at your disposal, you'll rarely need more than one instance. The only limitation is that you have access to just one sound set at a time. With two instances running, you could use a different set for each instance.

The most complex DXi of the bunch is *Tassman* 2.0 (see the January 2001 issue for a review of *Tassman* 1.2). Like *Dream Station, Tassman* is a modular software synth, but unlike the other DX Instruments included with *Sonar,* it offers dozens of modules and lets you create unique instruments by linking them in various ways (see **Fig. 2**). The modules include familiar analog elements like oscillators, amplifiers, envelopes, and mixers. Also included is an array of real-life physical-modeling modules, including a bowed string and a marimba bar. By combining the modules in unusual ways (how about a bowed marimba bar?), you can build one-of-a-kind synths.

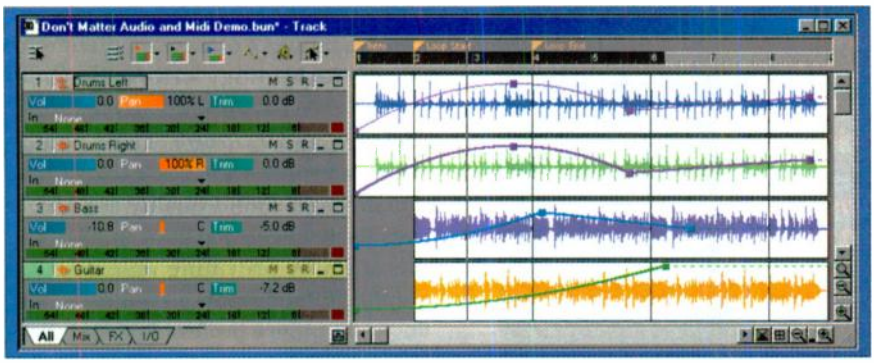


FIG. 3: *Sonar*'s automation data is stored as envelopes in tracks that you can easily edit by clicking and dragging nodes.

modulation depth and frequency, and pan parameters. The Power Technology plug-ins use little processing power—from 4 to 9 percent—so applying multiple instances in real time won't bog down your PC.

The best aspect of the Power Technology plug-ins is that they take advantage of the new functionality provided by Microsoft's DirectX 8 technology (for more information, see "Desktop Musician: DirectX 8 Steps Up" in the April 2001 issue). Thanks to DirectX 8, you can now automate an effect's individual parameters. For example, you could change a flanging effect's speed, an EQ band's frequency, or even a reverb's room size as your audio plays back. Be careful when changing room size, however, as you can introduce artifacts into the audio signal. Unfortunately, the Power Technology plug-ins are the only included plug-ins that support DirectX 8. I hope that more will appear in a future version.

EFFECTIVE AUTOMATA

In *Pro Audio* 9, automation data was stored as MIDI messages, which limited its usefulness. You couldn't automate a track's mute or solo parameters, for example, and the envelope feature was available only for controlling the volume and panning of audio tracks. In *Sonar,* you can automate almost all the parameters of a track, as well as aux and main bus parameters. Automation data is stored as envelopes in the respective track and can be edited by clicking and dragging nodes within the Clips pane of the Track view (see **Fig. 3**). Envelopes are recorded for MIDI and audio tracks.

Using automation on the individual parameters of DirectX 8 effects plug-ins is an exciting option. During one test, I applied the *FxChorus* effect to a sustaining synth-pad sound. Then I applied some subtle automation to the delay, modulation, and pan parameters of each voice in the effect. The result was an undulating sea of sound that made the entire stereo field seem alive with movement—very cool.

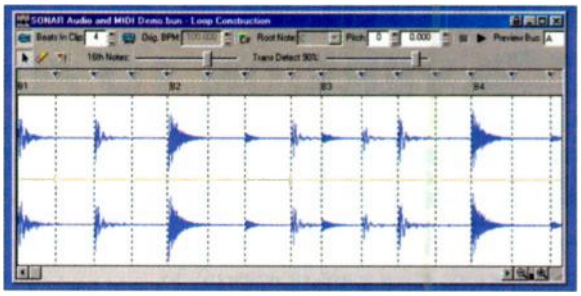


FIG. 4: Use the Loop Construction view to create and manipulate Groove Clips, which are comparable to *Acid* loops in their function.

You can also automate the individual parameters of a DXi, resulting in some incredible synthesis possibilities. For instance, by automating the parameters of a DXi to change smoothly from one set of values to another over time, you can actually morph between sounds. To test that possibility, I sketched out the parameters of two *Dream Station* patches on a sheet of paper and created envelopes for each parameter so that the values would change smoothly from one measure to another. It was a lot of work, and the result was a bit strange, but with the right combination of patches, the possibilities of such synthesis power are staggering.

GIVE 'EM THE SLIP

In addition to the usual cut, copy, and paste features in *Pro Audio* 9, *Sonar* includes new nondestructive editing capabilities that Cakewalk has dubbed *slip editing.* By clicking and dragging the ends or the center of a clip, you can hide or reveal the data in the clip. Hidden data is not processed during playback, but because the data can be revealed at any time, the technique is nondestructive.

For example, if you slip-edit a clip's beginning or end to shorten it, the data hidden at the beginning or end will not play, yet it remains unchanged inside the clip. Additionally, you can shift a clip's contents without changing its length. To do so, just click and drag in the center of a clip while pressing Alt + Shift. The process was fast, easy, and intuitive.

The new nondestructive fades that *Sonar* provides are also nice. Simply position your mouse at the top corner of the beginning or end of a clip (depending on whether you want to create a fade-in or fade-out), and then click and drag inside the clip to define the length of the fade. Creating nondestructive crossfades is even easier: just activate the Automatic Crossfades feature, and then overlap the beginning of the second clip with the end of the first. *Sonar* automatically creates a smooth crossfade across the overlapping portion of the clips. The process couldn't be easier.

GETTING GROOVY

Although DX Instrument support is a significant feature in *Sonar,* I think the coolest addition is the Groove Clips feature, which is Cakewalk's answer to Sonic Foundry's *Acid.* Like *Acid,* Groove Clips can automatically match the playback tempo and pitch of each loop you use in a project. You can even use *Acid*-compatible loops with *Sonar,* so you don't have to worry about having to restock your loop library with yet another file format.

Using the new Loop Explorer view, you can locate files on your system and preview them automatically or manually.

Pro Audio Past and Present

***Pro Audio* 9 (review)**	5/00
***Pro Audio* 9 ("Operation Help: Expert Advice")**	2/00
***Pro Audio* 8 (review)**	2/99
***Pro Audio* 6 (review)**	12/97
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When you preview a file, its tempo is automatically adjusted to the project tempo so you can hear how it might fit with your existing tracks. If you find a loop you like, just drag and drop it into the Track view—either into an existing track or into a blank area in the Clips pane—to have a new track created automatically.

If your loop isn't *Acid*-compatible, *Sonar* provides the tools you need to transform it into a Groove Clip. Using the Loop Construction view (see **Fig. 4**), you can specify whether you want a clip to be looped or transposed and how it should be sliced for accurate time- and pitch-stretching. When you enable looping for a clip, *Sonar* automatically sets the Slicing and Transient Detection parameters, and it usually guesses quite well. Setting the Transient Detection to about 90 percent and the Slicing to the smallest rhythmic value in the clip typically gives the best results. I found, however, that I sometimes produced better results by tweaking the parameters manually.

The wonderful thing about Groove Clips is that you no longer have to switch between two programs to do loop composing. You don't have to create a drum track in *Acid,* import the track to *Sonar,* and then return to *Acid* to make changes; you can do everything within one program. One thing I do miss is *Acid*'s paintbrush tool. In *Sonar,* you have to copy and paste clips into tracks, which is not nearly as easy or intuitive. On the other hand, clicking on and dragging a Clip to change its duration is similar to painting in *Acid,* and unlike *Acid, Sonar* supports different loops on the same track.

MORE MINI MODS

Other less dramatic but welcome improvements in *Sonar* are an unlimited number of MIDI and audio tracks, increased internal MIDI precision (from 480 to 960 ppqn), improved meters (with options for peak, root mean square, prefader, postfader, and prefader posteffects metering), and virtual (rather than fixed) main buses. There's also support for additional audio formats (AIFF, ASF, AU, MP2, MP3, and SND), dual monitors and multiprocessors, and optimization for Windows 2000 and ME.

Sonar isn't perfect. *Sonar* 1.0 shipped with a number of bugs, but Cakewalk addressed those problems with a free update, which brings the program to version 1.02 at the time of this writing. I would like to see a snapshot feature added to the Track view, parameter automation support for all the effects (not just the Power Technology plug-ins), and a paintbrush tool for applying loops to tracks.

Even without those improvements, however, *Sonar* is a definite success. *Pro Audio* 9 was looking a bit outdated compared with the other major sequencing packages. With *Sonar,* Cakewalk has easily caught up with, and maybe even surpassed, the competition.

Scott R. Garrigus *is the author of* Cakewalk Power *and* Sound Forge Power. *He also publishes the* DigiFreq *music technology newsletter. For more information, surf to www.garrigus.com.*

PRODUCT SUMMARY

Cakewalk
Sonar 1.02 (Win)
digital audio sequencer
$479; $739 (XL version)

FEATURES	4.5
EASE OF USE	4.0
DOCUMENTATION	4.0
VALUE	4.0

RATING PRODUCTS FROM 1 TO 5

PROS: WDM support. Unlimited tracks. DX Instruments included. Automatable DirectX 8 effects. *Acid*-compatible looping features. Nondestructive editing.

CONS: Not all effects can be automated. WDM drivers not available for many sound cards. *LiveSynth Pro* is a trial version only. No snapshot configuration for Track view.

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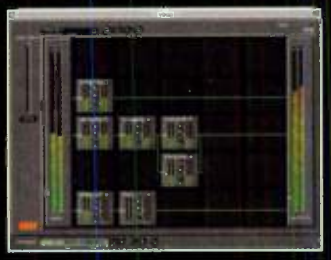

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enhances low-frequency pickup because the fundamental wavelengths of low-frequency vibrations can be longer than the boundary plate. Therefore, boundary-layer microphones work best when they are placed on a bare (noncarpeted) floor or wall. For convenience, they are often mounted on a flat, movable four-foot or larger square panel.

For the 622, which MBHO dubbed OSS-II, the Jecklin disk was essentially cut in half and attached to a round plate fitted with two boundary-layer mics, one on either side of the Jecklin "half-disk."

TWO EARS IS HUMAN

The 622 somewhat resembles a binaural recording system in that a solid object separates the microphone pair, the distance between the microphones is roughly equivalent to the width of a human head, and each mic's pickup is omnidirectional. But that's about as far as the similarities go. I recorded composer Dan Plonsey's Portcullis Ensemble with the 622 (mounted on a wall 30 inches above the floor with the baffle oriented vertically), a binaural head, and a near-coincident pair of omni mics (Neumann KM 183s) and compared the results.

Not surprisingly, when auditioned on headphones, the 622 recording did not sound as stunning as the binaural recording. Nonetheless, it was impressive on several counts. The 622 captured discrete separation among the ensemble's left, right, and centered components, and each voice was clearly positioned in the stereo field. If anything, the positioning of the instruments appeared a bit wider than their placement in the room. In contrast, the Neumann pair yielded a more realistic and blended sound in the headphones but sounded much more roomy and lacked the focused stereo imaging of the 622 when auditioned on monitor speakers.

In addition, the reduced room reflections at the 622's capsules not only made for a drier, more controlled recording but also seemed to bring distant instruments closer to the listening position. In particular, the drums—a full rock set with a deadened kick—had a tightly defined sound with no hint of the mushiness that can plague more traditional stereo drum recordings. The 622 also bestowed a round enhanced low end to the kit. Its high-end response, however, was not quite as smooth or pleasing as that of the Neumann omnis.

On the rest of the ensemble, the 622 gently highlighted the midrange instruments—trumpet, cello, and electronic keyboards—whereas the Neumann pair brought out the airy, higher ranges of the stringed instruments, piccolo, and cymbals. Considering that a single Neumann KM 183 costs hundreds of dollars more than the 622, this stereo microphone is an excellent value.

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AEG Auto Envelope GENERATOR

SKD Smart Knee DETECTOR

EFR Enhanced Frequency RECOVERY

DRAMATIC DRUMS

Acting on a tip from drummer and **EM** contributor Karen Stackpole, I tried the 622 placed on the floor directly in front of the kick on a full drum kit. If wide, dramatically panned drum sounds are your thing, give that technique a listen. I was particularly intrigued by the tom sounds in the recording, which, despite the fact that the mic was positioned below the toms, had a clearly imaged attack and a natural, uncluttered resonance.

The kick sounded respectable too. With careful placement and a bit of reinforcement from overhead mics, the 622 could become a new favorite for capturing dramatic drum sounds.

SPACED OUT

I tested the 622's performance on acoustic guitar in three sonic environments and, not surprisingly for a stereo mic positioned at a distance, received three very different results. I was seated for each recording, playing the guitar with the microphone positioned on the floor four feet in front of my chair's base.

Inside the carpeted and acoustically dead Headless Buddha Mastering Lab, the guitar sounded controlled and even, although not sparkly or exciting. Interestingly, the width of the stereo recording was enhanced by subtle arrival-time differences between the right and left channels. Despite warnings against using boundary mics on carpeted surfaces, the guitar's low end sounded full and even a bit boomy on a low G note.

Next, I recorded the acoustic guitar in a narrow, linoleum-floored hallway using the same setup. It was easy to hear the midrange resonance and lively quality imparted by the close walls. Again, the stereo separation was amazing, with the pick sound clearly audible on one side and my sloppy, buzzing fretwork on the other. In that environment,

PRODUCT SUMMARY

MBHO
MBNM-622
stereo boundary-layer microphone
$545

FEATURES	5.0
AUDIO QUALITY	4.0
EASE OF USE	5.0
VALUE	5.0

RATING PRODUCTS FROM 1 TO 5

PROS: Affordable. Easy to position. Full low-end response without muddiness. Precise stereo imaging.

CONS: No carrying case. Highs sound slightly brittle on some sources.

Manufacturer

MBHO/Music Trade Center (distributor)
tel. (718) 963-2777
e-mail nycdrums@aol.com
Web www.mbho.de

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however, the 622 picked up an overbearing amount of bass.

The third environment, a wider and more open section of the same hallway, produced relatively lean bass on the recording. That prompted me to return to the two hall spaces with the guitar and confirm that it was indeed the spaces' quirky qualities, not the 622, playing tricks on me.

Clearly, the 622 is by no means immune to room sound; it won't hide a space's sonic defects. However, it requires neither an acoustically perfect room or concert hall nor excessive fussing over placement to get usable results.

Incidentally, I left the tape running between takes while recording the aforementioned acoustic-guitar tracks, letting me hear the recorded handling noise as I repositioned the mic for each take. I was impressed by how little handling noise I heard. The mic's self-noise, as heard through the preamps in a Mackie 1402-VLZ mixer, was also acceptably low.

TIGHT ROOMS

I used one of the 622's channels as an ambient drum-room mic for a CD project by guitarist Shelley Doty, with **EM** associate editor Brian Knave thumping the tubs. As the control in this experiment, I employed a Neumann M 147, a large-diaphragm tube condenser that excels at capturing huge kick-drum sounds at a distance. The M 147 also downplays unwanted high-end harshness, which is helpful in the reflective confines of the Guerrilla Recording drum room. Having experienced high-end problems with other omni and boundary mics in that environment, I was interested to see how the 622 measured up. I placed both mics about nine feet from Knave's drum kit, with the 622 on the floor and the M 147 six to eight inches above the floor.

The 622 delivered room sounds that were tighter and less reverberant than what I am used to. The thunderous low end that I rely on from the Neumann tube mic wasn't quite there, but the 622 sounds were still meaty and free from midrange boxiness. As I observed earlier while recording the larger ensemble, the mic sounded nice and full in the crucial 200 Hz "punch" area, and it also responded favorably to experiments with additive EQ in that range. To my surprise, I could boost signals in the 40 Hz to 100 Hz range (using the digital parametric EQ in a TC Electronic M2000) on the MBHO tracks without encountering uneven response or excessive muddiness.

In addition, EQ sweeps throughout the high end showed that the 622 wasn't harsh or exaggerated in the 2 to 3 kHz region, as many condensers mics can be in that application. However, I did note a gentle boost between 5 and 8 kHz, which is typical for many condenser mics. That made the hi-hat and upper frequencies of the snare drum a bit more brittle sounding than I prefer, especially as I boosted the 622 room track to increase the proportion of distant room sound in the mix.

ONE OF A KIND

The MBHO MBNM-622 is an unusual and innovative stereo microphone that successfully combines the characteristics of Jecklin-disk OSS recording and boundary-layer mics. It captures precise stereo imaging and powerful low end, yet its ability to simultaneously magnify detail while minimizing the washing-out effect of reflected room sound is truly unique.

The mic's highs can sound slightly brittle on some sources, but overall, I rate the 622 highly, both for imaging and sound quality. What it might lack in clinically flat frequency response is more than made up for in rock 'n' roll attitude. In addition, the 622 is affordable and easy to use.

It's also quite the inspirational tool. The more I recorded with the 622, the more ideas I had for applications and experiments I'd like to pursue using it. (I'm especially excited about using the 622 as the main mic on a "vintage" jazz or blues session.)

The favored use of the 622 is likely to be for dramatic stereo pickup of drum kits, physically expansive instruments (pianos, marimbas, vibes), and acoustically balanced ensembles such as string sections, choirs, and chamber groups. Its acceptance in the pop-recording world might be limited, especially among novice recordists. But advanced and creative engineers should investigate the wealth of possibilities offered by the 622's twin talents—OSS and boundary-layer miking. The MBNM-622 may not prove to be the most used implement in your audio toolbox, but it unquestionably dares to go where no microphone has gone before.

MBNM-622 Specifications

Type	(2) stereo boundary-layer pressure-gradient transducers (electret), with modified Jecklin disk
Capsules	¼"-diameter aluminum-sputtered Mylar diaphragms
Polar Pattern	hemispherical
Frequency Response	10 Hz–26 kHz (±1.5 dB)
Dynamic Range	130 dB
Signal-to-Noise Ratio	64 dB (@ 1 Pa A)
Self-Noise	30 dB
Maximum SPL	130 dB (for 0.5% THD @ 1 kΩ)
Sensitivity	5 mV/Pa (@ 1 kHz)
Power Requirements	16–48V phantom
Dimensions	6" (H) × 12" (D)
Weight	1.13 lb.

Myles Boisen *is a guitarist, producer, composer, and head engineer and instructor at Guerrilla Recording and the Headless Buddha Mastering Lab in Oakland, California. You can reach him by e-mail at mylesaudio@aol.com.* *Thanks to Dan Plonsey and Karen Stackpole for their assistance.*

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A.R.T. DI/O

Affordable digital conversion with variable tube warmth.

By Mark Nelson

A.R.T. scored a huge hit a couple of years back with the Tube MP desktop mic preamp. Now the company has married digital converters to a 12AX7a tube to create the DI/O, a 2-channel, 24-bit A/D/A conversion box with variable tube warmth, switchable sampling rates as high as 96 kHz, and intelligent digital synchronization (see **Fig. 1**).

The DI/O is designed primarily to provide a high-quality alternative to the digital converters found in computer sound cards—a worthy idea if only because it takes the conversion process out of the noisy, interference-prone CPU environment. The unit can be used for various applications, including warming up digital audio, improving monitoring from digital devices such as DAT recorders (particularly older models), and acting as a tube stage in analog signal paths.

FAMILY RESEMBLANCE

With its sturdy metal enclosure and easy-to-read silk-screen lettering on the front and top panels, the DI/O bears a strong resemblance to A.R.T.'s other desktop processors. Like those units, it is designed to sit on top of something—there is no easy way to rack it. What's more, information about sampling rate and clocking status is printed on top of the unit, reinforcing the designer's intention that it reside on a level surface.

The front panel provides a pair of continuously variable rotary knobs: one for Input Gain (from 0 to +20 dB) and one for Tube Warmth (from Clean to Warm). The only other control is a button on the left for selecting sampling rate and clocking source. Two columns of green, yellow, and red LEDs complete the front-panel offerings. Those on the left (beside the button) display the selected sampling rate and whether the DI/O is operating as the master clock or slave; those on the right (labeled 0 dB, WRM, and –20 dB) indicate input level and the amount of signal flowing through the tube.

INNIES AND OUTIES

The DI/O's rear panel provides two unbalanced ¼-inch inputs and two unbalanced ¼-inch outputs; two RCA jacks supply S/PDIF digital I/O. The DI/O can sync to an outside digital clock carried in an incoming S/PDIF data stream, or you can use the unit as a S/PDIF master clock. As with most S/PDIF-clocked devices, the DI/O will slave to nearly any clock rate you throw at it, from 22 to 100 kHz. Unfortunately, the unit does not support word clock, which means you can't use a single clock source to maintain peace among a multiplicity of digital gear.

A wall wart with a fairly short cable supplies power. The review unit arrived with a mismatched power-supply plug and jack that caused the unit to short if the cord was jiggled. So I called on one of the four elemental forces in the universe: duct tape.

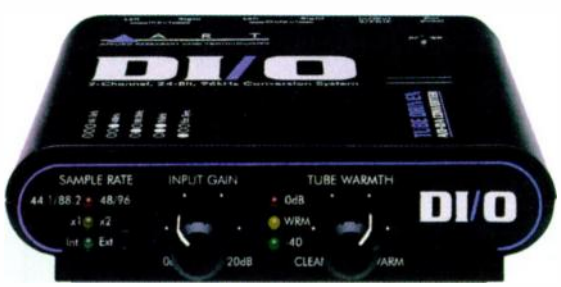


FIG. 1: The A.R.T. DI/O is a 2-channel, 24-bit A/D/A conversion box with quality converters, selectable sampling rates, and a built-in 12AX7a tube that provides variable warmth to analog and digital signals.

MEET THE METERS

Reading input levels on the DI/O takes practice. At first glance, the LEDs seem to act as a simple ladder meter: there's a green LED at the bottom, a yellow one in the middle, and a red peak-warning LED at top. The green LED glows when the DI/O detects a signal of at least –20 dB; however, the middle light doesn't indicate signals between –20 and 0 dB. To quote from the manual: "The yellow (Warm) LED comes on whenever the tube is adding warmth or character to the signal. This is a function of both the signal level and the Tube Warmth control."

I would have preferred three-stage input metering along with a separate indicator for the tube circuit. I also would have liked an output-level control; it was sometimes difficult to balance the Input Gain and Tube Warmth pots to set output level. Even with some built-in digital headroom (the peak LED lights at –3 dB Full Scale, not 0 dB as indicated by the manufacturer), I still managed to fry the audio going to my computer more than once.

PRODUCT SUMMARY

A.R.T.
DI/O
tube A/D/A converter
$249

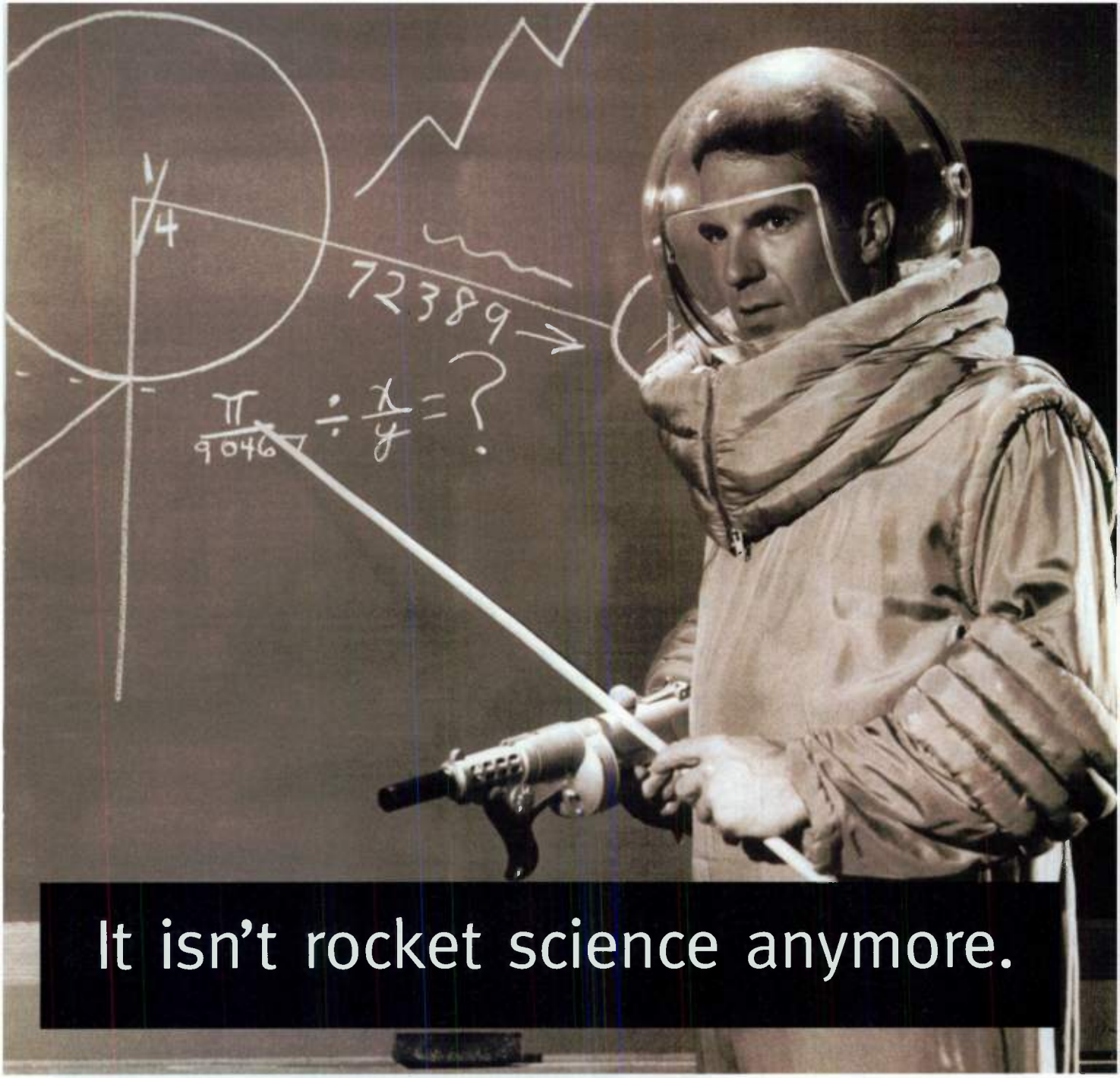
FEATURES	2.5
EASE OF USE	4.0
AUDIO QUALITY	3.5
VALUE	4.0

RATING PRODUCTS FROM 1 TO 5

PROS: Compact. Affordable. Easy to use. Surprisingly good-sounding converters. Tube adds warmth to analog or digital signals. Can function as DI box with digital out.

CONS: Unbalanced analog I/O. No output-level control. Does not support word clock. Word length not selectable. Wall-wart power supply with short cord.

Manufacturer
Applied Research and Technology
tel. (716) 436-2720
e-mail art@artroch.com
Web www.artproaudio.com



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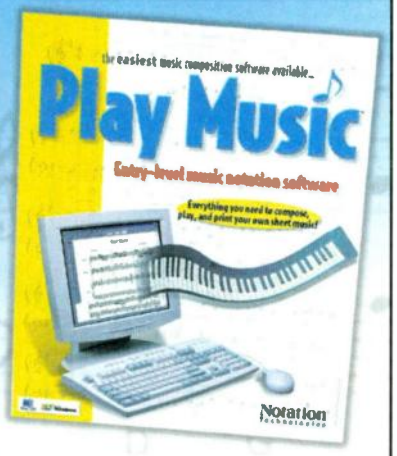

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JUDGMENT DAY

I have to say a bit about judging the sound of digital converters. In the first place, other factors are involved besides the quality of the converters (see the sidebar, "Sounds Good to Me"). Also, it's often difficult to hear subtle differences in the less-than-pristine environment of the typical desktop studio. For that reason, I want to stress that my analysis is subjective.

When testing the DI/O in my studio, I always listened with the unit set both as master and as slave, monitoring adjacent channels on a Mackie 1604-VLZ mixer through a pair of Alesis Monitor Ones driven by an Alesis Mattica 500 amp. At other locations, the listening environment was similar.

WHAT'S THE WORD (LENGTH)?

I decided first to see how the DI/O's D/A converters stacked up against those in a proven workhorse: the Panasonic 3800 DAT recorder. I cabled up with fresh S/PDIF cables, popped in a recently finished mix of a blues band, and prepared to be unimpressed. After all, the 3800 cost me a lot of dough, and the DI/O lists for less than $250.

Boy, was I surprised. Here are my notes from that first listening session: "3800: Big. Bold. Bass kind of washed out? Some splashiness in cymbals. DI/O: Tighter bottom. Cymbals more distinct. Sound field wider, more transparent. What's going on here?"

The DI/O rocked; when I dialed in tube warmth, I really sat up and took notice. As levels approached saturation, I heard telltale tube compression and grit, just the thing to capture a '60s vinyl vibe. I repeated the tests with a different demo; again, the DI/O impressed me. At the Clean setting, it flattered the female singer and did delightful things to the spaciousness of the reverb.

I did both tests with 16-bit, 44.1 kHz material—no problem when using the DI/O's 24-bit D/A converters for monitoring. However, when using the unit for recording to a 16-bit medium (such as a DAT recorder), the final 8 bits of each sample necessarily get truncated, effectively eliminating many of the advantages of the longer word. Likewise, when recording to a 20-bit medium, the final 4 bits get truncated. The DI/O's

SOUNDS GOOD TO ME

CD audio was standardized at 16-bit word length and 44.1 kHz sampling rate because it was believed that those specs adequately reproduced the full spectrum of human hearing. Almost immediately, though, audiophiles began carping, and the search for something better was on.

Although much of CD audio's original bad reputation can be traced to inferior digital-to-analog conversion technology, you can now take advantage of 20- and 24-bit depths for exponentially more resolution and headroom. Likewise, increasing the sampling rate to 48, 88.2, or 96 kHz greatly increases detail, which is especially noticeable in the higher frequencies.

But no matter what the resolution, all digital signals are susceptible to jitter, an unpleasant distortion caused by an unstable clock. That's why professional installations slave every piece of digital gear to a single clock source.

Fortunately, converters have improved dramatically since the early days of CDs. Yet most professionals agree that a high-quality converter at 16-bit, 44.1 kHz frequently sounds much better than a consumer-grade model at 24-bit, 96 kHz. Why? Aside from the quality of the converters, just about every design feature and component inside the box can have an effect on the audio quality. External conditions can also affect audio quality. For example, place the converters near a source of heavy electromagnetic and radio-frequency interference—inside a computer, say—and you're asking for trouble.

broadjam

Artist: Katrina Carlson
Genre: Pop

Song: I Know You By Heart
LO-FI MP3 | HI-FI MP3 | REAL AUDIO

Artist: Kodac Harrison
Genre: Blues

Song: Love Turned On The Light
LO-FI MP3 | HI-FI MP3 | REAL AUDIO

Artist: Faye
Genre: Alternative

Song: What's Right
LO-FI MP3 | HI-FI MP3 | REAL AUDIO

Artist: Bill Epps
Genre: R & B

Song: Sign On In
LO-FI MP3 | HI-FI MP3

Artist: Derrick Procell
Genre: Country

Song: Same Plan
LO-FI MP3 | HI-FI MP3

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lack of dithering prevents the usual solution of dithering samples down to desired lengths.

Even so, the DI/O's A/D converters compared favorably to the 3800's. For example, on an Appalachian mountain dulcimer with the DI/O's Tube Warmth control set to Clean, the DI/O recording better captured the sparkling transients of the pick hitting the strings, without losing what little lows the instrument produces.

Notoriously difficult to record, the Irish bodhran (a frame drum) often comes out sounding like a pair of tennis shoes rumbling around in a dryer. In this case, the results were even more pronounced. The DI/O won hands down, better capturing the *thwack* of wood against skin and the wonderful low end the drum is known for. Dialing in the tube added the final touch—it made the drum sound big, warm, and fat. I certainly want a DI/O for my next hand-percussion session.

DI/O Specifications

Digital Converters (A/D/A)	24-bit, 128× oversampling
Sampling Rates	44.1, 48, 88.2, 96 kHz (selectable)
Frequency Response	10 Hz–30 kHz (± 0.5 dB)
Dynamic Range (20 Hz–20 kHz)	>100 dBA (A/D); 105 dBA (D/A)
Maximum Input Gain	+20 dB
Maximum I/O Level	+20 dBu
Analog Inputs	(2) unbalanced ¼"
Analog Outputs	(2) unbalanced ¼"
Digital I/O	(2) S/PDIF on RCA connectors
External Sync Range	22–100 kHz
Tube	12AX7a dual-triode
Power Supply	wall wart
Dimensions	5.375" (W) × 2.0" (H) × 5.25" (D)
Weight	1.5 lb.

SOUND ADVICE

Impressed by how good the DI/O's A/D and D/A converters sounded, I was keen to find out how well the unit functioned in its intended role: as the digital front end for a computer sound card. Used in that manner, the unit essentially replaces the sound card's converters, so the results depend on the card.

The DI/O provided a distinct improvement in sound to a popular, inexpensive sound card I compared it with. The kick drum and snare sounded pleasingly fatter, and a crash cymbal's

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Type: vacuum tube condenser
Frequency Response: 20Hz to 18kHz
Polar Pattern: cardioid
Sensitivity: >16m V/Pa
Output Impedance: <200 ohm
Output Noise: <18dB typical, A weighted
THD: <0.5% at 120 dB SPL
Power: external regulated 115/220 P.S

SE1
Sale $89.00
Type: small diaphragm condenser
Frequency Response: 30Hz to 18kHz
Polar Pattern: cardioid
Sensitivity: 10mV/Pa
Output Impedance: <200 ohm
Output Noise: <18dB typical, A weighted
THD: <0.5% at 134 dB SPL
Power: +48V phantom power

SE1000
Sale $99.00
Type: large diaphragm condenser
Frequency Response: 30Hz to 20kHz
Polar Pattern: cardioid
Sensitivity: >18m V/Pa
Output Impedance: <200 ohm
Output Noise: <17dB typical, A weighted
THD: <0.5% at 120 dB SPL
Power: +48V phantom power

SE2000
Sale $129.00
Type: large diaphragm condenser
-10db Pad - lo-cut filter
Frequency Response: 30Hz to 20kHz
Polar Pattern: cardioid
Sensitivity: >18m V/Pa
Output Impedance: <200 ohm
Output Noise: <17dB typical, A weighted
THD: <0.5% at 120 dB SPL
Power: +48V phantom power

SE2500
Sale $149.00
Type: large diaphragm condenser
Frequency Response: 30Hz to 18kHz
Polar Pattern: cardioid
Sensitivity: >16m V/Pa
Output Impedance: <200 ohm
Output Noise: <17dB typical, A weighted
THD: <0.5% at 120 dB SPL
Power: +48V phantom power

SE3000
Sale $179.00
Type: 1.07" twin diaphragm condenser
Frequency Response: 20Hz to 20kHz
Polar Pattern: cardioid, figure 8, omni
Sensitivity: >18m V/Pa
Output Impedance: <200 ohm
Output Noise: <17dB typical, A weighted
THD: <0.5% at 120 dB SPL
Power: +48V phantom power

SE3500
Sale $169.00
Type: 1.07" large diaphragm condenser
Frequ1ency Response: 20Hz to 20kHz
Polar Pattern: cardioid
Sensitivity: >20m V/Pa
Output Impedance: <200 ohm
Output Noise: <15dB typical, A weighted
THD: <0.5% at 120 dB SPL
Power: +48V phantom power

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decay lacked the graininess I noticed when listening through the card's internally mounted digital-to-analog converters. If you're stuck with a wimpy sound card, the DI/O may be the cheapest improvement to your sound you can make.

I also put the DI/O head-to-head with some respectable 20- and 24-bit converters from Mark of the Unicorn and Digidesign, among others. I listened to material recorded at several studios and at various word lengths and sampling rates. Things started to get fuzzy: sometimes it was all but impossible to tell the difference between the DI/O and the more expensive converters. Considering that the other units cost much more than the DI/O, that is no mean achievement.

OTHER (CHEAP) TRICKS

I also checked out the DI/O as a digital direct-injection (DI) box. Again, lack of an output-level control made things difficult. The unit does not have sufficient gain for some signals—my acoustic guitar's pickup, for example, scarcely registered.

Electric guitar, bass, and keyboards fared better, however. In each case, the tube provided character and, well, warmth. The DI/O won't replace a full-fledged Class A tube DI, but it does a nice job. I particularly liked the added roundness it brought to Fender bass tones.

For my last alternative application, I took a tip from the manual and ran a keyboard through the DI/O's tube path with the unit's analog ins and outs. (That requires a jumper across the S/PDIF input and output.) The unit provided an improvement, albeit subtle. Stick the DI/O between your keyboard and the P.A. and you, too, can say, "Gee, Dad, it's a Wurlitzer!"

THE VERDICT

Admittedly, I was prepared not to like the DI/O. Call it audio snobbery, but I just didn't believe something this inexpensive could sound so good.

The A.R.T. DI/O does everything it is supposed to do and does it quite well. If you have a sound card with surface-mounted S/PDIF connectors, the DI/O will almost assuredly give you better-sounding audio. What's more, it can improve monitoring from older DAT and other digital recording devices; can double as a credible DI (with digital out); and can warm up analog signals, whether in the studio or live.

I remain underwhelmed with the DI/O's unbalanced analog ins and outs and the lack of a dedicated output-level control. Moreover, I would like to see support for multiple word lengths and word-clock sync, though clearly those amenities would drive up the unit's price. Just the same, the DI/O is one remarkable little box, especially considering its low price.

Mark Nelson *lives and records in southern Oregon. A lifelong acoustic musician, he remembers when "sampling rate" meant how fast you could scarf the shrimp at the wrap party.*

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KIND OF LOUD

REALVERB PRO 1.1 (MAC; TDM)

Is it real, or is it Kind of Loud?

By Jeff Burger

Plenty of good reverbs are available, both hardware and software. Most have many attributes in common, defining a standard method for creating the illusion of space in a mix. With modeling technology all the rage, it's no surprise that someone devised a reverb technology based on modeled spaces and materials. The result is a truly great-sounding reverb and a new way of thinking about defining spatiality.

RealVerb Pro 1.1 is designed for TDM systems, and a functionally equivalent version is included with Universal Audio's Powered Plug-Ins software and digital signal processing (DSP) card bundle ($995). Kind of Loud also offers *RealVerb RTAS* ($249) and *RealVerb MAS* ($249), as well as *RealVerb 5.1* ($795) for surround-sound reverb in TDM environments.

RealVerb Pro requires Digidesign's *Pro Tools* 5.1 or later. The older *RealVerb TDM* ($495) is required and still available if you're running *Pro Tools* 4.3 or 5.0. Scaled down a bit to accommodate the lack of DSP, the Real Time AudioSuite (RTAS) and MOTU Audio System (MAS) versions offer fewer reflections and no diffusion control.

PRODUCT SUMMARY

Kind of Loud
RealVerb Pro 1.1 (Mac; TDM)
reverb-modeling plug-in
$495

FEATURES	4.0
EASE OF USE	4.0
AUDIO QUALITY	4.5
VALUE	4.0

RATING PRODUCTS FROM 1 TO 5

PROS: Realistic reverberation. Smooth audio even when moving controls. Preset morphing. Source positioning. Intuitive interface.

CONS: PDF documentation only.

Manufacturer
Kind of Loud Technologies
tel. (831) 466-3737
e-mail info@uaudio.com
Web www.uaudio.com

MATERIAL WITNESS

At the core of *RealVerb*'s design is the concept that you choose what physical materials make up your virtual environment. That environment dictates the relative decay rates of different frequencies. *RealVerb* uses standard acoustic measurements of the absorptive properties of real-world materials to calculate decay-rate characteristics.

Acoustical law says that the more a given frequency is absorbed, the faster it decays. Conversely, the less a frequency is absorbed, the slower it decays. That approach to simulating physical surroundings yields virtual spaces that sound more realistic than simply dialing in some EQ on traditional reverbs.

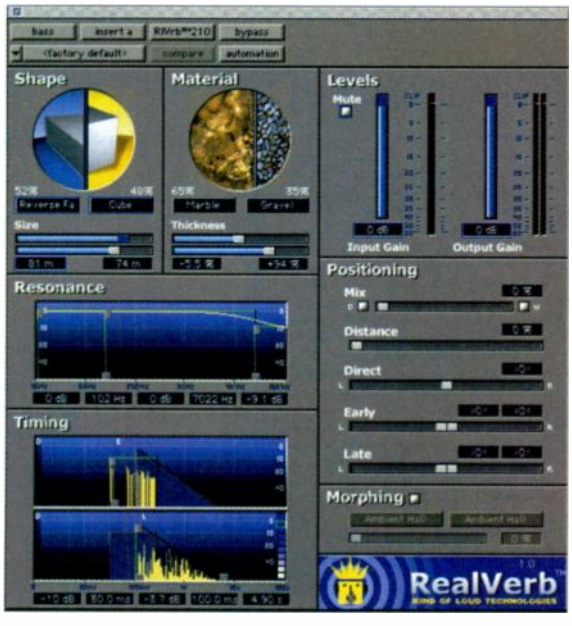

FIG. 1: Taking an unconventional approach to room simulation, *RealVerb Pro* lets you construct a virtual environment from real-world materials such as marble and gravel. Additional programmable parameters include the room's shape and separate timing for early- and late-field reflections.

RealVerb offers a pair of pop-up menus to select two room materials from a list of 36, including marble, carpet, plaster, glass, concrete, hardwood, air, seats, and audience. Graphics representing those materials appear in a split window; change the balance of the two materials by dragging the split point (see Fig. 1). The Thickness slider determines the response of the selected material's natural reflective and absorptive qualities. Positive values exaggerate properties, and negative values invert them. A setting of zero means that all frequencies are absorbed equally. (For a look at *RealVerb*'s use of artificial materials, see the sidebar, "Artificial Reality.")

A similar construct lets you choose not just one room type and size but a blend of two; for example, you can combine a large dome with a small A-frame. The two selected rooms are combined into a single conceptual room (as opposed to simply adding the two results together at the output). Other shapes include cube, shoe box, corridor, and horseshoe. The plug-in provides artificial room types such as spaces realized with springs and various plates. The distance from the sound source to the opposite wall of the room can be as little as half a meter or as great as 99 meters.

Although your selection of materials largely dictates the environment's tonality, *RealVerb*'s 3-band "paragraphic" EQ lets you change the resonance of the virtual space. The equalization curve is determined by the amplitude at four frequency points—two defined by the user and one at each end of the audible spectrum.

TIME AND SPACE

RealVerb's Timing panel displays the selected materials' early reflections and late-field reflections in two graphs. The

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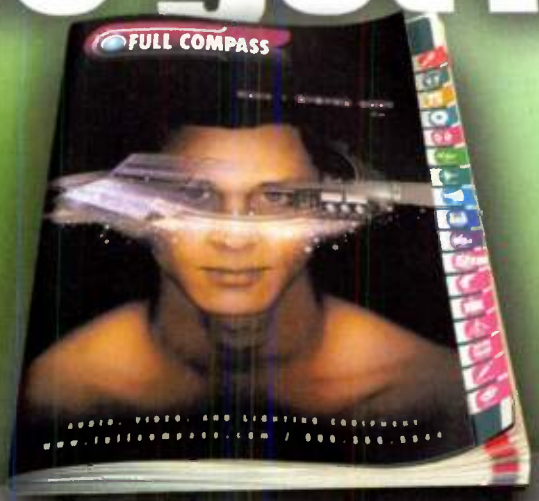

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separate display of those attributes is especially handy when constructing environments in which the two overlap.

By dragging the rectangular early-reflections envelope, you change the amplitude (the vertical axis) or delay between the direct sound's arrival and the onset of early reflections (the horizontal axis). Late-field reflections are contained in a triangular envelope, the slope of which dictates the decay of the reverberation tail. Dragging the upper vertex of the triangle changes the amplitude, onset time, and reverb time. You can also enter numbers to manipulate both graphs. Another control in the Timing panel determines how quickly the late field's density increases.

RealVerb's Positioning panel is an area in which the product shines. With most reverb hardware and software, you adjust reverb amount and predelay to try to simulate the source at a distance. In another example of real-world thinking, *RealVerb* employs a distance model that controls the mix of direct and reflected energy according to the Distance control's setting. The Direct Panning control determines the direct signal's width.

RealVerb offers controls for separately placing the early- and late-field reflections within the stereo field. The Early and Late sliders each have handles for determining extension into the left and right fields, providing precise control of stereo imaging. You can also grab anywhere between the handles and drag the stereo image farther right or left. *RealVerb* 5.1 replaces the positioning sliders with surround-sound positioning circles.

GIVE ME MORPHING

One problem that sound-effects designers encounter is transitioning between spaces—a car speeding out of a garage or someone walking through a doorway to a radically different environment, for instance. The typical solution has been to blend the outputs of the two environments. Consider an example cited in *RealVerb*'s documentation, in which one room has 10 ms of echo and another has 100 ms. Traditional methodology would blend them with each at half power. *RealVerb* includes a morphing feature that averages the two values, yielding an echo of 60 ms at full power, perhaps.

▼

Kind of Loud did a nice job of eliminating zipper noise.

Automating the Morphing slider allows smooth transitions between the two presets. You can select the morphing source presets only from *RealVerb*'s root directory, not from its hierarchical folders. Consequently, you might need to copy some of the presets prior to morphing.

Minimum System Requirements

RealVerb Pro

Mac 9500; 128 MB RAM; OS 9.0.4; *Pro Tools* 5.1 TDM; Mix card; CD-ROM drive

RealVerb's controls are continuously adjustable. Kind of Loud did a nice job of eliminating zipper noise and other digital artifacts when you change controls in real time.

ON REFLECTION

RealVerb sounds, well, real. Although not quite as lush as the TDM version, the RTAS and MAS versions still deliver possibly the richest native reverb around. *RealVerb* ships with a nice assortment of presets to get you started, as well as a PDF manual that includes a welcome technical appendix covering some reverberation concepts.

Kind of Loud has provided a tool that lets musicians and engineers think about creating acoustic spaces in a more organic way. Whether you want a marble bathroom or a concert hall filled with people, it's much easier to define a virtual environment by its physical attributes than to mimic one with the controls on a traditional reverb unit. The ability to position and move the source, as well as morph between spaces, is a tremendous boon for sound design.

Kind of Loud also struck a good balance with the software's interface. After all, true environmental modeling can be as involved as constructing three-dimensional models in the computer-graphics world. *RealVerb* doesn't let you design exact room shapes or place different materials on specific surfaces, but it strikes a manageable balance.

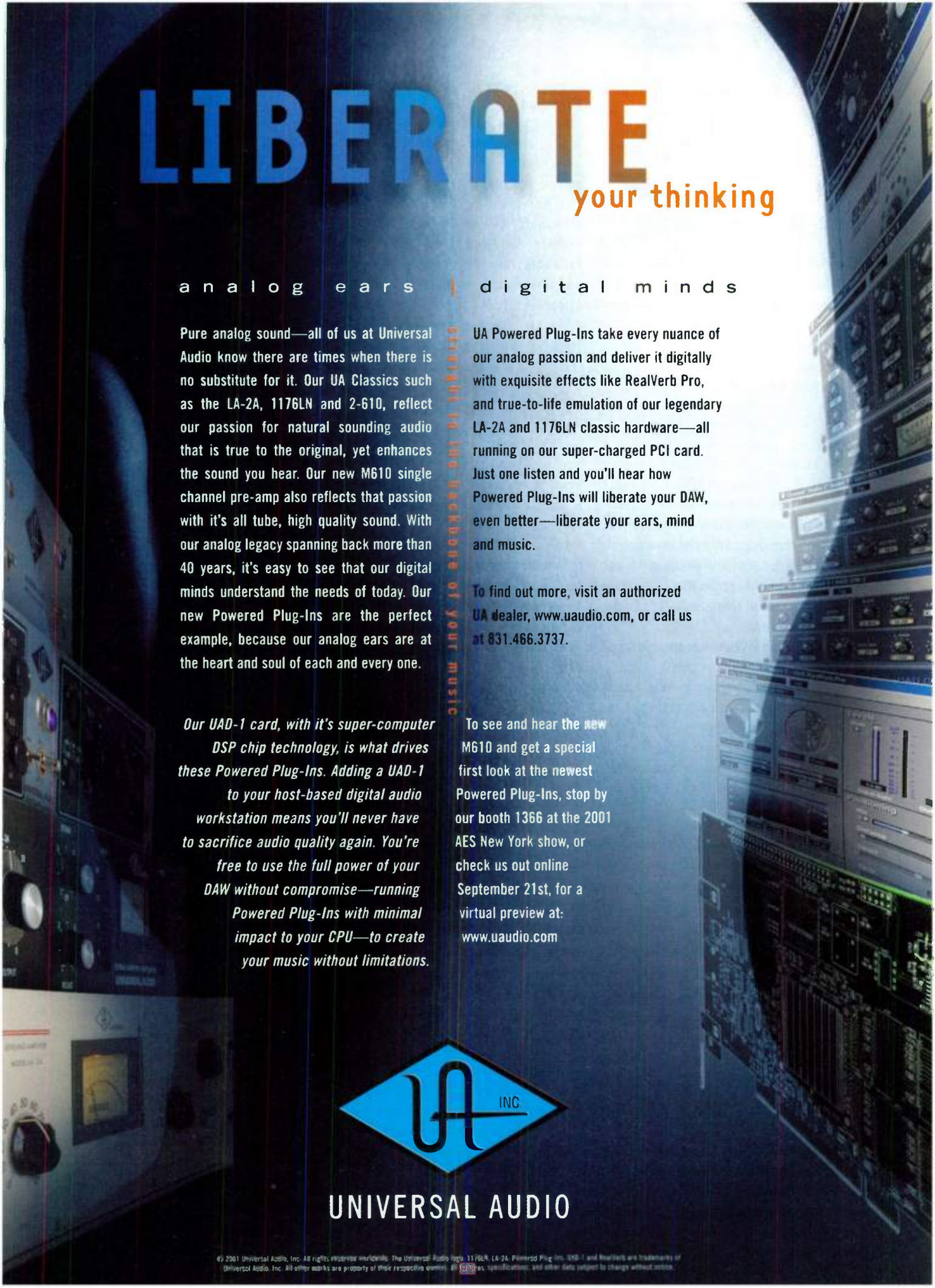
RealVerb is an excellent product for any mixing application. Until now, technology conventions conditioned most people to think about spatial simulation in artificial terms. Ironically, it takes a bit of adjustment to think about the process as defined by *RealVerb*. Ultimately, the results are more natural, both conceptually and sonically.

Jeff Burger *is a songwriter and producer based in Sedona, Arizona.*

ARTIFICIAL REALITY

In addition to dozens of standard materials, *RealVerb Pro* 1.1 also includes a variety of artificial materials named according to given frequencies. To fully understand the naming conventions used for those artificial materials, some background is needed.

In nature, high frequencies decay faster than low frequencies. In technical terms, T60 is the time it takes the reverb tail of the signal's low frequencies to reach 60 dB below the source level. High frequencies decay at a rate of T60/10. The frequency in the name of one of *RealVerb*'s artificial materials represents the rolloff point between those two realms. A material specified with a property of 8 kHz, therefore, means that all frequencies above 8 kHz will roll off ten times faster than the frequencies below 8 kHz.



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Quick Picks

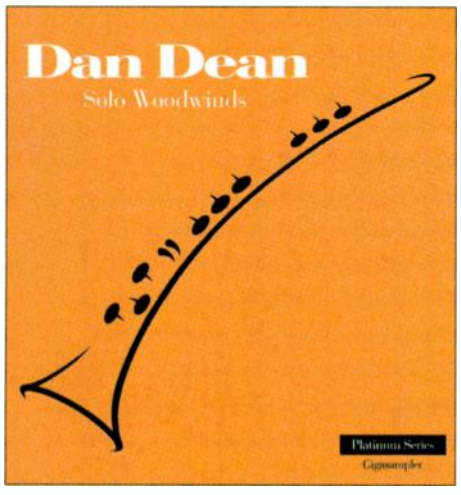
DAN DEAN PRODUCTIONS, INC.

Dan Dean Solo Woodwinds (GigaSampler)

By David Rubin

Samplers have been the traditional tools of choice for rendering the complexities of woodwind sounds. But hardware samplers are frequently hobbled by RAM restrictions, spawning presets based on a limited number of short, looped samples with few, if any, dynamic layers. To avoid those problems, composer and instrumentalist Dan Dean turned to the GigaSampler format. His *Dan Dean Solo Woodwinds* collection ($549) offers natural-sounding unlooped woodwind samples that beautifully exploit the power of NemeSys's *GigaStudio* software sampler.

Dan Dean Solo Woodwinds ships in a zippered nylon case filled with discs and a small but highly informative booklet. A separate CD is provided for each of the ten instruments in the collection: piccolo, flute, alto flute, bass flute, clarinet, bass clarinet, oboe, English horn, bassoon, and contrabassoon. You can buy the discs for $99 each.



***Dan Dean Solo Woodwinds* includes hundreds of great-sounding orchestral woodwind patches in a ten-disc collection. Every note was sampled for each instrument with as many as six dynamic levels.**

Playtime

The instruments were recorded digitally in a relatively small room with a modest amount of natural reverb and no EQ. The samples are consistently clean, clear, and easy to work with in solo parts or in combinations. You can add additional reverb without muddying the sound if you need to create a larger concert setting, or you can use any sound as is for an up-close effect.

EM ★★★★★ hot pick

Each instrument was recorded with four basic performance techniques: legato with vibrato, legato without vibrato, staccato, and portato (short but not as short as staccato). Because vibrato is less commonly used with the clarinet and bass clarinet, vibrato presets are not provided for those instruments. That's too bad; a clarinet with vibrato could come in handy for solos in certain styles.

In addition to the four basic playing techniques, each instrument was recorded at different dynamic levels from *pp* to *ff*. The clarinets, contrabassoon, flute, and oboe are offered with an amazing six dynamic layers. The English horn has five layers; the rest have three or four. Having so many dynamic levels can impart a greater realism to the instruments as their timbres change from soft to loud. As you might expect, sampling each note of an instrument containing multiple dynamic levels yields some rather large presets, so the collection also includes limited versions to conserve memory.

Tone Controls

Dan Dean Solo Woodwinds becomes interesting when it combines the basic presets with *GigaStudio*'s controller capabilities. For example, you can use the Mod wheel to add a slower or faster attack to either legato sound or to switch between playing techniques on the fly.

However, I much prefer using *GigaStudio*'s key-switching feature, which is well implemented in the collection. It lets you do the same things as the Mod wheel does, but with a more definite feel. Two or more designated keys outside of the playing range let you change, in real time, from one playing technique to another. For example, having vibrato on all the time often seems unnatural because wind players seldom add vibrato to every note. With key switching, I can play a passage without vibrato and add vibrato only to the final note in a phrase. In a similar manner, I can play a string of staccato notes and play the final note sustained, or vice versa.

Several presets allow you to change from one patch or layer to another with Velocity switching. One of my favorite presets, however, uses key switching instead of Velocity switching to jump from layer to layer. It takes some practice to use effectively, but selecting layers independently of the Velocity opens some exciting possibilities.

For example, sometimes a note that appears frequently in a passage begins to sound unreal because it always sounds exactly the same—a common problem with sampled instruments. By changing layers (with key switching) while keeping the Velocity constant, you can change the sound of a note in a subtle way without making it louder or softer. Not all layers work for that technique, but you can certainly add variety that might not otherwise exist. The same technique also comes in handy with unison ensembles to keep the different instrument lines from sounding identical.

Sound Judgment

Overall, the instruments in *Dan Dean Solo Woodwinds* sound great. The alto and bass flutes sound especially lush; the English horn and oboe have a nice reedy timbre and a subtle vibrato. The clarinet is not quite as woody in the *chalumeau* register as I would like, but the instrument's six layers offer a good deal of control over its sound. The bass clarinet and low double reeds offer smooth, dark timbres at the bottom end.

With well over 4 GB of carefully crafted multisamples and hundreds of useful presets, *Dan Dean Solo Woodwinds* is clearly aimed at desktop musicians and orchestrators who take their wind instruments seriously.

Overall EM Rating (1 through 5): 5

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Quick Picks

HHB

CDR-830 BurnIt

By Gino Robair

HHB's latest addition to its line of standalone burners is the CDR-830 BurnIt ($699). BurnIt records and plays both CD-Rs and CD-RWs and can add text to the disc for use in CD Text–compliant players.

Why Stand Alone?

A standalone burner is handy for quick and easy backup and archival purposes. Unlike a computer-based burner, a standalone unit works in real time only. Herein lies its strength: a standalone burner is as easy to use as a tape machine. Unlike computer-peripheral CD-R burners, BurnIt lets you finalize a disc when you're ready.

Right after a multitrack mixing session, for example, you can burn a reference CD of each mix to give to a bandmate or client. If the session isn't finished, remove the CD-R without finalizing it. When you're ready to mix again, pop the unfinalized disc into the recorder, and BurnIt will continue recording where it left off.

With CD-RWs, you can erase and record tracks as much as you need to before you finalize the disc. Once you have finalized it, you can choose to erase just the Table of Contents (TOC), erase all of the tracks, or completely reinitialize the disc.

You can only record audio using BurnIt, however. It cannot be used to back up computer files or to duplicate CD-ROMs. The recorder does let you set the Serial Copy Management System (SCMS) bit that controls the number of serial digital copies that can be made from your CD-R or CD-RW.

Archive-o-matic

BurnIt's front panel is neat and simple, featuring traditional controls such as Record, Play, Fast Forward, Reverse, and Skip ID. The wireless remote control includes the full functionality of the front panel, so you can work from across the room if needed.

BurnIt has individual front-panel level controls for the analog and digital inputs. It is unusual for a digital recorder of BurnIt's price to have a digital level control; I used the feature to archive low-level digital recordings. The digital control gives you ±20 dB of gain.

With RCA jacks for analog I/O at –10 dBV and optical and coaxial jacks for S/PDIF digital I/O, the back-panel layout has a semipro feel. The A/D/A converters sound great, and the unit automatically converts incoming digital signals between 32 and 48 kHz to 44.1 kHz.

BurnIt is great for backing up digital source material such as DATs, CDs, and MDs. In Sync-Final mode, BurnIt starts recording when the source deck begins playing, transfers the ID marks, and automatically finalizes the disc at the end. In Sync-All mode, the recorder pauses at the end of the recording and waits for you to begin the finalization process.

The ability to create CD Text discs also helps this unit stand out from others in its price range. BurnIt's memory can store text for three separate unfinalized CD-Rs. Each ID title can include 120 characters, with a maximum of 2,000 per disc; you can copy and paste as many as 40 characters. I found the text abilities of BurnIt important for archival purposes.

Quick and Painless

I created a number of demo compilations, from a variety of sources and formats, during the review. If I had made the demos using my computer and CD-R peripheral, it would've taken me much longer than it did with BurnIt. The Rec Mute button lets you add four seconds of silence between IDs, but you cannot specify exact timings, as you can with a dedicated CD-burning computer application. That's a trade-off you will have to accept for the convenience that BurnIt provides.

BurnIt tackled almost every task I threw at it. Only two CD-Rs failed during finalization; both were the result of using low-cost blank media. A couple of times, the excessive blank space on a DAT I was backing up in Sync-Final mode caused BurnIt to erroneously begin finalizing the disc before the end of the tape. To remedy such situations, add the IDs manually.

HHB's CDR-830 BurnIt is a 2U standalone CD-R and CD-RW burner that sounds great and is as easy to use as a DAT recorder.

Burn Unit

Priced well below $1,000, BurnIt is ideal for the personal studio. The blank media is cheaper than DAT tape, and the unit itself is less expensive than recorders with comparable sound.

If you're tired of the extra time it takes to use your computer to assemble a CD-R or CD-RW, you'll appreciate BurnIt's simplicity and quality. But be forewarned: using it is addictive.

Overall EM Rating (1 through 5): 4.5

HHB; tel. (310) 319-1111; e-mail sales@hhbusa.com; Web www.hhbusa.com

BIG FISH AUDIO

Off the Hook

By Jeff Obee

Big Fish Audio's *Off the Hook* ($99.95; two-CD set) is all about contemporary R&B and hip-hop dressed to the nines in a silk suit. The collection is presented in the familiar construction-kit format: a short song leads off each track and is followed by its individual instrumental elements. The strength of this collection is its live feel; most of the samples are real-time performances.

The music skirts between fairly predictable adult-contemporary styles, hip-hop-flavored pop, and a bit of bluesy funk. Musicians who write songs in the style of Babyface or Najee will find plenty of appealing material. R&B singers of all stripes will most assuredly pull the CDs out of their libraries often, and rappers will also find many tracks to be ideal foundations to build on.

Overall, I like the construction-kit compositions. Many are sweet and melodic. For example, disc 2's leadoff track, "The Maestro," is in E minor and has a soulful, medium-slow hip-hop groove. Some fine piano playing floats over the drums and percussion; portamento synth pads; strings; and squirrelly, legato, monophonic synth lines are layered throughout. The funky

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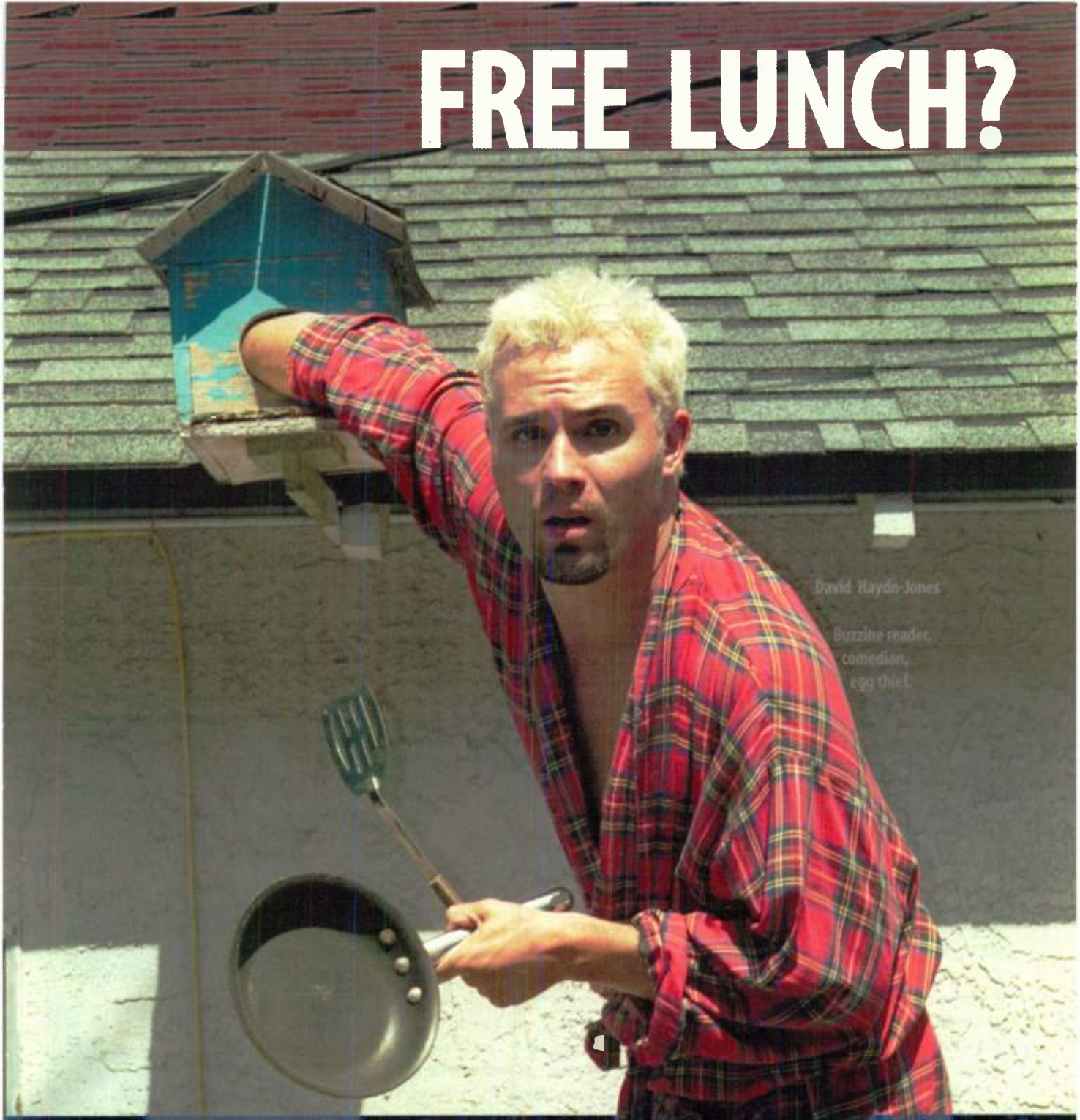

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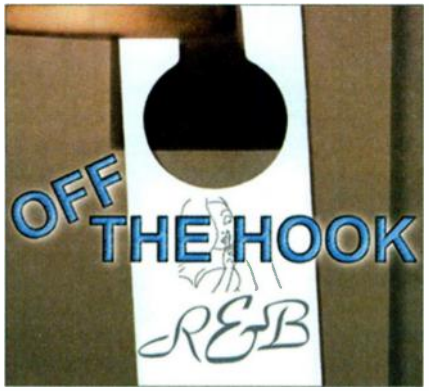


Big Fish Audio's *Off the Hook* sample CD offers a stylish collection of construction kits for contemporary R&B, smooth jazz, and hip-hop.

"Maryjane" has a Toots Thielemans–inspired chromatic harmonica over dope guitar, overdriven slap bass, and tremolo Rhodes—nice.

Elements of Style

The construction-kit tunes are broken down into an average of about 15 elements per track. The drum loop follows the main song, after which you get an ever-changing menu of guitar, synth, and live bass; pads and single-line synth strings; acoustic and electric pianos; analog "worm" and portamento synth lines; drum and percussion one-shots; a sprinkling of special effects; and more.

The guitar playing is adventurous in places and covers fingerpicked acoustic-guitar progressions, chunky funk licks, and Hendrix-inspired riffs. Those are found in the song elements and in the nine tracks of guitar-only loops at the end of disc 1. Unfortunately, the acoustic-guitar tracks on disc 1, track 16 and disc 2, track 13 have a bit of audible click track and drum track in the background. To a lesser extent, that is also the case on a few other acoustic-guitar tracks.

The drum loops and one-shot samples are the only programmed patterns and sound relaxed on almost every piece. The end of disc 2 has excellent drum-only loops ranging from 65 to 128 bpm. I time-stretched a few loops and created some awesome grooves. The bass elements consist of electric and synth bass. The live playing is largely in-the-pocket, slapped funk. Some bass lines are overdriven, which isn't to my taste, but the line on "Tonite" is clean and way down.

I especially like the piano playing on many of the pieces; the pianist exhibits taste and chops on both acoustic and electric pianos. The synth pads augment the main composition well. But as always with construction-kit CDs, the elements are created to fit the tempo and key of the song loop that contains them; consequently, there are no multisamples for creating key maps over the full range of your controller.

The sleeve contains adequate documentation providing each track's key and bpm. The time location of each element within the track isn't referenced, however, so you'll have to fish around if you're importing audio directly from a CD player.

Hangin' Up

The one word that kept coming to mind while I auditioned this material was *smooth.* This collection does not take many chances, but it has some funky live performances and lovely melodic elements that can stoke your inspiration. It's a good resource for drum loops and hits. If smooth jazz and contemporary R&B is your bag, then you should give this collection a serious listen.

Overall EM Rating (1 through 5): 3.5
Big Fish Audio; tel. (800) 717-FISH or (818) 768-6115; e-mail info@bigfishaudio.com; Web www.bigfishaudio.com

MUSKA AND LIPMAN

Sound Forge Power

By JoE Silva

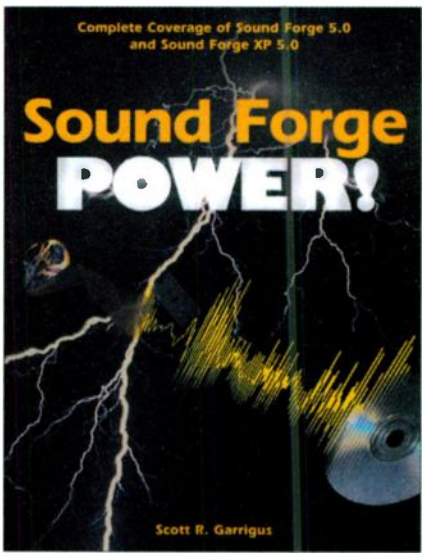
Scott Garrigus's *Sound Forge Power* ($29.95) is a thorough guide to Sonic Foundry's digital-audio-editing software, *Sound Forge.* The book offers valuable insights for the novice as well as for the more experienced user. *Sound Forge Power* concentrates largely on version 5.0 of the software, which adds 24-bit, 192 kHz capabilities; mic modeling; mastering; and CD-ripping support. The book will also benefit users who have not upgraded to that version.

For beginners with sufficient patience, the first four chapters of the book offer a suitable primer about the basics of Windows-based audio and how to customize your environment for *Sound Forge.* Those who are familiar with *Sound Forge* can explore these chapters to take advantage of any useful tips that they haven't acquired on their own. The subsequent chapters, in which Garrigus steadily unveils the *Sound Forge* environment, are the meat of the book. Further on, the author puts some of the program's features into practice.

Forgery

One particularly neat technique that Garrigus points out—and that is not evident from the *Sound Forge* Help files—is the ability to use WAV files as a resource for the Acoustic Mirroring effect included in version 5.0. Instead of using Sonic Foundry's Impulse files to simulate different acoustic environments, you can use WAV files to process audio data. For instance, placing a drum loop over a WAV file of plain speech weds the characteristics of one file to the other. That is a great tool for dance producers looking to quickly add rhythmic effects to a vocal line. Those looking to take advantage of *Sound Forge*'s integration with Sonic Foundry's *Acid* should check out first of several appendices that Garrigus dedicates to that topic.

The book effectively details underlying concepts behind *Sound Forge*'s spectrum-analysis capabilities. Garrigus offers tips about manually tracking down clicks and other glitches with the Spectrum Analysis tool, greatly reducing the painstaking guesswork that process involves. Placing the spectrum-analysis section in the context of



***Sound Forge Power*, a guide to using Sonic Foundry's *Sound Forge* 5.0 and *Sound Forge XP* 5.0 digital-audio-editing software, is a valuable reference for novices and experienced users.**

Unity DS-1 Sound Storm

The promise of incredible polyphony is here. The tales of awesome sound quality are true. The reality of an integrated music production system on a computer has arrived. These are the perfect conditions for a Sound Storm. This collection of expressive, dynamic libraries was crafted to spark creativity during torrential deadlines. Each instrument takes advantage of Unity 's digital synthesis architecture. After all, what use is a lightning fast computer without a little thunder?

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Unity Compatible

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is a tropical blend of rhythms from all around the Carribean. Rhumba, Tango, and Marengue your way into a whole new latitude w/OscillatorStretch tempo control.

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the audio-repair techniques that appear earlier in the book, you can acquire a comfortable grasp of the software's far-ranging capabilities. You can skim some manuals for specific procedures and quick fixes; Garrigus's book is most satisfying when you digest it from beginning to end.

Sounding Off

Garrigus's writing is comprehensible and knowledgeable. If this guide lacks anything at all, perhaps it is a demo version of the *Sound Forge* software and working examples for beginners. Apart from that, *Sound Forge Power* is an indispensable reference for anyone who relies on *Sound Forge*.

Overall EM Rating (1 through 5): 4.5

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The MIDI Manual, 2nd ed.

By Brian Smithers

Subtitled *A Practical Guide to MIDI in the Project Studio,* David Miles Huber's *The MIDI Manual* ($29.95) could easily claim to be a guide to virtually every aspect of the personal studio. The second edition of this worthwhile book expands and updates its coverage of music production at the turn of the millennium, covering everything from sequencing to synchronization to digital-audio editing.

Huber covers a lot of technical ground and avoids sounding like a technical writer. With few exceptions, he explains concepts in everyday terms without watering things down. The guide is a good read for anyone seeking a thorough and accessible introduction to modern music-making technology.

Things Change

Eight years, an eternity in music technology, have passed between the first and second editions of *The MIDI Manual.* However, the MIDI language itself has remained pretty stable. That allows Huber to leave the MIDI-intensive chapters largely unchanged, updating for the most part just the illustrations and gear-specific examples. Because the chapters were quite good to begin with, leaving them alone is a fine idea.

Huber demystifies the MIDI language in a clear and organized way, starting with a bit of history and maintaining a practical perspective. From Note On to System Exclusive messages, his explanations offer sufficient detail for the serious MIDI student without overwhelming the more casual practitioner. Subsequent material deals with MIDI hardware and connections, keyboards, sound modules, alternate controllers, and sequencing. Short but informative chapters cover editor/librarians and music-notation programs with enough detail to make readers aware of the technologies' usefulness but without straying from the book's main purpose.

Note On

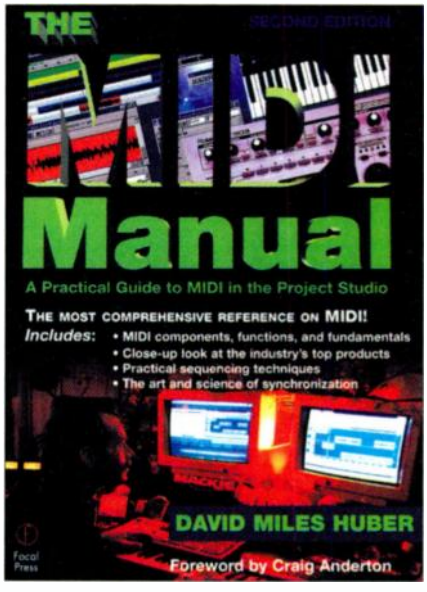
Most updates appear in the chapter about digital audio and the addition of a multimedia chapter. The digital-audio chapter gets off to a good start, addressing hard-disk recording, editing, and plug-ins. Unfortunately, the chapter goes astray with an unnecessarily technical segment about digital tape. Considering the book's MIDI focus, do readers really care about the helical scan tape path and that an ADAT supports ELCO connections? Huber's arcane definitions of the AES/EBU and S/PDIF digital-transfer protocols sound more appropriate for a standards committee white paper than for this otherwise accessible book.

The new multimedia chapter is undernourished and unfocused, bouncing off topic from device drivers to digital video before skimming streaming audio in the last page and a half. The chapter devotes little attention to MIDI as it applies to multimedia, with only a brief recap of Standard MIDI Files and a short section about General MIDI (GM) with patch tables and a GM drum map.

The synchronization chapter is a bit more technical than the rest of the book, but Huber pulls it off nicely. However, I would gladly trade the chart "Optimum Time Code Recording Levels" for some information about the role of word clock in a project-studio environment, but most of the information presented is quite useful.

The second edition is marred, though far from ruined, by a handful of errors and oversights held over from the first edition. The definition of Channel Pressure messages in chapter 2 mistakenly includes a data byte identifying note number, and later in the same chapter, the byte structure of Local Control On/Off is also misrepresented.

Bank Select is missing from the chart of continuous controllers, even though controllers 0 and 32 were well established for that purpose by the printing of the second edition. MIDI Clock is introduced in chapter 2 as having variable resolution, though the first edition and chapter 10 of the second edition list it correctly at 24 ppqn.



David Miles Huber's instructional book *The MIDI Manual,* 2nd ed., has broadened its focus to include new information about digital audio and multimedia production.

Note Off

None of those minor flaws is enough to detract from the fact that *The MIDI Manual* is a great source of information about MIDI and the personal studio. Huber's straightforward writing style and broad view of music production give the book plenty of appeal to readers at all sophistication levels. The second edition isn't a must-buy for owners of the first, but it first-time readers will find it well worth their money.

Overall EM Rating (1 through 5): 3.5

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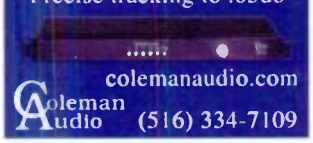
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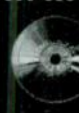

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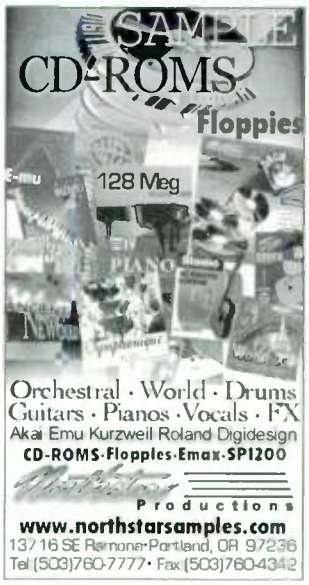

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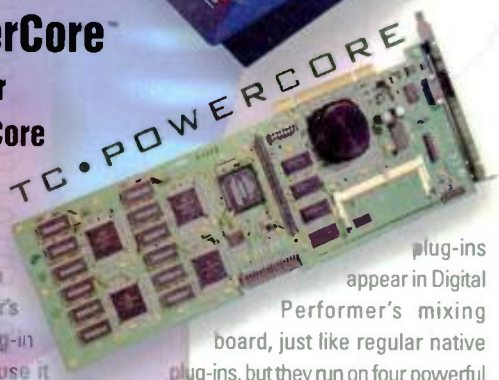

TC•PowerCore is a major breakthrough for Digital Performer's real-time MAS plug-in environment because it provides DSP turbocharged plug-in processing. At last, the renowned TC TOOLS 96 studio-quality FX package (included), with TC MEGAVERB, TC Chorus/DELAY and TC EQ[sat], can be at your fingertips in Digital Performer, plus other TC | Works plug-ins such as TC MasterX and TC Voice Tools (sold separately). These powerful plug-ins appear in Digital Performer's mixing board, just like regular native plug-ins, but they run on four powerful 56K DSP chips on the TC•PowerCore PCI card. It's like adding four G4 processors (equal to 2.8 gigahertz of extra processing power!) to your computer. Run 12 studio-quality TC plug-ins with no hit on your CPU power, and run other native plug-ins at the same time! TC•PowerCore is an open platform, so it will also run plug-ins from other respected 3rd party developers, too (details TBA).

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FINAL MIX

By Larry the O

Five Who Matter

I have had the good fortune to cross paths with brilliant folks in the world of sound who have done much to shape our industry yet have often gotten little recognition because their work is mostly behind the scenes, doing research and development. This month I'm going to call your attention to just a few of those people. I wish I had the space to mention more who are equally worthy.

I'll start with David Griesinger, who devised the Lexicon 224 reverb and authored the reverb algorithms we all know and love so well. Griesinger brings to bear on his work an incredible synthesis of musical, acoustical, and mathematical knowledge. He's a classical singer and recording engineer as well as a holder of a Harvard Ph.D. in low-energy nuclear physics, and each and every encounter I have ever had with him has left me better educated and enlightened. I've been lucky enough to have assisted him on a few recording jobs and to have joined him in listening to the choir and organ in Westminster Abbey during the installation of a bishop. From such opportunities, I learned where the rubber meets the road in terms of musical acoustics. Play on, David.

Next, I'd like to call out Marcus Ryle. Marcus first made his, uh, mark masterminding the Oberheim Xpander, one of the first MIDI synthesizers and still one of the great analog synths. More recently, he was the force that created Line 6, and he still drives that company. Between those two landmarks, he had his hand in many other important and notable projects, including the design of the ADAT. Rock on, Marcus.

If you recognize the name David Blackmer, it is probably as the "db" in dbx, and indeed, he's the guy who developed those early VCAs and RMS detectors upon which the dbx sound and reputation were built. Blackmer seemed to disappear from the scene for a few years, but he was just readying his next salvo: Earthworks microphones. I am a big fan of Earthworks because each of its products that I've used performs outstandingly, especially for the money. A more recent chance to speak with Blackmer at Earthworks showed him as a man who likes to expound on his ideas (with which not everyone agrees). I, for one, like to listen. Sing on, David.

Gary Hall has been a friend for many years, giving me a chance to see his contributions up close. Gary is a current author for and former technical editor of **EM**, so you've seen his work. Earlier, during his years at Lexicon, he devised clever ideas such as the PCM 41 and PCM 42, the effects that were the heart of the PCM 70, the LXP series, and more. A stint at Sonic Solutions put Gary on the bleeding edge of DVD when it came along, making him one of the first people to really understand what DVD is all about. (See the August 2001 issue for his cover story about DVD-R.) Gary dug in further while developing DVD authoring tools at Spruce Technologies for several years. All this time, he has been under the public's radar, even while blazing trails we have followed. Roll on, Gary.

Last, but definitely not least, is one name every **EM** reader should know: Don Buchla. The phrase "one of a kind" doesn't begin to cover Buchla. Like the others, he is a true visionary, but his vision has always proved to be minimally commercial. That's really a shame, because Buchla led the way with his modular synths in the 1960s and was one of the first to really harness the power of computer control for music synthesis. For as long as he has been building synths, Buchla has also been building Different (yes, capital *D*) controllers. His early synths used capacitive keyboards; later, he developed the innovative (duh) Thunder and Lightning controllers and, more recently, the amazing Marimba Lumina. Rocket on, Don.

I have had a long and abiding respect for and lasting inspiration from the work of these people, and I hope that by knowing about folks like them, you will too. ❀

We welcome your feedback. E-mail us at emeditorial@primediabusiness.com.

STEVE CURL