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# Electronic Musician

www.emusician.com

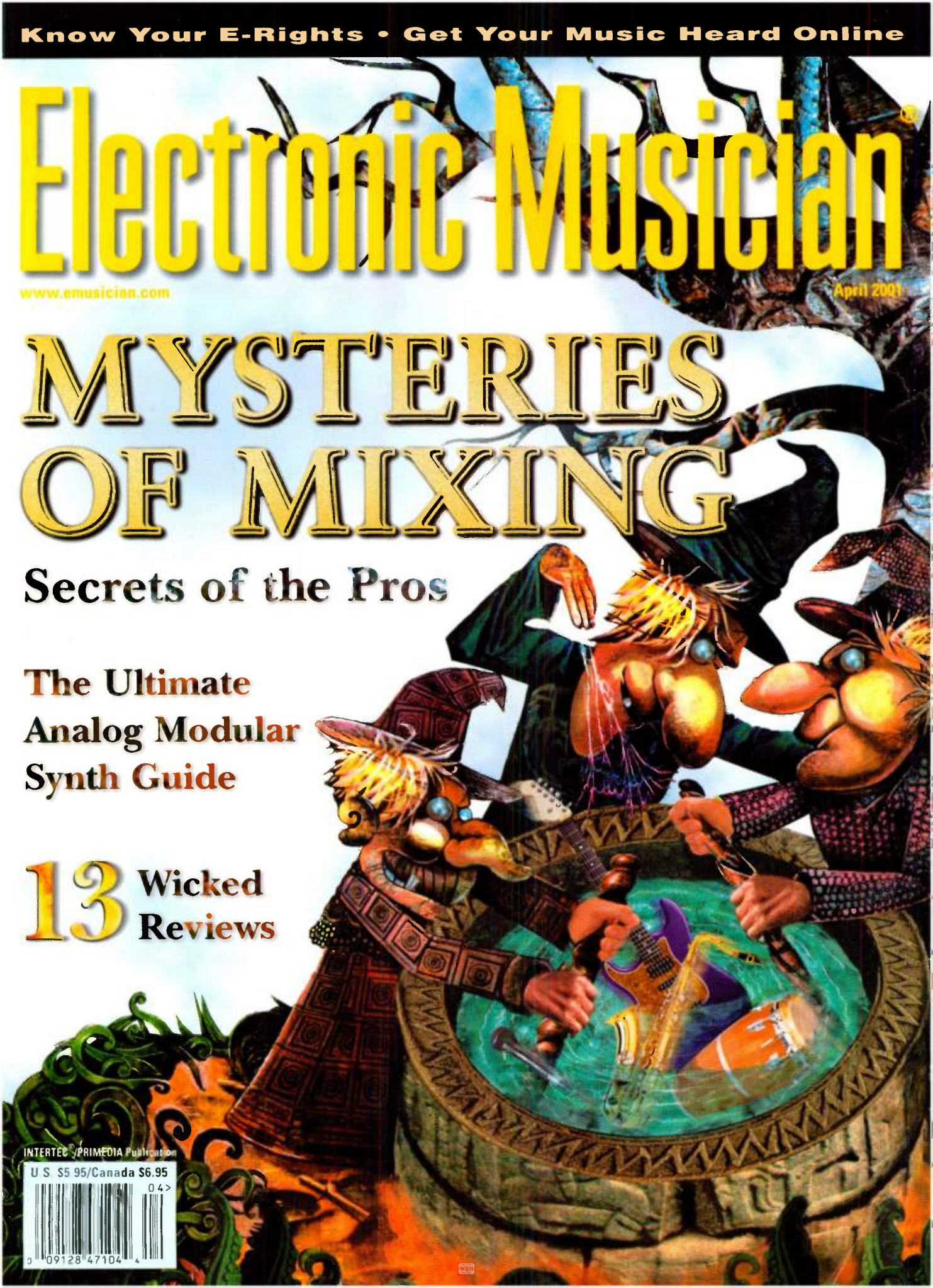
April 2001

# MYSTERIES OF MIXING

## Secrets of the Pros

## The Ultimate Analog Modular Synth Guide

## 13 Wicked Reviews



INTERTEC PRIMEDIA Publication

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# The HDR24/96 versus recording on

## A fully-equipped LESS than three

With an HDR24/96 it's so easy to record, edit, and manipulate tracks, so easy to be creative…whether you're recording for yourself, your band or for a Fussy Client.

With all due respect, recording onto linear media (a.k.a. tape) has some pretty severe limitations: Access time to cue points is slow. Punch-ins erase stuff you previously recorded. And the tracks just sit there side-by-side on the tape with no chance to easily slip, slide, cut or paste them in new ways.

**Hard disk recording and workstation editing for less than the price of linear recording.**

It's no secret that non-linear hard disk recording is the way to go. But until now, 24- track/24-bit recording and playback required serious investment in a digital audio workstation. — And a heckuva lot of mousing and clicking.

Only the HDR24/96 combines the intuitive, analog-like convenience of a tape deck with the editing versatility of a computer-based workstation.

**As easy to use as an analog recorder.**

All basic functions are right there on the HDR24/96 front panel including transport buttons and individual Record Enable buttons for each track. Just hit Record and Play

* based on current U.S. list and pro audio dealer "street" prices at the time of ad production and on the assumption you will buy a CRT-type SVGA monitor and not an ultra-pricey flat panel model like our art director insisted on using for this ad.

** based on average of length of current pop songs using 24 tracks @48Hz/24-bits and a liberal number of extra regions and virtual takes. Does not apply to extended trance remixes.

©2001 Mackie Designs Inc. All Rights Reserved. Mackie and the Running Man figure are registered trademarks of Mackie Designs Inc. MackieMedia is a trademark of Mackie Designs, Inc. ORB is a trademark of Castlewood Systems.

# long thin strips of rusty plastic.

## Mackie 24-track HDR24/96 Hard Disk Recorder/Editor costs tape-based, 8-track digital recorders*...and does much more.

without even cracking the manual. But if you plug in an SVGA computer monitor, things get even better.

**The graphic interface that tape recorders always should have had.**

Even if you immediably don't use the HDR24/96's editing functions, you'll love the graphic interface for recording.

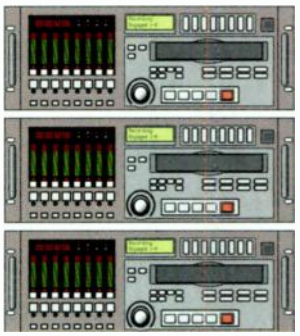
It gives you one-click access to all deck functions without a lot of annoying pull-down/fly-out menus.

Choose from 2x, 4x, 8x, 12x or 24-track views and then watch them scroll smoothly past a centerline.

Mark hundreds of cue points and four locate points for looping and auto-punch-in modes. Cue points are visible on screen and are accessible from a side list.

Use the mouse to "scrub" individual tracks, Cue, Punch and Loop points with continuously variable velocity.

Each track also supports eight "virtual tracks," so you can do multiple takes and comp them together easily.



**Think of MackieMedia™ as "tape in a brick."**

Right out of the box, the HDR24/96's internal drive will record 90 minutes of 24 tracks at 48kHz. Your backup choices are simple—

1. Record directly to a MackieMedia™ M90 external drive. They're considerably less expensive than the SCSI drives some HD recorders require — $10 a song** — and they're in stock at your Mackie dealer.
2. For a quick back-up of just a song or two, we also offer an optional 2.2GB ORB™ drive that uses *really* inexpensive media.
3. For real economy use the HDR24/96's 100BastT Ethernet port to back up to your computer and its media.

***Even with three OPT•8 I/O cards, a MackieMedia removable disk, SVGA monitor, keyboard and mouse, the HDR24/96 costs less than three digital tape recorders*...which don't offer loads of workstation-style editing features, super-fast access and true 24-bit recording.***

**Serious editing tools built in... with 999 levels of un-do.**

Once you've experienced non-destructive editing of tracks, you'll never go back to linear recording.

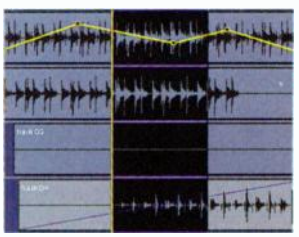
You can mark a segment (or multiple non-adjacent segments) as a *region* and then cut, copy and paste it anywhere — onto a blank track or right in the middle of an existing track without erasing anything (the part of the track after the insert just "slides down").

You can audition regions or modify their start/end points instantly, capture them as "sound elements" for later use or quantize them to user-defined time grids. And all regions are easy accessible from a side menu.

Create fade-ins, fade- outs and crossfades just by dragging and dropping them ...and then set their length by dragging the mouse.

Add volume envelopes for simple level automation of regions or whole tracks.

Then use Track Render to combine all or selected regions of a track just as you hear it — complete with crossfades, volume envelopes, mutes, etc. — into a single region.



***Zoom in to the waveform level. Drag, cut, paste, and slip tracks and segments of tracks just like on super-expensive workstations. Adjust track levels. Add editable crossfades. All with 999 levels of undo.***

**Get a demo at a Mackie dealer.**

This ad only scratches the surface of the HDR24/96's features, options and capabilities. Visit our web site...or get your hands on an HDR24/96 and experience (pun intended) *unparalleled* creativity.

*Hard-shell case. Really ugly pink anti-static foam.*

***Twenty-four track songs for under ten bucks each!! Divide the cost of a MackieMedia M90 into the 20+ pop tunes you can record on it and you're looking at under a ten-spot for each 24-track master. —Much less if you do a little disk drive housekeeping. Remember, hard drives can choose only to store audio data, not silence. Tape just rolls merrily along...costing money... whether you're using a track or not.****

**www.mackie.com • 800/258-6883**

Made by Mackoids in Woodinville, USA

# Left Brain

24 tracks

24-bit/96kHz

Motorized faders

384 Virtual Tracks

8 XLR, 16 1/4" TRS inputs

Mouse and PC keyboard inputs

VGA "Information Display" output

8 stereo/16 mono effects processors*

"Drag-and-drop" editing on LCD using mouse

64-channel mixer w/individual dynamics

2 R-BUS ports for 16 ch. digital I/O

Phrase pad playback w/sequencing

Audio CD-burning capability**

SMPTE and Word Clock input

*With optional VS8F-2 Effects Expansion Boards
**With optional VS-CDRII/CD-Rack CD Recording Systems

Burn audio CDs and archive data using the optional VS-CDRII or CD-Rack.

A VGA output confirms playlist, mixer settings, routing and more using an optional computer monitor.

VS-2480 back panel

The AKG C3000B: the perfect input source for the VS-2480's COSM Mic Modeling effect.

# Right Brain

**Wow.**



What were we thinking when we created the new VS-2480? It's pretty obvious. Only the best of the best workstations ever. With 24 tracks to give you all the room you need to take your music anywhere it wants to go, without having to build a studio to get it. And drag-and-drop mouse editing on the LCD to make operation easy and intuitive. Check it out for yourself. Because once you get your hands on it, you'll only have one thing on your mind.

**VS-2480 24-track Digital Studio Workstation** Roland

DEMO VIDEO AVAILABLE Call (800) 386-7575 for the VS-2480 demo video ($5.00) Roland Corporation U.S., (323) 890-3700 www.rolandus.com

FaxBack Information: (323) 890-3780 (Doc.#10522). Specifications and appearance are subject to change without notice.

# I N S I

## FEATURES


**60 SOMETHING OLD, SOMETHING NEW**

Modular analog synthesizers are more popular, more plentiful, and better manufactured than ever before. Here's everything you need to know about the current generation in order to select the modular analog synth that best suits your needs.

*By Gino Robair*

**96 COVER STORY: MYSTERIES OF MIXING**

Although mixing can be thrilling and fun, it also can be a frustrating process fraught with pitfalls. But sonic disaster can be averted if you know where the dangers lie and how to avoid them. EM asks three top professional mix engineers to share tips and tricks that they use regularly to overcome common mixing problems.

*By Brian Knave*

**112 ELECTRIC LADYLAND**

Explore the exciting, adventurous electroacoustic music and performance art of Krystyna Bobrowski, Miya Masaoka, and Kaffe Matthews, three cutting-edge musicians who have developed singular styles.

*By Bean with Gino Robair*

**120 HEARD IT ON THE WEB**

The Web continues to redefine music distribution, and opportunities abound for promoting and selling your music online. But with so many possibilities, it can be difficult to identify which are most likely to work for you. EM experts help you sort through the morass and discover the best ways to achieve your goals.

*By Robert Powell with Alex Artaud*

Cover: Illustration by David Ball

## DEPARTMENTS


8 FRONT PAGE

12 LETTERS

14 FIFTEEN YEARS AGO IN EM

20 WHAT'S NEW

44 WEB PAGE

50 VINTAGE PAGE

206 AD INDEX

210 MARKETPLACE

215 CLASSIFIEDS



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15 YEARS EM 1986–2001

# COLUMNS

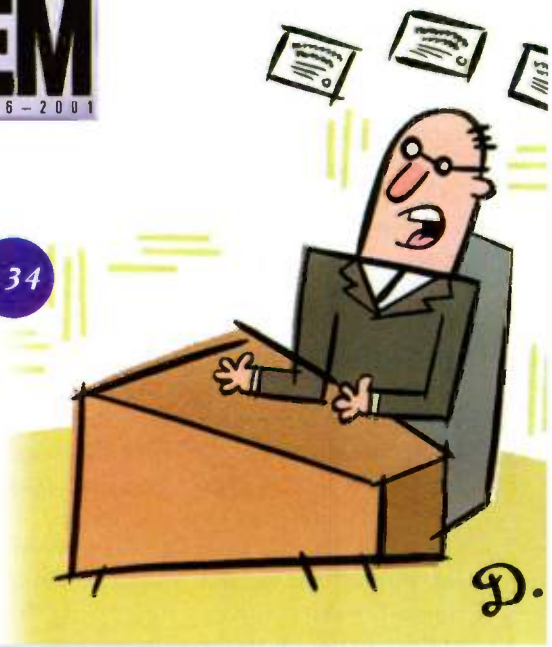
54 **TECH PAGE: Xena: Wired Songtress**
A new vocal technology teaches your computer to sing.

58 **PRO/FILE: Soul Distribution**
Soulstice creates an intriguing collage of samples and vocals.

130 **DESKTOP MUSICIAN: DirectX 8 Steps Up**
DirectX 8 brings new power to PC-based studios.

134 **WORKING MUSICIAN: Do the Right Thing**
A primer on the new laws of online music distribution.

226 **FINAL MIX: A Matter of Physics**
Applying the physics of perceptual mass to music.



# REVIEWS

146 **ROLAND HPD-15 HandSonic** percussion controller/sound module

158 **MICROWORKS CAMPS 4.0 (Win)** intelligent MIDI sequencer

164 **EMAGIC Unitor8 MkII** MIDI interface/SMPTE synchronizer

170 **SOUND QUEST Midi Quest 8.0 (Win)** MIDI editor/librarian

176 **ZOOM PS-02 Palmtop Studio** portable digital studio

182 **GT Electronics AM40** tube condenser mic

190 **ECHO DIGITAL AUDIO Mona 24/96 (Win)** digital audio interface

194 **DUY EverPack (Mac)** audio plug-in bundle

198 **QUICK PICKS:** **Northstar Productions** *Ancient Worlds* sample CD-ROM; **Big Fish Audio** *Things That Go Bump in the Night*, vol. 2 sample CD; **Miller Freeman Books** *Vintage Synthesizers* (Second Edition); **Mil Productions** *Modularing* 2.01 (Mac) step-sequencer construction kit; **Apogee Electronics** *Session Tools* 2.0 (Mac/Win) studio management database

# 'Tis Magic

***"Double, double, toil and trouble; fire burn and cauldron bubble."***

DAVID BALL

The most famous "mixers" in the history of English literature were the three witches in Shakespeare's *Macbeth*. Admittedly, their raw material was a lot more exotic than the contents of our music mixes: "eye of newt and toe of frog, wool of bat and tongue of dog" are a lot stranger than even the most "out" musical tracks. But the witches' rhyming lyrics were impeccable, and you have to admit that their results were more potent than your average music mix.

The Weird Sisters also understood the art of deception, that what appears to be good can be bad: "Fair is foul, foul is fair," they said before offering Macbeth seemingly optimistic predictions that actually foretold disaster. Similarly, when we begin mixing a piece, we often discover that tracks we thought were fine don't work in the mix, whereas tracks that appear inadequate when soloed may prove a perfect complement to other tracks.

But how can one know when fair will turn out to be foul or foul, fair? We lack the witches' magic, though the technology we use seems magical enough at times. The three witches were guided by Hecate, the Greek goddess of the moon and witchcraft who is the ultimate source of their power. We recording musicians can turn to much more benign sources for guidance: expert engineers who have a history of success.

Following that philosophy, associate editor Brian Knave interviewed three highly successful producer/mixers with top credits—Ken Kessie (En Vogue, Tony Toni Tone, Celine Dion), Chris Lord-Alge (Faith Hill, Green Day, Sheryl Crow, Melissa Etheridge, Dave Matthews Band, Barenaked Ladies), and Mark Needham (Chris Isaak, Bruce Hornsby, Meredith Brooks)—and asked them to share the magic they use to avert or fix some of the most common mixing problems (see "Mysteries of Mixing" on p. 96). Of course, there is no perfect recipe for a great mix, but our experts' advice can help you recognize problems before, as the second witch put it, "something wicked this way comes."

While we're on the subject of magic, let's talk about analog modular synths, which are among the most magical of electronic musical instruments. These wonderful devices allow you to create an endless variety of unearthly sounds, but many people mistakenly assume that they are historical instruments. In fact, analog modular synths are very much in style these days, and at least 20 companies currently offer a wide variety of modules. Associate editor and inveterate synth junkie Gino Robair tested every modular analog synth he could get his hands on; read his fascinating report in "Something Old, Something New" (p. 60).

There's plenty more, but these stories ought to be enough to stir the pot.

We welcome your feedback. Contact us at emeditorial@intertec.com.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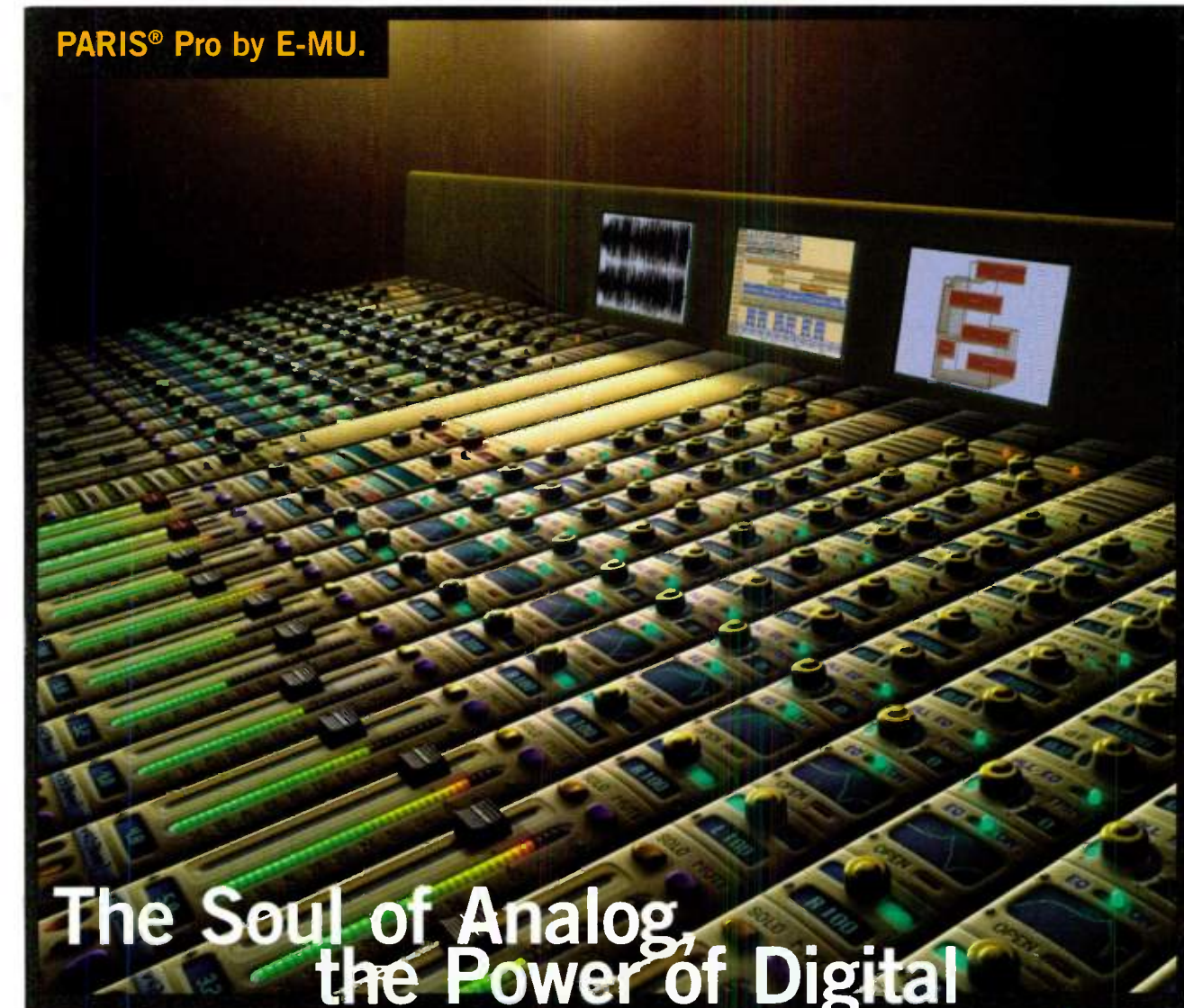

Professional Audio Recording Integrated Solution

# The Soul of Analog, the Power of Digital

**Analog Sound Quality**
Industry professionals choose PARIS Pro for its warm analog console sound and feel. PARIS Pro is a proven and mature platform, with several #1 Billboard® Hits already to its credit.

**Intuitive and Flexible Software**
PARIS 3.0 Software offers you the most intuitive user interface on the market, emulating the logic and flow of an analog console, patchbay and tape mutitrack. And PARIS imports and exports OMF files (Avid's Open Media Framework®), giving you compatibility with Pro Tools® projects and studios.

**Penalty Free Expansion**
It's easy to expand PARIS Pro – simply add the I/O and Sync modules you need to your MEC (Modular Expansion Chassis). Need more tracks and effects? Each EDS PCI Expansion Card gives you 16 more tracks (up to 256), effects and 64 EQ's.

**Powerful Hardware/Native CPU Dual Mode System**
PARIS Pro not only gives you hardware-based guaranteed track count and DSP performance, but also allows you to run additional tracks and effects (VST™ and DirectX®) off of your CPU to get the most out of your system.

**Unbeatable Value**
PARIS Pro offers you a dedicated 16 fader control surface, Modular Expansion Chassis, true Mac/PC cross platform software, and EDS PCI Card for $4995. Choose PARIS Pro and then take the money you saved and treat yourself to some nice mics and a rack of high-end preamps – you deserve it.

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KARMA ...7 YEARS IN THE

At Korg we're always dreaming up innovative ways to make our keyboards more expressive, more powerful, more musical, and when we first learned about a brand new technology called KARMA™, we knew we'd found one. Seven years after assembling a global team of skilled engineers, programmers and musicians, the Karma Music Workstation brings new music-making possibilities to life.

To start, its synth and effects engines are identical to Triton's, so you know how good it sounds. It's also compatible with Triton sound data and supports the same user-installable PCM and MOSS expansion options so your sound palette can grow. Plus, the Karma Music Workstation provides the same feature-packed 16-track sequencer that has made the Korg Triton the leader in music workstations. So what makes *this* new keyboard so special?

It's KARMA, our revolutionary technology that generates amazing phrases, grooves and other musical effects that can be altered and randomized in real-time. With a bank of knobs and switches, you control elements like rhythmic complexity, harmony, melodic repeat, phrasing, panning...even the synth's sound and effects.

KARMA gives you the power to play impossible, interweaving cascades of notes, techno arpeggios and effects, dense rhythmic and melodic textures, natural-sounding glissandos, intricate fingerpicking and guitar strumming, swooping portamento and pitch bend moves, to name but a few. The only limiting factor is your imagination.

Karma like this only comes around once every seven years. Fortunately for you, the wait is over.

GOOD KARMA. WICKED SOUND.

## SPEC SHEET

- 61-key synth action keyboard with velocity and aftertouch sensitivity
- 62-note polyphony
- 32 Mbyte wave ROM, expandable to 64 Mbytes with 2 EXB-PCM expansion boards
- 640 Programs (including GM Level 2)/384 Combis – expandable to 896 Programs/640 Combis
- Support for EXB-MOSS (adds 128 new Programs/64 new Combis)
- 102 Insert/90 Master effects (up to 5 Insert, 2 Master effects plus 3-band EQ)
- 16-track 200,000 note sequencer, 200 Songs, 20 Cue Lists, 100 patterns per Song, 150 preset drum patterns, 72 RPPR patterns per Song, 16 preset/16 user Template Songs
- Joystick, 4 assignable knobs, 2 assignable switches and 1 assignable slider

**KARMA features:**

- Over 1000 Generated Effects (1 GE per Program, 4 GEs per Combi or Song). A GE contains over 400 parameters to generate notes, control synth and effects parameters, and provide randomization of these events
- 8 knobs, 2 switches and 2 scene memories, plus joystick, slider and pedals for real-time control over GE parameters
- 4 programmable Chord Memory buttons for triggering chord voicings easily
- The ability to load new GEs as they are released

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www.karma-lab.com

# MAKING

KARMA
MUSIC WORKSTATION

KORG
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MIKE CRUZ

## DJ DOTH PROTEST TOO MUCH?

I just finished reading your article "Breaking the Sound Barrier" (February 2001). DJ Rap referred to Madonna's music breakthroughs as "provocative" and "sexual." Apparently, this really offends her. "Let's (women) do it in a way where our brains speak for us," she says. Later on she says, "You have to not play on the fact that you're female" and to do it without "being a 'ho.'"

Those statements appear beneath a snapshot of her album cover, in which we see her sitting spread-eagle, cleavage bulging, on a shiny red leather chair with stitching going up the center.

**Thomas Sobcak**
**via e-mail**

## CHIP CONUNDRUM

As a longtime **EM** subscriber, I rely on your product reviews for my studio purchases. I have decided to upgrade my computer-based home studio with new hardware and software. But I'm getting conflicting advice from friends and equipment vendors. What is your opinion of non–Pentium III processors? I've heard that the older Cyrix chips are no good at all—but what of the newer Celerons, Athlons, and so on? Should I stick with the Pentium III, or can I buy a cheaper chip and be confident that whatever software I buy will work?

**Arthur White**
**via e-mail**

*Arthur—Using non-Intel chips can be a bit of a minefield. I'm aware of some audio cards and some software that performs less than optimally or not at all with certain chips. In particular, older AMD and Cyrix chips were problematic for desktop musicians, though many people are having good results with the current crop (Athlons and Durons) of AMD chips or the Cyrix VIA. Newer Celerons can also give good performance, but their top clock speeds are nowhere near the 1.5 GHz rating of high-end Pentiums.*

*In the case of audio cards, your best bet is to contact the manufacturer of any card you are considering to see what it recommends.* **EM** *recently covered well-known products whose manufacturers guarantee compatibility only with certain chips. This would imply that chip compatibility remains a major issue.*

*Software presents other concerns. Some recent audio software, such as Cakewalk's* Sonar *and newer versions of* Cubase, *are optimized for use with a Pentium. Though they will run with non-Pentium chips, don't expect the same performance level that you would get with a Pentium.*

*You should be fine using newer non-Intel chips or an Intel Celeron, but check with the manufacturer of the hardware and software you plan to use. That's the best way to ensure that you won't encounter problems after you set up your new rig.—Dennis Miller*

## MISSING TOOLS

I enjoyed your article "Music for New Media" (December 2000). The interviews with producers of that type of music were well done and informative.

However, the article overlooked DirectMusic's composer and the development tools that are part of Microsoft's DirectX SDK. Those tools allow for interactive music that is much richer than remixing of tracks. The tools let you create bands, rhythms, and chord progressions that can be manipulated during playback. Beyond that, the composer can provide alternate phrasings and progressions that can be triggered based on user interaction. Playback can contain random changes that occur in real time based on parameters entered by the author. On the downside, the tools have a rather large learning curve.

I hope products such as Beatnik do well. However, DirectMusic is an option worth looking at for some interactive applications.

**Alan Jones**
**Forest, VA**

*Author Peter Drescher replies: Alan—Your point is well taken. There are a number of systems available for creating interactive soundtracks, including* Flash *and* JavaSound, *that I did not address in the article because I was more interested in compositional techniques than production technologies.*

*Whereas DirectMusic's algorithmic-composition functions can certainly be useful for adding variety to inherently repetitive scores, I tend to shy away from the concept that "random" changes make for good music. Important musical concepts such as voice leading, melodic phrasing, and instrument ranges can sometimes get lost in the computer-generated shuffle. On the other hand, unpredictability is the name of the game in interactive music, and composers must use all the tools at their command to create compelling audio environments.*

## MAKING FLIPPY FLOPPY

In Brian Smithers's article in the February 2001 issue ("Desktop

Professional, flexible, expandable... VST The System

**Integration and perfection have a name: VST.**

**Cubase VST 5.0**
The heart of the VST System

**HALion**
32-Bit sampler unit

**MIDEX 8**
USB MIDI interface

**HOUSTON**
VST studio controller

A system so powerful and so intuitive; no wonder so many have chosen VST to create and produce their music.

**VST - a technology by Steinberg**

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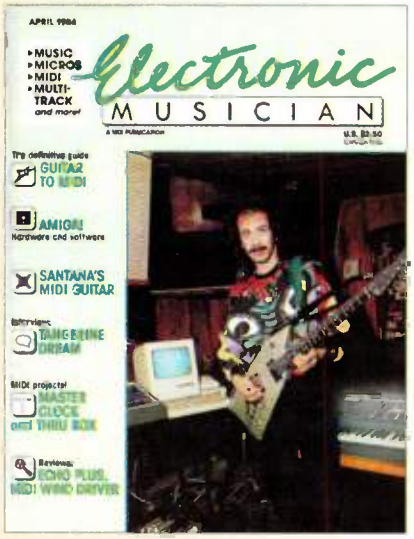
# FIFTEEN YEARS AGO IN EM






During EM's first year as a monthly publication, we often had stars on the cover. This changed in 1987, when we reduced our emphasis on personalities. But in 1986, we were still stargazing, and Carlos Santana, who graced our April cover, was one of the brightest stars in the firmament.

However, we did not actually interview Santana; rather, engineer and programmer Bryan Bell described the MIDI guitar composition system he put together for Santana and discussed how the gear was used. Bell built Santana's computer rig around a Macintosh 512K, which was a hot item in early 1986. He loaded the Mac with sequencers from Southworth, Musicworks, and Opcode; notation software from MOTU; and several Opcode patch librarians. This was before the era of universal patch librarians, so you had to buy separate patch librarian software for each device. Bell also specified E-mu Emulator II and Ensoniq Mirage samplers, Yamaha DX7 and Casio CZ-101 synths, and an assortment of drum machines. Santana controlled it all with Roland GR-700 and GR-707 MIDI guitar controller/synthesizers.

We also offered an interview with Tangerine Dream and ran a tremendous "what you need to know" story on MIDI guitar by Jim Wright. Wright didn't miss a trick; his article covered controllers, pitch-to-voltage conversion, MIDI issues, synth selection for MIDI guitar, and system integration.

The other hot news was the Commodore Amiga computer, which seemed poised to grab a large chunk of the music-computing market. Based on a Motorola 68000-series CPU, it offered color graphics, true preemptive multitasking, and custom chips that provided multitimbral, 4-voice synthesis with user-programmable, note-stealing options. We offered three Amiga stories: David Karr's in-depth overview; Peggy Herrington's preview of new music software; and Don Slepian's story about the computer's video capabilities.

EM wouldn't have been EM in those days without DIY projects. In 1986, if you wanted to control several synths from one controller, you usually had to daisy-chain the synths one after the other. This slightly delayed, and in some cases distorted, the signal. Kirk Austin's active MIDI Thru box took the data from one MIDI In and distributed it to a number of identical, parallel outputs, eliminating daisy chains.

Another common problem was synching MIDI devices to pre-MIDI sequencers or drum machines that only output analog timing pulses. Tim Dowty solved this problem with his SmallTock, which converted 24, 48, or 96 ppqn signals to MIDI Clock data.

On the products front, we checked out JLCooper's MIDI Wind Driver, an early CV-to-MIDI converter optimized for use with the Lyricon woodwind controller. Unfortunately, Lyricons were hard to find, so the product had limited appeal. On the other hand, Dr. T's *Echo Plus* for the Commodore 64 was extremely useful. One of the first MIDI data-processing programs, *Echo Plus* processed MIDI in real time to create keyboard splits, delays, arpeggiated chords, and one-finger chords, and it let you control several synths from one keyboard in some very cool ways.

*—Steve Oppenheimer*

Musician: U Store It"), he mentions a problem with ATA. "Probably Ultra ATA's biggest liability right now is its limit of four devices per controller," he says. This is accurate, but he then says, "Typically, an internal hard drive, a floppy drive, and a CD-ROM drive use up three devices right away."

That isn't accurate. Floppy drives (which only PCs use anymore) are not connected to the ATA bus. He also goes on to say that you could not add another hard drive and CD-R.

I give him his point: four devices are limiting. But, consider the following: CD-Rs read CDs, so toss the CD drive. Furthermore, Apple's new Super Drive writes to DVD-R (no, I don't mean DVD-RAM), reads CDs, and writes CD-Rs.

Smithers says that "DVD-RAM is an optical media and shares MO's physical integrity advantages." I hope this was a typo and Smithers meant to say its disadvantages. I have had nothing but problems with MO technology. Although it seems to work quite well when used on the same drive over and over again, the integrity breaks down quickly when using the same media on different drives, which is something quite common when sharing media between two musicians or different studios. Of course, the caveat is that has been my mileage with MO technology.

**Steven Woolgar**
**via e-mail**

*Author Brian Smithers replies: Steven—Thanks for your perspective on the ATA issue. You're correct about the floppy drive having its own controller, and I hereby submit myself for 50 lashes with a wet ribbon cable. However, saying that "only PCs" use floppies is simply false. Many Mac users add external USB floppy drives to their machines. Besides, Windows PCs represent the vast majority of consumer computers, so you cannot dismiss them so lightly.*

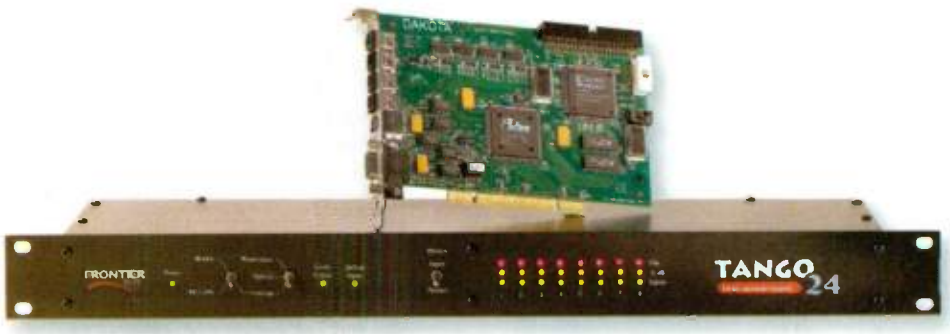
*Even without the floppy, though, the ATA bus can get crowded. Some CD-ROM drives have higher read speeds than CD-R drives, so some folks still want both. If you need to make a copy of your CD, having both lets you copy directly from disc to disc, rather than using the hard drive as a temporary*

*"What sets the Dakota apart is the quality of its design and its ability to play well with others."*
Electronic Musician Magazine

*"After much critical listening, Tango24 was revealed to be a great-sounding interface. Its sound is smooth and detailed."*
Loren Alldrin, Pro Audio Review

*"The Dakota system worked well straight out of the box. There's not a lot of hype, just rock-solid performance."*
Jim Roseberry, ProRec.com

# What's New?

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*storage area. As for Apple's SuperDrive, it's only available as an internal drive for the Power Mac G4/733 MHz. That probably will change, of course. Furthermore, depending on the kind of computing you do, you might need several large hard drives and perhaps a tape drive, in addition to CD-R and DVD drives.*

*"Limiting" is the right word for ATA's four-device maximum. For many users, it's not even a minor inconvenience. For others, though, the ability to use several devices simultaneously is plenty of reason to opt for SCSI.*

*And no, it's not a typo. "Physical integrity" is MO's main advantage, owing to the fact that, because its surface must be micromelted at about 200 degrees Celsius to write data, the disc is pretty much impervious to data loss at room temperature. Keep in mind that there's a difference between "data integrity" and "compatibility," and your MO woes are of the latter variety.*

## ERROR LOG

**February 2001,** "Breaking the Sound Barrier," p. 66. Author Carolyn Keating was editor of *Digital Home Recording*, not *Home Digital Recording*.

**February 2001,** "Desktop Musician: U Store It," p. 138–143: Due to a proofreading error, the unit measurement of "MBps" was incorrectly changed to "Mbps" throughout the article. Also, the USB 2.0's throughput specification on p. 142 was listed incorrectly. The throughput has been increased to 60 MBps, not 50 MBps.

### WE WELCOME YOUR FEEDBACK.

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

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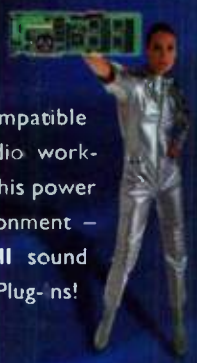

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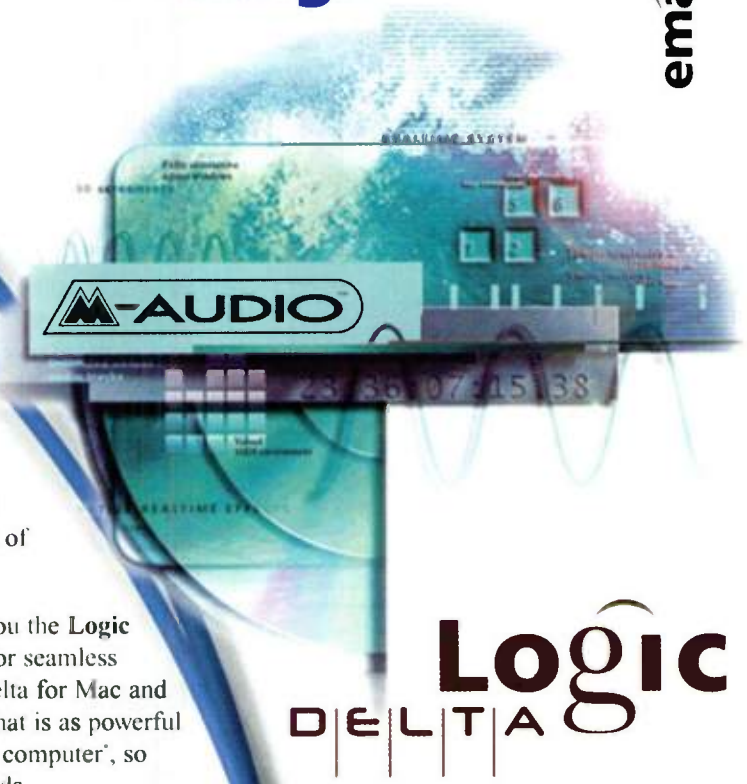


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*1-Computer Music, January 2001; 2 Sound on Sound, January 2000*
** - Dependent upon CPU resources. Multicard drivers for Mac coming soon.*

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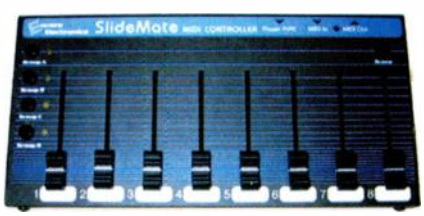
# WHAT'S NEW

By Marty Cutler

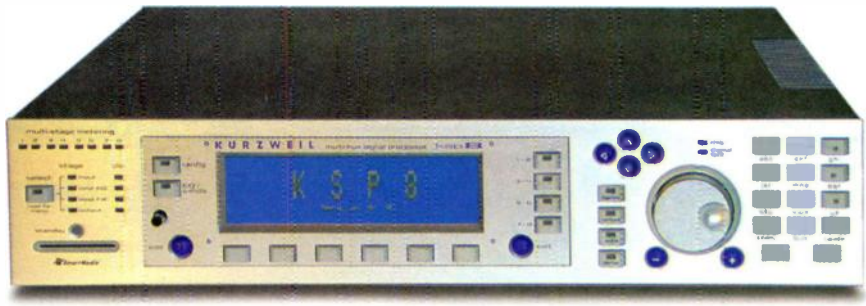



## ▲ ENCORE ELECTRONICS SLIDEMATE

Slidemate from Encore Electronics ($249) is a programmable hardware MIDI controller that can be used as a standalone device or with your computer.

The controller replicates the features of its sibling, Knobby, but instead of knobs, you get eight 60 mm hardware faders. Four group buttons, used individually or in pairs, allow access to 15 groups of functions. You can program delays for MIDI messages sent to slower devices. Should you need to correct unruly synthesizers, the Scene button does double duty as a Panic button. The unit's memory is nonvolatile, and there are no batteries.

Slidemate is bundled with programming utilities for Windows and Macintosh computers and with a library of profiles for a wide variety of synths and digital effects processors. You can create your own profiles with drag-and-drop functions that are predefined for each fader. All controller icons are named, and the online help system can guide you through the process. Encore Electronics; tel. (925) 229-8875; e-mail sales@encoreelectronics.com; Web www.encoreelectronics.com.




## ▲ KURZWEIL KSP8

The KSP8 ($2,995) from Kurzweil is an expandable, eight-channel, rack-mount signal processor with real-time MIDI control. The unit includes all of the effects algorithms from the K2600's KDFX signal processor and adds new effects and surround reverbs.

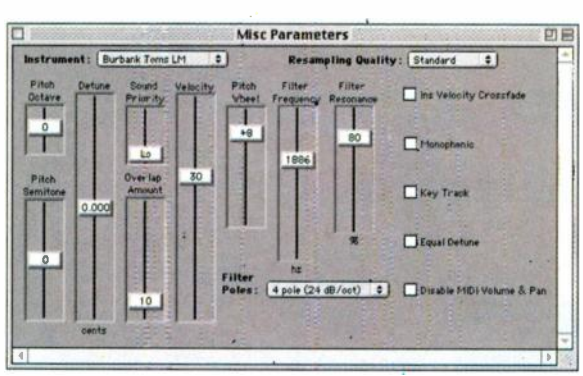
The base model offers four ¼-inch, balanced TRS inputs and outputs and stereo AES/EBU I/O. You get a slot for adding four additional channels of AES/EBU and analog I/O ($195) or eight channels of Alesis Lightpipe with BNC word-clock input, TDIF, or Kurzweil Digital Stream I/O ($695). A/D/A conversion is 24-bit. You get a selectable master clock, dedicated EQ, and the ability to process eight simultaneous mono channels of audio.

Effects include reverb and room simulators, flanging, chorus, dynamics processing, cabinet simulators, filters, EQs, chaos generators, and bit-resolution reduction. You can even create aliasing. Many effects can synchronize to MIDI Clock or an internal time base. You can also store patches on SmartMedia cards. Kurzweil Music Systems, Inc./Young Chang America; tel. (800) 421-9846 or (253) 589-3200; Web www.kurzweilmusicsystems.com.

## ▼ DIGIDESIGN SOFT SAMPLECELL

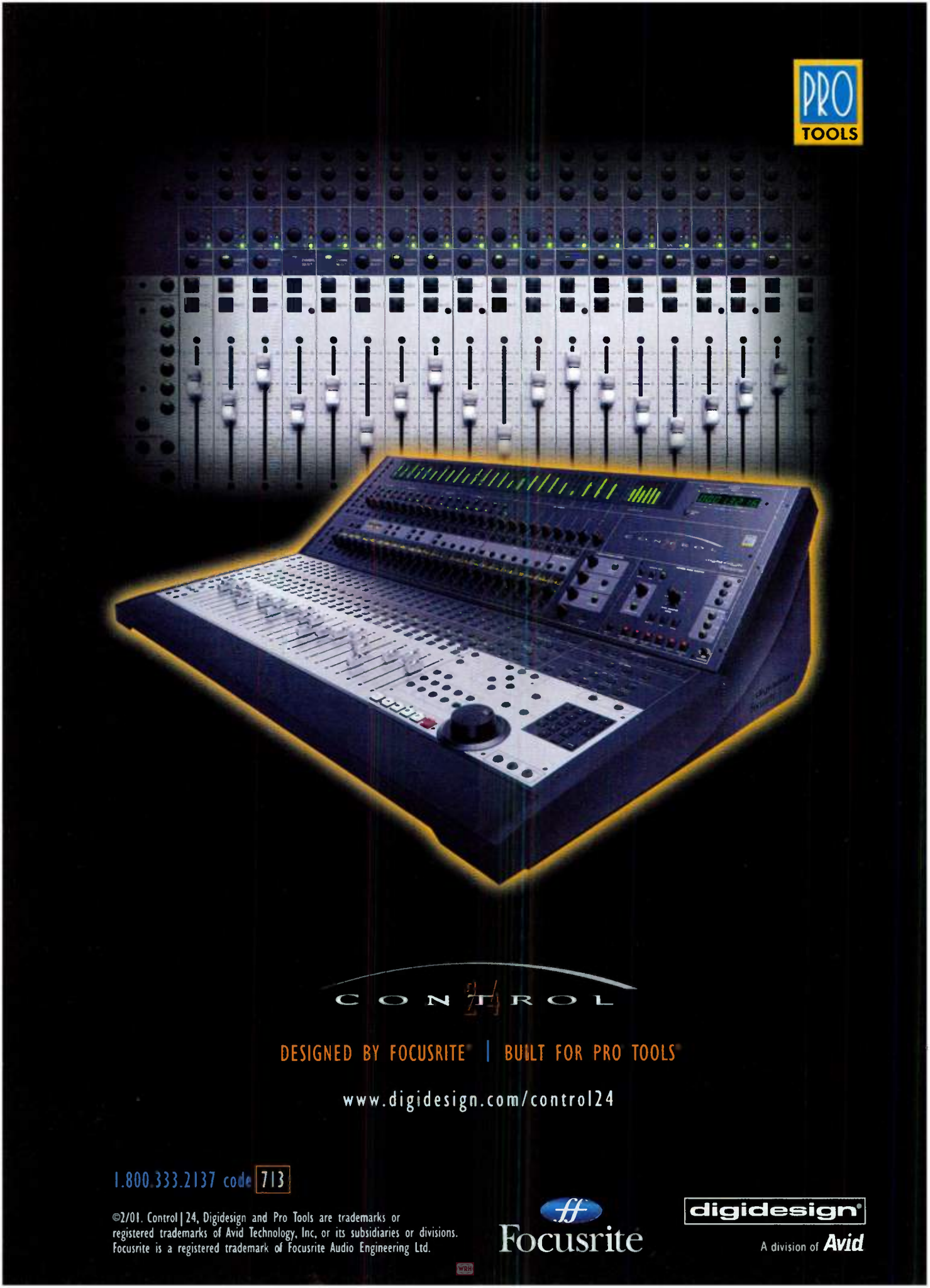
Digidesign's *Soft SampleCell* ($345) is a host-based sampler derived from the SampleCell II PCI sampling system. The software offers 24-bit playback of audio files with extremely low latency.

Samples are processed with *Soft SampleCell*'s resonant, four-pole lowpass filter. You get three envelope generators, two LFOs per voice, and a modulation matrix that offers as many as 18 sources and 26 destinations.




You can load 128 MB of audio files into RAM for a maximum of 64 dynamically allocated voices, depending on CPU resources. The program can import and export Sound Designer II and AIFF and WAV files and is compatible with all SampleCell libraries. A sample and loop editor is integrated into the sampler in case you need to tweak your files.

When used without an audio interface, *Soft SampleCell* offers stereo output, using Apple's Sound Manager. A Digidesign Pro Tools or Pro Tools LE system raises the ante considerably, offering 16 analog or digital outputs. When it's used with DirectConnect, the sampler provides 32 polyphonic outputs. *Soft SampleCell* coexists happily with its hardware sibling, SampleCell II. To run *SoftSampleCell* using Sound Manager, Digidesign recommends a PPC G4/400 MHz Mac with 192 MB RAM and Mac OS 9.04. Digidesign; tel. (800) 333-2137 or (650) 842-7900; e-mail prodinfo@digidesign.com; Web www.digidesign.com.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## ▲ KORG KARMA

The Korg Karma keyboard workstation ($2,250) combines the Triton's sound and synthesis engine (but not the sampling capabilities) with a 200,000-event onboard sequencer and extensive real-time MIDI processing. But the Karma is far more than a Triton clone: real-time MIDI control over playback of generated phrases allows complex and animated changes in a performance. The MIDI data governing the performance can be captured in the onboard sequencer and routed to the MIDI Out port.

The Karma can automatically create real-time phrases and patterns called Generated Effects, which you can manipulate in a variety of ways. For example, drum grooves can easily be altered for dynamics and swing, and patterns can be modulated from sparse to busy playback. Guitar patterns can be continuously altered from fingerpicking to full strumming. You can generate arpeggiator-like patterns that can be layered for complex, polyrhythmic textures.

Additional controls provide real-time alteration of timbre, pan, effects, pitch bend, volume, note duration, and more. You get a single Generated Effect in Program mode and four Generated Effects when using the Sequencer or Combination modes. As many as 16 performance parameters are controlled with a combination of eight knobs and two switches. You can save controller settings in either of two Scenes. Four Chord buttons let you create, store and trigger voicings of any complexity.

Pattern playback and MIDI data governing real-time control can be recorded in the onboard sequencer. Each song can hold a maximum of 999 music measures, and the instrument can store 200 songs. Of course, you can record tracks in a straightforward fashion without Generated Effects, or you can enter music in step time. Alternatively, with Korg's Realtime Pattern Play and Record, you can trigger and record patterns and phrases that are assigned to keys. When you finish your song, you can save it as an SMF or in Triton format.

The synthesizer engine offers 62-note polyphony and 32 MB of PCM ROM sounds. You can expand Karma's sound set by adding optional PCM and EXB-MOSS synthesizer expansion boards. The EXB-MOSS board provides six additional voices and 13 synthesizer algorithms.

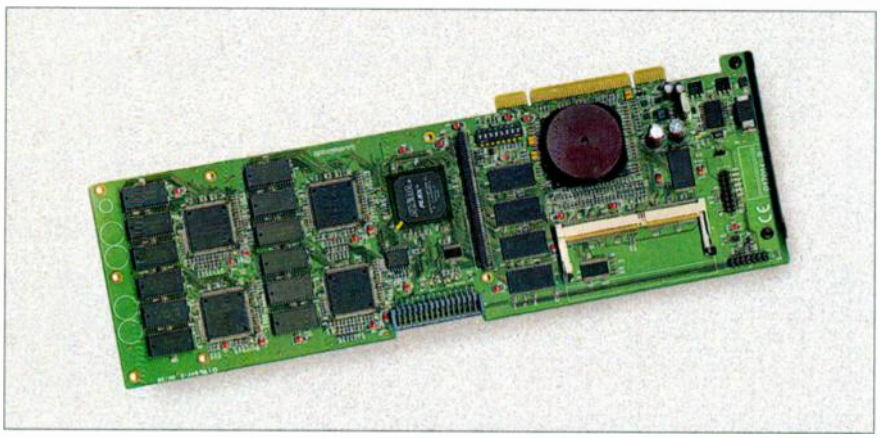
The unit has 102 effects algorithms, with five insert effects, two master effects, and a three-band equalizer. It offers a main stereo output pair; two assignable, independent outputs on ¼-inch, unbalanced jacks; and a ¼-inch headphone jack. Control inputs include damper pedal and assignable switch pedal. Korg USA, Inc.; tel. (516) 333-9100; Web www.korg.com.

## ▶ TC WORKS POWERCORE

Signal processing and software synthesis plug-ins still require a major percentage of your CPU's horsepower. TC Works aims to redistribute the division of labor with the TC PowerCore DSP card for Macintosh ($1,599). The PCI card wields four Motorola 56362 DSPs and a PPC 8240/200 MHz chip that handle the VST signal-processing chores. You can install multiple cards to expand the system.

The card employs a new PowerCore VST format; plug-ins need to be rewritten to take advantage of PowerCore. The DSP card ships with TC Works' *TC Tools* package, which includes *MegaReverb, TC EQSat,* and *TC Chorus/Delay,* and TC plans to port its complete line of TDM-only plug-ins to the new PowerCore format. According to TC Works, PowerCore VST plug-ins will also be developed by third-party manufacturers, but specific support has not been announced. Card-based plug-ins can operate side by side with native VST software as well as VST instruments.

Audio I/O is still managed by your digital-audio card; PowerCore supports any audio hardware that is compatible with the host application. PowerCore's minimum system requirements are a PPC G3/233 MHz, 128 MB RAM, and Mac OS 8.6. TC Electronic (distributor); tel. (805) 373-1828; e-mail us@tcworks.de; Web www.tcworks.de.



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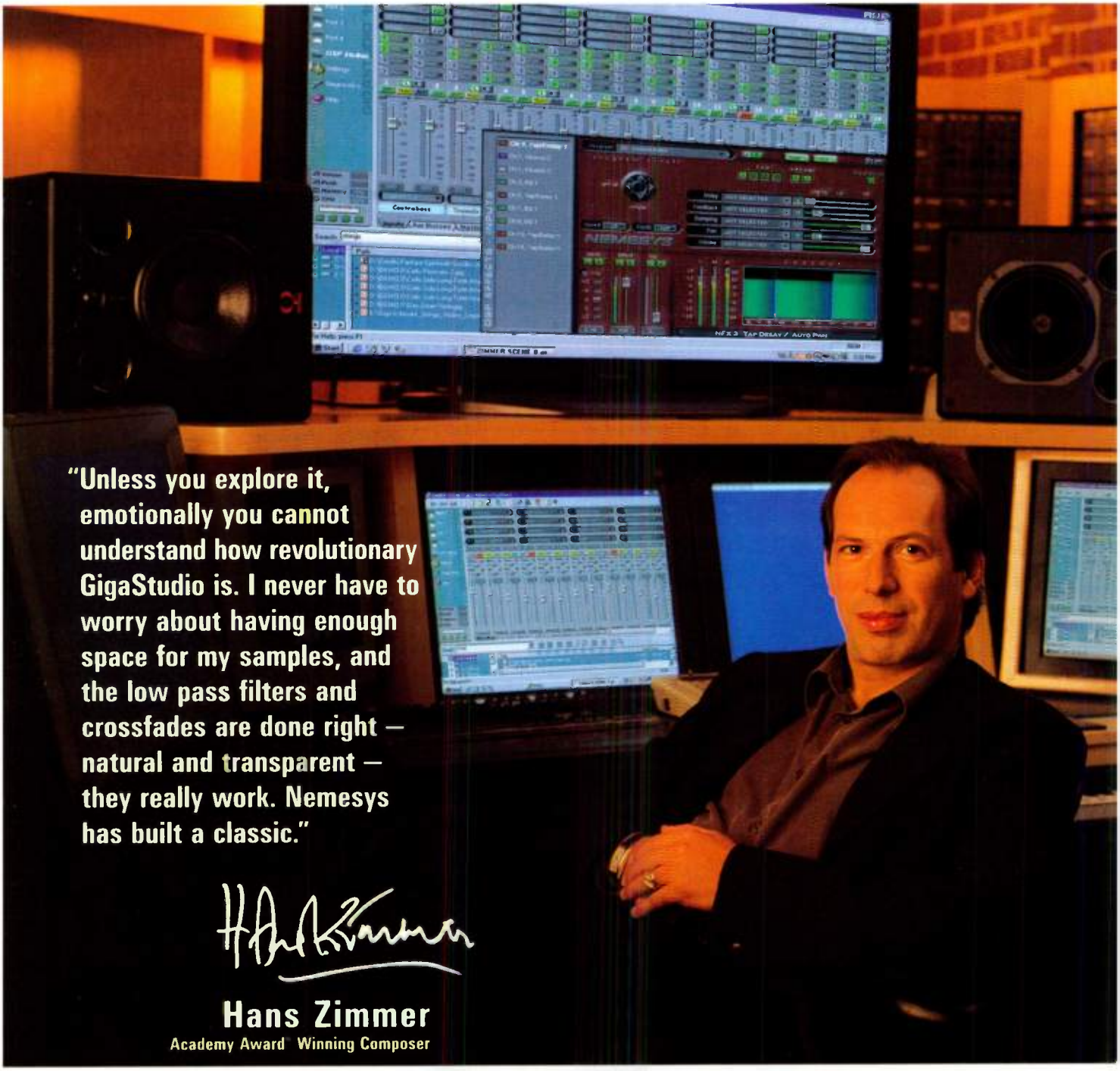

"Unless you explore it, emotionally you cannot understand how revolutionary GigaStudio is. I never have to worry about having enough space for my samples, and the low pass filters and crossfades are done right – natural and transparent – they really work. Nemesys has built a classic."

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## ▶ ALESIS HD24

The HD24 ($2,499) is Alesis' entry into the multitrack hard-disk recorder market. The unit provides 24 channels of 24-bit recording at sample rates of 44.1 and 48 kHz. You can record 12 tracks of 24-bit, 88 or 96 kHz audio but only through the ADAT optical inputs; however, a planned upgrade option will enable 12 tracks of 24-bit, 88.2 and 96 kHz recording from the analog inputs. You can cut, copy, paste, insert, and move tracks or regions of audio from the HD24 front panel, and the unit also offers one undo level.

The unit's 24 channels of analog I/O are on ¼-inch, TRS, balanced connectors. You receive 24 channels of optical ADAT I/O and DB-9 connectors for ADAT sync. Other ports include MIDI In and Out, a BNC word-clock input, and a rear-panel 10Base-T connector for offloading HD24 files in AIFF and WAV format to your computer's hard drive. The HD24 can also output MIDI Time Code, and it supports System Exclusive bulk dumps and MIDI Machine Control.

A proprietary method of writing data to disk allows for recording to inexpensive, slower IDE hard drives. A 10 GB hard drive comes with the HD24, and two hot-swap drive caddies make changing drives simple. The second drive can only be used for file backup, not for additional recording time.

The HD24's basic package includes an LRC remote control, which provides access to transport controls and loop and punch in/out locations. A more robust remote control that will provide control of transport, track arming, and editing functions is scheduled to hit the market this summer. Alesis Corporation; tel. (800) 525-3747 or (310) 255-3400; e-mail info@alesis.com; Web www.alesis.com.

## ▶ ROLAND VS-2480

Roland's VS-2480 portable digital studio ($4,495) provides 24-bit recording, sampling rates of 96 kHz, a built-in 64-channel mixer, 17 motorized faders, and as many as 8 stereo effects processors.

The 64-channel, 34-bus digital mixer features 100 scenes, dynamic automation, and 16 rotary encoders for controlling channel parameters. You can also assign dynamic automation parameters to MIDI Control Change messages. The unit can be used with a PC mouse (included with the unit), an ASCII keyboard, and a VGA monitor, allowing you to edit phrases and highlight and name regions. You get a BNC word-clock input and a SCSI port for connecting external hard drives.

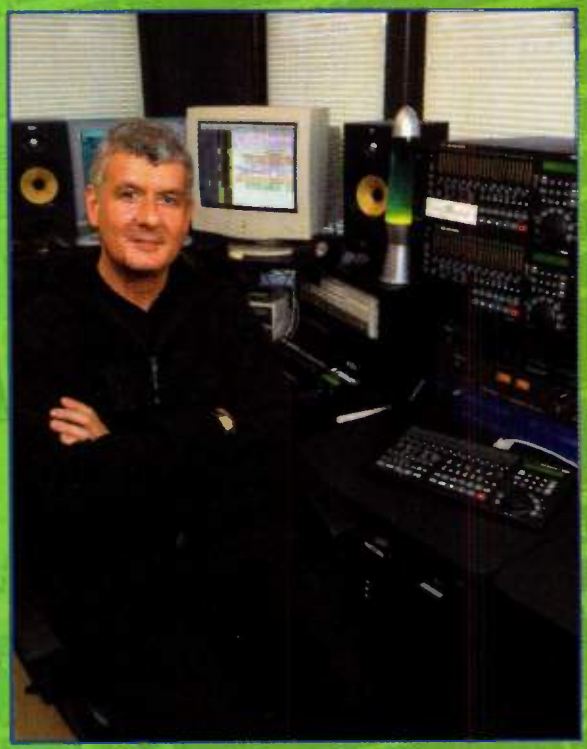
The VS-2480 has two onboard stereo effects processors. Effects include reverb, microphone and speaker modeling, guitar-amp simulation, and dynamics processing. You can add up to three VS8F-2 expansion boards ($395) to expand your effects-processing arsenal to 16 mono or 8 stereo processors. You can burn your final product to CD-R with the optional VSCDRII CD Recording System ($750).

You get 16 analog mic/line inputs: 8 on balanced, ¼-inch, TRS/XLR combination Neutrik connectors and 8 on balanced, ¼-inch phone jacks. A ¼-inch, unbalanced, high-impedance input accepts guitar or bass signals. The stereo analog monitor outputs, stereo master outs, and four aux outs are on ¼-inch phone jacks. There is also a ¼-inch stereo headphone jack.

Digital I/O includes coaxial S/PDIF and two Roland R-Bus, which let you cascade additional VS units. Optional R-Bus audio interfaces include the AE-7000 ($645), which offers 8 channels of 24-bit AES/EBU I/O, and the ADA-7000 ($1,245), which gives you 8 channels of 24-bit, 96 kHz A/D/A.

Other expansion options include the MB-24 Level Meter Bridge ($895) and the VE-7000 Channel Edit Controller ($695), which offers a knob for every channel-edit function and a joystick for surround mixing. Roland Corporation U.S.; tel. (323) 890-3700; Web www.rolandus.com.

# MX-2424 Profile:
## Steve Levine of Manmade Souls Studios



*Steve Levine in his studio with two MX-2424s and an RC-2424 Remote Control Surface. His discography includes records by Culture Club, The Beach Boys, Ziggy Marley, Quarterflash, Gary Moore, Honeyz and many others.*

Producer Steve Levine's golden ears have been integral to a string of hit records by Culture Club, The Beach Boys, Ziggy Marley and many others. The centerpiece of Steve's new studio? Two **TASCAM MX-2424** 24-Track 24-Bit Hard Disk Recorders.

When Steve got ready to make the transition away from tape, he needed a system that provided the ease of use of tape recording with all of the creative benefits of nonlinear hard disk recording. He found that the MX-2424 offered a no-compromise solution for the best of both worlds.

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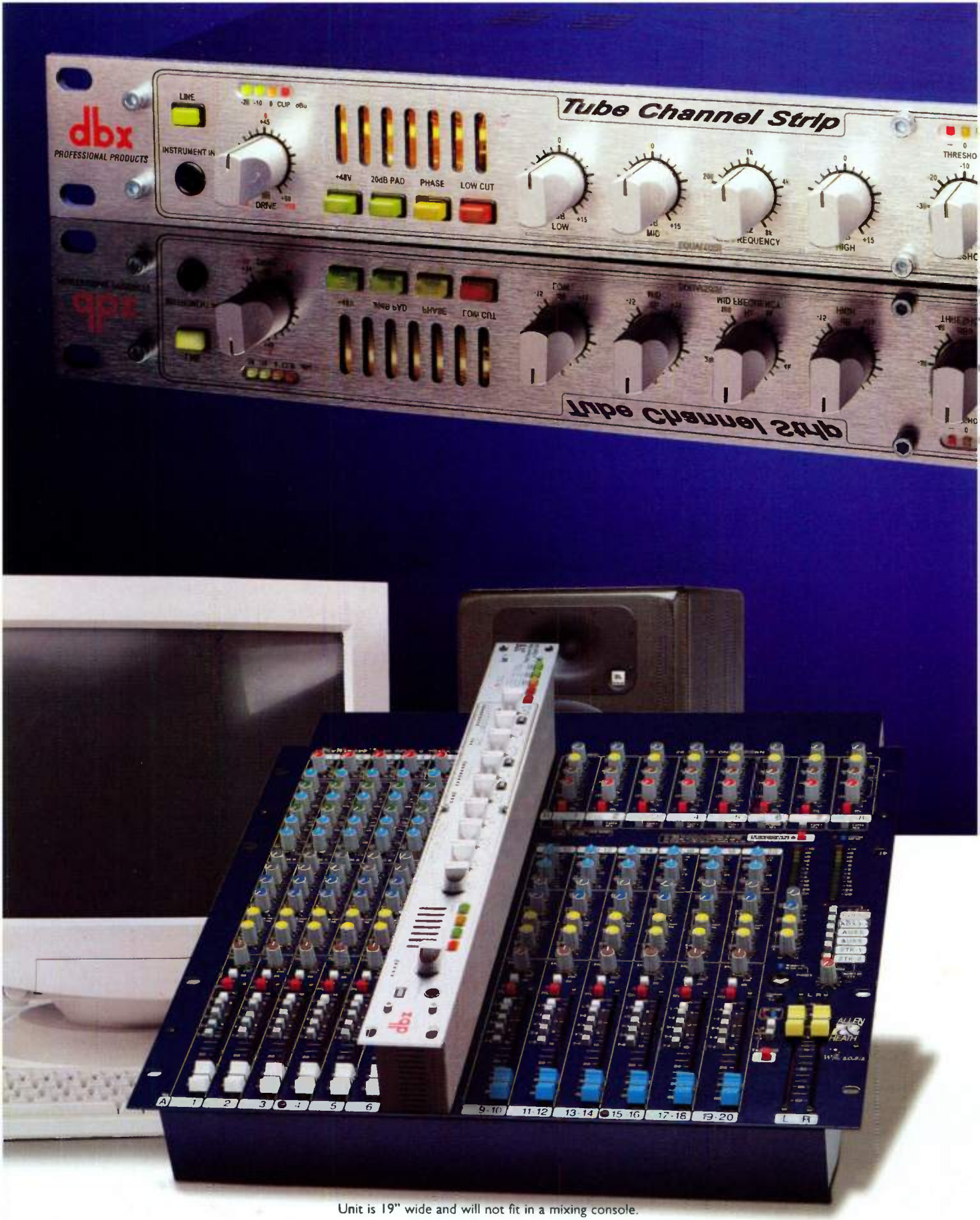


Unit is 19" wide and will not fit in a mixing console.

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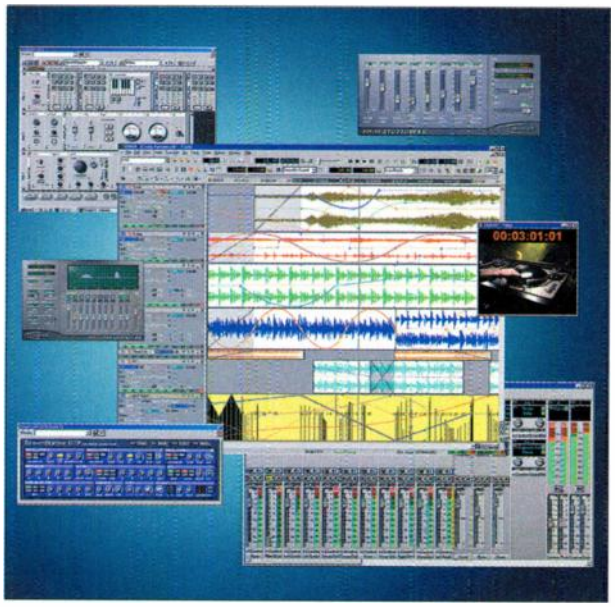

## ▲ CAKEWALK SONAR 1.0

Cakewalk's *Sonar* 1.0 ($479) replaces the company's popular *Pro Audio* digital-audio sequencer. The new program records 24-bit, 96 kHz audio and offers 32-bit effects processing, real-time automation of DirectX 8.0–compatible plug-ins, and audio loop construction tools. The XL version ($739) differs only in the number of third-party plug-ins and content.

The software provides as many tracks and real-time effects as your computer's CPU and memory can manage, with as many as 16 auxiliary sends and 64 master outputs. You can also monitor audio effects on input. Trimming and editing of audio and MIDI data is nondestructive, and crossfades between overlapping audio clips are automatic.

The Console view lets you mix audio and MIDI data simultaneously. Simple drag-and-drop moves let you arrange audio and MIDI tracks and import files from the Explorer window. *Sonar* supports dual monitors.

Also new in *Sonar* is Cakewalk's DXi plug-in format. A number of third-party developers have plug-ins ready for DXi, including Applied Acoustics Systems' *Tassman;* BitHeadz's *Retro AS-1* and *Unity DS-1;* and Native Instruments' *Dynamo, Reaktor, Spektral Delay,* and *B4* software synths. The list is not limited to synthesizers, though; Alien Connections' *ReValver* guitar-amp simulator and RBC Audio's *Voice Tweaker* will soon be available for DXi. *Sonar* can also import Sonic Foundry *Acid* loops and MP3, AIFF, and WAV files.

*Sonar* requires a Pentium II/400 MHz computer with 64 MB RAM and Windows 98/98SE, 2000, or ME. Cakewalk; tel. (888) CAKEWALK or (617) 441-7870; e-mail sales@cakewalk.com; Web www.cakewalk.com.

## ▶ DIGITECH GENESIS3

DigiTech has released the Genesis3 ($499.95), a guitar processor tailored for use in the personal studio. DigiTech's proprietary GeNetX DSP technology provides a new wrinkle to amplifier modeling: it can create a wide variety of hybrids between any of the available amp and cabinet models.

The unit's 48 presets and 48 user patches combine modeled and traditional digital effects. Sounds can be offloaded, stored, and edited with the included editor/librarian software for Mac and Windows 95 and ME.

You can create hybrid sounds on the fly with the Warp knob, which instantly creates new amp and cabinet sounds. You also get knobs for selecting your amplifier model and cabinet and for setting the gain, treble, mid, bass, and amp level. An additional set of knobs and buttons control the effects, utilities, and storage parameters.

Sounds are enhanced with multi-effects processing, and you can add up to eight effects at a time. Effects include reverb, delay, auto swell for volume effects, flanging, phasing, tremolo, pitch shifting, detune, whammy, and dynamics processing. You also get synthlike effects, including an envelope follower and vocoding. An expression pedal can be used for modulating effects.

Genesis3 has 24-bit A/D/A conversion and comes with a coaxial S/PDIF output, a stereo pair of ¼-inch, unbalanced analog outs, and a ¼-inch headphone jack. You get an ⅛-inch stereo minijack for CD players and the like, along with a ¼-inch, unbalanced, high-impedance guitar input. The unit has a MIDI In jack and a MIDI Out jack that also doubles as a MIDI Thru. DigiTech; tel. (801) 566-8800; e-mail customer@digitech.com; Web www.digitech.com.

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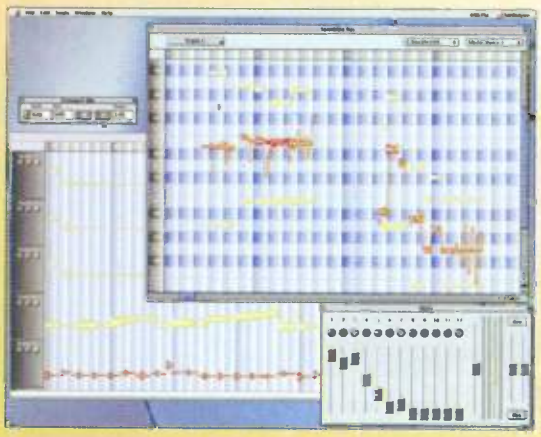
# ON THE HORIZON ▲▲▲▲

## ▼ CELEMONY SOFTWARE

Time-compressing and pitch-shifting of digital audio is nothing new; many fine programs offer those features with a number of bells and whistles, including compensation for pitch-shifted formants. What's really cool about Celemony Software's *Melodyne,* however, is its ability to perform all of these chores independently in real time. The program, which has yet to be priced, is expected to ship in June 2001.

*Melodyne* works its wonders on monophonic material, and you can record melodies or import files into the program. The software detects the performance's individual pitches. Once that is done, the screen presents a view of your sampled melody as segments on a pitch and time graph that resembles a graphical MIDI editor. You can grab any segment of the melody and change its pitch, its location, or the duration of any note. When you move the segments, you can hear the pitch changes in real time. Notes can snap to the next semitone, or you can constrain them to a scale. Any vibrato in the performance will stay the same. Transitions between notes remain natural, and formants remain consistent over a two-octave range. Alternatively, you can reduce or add vibrato to the segment or alter formants.



Creative options abound; notes can be copied, pasted and pitch-shifted to create harmonies. You can alter formants to change voice gender or instrument types, for example, trumpet to trombone or vice versa. Melodies recorded into *Melodyne* can be exported as a Standard MIDI File, so you can double audio performances with your MIDI gear.

*Melodyne* presents the same graphical editing capabilities for changing the time of a segment; just grab a note and move it. Subsequent segments can either be shortened to accommodate the prior event or moved to a later position. If you stretch segment durations, transients and other noise components will remain unchanged. You can also choose to alter the character of note transients to achieve legato or percussive effects.

The playback time of a complete arrangement in *Melodyne* has no bearing on the playback's pitch; you can listen to the content at extremely slow tempos or considerably faster tempos without a change in pitch. *Melodyne* supports ASIO 2 and can serve as a host program for VST plug-ins.

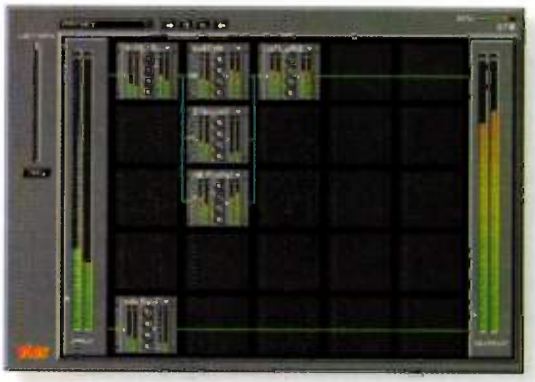
*Melodyne* will be available for Mac OS and Windows platforms. To run it, you will need a PPC G3/300 MHz, 128 MB RAM, and Mac OS9. Windows users will need a Pentium III/300 MHz with 128 MB. The appropriate Windows version has not been determined. Celemony Software; e-mail info@celemony.com; Web www.celemony.com.

## ▶ BIAS VBOX

*Vbox* from Berkley Integrated Audio Software ($129) is a Macintosh program that can combine VST plug-ins into intricate multi-effects patches. The software employs a flexible signal flow matrix that lets you repatch, layer, combine, and mix your VST effects in real time. You can link different VST processors in series, parallel, or a combination of the two. Effects can be muted, soloed, or bypassed on the fly. You can even hot-swap effects without interrupting audio playback.

The program can run as a standalone processor or as a VST plug-in. *Vbox* can also read AIFF and SDII audio files or process real-time audio input.

To get you started, *Vbox* is bundled with more than 25 VST plug-ins, including delays, panners, compressors, vocoders, and filters. Although *Vbox* can operate on a PPC 604e/200 MHz, it is optimized for the PPC G4's AltiVec engine. Running *Vbox* requires Mac OS 8.1, and an OS X–compatible version is being developed. *Vbox* requires 10 MB of free RAM, but operation within a VST host program increases the basic RAM requirement by 3 MB. The maximum number of plug-ins available depends on your computer's CPU. Berkley Integrated Audio Software; tel. (800) 775-BIAS or (707) 782-1866; e-mail sales@bias-inc.com; Web www.bias-inc.com.



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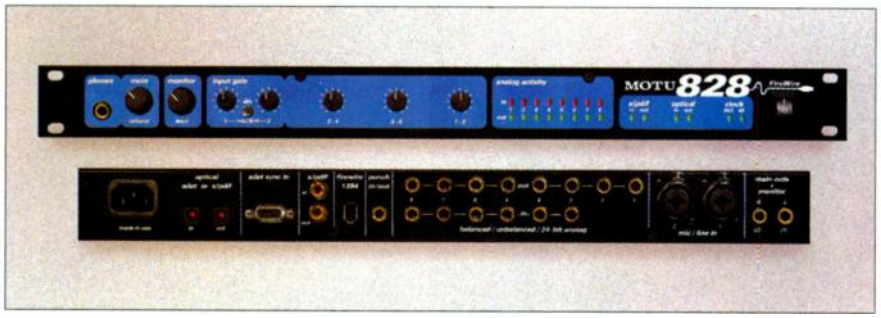


## ▲ MARK OF THE UNICORN 828

MOTU's 1U rack-mount 828 ($795) 18-channel FireWire digital-audio interface allows 24-bit recording at 44.1 or 48 kHz sampling rates. The unit is supported by FireWire-equipped computers running Mac OS 8.6 or later or Windows 2000.

MOTU's CueMix Plus feature boasts monitoring without latency; monitoring signal flow is handled in the 828 hardware, where it is passed directly to the main outputs. You choose any two analog inputs for monitoring in the MOTU 828 control panel, the 828 control strip, or the Configure Hardware dialog box in MOTU's *Digital Performer* or *AudioDesk*.

The rear panel sports selectable ADAT or S/PDIF optical I/O and stereo S/PDIF on RCA connectors. Analog inputs 1 and 2 use Neutrik combination connectors to accommodate ¼-inch or XLR plugs; the remaining six inputs are on balanced, ¼-inch jacks. Analog channel outputs are on balanced, ¼-inch connectors, and you get an additional pair of ¼-inch, balanced analog outputs for direct connection to monitors. Other connections include a ¼-inch footswitch jack, IEC power jack, and FireWire port.

A front-panel volume knob adjusts the monitored input level relative to the main mix output. The front panel also sports an on/off switch, a ¼-inch headphone jack, a main volume knob for controlling headphone and main outputs, and five input-gain trim knobs. Inputs 1 and 2 have trim knobs, and each of the remaining three pairs of inputs has a trim knob. A switch on the front panel enables phantom power on the first two inputs, which are equipped with mic preamps. You get a signal-present LED for each analog input. Two additional pairs of LEDs chart I/O activity on optical and coaxial digital inputs and outputs. Another pair of lights indicate sampling rate.

The MOTU 828 comes bundled with *AudioDesk* (Mac only), ASIO drivers for Macintosh and Windows, and a Windows Drivers Model audio driver for Windows 2000 and NT.

MOTU recommends a PPC G3/400 MHz, 64 MB RAM, and Mac OS 8.6. PC users will need a Pentium III/400 MHz, 64 MB RAM, and Windows 2000. Mark of the Unicorn, Inc.; tel. (617) 576-2760; e-mail info@motu.com; Web www.motu.com.

## ▶ CREAMWARE VECTRON

Inspired by the venerable Sequential Circuits Prophet-VS, CreamWare's *Vectron* ($265, Mac/Win) software synthesizer for Pulsar and Scope/SP systems even includes the equivalent of the factory wavetables from the VS. However, *Vectron* goes beyond its hardware predecessor's capabilities, offering more flexible modulation routing, effects, and polyphony.

*Vectron* has four oscillators per voice, and each oscillator plays back one wavetable. Oscillators are mixed and passed through filter, amplifier, and a panning control. Chorus and delay are provided. The fun begins at the mixer stage, in which you can dynamically vary the balance between oscillators by using two-dimensional vector envelopes and other modulation sources. The synth can be modulated using onscreen controls or with a wide variety of MIDI continuous controllers.

The synthesizer ships with 127 waveforms, but you can add sounds from WAV files, rendered oscillator mixes, or freehand waveform drawings. The software also provides a graphic waveform display with basic editing features.

The required Pulsar or Scope/SP card will relieve your computer of most of *Vectron*'s processing chores.

Macintosh users need a PPC G3/300 MHz machine with 128 MB RAM and Mac OS 8.6. Windows users need a Pentium II/300 MHz with 128 MB RAM and Windows 98. CreamWare U.S. Inc.; tel. (800) 899-1939 or (604) 435-0540; e-mail info@creamware.com; Web www.creamware.com.

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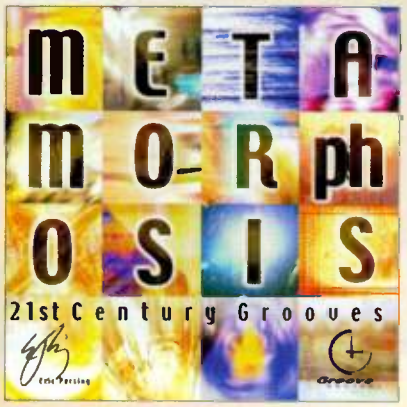
# SOUND ADVICE ▲▲▲▲

## ▲ ILIO ENTERTAINMENTS

The blues, as with jazz, is difficult to pigeonhole because of a wide variety of styles and variations. With that in mind, Ilio Entertainments has released *Hot Steel Blues* ($199 CD-ROM for Akai, E-mu, and Roland; $99 CD audio), a construction kit comprising more than 800 blues guitar phrases that are sorted as patterns, melodies, and endings. The phrases are inspired by a host of styles, ranging from acoustic to electric and from country blues to the sounds of Chicago. The CD-ROM version also includes the audio CD.

Terry Robb, whose performances are captured in the collection, has played with stars such as Buddy Guy, Steve Miller, and John Fahey. Robb used a large selection of electric and acoustic guitars, including a Martin 000-28, a Weissenborn lap steel, and a Gibson B25 upright slide. The guitars were recorded using an assortment of solid state and tube amplifiers.

Ilio has also released *Analog Meltdown* ($199, CD-ROM for Akai, E-mu, Kurzweil). For this collection, Ilio pressed synthesizer programmer Kevin Wakefield into service to design a battery of brash, unusual sounds with a host of modulation options for real-time control. The collection includes lead instruments, "power pads," plucked sounds generated by FM synthesis, science fiction–type sound effects, and more. To ensure animated sounds, Wakefield designed the original synthesizer sounds and then programmed the target samplers with lots of modulation features, including Breath Controller, Modulation Wheel, and Expression Pedal. Ilio Entertainments; tel. (800) 747-4546 or (818) 707-7222; e-mail ilioinfo@ilio.com; Web www.ilio.com.




## ▲ SPECTRASONIC

Spectrasonics' *Metamorphosis* ($199 Akai, E-mu, Roland, and GigaStudio CD-ROM; $99 CD audio) provides 300 highly processed grooves that were created with more than 100 hardware and software synthesizers and effects, including Native Instruments' *Reaktor* and Steinberg's *Reason*. Musical styles include trip-hop, ambient, and drum 'n' bass, and tempos range from 50 to 180 bpm, but the CD-ROM versions use Ilio and Spectrasonics' trademark Groove Control, so you can easily modify the tempo and feel.

All of the grooves provided on *Metamorphosis* are offered in four forms. *Metamorphosis* contains standard loops; tempo-matched grooves laid out across keyboard; WAV files; and Groove Control files. Ilio Entertainments; tel. (800) 747-4546 or (818) 707-7222; e-mail ilioinfo@ilio.com; Web www.ilio.com.

## ▼ SOUND IDEAS

Sound Ideas presents *The Sound Effects of Rocky and Bullwinkle and Friends* ($395). The three audio CDs serve up 785 tracks of royalty-free dialog, music, and sound effects from the beloved moose and squirrel. The CDs also provide other Jay Ward characters and features, including the evil Boris and Natasha, Dudley Do-Right, Peabody and Sherman, and the hapless George of the Jungle. Sound effects include airplane dives, fire alarms, chickens, horses, pigs, sheep, and of course, moose. You also receive angry crowd sounds, crowd murmurs, duck horns, hiccups, and George's famous jungle call.

Try dropping these sound effects into your next hip-hop track or ambient production. Sound Ideas; tel. 800/387-3030; e-mail info@sound-ideas.com; Web www.sound-ideas.com.

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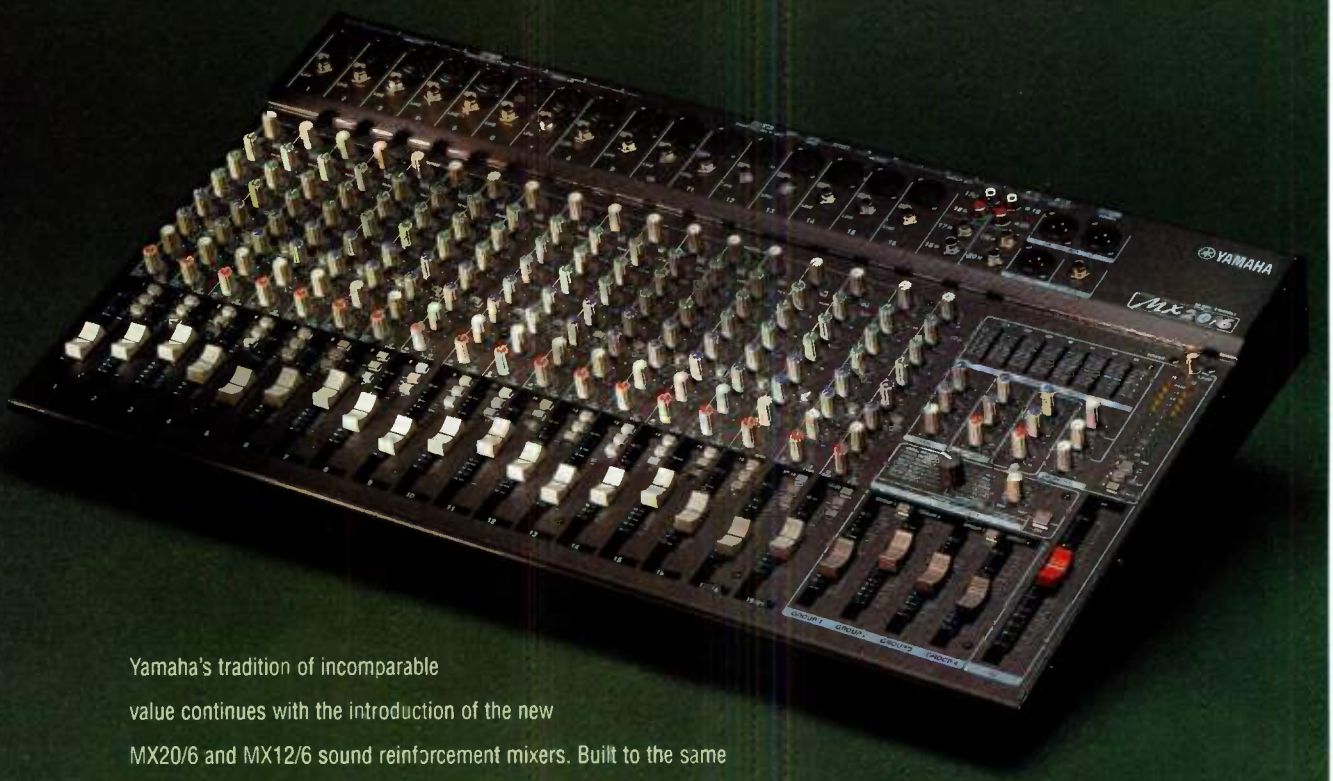


Yamaha's tradition of incomparable value continues with the introduction of the new MX20/6 and MX12/6 sound reinforcement mixers. Built to the same standards as Yamaha's famous PM touring consoles, these MX models share 6 output busses, 3 auxiliary busses, 7-band graphic EQ and enhanced Yamaha effects. They differ only in the number of input channels: 16 mono and 2 stereo for the MX20/6 and 8 mono plus 2 stereo on the MX12/6. As for the pricing, they're just $949 and $649 MSRP, respectively. Pretty impressive! Once again, Yamaha gives you more for less.

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# REV UP ▲▲▲▲

## ▲ MARK OF THE UNICORN

*Digital Performer* 3.0 ($795; $295, upgrade from Performer; $395 cross-grade), MOTU's flagship digital-audio sequencer, has a new design and a host of new features, including support for dual G4 processors, Pro Tools/OMF file export and import, and comprehensive surround-mixing tools.

The redesign includes a new Sequence Editor window in which you can view and edit audio, automation, and MIDI data along a single timeline. MIDI and audio tracks can be vertically resized independently.

The MIDI Graphic Editor offers many enhancements. You can edit multiple MIDI tracks in a single window, and each track's individual color coding carries over to related note data. MIDI-controller data can be edited in three ways: as individual event points, as colored bars, or as breakpoint lines (as with audio-automation editing). Another interesting way to modify controllers is to select a waveform contour for the data; you can choose between sine, square, triangle, and sawtooth waves, as well as parabola, spline, random, and freehand drawing. The feature provides control over period, amplitude, and scaling of MIDI data and audio parameters.

Post-production enhancements include support for SynchroArts *VocAlign* automatic dialog-replacement software so that *VocAlign* users can quickly select and replace dialog within *Digital Performer.* A new QuickTime movie window scrubs along with your edits; if you trim a Soundbite, for example, the movie window will scrub with the selected edge of the audio data, frame by frame. You can import and export complete multitrack Pro Tools sessions and other OMF-compliant projects.

Surround mixing in *Digital Performer* 3.0 supports LCRS, quad, 5.1, 6.1, 7.1, 10.2, and other multiple-channel formats. The program has four panners that you can use simultaneously and independently across tracks. Each panner has five modes for panning stereo tracks. Support for Mac OS Input Sprockets lets you use a USB joystick to control any panner.

The new version runs on any Power Macintosh, but a G3/233 MHz is recommended for recording digital audio. You will need at least 64 MB RAM and Mac OS 8.51. Mark of the Unicorn, Inc.; tel. (617) 576-2760; e-mail info@motu.com; Web www.motu.com.

## ▼ ANTARES

*AutoTune* 3.0 from Antares (TDM $599; MAS, RTAS, or VST $399; DirectX $299; upgrades $149 for TDM, $99 for other formats) adds phase-coherent pitch correction of stereo tracks and specialized pitch-detection and -correction algorithms.

The program offers a selection of processing algorithms optimized for commonly recorded audio types. New algorithms include soprano, tenor, and alto voices; instrument; and bass instrument. Using the proper algorithm increases accuracy and speeds up the pitch-detection and -correction processes. Bass mode extends low-frequency pitch detection to 25 Hz, allowing correction of bass-instrument intonation problems.

You can set target pitches in real time with MIDI note numbers. The Make Scale From MIDI function constrains audio content to a custom scale; audio adheres to only the pitches played. Other features include compatibility with 88.2 and 96 kHz sampling rates and better Mix-chip usage for TDM users. System requirements vary depending on the host software. Antares Audio Technologies; tel. (888) 332-2636 or (408) 399-0008; e-mail info@antarestech.com; Web www.antarestech.com.

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# REV UP ▲▲▲▲

## ▼ APPLIED ACOUSTIC SYSTEMS

Version 2.0 of Applied Acoustic Systems' *Tassman* software synthesizer ($399; the upgrade is free) provides users with reduced latency, integration with other hosting systems, more flexible synthesizer-building capabilities, as well as 16-part multitimbral operation.

The new *Tassman* version is compliant with DXi and VST Instrument host programs. Therefore, you can employ the program as a standalone

synthesizer or within a sequencer host without needing MIDI loopback utilities.

You can create hybrid synthesizers from components of analog and acoustic models, and MIDI control of all the module parameters can be customized. The package ships with hundreds of patches to help you get up and running, and you can also customize the presets to suit your tastes. Patches can be saved as short text files, which allows you to easily share your creations with other *Tassman* users.

*Tassman* supports Windows 95, NT, 2000, and ME. It needs a Pentium II/233 MHz computer with 32 MB RAM, DirectX 5.0, and a DirectX-supported sound card. Applied Acoustics Systems; tel. (888) 441-8277; e-mail info@applied-acoustics.com; Web www.applied-acoustics.com. ●

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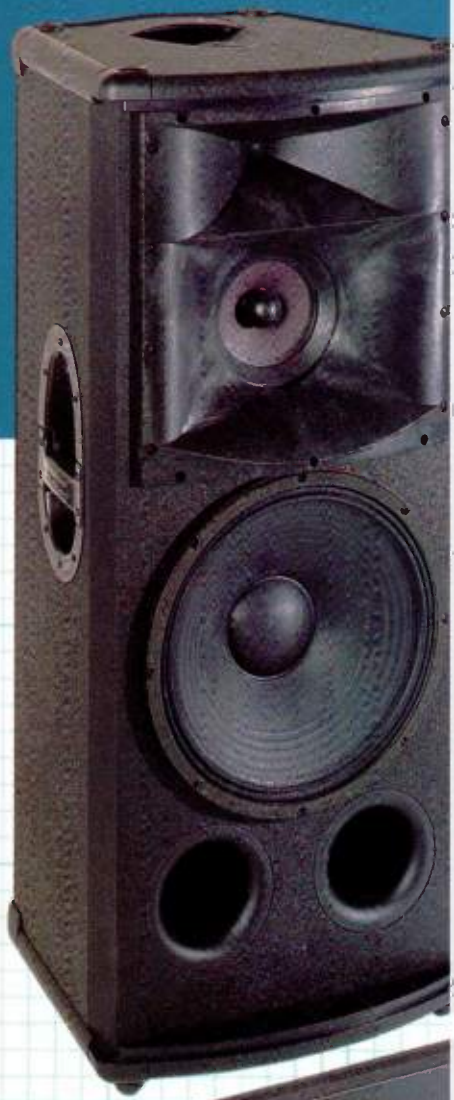
# It *looks* like a regular system. It *sounds* like amplified reality.

## The technology behind the SR1530 Active 3-Way speaker system and SR-VLZ Pro Series mixers.



Until the SR1530, there's never been a three-way active processed sound reinforcement speaker in this compact, fit-in-a-van size. In fact, as far as we know, there's never been another compact, active three-way speaker *period*.

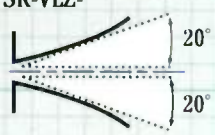
*A dedicated horn-loaded 6-inch transducer refines SR1530 midrange.*

And until the SR24•4-VLZ® PRO and 32•4-VLZ® PRO, there have never been compact SR mixers with mic preamplifiers this good.

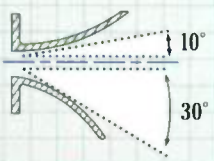
Put them together and you have a new level of sound system accuracy.

If you're the non-verbal, gotta-hear-it-to-believe-it type, audition the SR-VLZ-PRO/SR1530 combo at your nearest Mackie dealer. We think you'll agree that it definitely walks the walk.

If you're more of the tech type, read on while we talk up why this system re-defines how good a medium-sized PA can sound.




*Symmetrical horn*




*Asymmetrical Optimized Wavefront™ horn*

### It's a three-way, not a two-way system.

Midrange is where fundamental vocal and instrumental frequencies are. A two-way system has to compromise by reproducing this range through a too-big low-frequency transducer and a too-small high frequency transducer.

Our three-way system has a specialized transducer with separate horn that's sized perfectly for handling vocals and instruments.

When you listen to the SR1530, you hear the difference right away. Midrange sounds more accurate and natural especially at really high SPLs.

### It's internally tri-amplified.

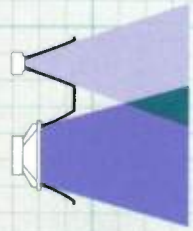
For clear definition, tight transient response and hard-hitting bass, nothing beats application-specific amplifiers for each transducer. Trouble is, until now that's required an outboard electronic crossover, three separate power amps and a lot of speaker cable.

The SR1530 has two 100-watt and one 300-watt internal amps, each optimized for an individual transducer. Moreover, we've built in electronic parametric equalization and time correction for accurate frequency response and phase alignment.

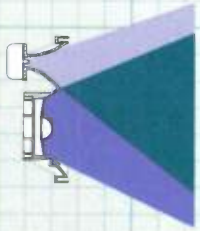
### Optimized Wavefront Horn.

Generating accurate high and midrange frequencies is only part of the story. They must be delivered to your audience in the right amounts and in the same place at the same time.

Instead of using separate horns, we created a one-piece 90°x 40° Optimized Wavefront system that combines high and midrange horns. Unlike conventional horns, which are symmetrical, the high frequency section of the SR1530's horn is shaped so that more of its output is directed down into the 6-inch midrange's dispersion pattern. This creates a focused, single wavefront with excellent phase and power response characteristics. Your whole audience gets even frequency balance, instead of lots of midrange up front and too much high end in the back.



*Conventional horns fire straight out. The quality of sound depends on where you're sitting in the audience.*



*Optimized Wavefront™ system mixes high and midrange output for better detail and vocal intelligibility everywhere.*

### Inside/Outside voice coil.

Because we make our own transducers, we've been able to add technology that gives the SR1530's low frequency transducer (woofer) added thermal protection.

Conventional voice coils have two

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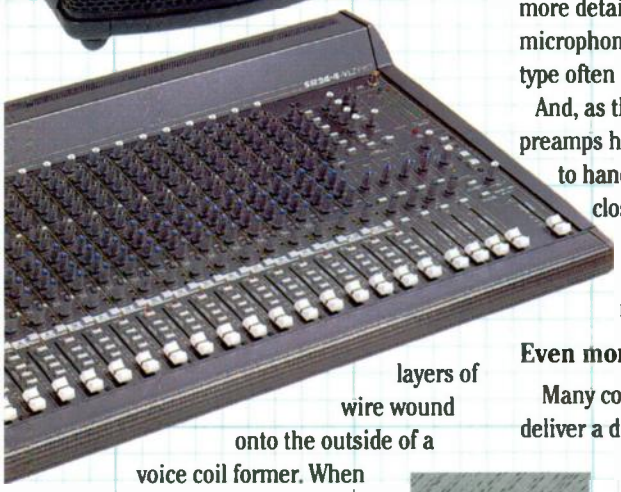


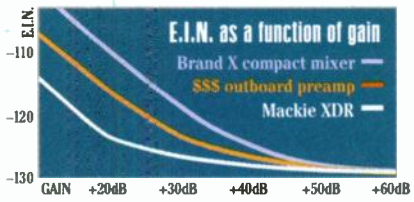
32•4 VLZ-PRO NOW SHIPPING!

forced to expand at the same rate as the wire, relieving stress and preventing separation.

## XDR™, the best mic preamps ever offered on a compact SR mixer.

With a speaker system as accurate as the SR1530, you can take maximum advantage of the premium, eXtended Dynamic Range mic preamps on our new SR24•4-VLZ PRO and SR32•4-VLZ PRO sound reinforcement mixers.

We spent over two years creating the first mixer mic preamp with specs that meet or beat those of mega-expensive esoteric outboard microphone preamplifiers. For example 0.0007% Total Harmonic Distortion, and frequency bandwidth from 5Hz to 100kHz ±1dB. At real-world gain settings (0 to +30dB), XDR preamps are capable of extracting more detail and better sound out of any microphone — including the dynamic type often used on stage.




And, as the name implies, XDR mic preamps have extended dynamic range to handle screaming vocalists or close-miked drum kits. Plus a full 60dB of gain to boost weak inputs without adding extra noise.

## Even more live sound benefits.

Many conventional mic preamps deliver a different frequency response when presented with a 50-ohm load than with a 600-ohm load. Our XDR design is *impedance-independent*. In basic terms, this means that no matter what the combined impedance load of the mic and cable are, you'll get the same frequency response at the mixer. And, XDR mic preamps have the best RFI (radio frequency interference) rejection of any compact mixer brand. So you won't pick up stray signals or background noise when you use long cable runs.

## Is your band worth it?

We'll be honest. The SR1530/SR-VLZ PRO speaker/mixer combo isn't the lowest-priced SR system you'll find in a music store (although it's far less money than a comparable tri-amplified passive system). We designed the SR1530 and SR-VLZ PRO Series mixers for musicians who want to sound their best at up to 126dB SPL. If you fit in this category, call toll-free or visit our web site for more info. Or better yet, visit a Mackie dealer and hear amplified reality.

### The SR1530 Active 3-Way:

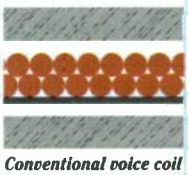
■ Linear response from 45Hz to 18kHz ■ Total of 500 actual watts RMS delivered to internal transducers ■ Electronic EQ for flat frequency response ■ Time correction for accurate phase alignment ■ Optimized Wavefront™ high/mid horn system ■ RCF Precision™ transducers: 15-inch LF transducer with Inside/Outside heat-resistant voice coil and high-flux magnetic circuit ■ 6-inch horn-loaded midrange ■ 1-inch exit HF compression driver ■ Trapezoidal Baltic Birch plywood enclosure with rugged molded resin endcaps ■ Polymer-coated steel grille ■ Weight-balanced with side and top handles for easy carry and set-up ■

### SR24•4-VLZ PRO & SR32•4-VLZ PRO:

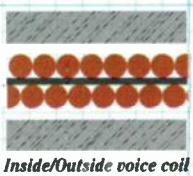
■ 24•4: 20 mono channels., 2 stereo channels, 20 XDR mic preamps ■ 32•4: 28 mono channels, 2 stereo channels, 28 XDR mic preamps ■ Both: 4-bus design ■ New high-performance 2086 op-amps ■ 6 aux sends per channel ■ 3-band EQ w/swept mid & low cut filters on mono channels ■ 4-band fixed EQ on stereo channels ■ Mute, solo, signal present & OL LEDs on every channel ■ 4 stereo aux returns with EFX to Monitor feature ■ Separate Talkback section with extra mic preamp ■ Double-bussed sub outs for easy studio multi-tracking ■

layers of wire wound onto the outside of a voice coil former. When heat builds up, the wire and former expand at different rates, which can lead to catastrophic failure.

The SR1530's LF transducer voice coil has one layer of wire on the outside and another on the inside. Both make full contact with the air, transferring heat to both surfaces of the surrounding magnet structure. Maximum cooling takes place…and the voice coil former is



*Conventional voice coil (Burnus Outus Potentialia)*



*Inside/Outside voice coil (Coolus Cucumberous)*

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# WEB PAGE

*By Gino Robair*

## WEB SITE OF THE MONTH

An interesting online resource for the synthesizer enthusiast is Joseph Rivers's Audio Playground Synthesizer Museum. Located in Orlando, Florida, the Audio Playground Synthesizer Museum houses one of the finest electronic instrument collections in North America. The collection contains more than 1,000 instruments, ranging from modular analog gear such as the ARP 2600 and EML Electrocomp 101, to smaller synths such as the Oberheim 2-Voice and Star Instrument Synare electronic drum, to classic rhythm machines including the Maestro Rhythm King and Boss DR-55. The last category of instruments makes the museum's Web site worth visiting.

To give musicians a sense of what it is like to use the more obscure rhythm machines, Rivers created a collection of interactive virtual drum machines (www.keyboardmuseum.org/d_machines/vdrums.html). This section of the site includes re-creations of 31 classic drum machines, percussion synths, and rhythm boxes produced in the '60s, '70s, and '80s that you can play from your browser. Have you ever heard the Seeburg Rhythm Prince or the Rhythm Box Tronix? How about the Mattel Synsonics, MXR Computer Rhythm 185, or the Roland Rhythm 33? Whether you're looking for disco drum zaps or mechanized Latin beats such as the mambo, cha-cha, and beguine, there are plenty to choose from in these pages. The virtual instruments let you hear the beat box's historical development during its first three decades.

The virtual drum machine page also includes interactive demonstrations of how the Hammond tonewheel organ and Fender Rhodes electric piano work, as well as demos of the Rheem Kee Bass and Technosaurus Microcon monophonic synth. To experience the virtual drum machine pages, you need Macromedia *Shockwave* and *Flash* 3.

## DOTDOTDOT.COM

Over the years, toy manufacturer Mattel has created a number of unusual and intriguing musical instruments that have graduated from consumer items into the realm of the professional musician. A classic example is the Optigan (short for *optical organ*). Developed in the early '70s, the Optigan resembled other home organs that were popular at the time. However, the Optigan used recordings of real instruments played from interchangeable optical disks. Optigans were fragile, temperamental, and, to many people, sounded terrible. However, for audio kitsch connoisseurs, the Optigan has proven to be invaluable. A wonderful and comprehensive resource on the instrument is **Optigan.com** (www.optigan.com). Here you will find background information on the instrument, details about the disks, and lists of musicians who have used the Optigan on records. . . . A Web site that includes not only the Optigan but instruments of even greater

obscurity (have you ever heard of the Sonorous Cross, the Optophonic Piano, or the Hellertion?) is **120 Years of Electronic Music** (www.obsolete.com/120_years). Although the site could use a once-over with a link validator and spell-check program, it nonetheless documents numerous rare and one-of-a-kind instruments. The page begins with Elisha Grey's Musical Telegraph and ostensibly goes up to the '80s, where many of the links are not fully functioning, to cover instruments by Akai, Kurzweil, and E-mu. The E-mu Emulator page is particularly interesting because it contains a fabulous photo of a large E-mu modular synth rather than an Emulator. Where this Web site succeeds, however, is in giving the visitor a sense of the breadth of simultaneous research in electronic instruments throughout the 20th century.

Sex-changed Cameraman Decides to Switch Back to Being a Female

I can't believe it's really

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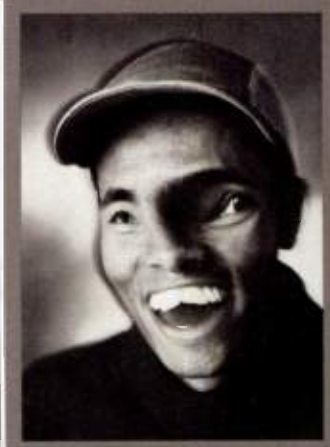

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## DOWNLOAD OF THE MONTH

Available from the BBC's Science Playground site is a downloadable gem that is sure to be the hit of your office or dormitory. The Desktop Theremin (Mac/Win; www.bbc.co.uk/science/playground/theremin1.shtml) is a standalone, *Shockwave*-driven re-creation of that classic instrument with a cleverly designed graphical user interface.

The "instrument" resembles a portable television with a single antenna displaying Professor Theremin fronting an orchestra. To play the virtual theremin, simply click on the on/off switch and move your mouse. You can place the computer's cursor anywhere on your screen. Moving the cursor to the right raises the theremin's pitch, and moving the cursor to the left lowers the pitch. Move the cursor to the up and down to increase or decrease the volume, respectively. As you play, you will also notice that Professor Theremin is playing with you, though his hand movements are contrary to what would happen if you played a real theremin (for example, you move your hand toward the pitch antenna to play higher pitches).

However, the fun has just begun! The six buttons below the television screen let you add looped material—beats, pads, and breaks—behind your theremin playing. The Weirdness control changes the theremin's timbre from clean to buzzy. Tempo increment and decrement buttons, which raise and lower the pitch of the accompaniment along with the tempo, are also available. To top it off, a simulated oscilloscope shows you the wavelength of the pitches you're playing. If you have never played a real theremin, don't worry. The application plays discreet pitches, so even a rank beginner can play in tune like a pro.

## WEBCAST

Cuban music fans now have an online radio station that caters specifically to their tastes. The bilingual Batanga (www.batanga.com), which specializes in a variety of Latin music styles ranging from the traditional (salsa, boleros, and merengue) to the contemporary (jazz and rock), has created Cubanisimo, a channel devoted entirely to the music of Cuba.

Cubanisimo covers the wide range of styles played in Cuba, including cha-chas, mambos, rumbas, danzons, sons, and guaguancos. Featured artists include Los Van Van, Beny More, Perez Prado, Celia Cruz, the Afro-Cuban All-stars, Xavier Cougat, and Cuba's master hand drummer, Francisco Aguabella.

Batanga has also launched two additional channels: Latin Jazz and Latin Dance/Techno. The Latin Jazz channel's featured artists include Tito Puente, Poncho Sanchez, Chucho Valdes, and Arturo Sandoval. The Dance/Techno channel reflects the music heard in today's club scene, which combines traditional Latin rhythms with rap, house, and hip-hop styles. That channel's artists include Tito Puente Jr., DJ Cubanito, El General, and Ilegales. You can listen to Batanga using Microsoft *Windows Media Player* or *RealAudio Player*.

## WEB APP

Voice Extensible Markup Language (VoiceXML) is a new computer language that allows Web browsing through voice commands. It is related to the more familiar HTML used to format Web pages but contains a new set of code words, or *tags*, designed to handle input from a voice-recognition system and format information from the Web for audio delivery over the phone. A number of companies are pioneering VoiceXML's use to create a new and exciting Internet audio application: the voice-activated Web browser.

VoiceXML is based on XML, which uses programmable tags to define Internet transfer protocols for an arbitrary set

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DXi

For a list of soft synth developers supporting the new DXi plug-in standard, visit www.cakewalk.com/dxi

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of data, such as customer names and addresses, stock quotes, or even music notation (see "Web Page: Web App" in the March 2001 issue of **EM**). The VoiceXML 1.0 specification was published by the VoiceXML Forum (www.voicexml.org)—whose founding members include AT&T, IBM, Lucent Technologies, and Motorola—and was submitted to the World Wide Web Consortium (www.w3.org) in May 2000. The specification defines a programming interface that developers can use to write sophisticated Internet telephone applications.

Of course, the whole idea hinges on the proficiency of the voice-recognition software that receives the original input from the phone, but these systems have improved remarkably during the past few years. Although the HAL 9000 computer is still very far from reality in 2001, the cell phone is ubiquitous and the potential market for Web phone interfaces has driven voice-recognition R&D efforts. It turns out that computers can be taught to understand voice commands with a fairly high degree of accuracy when the expected input is limited to a short list, such as a menu of commands or a string of numbers.

An application written in VoiceXML defines a set of dialogs that prompt the user on the telephone for input, such as a vocal utterance or a set of touch tones (also known as DTMF). Each dialog, or *form,* contains a field for storing the caller's response, a list of allowable answers to the prompt, and calls to routines that handle correct and incorrect input. Garbled or incomprehensible answers usually return the computer equivalent of "Say what!?"

A recognized response will cause the application to branch to another menu and another prompt or respond to the user with recorded audio and text-to-speech synthesis. That information can take the form of canned speeches from a database, current account balances, Stephen Hawking–style readings of your e-mail, or data downloaded from the Web, such as the latest sports scores, movie listings, or Mexican restaurants in your area. VoiceXML documents can even include JavaScript commands for more complicated processing such as currency conversion or telephone games.

Obviously, interactive systems of this type can be extraordinarily useful for an increasingly wireless public, despite their limitations. Cell-phone audio tends to be noisy by definition, which makes voice recognition even more difficult, and it will be a long time before there is any kind of reliable speech-to-text software. Nonetheless, well-funded companies such as TellMe and BeVocal are anticipating the growth of a major new market based on VoiceXML-powered Web browsers. For more information, point your browser to www.voicexml.org, www.w3.org, www.tellme.com, and www.bevocal.com.

*—Peter Drescher*

## BAND ON THE WEB

Remember those captivating scenes from mid-'60s TV shows in which the main character enters a party and finds young people dancing to the latest craze? If you spent the next few weeks searching out similar music to jerk and frug to like the characters on the tube, then the Oscillators—New Hampshire's solution for listeners hungry for Hollywood-filtered, pre–Sgt. Pepper's rock 'n' roll in go-go boots—is for you.

"We've always been garage oriented, but within that genre, you'll find surf, old R&B, bubble gum, and punk," says Joel Mellin, songwriter, instrumentalist, and co-producer of the Oscillator's second release, *Incog-Neat-O!* (www.stereorrific.com). "We're paying homage to the great garage-pop bands in hopes that people will enjoy the subtle jokes and ironies. It's hard to go wrong with three chords, boots, and some 'yeah yeahs.'"

The Oscillators is a quintet featuring guitarist and songwriter Miss Mary and keyboardist Samantha on vocals; Mellin on vocals, guitar, keyboards, and theremin; M@ on bass; and Wendy on drums. The band's dune buggy mascot, Doug, plays a major thematic role on the album.

*Incog-Neat-O!* showcases Mellin's and Miss Mary's brilliant flair for catchy melodies wrapped in simple, classy arrangements such as "Don't Look Back" and "Gimme Gimme." The Oscillators successfully re-create the party-rock sound familiar to the TV generation, thanks to the studio wizardry of producers Mellin and Pete Weiss, who have crafted a record that buzzes with Farfisa organs and jangles with tambourines and surf guitars.

The Oscillators' songs focus primarily on teen love gone wrong, with Miss Mary and Samantha taking turns at the mic. In addition, Mellin delivers spectacular Eric Burdon–inspired vocals on "I Can't Wait 'Til Friday Comes" and the Billy Childish chestnut "Out of Control." There are even a couple of fine surf instrumentals such as the title track and "Doug Buggy," both penned by bassist M@.

"We've sold a decent number of records over the Web," Mellin says when asked about the Internet's relevance to an up-and-coming band. "Miss Mary receives a considerable amount of attention on MP3.com from her Stereorrific Recordings solo debut *Hey Blue!* She's been featured on the 'Women of MP3.com' twice now. The Web is fascinating, though, because your musical niche, however specific, is accessible to listeners worldwide."

JOHN SOARES

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AKG.SOUNDS.BETTER

By Julian Colbeck

# Linn Electronics LinnDrum

*Produced: 1982–85*
*Made in: United States*
*Designed by: Roger Linn*
*Number produced: 5,000*
*Sound-production system: digital sampling*
*Price new: $2,495*

| *Today's prices:* | | |
|---|---|---|
| | *Like new* | *$600* |
| | *Like, it's okay for its age* | *$500* |
| | *Like hell* | *$250* |

If one name is synonymous with dragging the drum machine out of its organ accoutrement niche, that name is Linn. While in his early 20s, California guitarist Roger Linn was sufficiently ticked off about the state and cost of drum machines that he built his own beat box. The Linn LM-1 was the first commercial drum machine that used sampled drum sounds instead of analog, synthesized binks and bonks; hence, it is considered the first digital drum machine. Linn's design cut across stylistic barriers. Anyone who could afford a Linn machine, from Prince to Peter Gabriel to XTC, bought one.

Linn began producing the LM-1 in 1979, but only about 500 were manufactured. It wasn't until three years later that Linn's second product, the LinnDrum, firmly established the line. A substantial instrument measuring almost two feet across, the LinnDrum quickly gained classic status thanks to its sampled sounds and revolutionary rhythmic concepts such as swing factors, shuffle, accent, and real-time programming, all of which have since rooted themselves in beat box technology.

The first thing that set the LinnDrum apart was the sounds, which are big and beefy, like real drums. "I think we recorded at a 35 kHz sample rate," says Linn. But in one of those happy accidents, he didn't apply the filtering that's normal for such a modest sample rate—"It made the drums sound dull," Linn says—and the resulting distortion and sizzle provide much of the instrument's realism and bite.

Among the LinnDrum's 15 separate sounds are crash and ride cymbals, both of which were absent from the LM-1. Other sounds offered are cabasa, tambourine, high and low congas, cowbell, hand claps, hi-hat, three sizes of toms, kick, snare, and rimshot. Any 12 sounds can be selected for simultaneous play.

A number of session drummers provided the raw sonic material for the LinnDrum. You can easily insert new chips into the LinnDrum, providing it with a theoretically limitless tone palette. This design allowed Linn to offer customers the option of burning their sounds onto a chip, free of charge, if they would make those sounds available to the company in return. A number of those customer contributions made their way into the LinnDrum.

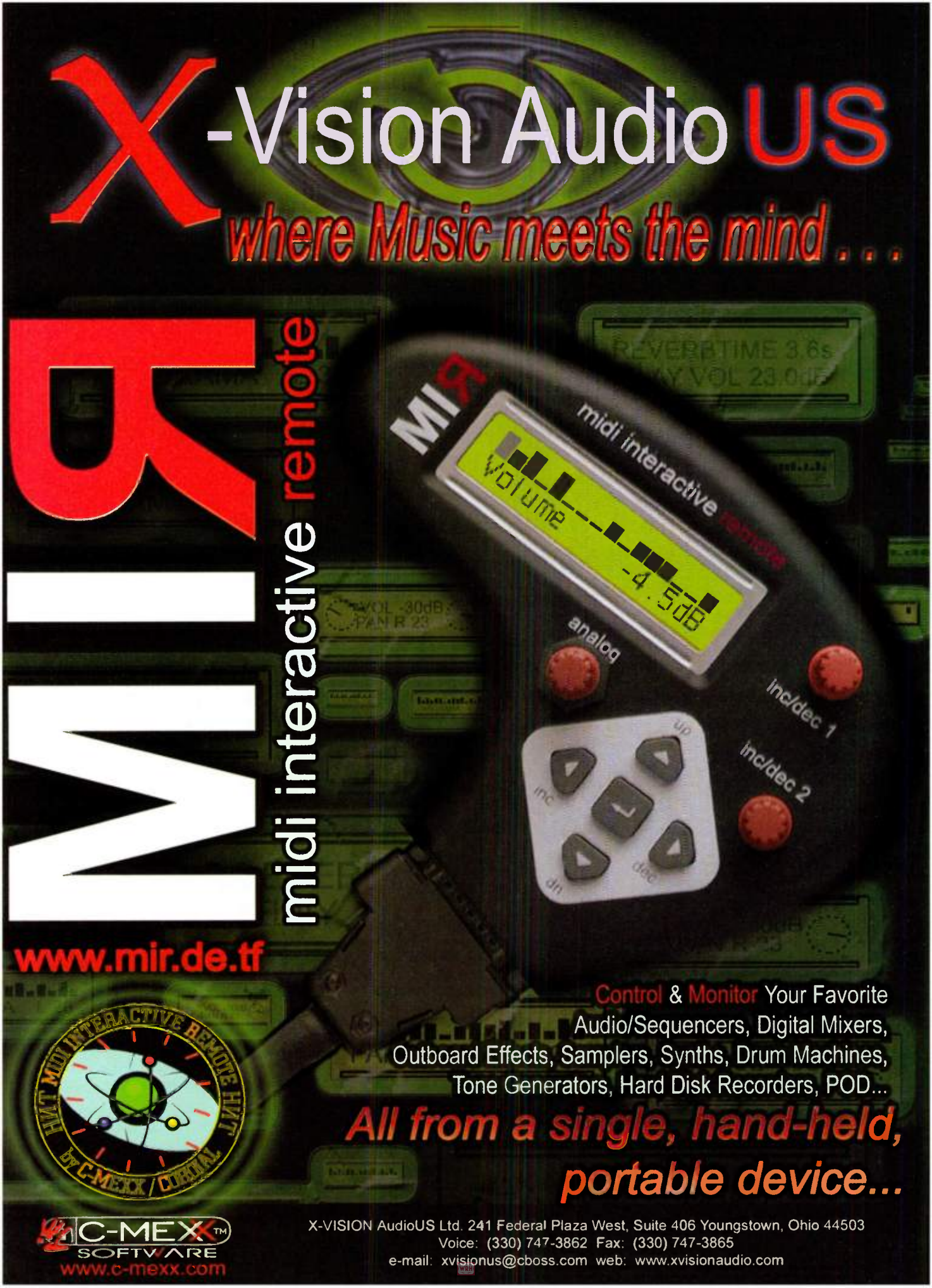
Operating a LinnDrum is mostly a quick and friendly affair. New 2-bar patterns can be programmed in real time and quantized (or not) on input. Different instruments and passes can use varying quantization factors, and the patterns loop automatically, letting you keep adding as the pattern rolls by. If you don't like what you just played, simply hit Erase and the offending instrument button while the pattern plays. It's a fantastically swift and satisfying way of working.

Sounds can be recorded into any of 56 user patterns in real time by hitting the generous-size pads or in step time. You also get 42 preset patterns that cannot be rerecorded. Patterns can be chained into Songs, of which 49 can be stored internally. In addition, the unit's cassette interface lets you store Song data on tape.

Each drum can be individually tuned—seven of them

COURTESY AUDIO PLAYGROUND SYNTHESIZER MUSEUM

**The Linn Electronics LinnDrum not only inspired a generation of digital drum machines but also sparked a lot of drum-driven electronic music ranging from underground dance and electronica to hip-hop.**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directly from the front panel using dedicated knobs—and each can be panned and mixed using separate sliders. The key instruments—including kick, snare, and hats—have two (or three, in the case of the snare) Accent (level) buttons, so a pattern can use the same drum at different volumes. Although you can remix the levels in real time with the faders, you cannot record the level changes in a pattern. Hi-hat decay appeared at the back on the LM-1 but made the LinnDrum's front panel. This feature lets the user set the length of the relationship between open and closed hi-hat, adding considerably to the instrument's human feel.

Obviously the LinnDrum's sound continues to play a huge part in its popularity; the Internet is swarming with Linn samples. But the LinnDrum also has a particular timing feel, partly due to its resolution (96 ppqn, maximum) and partly because of its shrewd human shuffle/swing feature that offers six percentage levels between fully straight beats and regular swing-time feels. Although the overall resolution is a fraction of that in a modern sequencer, the lilt this feature provides sounds convincingly natural.

The LinnDrum was designed as a professional piece of equipment. At the rear are 15 individual instrument output jacks, External Sync and Trigger ports for connecting with other timed devices, and five Trigger inputs that allow the LinnDrum to be played with pads or to be triggered by any incoming audio signal. Because the LinnDrum was introduced about a year before the MIDI specification was adopted, MIDI never appeared on a production model; it is interesting that the LinnDrum offers all the control options that MIDI would soon provide collectively. One of Linn's few regrets seems to be that, despite his intimate knowledge of drum machines, he did not offer much input into the discussions that led to the MIDI specification.

The importance of the LM-1 and the LinnDrum cannot be overstated. Those instruments took drum machines out of the toy box and put them into the professional studio. Linn's musical and intuitive cut-and-paste–style user interface resurfaced in subsequent instruments made in cooperation with Akai, notably the popular MPC series, which remains a key tool for hip-hop musicians.

The LinnDrum has not yet scaled the giddy heights of hipness (or price) achieved by contemporaries such as the Roland TR-808 or even the E-mu SP-1200. Fortunately, Forat Electronics (staffed by ex-Linn employees) offers a variety of modifications, including a MIDI retrofit that lets the instrument integrate with current technology. Forat (www.forat.com) also offers service, repair, and user manuals. Some additional information is available from Roger Linn Design (www.rlinndesign.com).

**Julian Colbeck** *has toured everywhere from Tokyo to São Paulo with artists as varied as ABWH/Yes, Steve Hackett, John Miles, and Charlie.*

Ed Cherney has engineered for some of the biggest music artists of the last two decades – and is still going at it. Cherney's engineering credits are literally a Who's Who of the music industry: Jackson Browne, Eric Clapton, Bob Dylan, The Judds, Bette Midler, Iggy Pop, Bonnie Raitt and The Rolling Stones – to name only a few.

World-renowned producer Don Was has worked with Ed on numerous projects over their long and prolific partnership. Was has produced an impressive number of major recording artists including The B-52's, Barenaked Ladies, Bob Dylan, Elton John, B.B. King, Willie Nelson, Randy Newman, Bonnie Raitt and The Rolling Stones.

When it comes to choosing the right mic for their Grammy winning work, the Audio-Technica 40 Series tops the list. "My AT4060's have great body and warmth and still give me the clarity and presence I want," says Ed. "I put up a 4060 and everyone is happy – the artist, me, everyone."

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# TECH PAGE

By Scott Wilkinson and Joanna Cazden

# Xena: Wired Songstress

*Ululations at NAMM signal a new vocal technology.*

Among the trends at this year's NAMM convention was a strong emphasis on vocal synthesis and processing. For example, TC Helicon demonstrated its VoiceCraft vocal-modeling plug-in card for the VoicePrism processor (see "Tech Page: Vocal Modeling" in the February 2001 issue of **EM**). At the Roland dealer meeting, company founder Ikaturo Kakehashi extolled the VP-9000's ability to manipulate vocal phrases, saying, "Before, we couldn't touch the voice; now, we can."

But by far the most impressive voice-oriented technology at the show came from an upstart startup called XenaXing (www.xenaxing.com), which was founded by a group of self-described bodacious technobabes. These young, savvy women demonstrated a remarkable software product called *Serenade* that works with most notation programs. Applying highly advanced linguistic algorithms, this software can actually "read" the lyrics entered in a notation program and "sing" them using any of several available vocal models. The sound is directed to the computer's sound-card output, just like a software synth.

*Serenade* began as the brainchild of firmware pioneer Lucy Lawful and her partner Gaby Realle. They came up with the initial concept while wandering through the forest near their hometown of Amphipolis, Maryland. Needing some serious venture capital for a project of this complexity, they approached Opera Wiminfree, the popular TV talk-show host, who has always wanted to sing. Impressed with XenaXing's concept, Wiminfree happily invested in the project, and she also enlisted the help of other celebrities, such as Callisto Flakjacket and Athena Franklin.

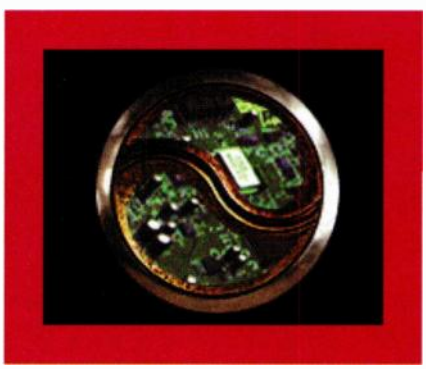
Lawful and Realle understood that the software they were designing would require Herculean processing capabilities and Olympian amounts of memory, so they invited hardware genius Ami Zahn to join the company. Zahn, an MIT-trained engineer, quickly produced a new type of integrated circuit called Shock ROM (see **Fig. 1**). This new device goes way beyond conventional Flash ROM by combining massive high-speed memory and powerful programmable processing on a single chip. Several Shock ROM chips are required to run the *Serenade* algorithms, so Zahn incorporated them into the Broadband Algorithmic Realtime Device (BARD) card.

XenaXing also decided to hire singer Melissa Ethernet as the company's resident musician who oversees the quality of the vocal models. If the NAMM demo is any indication, she's doing an excellent job; the model of Sarah Brightwoman singing "I Am the Sunshine of Your Life" was particularly effective, as was "Flight of the Bumblebee" scatted by Sting.

Among the musicians who packed the booth during the show was Pea from the women's techno group D'Clöck. She immediately recognized the product's potential. In fact, she met with Lawful and Realle to pitch an idea for the technology's next generation, which would use a head-mounted laser scanner. This apparatus would look like a headset mic, but it would actually read the performer's lips in real time. The scanning data would be processed by *Serenade* and used to generate a vocal part based on the notes in a MIDI file.

This new form of lip-synching would free performers to concentrate solely on their costumes and choreography and release them from any lingering demand to actually be able to sing. However, Pea cautioned that light reflecting from shiny, unscratched instruments might disrupt the laser, leading Lawful to proclaim, "Read *my* lips: no new axes!"

Clearly, this technology is a remarkable achievement that adds convincing synthesized vocals to the electronic musician's computer-based toolkit. Notably, XenaXing opted not to hire a PR agency because the product can sing its own praises. The only thing it can't do is remind the boys in the band to put the seat down. ●



MIKE CRUZ

**FIG. 1: In this photomicrograph of one Shock ROM cell, storage and processing are integrated into a circular form, which allows data to fly around and return to its point of origin for reprocessing.**

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WRH

By Matt Gallagher

# Soul Distribution

*Electronic sound sculptures send Soulstice in myriad directions.*

The music of San Francisco's Soulstice is a rich amalgam of styles—including soul, R&B, techno, house, and Brazilian jazz—that evolved from the group's foundation in DJ performance. Soulstice comprises vocalist Gina René, turntablist Mei-Lwun Yee, and keyboardists Andy Caldwell and Gabriel René. The band's debut CD, *Illusion* (Om Records), is a finely crafted tapestry of samples, drum loops, keyboards, guitars, horns, and vocals.

"A lot of it is experimentation," says Gabriel René. "We went through pretty much every genre of electronic music before we settled into our current ambiguous style." Caldwell adds, "We're waiting for everyone else to describe it for us."

Soulstice has been together for five years, and *Illusion* is the culmination of its efforts. "We've been through several record deals," Caldwell says. "For the same record," adds René. "Plus, we're perfectionists. We're trying to be Steely Dan now or something."

The band recorded most of *Illusion* in a rented warehouse space in San Francisco. "It's about a 250-square-foot room that we built in one corner," Caldwell says. "We built a vocal booth and put a sliding-glass door in there. It's very industrial."

*Illusion* was tracked on a Digidesign Digi 001 digital-audio system connected to a Mac G4/450 MHz running *Pro Tools* 5.0. "Earlier we used [Opcode's] *Vision,* but for the album, we just did it in *Pro Tools* 5, all the MIDI and everything," Caldwell says. Soulstice captured vocals and acoustic instruments with a CAD E-300 large-diaphragm condenser microphone and a Joemeek VC3 mic preamp/compressor.

"We used the Soundcraft Ghost 32-channel [mixer]," says Caldwell, noting that they mixed a few of the tracks on a friend's Pro Tools system. Their outboard processors consist of an Alesis Midiverb II, Alesis Quadraverb, and a Lexicon MPX1. "The dbx 1066 compressor was our workhorse for a lot of the drum sounds.

"Our main instruments were the [Ensoniq] ASR-10, the [E-mu] E4XT, and the [Clavia] Nord Lead," says Caldwell. He also mentioned a Yamaha EX5, Yamaha FB01, a Roland Juno 60 with a built-in MIDI converter, and a Roland SH-101 bass synth.

"There's no real formula for the sound sculpturing that we do," he says. "For every song, we pretty much construct a whole new set of sounds." Soulstice sampled most of the album's drum sounds from vinyl, and only the title track includes acoustic hi-hat and cymbal samples. "We'll spend a whole day looking for a snare drum sound," says Caldwell. "Snares are key. Distortion is always friendly too. We put a little distortion on certain sounds, and it just fixes things."

Several freelance musicians augmented their tracks with fresh musical ideas, instrumental expertise, and acoustic sounds. "We're treating session players as human samplers," Caldwell says. "They lay a bunch of samples down, and we put them together."

Soulstice occasionally ventured outside of its warehouse to record tracks at three commercial studios in San Francisco: Toast, Mobius, and A Different Fur. "Over the course of the record, we recorded on every level of system," says Gabriel René. "We were actually on SSLs and Neve consoles."

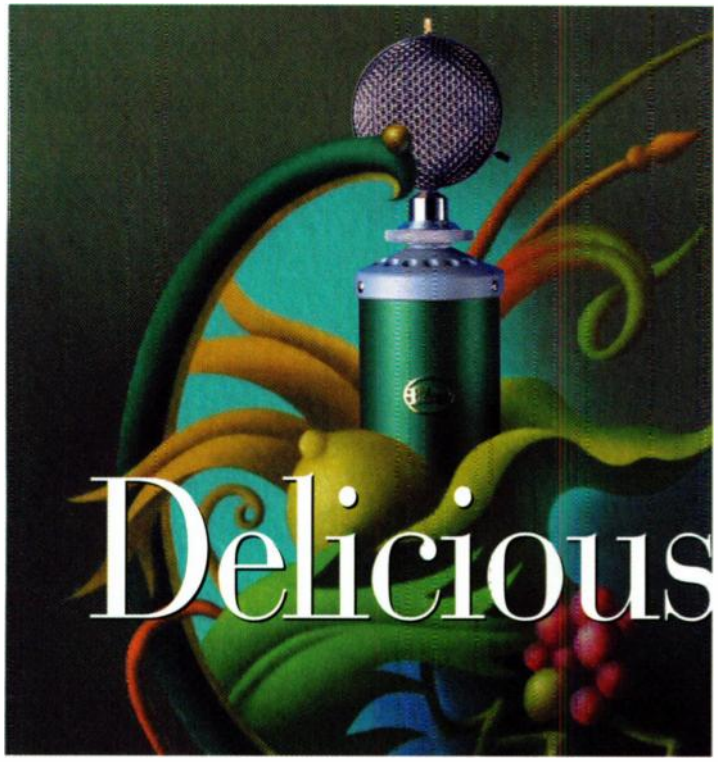
"I think if we had owned all that gear ourselves, that record would sound really insane," Caldwell says. "But the times that we did go into thousand-dollar-a-day studios, I was never satisfied with what we came out with. Once you know the limitations of working in another environment, you tend to maximize what you already have just because you know what you can do there."

*For more information, contact Om Records; tel. (415) 575-1800; e-mail info@om-records.com; Web www.omrecords.com.*

GOFF PHOTOGRAPHY

***Illusion*/Soulstice**

Kiwi



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# SOMETHING *Old*, SOMETHING *new*

## Analog modular synthesizers are better than ever.

BY GINO ROBAIR

Modular analog synthesizers are back in vogue with a vengeance—but not just in the world of electronica. Sound designers, remixers, composers, and keyboardists are once again exploring the creative potential that a modular synthesizer provides. When used in conjunction with a MIDI-to-CV converter and a digital-audio sequencer, a modular synth integrates easily into the personal studio.

Why spend a fortune on a vintage synthesizer, which may be somewhat unreliable, contain hard-to-find parts, and require constant upkeep? Technological improvements in materials and circuit design have made analog synthesizers more stable than ever. And a number of daring companies are producing a wide variety of new instruments.

The last time **EM** did a roundup of companies making analog modular synthesizers, there were only three major players: Germany's Doepfer, England's EMS, and Serge/Sound Transform Systems in the United States (see "Living Fossils" in the November 1995 issue of **EM**). Six years later, at least 20 companies offer analog synthesizer modules.

It's true that you probably won't find an instrument that has the exact sound of a classic ARP, Buchla, or Moog synthesizer. Instead, you have the opportunity to create a highly personalized modular synthesizer that is more powerful, more stable, and less expensive than the highly sought-after—and often temperamental—vintage instruments going for record prices in online auctions.

ILLUSTRATION BY PHILIP BROOKER

PB

# SOMETHING OLD, SOMETHING NEW

STEVE JENNINGS

**FIG. 2: The Analogue Systems Sorceror combines two rack spaces of modules with a 4-octave keyboard, MIDI I/O, and a joystick controller.**

## CREATING YOUR SYSTEM

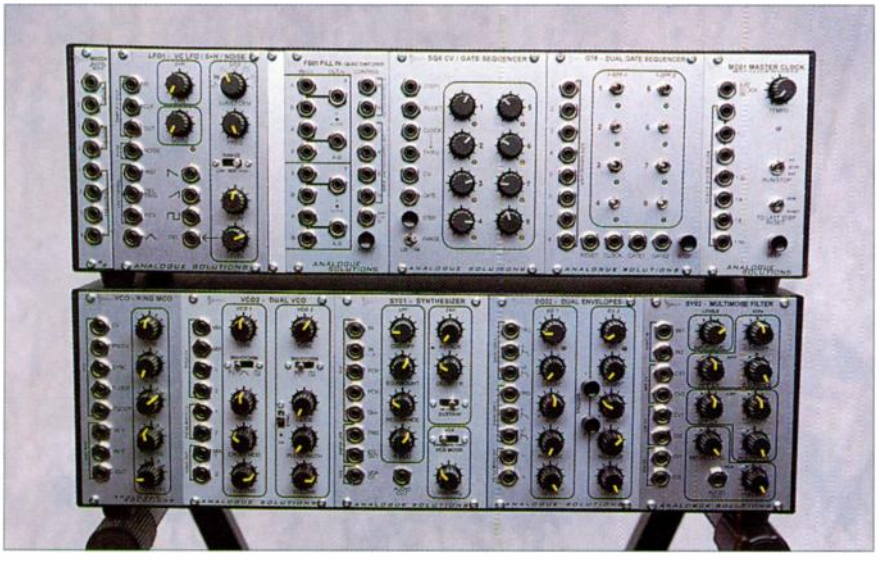
You should ask yourself several questions before buying modules: Is synthesis or processing your greater interest? Do you want a huge rack of inexpensive modules or a smaller rack of more expensive, high-performance modules? Do you have any hang-ups about cable size, knob size, or audio quality? Do you have a knack for or interest in DIY projects?

If you want to create a basic monosynth that you can play from a MIDI controller, a selection of single-purpose modules will do. A performance instrument requires VCOs, VCFs, VCAs, and envelope generators (EGs). If effects processing is your interest, you may want to configure a system around a variety of VCFs, ring modulators, and comb filters, with perhaps a couple of LFOs and EGs thrown in for sound shaping.

Modules generally fall into two design categories: simple, single-purpose modules or complex, multipurpose modules. Of course, given enough of the simpler modules, you can get complicated results. But if you want to create large intricate sound masses that evolve over long periods, multipurpose modules are often a more economical means.

The modules from Synthesizers.com, for example, have the look and feel of the classic Moogs, are single purpose, and do exactly what they say—the Oscillator is a multiwaveform, voltage-controlled oscillator. On the other hand, modules from the Wiard Synthesizer Company tend to have added features that the designer felt would maximize their potential: Wiard's Waveform City module combines a VCO, a voltage-controlled digital oscillator (VCDO), a 2-stage envelope generator, a VCA, and extensive patching capabilities. As you may suspect, a wide difference in price and performance exists between the two modules.

In addition, many companies offer modules that include digital technology in some form, whether it's an 8-bit sampler, MIDI-to-CV converter, or VCDO. This technology gives you the ability to utilize analog signals in more sophisticated ways than are possible with an all-analog system.



STEVE JENNINGS

**FIG. 1: Analogue Solutions offers lightweight plastic cases, which provide a nice desktop solution to mounting your modules.**

## CHOOSING THE RIGHT SYNTH

The great difficulty in purchasing one of these modular systems is not having firsthand experience with one before buying. The analog synth market is small, and the companies are run by adventurous individuals who sell directly to their customers, so you can't go to the local music store to hear them. In fact, the instruments are often sold as quickly as they are made. That makes comparing modules from the various manufacturers difficult. Attendees to this year's NAMM show in Anaheim, California, had a rare opportunity to get hands-on experience with eight brands of modular synthesizers.

A modular synth is a work in progress, and you can assemble one over time to suit specific budgetary and musical needs. And you don't have to stick with modules made by one manufacturer: all the modules described in this article play well together. The most difficult issues are individual power requirements and module size (see the table "Modular System Overview"). But with a little creativity, planning, and careful layout, you can create an elegant hybrid instrument that will resist obsolescence.

Individual module prices differ markedly, but price shouldn't be the only factor in determining which system you

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buy. It is likely that you will spend more money building a complex system from simple, low-cost modules than you would purchasing seemingly expensive, multifeatured modules from another manufacturer.

## MODULAR HEAVEN

This article will provide an overview of each company producing analog synthesizer modules, whether full systems or single modules. Included are modular and semimodular instruments, synths that have internally normalized connections but allow for patchable interconnectivity between important parameters.

This piece does not have space for details about every module from each manufacturer. Most companies have a complete listing of their modules on their Web sites, often with audio examples. For modules that offer multiple features, I will only describe the basic functionality.

Some companies offer their modules in kit form. Besides being a less expensive way to create an instrument, building a synthesizer is satisfying. When two prices are given for a module (for example, $149/$129), the first price is for the fully assembled version and the second for the module in kit form.

**Analogue Solutions.** The Analogue Solutions Concussor system from England caters to classic synthesists as well as dance-oriented musicians. The Concussor modules are the same size as modules from Analogue Systems and Doepfer, so they fit the Euro subrack configuration (see the sidebar "Size and Shape"). An interesting design feature shared by the Analogue Solutions, Analogue Systems, and Doepfer modules is a vertically mounted patch bay on the front panel's left side, with manual controls on the right. This arrangement keeps the cable drape somewhat clear of the controls.

In the area of traditional synth modules, Analogue Solutions is quite strong. Its catalog features the VCO2 Dual VCO ($210), the VCO-RM ring modulator ($103), EG02 Dual Envelope Generator ($125), and the LFO1 VCLFO ($165) that includes sample and hold and a noise generator.

The SY02 Multimode Filter/VCA ($170) is designed in the style of the Korg MS-20 filter. It features 2-pole highpass and lowpass filters that when used together can form a 2-pole bandpass filter with two resonance controls. The filter has two audio inputs, two CV inputs for each filter to control cutoff, and two CV inputs for controlling the VCA.

In addition to the eight classic synthesizer modules, the Concussor series includes 12 modules modeled after specific Roland drum-machine sounds. They include replicas of Roland TR-808, TR-909, and CR-78 bass and snare drums, and TR-808 toms, congas, claps, cowbells, hi-hats, and ride cymbal. Each percussion module has plenty of controls for tweaking the sound to more specific tastes and applications, including tuning control, filter balance, and noise. The hi-hat, for example, lets you adjust the open and closed sounds in a natural, musical way.

The TR-909 bass and snare drum modules include CV inputs so you can cross modulate the pitch and extend the timbral possibilities of the instruments. The Concussor percussion modules are a formidable collection that goes beyond the standard drum machine sounds.

Concussor modules have 3.5 mm jacks, and the percussion modules include an additional front-panel ¼-inch audio output jack. The modules are available in a variety of configurations. One in particular is the Mini System ($395), which combines two modules—VCO1 and SY02—in a single plastic tabletop case (see **Fig. 1**).

The newest release from Analogue Solutions is the Black Coffee ($300), an 18-HP-wide module that can be used as a standalone mono synth or as an effects processor. Black Coffee has a VCO, LFO, VCF, envelope filter, VCA, ring modulation, noise, and optional MIDI I/O. The front panel has 3.5 mm jacks for reconfiguring the basic synthesizer functions.

The back panel includes ¼-inch audio input and output jacks, a CV pedal input, and MIDI In/Thru. You can use MIDI to control oscillator pitch, gate, and filter cutoff. Roland TB-303–style Slide and Accent are also available through MIDI.

Analogue Solutions has a couple of sequencer options as well. The GT8 ($115) is an 8-step dual-gate sequencer. The SQ8 ($115) is an 8-step sequencer that

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**FIG. 3: With the addition of the CP-251, the Moogerfooger line of effects from Big Briar can be combined to form a simple but effective synthesizer.**

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can be controlled with CVs and gates. The newest is the Oberkorn ($750), a 16-step multichannel sequencer with a built-in MIDI-to-gate/trigger converter. With its complement of sequencing, percussion, and standard synthesis modules, Analogue Solutions has almost everything you need to create a self-contained multipurpose synth system.

**Analogue Systems.** Analogue Systems, creator of the RS Integrator module series, is also based in England. Analogue Systems uses standard 3.5 mm connections, and its modules fit the Euro subrack system.

RS Integrator modules have a simple, straightforward layout and provide a classic set of synthesizer building blocks. The RS95 VCO ($129) has sine wave and CV-variable sawtooth, triangle, and pulse waves, each with its own output jacks. The pulse wave has a wide range of variance, from a leading pulse wave, through a square wave, to a trailing pulse wave.

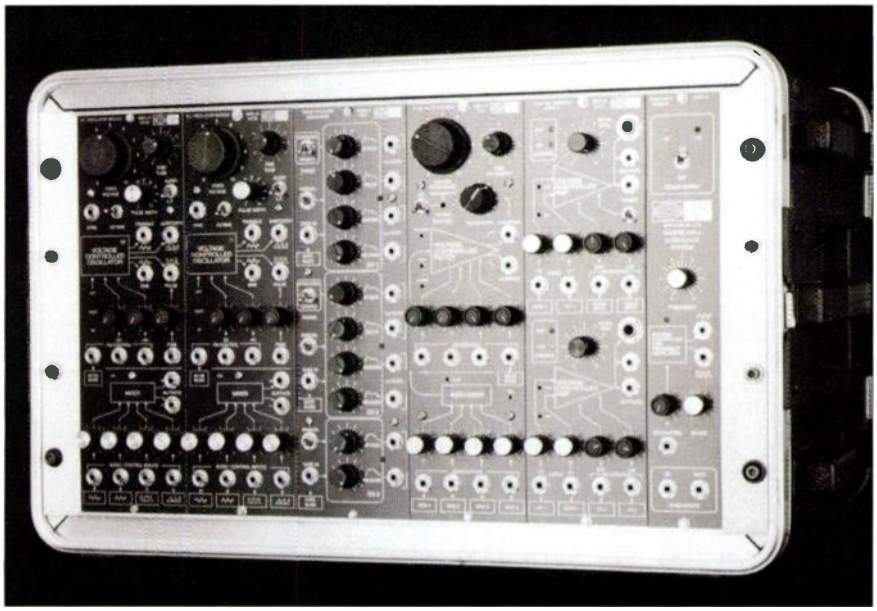
The RS80 VC-LFO ($119) includes sine, triangle, sawtooth, and square wave shapes, with Reset and Linear CV inputs. The module has two modes: low frequency from 0.02 to 5 Hz, and high, from 3 Hz to 1.4 kHz.

The RS Integrator line has two filters. The RS100 ($119) is a 4-pole lowpass, Moog-style transistor-ladder VCF with two audio inputs, two CV inputs, and manual controls for resonance and frequency cutoff. The RS110 Multimode filter ($119) includes two audio inputs and individual highpass, lowpass, bandpass, and notch outputs. The highpass and lowpass filters are 4-pole, and the bandpass and notch filters are 2-pole. The RS110 also has resonance output and input jacks so you can introduce external modules into the resonance circuit.

The Analogue Systems line includes the RS260 Voltage Quantizer ($215) and the RS130 Programmable Scale Generator ($550). Use the voltage quantizer to set voltages into specific values, such as equal-temperament semitones. The RS130 uses a microprocessor to quantize the input into predetermined scales and arpeggios. The module has transposable default settings for major and minor scales and chords, as well as memory for user-defined scales. Both modules are useful when combined with a sequencer or sample-and-hold module.

Analogue Systems sells custom-built cases for its modules. For smaller configurations, the Mini System ($985) comes in the RS10 case, which holds one 84-HP row of modules. The System 1 ($1,600) comes in an RS15 case, which holds two 84-HP rows of modules. Large configurations include the RS8000 ($4,200), a full system of modules that fills four rack panels in a wooden case. The RS8500X ($7,600) system fills four double-width, 168-HP panels. These large systems include bidirectional trunk lines leading to ¼-inch jacks on the back panel, allowing you to interface the system into your studio without having cables running permanently from the front of the instrument.

Analogue Systems has recently introduced the Sorceror ($1,395), a keyboard controller housed in a walnut case with enough space for 168 HP–worth of modules. The price above includes the 4-octave keyboard, the RS-330 Keyboard Controller module with MIDI I/O, the RS-220 X-Y joystick controller, and a power supply for the modules. The MIDI



COURTESY CMS

**FIG. 5: The MR-2 configuration of modules from CMS includes the Precision VCO, Dual VCO, VCF, VCA/Ring modulator, and triple envelope generator.**

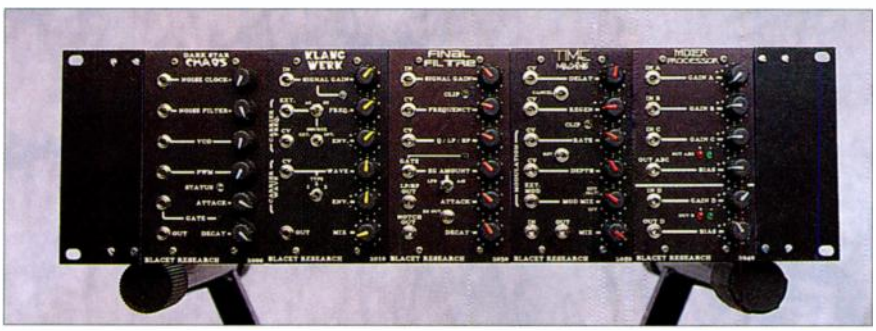


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**FIG. 4: Blacet Research offers modules with a sound all their own. This rack includes the popular Dark Star Chaos and Time Machine modules.**

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# SOMETHING OLD, SOMETHING NEW

In, Out, and Thru jacks are on the Sorcerer's back panel (see **Fig. 2**).

Filling the Sorceror's module space costs extra. The demo unit used for this article included two VCOs, two LFOs, two EGs, two VCAs, a multimode filter, noise/sample and hold module, comb filter, an audio mixer, a CV mixer, and a pair of 5-way multiples. When put under MIDI control using the Keyboard Controller module, the result is a powerful synthesizer that sounds fantastic. Any configuration of modules can be used in the Sorceror, including modules from Analogue Solutions and Doepfer.

**Big Briar.** Some purists will probably argue that Bob Moog's Big Briar doesn't make a true modular synthesizer system. However, with the release of the Moogerfooger CP-251 control-voltage processor ($299), Big Briar's line of Moogerfooger products can be nicely configured into a synthesizer, albeit a somewhat limited one (see **Fig. 3**).

Indeed, the system lacks a dedicated oscillator if you don't count the company's line of theremins. However, tone sources are available from the LFO and carrier oscillator on the MF-102 Ring Modulator ($299), the LFO and noise source on the CP-251, the LFO of the MF-103 Phaser ($399), and the filter of the MF-101 Lowpass Filter ($299) when set into resonance. The other module in the Moogerfooger line is the MF-104 Analog Delay ($595), which is limited to an edition of 1,000 units.

Moogerfooger effects' main attraction is their voltage control capabilities. Each effect includes powered CV-input jacks that can be used with Big Briar's passive EP-1 Expression pedal ($40). The MF-101, for example, gives you voltage control over the filter cutoff, filter response, the amount of input from the envelope follower that is used to sweep the filter, and the mix between the source and processed signal. In addition, the device has an Envelope Output jack so you can send the contour from the envelope follower to another voltage-controlled device.

Besides the audio input and two audio outputs—mix and delayed signal—the MF-104 has three CV inputs. The CV inputs control the delay time, the mix of dry and processed signal, and feedback amount. However, there are input and output jacks for the feedback loops, so you can patch in an external processor and modify the sound of the echoes.

Although they look like they should be used as floor-bound stompboxes, Moogerfooger effects interface nicely with other synths on a tabletop. Ergonomically speaking, patching the Moogerfooger effects together is cumbersome because the jacks are on the rear panel, facing away from you. The good news is that once you have everything patched, the cables are well away from the control surface. The exception to this is the CP-251, which has all of the jacks on the lower part of the front panel, closer to the knobs. The ½U CP-251 can be rack mounted when the wooden side panels are removed. You can use a second power jack, located on the bottom panel of the unit, when the unit is in a rack.

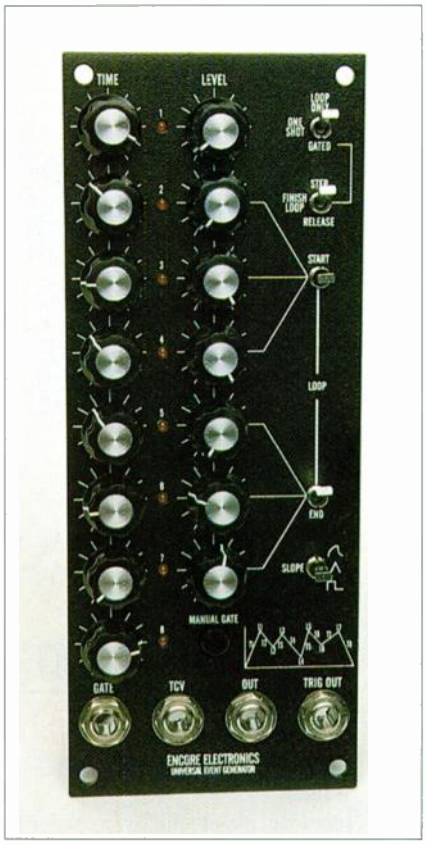


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**FIG. 7: The Universal Event Generator is a microprocessor controlled module that can be used as an 8-stage envelope generator, sequencer, or LFO.**

Big Briar's Moogerfooger effects have the classic look and feel of the early Moog modular synths. The knobs and switches are large and well spaced, ¼-inch jacks are used throughout, the housing is sturdy, and the sound quality is top notch.

**Blacet Research.** Blacet Research offers seven unique modules available fully assembled or in kit form. The kits come complete with front panels, ⅛-inch jacks, and knobs, and finished modules are compatible with PAiA Fractional Rack cases. Like the modules from Analogue Solutions, Analogue Systems, and Doepfer, the jacks are on the module's left and the knobs on the right (see **Fig. 4**). But most of the Blacet modules can act as standalone processors.

Although Blacet Research doesn't offer a dedicated, full-feature oscillator,

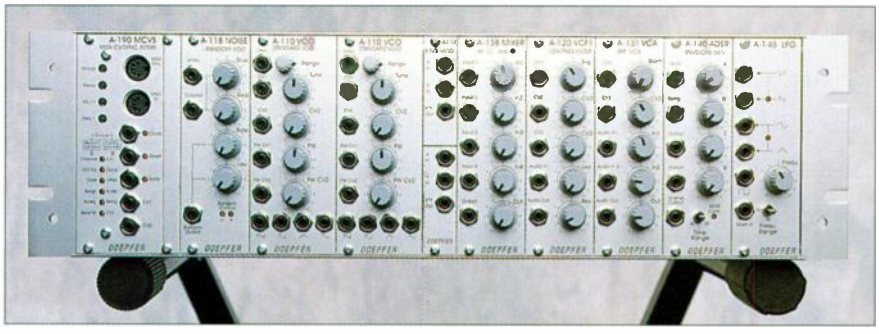

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**FIG. 6: This rack contains no less than ten Doepfer modules: two VCOs, LFO, ring modulator, VCF, VCA, EG, noise, 4×1 mixer, and a MIDI-to-CV/Sync converter.**

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the Dark Star Chaos module ($149/$129) is a multifunction generator that includes a VCO with a 0 to 6 kHz range. The company suggests that the oscillator not be used when accurate keyboard tracking is required.

The name of the module aptly describes its sound. With its noise modulated square-wave VCO, you can easily set up nasty timbres that shift with seemingly endless variation. The Dark Star Chaos module includes a digital noise source, a lowpass noise filter, and pulse-width modulation. Each of these can be adjusted manually or put under voltage control. The combined settings of the noise source and noise filter knobs give the module its chaotic abilities. By setting the knobs to the point where the noise begins to modify the VCO, you can get randomized, rhythmic bubbling that gives you plenty of sound to process with the other modules.

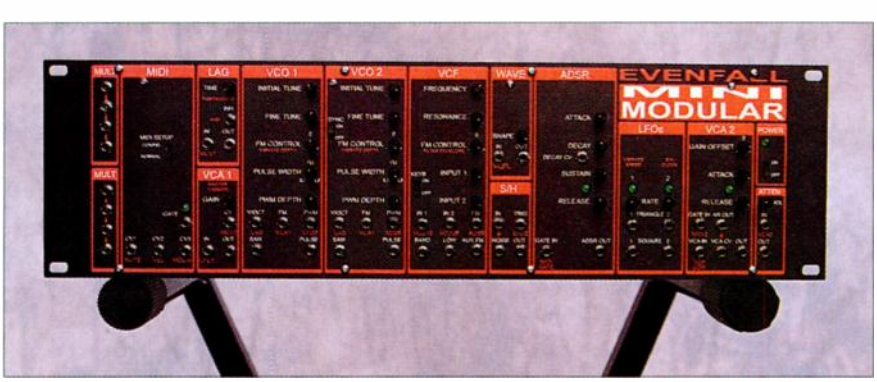
A 2-stage EG, with a gate input and push-button trigger, resides at the bottom of the Dark Star Chaos module next to the audio output. Attack and Decay times are manually adjustable.

Module 2010 Klang Werk ($199/$159) is a ring modulator with the added ability to change, or morph, the carrier signal in various ways, both manually and with a control voltage. The results are strange effects that go beyond the usual timbral ring modulation sounds. The mix control at the end of the signal path lets you balance the processed and unprocessed signals to your taste.

I had the most fun with the voltage-controlled analog delay, the Time Machine ($309/$229). It has an old-fashioned delay sound and the ability to alter the delay characteristics in musically useful ways. The module gives you voltage and manual control over the delay time and the amount of regenerative feedback. The Time Machine includes an internal triangle-wave LFO as a modulation source. The rate and depth of the LFO are also manually and voltage controllable. As you would expect, it is easy to get carried away with a delay with CV inputs.

The other modules are equally charming. The Final Filtre ($189/$139) is a lowpass filter with a surprising 5-pole response. It has a single audio input, a lowpass/bandpass output, and a notch output. CV inputs are given for 1V/octave frequency control and Q. A self-triggering envelope generator that can be operated as a 2-stage EG or LFO fills out the module's features. The Mixer Processor ($127/$99) lets you mix three audio or voltage inputs and offers a phase control for each input and DC bias control for the output mix. At the bottom of the module is a single input and output with a phase and DC bias control.

Rounding out the Blacet modules is the Frequency Divider ($134/$105), which gives you subharmonics of the input, and the EG 1 ($140), a voltage controlled 4-stage envelope generator.




STEVE JENNINGS

**FIG. 8: The Evenfall Mini Modular is a full-featured, semi-modular synthesizer. It includes a built-in MIDI-to-CV converter, sample and hold, and a waveshaper.**

**Cirocco Music Systems (CMS).** Owners of ARP instruments may already be familiar with Phil Cirocco's Cirocco Music Systems because of its upgrade packages for ARP 2600, Avatar, and other synthesizers. The CMS 9000 Series modular synthesizer system is a line of 18 modules designed by Cirocco to meet the highest audiophile standards.

CMS modules have normalized connections that can be broken with ¼-inch patch cords, and the internal signal path for each module is printed on the front panel. Among the modules offered are the 9001 Precision VCO/4-Channel Mixer ($567), the 9002 Dual VCO ($699), the 9000A VCLFO ($125), the 9008 Triple Envelope ($579), the 9010 VC phase shifter ($699), and the 9027 VC Hex Rectifier/VC Balanced Mod. The 9004 Highpass/Lowpass Filter ($631) uses a discrete Moog-style transistor ladder design. The line also includes a sequencer ($935).

The 6U-tall modules are available individually and in three configurations: the MR-2 ($3,379) contains 6 modules (see **Fig. 5**), the MR-10 ($4,699) contains 9, and the MR-15 ($6,499) has 12.

**Doepfer.** The Doepfer A-100 modular system includes 66 modules, ranging from filters, envelope generators, and MIDI-to-CV converters to more unusual items such as the A-112 8-bit Sampler/Wavetable Oscillator ($195). Doepfer modules are well built but priced surprisingly low for German imports. Most of the modules offer the expected basic control functions. However, they tend to be fairly narrow, allowing you to add more in a rack than you can with most systems (see **Fig. 6**).

Doepfer has a large number of filters available, notably the A-120 ($85), a Moog-style 4-pole, transistor-ladder lowpass filter; the A-122 ($85) and A-123 ($90), 4-pole lowpass and highpass filters, respectively, using Curtis chips (CEM 3320); the A-121 ($95), a 2-pole Curtis chip multimode filter; and the A-124 ($95), a 2-pole multimode filter modeled after the filter in the EDP Wasp synthesizer.

Other filters include the A-127 Voltage Controlled Resonance Filter ($195), the A-128 Fixed Filter Bank ($160), the

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A-104 Trautonium Formant Filter ($160), and A-129/1 and A-129/2, the Modular Vocoder Subsystem ($390).

One of the Doepfer system's stars is the collection of modules that makes up the Modular Vocoder Subsystem, which was designed in collaboration with Kraftwerk. The main portion of the vocoder consists of two modules, one for analysis (A-129/1) and one for synthesis (A-129/2). The analysis module includes 15 discreet filters—1 highpass, 1 lowpass, and 13 bandpass—which yield control voltages that are sent to the 15 CV inputs of the synthesis section.

To take full advantage of Doepfer's vocoder system, you will need slightly more than a rack space to hold all of the various vocoder options, including the A-129/3 Attenuator/Offset Generator/Slew Limiter ($117) and the A-129/5 Voiced/Unvoiced Detector ($95).

Another interesting series of Doepfer modules can be used to replicate the Mixtur-Trautonium, an instrument dating from the 1930s that was designed by Dr. Freidrich Adolf Trautwein for composer Oskar Sala. The first module is the A-113 Subharmonic Generator, which lets you create four subharmonics ranging from 1 to 24, from a square-wave audio input. A series of subharmonics can be saved as a *mixture*, a term Sala used to describe particular sonorities created with subharmonics. The module lets you switch between four different mixtures. You can save a group of four mixtures as a preset, and save as many as 50 presets.

This module's concept is somewhat similar to mixtures as they pertain to church-organ stops, but it works the harmonic series in reverse. Each subharmonic on the A-113 has its own level control and output jack. In addition, there is an audio mix output and two gate inputs.

Complementing the A-113 is the A-104 Trautonium Formant Filter, which is modeled after the filter used in the Mixtur-Trautonium. The A-104 includes four independent filters, each with its own frequency, resonance, and level controls. Each filter can be switched into lowpass or highpass mode, or turned off. The module has a single audio output and is not voltage controllable. When the A-113 and A-104 are used with a lag processor, you can achieve the characteristic sliding sounds of the Mixtur-Trautonium.

Other notable Doepfer modules include the A-144 Morphing Controller ($65); the A-126 Voltage Controlled Frequency Shifter ($226); the A-136 Distortion Waveshaper ($95); the A-179 Light Controlled CV Source ($95); and the A-178 Theremin Module ($95), which despite its name is not a true heterodyning theremin but makes an interesting controller nonetheless.

The Doepfer A-100 system is an inexpensive means to building a powerful synthesizer. The sound quality is good and the module offering is large and well-rounded, with options that are unavailable anywhere else.

**Electronic Music Studios (EMS).** The oldest, largely unchanged modular synthesizers currently manufactured are from EMS in England. The company's most popular instruments—the Synthi VCS3 (Voltage Controlled Studio Version 3) and the Synthi A—have been used by countless artists since the late '60s. Both synths were renowned for their fine-sounding but unstable oscillators, which made the synthesizers difficult to use as keyboard-driven instruments. EMS has addressed this issue: the latest versions are built to the same specifications as the post-1971 Mark II designs but with greater stability in the oscillators and with an added gate input. The company also provides an oscillator stabilization upgrade for older systems.

The Synthi VCS3 and Synthi A are a collection of preconfigured modules that can be interconnected using a 16×16, 256-hole pin matrix rather than patch cords. The good news is that this matrix gives you greater patching flexibility, because each module has 16

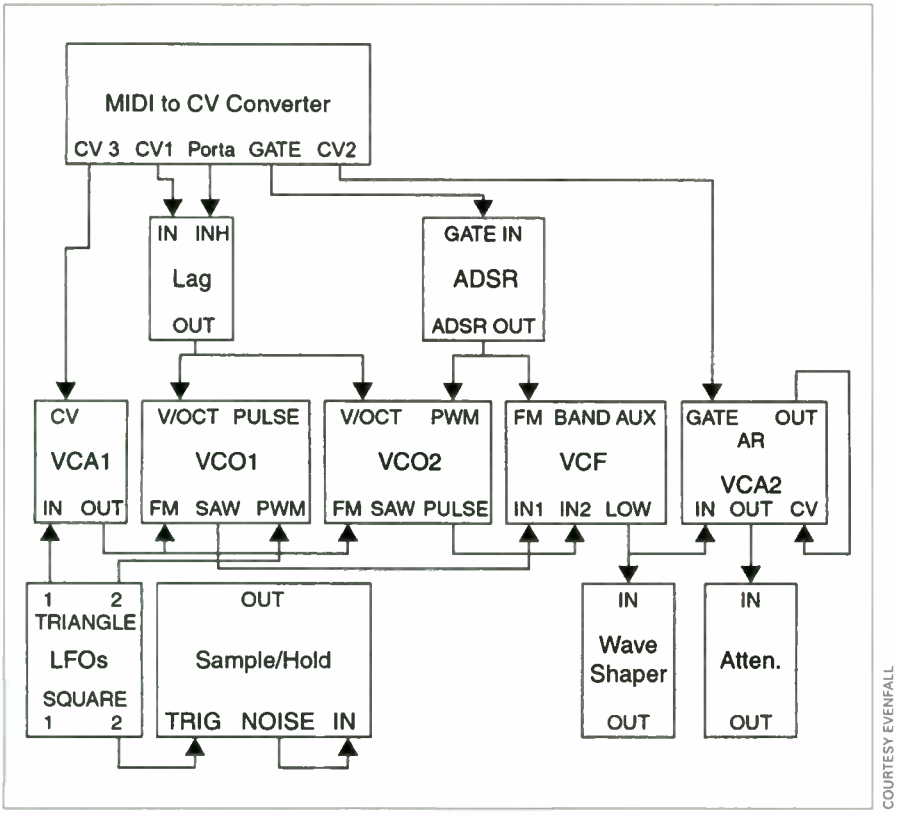


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**FIG. 9: The Mini Modular's internal signal routings are shown here. Once you have used the tutorial or spent time working with the instrument, the normalized connections become second nature.**

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input and output connection points. Imagine being able to stack up to 16 patch cords per input and output! But the matrix is not buffered, so slight voltage changes occur each time you add a pin. The original pins were color coded—red, yellow, and white—to indicate the value of the resistors inside. All the new pins contain a 2.7 kΩ resistor with a 1 percent tolerance.

The Synthi VCS3 ($2,700), known as the Putney in the US, is housed in a wooden L-shaped case. The Synthi A ($2,400) is the portable "suitcase" model of the VCS3. The Synthi AKS, which originally included a 2½-octave plastic-coated touch keyboard and sequencer, is no longer available from EMS, but the Vocoder 2000 ($1,395) is.

The Synthi VCS3 and Synthi A have an impressive feature set: three VCOs (one that can serve as an LFO), noise, a resonant 3-pole lowpass diode VCF, an enhanced envelope generator, a spring reverb with voltage-controlled mix, a ring modulator, stereo output VCAs, a joystick, a trigger button, an AC/DC voltmeter, and a pair of internal speakers. In addition, there are two ¼-inch line-level inputs, two ¼-inch mic inputs, a headphone jack, and stereo outputs with EQ on the back panel. It's easy to see why these synths have remained popular for so long.

Each VCO has two waveforms. VCO 1 has sine and sawtooth waves, with a level control for each. VCO 2 and VCO 3 have square and triangle waves with corresponding level controls. VCO 3 is suitable for use as an LFO because it has a reduced range of 0.05 to 500 Hz.

One interesting thing about EMS synthesizers is that their oscillators use 0.32V/octave for control, rather than the common V/octave or Hz/V standards. EMS suggests adjusting the input amplifiers on the synthesizer and using a cable with a 100 kΩ resistor to achieve a 1V/octave tuning. Consider this if you plan to use these oscillators for tonal music. Additionally, the VCF runs at 0.2V/octave.

For owners of EMS synthesizers, a host of modifications is available. These range from oscillator stabilization ($27 per oscillator) and 5-second envelope attack-time extension ($22) to an extra audio input ($45) or external gate input ($9). Parts, patch pins, and manuals are also on hand.

If you want to purchase a new EMS instrument, be prepared to wait. These synths are so popular that the lead time is nine to ten months.

**Encore Electronics.** An interesting new module that deserves mention is the Universal Event Generator ($289; see **Fig. 7**). Designed by Tony Karavidas to fit the Synthesis Technology MOTM rack configuration, the Universal Event Generator has eight stages, with a Time and Level control for each stage. This permits you to use the module as an 8-stage envelope generator, sequencer, or LFO.

The module has Gate and Time Control Voltage (TCV) input, waveform Out, and Trigout jacks. The Gate input accepts pulse waves, square waves, or fast triangle waves; the TCV accepts 0 to 5V input signals. As you raise the voltage to the TCV input, the time values set at each stage increase. The time values range from 1 ms to 8 seconds.

The Out jack sends a 0 to 5V waveform depending on the settings at each stage. The Trigger output sends a pulse after the module cycles to stage 8. This pulse can be used to trigger another Universal Event Generator for a 16-step sequencer or envelope or some other event.

The Universal Event Generator has three operational modes. In Oneshot mode, the module cycles through all eight stages when it receives a trigger at the Gate input; in Looponly, the module will cycle within the loop points set with the Start and End toggle switches. The Gated mode gives you additional parameters: Step, Release, and Finish Loop. In Step, the module cycles through the stages like a step sequencer, and in Release the module cycles through the stages as long as a gate signal is present. As soon as the gate finishes, the module will jump from wherever it is in the cycle to stage 8. In Finish Loop mode, the module will go through the remaining stages at the end of a gate signal.

The Universal Event Generator also gives you a choice of linear, logarithmic, and square output wave shapes, so you can tailor the output into complex waveforms. For example, if you create a loop and cycle it quickly, you get an LFO. By changing the wave shape, you can modify the LFO in unusual ways.

The Universal Event Generator is the first microprocessor-based module developed for the Synthesis Technology MOTM system. And like MOTM modules, the jacks on the Universal Event Generator are located at the bottom of the panel, away from the switches and knobs. The Universal Event Generator includes a power cable and can be powered from the same ±15 VDC power supply running the Synthesis Technology modules. However, unlike the MOTM modules from Synthesis Technology, the Universal Event Generator is not available in kit form.

**Evenfall.** A recent addition to the analog-synth scene is the Evenfall Mini Modular ($699). Designed by Chris

STEVE JENNINGS

**FIG. 10: The Metasonix TS-22 Pentode Filterbank is a tube processor that has four bandpass filters with independent tuning and resonance controls.**

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# SOMETHING OLD, SOMETHING NEW

waveshaping possibilities, I created rich, biting sounds that blended nicely with other synthesized textures.

The Mini Modular is elegantly designed; easy to use; and with 12 versatile modules in one package, a great value for the money. The Mini Modular is a great instrument for anyone new to analog synthesis. For the experienced synthesist, it's a pleasure to use.

**Metasonix.** The Metasonix products are unique in that they use vacuum tubes in sophisticated ways. The company's founder and designer, Eric Barbour, is well versed in tube technology, and he has put his knowledge to good use by building instruments around the peculiarities of specific tubes.

Vacuum tubes are not put into these products for their marketing value. Each processor was designed around the interesting and often unpredictable properties that vacuum tubes present. For example, the TS-21 Hellfire Modulator ($749) includes a pair of tubes that have never been used in audio products. When they are modulated, they allow you to waveshape a signal to a greater degree than you can with traditional analog synthesizers.

One of the first things you notice with these devices is their response. You need to move the knobs slowly to hear the subtle changes the sound is going through. If you move a knob too quickly, you may miss a world of minute timbral shades. I found it best to move a knob slightly, wait for the tube to catch up, and proceed from there. The feedback and processing grows organically and often somewhat uncontrollably. Metasonix devices give you a chance to explore the subtle instabilities within each system, a quality few other synthesizers offer.

Each Metasonix product is hand wired and built into a heavy-duty 2U case, with a front-panel power switch and a center window that allows you view one of the tubes. All connections are made with ¼-inch jacks and plugs.

The TS-22 Pentode Filterbank ($999) offers four 2-pole bandpass filters with independent controls for tuning and resonance (see **Fig. 10**). The center frequencies of each filter are tuned an octave apart from the others, and each filter has a 1-octave range. The frequencies of all four filters can be swept from a dedicated knob or with a control voltage. The TS-22 has a single audio input and output, a CV input for sweeping the filter, and a CV input for the output VCA.

This is a module that requires some restraint when it comes to knob turning. The filters, for example, move into resonance easily.

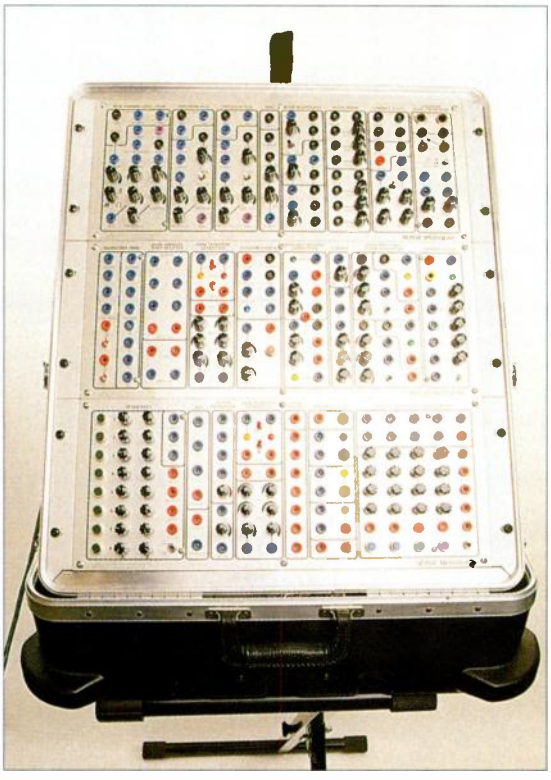

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**FIG. 12: Serge modules are available in rack-mountable panels. This Fun Station has three panels of modules in an SKB road case. Tony Karavidas provided the synthesizer.**

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FIRST WE LISTEN

# SOMETHING OLD, SOMETHING NEW

When you back the knob out of the resonant territory, it takes a moment to hear the result.

The PT-2 Tube Station ($949) is a monosynth with a VCO, VCF, and VCA, as well as an LFO and a pair of 2-stage envelope generators. Audio and CV connections are all made on the rear panel. The VCO has CV input and FM inputs, controls for level and tuning, and an octave switch. The gate input triggers a pair of envelope generators, one for the VCF and the other for the VCA. Both envelope generators have controls for attack and decay. The VCF is a tube-based 2-pole bandpass filter with individual controls for tuning, resonance, and envelope amount. The LFO has a rate control from 1 to 20 Hz, and a switch that sends it to the VCF.

When used with a MIDI-to-CV converter, the PT-2 requires V/Hz conversion similar to certain classic Korg and Yamaha synths, rather than the more common V/octave conversion. Metasonix can add a MIDI-to-CV converter to the PT-2 by request.

The most recent addition to the line is the TS-23 Dual Thyratron VCO ($799) The module uses a pair of thyratron tubes for the oscillators that cross modulate each other in unpredictable ways. This module also uses the V/Hz control standard.

The tubes in the Metasonix processors offer an amount of unpredictability and timbral variety unavailable in solid-state synthesizers. If you're looking for unusual sounds, Metasonix products are worth investigating.

**Modcan.** The modules from Canada-based Modcan are well designed, offer a wide variety of control options, and are in some cases multifunctional. Modcan is the first system in this roundup that uses banana jacks and plugs (see Fig. 11). Banana jacks, which feature different colors to indicate their functions, allow you to send the output of a module to more than one input by stacking plugs, thus alleviating the need for mults. Modcan's chief designer, Bruce Duncan, warns against stacking two or more outputs into one input, because it puts additional strain on the power supply.

Modcan sells the modules separately or rack mounted. The power supply has a power switch and is attached to the rear panel. The modules are solid and well built; however, their heights don't fit the form factor of other modules in this article.

The Oscillator 01A ($250) has four waveforms. The triangle and sawtooth waves each have two outputs, and the sine and square waves have one. However, the saw and square waves have a range of 0 to 5 volts and are DC offset. The sine and triangle waves are symmetrical at ±2.5V. The oscillator has two CV inputs with controls, a pulse-width modulation input and control, a manual control for pulse width, fine and coarse pitch controls, a sync input, and an overall high and low frequency switch.

The Modcan system features five filters. Both the 4-pole Highpass 14A ($200) and 4-pole Lowpass 15A ($200) include a single audio input and output, two CV inputs, a 1V/Octave input, and a CV input for controlling resonance. Lowpass Filter 02A ($190), based on the Moog transistor-ladder design, has a single audio input and output, two CV inputs, and a 1V/Octave input, but resonance is not voltage controllable. Instead, a pair of attenuators resides at the bottom of the module.

The Multimode Filter 10A ($200) is a

## SIZE AND SHAPE

Although there is no standard size for analog synth modules, there are some common sizes. Knowing which systems fit these particular sizes will help you assemble the module configuration that best suits your needs.

Most of the modules in this article conform to the international rack standard in height and width. The standard horizontal rack width is 19 inches, but individual modules come in a wide variety of widths. That means you will have to do some organizing if you want to fill a rack space effectively.

There are several standards when it comes to module height. One vertical rack unit (U) is 1.75 inches. Original Moog modules were a standard height of 8.75 inches or 5U. The modules from Encore Electronics, Oakley, Synthesis Technology, and Synthesizers.com fit that profile. PAiA's Fractional Rack (FracRak) system is 5.25 inches or 3U tall. Modules from PAiA and Blacet Research fit that configuration.

The Euro subrack standard is also 3U tall, but the mounting rails are somewhat different. Modules from Analogue Solutions, Analogue Systems, and Doepfer fit that standard. In the Euro subrack, the 19-inch width is divided into smaller units known as HP (horizontal pitch) or TE (from the German for "parts per measure"). Each HP/TE unit is 5.08 mm, or 0.2 inches. Modules come in sizes ranging from 4 to 72 HP/TE. A 19-inch rack holds 84 HP/TE.

If you're planning to mix modules from different companies within a 3U rack, note that the position of the screws on the front panel of the modules may differ slightly from company to company. That is especially true if you're mixing modules from European and U.S. manufacturers. Additionally, power supply issues will need to be addressed.

If you have any concerns regarding compatibility issues about a module you want to add to your rack, share them with the manufacturer of the modules you are purchasing. They will give you advice on how to mount the module and power it up. It is in the company's best interest to make you a satisfied customer, because they know that you will be back for more once you get a taste of modular synthesis.

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2-pole filter with individual highpass, lowpass, bandpass, and notch outputs, two CV inputs, a resonance CV input, and an auxiliary input for resonance modulation. The Diode Filter 23A ($200) has a 4-pole lowpass response based on the diode-ladder design found in the Korg MS-20 and the EMS VCS3.

Morph/Peak and Trough 12A ($200) is a dual-function module. The Morph section lets you combine two waveforms into a new shape. Each of the waveform inputs has a control voltage input for modulation. The bottom portion of the module is the Peak and Trough processor, which sums four inputs and gives you both the highest (peak) and lowest (trough) voltages at dedicated outputs.

Each of the five stages (DADSR) of the Envelope Generator 04A ($200) is voltage controllable. The module also features a switch for setting different linear or exponential response curves to the envelope.

A particularly interesting module in the line is the Wavetable 19A ($250), a digital wavetable oscillator with 64 waveforms available. The waveforms are in two 32-waveform tables, each divided into four banks. The Bank Increment Input and Wave Increment Input employ trigger signals to step through the banks and waveforms, respectively. The 19A module requires a square wave to operate. The Sync Input accepts a square-wave input, and gives you timbral variations as the pitch of the input oscillator is changed.

The Modcan system is very musical, and I found myself sampling most of the sounds I patched up. Useful features are plentiful on each module, and the overall layout of controls is clean and inviting.

**Oakley Sound Systems.** Based in the United Kingdom, Oakley specializes in kits developed by Tony Allgood. The line includes 12 modules, enough to assemble a full system. The PCBs for the modules are designed for faceplates compatible with the Synthesis Technology MOTM system, so most modules are 5U tall and one to three spaces wide, with ¼-inch jacks along the bottom.

J. HENDRY

**FIG. 13: The MOTM modules from Synthesis Technology are designed to fit into an SKB road case.**

The kits include only the circuit boards and difficult-to-find parts. The other parts you'll need to find yourself. Oakley's Web site has a number of helpful online resources to help you complete your modules. For example, it has a database of front-panel layouts, and it lists a company that will make the panels for you by special order.

The Oakley line includes the usual run of modules but with some interesting features. The One-of-Three VCO ($37) gives you four simultaneous waveform outputs—sine, triangle, sawtooth, and pulse. However, a front-panel toggle switch allows you to determine whether the pulse wave is derived from the triangle or sawtooth wave. The VCO also includes separate exponential and linear FM inputs, a pulse-width modulation input, and a sync input.

Oakley has a couple of different filters built on the Moog-style, matched transistor-ladder principle. The MultiLadder ($54) includes three audio inputs, single global controls for frequency and resonance, and an output for each rung of the transistor ladder. This final feature allows you to use the filter as a 1-, 2-, 3-, or 4-pole filter, or to process and mix the outputs in various ways. The SuperLadder2 ($41) gives you the option of building a Moog-style filter or a diode-ladder filter, similar to that in the Roland TB-303, with the same PCB. The filter also features three audio inputs and two CV inputs in addition to a 4-pole and a 1-pole output. The Noise and Filter ($30) module includes white- and pink-noise outputs, an infrared noise output that sends out a randomized control voltage, 1-pole highpass and lowpass filters with inputs and outputs, and controls for the filter frequency.

Other interesting modules include the Wavefolder ($51), a voltage controllable waveshaper to be used with

## Analog Synthesizer Reviews in EM

| Product | Issue |
|---|---|
| Big Briar Moogerfooger CP-251 | 3/01 |
| Big Briar Moogerfooger MF-101 | 6/99 |
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# SOMETHING OLD, SOMETHING NEW

voltage or audio signals as a voltage-controllable limiter that outputs the signal above the limiter's threshold level; the ADSR/VCA ($31), a combination module with a 4-stage envelope generator and VCA that can be used together or independently; and the midiDAC, a single-channel MIDI-to-CV converter with three trigger types (+5V, +15V, and Moog-style S-trigger), as well as Pitch Bend, Modulation, Velocity, Note-off Velocity, and Aftertouch. For more-experienced builders, Oakley offers the TB3030 SuperBassline ($79), a complete monophonic synthesizer designed with the Roland TB-303 in mind.

If you haven't already gotten into building modules, Oakley provides a good reason to do so.

**Orgon Systems.** Electronic musicians in Britain and Europe will remember Orgon's monosynth, the Enigiser. Geoff Waterston, Orgon's chief designer, is now offering individual preassembled modules and kits from his Web site. The modules available include the VCO 01 Oscillator ($100/$86), the VCF 01 Multimode Filter ($86/$72), the LFO 01 Dual LFO ($57/$42), the ENV 01 ADSR Envelope ($57/$42), and the VCA 01 Log/Lin VCA ($72/$57). Waterston is selling the PSU Power Supply ($57/$42) as a kit.

Orgon's modules have a simple, utilitarian design. For example, the VCO 1 has individual outputs for sine, triangle, square, and sawtooth waveforms; linear and exponential FM inputs and controls; a pulse-width modulation input and control; and a sync input. The VCF 01 has two audio inputs; two CV inputs that control frequency cutoff; manual frequency and resonance controls; and four audio outputs, one for each filter type (lowpass, highpass, bandpass, and notch).

The modules use standard ¼-inch cables but are 4 inches wide and 6 inches high, which doesn't make them immediately compatible with other module brands. Orgon offers inexpensive preassembled 3-, 5-, 7-, and 14-space cabinets, which include a front-panel mounted power supply. If you purchase more than $146 in modules, Orgon will throw in a cabinet for free.

**PAiA.** In the early '70s, John Simonton's PAiA began selling the inexpensive synthesizer kits that spawned a

J. HENDRY

**FIG. 14: This kit from Synthesis Technology contains all the parts needed to build your own MOTM module.**

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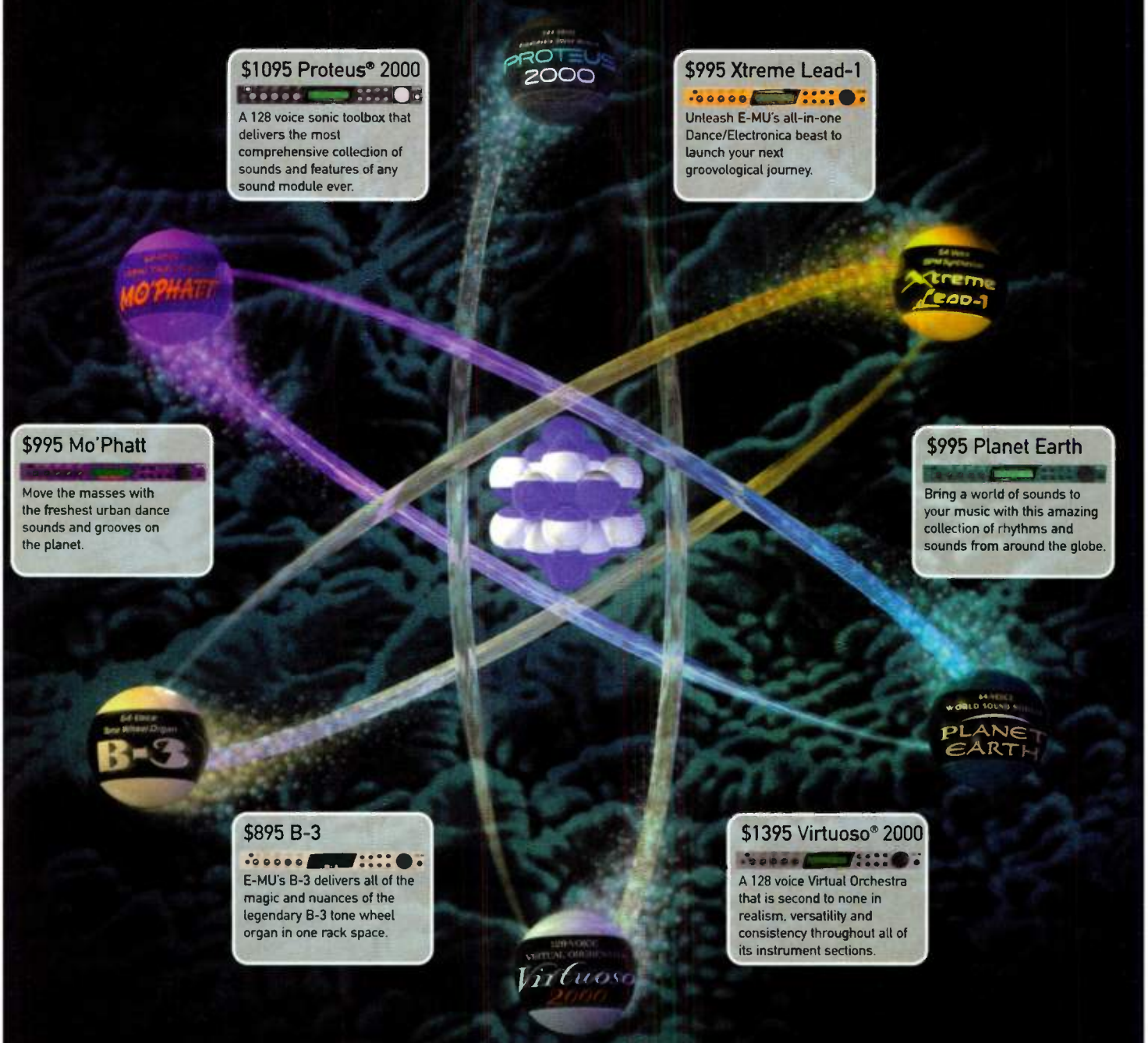


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# SOMETHING OLD, SOMETHING NEW

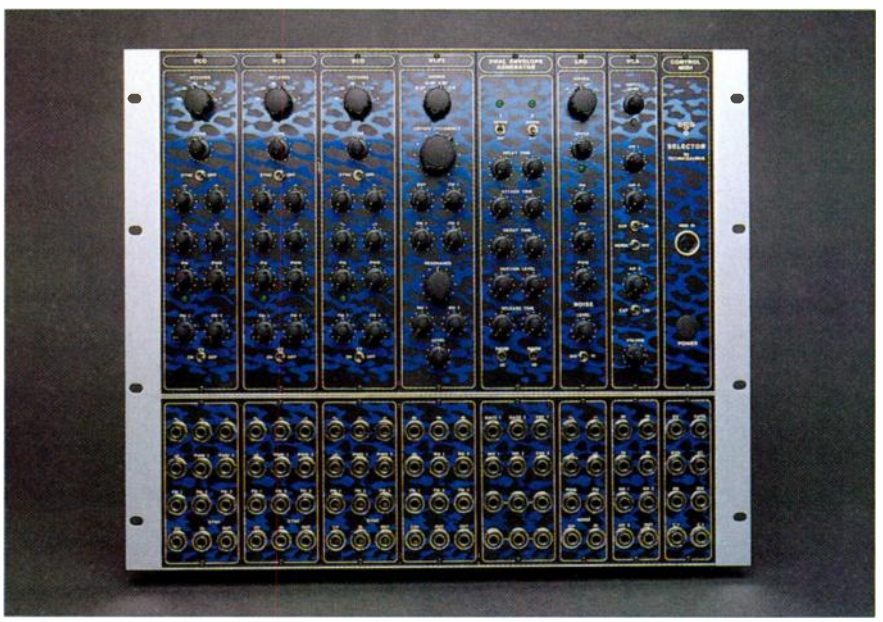
generation of DIY synth hackers. Today PAiA still sells kits, including a number of synth modules that fit into its Fractional Rack (FracRak) 3U mounting system. An important addition to the FracRak system is the Power Wing Accessory package ($18.50), which allows you to mount the PAiA power supply onto the end of the panel so it doesn't take up module space.

PAiA's manuals are highly detailed and clearly written. In fact, each assembly step has a corresponding check-off box so you won't lose your place as you work. At the end of each manual is a description of the modules' various functions and a useful design analysis. PAiA's kits do not include jacks or panels, but each kit has a matched accessory package that includes the additional hardware required to build a complete module. The prices quoted below include the kit and accessory package.

Each module is made up of multiple versions of a basic function, with normalized connections between important parameters. For instance, module 9720, the Dual VCO with Modulator ($103), includes a pair of independent VCOs and a modulator with a 2-stage envelope generator and self-triggering function. VCO A has four waveforms, a built-in lag processor, and a soft-sync input. VCO B has three waveforms, a pulse-width control, and an FM input.

Module 9730, the Dual VCF with Modulator ($96.25), includes a pair of independent 2-pole filters with individual highpass, bandpass, and lowpass outputs. You can also connect the filters to create a single 4-pole filter. Again, the modulator is a 2-stage envelope generator with trigger and gate inputs. The gate input allows you to expand the EG to three stages. When the AR/Cycle switch is in the Cycle position, an LFO with independently adjustable rise and fall times is accessible.

Similarly, the 9710 VCA/Mixer/Noise Source ($89.50) combines a pair of VCAs, a voltage controlled submixer, a noise source, an envelope generator, and a ring modulator in a single module. The midi2cv8 ($123) kit is an 8-channel MIDI-to-CV converter with MIDI In, MIDI Thru, and eight CV outputs.



STEVE JENNINGS

**FIG. 15: This is a Technosaurus System B cabinet. Selector modules are divided into two sections, with the lower half serving as a dedicated patch bay.**

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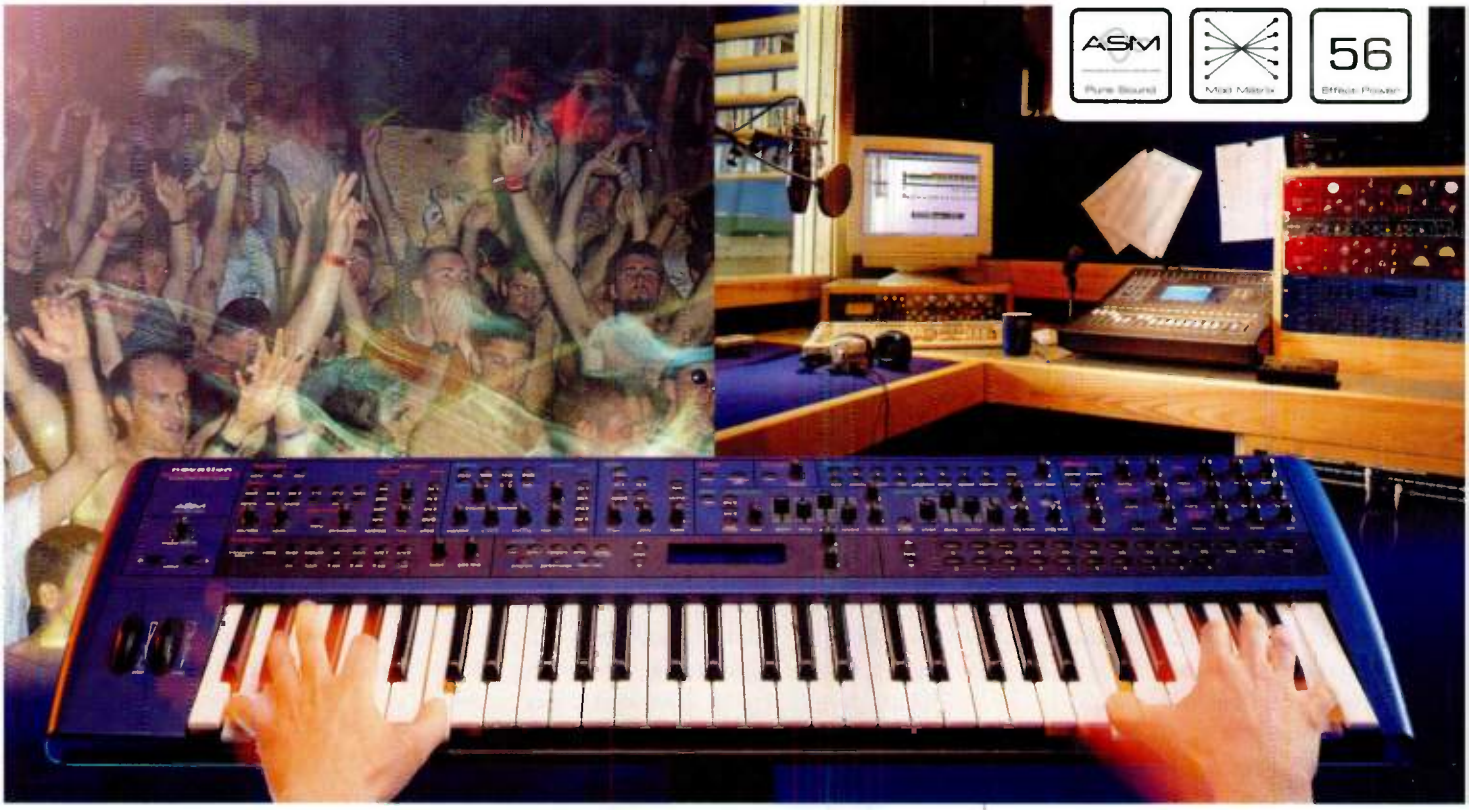


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The 9700S Package ($425) comprises the entire series of modules. The kit includes the midi2cv8, 9710, 9720, and 9730 with all the panels and hardware, as well as a FracRak, patch cords, and power supply.

**Serge/Sound Transform Systems (STS).** The Serge Modular Music System, originally designed by Serge Tcherepnin, has been around since the early '70s. The Serge system features an impressive 65 modules that give you the maximum amount of control parameters in the smallest amount of space. Most parameters in a module are voltage controllable, and often the voltage can be scaled in either a positive or negative direction.

Serge modules use banana connectors, allowing you to combine voltages by stacking plugs. You can put as many as four control voltages together and still have linear headroom. To interface your Serge system with other instruments, an adapter panel ($85) with ¼-inch, ⅛-inch, and RCA jacks is available.

A number of improvements have been made to the system since Rex Probe and Sound Transform Systems (STS) began manufacturing and distributing Serge products in 1993. STS has added audiophile-quality components to Tcherepnin's original circuit designs and developed new modules to fill out the line. The upgrade in components has created a system of great stability and precision, with complete phase coherency throughout.

A couple of modules in the product line stand out. The New Timbral Oscillator ($385), for example, has a voltage-controllable frequency range of 0.1 Hz to 200 kHz; three waveform outputs (sine, triangle, and sawtooth); and a voltage-controllable wave shape that ranges from sawtooth wave, through sine and pulse, to square wave. The Variable Q VCF ($300) has independent outputs for highpass, lowpass, bandpass, and notch filters; trigger and 1V/octave inputs; and independent voltage controlled frequency and Q. Each stage of the Extended ADSR ($285) module has a voltage input and control knob. The initial delay time—the period before the envelope begins—is also voltage controllable. There are also trigger and gate inputs and a switch for adding exponential slopes to various parts of the envelope.

The modules in a Serge system are built into 4U, 7-inch-tall rack-mountable panels. You can design your own panel by choosing from the list of individual modules. STS then builds the modules into the panel for you.

STS sells 12 preconfigured panels to meet specific musical needs. For instance, the Blue Voice ($2,235) and the Red Voice ($2,235) are sound-generating panels. For signal processing, STS designed the Soup Kitchen ($3,490) and Soup 2 ($2,820) panels. Real-time control panels include the Sequencer ($575), and the Touch-Keyboard Sequencer ($1,450). Fun Stations ($7,550), complete systems of three preconfigured panels in a portable SKB case, are also available

## Modular System Overview

| Company | Number of modules | Average price per module | Rack config./ module size | Primary cable type |
|---|---|---|---|---|
| Analogue Solutions | 31 | $90 | Euro subrack | 3.5 mm/¼" |
| Analogue Systems | 31 | $161 | Euro subrack | 3.5 mm |
| Big Briar | 5 | $378 | n/a | ¼" |
| Blacet Research | 7 | $178/$143 | FracRak | ⅛" |
| Cirocco Music Systems | 18 | $567 | 6U (H) × 3" (W) | ⅛" |
| Doepfer | 66 | $97 | Euro subrack | 3.5 mm |
| Electronic Music Studios | 10* | $270 | cabinet or suitcase | pin matrix |
| Encore Electronics | 1 | $289 | 5U (H) | ¼" |
| Evenfall | 12* | $58 | 3U | ⅛" |
| Metasonix | 4 | $874 | 3U | ¼" |
| Modcan | 22 | $255 | 9" (H) | banana |
| Oakley Sound Systems | 12 | $120 | 5U (H) | ¼" |
| Orgon Systems | 5 | $71/$57 | 6" (H) × 4" (W) | ¼" |
| PAiA | 4 | $103 | FracRak | ⅛" |
| Serge/Sound Transform Systems | 65 | $379 | 7" (H) × 19" (W) panels | banana |
| Synthesis Technology/MOTM | 14 | $225/$160 | 5U (H) | ¼" |
| Synthesizers.com | 21 | $105 | 5U (H) | ¼" |
| Synthetic Music Systems | 5* | $80 | 1U | 3.5 mm |
| Technosaurus (Selector Series) | 12 | $282 | 9U (H) | ¼" |
| Wiard | 7 | $442 | 6U (H) | ⅛" |

* these modules are in a preconfigured arrangement

in Blue and Red varieties (see **Fig. 12**).

The Blue Voice contains eight modules in a single panel: a New Timbral Oscillator, two Precision VCOs, a ring modulator, Variable Q VCF, a Wave Multiplier module, Audio Mixer, and Universal Audio Processor. The Red Voice ($2,235) also packages a New Timbral Oscillator, Audio Mixer, Variable Q VCF, and Universal Audio Processor but adds a single Precision VCO, a Pulse Divider, Triple Waveshaper, X Fader, and a Divide-by-N Comparator. With this many modules in a single panel, cable lengths can be short, which is helpful when you are employing unshielded banana plugs.

The line's newest panel, the Animal ($2,850), fits into the sound generation category and resembles the Blue Voice. The Animal includes a New Timbral Oscillator, a Precision VCO, a Variable Q VCF, Wave Multipliers, Mixer, Smooth/Stepped Generator, Dual Transient Generator, and the Universal Audio Processor.

The Touch-Keyboard Sequencer is a performance-oriented controller—a sort of cross between a keyboard and a metasequencer—that is remarkable for its number of options. It has 16 pressure-sensitive touch plates and four rows of 16 voltage-programming knobs. You have the option of clocking through the rows horizontally like with a traditional step sequencer (for a 64-stage sequence) or clocking vertically. Each way of clocking has its own output system. You can run the sequencer forward or backward or alter the sequence's length by touching the pads. The Serge system also includes five multistage sequencer programmers and an 8×2 step sequencer ($575).

The Serge modular is known for timbral clarity in every register and for its ability to produce rich, slowly evolving sounds with just a few modules. Although the Serge system is priced higher than most others, it's one of the most powerful and versatile analog synthesizers on the market.

**Synthesis Technology/MOTM.** Paul Schreiber set out to design the "mother of all modulars" (MOTM) when he began Synthesis Technology. MOTM modules include top-quality parts throughout and conform to low-noise, audiophile standards. For example, the modules have few LEDs in order to remove the minute amount of noise each LED introduces into the system.

With a simple layout, large knobs, and ¼-inch jacks, MOTM modules resemble Moog modules (see **Fig. 13**). However, the modules are designed for high performance and ultra stability. The MOTM-320 Voltage Controlled LFO ($229/$149) has four discreet waveshape outputs and a CV input that alters these waveforms. The frequency range is from approximately one cycle every 30 minutes to 4 kHz.

Most of the modules are available as complete kits (see **Fig. 14**), rated on a scale of 1 to 5 for difficulty. The Synthesis Technology Web site includes building tips for people new to DIY.

Besides the MOTM-320, the MOTM system has 13 additional modules: the MOTM-300 Ultra VCO ($349/$259); MOTM-120 Sub-Octave Multiplexer ($199/$139); MOTM-110 VCA/Ring Modulator ($199/$139); MOTM-101 Noise/Sample and Hold ($175/$125); MOTM-410 Triple Resonant Filter

| Modules available as kits | MIDI-to-CV module | Sequencer module | Power requirement |
|---|---|---|---|
| no | yes | yes | ±12 VDC/+5 VDC |
| no | yes | yes | ±12 VDC/+5 VDC |
| no | no | no | +9 VDC |
| yes | no | no | ±15 VDC |
| no | no | yes | ±15 VDC |
| no | yes | yes | ±12 VDC/±5 VDC |
| no | no | no | 110/220 VAC |
| no | yes | no | ±15 VDC |
| no | yes | no | ±15 VDC |
| no | no | no | 110/220 VAC |
| no | no | yes | ±15 VDC |
| yes | yes | no | ±15 VDC |
| yes | no | no | ±12 VDC |
| yes | yes | no | ±12 VDC/±15 VDC |
| no | yes | yes | ±12 VDC |
| yes | no | no | ±15 VDC |
| no | yes | yes | ±15 VDC |
| no | no | no | 110/220 VAC |
| no | yes | yes | ±18 VDC/±20 VDC |
| no | no | yes | ±15 VDC |

# SOMETHING OLD, SOMETHING NEW

($279/$199); MOTM-420 Voltage-Controlled Filter ($229/$169); MOTM-440 Voltage-Controlled Lowpass Filter ($269/$199); MOTM-700 Dual Voltage-Controller Router ($189/$139); MOTM-800 Envelope Generator ($129/$89); MOTM-820 Voltage-Controlled Lag Processor ($209/$149); MOTM-910 Cascaded Multiple ($99); MOTM-940 Patch Panel ($89); and the MOTM-130 Dual Pan/Fade VCA ($269/$199). For an in-depth review of the MOTM system, see the March 2001 issue of **EM**.

**Synthesizers.com.** Roger Arrick's Synthesizers.com offers a full line of basic modules that have a design aesthetic based on the original Moog modular. Each module offers the traditional control functions. The Q106 Oscillator ($170) features a stepped 6-position octave-selection knob; tuning control; individual linear and exponential frequency controls; a hard-sync input; and five individual waveform outputs (sine, triangle, ramp, sawtooth, and square). The Q107 State Variable Filter ($110) has two audio inputs, 2-pole highpass and lowpass outputs, and 1-pole bandpass and notch outputs. Frequency cutoff and resonance are voltage controllable.

The list of modules includes the Q119 Sequential Controller 24-stage sequencer ($490), the Q105 Slew Limiter ($70), the Q117 Sample and Hold ($80), and the Q109 Envelope Generator ($80).

The QKB15S ($390) is a 5-octave keyboard with a built-in MIDI-to-CV converter and 8-note polyphonic MIDI output. The keyboard has four operation modes: it can be used in two different split configurations or as a single- or dual-voice controller.

Synthesizers.com also offers cabinet choices, such as 44-space ($350) and 22-space ($175) solid walnut studio cabinets and a 22-space portable vinyl-covered cabinet ($200). A Keyboard Garage ($200) for storing your keyboard under one of the studio cabinets is also available.

**Synthetic Music Systems (SMS).** Hot off the shelf from the United Kingdom's SMS is the Modular Analogue Rack Synthesizer (MARS; $400), a nice-sounding mono synthesizer in a 1U case. Each of the five modules—

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VCO, VCF, VCLFO, VCA, and 4-stage envelope generator—is internally normalled but can be accessed individually through the rear-panel patch bay. The MARS includes 16 front-panel knobs and 21 3.5 mm patch points on the rear panel.

The MARS has front-panel VCO controls for tuning and for choosing the modulation type and waveform shape. The VCF is a 4-pole lowpass transistor ladder with a front-panel control for input level, cutoff frequency, resonance amount, modulation amount and waveform type, and envelope. The VCA gives you control of the level and the amount of linear or exponential control. The VCLFO has a rate control.

SMS has crammed several jacks onto the rear panel of the MARS. The VCO has sync, modulation, and CV inputs, and waveform controller outputs. The VCF has a single audio input and output, a modulation input, and a CV input. The VCLFO has four waveform outputs (square, triangle, and positive and negative sawtooth) and a CV input. The VCA has both linear and exponential inputs, as well as an audio input and output. The envelope generator has trigger and gate inputs and an envelope output.

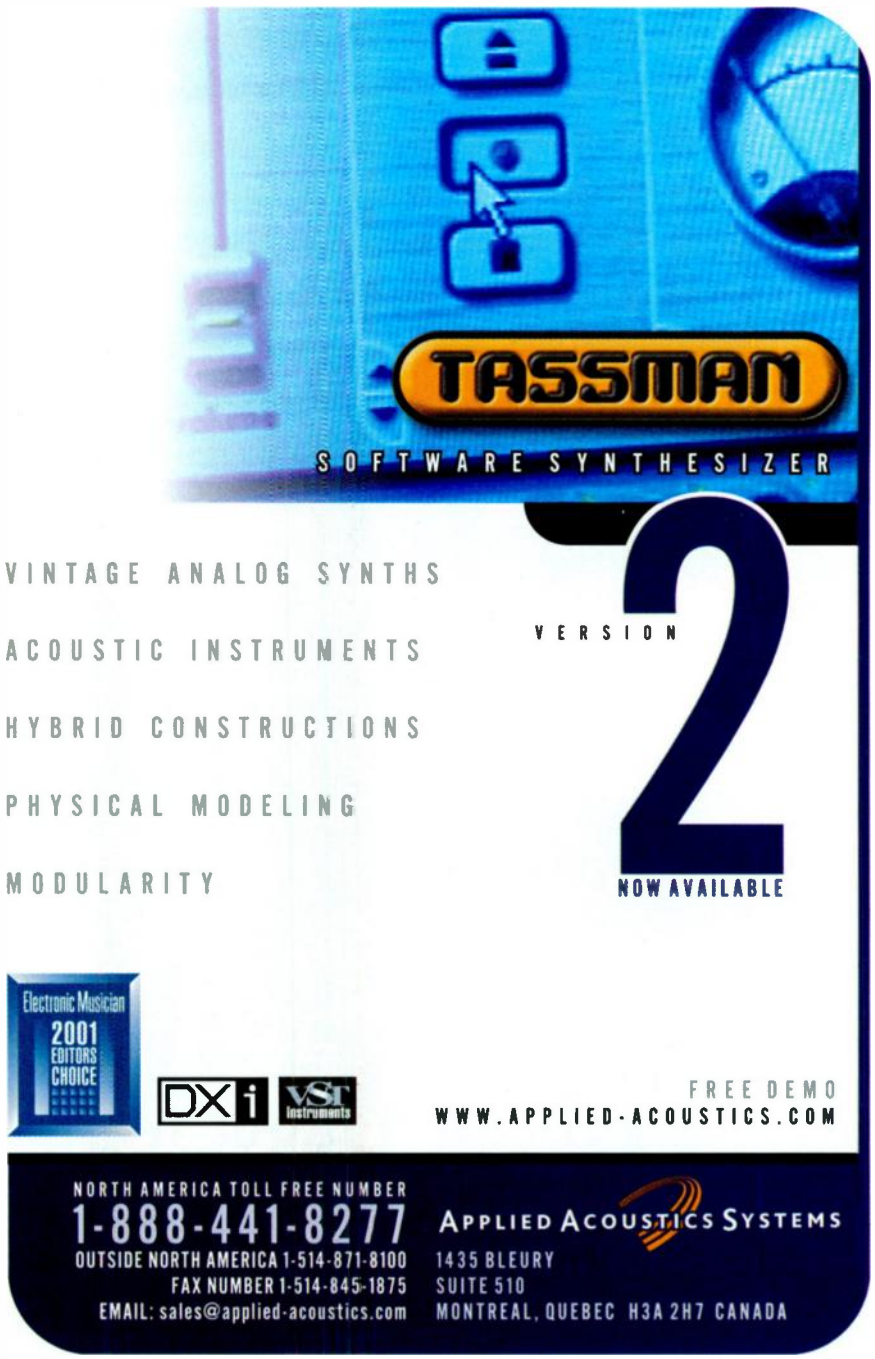
The obvious drawback of MARS is the placement of the patch points on the rear panel, which doesn't lend itself to quick experimentation through patching. However, SMS offers the Planet 7 expander ($400), which not only brings the patch points to the front panel but offers additional features. These include a ring modulator, lag processor, sample and hold, noise, a DC shifter, four attenuator/inverters, and a mixer. Planet 7 has enough rear-panel and front-panel patch points for two MARS synthesizers.

**Technosaurus.** Swiss synthesizer company Technosaurus has two lines of products: the Small Monster series, which includes the Microcon, Microcon II, Cyclodon, and Effexon; and the Selector series pro-level modular system. **EM** has covered most of the compact Small Monster products (see the sidebar "Analog Synthesizer Reviews in **EM**"), so I will concentrate on the Selector modules.

The Selector series comes in system configurations A, B, C, and D. System A has normalized connections, so you don't need patch cords. Systems B, C, and D are preconfigured selections of Selector modules; they contain 8, 15, and 27 modules, respectively.

At 9U high, the Selector modules are the tallest of any in this survey. Uniquely, the modules are divided in two. The upper half contains the knobs and switches, and the lower portion sports a ¼-inch patch bay connected with a multipin cable. This system helps keep the patch cables out of the knobs' way if you have a single cabinet. In customized cabinets the patch bay can be located wherever is most convenient. I used a pair of System B cabinets for this article. Rather than stack the cabinets, I set them side by side so that the cables hung over the side of the table.

The Selector system comes with an external power supply that connects



to the back of the synthesizer cabinet with a multipin cable. The back panel of each cabinet has an extra jack so you can daisy-chain two System B cabinets to a single power supply.

A special feature of Selector modules is the inclusion of a wide variety of control inputs. For example, the VCO ($280) includes a hard sync input, a CV input, two pulse-width modulation inputs, and three FM-inputs. With this many inputs, you can set up complex cross-modulating patches fairly quickly.

Another feature of Selector modules is an abundance of level controls. The VCO has a dedicated level control for each of the four waveform's outputs (ramp, sine, triangle, and square). In addition, two of the three FM inputs have level controls.

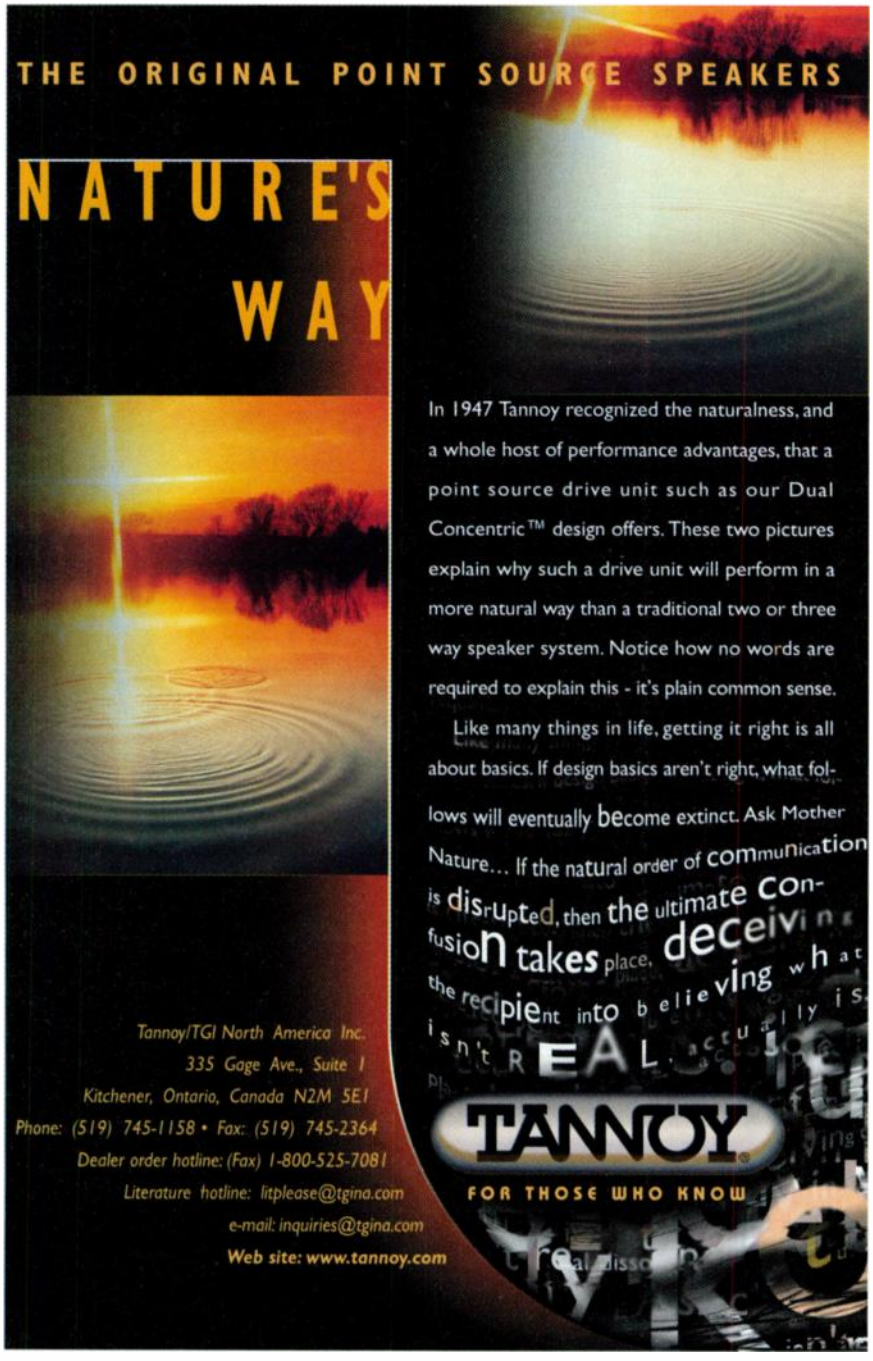
The basic System B ($3,000) configuration (see **Fig. 15**) includes three VCOs, VCF2 ($280), Dual Envelope Generator ($280), LFO/Noise ($205), and Control MIDI ($478) MIDI-to-CV converter. Other System B configurations include the Stereo Filter Bank ($3,050) and Stereo Filter Bank II ($2,950), which feature the Triple Resonators ($311) module.

The VCF2 can be used as a 2-pole highpass or lowpass filter or as a 1-pole bandpass or notch filter. Besides the requisite cutoff frequency and resonance controls, the VCF2 is unique in that it has an envelope input, three FM inputs with individual level controls, and two resonance modulation inputs with individual level controls. The VCF2 is a great-sounding filter that you can modulate in extreme ways.

**▼ Many companies offer modules that also include digital technology.**

The Triple Resonators module is great for simulating formants that lead to vocal-type sounds. It features three variable-Q resonant bandpass filters. Each filter has its own frequency, Q, and level control, as well as individual FM inputs and controls. When the filters are in resonation, the FM inputs can be used as CV inputs to control each filter's pitch. The module also includes an amplitude modulation (AM) input that affects the mix of the three filters. The Triple Resonators has four audio inputs and two audio outputs. The extra space on the patch bay is used for two 3-way mults and one 4-way mult.

The Octal Subharmonic Oscillator ($465) lets you combine nine sine



waves (a basis tone and eight subharmonics) with an FM input and independent modulation inputs for both odd and even numbered subharmonics. The module also includes a highpass filter with two FM inputs and adjustable cutoff frequency.

The Dual Envelope Generator is notable for its fast 70 µs attack time. The module can be used in either a 5-stage (DADSR) or 2-stage (AD) mode. Each EG has a positive and negative envelope output.

Technosaurus recently unveiled the Technosaurus Selector Expander Module (TSEM; $495). The TSEM is reminiscent of the Oberheim Synthesizer Expander Module (SEM) because it packs two VCOs (including LFO and noise), a VCF, a VCA, and a pair of EGs into a single unit. The module also contains 25 patch points, including CV and FM inputs on the oscillators, dual audio inputs and FM inputs on the VCF, and a pair of amplitude-modulation inputs on the VCA. A complete 2-voice synth with two TSEM modules in a walnut desktop cabinet is also available ($1,190).

The latest addition to the Small Monster series is the analog multi-effects processor Effexon ($329). Like the other Small Monsters, it is roughly the size of a VHS video cassette, and it uses a wall-wart power supply, 3.5 mm jacks for control inputs, and ¼-inch jacks for audio I/O. The effects include a ring modulator, two parametric EQs with resonance controls, VC overdrive, and a VCO/modulator.

▼

**You have a large number of choices when designing an analog modular synth.**

**Wiard Synthesizer Company.** Grant Richter considers his Wiard system "a sonic amusement park." Each of the multifunctional modules is designed to be a standalone processor and to give you the most control options possible within the space of a 10.5-by-2.83-inch panel. Each modules include 16 or more I/O options, 10 manual controls, and, in some cases, a 4-way multiple, space permitting.

The detail in design is evident from the feature layout and informative manual to the elaborate front-panel decoration (see **Fig. 16**). Each Wiard module has more features than I can describe within this article's constraints. The following descriptions merely scratch the surface of these features. Please refer to the Wiard Web site for a more detailed look at each module.

The Sequantizer Module ($399) includes an 8-step sequencer with voltage quantization and a lag processor

for adding glide between the steps. It also has CV inputs for changing the octave of the entire sequence. The module includes a Select control, which allows you to step through the sequence stages one at time when no clocking pulse is received. When the sequencer is being clocked, the Select control allows you to gradually permutate the sequence's order into eight different patterns. The permutations resemble English change-ringing patterns.

The Envelator ($399) contains two independent 2-stage envelope generators with voltage-controllable attack and decay times. The two EGs can also be mixed to form an ADSR envelope generator. The module includes positive and inverted voltage output jacks, in addition to a retriggering mode that gives a triangle- and square-wave LFO signal, which can be employed for clocking other modules in the system or for general-purpose modulation.

Waveform City ($549) combines a true analog VCO, a nonlinear function generator that can be used as a VCDO, a 2-stage envelope generator, and a VCA. A collection of 256 8-bit waveform samples are arranged in a 16×16 matrix of Banks and Waves, and the wavetable is under complete voltage control. You can sweep through the wavetable with an external signal or the internal EG.

The Classic VCO ($399) includes four waveform outputs, a random-voltage output, a pulse-width modulation input, two FM inputs (one with an attenuator), a linear FM input (with attenuator), a 2-stage (AR) envelope generator/lag processor, a 2-input VCA, and a 4-way jack multiple.

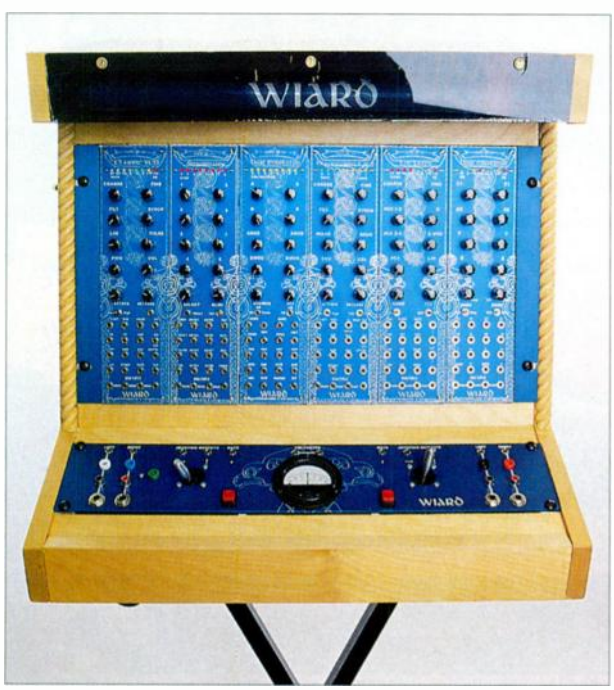
The Omni Filter ($549) is a 4-pole multimode filter with four inputs and outputs. The selection of filter mode—highpass, lowpass, bandpass, and allpass with 720 degrees of phase shift—and filter resonance are under voltage control. This allows you to sweep between filter types while adjusting the Q of the filter.

The Dual Mixolator ($399) is a pair of stereo VCAs that can function independently or together. The VCAs can function as a crossfader, panner, mixer, or ring modulator for audio or control signals. Each VCA has three audio inputs, four outputs, and a modulation input. Two of the audio inputs, X1 and X2, are mixed together and used for the right channel in a stereo setup. The third input, Y, acts as the left channel. Each VCA has four audio outputs, one each for the X and Y signals, and one each for phase-shifted X and Y signals. The modulation input allows you to crossfade the X and Y inputs between two channels.

The newest Wiard module is the Borg Filter ($399), which combines a pair of 2-pole filters based on the characteristics of the Buchla Model 292 lowpass gate and Korg MS-20 highpass and lowpass filters. The Borg also includes a pair of independent LFOs. The filters can be used separately or together to form an interesting 4-pole filter. Like many Buchla modules, the Borg filter employs vactrols in the circuit design, which results in a slewed response that gives the filter more of an acoustic sound.

The Wiard Joystick Controller ($299) is a 2U panel featuring a pair of joysticks with corresponding X and Y voltage outputs, a pair of trigger buttons with gate outputs, a voltmeter, and four cable converters with ⅛-inch, ¼-inch, banana, and RCA jacks. A single joystick, trigger, and patch panel resides on each side of the panel, with the voltmeter centered between the two control sections.

The Wiard modular provides a powerful sound generator and processor in a relatively small space. Although the system doesn't come cheap, you definitely get your money's worth.




STEVE JENNINGS

**FIG. 16: The modules from the Wiard Synthesizer Company pack a lot of features in a small amount of space: each panel contains 10 knobs and 20 jacks.**

## GOIN' MOD

As you can see, you have a large number of choices when designing an analog modular synthesizer. Remarkably, the price of a modular system has remained relatively low compared with the cost of the first generation modules. And after four decades, the designs and materials have improved while the prices have remained steady.

With the addition of microprocessors, hybrid modules are now common, giving you an even greater timbral palette. A fully equipped analog modular synthesizer offers you levels of sound exploration that have yet to be modeled.

**Gino Robair** *is an associate editor at* **EM.**

*Special thanks to Alex Artaud, Joel Chadabe, Robert Clarida, Ben Covington, Steve Curtin, Tony Karavidas, Lucid Technology, Dean Santomieri, Mickey Tachibana, and W. Scott Vance.*

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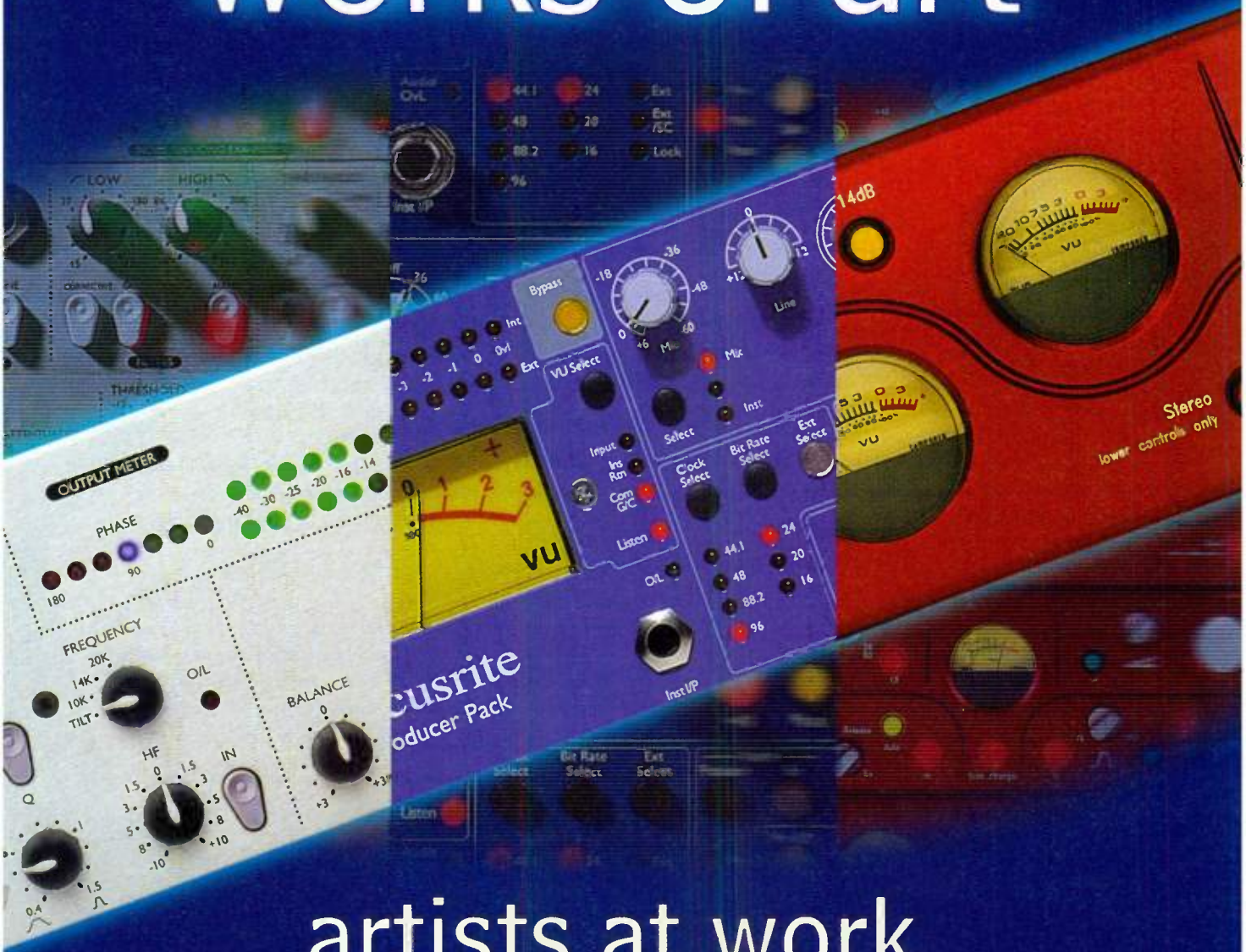


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# MYSTERIES

## *How the pros solve common mixing problems.*

If talking about music is like dancing about architecture, then perhaps talking about mixing is like somersaulting about perfume. That is, music is better listened to than talked about, and its mysteries and pleasures simply cannot be elucidated by symbols alone. Likewise, the mysteries of mixing don't readily yield themselves to words. For one thing, there are too many variables—musical style, instrumentation, audience, and gear, to name only a few—for absolutes to be of much use. Mixing music is as much an art as making it—and in one sense, it is making it—and therefore is irreducible to formula.

Just the same, the problems commonly encountered by amateur mixers are deftly handled by the pros on a daily basis, so it stands to reason that talking to the professionals can shed some light on the process. I spoke recently with three renowned mix engineers about how they deal with common mixing problems. They were understandably reluctant to suggest one-size-fits-all solutions, but they did provide many helpful tips and the occasional gem of insight on a number of topics. In fact, I was able to incorporate many of their suggestions and improve my own mixes right away.

### MEET THE PANEL

Even if you don't recognize the names of the mix engineers I interviewed, it's pretty certain you've heard the fruits of their labors. Each is a veteran who has mixed (not to mention produced) dozens of best-selling albums, and none is a stranger to platinum. Interestingly—though perhaps not surprisingly—all three are musicians, as well.

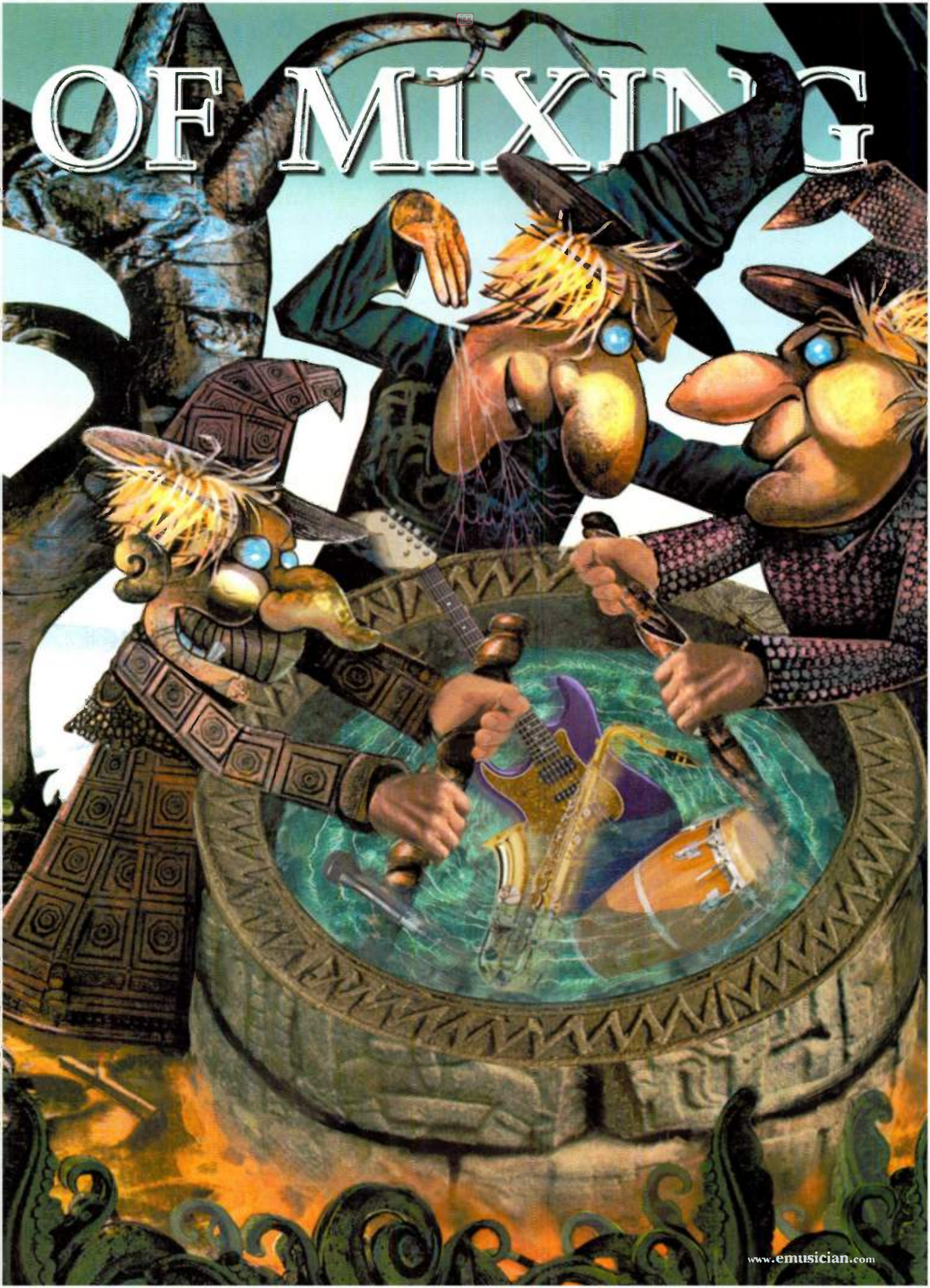
Producer and mixer Chris Lord-Alge, who resides in Los Angeles, was a 1998 Grammy nominee for Faith Hill's *Faith* and a 1992 Grammy nominee for Lindsey Buckingham's *Out of the Cradle*. Lord-Alge has platinum credits from his work with Green Day, Fastball, and Savage Garden. Other recent credits include Sheryl Crow, Melissa Etheridge, Foo Fighters, Dave Matthews Band, and Barenaked Ladies.

San Francisco–based producer, mixer, and engineer Mark Needham, though best known for his work with Chris Isaak, has also mixed (and in some cases recorded and produced) platinum-sellers for Bruce Hornsby, Meredith Brooks, and Cake. Upcoming releases include albums from Lindsey Buckingham and Simon Says.

Los Angeles–based producer and mixer Ken Kessie has mixed several chart-topping singles and seen platinum sales from albums he did for En Vogue, Tony Toni Tone, Celine Dion, and Bel Biv Devoe. Upcoming releases include works by Vanessa Williams, Carl Martin, Assia, and Eklipse.

*By Brian Knave*

*Illustration by David Ball*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## VOICE RECOGNITION

For vocal-based songs, nothing is more critical to the mix than a consistent, just-right level for the lead vocal. As Lord-Alge puts it, "The vocal leads the track." To determine an appropriate vocal level, Lord-Alge suggests monitoring at a low volume. "If the monitors are cranked up really loud," he says, "the tendency is to put the vocal too loud in the mix."

Lord-Alge also emphasizes the importance of choosing the compressor that will "add some personality to the vocal, which is the bottom line, and help it sit in the mix just right. Generally," he says, "you can't go wrong with a UREI 1176—the blue one is my favorite on vocals. An LA-2A [see **Fig. 1**] is not going to hurt you, either. And sometimes an LA-3 will do the job. Between those three you've got it covered." Needham also praised the 1176 for vocals, as well as the new Drawmer 1969 compressor.

To get the vocal correct in the mix, Kessie focuses on "excitement, fader rides, and clearing out the track to leave some room. Mick Jagger is known for wanting his vocal 'in the red,' and that's something I aim for, too. I will run my vocal compressors hot, add some tube or Neve preamp distortion to the track, and mult the track to another channel where I can push the high end. All these combine to bring the vocal close to the edge of disaster—which is exactly what I want because it draws in the listener's attention. Next, I do fader moves to ensure that all the words and tails of words are strong. In addition, I will duck breathing noises that are too loud and *esses* that are peaky. However, I won't eliminate breaths between phrases because that makes it sound fake. Anything in the track that competes with the lead vocal gets knocked back a bit with EQ, compression, or fader rides."

Needham uses various fail-safe techniques to create a mix that has the perfect vocal level. "First I work to get the vocal intelligible all the way through at a level that feels good to me," he explains. "After that, if there is any question, I do alternate mixes—for instance, a vocal-up and a vocal-down version, including ones with the background vocals up and down. In some cases, when working on Pro Tools, I'll do an instrumental mix with the vocals split off to separate tracks. That way, if the vocal is too loud in one spot, I can go back in later and correct it. The same thing applies if you need to go back and make a 'clean' [expletive-free] version of the song for radio release. With the vocal on separate tracks, it's easy to chop out a word and replace it."

Needham typically ends up with six or seven mixes "at the minimum, but I've had as many as 20 different mixes of a song. It's a lot easier to print them at the time than to try and do a total recall later." Kessie also runs multiple mixes as standard procedure.

## BASS INSTINCTS

Finding the right level for bass guitar is also tricky. Needham and Lord-Alge both stress the importance of using familiar and trustworthy monitors as well as monitoring on multiple playback systems. "The only way you're going to know for sure is multiple referencing," says Lord-Alge. "If you know the speakers and the room, you should be able to get the right bass levels. But alternative monitor systems are very important: a boom box, headphones, a car stereo."

Needham recommends comparing the mix in progress to other mixes. "Before you start," he says, "or in the middle of a mix, pop in a CD that has good mixes in the same style as the music you're working on. That should give you a good sense of appropriate bass levels. And if you're not familiar with the room, be sure to have a familiar system in your car that you can refer to."

Another common bass-related problem is insufficient high end. "In rock stuff," says Lord-Alge, "they never seem to record the bass guitar bright enough. So it never cuts through unless you add a lot of midrange to it. The trick is to find where to boost the EQ so the bass will peak through under the guitars." Needham suggests another solution: "A lot of times I'll either remic the bass through an amp or use distortion effects to get a little more grind out of the top end of the bass. Lately, I've been using the Tech 21 SansAmp on bass quite often."

As for favorite bass compressors, Lord-Alge again praised the 1176: "My favorites for bass are the black ones, which are discreet" (see **Fig. 2**). Needham favors LA-2As for miked bass and also uses the Empirical Labs Distressor (see **Fig. 3**) on the direct signal, as well as "some of the sub programs out there, such as Aphex's *Bass Maximize*."

## DRUM 'N' BASS

A related challenge is getting a good marriage between the kick drum and bass guitar. "Make sure to compress the kick so that it's punchy but not ringy," Lord-Alge advises. "But don't compress it to the point where it starts to ring and vibrate, because then it's going to eat up the bottom end, not to mention bring up all the leakage. Generally, you want the kick and bass to have an equal amount of low end. Then match the two together until it feels right." Lord-Alge says he prefers not to cut any low end from the kick but that often he will "suck out some of the 400 Hz to get rid of the boxiness." Once more, he recommends monitoring at a low level to

MATT SILVA

**Legendary for working fast, Chris Lord-Alge says mixing is about "gut instinct, not gear." He has mixed platinum records for Green Day and Savage Garden and was nominated for a 1998 Grammy for Faith Hill's *Faith*.**

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ensure the kick "cuts through enough but not too much, and to make sure it doesn't have too much 'point' on it."

Needham advises keeping the kick and bass at good levels relative to one another to avoid problems during mastering. "That way, if there's not enough or too much low end overall, it's easy for the mastering engineer to bring both the kick and bass up or down together with EQ. If the kick and bass are out of whack, the mastering engineer is not going to be able to fix it."

Needham typically starts a mix with the kick drum and then works on the rest of the drums before bringing in the bass. But he warns about equalizing and compressing the drums and bass separately from the mix because of potential EQ imbalances and phase cancellations. "Keep in mind the other instruments that are going to go around the bass and drums," he says. "For example, if you bring in, say, a string section, or some really loud guitars, the top end on the kick drum and bass tends to get eaten up. After compensating with EQ, the kick and bass may sound too bright when you solo them—but they're just right when you put them in with the other instruments."

Kessie, who claims he's "always experimenting with things you're not supposed to do," describes a different way to mix kick and bass. "I leave the kick in the center and pan the bass to both sides of the stereo spectrum. This can be done a number of ways. For example, you can mult the bass off to another channel or send it to a chorus unit—my fave is the TC Electronic 2290. My newest trick is to mult the bass and send it to two channels of an Aphex 106 Easyrider quad compressor. I then set the Process controls [which control attack and release times automatically] opposite to one another—one side fast, the other slow—and pan the two signals hard left and right. The slight difference in attack/release times makes the bass nicely audible in both speakers, allowing me to run the bass louder without burying the bass drum. When both sounds coexist straight up the center, there's less room for either."

As for compressors, Needham loves the Distressor, both on kick and snare, and Lord-Alge says that "the built-in compressor on the SSL consoles is usually sufficient for kick drum." On snare, Lord-Alge alternates between a "Distressor and an old Neve 2264X in limit mode. The Distressor is good because it's so adjustable."

JOHN LUCASEY

**Best known for his work with Chris Isaak, Mark Needham has also mixed platinum sellers for Bruce Hornsby and Cake. He suggests making multiple versions of a mix to increase the odds of getting it right.**

## WHEN THE LEVEL BREAKS

Another difficulty beginning mixers often encounter is determining how heavily to apply effects to a mix. Of course this depends on the song and the market; however, the pros agree that, in general, less is more. "My philosophy on effects is to run as little as possible," says Kessie. "The main reason is clarity—there is usually a lot going on already, and effects can take up a lot of room. Also, I want to make 'classic' mixes that will sound good 20 years from now. Anytime you load on the current 'flavor of the day' effect, you run the risk of dating your mix—just listen to any hair-band mix from the '80s. One of the biggest mistakes in amateur mixes is too much reverb. The best approach is to get the mix working as dry as possible; then, if you need some ambience, sneak it in."

Lord-Alge offers the same advice: "You grill the steak first and then put the sauce on it—you don't put sauce on it while it's grilling. Get the mix sounding good relatively dry and then add the sauce as needed in the places where you feel it adds some attitude." Lord-Alge also emphasizes the need for clarity and suggests how to maintain it: "In general, don't put an effect on everything. What you want is clarity—and you're not going to get it unless you leave some things dry. The more goop you pile on, the less definition you get."

Needham again recommends the failsafe option of alternate mixes: "If there's ever any question—say, you're worried about a certain delay—simply make one mix with it on and another with it off." Does Needham ever notice uses of effects on other people's mixes that he thinks of as a mark of amateurism? "Actually, I get some of my best ideas from people who are working in home studios because they're not afraid to try things that are totally off the wall. It's amazing some of the creative effects they come up with. I usually tell people to bring in those mixes as well as the effects boxes they've been using. Or, if they have extra tracks, they can just print the effects—because often, when you try to duplicate them later, you never come up with something as good."

## CROWDED HOUSE

A common mixing problem is clutter, which can occur when two or more instruments are playing in the same frequency range and thus competing for sonic space. "The trick here," says Lord-Alge, "is to identify the instrument [in the cluttered part] that's most important to the song and then to move the other instruments out of its way with panning, EQ, or whatever. What you don't want is the middle of the mix all jammed up—try to keep as much out of the middle as possible. There's no rule, of course; it's all instinct. If you have to

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MYSTERIES OF MIXING

**FIG. 1: The legendary LA-2A Leveling Amplifier was originally made by Teletronix, which later was acquired by UREI. A highly coveted unit, this is not one you are likely to find on eBay.**

add a boatload of EQ to make it work, then that's what you do. You're not going to sit back and say, 'Oh, I think that's too much EQ.' If it sounds good, who cares how far the knob is turned?"

"I will look at any and all options to keep a mix sounding clean and uncluttered," says Needham. "If I can't get it to work by changing the EQ or the panning, then it's time to ask, 'Is this the right part?' People just getting into mixing often don't realize that the most dramatic tool on the console is a mute button. Rather than just turning things down because they're a little muddy, sometimes it's better to turn them off, whether just for a section or for the whole tune. Of course, that could be a touchy situation—the band comes back in and realizes you've taken out three guitar parts in the verses! But say you have a piano and guitar playing basically the same part—by leaving one of them out and then bringing it in later to build the second verse or the chorus, you can create a more dramatic difference between the sections."

Kessie echoes Needham: "Often, the best way to fix poor tonal balances is to mute one of the offenders. Other options are to remove clashing regions with EQ and panning. For example, use panning to make one part stereo and the other mono. I think many mixers avoid putting sounds straight up the middle—but sometimes a key rhythm part panned dead center can really glue a mix tight. Another solution is to use depth: by adding ambience to one part, you can make it seem farther away than the other. Auto panners and other motion-based effects can also be used to differentiate parts: having one part in motion will separate it from a part that's static."

MAUREEN DRONEY

**Ken Kessie, who has mixed hits for Celine Dion, En Vogue, and Tony Toni Tone, says he often experiments in the studio with "things you're not supposed to do."**

## CAN'T TUNA FISH

Digital-audio editors have provided a relatively easy solution to a problem that can ruin the best of takes—an out-of-tune part. But it wasn't always that way. "Ten years ago," says Needham, "I used a device that allowed you to control pitch with an automated fader. But you had to do it by ear, which was hard—especially when a note was bending and you were trying to creep the fader up just enough to keep it in tune." Once, to deal with some out-of-tune background vocals in the days before digital tuning programs were available, Needham washed them out a bit with echo and chorus and turned them down low in the mix. "People actually dug the sound—'Wow, what a mysterious background level!'"

These days, dedicated mixers rarely deal with tuning problems. Instead, the problem is often handled by engineers who specialize in tuning vocal tracks—the producer sends the vocal out and it comes back tuned. As Lord-Alge points out, "Tuning is an issue for the producer and the artist. Hopefully, they've sorted out any tuning problems prior to giving you the tape." Still, any mix engineer worth his salt knows how to tune a vocal track.

"The great thing about tuning programs," says Needham, "is that you can rescue a troublesome line that has an emotionally great performance. I usually work on Pro Tools, so I mostly use Antares's *AutoTune*. But some people get a little carried away with *AutoTune:* they use it in auto mode and start taking out pitch bends that are supposed to be there and that support the emotion of the delivery—and sometimes those little pitch bends are what make the vocal work."

Lord-Alge frowns upon of the extent to which tuning correction has become commonplace and is concerned that the ubiquity of digital fixes can lead to a certain slackness in the recording process. "You know, I'm getting a little tired of hearing that *AutoTune* sound. Instead of, 'That's close enough—let's just *AutoTune* it,' have the artist sing the part a couple more times; have the vocalist get some attitude into it and get it in tune. An extra ten minutes isn't going to hurt. If the singer just can't hit the note, then *AutoTune* it. Don't just use it out of laziness."

Kessie offers an approach for those times when tuning programs aren't up to the task. "*AutoTune* doesn't always work for more extensive tuning problems. In really difficult cases, it helps to be running a synched-up sequencer. Then you can drop the offending line into a sampler and use the pitch wheel of your

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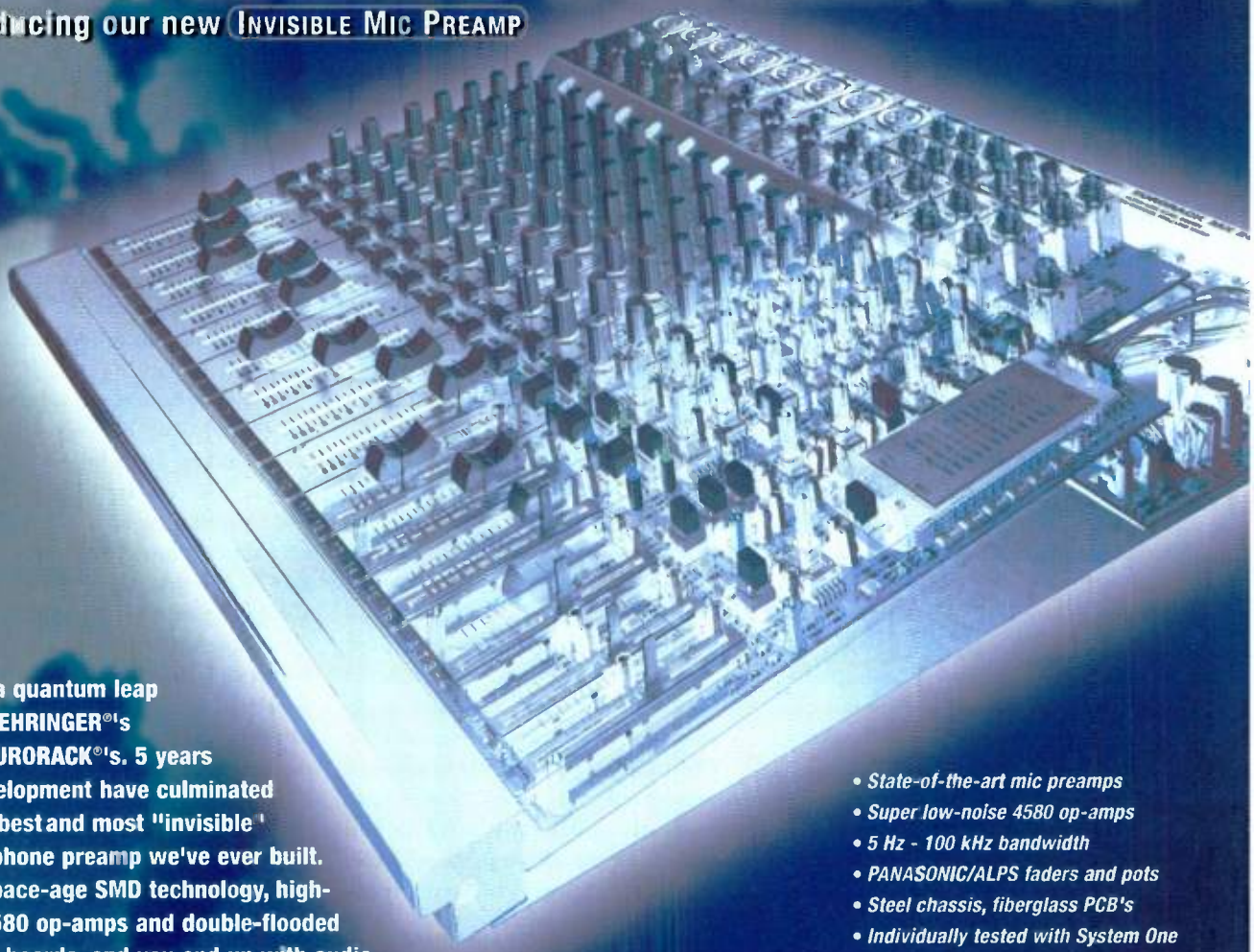

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## WAYWARD WALLOPS

One mark of a seasoned studio drummer is the ability to play backbeats and other groove-defining parts at consistent levels from hit to hit—a skill that can take years to hone. Not surprisingly, many young drummers have yet to develop that level of control. Hence another common mixing problem: how to deal with inconsistent drum and percussion hits.

In Kessie's view, there is a right way and a wrong way, depending on the capabilities of the engineer and the studio, and on how much time is available. "The right way," says Kessie, "is to replace the weak hits with samples of the strong ones. It's best to do this on a digital audio workstation, as all triggering devices will induce a delay. A delay may work on the snare, but a delayed kick will ruin a groove. The wrong way is to compress the hell out of the offending sound, because usually the amount of compression needed to compensate for a weak hit will overcompress the strong hits. Fader rides can sometimes do the trick, but the fact is that a softer hit turned up louder doesn't sound like a harder hit."

Needham is quick to point out that "sometimes the inconsistencies are what make it work." But in general, his approach jibes with Kessie's. "In a situation where one important hit was done correctly and musically right, but only once by the drummer, I would probably copy that hit and paste it where it's appropriate. It's nice for variety's sake to have more than one good hit, though.

"One thing I use a lot," he continues, "is Digidesign's *Sound Replacer.* Not only does it allow you to replace a sound completely, but you can also reinforce the original sound with layers of other sounds, for example to improve the attack, consistency, or tone of a drum hit. Of course, it can be used creatively, too—for example, I've used it to make a kick drum sound bigger in a chorus."

## DIFFICULT PHASE

Phase problems occur most often between stereo or multiple mic signals, but they can also happen between stereo effects, the direct and miked signals from a guitar amp, and even separately recorded tracks. Whatever their origin, unresolved phase problems can spoil an otherwise good mix.

The simplest phase fix is to use one channel rather than two. "If you have an acoustic guitar on two tracks and you can't fix the phase problem," says Lord-Alge, "choose whichever track sounds better by itself for the mix and just use that one."

As for correcting phase problems, there are a number of approaches. The first step is to figure out where the phasing lies. "You put the two channels up," says Needham, "and it's pretty easy to hear the phasing as you bring one of the faders up and down—the whole middle just drops out. Usually one of the channels is 180 degrees out, as on bass guitars where the DI is out 180 from the miked amp. But that's an easy fix—just flip the switch on the console."

"Phase problems often occur on live drums because of all the mics," says Kessie. "I'll start with the kick, add one track at a time, and flip the polarity of the new track until the sound is fattest. Sometimes I flip background vocals out of phase because they feel better that way. And sometimes I flip loops and drum-machine parts if it makes them sound better. Careful listening is the key."

But what about more subtle phasing, such as phasing between signals on a stereo-miked acoustic guitar, where a simple 180 flip doesn't fix the problem? "In that case," says Needham, "I may actually move one of the tracks in Pro Tools—that is, jog one slightly one way or the other in time until the two tracks line up. You can watch the waveforms or just listen until it's right. I usually do it by ear. I may use the waveforms to start with, but in the end what matters is how it sounds."

Lord-Alge suggests a similar fix that can be done without the luxury of waveform editing. "In a worst-case scenario, put a delay on the second channel and nudge it a few milliseconds until it feels right. A couple of milliseconds will usually fix it; the trick is to move it just enough to make it sound good while listening in mono."

Although the pros hold differing opinions about how important it is to mix specifically for mono compatibility—"The only place you find mono speakers these days is in old pickup trucks!" jokes Lord-Alge—they agree that it's wise to check the mix in mono from time to time. "I always check in mono before I print the final mix," says Needham, "as well as at various stages along the way."

Switching to mono may introduce another problem: disappearing stereo effects. As Needham explains, that happens because many stereo effects processors—especially inexpensive ones—create a stereo spread by flipping

**FIG. 2: The UREI 1176 limiting amplifier came in three styles: the original had a black face, the first revision a silver face with a blue stripe, and the second revision (shown here) a silver face. All remain favorites of many pro mixers for processing vocals, bass, and other instruments.**

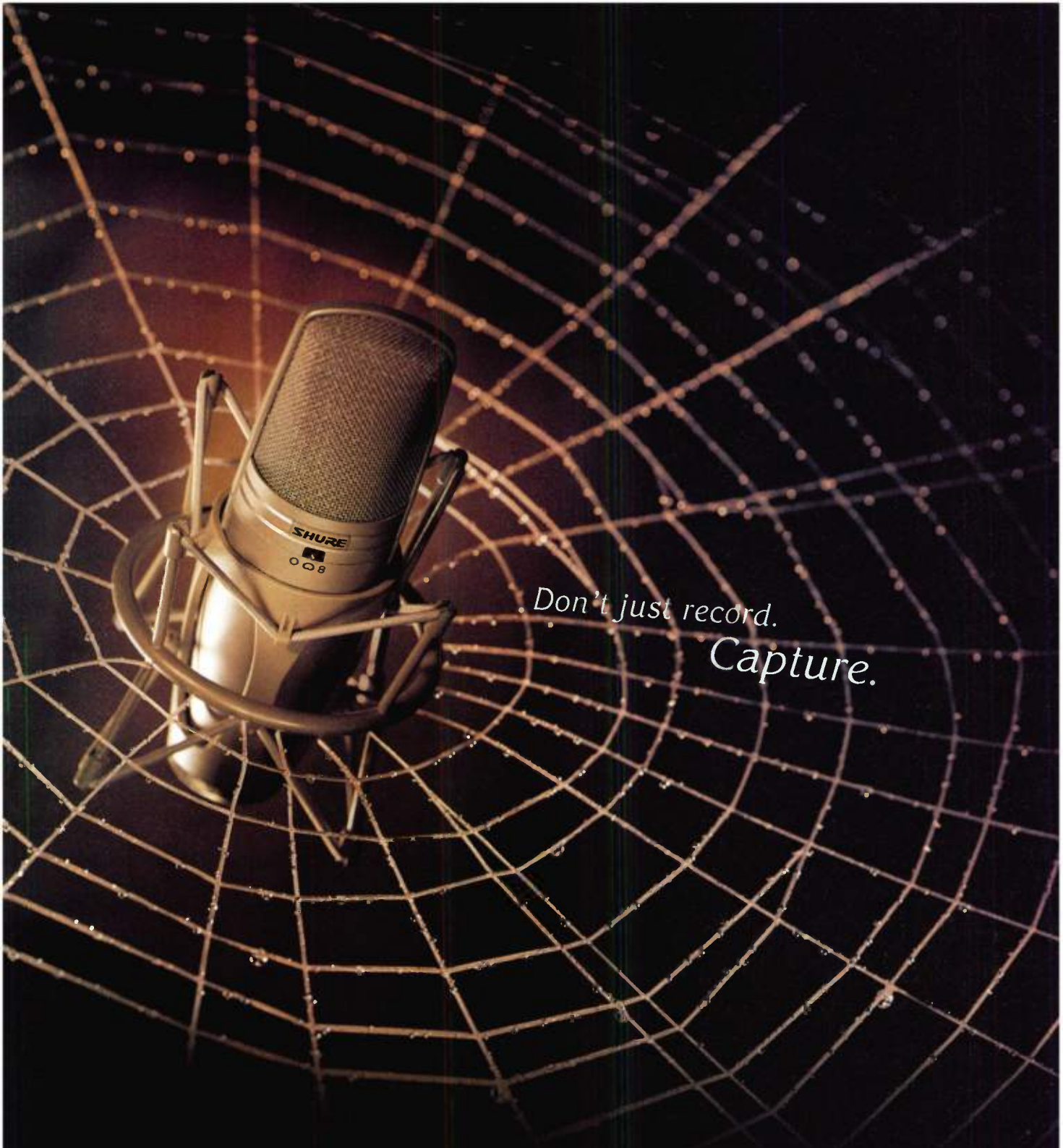


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**FIG. 3: The Empirical Labs Distressor is one of the more popular modern compressors among pro mixers, due both to its great sound and extreme versatility. Note the "Nuke" ratio setting.**

one side 180 degrees out of phase with the other. "One solution," says Needham, "is to use two separate but identical processors to create the stereo effect. For example, rather than using the left and right outputs from a Yamaha SPX90, use the left outputs from two SPX90s. That way the stereo image doesn't collapse when you go to mono. Of course, another solution is to use the effect in mono."

Kessie often uses two effects that seem to go "outside the speakers": a TC Electronic 2290 chorus patch and a 3D processor called Spatializer Pro. "These effects sound great in stereo, but they disappear in mono. I don't mind, though: when the mix is in mono, there's usually too much going on for one little speaker anyway. If the mix gets tighter and a little dryer, that's okay by me."

## ART OF NOISE

A crucial, albeit pedestrian, task for any mixer is making sure all tracks are free from extraneous noise such as unwanted breathing, chair creaks, guitar-strap noise, squeaking drum pedals, and so on. How do the pros clean their tracks? It varies.

Lord-Alge, who works primarily on an SSL console and a Sony PCM-3348 digital 48-track, says, "The first thing I do is make my own copy of the client's tape. Then I tidy up: I put the tracks where I want them to be and I go in and erase everything that's not supposed to be there. If I run into noises—clicks and pops or whatever—I'll either erase them or mute them."

"Automation is a lifesaver here," Kessie says, "and noise gates are another. If you don't have either of these, then clean the tracks on a digital audio workstation. But don't erase live drum tracks just because certain drums aren't being played—the sounds of adjacent drums resonating are part of the sound of the kit, so I like to keep those in there."

Needham says he can usually find any unwanted noise just by listening to the whole mix—but if he can't locate a particular noise, he'll solo everything all the way through until he finds it. He then uses mutes to block the unwanted noise, and he also mutes any instruments (except for drums) that aren't playing. "You don't want to hear someone tuning up a guitar or moving around or whatever."

As for extraneous breaths from an instrumentalist, they don't bother Needham much. "Usually you can just take out any breaths that are really annoying by riding with an automated fader. With drum sets, though, I've had to go back and use *Sound Replacer*—for example, on a track where a mic has fallen out of the clip and is sitting on the tom. On vocal stuff, I've gone back and taken good breaths from other parts of the tune and stuck them in where needed."

Another common noise problem is accidental distortion, whether from a mic, preamp, or digital recorder. "This can be almost impossible to get rid of," says Kessie. "It seems that no matter how hard you filter the sound or turn it down, you can still hear it. The best solution is to replace the offending note or phrase with a nondistorted one from another part of the song if possible. If the distortion is on a lead vocal, maybe one of the precomped tracks can be bounced in for a quick note or two. If that fails and you can't get rid of the distortion, try adding more by running the track through Line 6 *Amp Farm* or a SansAmp. That way, it will sound as if it's supposed to be distorted."

## POTS AND PANS

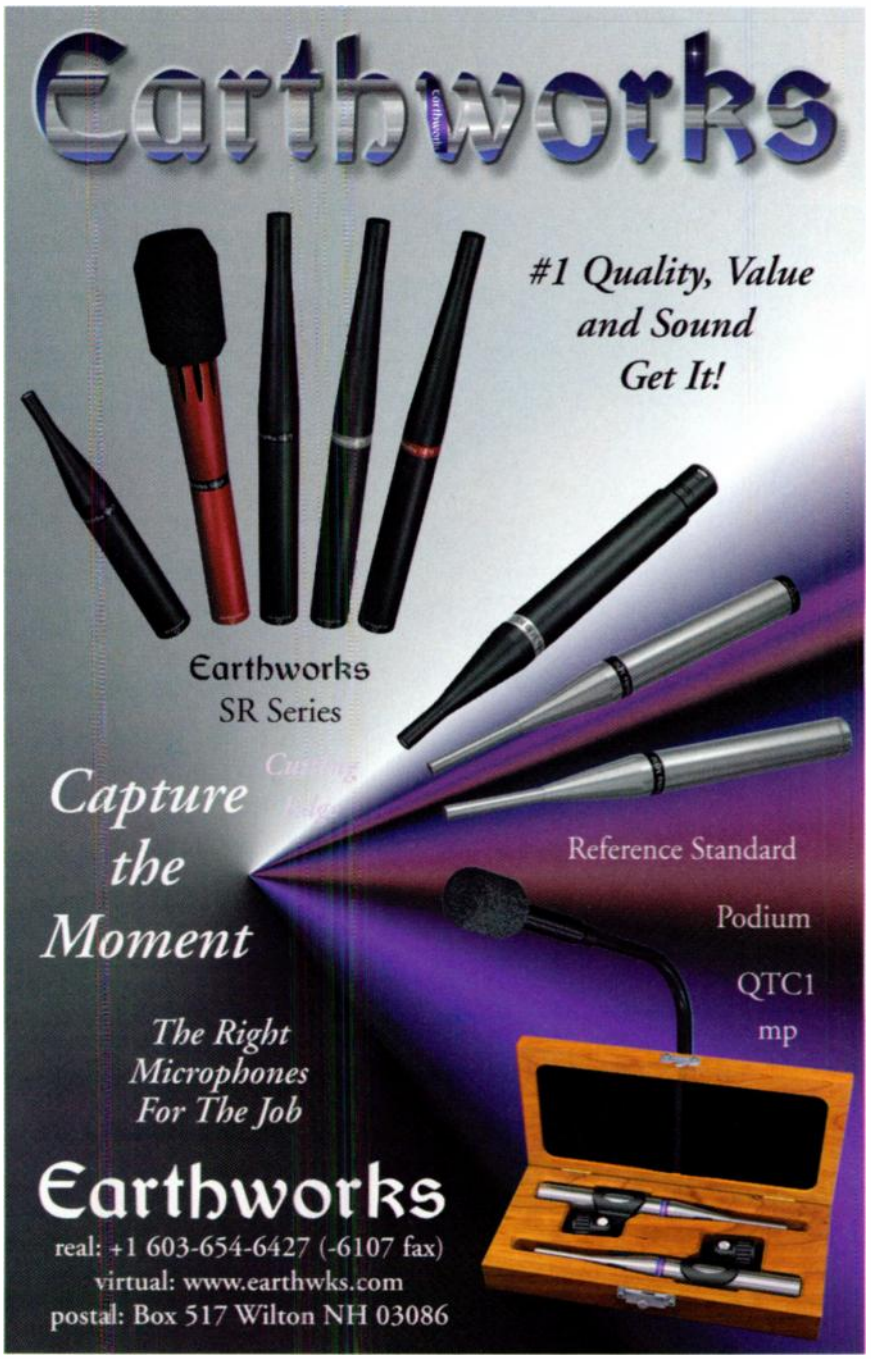
Poor panning is another common mix problem. "Sometimes you'll hear a mix with multiple guitar tracks, yet it sounds like one giant washy guitar," Needham says. "What I like is a wide stereo spread so the song sounds as open and big as possible. It says something that the best mastering engineers—Ted Jensen at Sterling, for example—really know how to widen the stereo spread."

Needham will do whatever it takes to make a mix more exciting, with little or no regard for what may seem natural. "In some cases I might try to keep the natural acoustic spread of the instruments," he explains, "especially if the whole band was recorded live in the studio with no baffles. But more often the reality of the recording has absolutely no bearing on the way I pan things in the mix. I might even pan an instrument to a different place during the chorus to make the mix more dramatic."

Lord-Alge espouses a pan philosophy similar to Needham's. "The trick," he says, "is to get interplay on the sides. I use three different pannings: left, right, and center. On occasion, if I'm really jammed with percussion or extra guitar parts, I'll use more of the spectrum. But generally, it's hard left, hard right, and center. Start with that and if it sounds too wide, bring in the reins. But start out as wide as you can go."

Multiple stereo tracks mean more panning options, but here Lord-Alge made an interesting point: "If you pan everything stereo—the guitars, the keyboards, the drums, the background vocals—the mix becomes super mono. Then you have to say, enough of this stereo crap—let's put some things left and others right so we can get some interplay."

Kessie takes a different view of panning: "To me, mixes with hard left and right pans can sound fake and disconnected. I probably run narrower



mixes than most guys because I like the way they feel. To me, a narrower mix just sounds more real and 'glued together.'"

## HERE, THERE, EVERYWHERE

A sure sign of an amateur mixing job is a final cut that sounds good on some speakers but awful on others. A professional mix, on the other hand, translates well no matter what it's played on.

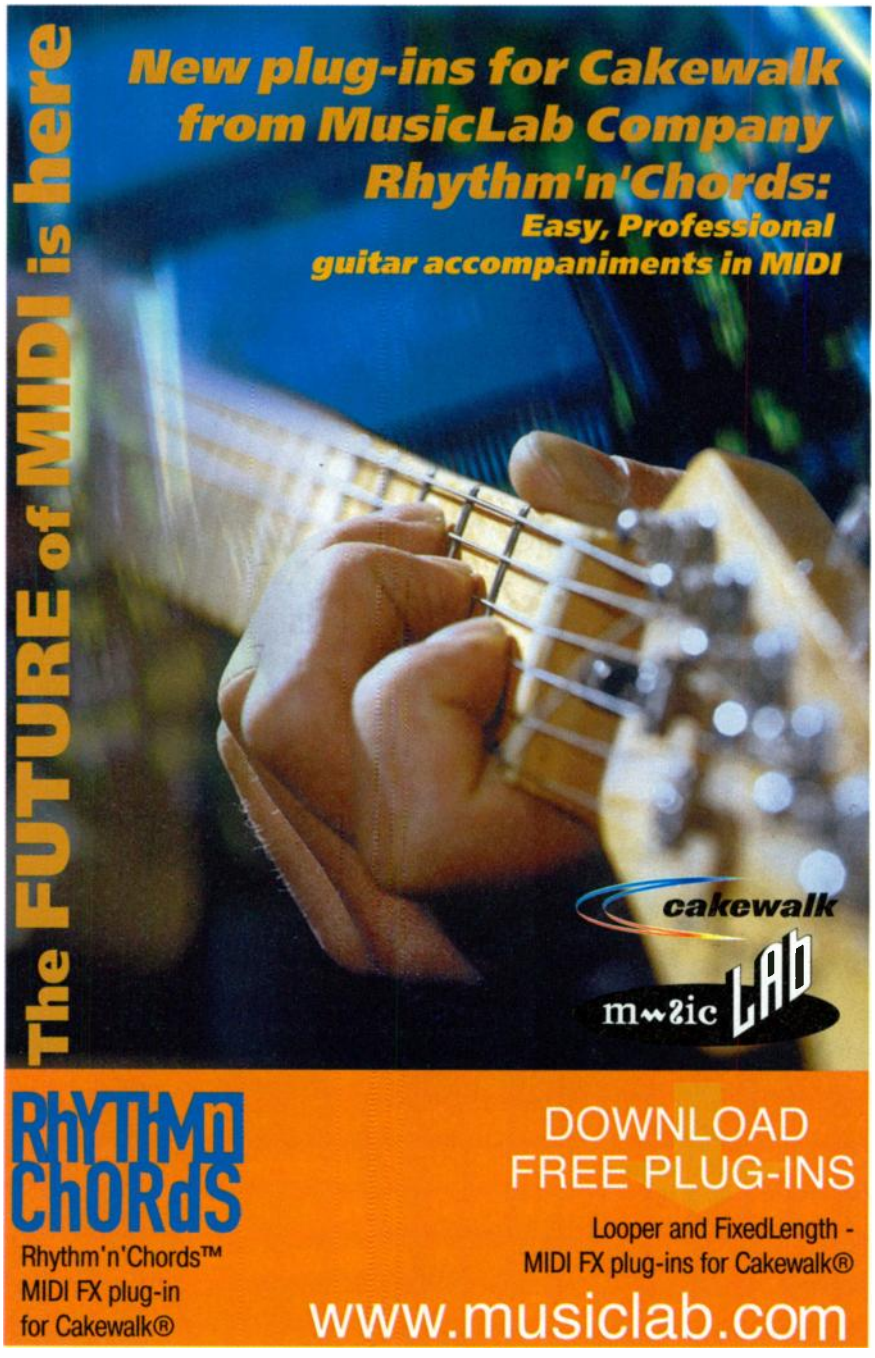
"The key," says Kessie, "is to use well-balanced monitors and to listen to your mix on as many different systems as possible. Cheap speakers, car systems, boom boxes, and headphones all provide information about which parts are too loud or are not cutting through. Listening at low volume is good, as is listening from the next room. Also recommended is taking ear breaks and playing some well-mixed CDs for reference. I would much rather work in a room with great monitors than a room with tons of outboard gear. You can always rent extra gear, but if the speaker/room combo isn't right, you will be back doing recalls or begging your mastering engineer for yet another miracle."

Lord-Alge points out the wisdom of considering the lowest common denominator among listeners. "Ninety-five percent of people listen to music in their cars or on a cheap home stereo. If your mix doesn't sound good on a pair of small speakers, what's the point? A pair of $10,000 powered monitors may sound pristine, but no one else has them, so you're more likely to have a translation problem. An engineer with a little practice who checks the mix on a whole bunch of small, crappy-sounding systems can find the middle ground where it sounds good on everything."

In addition to Yamaha NS-10s—the speakers he has mixed on for 25 years—Lord-Alge monitors on a small Sony boom box. "I have some big UREIs in the room, but I almost never turn them on. The fact is, 25 years on NS-10s haven't led me wrong yet. Of course, I use a subwoofer with them, and the sub is dialed in just right."

Needham, too, stresses the importance of using familiar speakers. "I travel a lot, so when I'm out of town, I always try to rent the same model of car—there are two or three that I know the systems in. I always have my own speakers with me for the studio, of course, but a lot of times I'm listening in the car."

Needham recently replaced the pair of Klark-Technic monitors he had been using for 15 years with a pair of JBL LSR28P powered monitors. "The LSRs are the first JBL product in years that I've been totally in love with. All the mixes I've done on them have translated great. I did my own comparison test of 15 or 20 different sets of speakers and for me the JBLs were the easiest to mix on."



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## ALL MIXED UP

Kessie's warns against missing the forest for the trees. "Some producers are unable to prioritize; to them, the correct ping of an 18-inch china cymbal is as important as the lead vocal. They will spend hours equalizing a tom, or endlessly altering the hi-hat level until it's 5:30 in the morning, and the lead-vocal fader hasn't even been opened yet. Don't be one of those people. Prioritize, and then spend your time on the important things. Not everything needs a lot of attention. Big-time mixers know this. They make the important stuff so strong, the little things take care of themselves."

In parting, Needham beat the drum for multiple prints. "Whenever you get to a place where one person thinks the mix is great and someone else doesn't, just print it to tape and move on. I've been in situations where after four hours the mix was sounding great and then five hours later it was like, 'Aw, man, this sucks!' But tape is cheap, so now, when I get to a point where I'm happy with the mix—that is, before I start deconstructing it and trying other things—I'll just print that version. That's also good to do because then you have something to go back and compare to. 'Damn, five hours ago we really had this nailed!' And if you have that version on tape, you're covered. You can pack up and go home."

Lord-Alge, who like Needham is legendary for turning out great mixes fast, puts the subject of gear into perspective. "How about getting the mix done as fast as you can? Use your instinct, find what makes the song work, and go after that. Don't dilly-dally. Make the song work quickly. What's not important is going through tons of compressors and EQs on every instrument until you feel you have the right ones. Just put your favorites in and use those. Make the song work first before saying, 'Oh, let me just try this goofy compressor on the background vocals and see if it adds something.' If you get creative before you even have the song together, by the time you have gone off on your tangent, you won't know what you are doing with the song.

"A lot of engineers think the mix is about the gear, but it's not—it's about your gut instinct. The gear is just there to help you. The most important thing is to make the song work for those who are going to buy it. Period. You're not the artist; it's not your song. If the artist is happy and the label is happy and people respond to the music, then you have done your job. Sitting around playing with your toys isn't going to help make the song a hit. The trick is to gradually incorporate the tools into the process."

*For associate editor* **Brian Knave,** *the mystery is how to find time to mix all the songs he has recorded. Special thanks to George Petersen and Steve Oppenheimer.*

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# ELECTRIC LADYLAND

BY BEAN WITH GINO ROBAIR

Artists who customize or build instruments to realize their singular artistic visions often make the most exciting music. Three female performers who take that route—Krystyna Bobrowski, Miya Masaoka, and Kaffe Matthews—make groundbreaking music that transcends gender and conventional musical expectations. Composer and instrument builder Bobrowski integrates a curious collection of organic materials with motors and contact mics for extraordinary performance-based installations. Composer and performer Masaoka blends computer-enhanced instruments, gestural language, and assorted living creatures to express a musicality that melds futuristic and ancient sensibilities. Sampling wizard Matthews works with found sounds in an immersive improvisational performance environment.

Each daring performer has a different approach to producing music that is as experiential as it is impossible to reproduce. They rely on the element of surprise, welcome the unexpected, embrace the unknown, and explore the relationship among sound, self, and the audience.

## KRYSTYNA BOBROWSKI

Years of liberal-arts studies formed a solid foundation for Krystyna Bobrowski's keen interest in physics and natural phenomena. Much of Bobrowski's work exploits the sounds that result from demonstrating basic scientific principles in unusual ways. Mundane actions and objects are also important elements in her pieces.

Many of Bobrowski's installations employ simple mechanical devices in novel ways, often using a computer for control or data processing. She especially enjoys working with motors and contact microphones in conjunction with natural materials. As if to prove the point, Bobrowski's work space is strewn with everything from electronic parts to large pieces of drying bull kelp.

### ROCK ON

Bobrowski came up with the idea for the piece *Rock On* during a residency at the Headlands Center for the Arts in Sausalito, California. "*Rock On* is a collection of six amplified and prepared rocking chairs," Bobrowski says. "The preparations include motion switches and electronics. The chairs rock on amplified surfaces, including newspaper, a car hood, nuts and bolts, and pools of water."

When she borrowed rockers for the piece, Bobrowski found that owners had stories to tell about their chairs. Those tales inspired her to create themes for each rocker. "Each chair includes a speaker that plays prerecorded material relating to the theme of the chair," she says.

The first chair features recordings of Bobrowski's grandmother reminiscing about the artist as a young child. In addition to recordings of her grandmother's voice, the chair was amplified by contact mics. Bobrowski created a program in the Hierarchical Music Specification Language (HMSL) to interpret the data initiated by the rocking motion. She used an Anatek Pocket Pedal to translate the voltages into MIDI data.

"As a person rocks back and forth in the chair, a mercury switch senses its

# ADVENTURES IN ELECTROACOUSTIC PERFORMANCE.

COURTESY KRYSTYNA BOBROWSKI

COURTESY MIYA MASAOKA

COURTESY KAFFE MATTHEWS

position," Bobrowski says. "The switch data is translated into a MIDI message, which is fed into the HMSL program on the Mac. That, in turn, triggers samples of my grandmother speaking while simultaneously fading the speaker volume up and down. There's a nice interaction between the voice and the chair. My grandmother has a very high voice with a thick accent, which blended really well with the squeaks of the chairs."

The "grandmother chair" is the most technically complex rocker of the group. "The other chairs are more simple in that the rocking motion merely raised and lowered the volume of a long loop as it played," Bobrowski says. "The loops have an inherent rhythm to them. When the rhythm of the rockers was superimposed as volume changes over the loops, interesting moiré patterns resulted."

She dedicated a different chair to her father. That chair rocks on amplified nuts and bolts while playing recordings of Bobrowski's father singing lullabies over the phone. Still another, the "news chair," plays sound bites from a talk-radio station while rocking on amplified newspaper. Not surprisingly, Bobrowski dedicated the chair to friends who obsessively listen to the news.

The "rap chair" rocks on an amplified car hood, which triggers rap beats as it creaks and thuds on the hood's uneven surface. Bobrowski immersed another rocker in a pool of amplified water, accompanied by an ocean soundtrack.

The smallest chair is a child's rocker, which sits on a speaker. Rocking the chair triggers loud squeaks that are pitch-shifted down until they sound like violins and cellos. "Although it was the smallest chair in the room, it was the loudest," Bobrowski says. "But you couldn't sit in it. You had to push it with your hand."

Bobrowski put on a performance version of *Rock On* called *Rock Her* at the Alternative Museum in New York City. For that incarnation, she choreographed a quartet of performers in prepared rocking chairs.

## RIGHT AS RAIN

Bobrowski feeds on the challenge of creating site-specific pieces, and she enjoys working in large sonorous spaces. The Chapel of the Chimes—a beautiful columbarium in Oakland, California, designed by architect Julia Morgan—is one such environment.

For *Playing Rain,* Bobrowski uses a dozen brass flower vases that are scattered throughout the columbarium. As visitors pour water through the vases, the liquid drips onto plates with piezo triggers strategically placed underneath to sense the droplets. The piezos are connected to a Roland PM16 pad-to-MIDI interface that sends input data to a Mac for triggering samples of gamelan instruments. "The first time I heard gamelan music, it reminded me of rain," Bobrowski says. "I used gamelan samples in this piece because of their chimelike quality, which seemed to fit the theme of the performance environment.

"The water droplets trigger samples with randomized pitches in a Javanese tuning system," Bobrowski says. "However, the rhythm of the samples is in sync with the drips. This gives control over the density of the sound to the visitors of the exhibit."

# ELECTRIC LADYLAND

FIG. 1: In Krystyna Bobrowski's piece *String Quartet:Music Box*, a motorized twig brushes over the strings of a quarter-size violin, as a viola (in the background) is played in a similar manner.

FIG. 2: Bobrowski plays the Gliss Glass. Rubber tubing interconnects the ensemble of six glasses so water flows freely throughout the system.

Bobrowski is also interested in the contrast between the way musicians and computers perform similar musical tasks. The performance version of *Playing Rain* pits performers against a computer as both attempt to synchronize with the drips.

The musicians play melodic gamelan instruments known as slentem, gender, and saron, in 5- and 7-note tunings called slendro and pelog, respectively. Bobrowski uses a Peavey DPM SP sampler as the computer's sound source. Because the gamelan instruments' bars are highly resonant, players must dampen a ringing note before striking a new one. The combined striking and damping action limits the speed at which performers can play wide intervallic leaps. At high speeds, the musicians tend to play in limited areas on their instruments and cannot hit octaves or achieve as wide a range of notes as easily as the computer can.

"The piece begins with the instrumentalists trying to sync with the drips," Bobrowski says. "As the piece progresses, the dripping frequency increases, and it gets too difficult for the musicians to keep up. The computer then attempts the same process, which results in a contrast in errors between the human performers and the computer. Both make mistakes but in different ways. For example, the computer often interprets a quick succession of drips as one drop. Also, the sounds are sometimes triggered by the computer so quickly that you end up with a series of drones—especially when the piece is played in a reverberant space."

## STRINGS AND THINGS

For her *String Quartet:Music Box*, Bobrowski created a prepared string quartet by playing a cello, viola, violin, and quarter-size violin with flexible materials attached to the shafts of small DC motors. The materials include leaves, grass, rubber bands, flexible plastic strips, and tape (see Fig. 1). Bobrowski connected a Variac variable autotransformer to the system to control the motors' speeds. "There are several motors per instrument," Bobrowski says. "By changing the voltage going to the motors with the Variac, participants can change the tempo of the piece."

In a variation on the instruments-played-with-motors theme, Bobrowski wrote a score in revolutions per minute for her piece *0002≥2000 RPMs*. In that piece, Bobrowski gives performers handheld motors with wooden dowels attached to the spinning shafts. Little flags of tape attached to the ends of the spinning dowels are used to play the instruments. Although performers control their own motors, the composer controls one section of the piece with a Variac. The instruments—acoustic and electric guitars, cello, and violin—survived the lashings unscathed.

## PLUMES AND FOLIAGE

As part of an installation called *Leaf Litter*, Bobrowski crafted "leaf speakers" by gluing piezos to a collection of leaves and using them as playback transducers. The sounds of people walking through leaves and children playing in leaves are played through the speakers, creating self-referential filters.

"When you play sounds through normal loudspeakers, you're usually looking for the purest representation of the

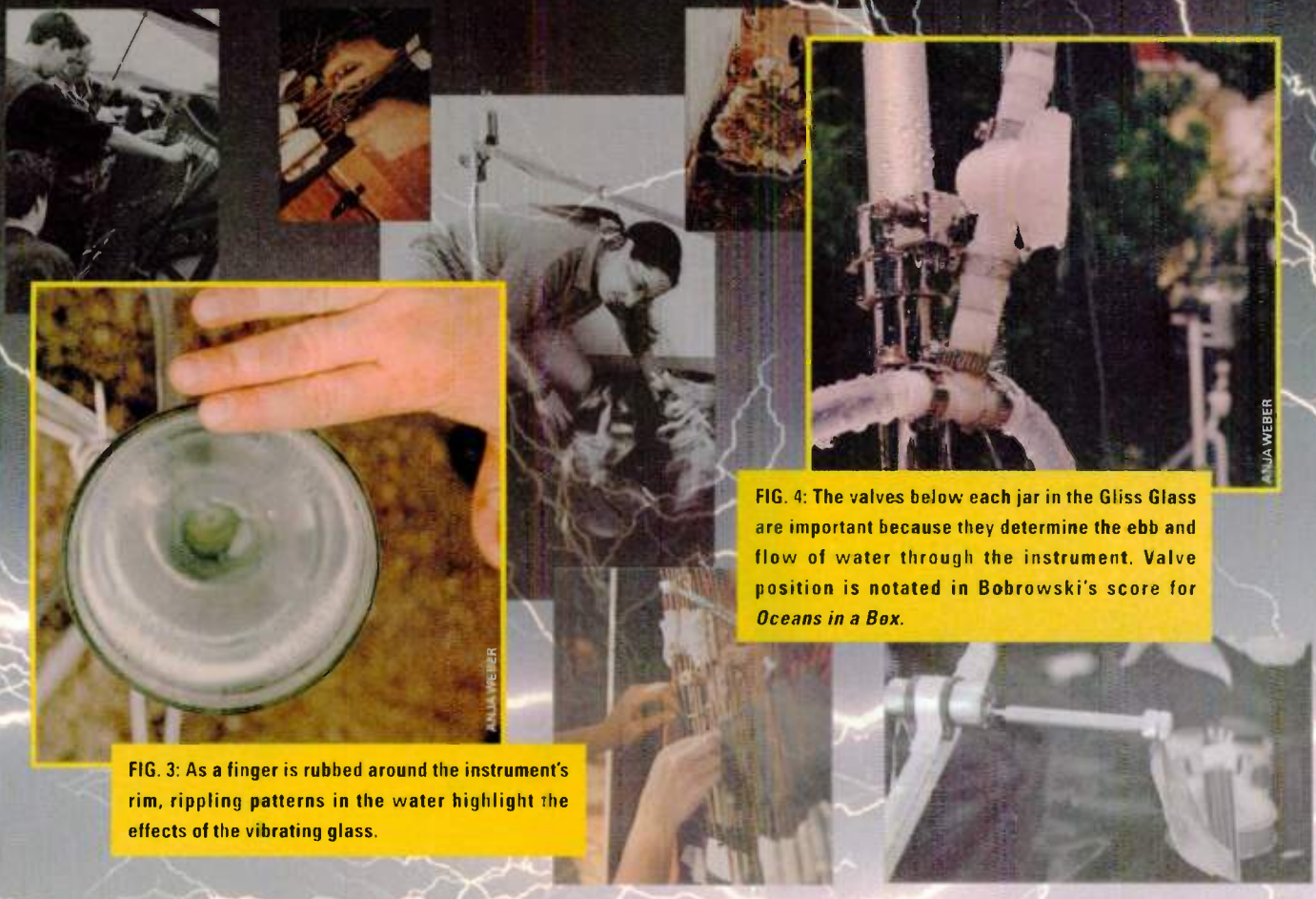


FIG. 3: As a finger is rubbed around the instrument's rim, rippling patterns in the water highlight the effects of the vibrating glass.

FIG. 4: The valves below each jar in the Gliss Glass are important because they determine the ebb and flow of water through the instrument. Valve position is notated in Bobrowski's score for *Oceans in a Box*.

original sound," Bobrowski says. "I wanted to take environmental sounds—in this case, sounds involving leaves—and see what happens if you play them through the material itself. I was interested in hearing the resonances and filtering effects that would result from playing leaf sounds through leaves."

## LIQUID AUDIO

Bobrowski's most recent work, *Oceans in a Box*, involves an acoustic instrument she devised called the Gliss Glass (see **Fig. 2**). *Gliss* is short for glissando and refers to the instrument's ability to create six simultaneous glissandi. The instrument uses six custom glass containers connected by plastic tubing and valves to a large water container. Each glass is open at the top, and the valves control water flow to each glass through a hole in the bottom.

Musicians can play the instruments in several ways, including rubbing a wet finger around the glass's rim, tapping and striking the glass, and splashing the water (see **Fig. 3**). Each player has an effect on the other glasses, depending on the glass's height and valve position.

"The Gliss Glass is based on a simple property in physics where a body of water tries to return to equilibrium due to atmospheric pressure," Bobrowski says. "By raising or lowering the glasses, the performers disrupt the equilibrium in the entire system. As the glasses are played, the audience hears rising and falling glissandi as water enters or leaves the glasses, respectively. The Gliss Glass gives you the sonic impression of this physical phenomenon.

"When I built the instrument, I was thinking of closed systems, such as our ecosystem or the body's circulatory system," she says. "There are a lot of analogies you can draw from this instrument based on hydraulic principles."

Bobrowski created *Oceans in a Box* for six female vocalists and the Gliss Glass. Each vocalist plays one glass, usually one that best matches her vocal range. The piece is a structured improvisation using graphic notation that indicates valve position (see **Fig. 4**), glass height, glass types, and vocal sounds to be used. In the score water flow is the basic time structure rather than metronome markings. The musical result is an exquisite blend of slippery harmonics and vocal and glass textures.

## MIYA MASAOKA

Miya Masaoka is a composer and improviser with training in both Japanese court music and contemporary music. She has collaborated with an impressive roster of musicians, including Pharaoh Sanders, Cecil Taylor, Ornette Coleman, Dr. L. Subramaniam, George Lewis, Toshiko Akiyoshi, Fred Frith, Steve Coleman, the Rova Saxophone Quartet, and the Bang on a Can All-Stars.

The main motivating factors behind Masaoka's work are sound exploration and its relationship to the audience. However, her desire to expand the traditional playing techniques of the koto, a zitherlike Japanese instrument, fueled the development of her electroacoustic invention, the Laser Koto (see **Fig. 5**).

"The Laser Koto combines the traditional Japanese koto, in this case a 21-stringed instrument, with a computer interface and controllers," Masaoka says. "I use several different controllers—pedals, sensors, and lasers—and have a library of more than 450 samples of

# ELECTRIC LADYLAND

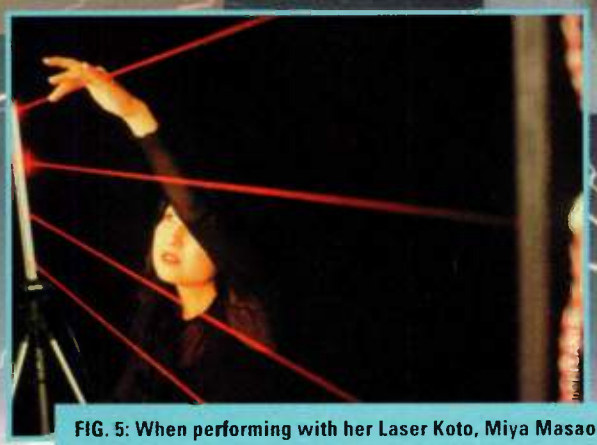

FIG. 5: When performing with her Laser Koto, Miya Masaoka cleverly mixes the direct sound of the koto with her samples of the instrument (triggered by the lasers) into a rich, musical pastiche.

FIG. 6: Masaoka uses the video *Adventures of the Solitary Bee* in *Bee Piece #6*. The multichannel playback system surrounding the audience evokes a sense of being in the hive.

koto-related sounds. The challenge is to have immediate access to this tremendous number of samples in a musical way during a performance."

## EXTENDED BODY LANGUAGE

As an artist-in-residence at the Studio for Electro-Instrumental Music (STEIM) in the early '90s, Masaoka worked with Tom DeMeyer to develop a computer interface for her instrument. Their collaboration began with a system that included ultrasound rings, an ultrasound receiver, pickups, pedals, and switches. "The rings are worn on one finger on each hand, and each ring has three sensors for capturing gestures in two-dimensional space," Masaoka says. "This information is fed to samplers and sound modules through STEIM's SensorLab voltage-to-MIDI converter." (For more information about the SensorLab, see "The Outer Limits" in the August 2000 issue of **EM**.)

Masaoka began using this performance setup to trigger sounds and control feedback. Through trial and error, she and DeMeyer found that some ideas that worked well in STEIM's studio did not work as well on stage and vice versa. "Sometimes too many samples or processes would get triggered when I moved my hands," she says, "so we were always fine-tuning the system. For example, in a 6-foot range of the instrument, you could trigger dozens of samples or six samples, as well as have different degrees of effects."

Returning to STEIM with a laser harp designed by Donald Swearingen and built by Oliver DiCicco, Masaoka continued to develop performance techniques while she explored ways to map performance gestures in an electronic environment. Swearingen's laser design uses a grid of sensors mounted on a pair of camera tripods that flank Masaoka's koto. In performance, she uses a can of Fantasy FX smoke spray to highlight the laser beams and to reveal the virtual instrument to the audience.

Along with her SensorLab voltage-to-MIDI converter, Masaoka uses a combination of STEIM's *Spider* and Cycling '74's *Max* software. An audio feed of the music created live is routed into *Max*, where her samples archive is organized by timbre and pitch. While she plays, Masaoka mixes and matches her phrasing on the acoustic instrument with the phrasing in the samples. Because of Masaoka's fine use of extended techniques and her subtle control of the balance between the electronic and acoustic sounds, it is often difficult for the listener to discern the real koto from the virtual one. That is the exact effect Masaoka strives for.

"Having such a huge range of sounds available—and to be able to work with the computer in this way—is very exciting," Masaoka says. "The Laser Koto expands people's awareness of the koto as an instrument. The physicality required to play the instrument is something I've always emphasized; whether I'm bowing or scraping the instrument, it's a very physical act. The Laser Koto is an extension of this, meshed with the Mac G3 PowerBook."

Masaoka believes that the relationship between acoustic and electronic music is closer than most people think. To extend her instrument's timbral

FIG. 7: For Masaoka's piece *Ritual*, Madagascar hissing cockroaches crawl around on the artist's body and initiate sounds as they interrupt infrared beams.

range, Masaoka often prepares the koto by weaving objects between the strings. For example, she emulates synthesized sounds by bowing a small cymbal stuck between the strings.

As a result of her years playing Laser Koto, Masaoka has created a gestural and timbral language all her own. She plucks, strums, scratches, and bows the koto acoustically while waving her hands through the laser beams to layer an additional 12 koto-derived sounds.

Complementing Masaoka's fully loaded PowerBook is a DigiTech TSR 24S connected to a MIDIWizard RFX Foot Pedal, which she uses for changing patches. At home she relies on a Mac G4 with Digidesign's *Pro Tools* and BIAS's *Peak* for recording, sampling, and editing.

Currently Masaoka is collaborating on new developments for the Laser Koto with Matt Wright from the Center for New Music and Audio Technologies at the University of California, Berkeley. "The ongoing development of the instrument has been with the help of Matt—right down to the core of the whole system, including how the pedals, samples, and controllers work together," Masaoka says.

## HOW DOTH THE BUSY BEE

Drawing on her interest in the relationship between nature and technology, Masaoka has created works utilizing ensembles of insects. Her *Bee Projects* series explores the social order and sonic behavior of bees.

In *Bee Project #1*, Masaoka combines violin, percussion, and bowed koto with an amplified beehive onstage. The piece sets up an interplay between the musicians and bees that highlights the slowly developing rhythmic patterns created by the droning hive. During the premiere performance, the drones were punctuated by the occasional solo statement of a stray bee near a microphone.

Masaoka also fashions pieces that use the human body as a canvas on which she builds dramatic soundscapes and confronts the audience with issues of gender, sexuality, and ethnicity. One such piece, *Bee Piece #6*, was a collaboration with Joe Anderson, a specialist in sound spatialization. For that piece, Anderson's SoundField ST250 4-capsule microphone is cautiously lowered into a beehive while videos of bees navigating Masaoka's body are shown (see **Fig. 6**). Anderson's careful placement of speakers throughout the venue lets the audience share the experience of being inside the hive.

In her work *Ritual*, Masaoka reclines amid an array of motion sensors from Radio Shack, covered by an invited gathering of giant wingless Madagascar hissing cockroaches (see **Fig. 7**). As the cockroaches crawl over Masaoka's nude form, they interrupt the sensor beams and trigger samples of cockroaches hissing, creating a random soundscape.

Masaoka relies on the human body for the material in *Naked Sounds*. "In *Naked Sounds*, I'm treating the body as a potential orchestral source," she says. "Using medical equipment, I chart and interpret brainwaves, heartbeats, and the sound of the blood coursing through the veins. The brainwaves are output as a musical score that can be realized using Cycling '74's *Max* and *MSP* or performed by musicians. The

# ELECTRIC LADYLAND

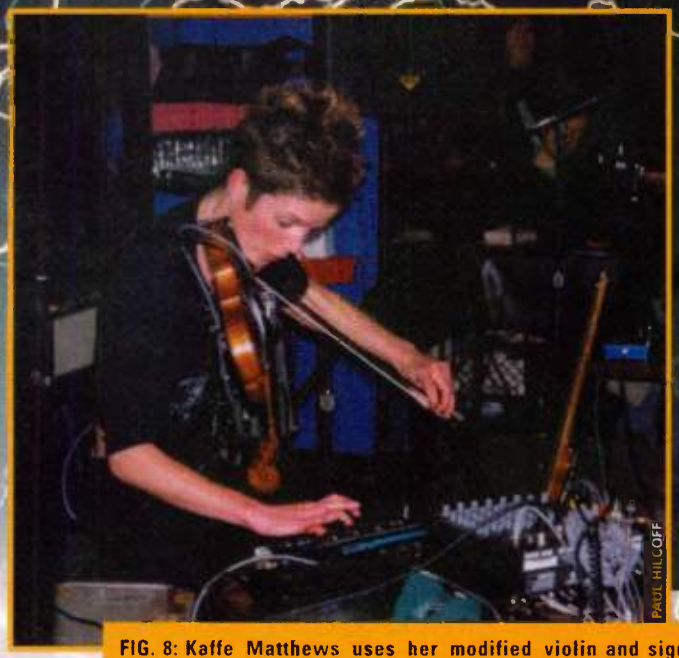

FIG. 8: Kaffe Matthews uses her modified violin and signal processing rig during a 1997 solo performance at the Green Street Grill in Cambridge, Massachusetts.

subject's brain activity can also be translated into MIDI data. The interface I'm using for this piece is the Interactive Brainwave Visual Analyzer from IBVA Technologies." (For more information about IBVA Technologies, see "The Outer Limits" in the August 2000 issue of EM.)

"I think of the skin as a barrier between the internal and the external world," Masaoka says. "The sounds from the body reveal what is hidden, what is undiscovered. These sounds are always there within us but are so mundane and functional that we ignore them. *Naked Sounds* reminds us of what lies within."

## KAFFE MATTHEWS

Kaffe Matthews describes herself as a "live converter." Although she electronically processes sound events in real time, every aspect of her performance is improvised, and her spontaneous reactions to the surrounding environment define each performance. That approach highlights an event's temporal nature as she samples, resamples, alters, and regenerates found sounds with her live-sampling setup.

"By working with sound generated at the performance or in another space at the same time as the performance, you're bringing in another place with all its dimensions and history," Matthews says. "It doesn't just expand the sonic palette. It also means that the musician is actively using place and event as material for real-time perversion."

An impromptu trip to study drumming in West Africa laid the foundation for Matthews's complete immersion in electronic music. The journey came at a time when she was open to deep listening and could sense the effect of small changes on a complex sound's tonal characteristics.

## AUDIO HARVEST

Matthews's exploration of musical color and texture developed during an intensive phase of performing solo improvisations. She wanted to develop new ways to play the violin while introducing sounds outside the instrument's traditional realm (see Fig. 8). However, the more she performed in public, the more she found inspiration in the unforeseen nuances of each location. A courtyard's ambience, bar noise, even sounds from the band downstairs became source material to be layered into the emerging sonic fabric (see Fig. 9).

Matthews revels in the experience of creating something fresh and unexpected every time she plays. She occasionally works with prerecorded material but only if the sounds are extraordinary, such as the kite-flying samples she created during a recent trip to the Scottish Isles.

Matthews arrives to performance venues early to assess their layouts. Before a show begins, she places lavaliere and PZM microphones around the venue to capture diverse sound material. Then Matthews pulls out the gaffer's tape and judiciously embeds the microphones within the environment. Often the best material comes from close-miking a sound that changes regularly, such as a fan, water faucet, or beer tap. Matthews usually designates another mic for ambience and might strategically hide it beside unsuspecting diners, patrons at the bar, or near another club's sound system. The artist

FIG. 9: Performing within the safe confines of a tent, Matthews busily samples and reconstitutes sounds from the surrounding environment in real time.

FIG. 10: Matthews performs at San Francisco's Aquarius Records in May 2000. The portability of her live-sampling setup lets her work in just about any environment with an electrical power source.

reserves the third microphone for a prime location within the performance space so she can resample herself as she plays.

## DISCOVERING LISA

Like Masaoka, Matthews has been an artist-in-residence at STEIM. With STEIM's Jorgen Brinkman, Matthews retrofitted her violin with a pad of six controls that serve as remote-to-MIDI switches for her Peavey PC-1600x MIDI controller. Despite the upgrade, Matthews prefers to concentrate solely on using microphones and live sampling and has temporarily suspended using violin in her solo performances (see **Fig. 10**).

Matthews is one of the few musicians actively using STEIM's proprietary live-sampling software, *LiSa*. Matthews says the software is intuitive and works well for sampling, processing, and playing material in an interactive performance situation. She creates performance templates that let her make spontaneous music—without spending endless hours programming.

Matthews takes full advantage of *LiSa*'s ability to control sampling and processing using MIDI data from external controllers, such as a keyboard, faders, pedals, or strings. For example, Matthews uses the PC-1600x to send sampling commands and to play samples. She employs foot pedals to send continuous controller messages or to determine a loop's starting point or length. *LiSa* also lets Matthews immediately access and play the samples in a variety of layered combinations. The sonic results range from fuzzy, chopped, and twisted to eerie and ethereal.

Matthews runs *LiSa* on a Mac G3 PowerBook; she also uses a Behringer 8-channel mixer and a Boss SE50 FX unit, in addition to the PC-1600x. She occasionally augments that setup with ultrasonic tracking sensors for converting movement into MIDI data. This allows a dancer or audience member to use his or her body to produce sounds, whether deliberately or unintentionally. Although Matthews has collaborated with a number of choreographers, she generally prefers to use unwitting participants as primary contributors to an event.

## STAY TUNED

What do these these three artists have in common? They possess large doses of imagination, motivation, and determination that keep them creatively vibrant and make them exemplary sources of inspiration for anyone creating electroacoustic music.

Through self-reflection, research, and good old-fashioned hard work, Bobrowski, Masaoka, and Matthews have developed highly individual approaches to music making that transcend technology. Whether it's transforming physical phenomena into sound, extending a classic instrument's vocabulary, or using the environment as source material during an improvisation, the restless energy these artists exude will keep them at the forefront of creative music for years to come.

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*A visiting scholar at Carnegie-Mellon University,* **Bean** *is tearing up the school's Entertainment Technology Center while teasing new ideas for collaborative music-making schemes from the students.* **Gino Robair** *is an associate editor at* **EM**.

Illustration by Charles Bell

# Heard It on the Web: Internet Music Distribution

## Put your music online for the world to hear.

By Robert Powell with Alex Artaud

Most musicians are well aware that the Internet is spurring major changes in the music industry. Today digital download and streaming technologies offer musicians ways to distribute and promote their music to an international audience at minimal cost. Besides encouraging greater diversity, these technologies can contribute to a richer and more direct relationship between the artist and the fan. As a musician and producer, and as someone who has been working in the Internet music scene for a couple of years, I take a great interest in these developments. I'm also alternately awed by the potential and put off by the hype that seem to be endemic to this evolving industry. In the time I researched and wrote this article, a number of events occurred in the industry. Big fish swallowed little fish, and numerous companies folded in the wake of dwindling capital and unrealistic financial expectations. The first wave of Internet excitement crested and crashed, and the companies that emerged intact can provide us with a picture of the industry to come.

Cyberspace offers plenty of opportunities for promoting and selling your music. I couldn't possibly cover all the Internet music distributors working today, so I set up some general categories to examine. Various companies' offerings overlap a great deal; the more informed you are about what's available, the more skillfully you can choose what combination of approaches best suits you.

## PEER-TO-PEER SITES

Peer-to-peer software lets you bypass central servers and connect directly to other users for trading MP3 and other types of files. The software directs you to the users' hard drives that have the desired music files. Peer-to-peer technologies have generated much controversy; the recording industry, including many musicians and songwriters, has tried to stop companies such as Napster, Inc. (www.napster.com) because the users often trade copyrighted material (see **Fig. 1**).

In 2000 Napster ended up in a nasty court battle with the recording industry. A stunning development in the fall caught the big labels and the rest of the industry off guard. Napster agreed to license its technology to recording industry giant Bertelsmann (BMG), with the intention of developing a commercial version of Napster. Maybe this development follows the adage "Keep your friends close, but keep your enemies even closer." Or maybe it follows the report that CD sales have actually increased since Napster began operating. Either way BMG is poised to use Napster's technology and, more important, its user database for empire building. The other major labels have been relatively quiet since this agreement was reached. Perhaps they are trying to develop peer-to-peer business models too. (For more details, check out Larry Powers's coverage of the ongoing saga at www.newmediamusic.com.)

Most peer-to-peer programs, such as *Gnutella*, are essentially shareware that isn't associated with any centralized entity that can be challenged in court. So no matter what companies such as Napster do, the bottom line is that fast, free music-file-trading technologies are here to stay.

**FIG. 2: MP3.com has helped make MP3 a household word and provides extensive services for artists and fans.**

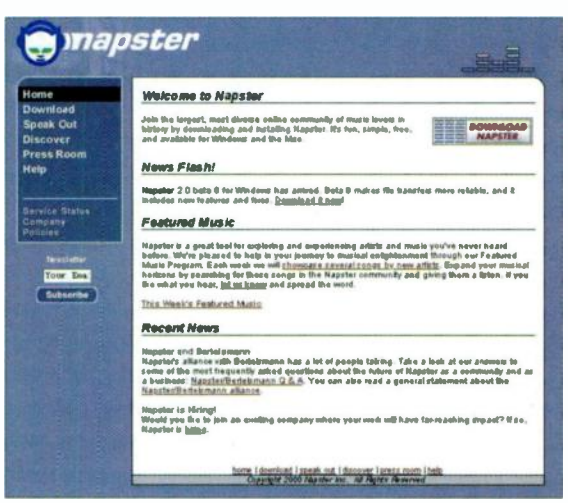


**FIG. 1: Napster was responsible for unleashing a file-trading frenzy and a highly publicized legal battle. Its partnership with BMG will be closely watched and perhaps emulated by other companies.**

As a recording artist, you can attempt to protect your material from rampant trading by using a secure delivery format such as Liquid Audio's. But getting your music traded over the Internet is nearly impossible—especially if it's good. If you take the view that any exposure is good exposure, you can choose to become involved in circulating your MP3 files in peer-to-peer communities. If you are not signed to a record label or if you own the copyright to your work, peer-to-peer trading may help you. (If you are signed but your agreement provides some flexibility, peer-to-peer may be an option for you as well.) At the very least, you'll be able to redirect users to your own Web site or your choice of retail site by putting a brief audio tag at the end of your songs, letting listeners know how to find you, how to get more music, and maybe how to purchase your CD. Some musicians who have embraced Napster, such as Dave Mason and Donna Delory, have been rewarded with tens of thousands of visits to their Web sites.

Years ago the Grateful Dead realized that giving away music paid off. The band let fans tape live shows and trade its music freely. That circulation of Grateful Dead music created a culture of devoted fans and ultimately allowed the band to earn substantial revenue from touring and merchandising. Many artists don't make the bulk of their income from CD sales but rather through live performances, broadcast residuals, and merchandise.

The MP3 format and peer-to-peer technologies are part of a transitional phase and are an indication of new possibilities for approaches beneficial to artists and music fans alike. Those approaches take advantage of the convenience and ease of quickly locating and downloading songs on the Internet as well as the ability to purchase single songs at a lower price than the traditional $15 to $18 for a CD that might only contain one good song.

## FAN COMMUNITY SITES

Many sites create online fan communities or music communities that focus on individual artists, music styles, music in general, lifestyles, or the site itself.

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Most of the sites in this article share at least some of those characteristics. Companies such as Artist One.com; ARTISTdirect, Inc. (www.artistdirect.com); and ArtistEnt.com offer chat rooms and online forums dedicated to specific artists, so that fans can interact and trade with each other.

Pearl Jam released an online album of shows from its summer 2000 tour and has encouraged fans to collect and trade the recordings. This activity is essentially an update of what the Grateful Dead did, and it's what those fan community sites are focused on: creating "digital Deadheads" for bands and artists.

## UPLOAD SITES

Some of the more prominent music upload sites are MP3.com, Internet Underground Music Archive (IUMA), and Riffage (which recently ceased operation). Those sites generally offer free membership, have nonexclusive agreements, and let virtually anyone upload music and make it available to others for previewing or downloading. They also sell CDs. Users get a page on which they can post songs, biographical information, press reviews, and performance schedules. In most cases, musicians can change and update their pages themselves, and they can link to a more central home page. To maximize traffic and sales, some Web sites offer music from, or partner with sites dedicated to, established artists.

**FIG. 4: EMusic.com takes a rather traditional approach, signing artists to exclusive deals for sales and distribution. It also provides music to users on a subscription basis.**

MP3.com (see **Fig. 2**), the best-known upload site, made its debut in 1996 and continues to be a major player in the Internet music industry. Originally a site where virtually any unsigned musician or band could post songs for free download, MP3.com has expanded and now offers new ways for musicians to gain exposure and earn money. It also offers downloads for sale on custom CDs at brick-and-mortar retail stores through its partnership with Outernet, Inc. One important development is that MP3.com—since settling a suit with major record labels (and in the face of new lawsuits from independent labels) for unauthorized use of content—now charges users for some services. Many sites besides MP3.com sell downloads, but not every site makes such sales a major part of its business model—downloads are actually only a small source of income in the industry at this point. That's because it is still a relatively new approach; it is only available to those with computer access; and free downloads are already so prevalent.

**FIG. 3: Liquid Audio has a reputation for providing some of the best audio quality on the Internet.**

Established in 1994, IUMA (www.iuma.com) was one of the first organizations to explore and develop Internet music delivery. As the company profile says, "IUMA.com is the one place to post your music where actual musicians are watching out for you—not weasels watching the numbers." IUMA has retained its emphasis on helping unsigned bands and is associated with partners such as EMusic.com, which focuses on independent labels and established artists. How this association will play out remains to be seen.

Riffage was established in June 1999 and lasted 18 months before folding. Prior to succumbing to a volatile market, Riffage specialized in distributing tracks by unsigned artists. The company utilized visitors' feedback to develop artist and song recommendations. Artists could also check out daily updates about sales, rankings, and customer lists.

In 1999 Riffage purchased the Great American Music Hall, a venerable San Francisco nightclub. The purchase was aimed at expanding the Riffage Live Webcasting division, which broadcasted performances by new groups and established acts and presented Webcasts from other venues and musical events across the globe. When the company went out of business, the nightclub went up for sale. Riffage provides an illustration of one business model that left its company struggling to stay afloat. You will see variations on one company's approach in many other

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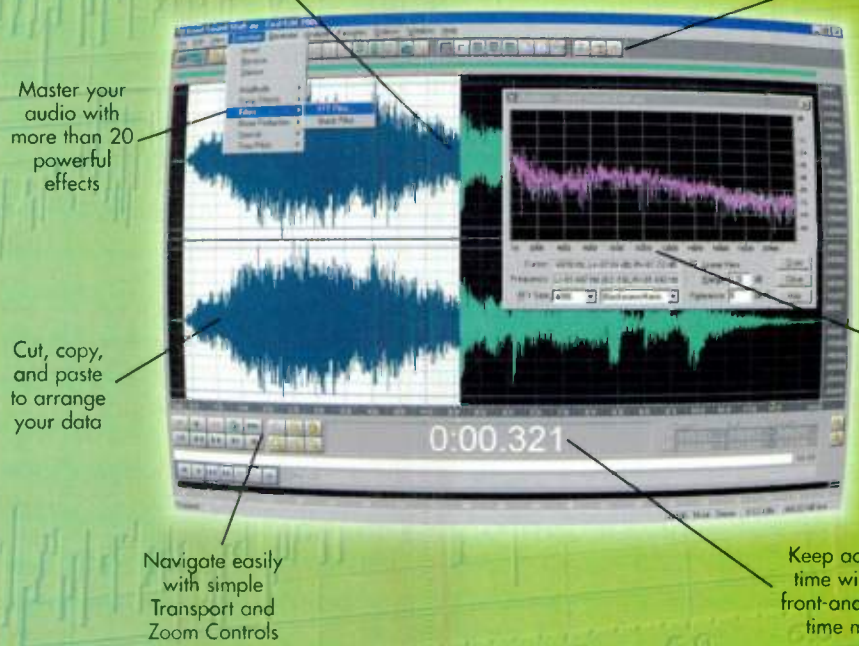


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Internet music distributors. It is quite important to be aware that the company you choose to work with may fold. As I wrote this article, music companies AtomicPop.com and Spinrecords.com fell by the wayside, too.

## ONLINE LABELS AND A&R

*Online label* can be used to describe sites that invest in producing, promoting, and distributing music in varying degrees. Most of those companies incorporate characteristics of both traditional retail outlets and online businesses. Their online advertising mainly tends to promote Web sites as a whole as opposed to promoting individual artists.

Besides being an Internet music site, Liquid Audio (www.liquidaudio.com; see **Fig. 3**) functions as an online label by promoting software that lets musicians, record labels, and music retailers deliver music through the Internet. The company provides comprehensive e-commerce logistics services, including digital-rights management. Artists can go to the site, register, download the free encoder, and then upload their music to the Liquid Audio transaction engine. Liquid Audio also offers one of the best-sounding compression formats available.

EMusic.com (see **Fig. 4**) claims to have the Internet's largest catalog of downloadable MP3 files for purchase. Individual tracks sell for as little as $0.99; entire downloadable albums cost $8.99. The site also offers EMusic Unlimited, a subscription service that lets users download as much music as they want for as little as $9.99 a month. EMusic.com selects artists in the same way a traditional record label would; you can't just upload your tracks as you can on MP3.com. EMusic.com works on an "exclusive" model, which means the company becomes your label for the material that you sign with it, and you're not necessarily free to post that material on other sites. EMusic.com also operates a group of music-oriented Web sites, including RollingStone.com, DownBeat.com, and IUMA.com.

For online A&R in its most basic state, check out DreamWorks Digital (www.dreamworksdigital.com), a division of DreamWorks Records. (For more about A&R, see "Working Musician: A&R Primer" in the June 2000 issue of **EM**.)

Artists can upload one song submission every three months. DreamWorks Digital plans to showcase selected submissions in the future. The company suggests you carefully read its submission agreement's "exclusive" aspects.

Artists Without A Label (AWAL; www.awal.com) falls into the A&R category as well. The company provides an outlet and services for emerging artists, most of whom are on small independent labels (see **Fig. 5**). Artists who get the most response from users in terms of downloads and online CD sales can then have their music distributed offline internationally through AWAL's arrangements with traditional retail outlets.

Garageband.com and Farmclub.com combine various qualities of online labels and online A&R. Garageband.com was cofounded by former Talking Heads keyboardist Jerry Harrison and boasts big-name, established producers on its board and staff, including producer George Martin of Beatles fame. Bands upload their songs to the site, and users can download, review, and rate the music. Every couple of months the winning band gets a $250,000 recording contract and teams up with an established album producer. Garageband.com produces and distributes the CDs.

Farmclub.com lets unsigned artists upload their music onto the site, where fans can listen to and download the music free of charge. Site users can also download music from some established artists. Users can vote for their favorite acts, and the most popular receives an invitation to appear on *Farmclub.com*, a one-hour television show that presents the new acts along with better-known musicians. The A&R staff at the Farmclub.com record label chooses bands to sign and develops and promotes their music through the Universal Music Group. Jimmy Iovine, a producer and record company executive, and Doug Morris, chairman and CEO of Universal Music Group, created Farmclub.com.

## YOUR OWN SITE

Whether you put it up yourself, hire someone to create it, have a friend develop it, or make your online home within an established company's domain, it's important to have your own Web site where users can find out more about you. If the Internet levels the playing field, then the challenge to any online musician is finding a way to be seen and heard among the many artists vying for attention. Moreover, once your potential fans find you, you must

**FIG. 5: Artists Without a Label (AWAL) provides services for emerging artists and has weathered the shifting winds of the Internet economy.**

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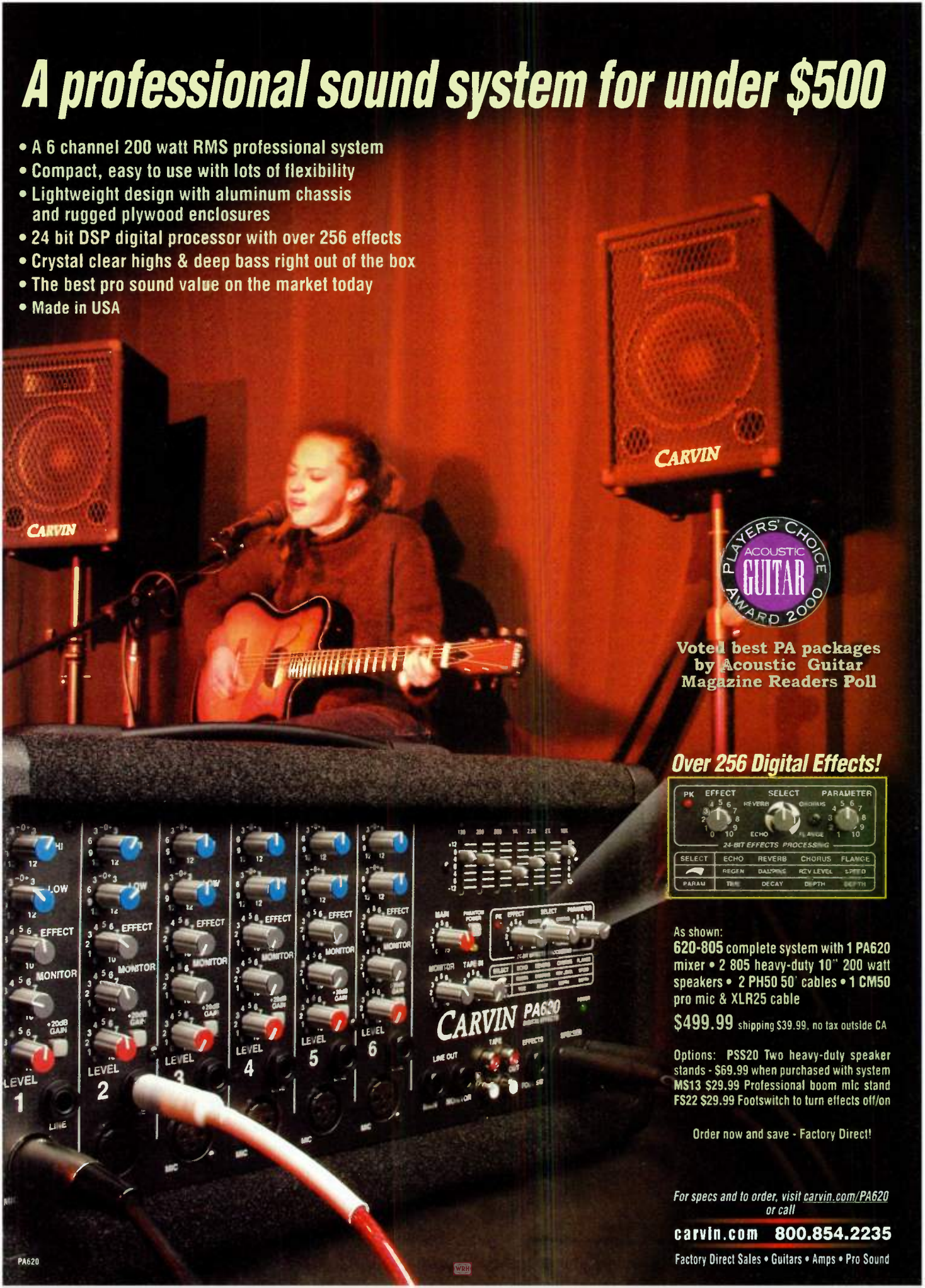


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keep them interested and returning to your site. Cultivating the relationship between artist and fan is an essential element of success.

Once you have a Web site and you start getting some visits, update your site as often as possible. Notify your fans of new shows, new content, and so on. Promote your URL at all of your performances and interviews. Above all, continue making music and posting it regularly. Take chances. Post works in progress for preview and get vulnerable with your fans. Let them know why you wrote the song. Television shows such as VH1's *Behind the Music* and *Storytellers*, and *MTV Unplugged* are popular for a reason: fans like to know what was going on in the artist's head when a song was created.

Consider dedicating one or two songs to use as free promotional downloads and make them available through any site you can. By giving the songs away, you can generate recognition of and interest in your music and can encourage listeners to visit your Web site and purchase your CD. (You might do an edit so that the free download is a full song, but the complete original version is only available on the CD.) Perhaps add a short voice-over tag to the end of the free songs, letting listeners know something about you.

Putting your music on the Internet is really a kind of shotgun approach to marketing. To maximize results, it's important to work your niche and fine-tune your efforts. Locate your fans through various music scenes and fan communities, try getting your music on sites that feature your music style, and learn from other artists' sites. If you don't know where to begin, visit a Web site such as Musicdistribution.com (see **Fig. 6**). Through its portal, you can link to thousands of artist sites, which will let you assess how much effort other musicians put into their Web presence. Based on your research, you can decide how much effort you want to invest in your site. Determine how much of your business you want to manage and how much you want an Internet distributor or label to handle. (For more sites that serve musicians, see the sidebar "Recommended Sites.")

**FIG. 6: Musicdistribution.com provides links to sites that let you study how different artists market their music.**

## CRYSTAL BALL

Subscription services are one strong trend that should grow in popularity with artists and fans. Those who want to follow your musical career can subscribe to your world. Many people would gladly subscribe to an artist's work for a monthly or yearly fee. Because digital duplication is not easily controlled, subscriptions allow for a more direct, supportive, and mutually beneficial relationship between musician and audience. People can subscribe to individual artist sites or to an Internet distribution site. Those sites distribute revenue from the subscription income to the artists in accordance with the number of downloads each artist generates. Even MP3.com offers a subscription service for classical music and may do the same with other genres in the future.

Jim Griffin, founder and CEO of Cherry Lane Digital, takes downloads out of the picture. He believes music will be carried in streams, not downloads, and that "the arrival of wireless digital access will permit customized access to music, movies, books, and other media content." Indeed, personal digital assistants exist that can surf the Net, pick up e-mail, make phone calls, and play MP3 files. So listening to streaming music via wireless DSL seems like a plausible scenario.

As much as the Internet has transformed the music industry, it will still have two major camps: independent musicians and established companies (which focus their promotion dollars on a few artists). Major and minor labels will continue to coexist but in many more permutations and varieties. Minor

### RECOMMENDED SITES

Many Web sites are devoted to serving established and emerging artists. The following ten sites merit some attention for the services they provide artists. Check them out and use them as a springboard for your own research.

http://bootlegal.com
http://cdbaby.com
http://dork.com
http://hungrybands.com
http://loudenergy.com
http://starpolish.com
http://tropia.com
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labels will be more artist controlled and not simply smaller versions of major labels. Continued competition from Internet companies will provide greater opportunities for artists to demand better contracts or to go online and claim a bigger piece of the pie.

The larger labels will continue to exist and will be especially important in developing certain artists. Their resources will be invaluable in promoting and marketing musicians who want to break through to national and international audiences. The major labels will absorb many of the newer music companies, as BMG arguably did with Napster, but they will also have to contend with the growing presence of independent companies prominently positioned on the Internet.

## GET STARTED

One clear drawback of the traditional record industry system is that it allows relatively few artists to succeed while most flounder in obscurity. The Internet and downloadable technologies, however, provide the tools for an emerging middle class of musicians that has a more direct relationship with its fans. Those artists may have perhaps 10,000 to 50,000 fans and could make $50,000 to $100,000 per year selling music directly. In most cases, those artists perform live. Live performances may become an even more important source of income for many artists in the future.

Last year a number of Internet music distributors rose quickly to prominence and then took a beating as their companies failed to build successful businesses quickly enough. Many in the music industry now believe that combining traditional brick-and-mortar retail outlets with online promotion, sales, and distribution is the best approach.

On the other hand, the volatility of the Internet is apparent, so from a practical as well as a creative standpoint, it is important that you put together your own Web site. Even if you only post a page with song previews and biographical information, you will be making a start and ensuring that your site is around while Internet music companies come and go. If you stick with it and your music's good, who knows what great opportunities may arise?

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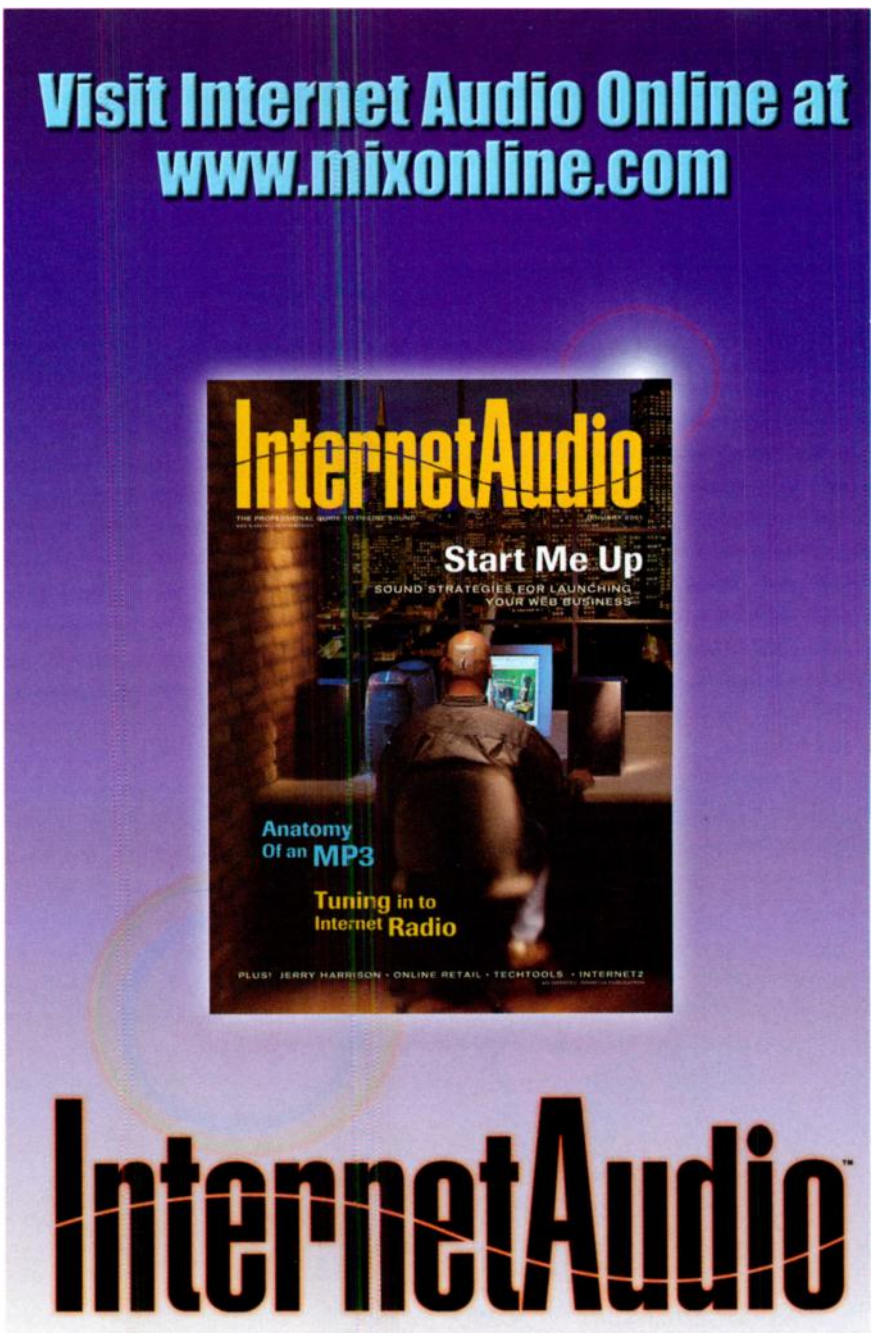
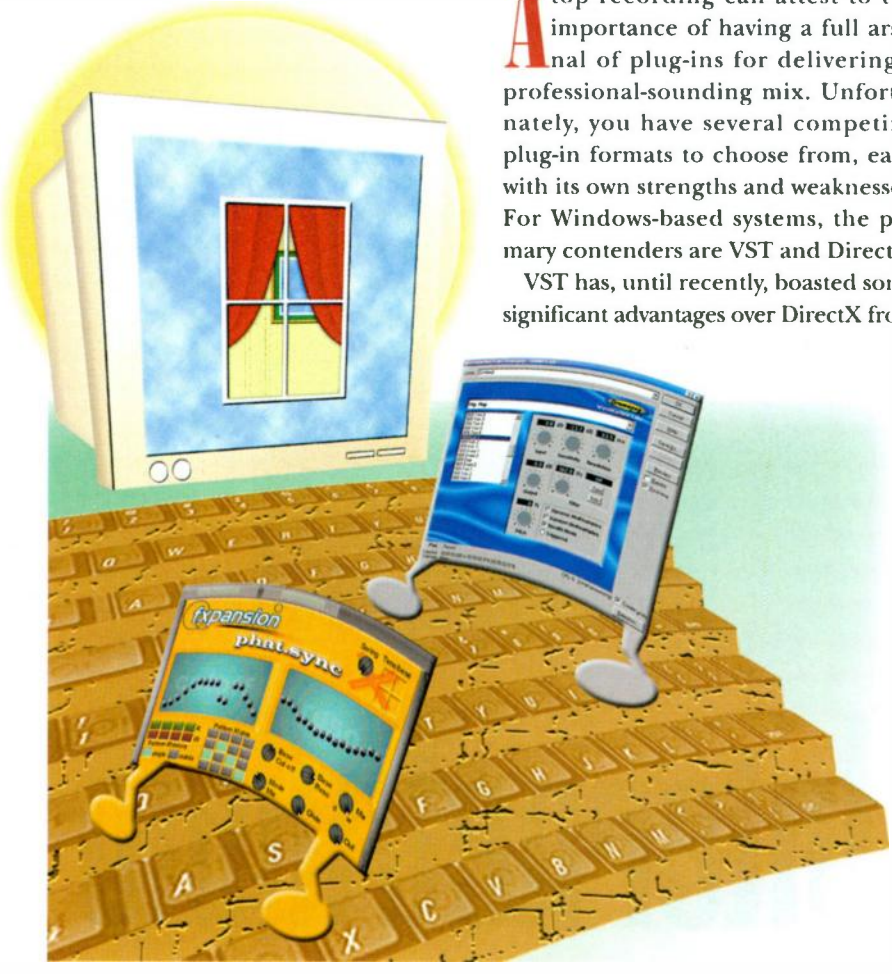
**Robert Powell** *is a musician, composer, and executive producer of music at ArtistOne.com in San Francisco. He thanks* **Alex Artaud** *for his assistance with this article.*



# DirectX 8 Steps Up

***The latest version of DirectX delivers more punch for plug-ins.***

By Matthew P. Graven




MIKE CRUZ

Any musician who does serious desktop recording can attest to the importance of having a full arsenal of plug-ins for delivering a professional-sounding mix. Unfortunately, you have several competing plug-in formats to choose from, each with its own strengths and weaknesses. For Windows-based systems, the primary contenders are VST and DirectX.

VST has, until recently, boasted some significant advantages over DirectX from the perspective of desktop music production. Because VST is designed solely for audio plug-ins (whereas audio effects are only a small part of the DirectX body), development is generally much easier for VST plug-ins. Furthermore, both Macs and PCs support VST, meaning vendors can develop a plug-in once and then compile it for multiple operating systems. DirectX, which is closely tied to the Windows operating system, isn't supported on the Mac.

However, DirectX's relationship with Windows may be one of its greatest strengths. Designed by Microsoft as an OS enhancement, DirectX is more of a standard than a proprietary format; hence, it is supported by a large number of applications, far more than VST. Even products from Steinberg, the VST format developer, support DirectX effects. Because most musicians depend on a variety of programs—a multitrack recorder, a stereo WAV editor, a loop-based sampler, for example—the ability to buy one plug-in that works in all applications is essential. You certainly don't want to buy two copies of Waves *Gold Bundle*—one VST and one DirectX. So the fact that DirectX is supported in almost all Windows-based audio programs is a clear advantage. Until DirectX 8's

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introduction, though, that advantage was offset by the format's shortcomings.

## AUTO AUDIO

Though most of DirectX's features apply to multimedia and games, DirectX 8 has taken some evolutionary steps that will have a great impact on musicians. It is now poised to establish itself as a pro-audio tool, delivering features that rival its main competitor.

In technical terms, DirectX is a collection of application program interfaces (APIs) used for delivering enhanced multimedia—such as video, 3-D animation, and sound—on Windows systems. One part of this collection is DirectShow, the element that makes possible the real-time audio processing performed by DirectX effects. Along with the other APIs, DirectShow has undergone significant alterations in version 8.

Perhaps the most important change in DirectX 8 is that it lets you automate audio effects in your mixes (see **Fig. 1**). The static nature of DirectX plug-ins meant that a track could have an effect or not; you couldn't change its parameters while the music played. You could split up your tracks and place effects with varying parameters on different tracks, but that's a tedious work-around at best, and it makes inefficient use of your CPU's resources.

With the introduction of automation, however, fixed parameters are no longer an issue. Just as you would record an automated volume change in a product such as *Cool Edit Pro*, you can tweak plug-in parameters on the fly and record the changes, so your mix plays back with dynamically changing effects. As you make changes to the effect parameters through the plug-in's graphical user interface, the host application records and time-stamps the changes. If on-screen knobs aren't your thing or if you're aiming for extremely precise adjustments, you can always edit settings using graphic envelopes from within the host application.

**FIG. 1: Cakewalk is about to release several new plug-ins that support effects automation and are compatible with DirectX 8.**

**FIG. 2: Applied Acoustics Systems *Tassman* 2.0 will support DirectX 8 and the new DXi standard.**

## SOFT SUPPORT

DirectX 8's second big development is the format's newly acquired support for software-synth plug-ins, known as DXi or DirectX instruments.

Loading up on software-based samplers and synthesizers is an excellent way to boost your sound collection (see **Fig. 2**). Software synthesizers are relatively easy to use if you trigger them from a MIDI keyboard; try running several programs simultaneously, and things get a bit trickier. You typically have to control each program independently and switch between them. You might be able to change synthesizer patches from within a multitrack program, but the drain on system resources from running multiple programs can easily become unacceptable. Each application requires its own memory and CPU cycles, which add up to a lot of system overhead.

With DirectX-compatible software-synthesizer plug-ins, however, you can add patches to MIDI tracks as easily as you add reverb to an audio track. Moreover, you gain the advantages of having a single unified environment. By tying in closely to your recording software, these soft synthesizers can benefit from many of the host application's features in a way that a separate sound application can't. For example, you can record a MIDI track, place a soft-synth piano sound on the track, and run it through an EQ and some delay, all without having to convert it to a WAV file. (Many of those operations depend on the host application's capabilities.)

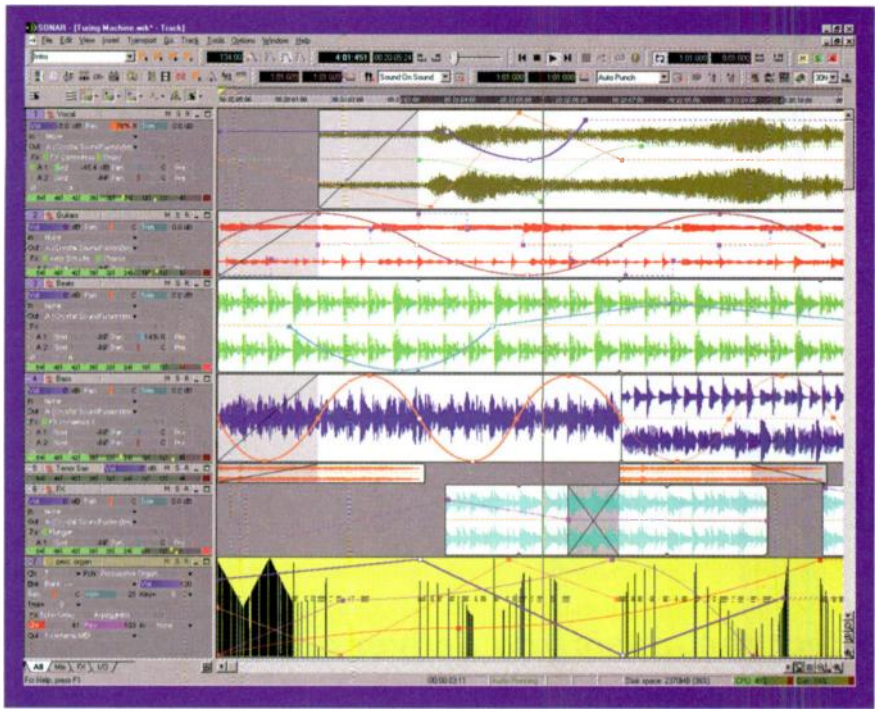

**FIG. 3: In addition to DirectX 8 effects, Cakewalk's new *Sonar* 1.0 digital-audio sequencer supports the new DXi software synths.**

A DirectX implementation of soft synths also offers the potential for very low latency (the time it takes for a note to sound after it's been struck). In early tests, Cakewalk claims it achieved latency times of 1 to 4 ms, much less than the time that is discernable to the human ear. In fact, DirectX 8 should prove to be generally more efficient than its predecessors.

Developers will discover that designing plug-ins is easier, too. Though the DirectShow API is improved, the new DirectX Media Objects allows developers to write in an even simpler environment.

## COMING SOON

Don't expect to install DirectX 8 and immediately start automating effects and playing software synthesizers and samplers. DirectX 8 may enable those activities, but the developers of plug-ins and host applications still need to make their products compatible with the new format. You can expect to see a variety of new and upgraded products for the PC in the coming months; many companies, such as Waves and Sonic Foundry, have been working with Microsoft on DirectX 8's new features.

Major developments are also coming from Cakewalk. It plans to replace its *Pro Audio* line with *Sonar* 1.0 (see **Fig. 3**). *Sonar* exploits DirectX 8's fresh features and includes a new software synth specification developed by Cakewalk. Third-party vendors including Roland, BitHeadz, and Applied Acoustics are working with Cakewalk to get their new soft synths underway. According to Cakewalk, *Sonar* soft synths automatically provide names for banks, notes, controllers, NRPNs, and RPNs. They are also multitimbral; support multiple instances; and can be placed anywhere in the audio chain, which allows them to take advantage of DirectX effects and audio buses.

Indeed, the future looks bright for DirectX 8, and Windows-based desktop musicians will soon reap the benefits of having a widely supported format with truly competitive audio capabilities.

**Matthew P. Graven** *is a writer and musician in New York City. His band, skip frenzy (www .skip-frenzy.com), is recording a new CD.*

# Do the Right Thing

***Learn how recent laws affect the music you deliver online.***

By Eric Leach

Okay, I'll admit it: the movie *Almost Famous* brought out my weepy, nostalgic side. I remember when making music was simple—I'm talking about the '70s. You'd practice in the basement, load your gear into the step van, play weekend gigs at the area bars, save enough money to record in the local studio, and beg stores to carry your album (my parents still have boxes of mine in their basement).

These days, though, music delivery is headed out of record stores and onto the Internet. That means you have a lot more distribution options. For example, you can distribute your music in a limited sense by simply posting songs on your Web site. But online music distribution involves licenses—and not just any licenses. Wild, new, and crazy, these licenses are steeped in laws complicated enough to make you want to change professions. Just ask the folks at Napster.

The laws surrounding online music licensing are extremely complex and, for the most part, have not been interpreted by the courts. That doesn't excuse you from familiarizing yourself with the basics of those laws if you plan to offer any music online. It is critical to consult a knowledgeable attorney if you become involved in online music.

## THE BASICS

The physical medium on which a song is recorded, or fixed, is known legally as a *phonorecord* (think CD). Each phonorecord may contain one or more songs. Each song on a phonorecord embodies two separate and distinct works of art that are protected by U.S. copyright

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law. The *musical work* copyright protects the composition, including musical notes and lyrics created by the composer. Ownership of a musical work copyright may be divided among various secondary composers, lyricists, arrangers, editors, and translators, as well as publishers, who usually gain ownership shares in exchange for promotion of the work. When the song is recorded, it qualifies for separate copyright protection as a *sound recording*. A sound recording's copyright ownership may be divided among performers, record producers, sound engineers, and others responsible for capturing, editing, and mixing the sounds in the recording.

Say, for instance, that you wrote a song, transcribed it onto paper, and copyrighted it. As the composer of the song, you own the musical work copyright. If you record the song in your home studio, you gain ownership of the sound recording copyright, which protects the recording. If you write a song and record it without first putting it on paper, you gain ownership of both copyrights because the composition and the recording are fixed onto the recording medium at the same time.

Copyright owners are afforded a *bundle* of exclusive rights in their musical works and sound recordings, which lets them control and receive compensation for the use of those works. The exclusive rights include the right to reproduce the work, distribute copies of it, and perform the piece publicly. The public performance right is enjoyed by musical work copyright owners but does not extend to sound recording copyright owners. For example, when a radio station plays a CD selection, the owner of the musical work copyright is compensated for the performance, but the owner of the sound recording copyright is not.

Typically, exclusive rights are managed directly by the copyright owner through contractual mechanisms called *licenses*, which let third parties reproduce, sell, or perform the work in return for money. *Compulsory* licenses, also known as *statutory* licenses, are licenses by which the copyright owner cannot prevent a third party from using the work as long as the third party pays a specified royalty rate and adheres to other statutory requirements.

For sound recording copyright owners, the reproduction and distribution rights are freely negotiated. For example, a sound recording copyright owner could provide a downloadable digital-audio file of his or her recording on a Web site and sell copies directly to consumers. For musical work copyright

## LICENSING ON THE WEB

To learn more about the laws and other details involved in delivering or broadcasting music over the Internet, check out the resources listed below.

**ASCAP (www.ascap.com)**
ASCAP's site offers a host of information and resources for members and nonmembers alike, including its "RateCalc" program for calculating licensing fees and a FAQ about Internet licensing.

**BMI (www.bmi.com)**
BMI's site, like ASCAP's, has a comprehensive selection of facts and resources regarding music licensing. You can peruse the different license agreements, calculate rates, and license music through the site by using the "Klik Thru"system.

**Kohn on Music Licensing (www.kohnmusic.com)**
Visitors to this site can find extensive legal information about copyright law and music licensing specifically relating to music delivery on the Internet. The site also has a question-and-answer board and offers various links to resources around the world.

**Legal Information Institute (www4.law.cornell.edu/uscode/17/index.text.html)**
This link takes you to a page that breaks down the copyright law into 14 sections, so you can easily find a particular part of the law. Other legal resources can be accessed from the site's main page.

**National Association of Broadcasters (NAB; www.nab.org)**
NAB's site has all the latest news and laws that affect the Web, radio, and television.

**Recording Industry Association of America (RIAA; www.riaa.com)**
Be sure to go to these pages on the RIAA site: Copyright Basics, Music and the Internet, Audio Technologies, and Licensing and Royalties. The site are also has sections about Webcasting and the RIAA's dispute with Napster.

**SESAC (www.sesac.com)**
The SESAC site offers online song registration for members as well as online licensing of music from the PRO's repertoire. Visitors can also read about licensing agreements and the latest news and laws.

**United States Copyright Office (www.loc.gov/copyright)**
Get all the copyright law you can handle from these new pages: Webcasting, the Digital Millennium Copyright Act, Napster, and Digital Transmissions.

owners, royalties on phonorecord sales of their compositions are handled through a *mechanical* licensing scheme. A mechanical license is a compulsory license through which owners of copyrights in musical works are paid for the reproduction and distribution of their compositions' phonorecords. Once a musical work copyright owner authorizes a phonorecord's public distribution, any third party may reproduce and distribute phonorecords of the composition provided that the party pays the compulsory license fee.

Sound recording copyright owners historically have not enjoyed a public performance right. However, for musical work copyright owners, the public performance right was and is important yet difficult to manage. Most owners cannot enforce their public performance rights on every broadcaster or nightclub owner who plays their songs.

**Exclusive rights are managed directly by the copyright owner through contractual mechanisms called licenses.**

An enforcement scheme known as *blanket* licensing was therefore developed. In this arrangement, performing rights organizations (PROs), such as ASCAP, BMI, and SESAC, issue blanket licenses that allow licensees to play any song in the PRO's repertoire. The PRO then collects and distributes royalties for those performances on behalf of musical work copyright owners. Royalty payments are calculated by surveying and sampling broadcasts.

Sound complicated? Those are just the basic laws that have been around for nearly a century. The fun, cutting-edge stuff lies ahead.

## THE NEW LAW

In 1995 Congress passed the Digital Performance Rights in Sound Recordings Act (later amended by the Digital Millennium Copyright Act), which provides sound recording copyright owners with the exclusive right to "perform their works publicly by means of a digital-audio transmission." That means sound recording copyright owners finally can be compensated, in the form of a freely negotiated license, for public performances of their recordings under certain conditions. Although certainly a boon for those owners, the act's language imposes several limitations on this new public performance right.

First, the right applies to transmissions only. It does not cover live performances or CDs that are played in restaurants, concert halls, or hotels. Second, it only applies to digital transmissions, not analog transmissions

such as AM or FM radio. Third, it only applies to digital transmissions of sound recordings; it doesn't apply to digital transmissions of, say, a movie. Finally, it only applies to digital-audio transmissions that are publicly performed; it does not apply to an audio file transmitted to a friend.

The act provides exemptions for various types of digital-audio transmissions, including broadcast transmissions, "incidental" transmissions (such as the programming feed of an exempt transmission from a remote truck), and transmissions of digital music to business establishments for ordinary business use (for example, Muzak transmitted to a clothing store for background music).

The act also imposes a compulsory license on certain types of digital-audio transmissions, including "subscription" transmissions—in which the transmission recipient pays for the service (such as the commercial-free digital music that comes with your cable)—and Webcasts. Notably, the new public performance right expressly applies to "interactive" digital-audio transmissions, in which the transmitted song is selected by or on behalf of the recipient.

Musical work copyright owners continue to enjoy their preexisting public performance right, payable through blanket licenses managed by PROs. Sound recording copyright owners gain a public performance right for any sound recording publicly performed by means of digital-audio transmission, payable through freely negotiated licenses or compulsory licenses.

The act also addresses the reproduction and distribution rights involved in *digital phonorecord deliveries*. Digital phonorecord deliveries are digital-audio transmissions that result in a "specifically identifiable" (replayable) reproduction of the transmitted sound recording. Essentially, the act recognizes that the preexisting mechanical compulsory license for reproducing and distributing phonorecords of musical works applies to digital phonorecord deliveries and traditional record store–type music distributions.

The act not only extends the compulsory license to musical works that are made and distributed through digital-audio transmission but also makes clear that such transmissions are functionally equivalent to physical reproductions and distributions. That development impacts sound recording and musical work copyright owners. Those who transmit digital phonorecord deliveries must satisfy the compulsory licensing requirements for the delivery of the musical work and obtain a voluntary license for the delivery of the sound recording.

## ANALYSIS MODEL

So how does all this legalese apply to a musician who wants to transmit or receive digital copies of songs? When this new body of law is synthesized with the traditional compensation scheme, figuring out who needs to be paid what can generally be analyzed through a series of fairly simple questions.

### Public performance rights analysis: is there a transmission?

The act is only concerned with transmissions; other performance types, such as live performances, have no potential liability.

### Is the transmission digital?

The act covers only digital transmissions. Analog transmissions are not addressed.

### Is the digital transmission a sound recording?

The act only deals with digital transmissions of sound recordings. Other transmission types are not potentially liable.

### Is the digital-audio transmission a public performance?

When a digital-audio transmission is classified as a public performance, the transmitter is responsible for obtaining licenses for both the musical work and the sound recording. Licenses for public performances of musical works are generally obtained from a PRO; the type of license available under the new sound recording public performance right depends on how the transmission is categorized. Digital-audio transmissions that are not public performances do not implicate the preexisting public performance right of musical work copyright owners or the new public performance right for sound recording copyright owners.

### Is the digital-audio transmission exempt?

Certain types of digital-audio transmissions are exempt. Exempt digital-audio transmissions do not trigger the new public performance right for sound recording copyright owners. However, the preexisting public performance right of musical work copyright owners is still in effect; the blanket license must still be paid to the PRO. If the digital-audio transmission in question is not exempt, it must be further analyzed.

### Is the digital-audio transmission an interactive transmission?

Regarding public performance rights, nonexempt digital-audio transmissions are either part of an interactive service or not. As for musical works, whether the transmission is interactive is irrelevant; if the transmission constitutes a public performance, a blanket license must be obtained through a PRO. For sound recordings, interactive transmissions implicate the new public performance right, and voluntary licenses must be negotiated with the sound recording copyright owners. Digital-audio transmissions that are not part of an interactive service are subject to additional scrutiny.

### Does the digital-audio transmission qualify for the compulsory license?

Noninteractive digital-audio transmissions are divided into two subcategories: those that qualify for the compulsory license and those that do not qualify. Regarding musical works, whether the transmission qualifies does not matter; if the transmission constitutes a public performance, a blanket license must be obtained. Qualifying and nonqualifying transmissions of sound recordings trigger the new public performance right but are treated differently. Qualifying

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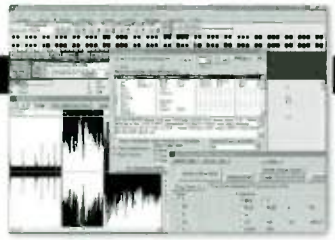

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transmissions, such as Webcasts or subscription transmissions, are eligible for a compulsory license. Nonqualifying transmissions aren't eligible for a compulsory license; therefore, voluntary licenses must be negotiated with the sound recording copyright owners.

### Reproduction and distribution rights analysis: is the digital-audio transmission a digital phonorecord delivery?

In terms of reproduction and distribution rights, digital-audio transmissions fall into two subcategories: transmissions that result in a specifically identified reproduction of the transmitted phonorecord (digital phonorecord deliveries) and those that do not. Digital phonorecord deliveries, as the functional equivalent of physical phonorecord deliveries, implicate the reproduction and distribution rights of the musical work and sound recording copyright owners. The standard mechanical compulsory license is available for digital deliveries of musical works, but a voluntary license must be negotiated with the owners of sound recording copyrights. If a transmission does not constitute a digital phonorecord delivery, no reproduction or distribution rights are invoked.

## ONLINE MUSIC

The analyses of public performance rights and reproduction and distribution rights are separate and distinct. A single transmission should be analyzed regarding the implication of the public performance rights and the reproduction and distribution rights in both the sound recording and musical work. For the most part, online music is still separated into two categories: streaming and downloadable files. By applying the analysis model, you can see what licenses are potentially involved.

**Streaming.** Analysis here is problematic not only because of the law's complexity but also because of interpretation issues and the pace at which technology evolves. Two streaming types are common on the Internet: Webcasting, which is essentially Internet radio, and posting, which lets Web site visitors hear a posted audio file by opening it. Posting is generally used to preview music for promotional purposes. For example, a Web site selling downloadable digital-audio files will often let you hear part of the song before you download it.

Both streaming types qualify as digital transmissions of any transmitted sound recordings. Does streaming a song qualify as a public performance? According to the statutory language, it appears so. However, limiting access of a streaming file to a single individual, for example, may not constitute a public performance.

▼

**Industry opinion is that all digital transmissions are digital phonorecord deliveries.**

Webcasting, the most common type of streaming audio, is likely not exempt. Although Webcasters could argue that their services are virtually the same as exempt broadcasters', they simply do not qualify according to statutory language. Webcasting is probably not considered interactive because Webcasters, like broadcasters, typically do not create programs specifically upon request. However, Webcasts likely qualify for the new digital performance right compulsory license. If not, the transmitter must obtain voluntary licenses from the transmitted sound recordings' copyright owners to satisfy the new digital performance right.

A posted streaming file is also not exempt but does appear to be interactive: when Web site visitors open a posted streaming audio file, they initiate a transmission of a particular sound recording. Therefore, the transmitter must obtain a voluntary license from the sound recording copyright owner to accommodate the new digital performance right. For both types of streaming, the transmitter must obtain licenses from a PRO for the public performances of the musical works.

The digital phonorecord delivery status of streaming audio remains unresolved. Webcasting does not seem to create a specifically identifiable reproduction of the song on the recipient's computer, but the opinion within the industry is that all digital transmissions are digital phonorecord deliveries. Posted streaming files may also qualify as digital phonorecord deliveries because those files are usually small enough to make a specifically recognizable reproduction possible. In that case, the transmitter must pay the incidental compulsory license fee for reproduction and distribution of the musical work and the voluntary license fee for the sound recording's reproduction and distribution.

**Downloadable files.** Downloadable files are digital-audio files posted on a Web site and available for downloading by the public, often for a fee. Thus they qualify as digital-audio transmissions when downloaded. An important question is whether downloading a digital-audio file constitutes a public performance.

From a practical standpoint, paying to download a digital-audio file seems too analogous to a traditional phonorecord sale to be considered a public performance and should be treated solely as a digital phonorecord delivery. That argument sounds reasonable; it does not seem fair to subject download transmitters to both public performance and reproduction and distribution fees. It can be argued that when the transmitter's computer responds to a download request for a digital-audio file, it is "performing" the work embodied in the file "publicly." That position appears to have support within the act's legislative history.

However, it can also be argued that the transmission is not a performance at all because neither the musical work nor the sound recording can be perceived during transmission. The song is being delivered rather than performed, in the classic sense of the word; the works are not "performed" until the

recipient plays and hears the digital-audio file, in which case the performance in most instances would not be considered public.

If downloadable audio files are not considered public performances, neither the new digital performance right in sound recordings nor the preexisting public performance right in musical works is implicated. But if those files are considered public performances, they would be classified as interactive transmissions because a downloadable file is a transmission of a sound recording that is selected by or on behalf of the recipient. Therefore, the transmitter must obtain voluntary licenses from the owners of the sound recording copyrights to satisfy the new digital performance right, and the transmitter is also responsible for obtaining licenses from the appropriate PROs for the public performances of the musical works.

Furthermore, downloadable audio files probably qualify as digital phonorecord deliveries, being the functional equivalent of physical phonorecord deliveries. Thus, the transmitter must obtain voluntary licenses for the reproduction and distribution of the sound recordings and must pay the mechanical compulsory license fees for the reproduction and distribution of the musical works.

## A TANGLED WEB

As you can see, this is not your parents' music business. Music licensing, particularly online music licensing, is complicated stuff. Take a little time to understand the basics—it will be worth it in the long run. Someday you will have your catalog online, and you may want to know where your money is coming from.

---

**Eric Leach** *is an intellectual property law attorney with Goodman & Leach. He has authored several technical and legal articles related to the music business, including* Everything You Always Wanted to Know About Digital Performance Rights but Were Afraid to Ask, *recently published in the* Journal of the Copyright Society of the U.S.A. *He can be contacted at (714) 836-0200 or eleach@goodmanleach.com.*



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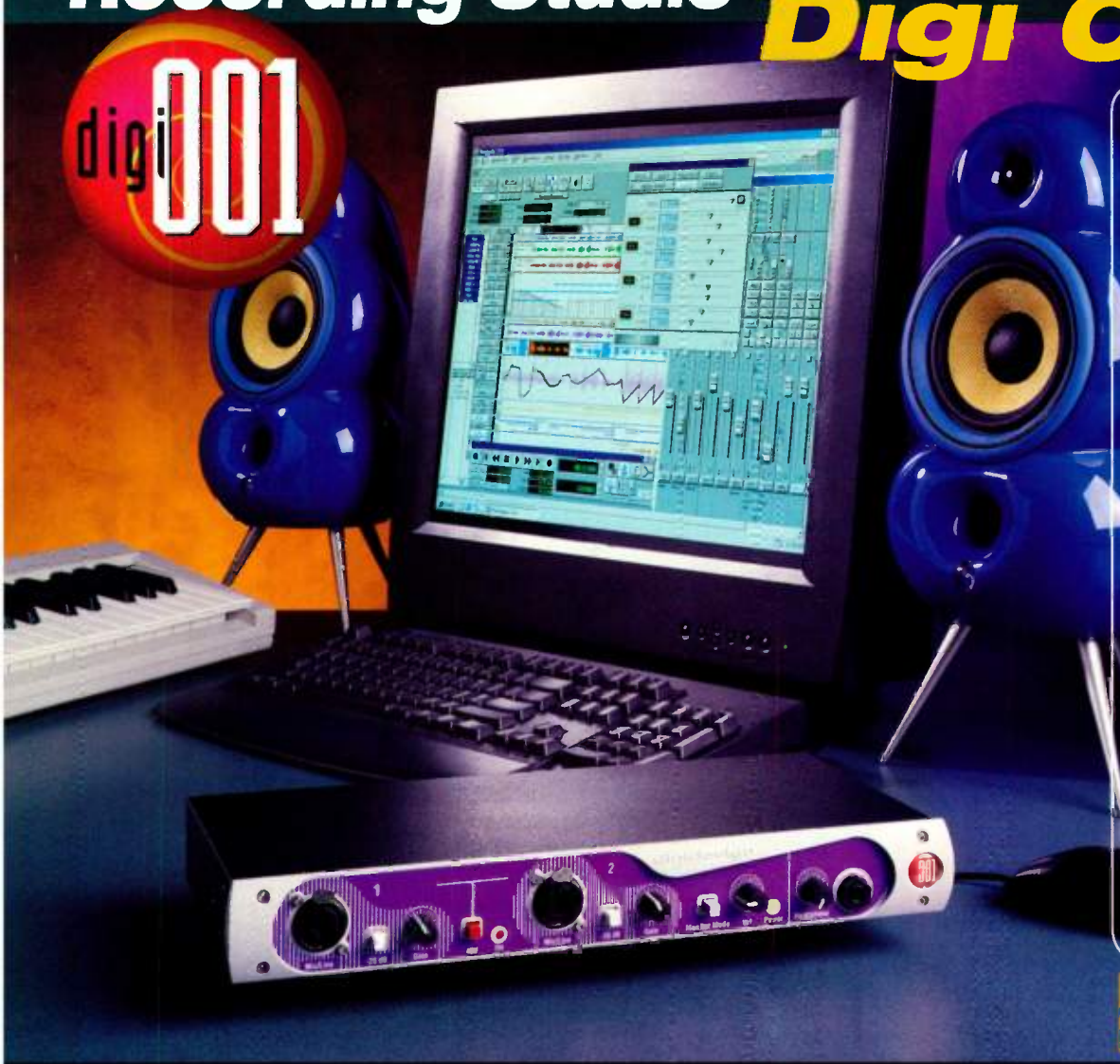


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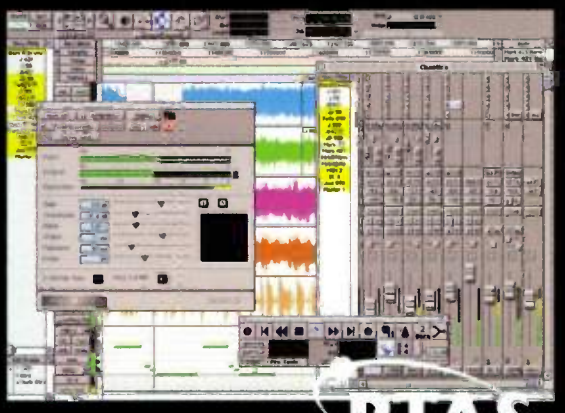

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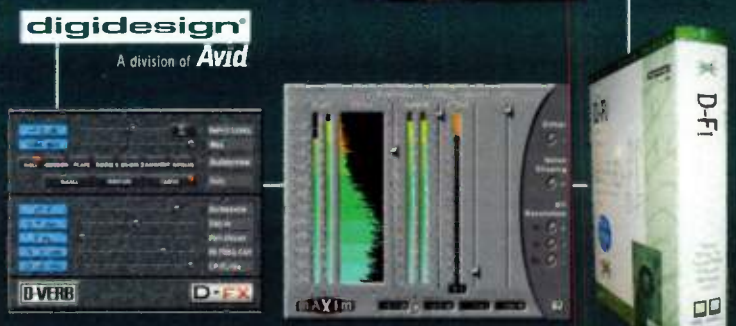

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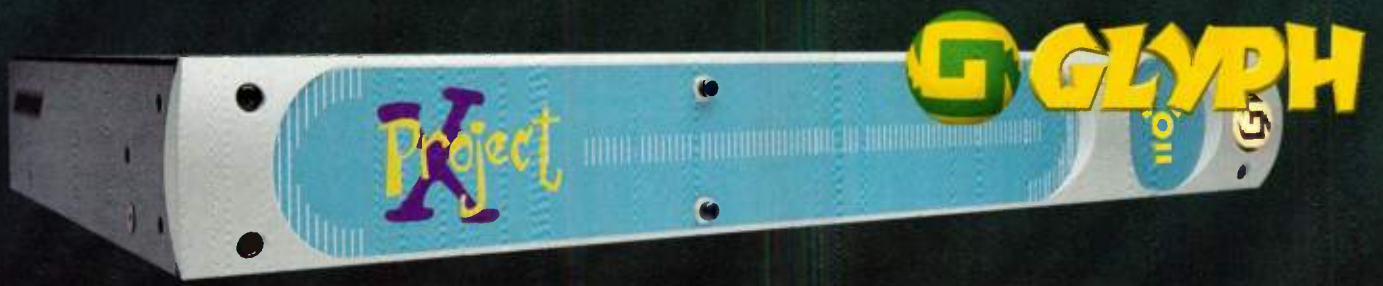


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# REVIEWS


146 Roland HPD-15 HandSonic
158 Microworks *CAMPS* 4.0 (Win)
164 Emagic Unitor8 MkII
170 Sound Quest *Midi Quest* 8.0 (Win)
176 Zoom PS-02 Palmtop Studio
182 GT Electronics AM40
190 Echo Digital Audio Mona 24/96 (Win)
194 DUY *EverPack* (Mac)
198 Quick Picks: Northstar Productions *Ancient Worlds;* Big Fish Audio *Things That Go Bump in the Night,* vol. 2; Miller Freeman Books *Vintage Synthesizers;* Mil Productions *Modularing* 2.01 (Mac); Apogee Electronics *Session Tools* 2.0 (Mac/Win)


## ROLAND

### HPD-15 HANDSONIC

***The doors to MIDI open wide for the hand percussionist.***

By Larry the O

Although major manufacturers of MIDI equipment have graced musicians with keyboard, guitar, wind, and drum controllers, there has been a notable shortage of products devoted to hand percussion. Until now.

Roland's HPD-15 HandSonic percussion controller and sound module is a self-contained electronic percussion instrument (see **Fig. 1**). Its 15-part pad, dual ribbons, and D-Beam controllers provide extensive control capabilities. The HandSonic contains more than 650 sounds ranging from ethnic drums to instrumental loops. It also features onboard reverb and multi-effects, a 4-track pattern sequencer, and a host of other goodies. It comes in a 16-by-16-inch package that is less than 4 inches thick and weighs about six and a half pounds.

The HandSonic looks like a silver rectangle overlapped by a 10-inch circle that contains the 15-pad playing surface (see **Fig. 2**). It has four large pads (identified as A1, A2, A4, and A5) with

**FIG. 1: The HPD-15 HandSonic is an extension of Roland's V-Drums technology. You can select from an impressive-sounding collection of 600 internal instruments to play on a 15-part, 10-inch rubber pad.**

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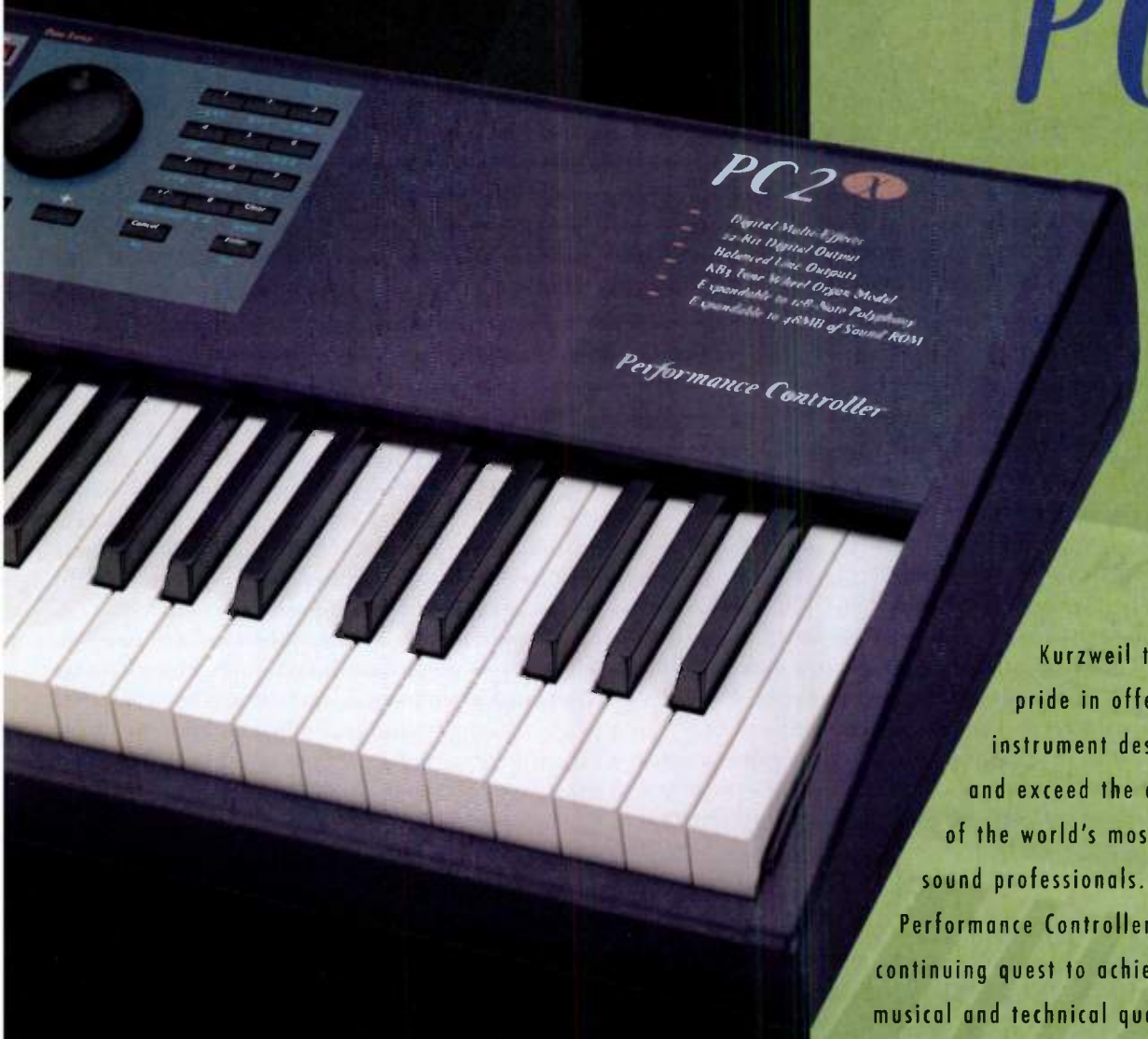


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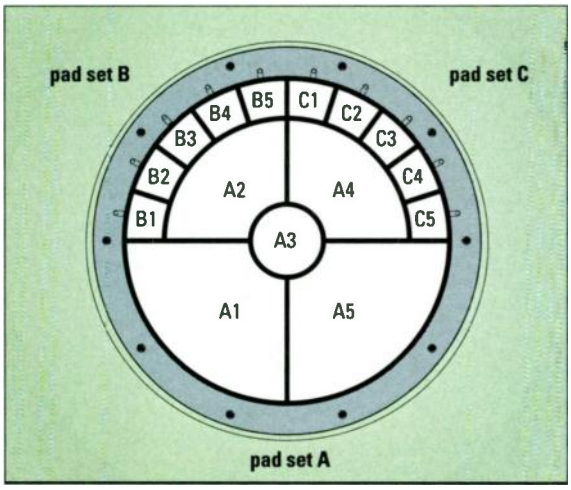


**FIG. 2: The HandSonic's playing surface is divided into three pad sets, each containing five pads. Each pad in a set plays either a different instrument or variations of the same instrument.**

a circular fifth pad (A3) in the middle and an arc of ten small pads across the top (B1–5 on the left and C1–5 on the right). The A, B, and C groups are referred to as "pad sets."

## PLAYING THE PADS

A different sound can be assigned to each of the HandSonic's 15 pressure-sensitive rubber pads; the sound is triggered when the pad is struck. The two largest pads, at the bottom of the unit, have two zones: center and edge, each of which has a different sound. The edge sound is not programmable; it can be played only if whatever is assigned to the pad includes an edge sound. I would have preferred the ability to freely assign any sound to the edge zone.

The pads can be played with hands, fingers, or even mallets. Roland doesn't recommend playing with sticks because the trigger sheet under the pads can be dented. If you want to play with sticks, you're better off with a pad that's designed for them.

I found fingers to be the most effective means of playing; when I used my hands on any pads other than A1 and A5 I frequently triggered more than one pad in a single stroke. In some cases, this produced a nice layering effect, but I received the best results when using my index and middle fingers together. On pad sets B and C, the two-finger technique was the only way I could trigger pads one at a time. Once I mastered the two-finger technique, I could play fast flurries over several pads as easily as I could play broken syncopations on one or two pads.

Striking any pad produces immediate visual feedback. Above and to the right of the playing surface, a graphic representation of the pad surface contains five LEDs, one for each A pad, that flash as the corresponding pad is struck. Additional LEDs embedded in the rim flash as the B and C pads are struck. During performance, the LEDs mostly contribute to the "gee-whiz" factor. They're more useful during editing because they indicate which pad is currently selected.

The Roll/Hold button, located just above the B pads, activates a sustaining function. For short sounds, a percussive roll plays as long as this button is pressed; its speed is programmable. Rather than being rolled, longer sounds are sustained for as long as the button is pressed.

Each pad is assigned a trigger mode and a velocity curve and is configured with four triggering and sensitivity parameters. There are three pad trigger modes: Shot, Gate, and Trig. Shot plays a sound once from start to finish. Gate plays a sound as long as you press on the pad, so it's useful only for sustained sounds. Trig plays a sound until the pad is struck a second time, so it is also useful only for sustaining sounds. There are ten velocity curves, including linear, exponential, logarithmic, spline (S-curve), and special-purpose curves.

The global Pad Sensitivity parameter offers two settings each for hands and fingers. There is a noticeable but not radical difference between the least setting (Hand1) and the most sensitive setting (Finger2), but the differences between these and the two settings in the middle are too subtle to seem useful.

One of my favorite performance-oriented features is the ability to trigger pattern playback with the B and C pads.

## OTHER DIMENSIONS

A Dimension Beam (D-Beam) infrared controller is in the top center of the unit, just above the LCD. A ribbon controller is located on either side of the pads. In addition to triggering sounds, the D-Beam and ribbons can be used as modulation controllers.

The ribbon controllers are oriented vertically. I generally prefer ribbons with horizontal orientation because that requires a more natural wrist motion. With the HandSonic, however, I found that because I often stuck my finger out between beats to use one of the ribbons, their vertical orientation worked well.

Trigger modes and velocity curves are also assigned to the D-Beam and ribbons, but their trigger modes are different from the pads' trigger modes. Some settings trigger when you simply touch a ribbon or when your hand enters the D-Beam's proximity. Others trigger when you move your hand along the controller.

Near each ribbon are a Sound button and a Hold button, which light up when you press them. When the Sound button is lit, the ribbon triggers the sound that's assigned to that ribbon. When the ribbon is acting as a controller, the Hold button causes the most recent value at the moment you lift your finger to be retained. The Sound and Hold buttons can both be lit to provide simultaneous functions. The D-Beam's Sound and Control buttons provide similar functions. The ribbons and D-Beam can alter a variety of modulating parameters.

The D-Beam is definitely fun, and it's a great visual element in live performance. As with much else on the HandSonic, though, the playing technique is fussy; it's extremely easy to accidentally trigger a sound whenever a hand or even a sleeve inadvertently passes over it. Tweaking the sensitivity helps some, but you must always be respectful of the D-Beam's "air space."

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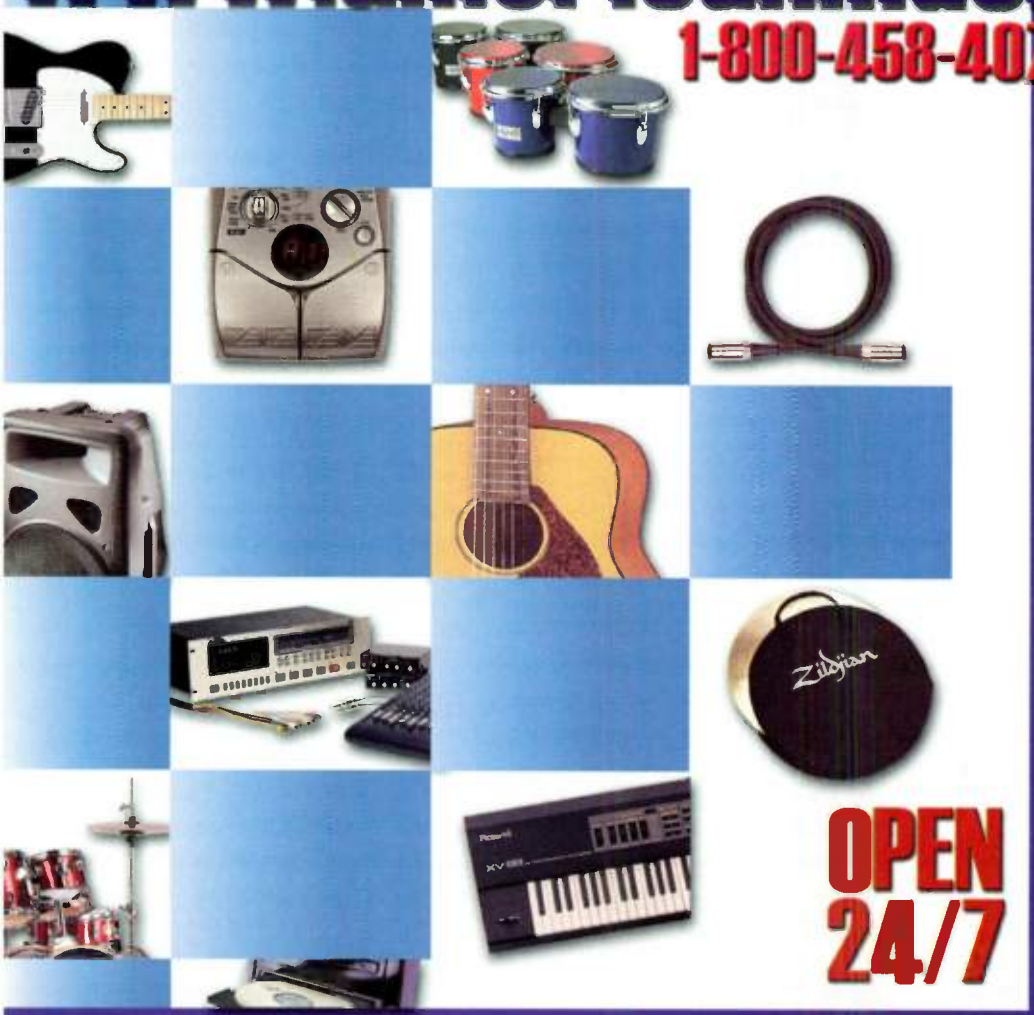


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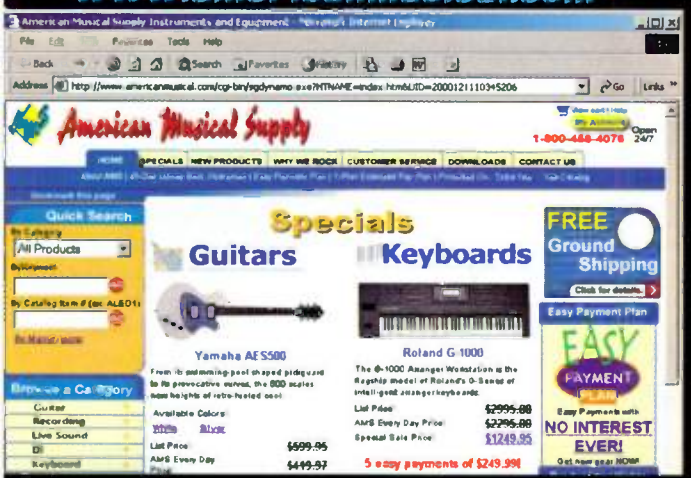


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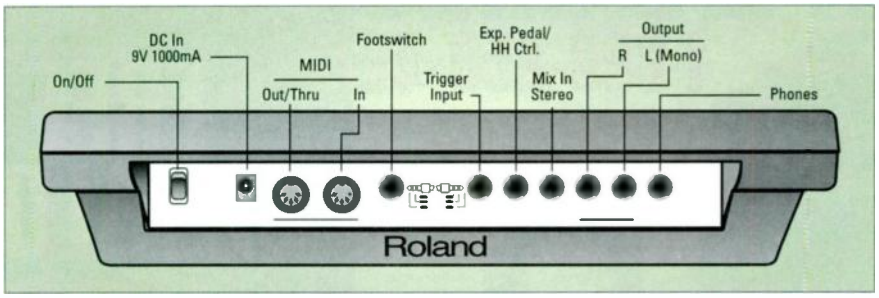


**FIG. 3: On the HandSonic's back panel, you'll find MIDI ports, an external trigger input, a footswitch jack, and an expression pedal jack that doubles as an input for a hi-hat pedal. In addition to two main outputs and a stereo headphone jack, there's a stereo input for external audio sources.**

an external trigger jack on the rear panel accepts one or, when used with a Y-cable, two trigger inputs (see **Fig. 3**). Also on the rear panel are a footswitch jack that accepts two footswitches when used with a Y-cable, as well as an expression pedal jack that accepts a hi-hat pedal. A comprehensive set of sensitivity, triggering, and function parameters configure all of those external inputs to trigger sounds and control them, sometimes simultaneously.

## ONBOARD SOUNDS

The HandSonic includes a healthy and well-organized selection of sounds, specifically 600 pad instruments and 54 backing instruments. The pad instruments are grouped into nine categories: Latin, African, Indian, Asian, Orchestral Percussion, Drums, Dance, SFX, and Others. In addition, 99 preset patterns can be triggered from pad sets B and C. These patterns are mostly loops in various styles, with a smattering of "OneShot" and "Tap" sounds to round out the collection. The backing instruments are primarily keyboards, idiophones (marimba, vibes, and so on), bass, guitar, and winds.

Pads or other controllers are assigned to trigger sounds. Those assignments, along with the associated sound parameters, onboard controller assignments, and rear-panel jack assignments, make up a patch. Roland has created 160 preset patches and provided locations in memory for 80 user patches.

Many of the preset patches are quite good, with logical layouts and assignments. After playing with the HandSonic, composer and **EM** contributor Peter Drescher gave two good examples:

"The pads of the main conga patch (Preset 01) are set up perfectly for playing [the HandSonic] like the real thing," Drescher says. "The lower left pad (A1) toggles the 'mute' sound on the lower right pad, so when you hit right hand down/left hand up, you get the open 'boop' sound, but right hand down/left hand down produces the muted 'pock' sound.

"A bunch of other patches are amazingly good, too, particularly the tabla," Drescher says. "Again, the layout of the pads is perfect for the various strokes, or 'bols.' When you hit the lower right pad (A5) in the middle, you get 'din,' but if you hit the same pad along the edge, you get the higher harmonic 'tin'—just like the real thing. [Roland] definitely had some real drummers' input on the design of this thing."

The Timpani preset features a great hand-damping effect, with the suddenness of the damping controlled by pressure: pressing the pad lightly dampens the sound gently, and pressing hard damps it abruptly. Getting the most out of this sort of programming requires practice, but a great deal of expressiveness is possible. Don't forget that the difficulty of achieving this level of expression has always been the Achilles' heel of electronic instruments.

Although many presets are well laid out, a few are less impressive. For instance, pads A2, A3, and A4 in Preset 03 (Timbales) have timbale hand-hit sounds that are so much softer than the regular stick-hit timbale sounds on A1 and A5 that I simply didn't use them.

Patches are collected into the same groups as the pad instrument sounds, with the addition of a tenth group called "Loops." The Loops patches are interesting. Typically, pad sets B and C are set up to trigger patterns; I could strike one of those pads and then jam over the pattern on pad set A. Some of the preset patterns loop, and others play once through. If you want to make a one-shot preset pattern loop infinitely or change its length, you can copy it to a user pattern and then edit it however you please.

The loops in a preset are often unrelated to each other in terms of tempo or feel, making it impossible to jam over one and then trigger another and jam over it. Once a loop starts playing, you can change patches to play instruments that are different from the sounds being played by the loop.

On balance, the factory patches are excellent. If you simply want to use the HandSonic as a substitute for a variety of percussion instruments, the factory patches should be sufficient.

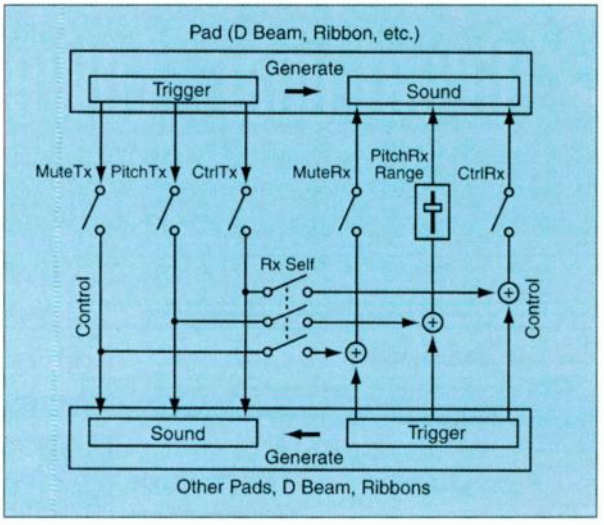


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**FIG. 4: The HandSonic's signal routing lets you enable and disable a variety of modulation sources and destinations, as well as trigger sounds from a number of sources.**

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Tonal instruments, such as Backing Instruments or pitched Orchestral Percussion, present additional technical challenges in performance. The easiest way to describe the problem is to say that playing a keyboard sound on the HandSonic is the evil twin of playing drum sounds on a keyboard. Learning to play complex figures and even chords using tonal instruments on the HandSonic is possible. However, it's much less awkward to play a MIDI controller that provides a technique that's closer to the technique associated with the original instrument.

## EVERYTHING CHANGES

The clear emphasis in the HandSonic is real-time performance, and that emphasis is reflected in its controls. The simplest control function is changing patches.

Three methods are available for manually selecting a patch. With any of these methods, press the User and Preset buttons below the graphic arc to toggle between the two patch banks. Patches can also be called with MIDI program changes from an external device.

Here's the method I used the most: In the upper right corner of the HandSonic's front panel, a graphic arc is divided into ten "slices," one for each of the ten patch groups. Each slice has an LED that lights to indicate when its patch group is selected. At the top corners of this graphic are Group + and Group – buttons to step through the slices. Inside the arc, at the bottom, are Patch Number + and – buttons. Simply select the group you want and then step to the desired patch number.

The second method employs the Patch Sel button just above and to the right of the pad array. Holding the Patch Sel button and striking one of the B or C pads selects one of the ten groups, and pads A2 and A4 serve as the patch number increment and decrement buttons.

The third method for selecting patches requires you to use the data entry dial, just to the left and above the Patch Sel button, to scroll through your choices.

The HandSonic lets you construct ten 32-step patch chains and then recall them with footswitches and group selection techniques. This provides a way to easily step through a collection of patches in any order you wish.

## EDITING TECHNIQUES

The current patch and all parameter edits are shown on the HandSonic's 2-line-by-16-character backlit LCD. The display's size is just barely adequate for the task, forcing you to step through lots of screens to perform edits.

In addition to a variety of options for changing patches, the HandSonic offers numerous approaches to editing. In each method a pad or controller is struck to select a parameter before its values can be changed.

Pressing the Edit button puts the HandSonic into EZ Edit mode, the highest editing level. EZ Edit lets you edit basic level, pan, and effects parameters of pad sets or patches. The other editing schemes let you edit individual pads or controllers. The Parameter buttons located below the LCD step through the available parameters, and the data entry dial alters parameter values.

The second and fastest method of editing uses the three semisoft Real-time Modify (RTM) knobs. A select button steps through three layers of control definitions for the RTM knobs, each knob performing a single function per layer. This three-by-three matrix proves to be a good compromise between dedicated and soft functionality. It lets you quickly access a small set of parameters with only three knobs, yet it provides a fair degree of control depth.

An RTM knob becomes active as soon as it's moved, and the associated parameter value jumps to the knob's current position rather than starting from its current value. That makes it hard to execute slight adjustments to current values.

For the lowest level of tweaking, pressing the Edit button twice puts the HandSonic into full-on Edit mode. Again, the Parameter buttons and dial are used to select and alter parameters.

Several shortcuts have been implemented for faster editing. For example, holding down one parameter button and pressing the other skips to the first setting in the next group of parameters. Holding down a single parameter button scrolls though the menu, but the rate of scrolling remains constant no matter how long you hold the button. Consequently, I discovered that multiple button presses are the fastest

### HPD-15 HandSonic Specifications

| | |
|---|---|
| **Playing Surface** | 10" rubber pad divided into 15 parts |
| **Real-time Controllers** | (2) ribbon controllers; D-Beam; (3) multifunction knobs; (1) ¼" footpedal input |
| **Polyphony** | 64 voices |
| **Sound Engine** | sample playback |
| **ROM/RAM Patches** | 160/80 |
| **ROM/RAM Patterns** | 99/99 |
| **Patch Chain** | 10 chains, 32 steps per chain |
| **Onboard Sounds** | 600 drum and percussion instruments; 54 backing instruments |
| **Sequencer** | 4-track; up to 999 measures |
| **Effects Processors** | (1) reverb; (1) multi-effects |
| **Audio Outputs** | (2) ¼" unbalanced L/R; (1) ¼" stereo headphone |
| **Audio Inputs** | (1) ¼" TRS stereo |
| **Additional Ports** | MIDI In, Out/Thru; (1) ¼" footswitch jack; (1) ¼" trigger input |
| **Display** | backlit LCD; 16 character × 2 line |
| **Dimensions** | 15.88" (W) × 3.88" (H) × 15.88" (D) |
| **Weight** | 6.63 lbs. |

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and most reliable way to make edits. In contrast, the shortcut for jumping through values by large increments is quite useful.

### TWISTING UP SOUNDS

Each sound has its own set of parameters, including level, pitch shift, pan, decay, color, and sweep. The pitch shift sounds good even at the extremes, up to two octaves in either direction. Panning includes modes that cause the sound to either alternate between left and right or to appear in a random location in the stereo field each time it's triggered. Color is a lowpass filter with a nice, warm quality; it becomes resonant at its most negative values.

The HandSonic has a versatile but step-intensive modulation scheme. Each controller has several parameters that enable the transmission of its control signals; correspondingly, each sound lets you enable its reception of control signals (see Fig. 4).

Here's an example of setting up modulators: To control the pitch of the sound assigned to pad A5 with the

**PRODUCT SUMMARY**

**Roland**
HPD-15 HandSonic
percussion controller/sound module
$1,295

| | |
|---|---|
| FEATURES | 4.0 |
| EASE OF USE | 4.0 |
| SOUND QUALITY | 4.0 |
| VALUE | 4.5 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Large collection of controllers. Extensive, well-organized variety of high-quality sounds. Good patch programming. Many performance-oriented features.

**CONS:** Rather fussy playing and editing technique. D-Beam false triggers easily. No external sync capabilities. Wall wart. LCD is too small. Unrealized potential as a more powerful MIDI controller.

**Manufacturer**
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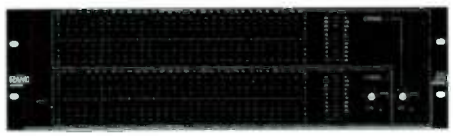

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right-hand ribbon, enter full Edit mode, touch the right ribbon, scroll to the Pitch Tx parameter, and set it to On. Then touch the pad, scroll to Pitch Rx, and set that to On. Finally, scroll to Pitch Rx range and set the pitch shift range.

If you're using Control Tx, you have to choose one destination parameter to control from a list of available choices in the controller's edit parameters and then turn on Control Rx in the destination's edit parameters. If you want to use a pad or controller to modulate a sound and the sound happens to be triggered by the same pad or controller, you must also enable the Rx Self parameter.

A less confusing and menu-intensive solution should have been possible, but the small display makes that difficult. Also useful would be the ability to transmit more than one control parameter per pad or controller—level and filter cutoff, for example, so the sound would get brighter as it gets louder. Still, the system remains powerful enough to allow control of parameters such as reverb send level and sequence tempo.

A single LFO with nine waveforms can modulate pitch, filter cutoff, volume, and multi-effects. Other controllers can be assigned to modulate the LFO modulation depth on those parameters. Unfortunately, the LFO doesn't sync to the sequencer or external sources.

## AFTER EFFECTS

The HandSonic features dedicated reverb and multi-effects processors, and there is a fair degree of crossover between them. For instance, the reverb processor has room, stage, plate, hall, and two delay algorithms, and the multi-effects processor has two reverbs and seven delays among its 28 algorithms. However, there are no duplicates between the two processors' algorithms.

In addition to the reverb and delays, the multi-effects include compression, distortion, chorus, flanging and phasing, ring modulation, Lo-Fi, an enhancer, and several kinds of EQ and filtering.

The effects' quality ranges from acceptable to very good. The reverb is nicely dense and somewhat colored, though not offensively so, but it has too much noise and graininess in the decay. The flanging, phasing, and chorusing effects generally have a pleasing quality. The distortion, like most digital distortion, is harsh and unpleasant unless the high end is rolled off significantly.

There are three strong pluses for the HandSonic's onboard effects: the variety, the real-time modulation possibilities, and the fact that two processors are included. Each effect has specific parameters that are available for modulation by the LFO or controllers.

For noncritical applications, such as most club gigs, the HandSonic's effects are fine. For studio recording or concert performances, you'll want to employ higher-quality external reverb.


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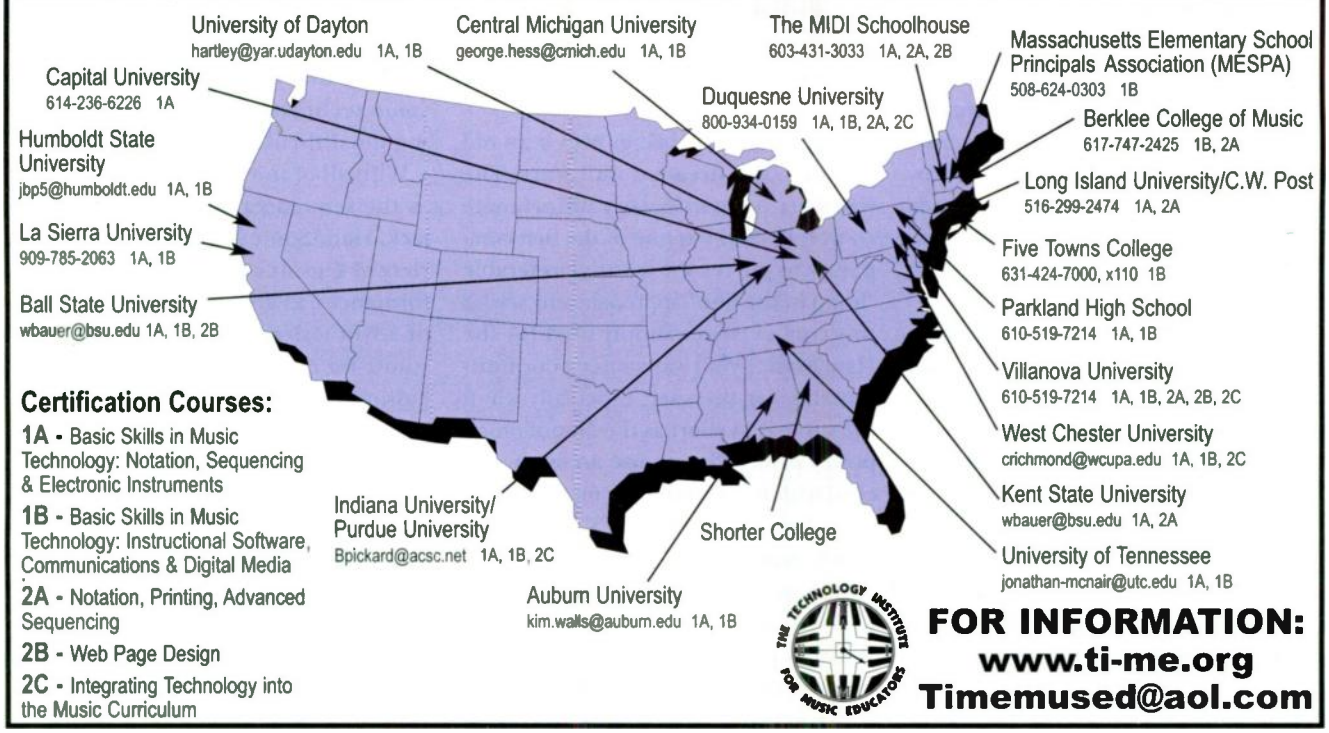

## SEQUENCING PATTERN

The HandSonic's 4-track pattern sequencer lets you build patterns as long as 99 bars on two percussion tracks and two melody tracks. Only pad instruments are available for the percussion tracks, and only backing instruments are available for the melody tracks. Both user and preset patches are present.

Loop recording is supported. You can also overdub on successive passes until you hit the 64-voice limit. There are 99 preset patterns in several styles and memory locations for 99 user patterns. The preset patterns work well for practicing and other purposes.

Editing sequences, like editing patch parameters, requires a lot of stepping through the menus, which is difficult during a real-time performance. Real-time sequence editing is possible once you learn how to do it, especially if some sequence parameters (tempo, length, sound assignments for the tracks, and so forth) are defined in advance.

Although the interface is a little awkward, I was impressed with how dense and how long a sequence I could construct with just four tracks. Sequences can also be dumped into and loaded from external sequencers through MIDI.

## I/O OPTIONS

Speaking of MIDI, all the pads and controllers make the HandSonic very attractive as a MIDI controller. Although it's well suited to controlling external instruments, it has a few limitations. For instance, I'd like to be able to assign the edge zone of the largest pads to transmit a different MIDI note number on a different MIDI channel than the center zone.

Transmitting Note On and Note Off is no problem; each pad or controller (including controllers from the rear panel jacks) can be assigned a MIDI note and gate time, but all note data is sent on a single MIDI channel. However, each track of the sequencer can send and receive on any single MIDI channel.

The D-Beam and ribbons can send Control Change messages, but the controller numbers are fixed (CC 81–83), and there are no range or minimum and maximum value settings. The expression pedal jack sends messages on CC 4. You can also send Polyphonic Aftertouch from the controllers or the pads.

The HandSonic has only two MIDI jacks: In and Out/Thru. Out/Thru is a misnomer, as is the SoftThru on/off setting that switches its function. The most accurate description would be Out/Merge. With SoftThru set to off, only HandSonic output is sent; setting SoftThru to on merges messages entering the MIDI In port with messages generated by the HandSonic.

The HandSonic's audio outputs are a stereo pair of unbalanced ¼-inch phone jacks as well as a ¼-inch stereo headphone jack. Also present is a stereo ¼-inch phone input labeled Mix In; this jack lets you combine a signal from another sound source, such as a CD player, with the HandSonic's sounds.

This audio input is great for playing over recorded material or mixing in the output of another player's instrument for jamming. The Mix In jack is probably useful for a host of other applications, especially for DJs.

## MINOR CONCERNS

Apparently, Roland never considered that you might want to play with the HandSonic sitting on your lap. Its flat bottom makes it awkward to play the way you would play most hand drums. The HandSonic is designed to sit on a tabletop or a stand, like a typical drum pad controller.

The HandSonic brings with it an old nemesis, the dreaded wall wart. The wall wart is a particularly unfortunate choice. Roland was one of the first companies to purvey the greatly preferable "lump in the line" approach; why wasn't this type of power supply used for the HandSonic? Wall warts offer poor functionality for the user, especially when the cable is as short as the HandSonic's power cable. Plan to use an extension cord with the HandSonic onstage. The only alternative is to have a power strip within arm's length.

Perhaps as a slight penance for the wall wart, Roland has provided a small lock that prevents the power cable from being inadvertently pulled out. This is a nice gesture, but it's more likely that the wall wart will get pulled out of the extension cord.

The user manual contains excellent diagrams, lists each user-programmable parameter, provides complete documentation of the MIDI implementation, and has a reasonable index; these strengths are all worth acknowledging. Unfortunately, the user manual also suffers occasionally from awkward and unclear wording, which is apparently the result of a poor final edit. After so many years of providing documentation for music technology products, Roland has little excuse for sentences that don't make sense.

## IS THIS COOL OR WHAT?

The HandSonic is really a gas to play. It feels great: the pads are easy on the hands and the rim around the pads is rounded so you don't bruise yourself. The sounds respond to the pads in a very expressive manner. I love all of the alternate control sources: ribbons, D-Beam, and all the rear-panel jacks.

The breadth of the sound set is impressive and gives the instrument a lot of range. With only a few exceptions (I could lose the thunder sound forever and never miss it), the quality of the sounds is high.

As a performance instrument, the HandSonic offers a lot of easily accessible flexibility. Playing the HandSonic requires that you develop and practice some technical finesse, but it's nothing too difficult to master.

With all of the included extras, such as the sequencer, effects, and Mix In jack, HandSonic is well suited for a variety of gigs. It could serve for DJ performances, as an adjunct to a drum kit or a synthesizer rig, or simply as a substitute for carrying lots of acoustic percussion instruments, just to name a few possible uses.

The HandSonic's high degree of utility and functionality, combined with a truly awesome fun factor, makes it a wonderful and unique addition to anyone's musical collection.

---

**Larry the O** *is a musician, producer, and engineer who currently performs on MIDI mallets with Action Palace.*

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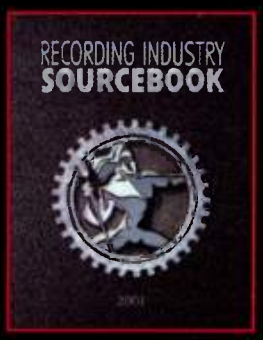


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# MICROWORKS

## CAMPS 4.0 (WIN)

### *A sequencer smart enough to lend a hand.*

**By Brian Smithers**

If you've ever hit a mental block when searching for the right chord or a variation on a melody, the people at Microworks can give you some assistance. They have created the *Computer Assisted Music Processing System (CAMPS),* an algorithmic composition program that might shake your creative logjam loose. *CAMPS* 4.0 features a reasonably complete sequencing environment and tools to generate virtually any element of a piece of music.

With an array of automatic tools, from harmonization to melody composition to drum arranging, *CAMPS* certainly covers a lot of bases. Though its language is that of music theory, *CAMPS'* features are accessible to users with little or no formal training. Ultimately, though, the autocompose features' nature and quality determine whether the program is useful to you.

## GETTING IN AND AROUND

The first thing I noticed when I opened *CAMPS'* box is the almost complete lack of hard-copy documentation. Only four sheets of paper are included with the installation CD. One page is devoted to a Quick Tour of the *CAMPS* environment, and the other three are concerned with the proper installation and authorization of the program. Read those pages carefully to avoid problems with your registration key.

Using a standard challenge-and-response technique, *CAMPS* hides a digital license on your hard drive. This requires that you extract the license to a floppy disk if you transfer the program to another computer. Unfortunately, you must also do this every time you defragment your hard drive, a huge annoyance for musicians who defrag their drives frequently. According to Microworks, the procedure is required because of Windows operating system limitations and may be resolved in the future.

If you're familiar with another sequencer, *CAMPS'* environment should be as comfortable as old jeans. The default startup window is a standard Track view with toolbars at the top and bottom of the screen (see **Fig. 1**). Other editing views include the Notation Editor, Piano Roll Editor, Event List Editor, and Controller Draw Editor.

Upon closer inspection, the Track view proves to have two unique features. First, an extra track called the Chord Track lets the user set an extensive group of parameters that establish the key, mode, and function of each chord in a song (see **Fig. 2**). These parameters are the guidelines that the program uses to generate alternate chord progressions. The second unique feature is the categorization of each track according to its function. Categories range from Melody to Bass to Drum, and they guide *CAMPS* in its analysis of existing parts and in the creation of appropriate new lines and harmonies. (The Drums category indicates that *CAMPS* should compose lines appropriate for unpitched instruments and that it should ignore that track when doing a harmonic analysis.)

As a sequencer, *CAMPS* is fine but not fancy. I like the fact that many commands are available directly from the keyboard or the right mouse button. I was able to play and record MIDI tracks, import Standard MIDI Files, and even tinker with all the autocompose features before cracking the online manual. The one truly obscure procedure is setting tempos, which is only possible from the Tempo List Editor or the Tempo Draw Editor. Unlike other sequencers, *CAMPS* doesn't have a dialog box where you can enter a tempo value, which I found awkward.

The program's online help feature is a model of hyperlinked organization. I can't imagine anyone doing a better job with that format, yet I found myself begging for a hardbound manual. A PDF file on the CD helps some, but unfortunately, it follows the online help structure. Hyperlinked help files are a great reference for retrieving details and cross-referencing information, but they just don't cut it for the linear process of learning new software.

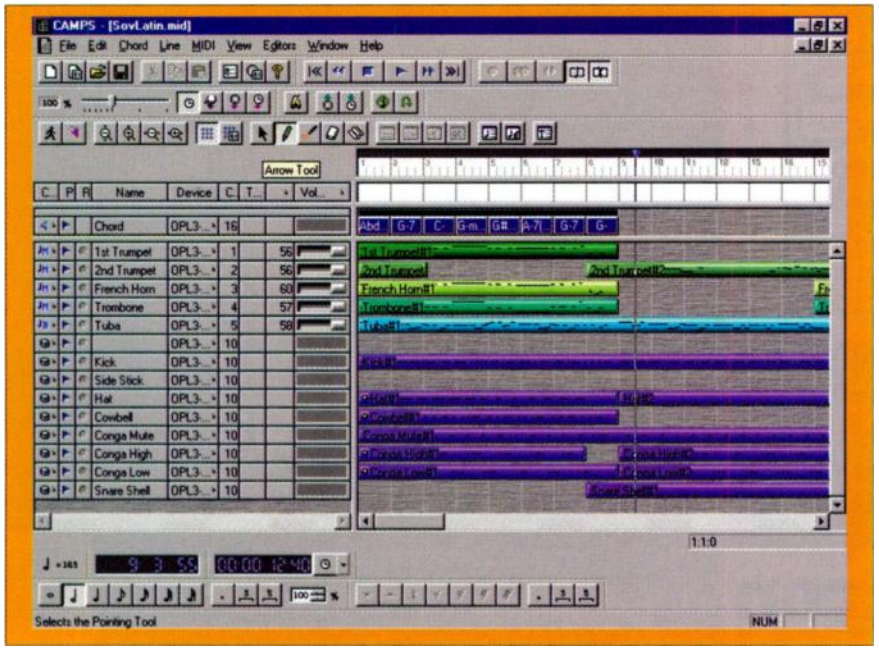
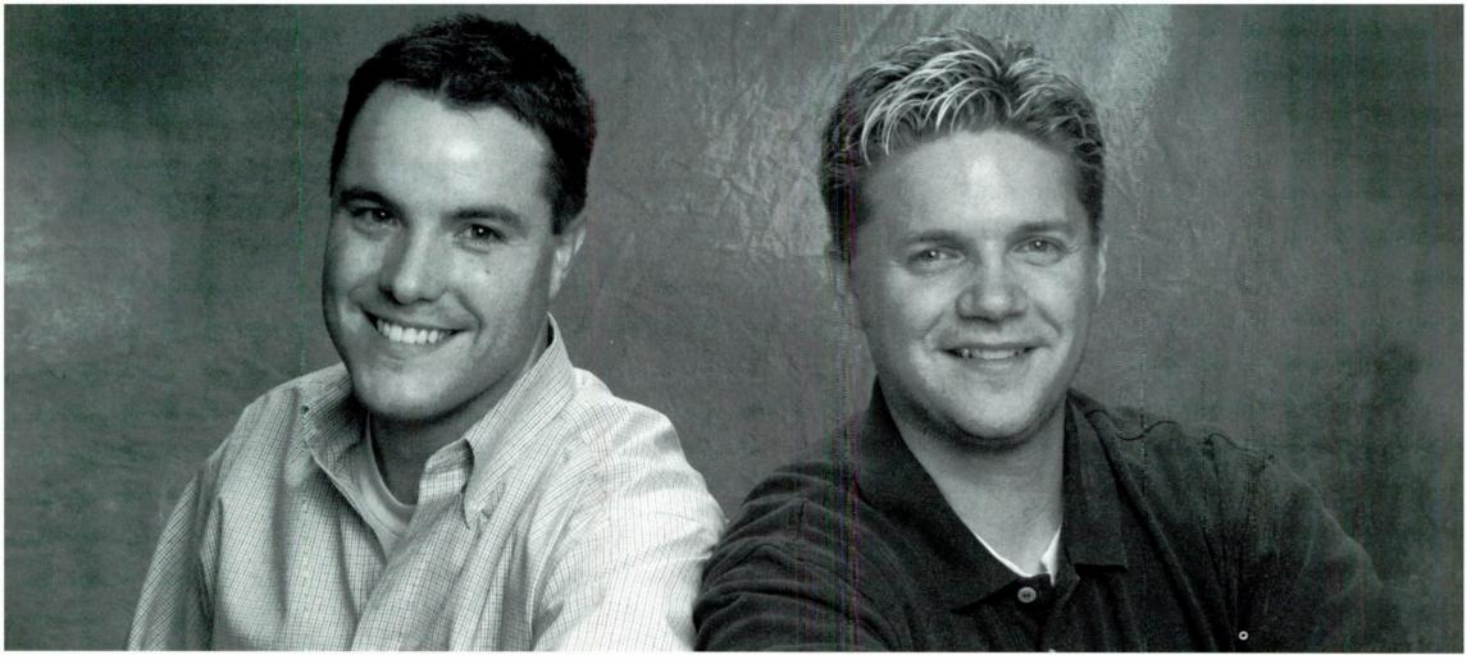



**FIG. 1: The default *CAMPS* environment resembles the familiar track view of most modern sequencers. The Chord track at the top of the track area is a hint that there's something different about this program.**



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## A FISTFUL OF CHORDS

The real power of *CAMPS* is in its autocompose features, including its ability to analyze the Chord Track and any existing MIDI tracks and make suggestions based on that analysis. Using the user-defined parameters in the Chord Track as a reference, the program can generate a completely new chord progression or suggest hundreds of alternative progressions that harmonize with existing tracks. You can also manually construct any of the chords yourself or simply have *CAMPS* analyze an arrangement's chord progression from the existing tracks.

The Chord Track is subdivided into Chord Blocks, and each Chord Block is made up of one or more Chord Containers. A Chord Block is nothing more than a way of dealing with groups of Chord Containers—for example, identifying them for reharmonization or performing standard cut, copy, and paste functions. A Chord Block usually corresponds to a complete musical phrase or subphrase, typically from four to eight bars. The length of a Chord Block can be defined manually or determined automatically based on *CAMPS*' analysis of existing tracks.

The really useful information resides in the Chord Containers. Each Chord Container contains only one chord, but the name "Container" reflects the fact that a Chord Container also holds information about the chord's key, mode, and duration—the factors *CAMPS* analyzes to determine potential alternative chords. The same Chord Container could therefore represent any number of chords that share the defined parameters. You can establish the harmonic tendencies of Chord Containers manually or let *CAMPS* sort them out from your existing MIDI tracks.

*CAMPS* provides three basic functions for manipulating chords: Generate, Harmonize, and Construct. Those functions also come in some "EZ" flavors, which, in combination with a Magic Wand tool, give novices quick results with predetermined algorithms. The authors are quick to point out, though, that the more input you provide, the more useful and musical your results will be.

## HARMONIC COMPLEXITY

I tested the program by importing a MIDI file of a salsa-esque original composition built around a stock chord pattern, namely one bar each of G minor, F, E♭, and D7. The arrangement consisted of 13 tracks: two trumpet; one each of horn, trombone, and tuba; and eight percussion. The piece's first eight bars were completely chordal and, with the exception of a single chromatic note in the tuba part, completely diatonic. *CAMPS* did a perfect job of analyzing the tuba part's function as a bass line and the drums as nonharmonic information, correctly declaring the other brass parts to be melodic lines.

**Minimum System Requirements**

**CAMPS**
Pentium processor; 32 MB RAM; Windows 95/98/NT

When I asked *CAMPS* to EZHarmonize the entire arrangement, though, I received some very strange results. The Harmonize function is intended to generate chords that fit with existing pitched data, yet its first chord choice on repeated harmonization passes was an F♯ diminished or G♯ diminished, despite the clear tonality of the music. Even removing that one chromatic tuba note didn't help.

Heeding the authors' advice that EZ functions are merely a starting point, I next tried to Harmonize the song. When I selected the Harmonize function, a dialog box opened and started listing dozens of Detected Keys and Modes and hundreds of Detected Chord Progressions, all at lightning speed (see **Fig. 3**). I selected G minor as the key and mode to focus on, and all the displayed chord progressions reflected that choice, more or less. Though EZHarmonize failed to suggest a starting chord of G minor on repeated passes, almost half of the suggestions in the Harmonize window started with that chord. Still, after scrolling through screen after screen of suggested chord progressions, I never found the pattern I thought my music implied.

If you're looking for ideas to shake up your staid harmonies, you may regard this tendency to avoid obvious

**FIG. 2: This expanded view of the Chord Track shows the parameters *CAMPS* uses to harmonize and generate new chords. Each chord is organized into a Container, which has a characteristic key and mode. Right-clicking on any chord opens a menu that offers an extensive list of alternate progressions.**

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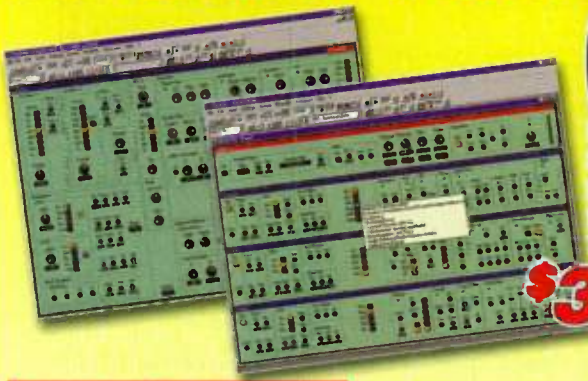

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choices as a good thing. Clearly *CAMPS* is not short on imagination; I suspended the search for possibilities at around 10,000 G-minor chord progressions.

I started a new file and tried to restrict the possible harmonizations further by entering a simple chord-based melody and also defining specific first and last chords. The good news is that *CAMPS* takes the chords before and after a harmonization region into consideration when generating alternatives. The bad news is that the Harmonize dialog box only lets you audition the newly generated chords and doesn't let you hear them in context. On the other hand, if you attempt to Harmonize several noncontiguous chords, it will play the intervening chords during the preview.

Next I entered five bars of George Gershwin's "I've Got Rhythm," one of the most common chord progressions in Western music. I included a simplified melody and the tonic chords that occur in the first and fifth measures. Then I selected measures 2 through 4 for harmonization. I wasn't forced to suspend the process this time, as there were only 997 variations, a much more manageable number. There were fewer jarringly dissonant suggestions, but I was still surprised to find that the familiar I–vi–ii–V progression was number 101 on the list of suggestions, with the rock 'n' roll version (I–vi–IV–V) barely beating it at number 97.

When I asked Microworks about the problem, I was told that to avoid making stylistic decisions, *CAMPS* does not prioritize results in any particular order. I think there needs to be some way the user can manage the program's many suggestions. Providing more effective tools to organize or constrain the results would make *CAMPS* a far more useful program. In its present form, the program lacks the tools to control its own imagination.

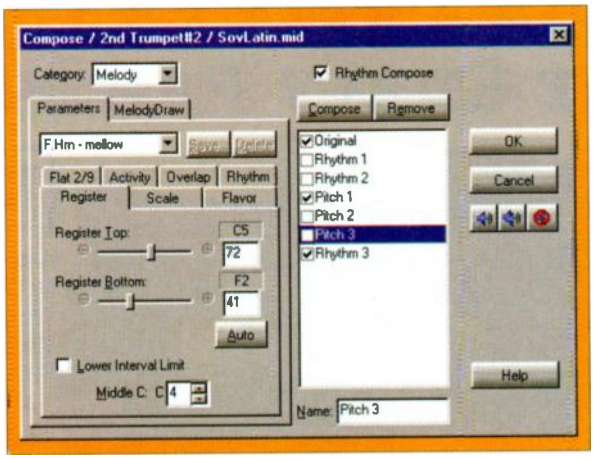


**FIG. 4: *CAMPS'* Compose dialog provides access to various parameters for creating new and altering existing melodies. The MelodyDraw tab opens a screen where the user can draw a melodic shape as a template for the autocompose process.**

To have the program create alternative chords without considering existing MIDI lines, use the Generate function. In this mode, *CAMPS* bases its choices solely on the existing key and mode data defined in the Chord Containers. When I generated alternatives to the first eight bars of my salsa tune, *CAMPS* offered 500,000 suggestions before I suspended the process. The first 13 suggestions were variations of the first chord with the rest of the phrase harmonized simply as I–ii–V–I–ii–V–I. The next 135 patterns varied the first two chords while keeping the remaining six bars constant. *CAMPS* generated about 20,000 progressions before varying the fifth bar.

These results from the Generate function again make apparent the absence of tools to distill the program's "creativity." Though the pattern of results was predictable, (varying only the first chord, then the first two, then the first three, and so forth), I found wading through half a million suggestions difficult. The fact that Generate gives you the flexibility to ignore melodic lines also makes me wish Harmonize respected existing lines more. That would allow the user more control over the number of outside-of-the-box suggestions.

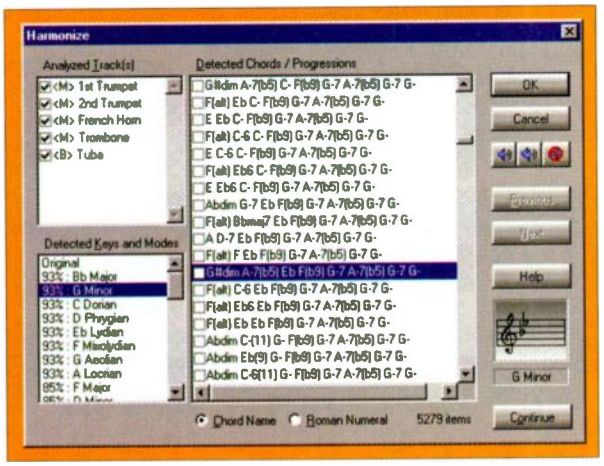


**FIG. 3: The Harmonize dialog box provides the tools to create alternate chord progressions. By highlighting one of the Detected Keys and Modes, you can ensure that *CAMPS* won't consider any tracks containing dissonant or potentially confusing notes when it suggests new chords and progressions.**

## LISTEN TO THE MELODY

*CAMPS'* Compose function is its only tool for generating new or transforming existing melodic lines, yet Compose utilizes more internal parameters than the chord functions (see **Fig. 4**). It also tends to be more conservative in its suggestions, varying the melody a little bit at a time depending on how you set up the parameters.

The Compose dialog box allows you to determine the relative consonance, melodic activity (for example, use of repeated notes and size of skips), rhythmic characteristics, and scale and range of the melody, among other factors. You can choose to have the new melodies follow an existing rhythm, or you can select Rhythm Compose to hear variations. All those factors affect the degree to which the melody is altered.

Numerous Compose presets are included that illustrate the algorithm's flexibility. Mellow Alto Sax, for example, has a range of less than two octaves, a very high consonance level, and a maximum leap of a perfect fifth. Out Guitar, by contrast, features twice the range and a significantly higher tendency toward

dissonance. There are different presets for every Line category, with the tendencies of an Obbligato or String line modified appropriately for its role in the overall arrangement.

A unique feature called MelodyDraw lets you draw a shape for the melody to follow. That may be one of *CAMPS*' strongest features as it allows a composer to say, in effect, "Give me a moderately dissonant line that descends for six bars and then reverses direction." MelodyDraw could be improved with the addition of a larger drawing window or a variable zoom for the window. Once I established chord patterns that I liked, I found MelodyDraw and the other Compose features to be potentially useful.

*CAMPS* even adds harmonies to a line with any combination of several standard voicings. Open the Notation or Piano Roll View, select a line for Voicing, and you are presented with a note-by-note dialog for choosing Cluster, Close, Drop-2, Drop-3, Drop-2&4, Fourths, Spread, or Upper Structure Triad voicings. That is an impressive array of arranging techniques, but selecting voicing styles on a note-by-note basis is pretty tedious.

Fortunately, *CAMPS* remembers the last voicing you used. The next time you open the Voicing dialog box, it assigns the previous voicing as the default for all selected notes. As long as you plan to continue in the same voicing style, this feature saves you a lot of effort. Still, I would prefer to select a voicing style for the entire selection and then tweak individual voicings as necessary.

## RATTLE YOUR MUSE

Make no mistake: *CAMPS* packs a lot of musical intelligence. Also, it performed at blazing speed on everything from a Pentium III/450 MHz to a mere Pentium 120 without a hiccup. It's the kind of direct, efficient, no-nonsense program I love to use.

Nevertheless, I was frustrated by the lack of control over the harmonization process. It's great that *CAMPS* generates the type of chromatic substitutions jazz players thrive on, but it has trouble dealing with simple triadic pop harmony. In addition, I discovered that its harmonic vocabulary lacks one of the most common dominant substitutions in pop music: the IV chord over the V chord's root (for example, an F triad over a G bass in the key of C). Moreover, the process of limiting and defining results is pretty clunky: if triadic harmony is possible, it isn't easy to achieve. Overall, the melodic tools are more useful, yielding possibilities that seem more appropriate. Undoubtedly this is due to the greater degree of user control over the process.

If you're looking for something to rattle your muse's cage, download the fully functional, 30-day demo. Considering the nearly limitless possibilities that *CAMPS* can suggest, you'll certainly never be able to say, "I hadn't thought of that!" again.

**PRODUCT SUMMARY**

**Microworks**
CAMPS 4.0 (Win)
intelligent MIDI sequencer
$369

| | |
|---|---|
| FEATURES | 3.0 |
| EASE OF USE | 4.0 |
| DOCUMENTATION | 3.5 |
| VALUE | 3.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Offers hundreds, even thousands, of chord and melody variations. Good user control over melodic parameters. Requires little theory training.

**CONS:** Difficult to sort through myriad alternatives. Not enough control over chord suggestions.

**Manufacturer**
Microworks Corporation
tel: (973) 492-1691
e-mail: info@mxw.com
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**Brian Smithers** *is associate course director of MIDI at Full Sail Real World Education in Winter Park, Florida. You can reach him through his Web site at http://members.aol.com/notebooks1.*

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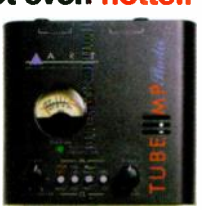

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# EMAGIC

## UNITOR8 MKII

### *Stability and simplicity for the chaotic world of MIDI.*

By Alex Artaud

Last year Emagic introduced the Unitor8 MkII, its flagship USB MIDI interface for the Mac OS and Windows 95, 98, and ME. This 8-In/8-Out, 128-channel, single-space rack-mount device offers solid synchronization features that let you connect to and address professional video decks. It also includes a MIDI timing innovation for *Logic Audio* that users will be delighted to have.

Though some sequencer users have experienced problems with USB MIDI interfaces, Unitor8 operation is hassle-free, even under the most punishing circumstances.

**Minimum System Requirements**

**Unitor8 MkII**

**MAC:** Macintosh 68000; 12 MB RAM; Mac OS 7.0; free modem or printer port, or USB port

**PC:** 486 DX2/66; 12 MB RAM; Windows 95/98/ME; free COM port (1–4) or USB port

### HAVEN'T WE MET?

The Unitor8's spare appearance bears a striking resemblance to the Opcode Studio 4 (see **Fig. 1a**). In the Mac OS, Emagic's interface emulates Mark of the Unicorn's MIDI Timepiece AV. As a result, the Unitor8 offers the best of both worlds, merging Opcode's clean design with MOTU's widespread support for FreeMIDI- and Open Music System (OMS)–compatible software. In Windows, it works with MME-compatible software. A wall wart supplies power to the Unitor8.

The front panel has red LEDs for MIDI input and green LEDs for MIDI output. There are also LEDs for SMPTE synchronization status and LEDs to indicate activity on the USB, RS-232, and RS-422 ports. The LEDs are bright enough to be seen easily from across a room, and their brightness is adjustable.

MIDI In and Out ports and a Click In jack are on the front panel's left side. A Panic/Patch button sends an All Notes Off command for stuck notes. Because the power switch is the only front-panel control, a computer must program and store MIDI or sync features.

On the back panel, there are ports for VITC SMPTE, LTC SMPTE, USB, RS-232, and RS-422, in addition to seven MIDI inputs and outputs (see **Fig. 1b**). The serial port connections let you stack up to eight Unitor8s for a total of 64 MIDI ports and 1,024 MIDI channels when you run *Logic Audio* in Windows 98 or ME. Stacking is not an option for Windows 95 users, who are limited to 11 MIDI ports. (That limitation is apparently caused by a bug in Windows 95 that's also present in Windows 2000.) USB drivers are still being developed for Windows NT and Windows 2000, and a beta version of a Com port driver for NT is available on Emagic's Web site.

### CONTROL ISSUES

*Unitor8 Control* is a specialized version of Emagic's *SoundDiver* that has been customized for configuring the Unitor8. Investigating its features provides a sense of what the Unitor8 can do.

The *Unitor8 Control*'s main window is the Device window (see **Fig. 2**). In this window, you can manage 32 MIDI port configurations, or patches, that the Unitor8 stores. Double-clicking on a patch name displays a graphic-editing window with an 8-In by 8-Out MIDI matrix. Within the matrix, you can make or break connections between inputs and outputs.

When you've finished setting up a configuration, you can name and save the patch. You can then call up patches with Program Change commands. Edits made in *Unitor8 Control* automatically transfer to the Unitor8 and store in memory. To maintain data consistency between the software and the interface, the Unitor8 transfers its settings to *Unitor8 Control*, and *Unitor8 Control* settings are sent to the Unitor8.

The Device window's left side has a table that displays as many as eight Unitor8s and their associated firmware versions. *Unitor8 Control* addresses multiple Unitor8s as a single unit. The Patch window's right side has selections for Patch Mode Setup, Computer Mode

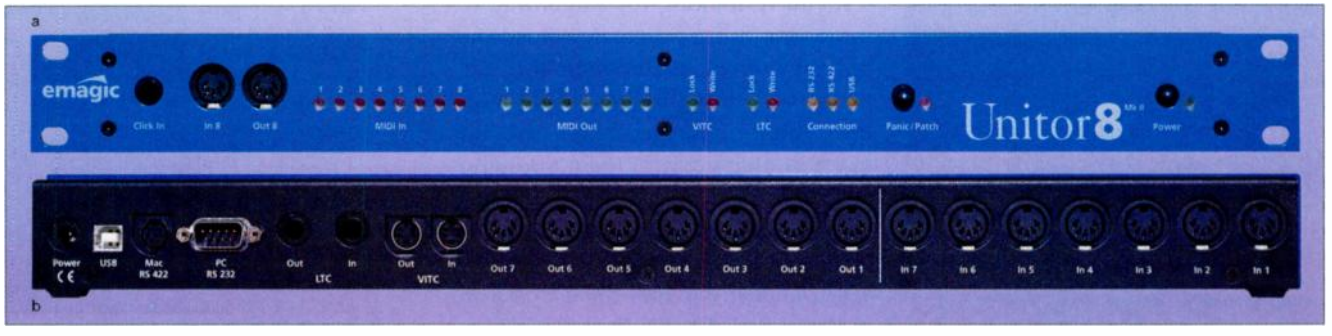


**FIG. 1: Emagic's Unitor8 MkII combines MIDI routing, innovative MIDI timing, and synchronization features in a clean, spare design. In addition to a USB port, the Unitor8 includes serial ports for older Macs and PCs. Also shown are inputs and outputs for SMPTE and MIDI.**

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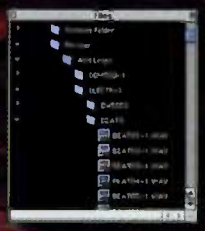

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WRH

Setup, Click Input Setup, and Global Setup. Patch mode may appear more limited than Computer mode, but it lets you disconnect the Unitor8 from your computer and use it as a standalone unit.

If you stack two Unitor8s, the matrix updates to 8-In by 16-Out. As you add more Unitor8s to your setup, MIDI data coming into one input is fed to multiple outputs (for example, 8 by 24, 8 by 32, and so forth). You might expect that you increase the number of inputs as you stack interfaces, but in fact, there's a limit of eight addressable MIDI inputs; all of the corresponding inputs of each Unitor8 will merge. So if you stack eight Unitor8s, data going to MIDI In 1 on Unit A will correspond to MIDI In 1 on Units B through H. Emagic assumes that nobody uses more than eight MIDI controllers simultaneously, which isn't necessarily true.

**FIG. 2: A descendant of *SoundDiver*, *Unitor8 Control* lets you edit all settings in the Unitor8. Shown above is the Device window, which manages the 32 MIDI port configurations stored in the interface.**

## IT'S A SETUP

Patch Mode Setup and Computer Mode Setup offer various customization options for the Unitor8's synchronization activities. In both Mode Setup windows, you can select whether the Unitor8 generates and receives LTC SMPTE, LTC EBU, or VITC SMPTE time code. Unlike Patch mode, Computer mode can stripe SMPTE, letting you record time code onto a tape so it can sync to your sequencer. Post-production pros should appreciate the Unitor8's ability to burn time code into video pictures.

A choice of frame rates (24, 25, 29.97, 29.97 drop, 30, and 30 drop) provides the ability to sync with a variety of formats. The Refresh option assists in handling poor-quality time code. In the Mode Setup Windows you can also enable Video Thru, read lines to properly sync to VITC (in which the Unitor8 scans the video signal and adjusts to the right line), and adjust the freewheel time, which is the time the Unitor8 takes to sync to an internal reference.

You can manually switch the video format from NTSC to PAL, but an Auto setting lets the Unitor8 automatically recognize the current format. Pro Tools users can adjust the Full Frame Message to select the number of frames they want to transmit. Other options include

## ALL IN THE FAMILY

If you don't need sync capabilities, the Emagic AMT8 ($499) offers most of the Unitor8's features and performs just as well. The AMT8 is a relative bargain for musicians who need a good patching system for multiple MIDI devices.

The AMT8's front panel is virtually identical to the Unitor8's, and the chassis is the same. The Click Input and LED readouts for VITC and LTC are absent, and you can't update the AMT8's firmware with MIDI. The AMT8 retains AMT's benefits and the ability to stack multiple units and to address and configure them with Unitor8 Control software.

I hope Emagic will consider adding a Click Input to the AMT8. Although the AMT8 is superb for live applications, you can't receive timing data from external audio sources or trigger sequences with a footswitch.

Beyond those minor concerns, the AMT8 is a good value. I subjected the AMT8 to the same abuse as the Unitor8, and it never flinched. If you already own a Unitor8, buying an AMT8 is a less expensive route to adding MIDI channels.

If you have rudimentary MIDI requirements and you are also on a tight budget, look into the Emagic MT4 ($199). Roughly the size of a thick chalkboard eraser, the MT4 is the smallest of Emagic's MIDI interfaces. The unit shares several traits with its larger relatives.

The 2-In/4-Out unit provides 64 MIDI channels and receives its power from the USB port. Six LEDs on the front panel correspond to the six MIDI ports, and two additional LEDs indicate the Patch Mode and USB power status.

Like the Unitor8 and AMT8, *Unitor8 Control* lets you configure and store up to 32 patches. You can play any MIDI instrument in your studio without running sequencer software. Because it relies on USB for power, the MT4 offers standalone operation as long as it's connected to a powered USB hub. If you use a laptop in live performance, you'll appreciate the MT4's portability.

While I was waiting for the delivery of the other two interfaces, I spent some time with the MT4. Its ease of integration with *Logic Audio* was a good sign; all I had to do was connect the MT4 and get to work. I had no problems using the MT4 with *Logic Audio* running under its proprietary driver or OMS. Even when I put the MT4 through the same rigorous testing as the Unitor8, the timing was excellent.

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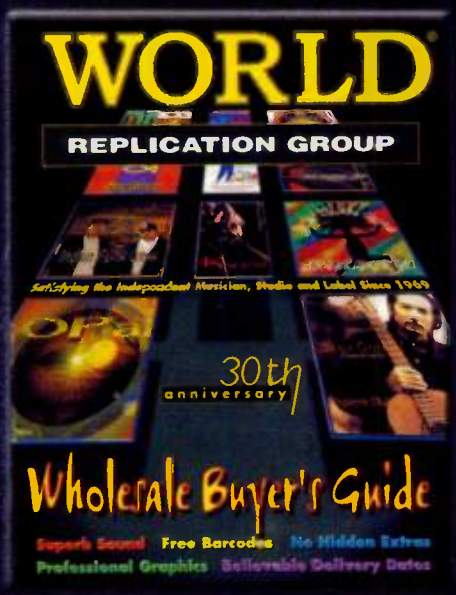


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enabling MIDI Time Code out and selecting the MIDI transmission channel or channels. You can also adjust LTC output gain with an onscreen fader.

Patch Mode and Computer Mode have input and output filters for certain MIDI commands, including MTC, SysEx, Active Sensing, Tune Request, System Real Time, System Reset, and Song Select. Most pro-level sequencers offer the same filtering options, but having additional data filters doesn't hurt.

The Unitor8's Click Input is a simple feature that offers lots of functionality. In the Click Input Mode window, you can configure the input to accept a repetitive audio signal, such as a click or a kick drum, or a trigger from a footswitch. If your footswitch terminates with a TRS plug, you can reconfigure the tip and the ring independently to connect a double footswitch for a greater range of functions. Applications include synching *Logic* to taped material through the sequencer's Tempo Interpreter and using a footswitch to start and stop your sequencer. For live performance, you can also configure a footswitch to skip through program settings or to serve as a panic button.

## GRACE UNDER PRESSURE

My first test of the Unitor8 MkII was to brutalize it with enormous amounts of MIDI data. I connected it to the USB port of a single-processor Power Mac G4/450 MHz. The Mac was running *Logic Audio Platinum* 4.5.1 under its proprietary driver and controlling an Akai S6000 sampler, an array of tone generators, and some analog synths connected to an Encore Expressionist MIDI-to-CV converter.

Recording and playback were seamless, even with lots of wild Pitch Bend and Aftertouch information. Without hesitation, the Unitor8 handled all the real-time control data I threw at it. Next, I quit *Logic*, stacked an Emagic AMT8 (see the sidebar "All in the Family") with the Unitor8 by connecting their RS-422 ports, and launched *Logic* again. I spent an hour pummeling both interfaces, which performed without even a whimper.

Running *Logic Audio* without OMS provides a higher degree of timing accuracy. Using *Logic Audio*'s built-in driver bestows the advantages of Active MIDI Transmission (AMT), which is implemented in the Unitor8's design. AMT actually puts part of the MIDI timing engine into the interface. MIDI commands are received in "packets" during the pauses between note events and held in a buffer in the Unitor8. The commands are then unpacked and released to the individual outputs at the precise moment they are required. Emagic claims this feature dramatically reduces potential delay problems. No other sequencer or music software company supports AMT.

All synchronization features worked perfectly for me. Striping SMPTE was a breeze; I locked machines with no hassle whatsoever. With an Alesis BRC's aid, I tried synching ADATs using the Unitor8's LTC SMPTE output. That task required some minimal adjusting within *Logic* and *Unitor8 Control*, but once it was set up, it worked well. Slaving *Logic Audio* to the BRC was also a simple operation.

PRODUCT SUMMARY

**Emagic**
Unitor8 MkII
MIDI interface/SMPTE synchronizer
$799

| | |
|---|---|
| FEATURES | 4.0 |
| EASE OF USE | 4.0 |
| DOCUMENTATION | 4.0 |
| VALUE | 3.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Seamless operation when paired with *Logic Audio*. Simple to configure using *Unitor8 Control* software. Performs well under pressure.

**CONS:** No front-panel configuration or control. No word clock or ADAT sync out. Expensive.

**Manufacturer**

Emagic USA
tel. (530) 477-1051
e-mail emagic@emagicusa.com
Web www.emagic.de

## IT TAKES A LICKING

There's a lot to like about the Unitor8 MkII. Its flexible routing is a welcome complement to its abundance of I/O options, though I wish it had ADAT sync and a word-clock port. With a direct connection to an ADAT, there would be no need to use a BRC or a JLCooper DataSync. Unfortunately, the back panel has no room for additional ports. On the plus side, you can update the Unitor8's firmware through MIDI, so future improvements are possible.

Combined with *Unitor8 Control*'s excellent layout and *Logic Audio*'s wealth of features, using Unitor8 MkII is a breeze. It works smoothly under OMS and performs beautifully under duress. The price may seem steep, but when you need a powerful interface that gets the job done, the Unitor8 MkII won't let you down.

**Alex Artaud** *operates a recording studio in the San Francisco Bay Area. He has worked with music technology for more than 15 years.*

## Unitor8 MkII Specifications

| | |
|---|---|
| MIDI I/O | (8) MIDI In; (8) MIDI Out |
| MIDI Channels | 128 |
| SMPTE In | (1) ¼" VITC; (1) S-video LTC |
| SMPTE Out | (1) ¼" VITC; (1) S-video LTC |
| Computer I/O | USB; RS-232; RS-422 |
| Other Ports | external footswitch/click input |
| User-Programmable Setups | 32 |
| Dimensions | 1U × 4.5" (D) |
| Weight | 3.56 lbs. |

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# SOUND QUEST

## MIDI QUEST 8.0 (WIN)

### *An editor/librarian gets a face-lift and a host of new features.*

By Scott R. Garrigus

Sound Quest's *Midi Quest* universal editor/librarian for Windows has been around for quite some time, but with the introduction of version 8.0, it has clearly grown into a professional-quality application. In fact, it now includes almost everything you need to edit, store, and organize the data for all your studio's MIDI devices.

*Midi Quest* 8.0 supports nearly 500 MIDI devices and offers a collection of more than 67,000 public-domain patches for various instruments. In addition, there are a number of more advanced enhancements. For example, the program can now be used as a Cakewalk MIDI Effect (MFX) or VST plug-in, and it can automatically create *Pro Audio* Instrument Definition files.

With this new release, Sound Quest has provided tight integration between *Midi Quest* and *Infinity*, the company's object-oriented, graphic MIDI control language. Other improvements include automated Keyword assignments when building databases, one-button patch comparison, enhanced editing in the SysEx View, and support for all current Windows versions (including 2000 and ME). In fact, this *Midi Quest* version incorporates more than 50 new enhancements, many of which are subtle but welcome.

Despite the numerous modifications, *Midi Quest* retains its Librarian, Group, Bank Editor, Patch Editor, and DBase windows. As in earlier versions, Libraries are used to create a master list of all your MIDI devices' patches. Other features, such as the MIDI Controller, Sequencer, MIDI Monitor, File Converter, and Driver Creator, are also still available. But the program is now more flexible and refined in its data handling and editing capabilities.

**EM** did an extensive review of *Midi Quest* 7.0 in the July 1999 issue, so I'll focus on the new features in version 8.0. If you're unfamiliar with the program, check out the earlier review or drop by Sound Quest's Web site (www.squest.com) for more information and a demo download of the program.

**Minimum System Requirements**

**Midi Quest**

80386/66; 4MB RAM; Windows 95/98/ME/NT 4.0/2000; MIDI interface

## INTERFACE LIFT

The program's most obvious change is the Patch Editor's new look (see **Fig. 1**). Instead of the plain-looking older versions, *Midi Quest* 8.0 features Skins that can change the Patch Editor's appearance. There are several different Skins included with the program, and you can edit or create your own. The Skins feature lets you control color; background, slider, and knob graphics; and fonts, among other things. (You can't have different Skins for different windows, but that's not a serious limitation.) The feature's value is purely aesthetic—it doesn't alter the Editor's functionality in any way.

A more significant change is the addition of keyboard equivalents for most of the menu functions. Those are particularly handy when you use the Patch Editor because they let you easily jump from one work area to another. In addition, you can quickly select any of the Editor's four buffers to compare variations of your patches. Unfortunately, you can't customize the keyboard equivalents; you must learn the ones that are permanently etched into the program.

Another update worth mentioning is that all the program's dialog boxes conform to the Windows standard. They use the default Windows colors and fonts, and they can be closed, maximized, or minimized like normal Windows dialogs, which makes working with the program much more efficient. It is now easier to gain access to different Desktop configurations. As with earlier versions, you can save screen layouts for later recall, but when you right-click on the desktop in the new version, a pop-up menu provides access to all previously saved configurations. You no longer have to wade through various menus and dialog boxes to find what you want.

One minor gripe is that *Midi Quest* includes only one toolbar that can be docked or floating, and you can't customize it in any other manner. I would like to be able to create and customize toolbars for quick access to my favorite functions.

## INFINITE INTEGRATION

Perhaps the most significant change in *Midi Quest* 8.0 is the program's integration with other software products. They include Cakewalk's *Pro Audio, Guitar*

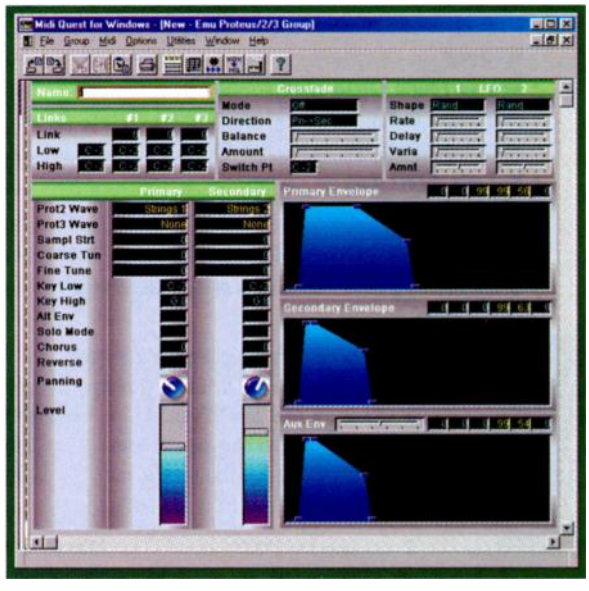


**FIG. 1: The Patch Editor's appearance in *Midi Quest* can now be customized using the new Skins feature. Skins lets you adjust the Editor's color, fonts, knob and slider graphics, and more.**

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*Studio,* and *Home Studio;* Steinberg's *Cubase;* and Sound Quest's *Infinity* real-time processing and MIDI control software. (For a review of *Infinity,* see the September 2000 issue of **EM.**)

Within the Cakewalk applications, *Midi Quest* can operate as an MFX plug-in. That lets you gain access to each of the five main *Midi Quest* display/editing windows (Group, Library, Bank, Patch, and DBase) from within these programs. To do so, simply open a Project in a Cakewalk application, right-click on an empty MIDI track's Effects Bin, and select Midi Quest MFX from the list. To open the *Midi Quest* plug-in, double-click on it. You can then open any *Midi Quest* file; depending on the type of file you choose, the appropriate window is displayed. For example, if you open a Bank file, the Bank window opens (see **Fig. 2**). You can also open more than one *Midi Quest* window by adding another instance of the plug-in to the Effects Bin.

*Pro Audio* users will also be happy to learn that *Midi Quest* 8.0 can automatically create Instrument Definition (ID) files. I don't know how many times I've been asked how to create ID files, but with *Midi Quest* 8.0, there's no longer any need for manual labor. You can quickly and easily export entire patch name banks from *Midi Quest* directly into the *Pro Audio* master.ins file or as a separate INS file for future importing or sharing among friends.

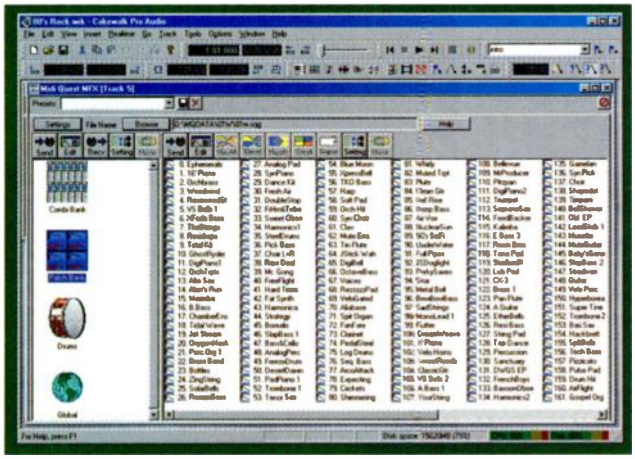

**FIG. 2: *Midi Quest* can now operate as a plug-in from within Cakewalk's *Pro Audio* and Steinberg's *Cubase.* This lets you send patch data to your MIDI devices from any point in a sequence.**

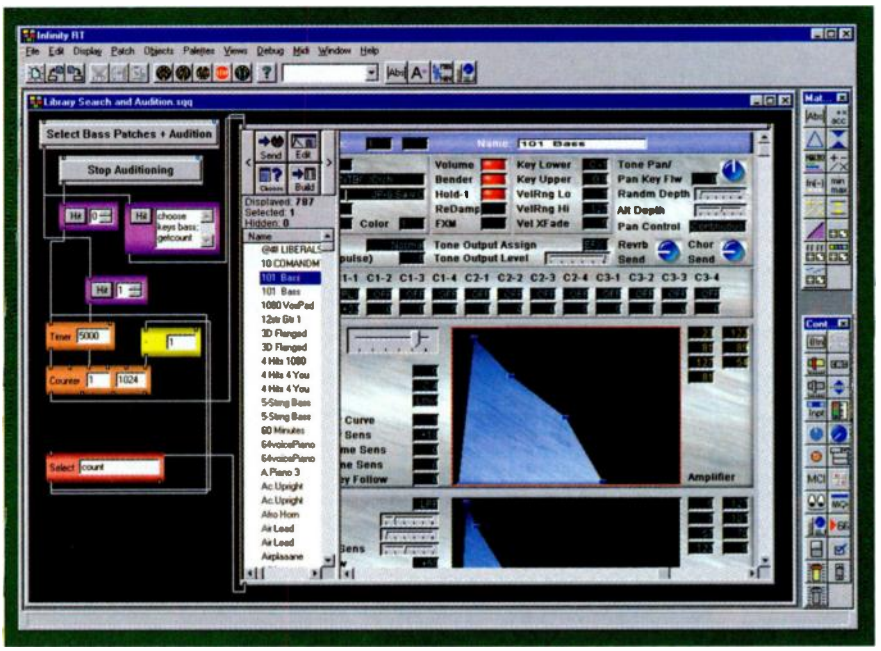


**FIG. 3: *Midi Quest* can be accessed from within Sound Quest's *Infinity* MIDI control software using the MIDI Quest Edit object. In this example, *Midi Quest* will search a library for the Keyword "Bass," then automatically audition those patches. Using *Infinity,* multiple *Midi Quest* parameters can be automated in real time.**

This feature is a massive time-saver, and as a *Pro Audio* user, I love it.

*Midi Quest* can also operate as a VST 2.0 plug-in within *Cubase.* One advantage of running *Midi Quest* as a plug-in rather than a separate application is that the plug-in offers automation capabilities. Specifically, you can have the host application automatically send *Midi Quest* data, such as a new bank of sounds, to your devices at appropriate times within a project.

Unfortunately, the *Midi Quest* plug-in doesn't provide the same individual parameter automation that you get with the standalone version (in which any parameter can be automated using MIDI controller data). But if you use *Midi Quest* with *Infinity,* you have access to parameter automation and lots of other types of automated processes. *Infinity* lets you construct various types of MIDI processing programs by assembling modules on a graphic "workbench." For example, you can create your own MIDI delays, transposers, arpeggiators, rechannelizers, and much more.

*Infinity*'s Midi Quest Edit object provides access to any *Midi Quest* window and lets you manipulate just about all *Midi Quest* parameters (see **Fig. 3**). By opening the Patch Editor window using the Midi Quest Edit object, you can automate any patch parameter in real time. Imagine the possibilities! (See the Sound Quest Web site for special pricing if you own one of its products and wish to purchase another.)

## ORGANIZATION IS KEY

One of an editor/librarian's most important functions is to keep track of all the patches in your collection. *Midi Quest* is well equipped for the task, especially with the latest version's expanded Keyword features.

You use Keywords to find a patch within your collection, and version 8.0 automates Keyword assignments. Every time you add a patch to the library, its name is analyzed for matches with

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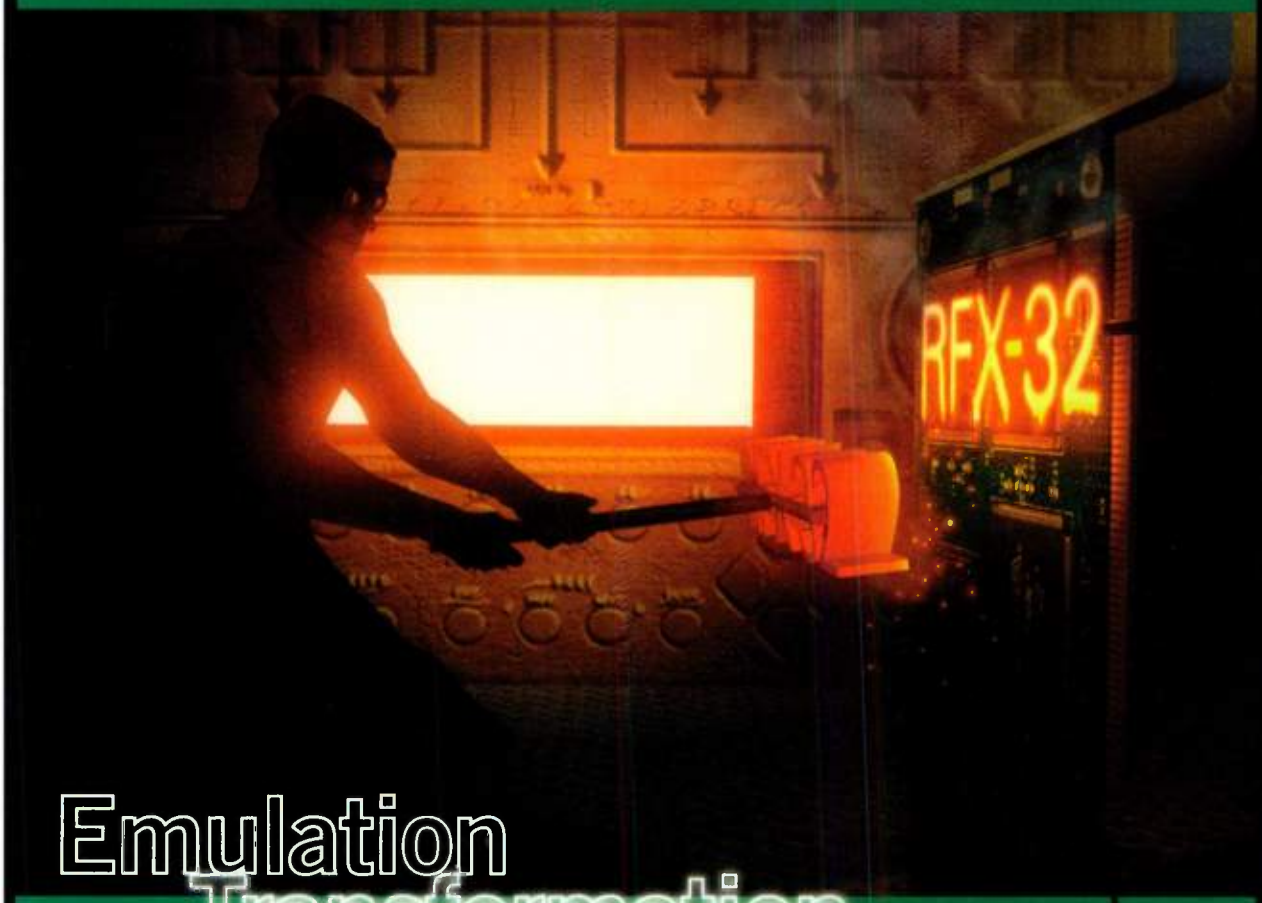


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existing Keywords. If a match is found, the Keyword is associated with the new patch. For example, if you add a patch called "Soft Piano" to a library and you already defined the word "Piano" as a Keyword, "Piano" is automatically assigned as a Keyword to the new patch. (Up to eight Keywords can be linked to a patch.) Also, when a Keyword is renamed in one library, you have the choice of making the same change in all your libraries.

You can also create a list of shortened names for use with the automatic Keywords feature. For example, you can use the short form "Pno" in place of "Piano," so that any patch name containing "Pno" will automatically be assigned "Piano" as a Keyword. This comes in very handy with synths that provide limited space for their patch names.

Finally, Keywords can be used with *Midi Quest*'s Sequencer feature. Specifically, you can now assign a sequence to a Keyword. That is great for auditioning patches with music that's suited to the specific sound type. For example, you might have a piano-music sequence assigned to the Keyword "Piano." Then when you want to audition a piano patch with that Keyword, the sequence automatically loads and plays music that's appropriate to the sound.

## IN-FLIGHT TESTING

*Midi Quest* supports more than 465 instruments with more coming all the time, so there was no way I could test all the modules. However, I did test *Midi Quest* with a number of the synths I own, such as the Roland Sound Canvas (SC-55) and the E-mu Proteus/2.

Of course, editor/librarians give you complete access to all parameters in a synth, and *Midi Quest* 8.0 definitely delivers in that respect. I really enjoy tinkering with the individual drum panning and volume parameters on the Sound Canvas without having to wade through a slew of unwieldy menus. I love the fact that I can view and manipulate all the main parameters for each of the 16 Sound Canvas Parts on a single screen as well. I was tweakin' like a madman.

I also like the flexibility with which you can view and enter parameter values. If you prefer to use numeric values instead of graphic sliders, you can enable Numeric Display in the Patch Edit tab, and all the editors will display precise numeric values for their settings.

One thing I'd like to see is an easier way to input a key range for each Part. It would be nice to have a little graphic keyboard pop up so that you could choose notes by sight rather than just by name.

Working with the Proteus module is similar to using the Sound Canvas. It's great having access to the unit's many "buried" parameters so easily. However, editing envelopes graphically is somewhat limiting in the default display because the parameters only change in increments of 2. (Proteus envelopes use a range of nonspecific units from 0 to 99.) Luckily, you can adjust the parameters more precisely by typing numeric

**PRODUCT SUMMARY**

**Sound Quest**
Midi Quest 8.0 (Win)
MIDI editor/librarian
$249

| | |
|---|---|
| FEATURES | 4.0 |
| EASE OF USE | 3.0 |
| DOCUMENTATION | 4.0 |
| VALUE | 4.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Integration with other applications including *Pro Audio, Cubase,* and *Infinity.* Excellent documentation including help file, printed manual, and videos. Library Keyword enhancements. No copy protection. Automatic *Pro Audio* ID file creation.

**CONS:** Keyboard shortcuts and toolbars not customizable.

**Manufacturer**

Sound Quest
tel. (800) 667-3998
e-mail sales@squest.com
Web www.squest.com

values. Another option is to use *Midi Quest*'s customization features to change the envelope display size on the screen, giving the envelope controls higher resolution and letting you step through the values in increments of 1.

Finally, I have one big wish, which no editor/librarian software that I know of provides. I'd like to see more documentation for the various parameters in different instrument modules. I realize that users are expected to read their synth manuals, but the names of onscreen parameters are often just as cryptic as their LCD counterparts. It would be wonderful to right-click on a parameter and have a full description, complete with a few usage tips, pop up in a separate window. No doubt the cost of this detailed help would be somewhat prohibitive, though.

### MINI MODS

There are a number of less significant updates in version 8.0 that still enhance the *Midi Quest* experience. These include a revised SysEx View (which lets you edit any byte of data), the ability to list sequences by name instead of number, and a one-click Patch-comparison feature.

▼

**I don't know how many times I've been asked how to create ID files.**

I would also like to commend Sound Quest for its decision to remove copy protection from *Midi Quest*. The control disk included with older versions is no longer required. Another important plus is the program's excellent documentation. Not only does *Midi Quest* include a whopping 5 MB help file, but there's a very nice printed manual as well. In addition, there are more than 300 MB of video-based tutorials on the CD. This is clearly a well-documented product.

There are a few improvements I'd like to see (for example, custom toolbars and key commands), but those shortcomings pale in comparison to the wide array of additions to the program. Being able to run *Midi Quest* within *Pro Audio* and create ID files automatically is especially useful. Also, the new Keyword features really make categorizing and searching for patches a breeze. Longtime users will find this new version very welcome, and new users will discover the great joys of controlling all their gear from a single software application.

---

**Scott R. Garrigus** *is the author of* Cakewalk Power *and* Sound Forge Power *as well as the publisher of* DigiFreq, *a music technology newsletter. For more information, surf to www.garrigus.com.*

# ZOOM

## PS-02 PALMTOP STUDIO

### *The Palm Pilot of digital recording.*

By Steve Broderson

If James Bond had a mission to write and record a song, Q would certainly give him a PS-02 Palmtop Studio. It doesn't shoot laser-guided missiles or cut through steel doors, but the latest offering from Zoom packs music-making firepower. Billed as "the world's smallest recording studio," it combines a multitrack recorder, a mixer, an effects processor, and a bass and drum machine into a box that fits in your pocket.

Because the PS-02 is such a unique product, it's difficult to compare it to anything. The 3-track digital-audio recorder has ten virtual tracks for each physical track, all with auto-punch and bounce capabilities. Audio is recorded directly to a SmartMedia card rather than to RAM or tape, so the maximum recording time depends on the card's capacity.

To inspire and accompany your musical ideas, 200 preset drum and bass patterns can be arranged in any order. The patterns are sequences of varying lengths that you use to trigger the internal ROM samples. Fifty effects are tailored for guitar, bass, keyboard, and vocals. The unit boasts a built-in condenser microphone and a chromatic tuner as well.

To connect external audio sources, there are two inputs: a ¼-inch unbalanced high-impedance jack for an instrument or mic and an ⅛-inch stereo minijack for sources such as CD or MiniDisc players. The PS-02's audio outputs are a ¼-inch stereo TRS jack and a stereo minijack for headphones. All ins and outs are analog, and there are no MIDI I/O capabilities. The PS-02 can be powered by the included A/C adapter or by four AAA batteries, which provide as much as four hours of continuous operation.

**The Zoom PS-02 Palmtop Studio is a 3-track audio recorder (with 30 virtual tracks), a bass and drum machine, and a standalone effects processor that almost fits in your shirt pocket. Maximum recording time is determined by its SmartMedia card's capacity.**

### GIMME A GROOVE

To road test the PS-02, I followed the well-written manual's suggestions for a typical tracking session. First I selected a song location; a single SmartMedia card can store up to 100 songs. Then I specified the song length in measures, selected a tempo, and laid down a groove with the drum machine. The percussion samples, which are quite good, come straight from Zoom's RhythmTrak series. You can't program specific beats on the PS-02 the way you can on most drum machines; instead, you select from a list of patterns in a variety of musical styles.

Selecting and entering rhythm patterns is a simple procedure. Using the PS-02's three multifunction sliders, you scroll through the available patterns and insert them wherever you want. You can go back later and rearrange the patterns, add drum fills and variations, and delete unneeded measures. To further tailor the sound, you can choose from six different drum kits and audition your choices as you make adjustments.

Programming the bass track is a bit trickier. An associated bass line usually follows the kick drum in the drum patterns. Using the sliders, you specify the root note and the chord for each measure in the bass pattern. You can program a chord change in the middle of a measure, but it has to fall on the beat. The down side to this kind of pattern-based sequencing, of course, is that you can't program a note-for-note bass line.

Programming the bass is much slower than programming the drum tracks, especially if you're accustomed to playing by ear. The process is easy enough, but it's not particularly intuitive. When I'm writing a song, I'd rather be playing than programming. I don't normally think, "Hey, a scale based on a G7 sus4 chord would sound great with this riff!" I just compose a bass part by playing it.

# get right to the point...

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Fortunately I had the luxury of recording an electric bass on one of the audio tracks. If you don't have a real bass at your disposal, though, the PS-02 provides five types of bass sounds: finger, pick, slap, acoustic, and synth. Because all the notes are quantized and played with the same velocity, the sequenced tracks always sound a little stiff and mechanical.

When Zoom's new RT-323 drum and bass machine becomes available, you'll be able to create your own patterns for the PS-02. SmartMedia card slots on both devices will make it possible to import patterns you've sequenced on the RT-323 directly into the PS-02, so you can program an original library of rhythms and bass lines.

## A TRIO OF TRACKS

When it's time to record acoustically, the PS-02's three audio tracks are quite flexible. You can record only two tracks simultaneously, which is no surprise considering the number of inputs. Even after you've recorded on all three tracks, you can still bounce them down to stereo. Because digital recordings have no perceptible generation loss, you can bounce down tracks as many times as you want. (If you keep the original unbounced tracks, you will run up against your SmartMedia card's memory limits.)

Virtual tracks give the PS-02 greater functionality than is initially apparent. To experiment with alternate versions of a track, you can record up to ten different "takes" per track. Those are like layers below the primary tracks. You can bounce all three physical tracks to a virtual track and keep your prebounced tracks intact. Because the PS-02 has limited editing capabilities, however, you can't assemble a track from different parts of several virtual tracks.

The PS-02 possesses two grades of audio recording quality: HiFi and Long. HiFi is recorded at 31.25 kHz with 20-bit resolution. Its frequency response is comparable to a stereo recording on a standard audiocassette but with greater dynamic range and no tape hiss. Recording on all three tracks at the HiFi setting can save more than 11 minutes to a 64 MB SmartMedia card.

Long grade gives you twice the recording time because the sampling rate is cut in half. Yet there's a noticeable loss of fidelity with less high end and more graininess. You can mix recording grades using both HiFi and Long on different audio tracks in the same song. If any tracks are recorded at HiFi grade when you bounce, the resulting bounced tracks are also HiFi.

The PS-02's fidelity shouldn't be criticized too harshly, though. It's a vast improvement over multitrack recording on a cassette ministudio. The recording rate is high enough to preserve decent audio quality, and at the same time, it minimizes the need for large amounts of memory. If the PS-02 could record at full CD fidelity, it would either offer less recording time or be more expensive. Considering the tradeoffs, I don't think most users will be disappointed with its sound. Don't forget that this device is a tool designed for songwriters, not for record producers. If you dismiss the PS-02 because of its audio limitations, you may be missing the point.

## LES PALM EFFECTS

I plugged in my guitar and spent some time jamming with the sequenced drum and bass tracks through my studio monitors, and I recorded the results. I wanted to try different effects presets and find where the drum grooves took me. The variety of rhythms and guitar tones provided me with fertile ground for new songwriting ideas.

The PS-02 is clearly designed with guitar players in mind. It has more than 30 guitar presets taken from Zoom's GFX-8 Guitar Effects Processor, including 14 amp models and a flexible speaker-cabinet simulation. Inspired by the included belt clip, I can imagine showing up for a gig with nothing but my guitar, a guitar cord, and a PS-02. The unit offers enough guitar goodies to make such a lean setup possible.

But the effects aren't limited to electric guitars. Zoom has provided effects patches designed for a variety of instruments and vocals, along with some mixdown settings that give extra punch and shimmer to the final mix. Effects patches contain as many as six effects, most of them in stereo. You can store up to 60 preset patches and another 60 user-programmable patches.

Effects include 3-band graphic EQ, reverb, chorus, flanging, pitch-shift, distortion, cry (a talkbox-type modulator), and all the other effects you'd expect from a company that built its reputation making effects boxes. In fact, when you're not recording with the PS-02, it makes a first-rate standalone effects processor. All effects are fully programmable, and most are well executed. The PS-02's three sliders give you quick access to an impressive number of adjustable parameters.

## EDIT? FORGET IT

I don't want to come down too hard on the PS-02 for its limited audio-editing capabilities. Come on, doesn't this little box do enough? Although you can edit rhythm patterns to your heart's content, I was disappointed to

### PRODUCT SUMMARY

**Zoom**
PS-02 Palmtop Studio
portable digital studio
$624.99

| | |
|---|---|
| FEATURES | 3.0 |
| EASE OF USE | 3.0 |
| AUDIO QUALITY | 3.0 |
| VALUE | 4.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Portability. Flexibility. Lots of excellent effects. Free downloadable updates.

**CONS:** Limited audio editing. Some complex operational steps. SmartMedia card reader required for archiving and exchanging data with a computer.

**Manufacturer**
Zoom/Samson Technologies (distributor)
tel. (516) 364-2244
e-mail sales@samsontech.comt
Web www.samsontech.com/zoom

discover that, apart from copying entire songs to new locations, the PS-02 can't cut, copy, paste, or otherwise manipulate audio within songs. Zoom hints that more extensive editing may appear in an upgrade, but for now the sequenced bass and drum patterns are the only tracks you can rearrange without a computer.

You can, however, replace part of any audio track by using the auto punch-in/punch-out feature. Begin by setting the punch-in and -out points, either in Pause or as the track plays. When you set the punch-out point, the track automatically rewinds to three seconds before the punch-in point. You can push Play to audition your punch before actually recording it, with the track muted between the in and out points. When you push Record, you record over the previous material. Auto punch-in/punch-out is a real benefit when both hands are occupied with an instrument.

## CARD PLAYER

The PS-02's operating system, effects, patterns, and recorded audio are all stored on a wafer-thin SmartMedia card—the same form of storage that many of today's digital cameras use. The unit comes with an 8 MB card containing all the factory presets and a demo song. Zoom recommends that you keep the supplied SmartMedia card as an operating system backup and use a working card of at least 32 MB for recording. That means you'll need to buy a bigger card up front and format it for the PS-02. At present the PS-02 recognizes cards with as much as 64 MB, with 128 MB support planned for the future.

A free utility program called Card Manager lets you transfer audio tracks to and from your Mac or PC as editable WAV files. You can also import and export drum and bass patterns as Standard MIDI Files, freeing you from the mechanical nature of preset patterns. Card Manager even makes it possible to add MIDI velocities to note data. To use Card Manager, you need a SmartMedia card reader for your computer.

With a card reader, you can also download a card's data to your computer for backup. Even without Card Manager, you can copy and rename songs. This capability lets you save backup copies of your songs at various stages in the recording process. With your computer and a SmartMedia card reader, you only have to buy one SmartMedia card; use it as work space and offload it when it's full.

## POCKETFUL OF MIRACLES

If you're a songwriter, by now you might be salivating over the possibilities inherent in the Zoom PS-02. The old microcassette recorder you carry around for capturing spontaneous song ideas might suddenly look very out of date. Although skeptics may consider it the Game Boy of recording, the PS-02 contains many useful and practical features that easily propel it out of the toy category.

The sequenced rhythm patterns sound crisp and detailed, while the bass and drums provide plenty of thump and sizzle. Regrettably, the audio recording quality isn't quite good enough to produce finished tracks for commercial release. I don't think Zoom expects to replace anyone's primary multitrack recorder, and the PS-02 was never designed for mastering CDs. Nonetheless, the PS-02 can help you create perfectly acceptable demos, and it's a giant step beyond any previous songwriter's notebook.

Because the PS-02 is software based, its features aren't written in stone. You can download new bass and drum sounds, patterns, and effects patches from Zoom's Web site (www.zoom.co.jp) as they become available. At the time of this writing, a new collection of hip-hop drum and bass patterns is ready for free download.

The PS-02 doesn't just capture moments of inspiration; it creates them and provides the tools to build on them. Whenever a piece of gear adds so much to the creative process, it's worthy of attention and praise. The PS-02 is such a unit.

**Steve Broderson** *is a central Kentucky-based songwriter and producer who recently formed Studio 246. His current clients include the University of Kentucky, Ale 8-1 (a local soft drink), and iHigh.com.*

## PS-02 Palmtop Studio Specifications

| | |
|---|---|
| **Physical Audio Tracks** | 3 mono |
| **Virtual Audio Tracks** | 10 mono per physical track |
| **Simultaneous Record/Playback Channels** | 2/3 |
| **Rhythm Pattern Tracks** | 1 stereo |
| **Bass Pattern Tracks** | 1 mono |
| **Preset Rhythm Patterns** | 200 |
| **Sampling Rate** | 31.25 kHz, 15.625 kHz |
| **ADCs/DACs** | 20-bit, 64× oversampling/20-bit, 8× oversampling |
| **Internal Effects Processing** | 24-bit |
| **Effects Patches** | 60 preset, 60 user |
| **Analog Inputs** | (1) ¼" unbalanced hi-Z; (1) ⅛" stereo TRS |
| **Analog Outputs** | (1) ¼" stereo TRS; (1) ⅛" stereo headphone |
| **Built-in Microphone** | nondirectional condenser |
| **Storage Medium** | SmartMedia card |
| **Maximum Songs** | 100 per SmartMedia card |
| **Maximum Recording Time** | 33 min., 33 sec. with 64 MB SmartMedia card |
| **Supplied AC Adapter** | 9V DC, 300 mA |
| **Batteries** | AAA × 4 |
| **Battery Life** | 4 hours (continuous operation with alkaline batteries) |
| **Display** | 1.38" (W) × .63" (H) LCD |
| **Dimensions** | 3.26" (W) × 3.58" (H) × 1.32" (D) |
| **Weight** | 4.9 oz. (without batteries) |

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# 20th Anniversary

# Perfect Pitch:

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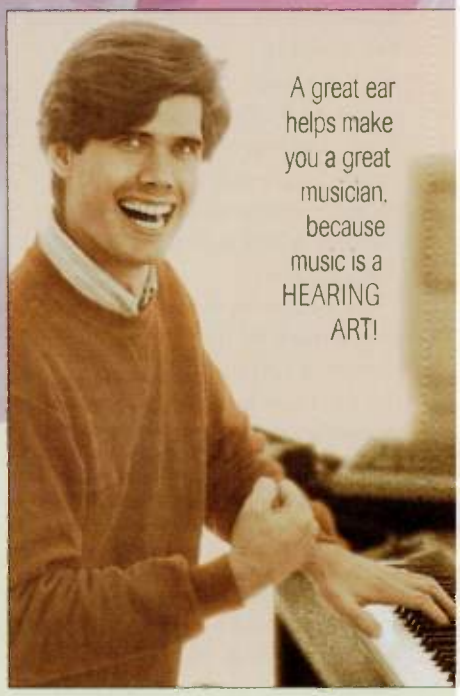

A great ear helps make you a great musician, because music is a HEARING ART!

### The true story behind the 20-year best-seller

They laughed when I said they could have **Perfect Pitch**...until I showed them the simple secret!

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 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 thought.)

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 get it . . .

*"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.

I tried it out for myself. After some 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 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 "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 *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 know tones, chords, and keys—all by ear!

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

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

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

"You don't understand Perfect Pitch," I countered. I showed her how to listen. Timidly, she confessed that she too could hear the pitch colors. With this jump start, Ann soon realized that she had also

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gained Perfect Pitch for herself.

We became instant celebrities. Classmates loved to call out tones for us to magically sing from thin air. They played chords for us to name by ear. They quizzed us on what key a song was in. Everyone was endlessly fascinated with our "supernatural" powers, yet to Ann and me, it was just normal.

Back then, I never dreamt I would later cause such a stir in the academic world. But as I entered college and started to explain my discovery, many professors laughed at 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 to *skip over* two required music courses. Perfect Pitch made *everything* easier for me—my ability to perform, compose, arrange, transpose, improvise, sight-read (because you know the tones you're playing without looking)—and my *enjoyment* of music skyrocketed. I learned that music is very definitely a HEARING art.

*Oh, 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*. 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 performance category. Linda got an A.

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

**Now it's YOUR turn!** Now I'd like to show YOU how to experience Perfect Pitch—*for yourself!*

For 20 years now, thousands of musicians around the world have proven the simple method that David Lucas Burge stumbled upon as a teenager—plus research at two leading universities (visit EarTraining.com).

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Think how Perfect Pitch could improve your playing, your singing—your own creativity and confidence. And picture your friends' faces when YOU can name tones and chords with laser-like precision!

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# GT ELECTRONICS

## AM40

### *This versatile tube condenser carves its own niche.*

By John Ferenzik

With the increased reliance on digital recording media, the demand for vacuum-tube condenser microphones, those beloved tools capable of imparting "warmth" to digital tracks, has never been greater. Unfortunately, vintage tube mic prices have soared, thwarting the desires of many personal-studio buyers. Even among the spate of new tube mics, prices rarely fall below $1,500, and typically they're much higher.

The GT Electronics AM40 provides some relief at the relatively reasonable price of $999. The deal is more attractive yet because the mic's design helps it cover a lot of ground. Rather than qualify as a large-diaphragm mic (usually one with a diaphragm an inch or larger in diameter) or a small-diaphragm mic (which typically has a ½-inch or smaller diaphragm), the AM40 is described as a medium-diaphragm condenser, thanks to its ¾-inch diameter diaphragm. This, in addition to its tube circuitry and top-address design, puts the AM40 somewhere between the usual "instrument mic" and "vocal mic" categories. (The GT AM30, which employs Class A FET electronics rather than tube circuitry but is otherwise nearly identical to the AM40, was included in the **EM** comparison review "To Tell the Truth" in the March 2000 issue.)

**The GT Electronics AM40 tube condenser mic is something of a hybrid, combining features from both small-diaphragm "instrument" mics and large-diaphragm "vocal" mics.**

I tested a pair of AM40s for this review. Each mic arrived in a foam-filled aluminum flight case, sheathed in a drawstring pouch of silky black fabric. Also packed neatly inside each case were the PSM power supply and AC-power cord, a hard-mount mic clip, and a 25-foot, 6-pin XLR cable.

### SOLID DEAL

The AM40 is a solid-feeling mic with a medium-diameter cylindrical body and an attractive burnished silver finish. Two switches are located just below the mic's removable grille cap, one for a 15 dB attenuation pad and the other to activate a 75 Hz highpass filter.

The AM40 ships with the AMC1 cardioid capsule. I also tested the AMC2 supercardioid and AMC3 omnidirectional capsules ($129 each), which can be purchased separately. The capsules are easy to switch out; however, read the manual carefully before changing them. While attempting to unscrew the AMC1, I almost removed the top of the mic—a relatively easy way to mangle the AM40's electronic innards. Fortunately, the instructions are specific and easy to follow on this point.

The AM40's power supply is housed in a compact metal enclosure with a solid heft to it. Unlike some tube mics' large and bulky power supplies, the compact PSM is a cinch to put in a rack or conceal. The PSM's input is a special 6-pin female XLR locking connector and the output is a standard 3-pin male XLR connector. Because the PSM is strictly a power supply and not a preamp, you still need to run the audio output through a mic preamp to get enough signal level for recording. But unlike some tube-mic power-supply boxes that can be damaged if phantom power is inadvertently supplied to the signal chain, the PSM rejects phantom power without damaging either the power supply or the mic—a nice fail-safe feature.

### DOWN TO BUSINESS

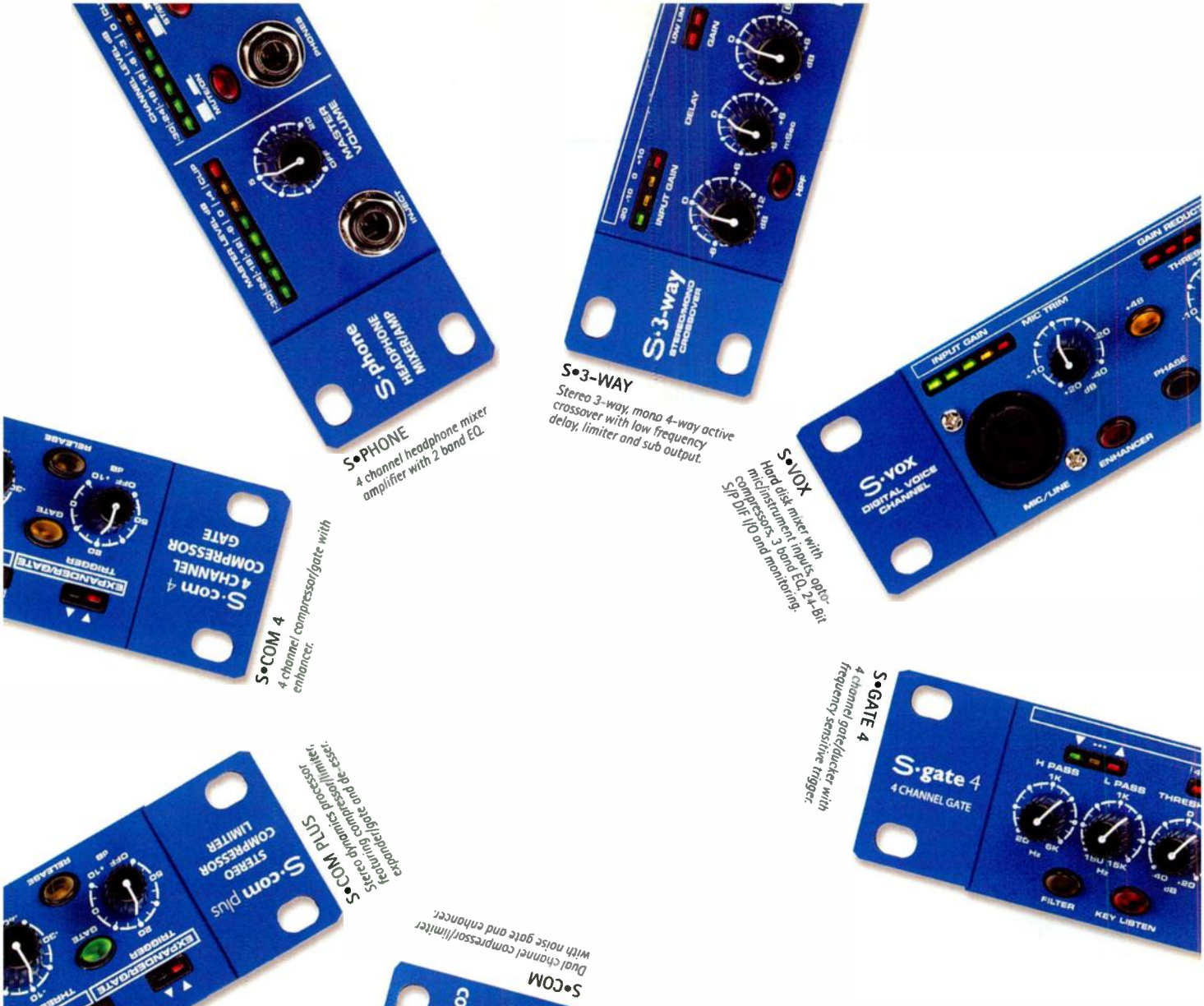
I put the pair of AM40s to work in my personal studio for a variety of applications, using them to record tracks of my material and on client's projects. I cut most of the tracks on an ADAT XT-20 or direct to hard disk through a Digidesign Digi001. I also auditioned the mics in the analog realm using a Tascam 38 8-track tape recorder. In addition, I ran the AM40s through a variety of mic preamps, including those in my Yamaha 03D console and several outboard units including the dbx 1086 and A.R.T. Pro MPA.

Outside of my studio, I had significant assistance from John Anthony at the Maja Audio Group, a multiroom studio in the heart of Philadelphia's Society Hill Section. Anthony graciously lent a hand with A/B comparisons between the AM40 and comparable mics from Maja's sizable collection. Extreme care was taken to duplicate the signal path and microphone position when the AM40 was pitted against another mic. I also strove to ensure that the timbre and dynamics of performances recorded with different microphones were as close as possible to those of the AM40's.

Anthony gave the AM40s some real-world workouts on recording sessions with various artists booked at Maja. All tracks at Maja were recorded to Pro Tools through an Avalon VT-737sp for mono overdubs and custom-made mic preamps from Mill Creek Audio for stereo applications.

### BASEMENT BASH-A-THON

To test the AM40s as drum overheads in my studio, I flew them about two to three

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feet above a great-sounding old Gretsch kit, positioned on separate boom stands roughly four feet apart with the mic capsules angled slightly away from one another. I routed the signals through the preamps on a Mackie 1202-VLZ mixer and logged the results to 1-inch tape at 15 ips on my Tascam 38.

In this analog application, the AM40 mics sounded, well, smashing. Compared to the Shure SM81s or Crown CM-700s (both are small-diaphragm condensers) that I normally employ, the AM40s exhibited a smoother overall response with warmer mids and plenty of air above 10 kHz. The AM40s also nabbed more of the low ringing tone (around 160 Hz) from the ride and crash cymbals, lending a visceral "body" to the crash cymbal. In addition, the tube mics minimized the toms' tendency to sound muddy in the lower mids from shell resonance—great news for the Keith Moon lurking in all of us.

I also tried close-miking the snare drum with the AM40, this time running the signals to the ADAT at 20-bit resolution and to hard disk through the Digi001. For this application, I usually use the ubiquitous Shure SM57, so I was curious to see how the AM40 would fare. I was not disappointed. Overall, the AM40 sounded like a warmer version of an SM57, yet with more sparkle in the high end and cleaner, more detailed presence in the midrange. The mic also captured plenty of snare-wire detail in the 800 Hz to 1.5 kHz range, yet there was none of the tube distortion "fuzz factor" you can get with certain older tube mics. If you need a microphone that handles the ruffs and ghost notes on a busy jazz snare track without being overwhelmed, the AM40 is a formidable ally.

PRODUCT SUMMARY

**GT Electronics**
AM40
tube condenser mic
$999

| | |
|---|---|
| AUDIO QUALITY | 4.0 |
| VALUE | 3.5 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Great at capturing room ambience. Exceptionally good for small percussion and as drum overheads. A natural-sounding choice for acoustic guitar. Sturdy carrying case.

**CONS:** Thin and overly bright sounding in some applications. Changing capsules can potentially damage mic.

**Manufacturer**

GT Electronics
(a division of Alesis Corporation)
tel. (310) 255-3400
e-mail rneiman@alesis.com
Web www.gtelectronics.com

## FAIRY DUST

For a song submitted by a client on an ADAT tape, I had to fabricate a world beat arrangement using various hand drums and small percussion instruments. The client's tape provided four tracks: a fretless electric bass, an acoustic guitar, a reference vocal, and a relentless drum-machine-generated sidestick for the click. On those tracks I stacked congas, bongos, a dumbek, an egg shaker, claves, a tambourine, and a triangle, stopping just shy of the proverbial kitchen sink. Most of the tracks were mono, but I miked the bongos and congas in stereo using the AM40s and the SM81s in XY configurations.

It wasn't long before I opted to use the AM40 mics exclusively. With hand drums in particular, the AM40 seemed to sprinkle a bit of "fairy dust" on the tracks. The mics bathed congas and bongos in warm, woody hues and accurately rendered those instruments' unique resonances. The dumbek had the same treatment; a single AM40 caught the clay-bodied instrument's hollow, earthen ring and the sharp patter of finger rolls on the paper head, managing to sound bright and warm at the same time.

All other small percussion overdubs benefited from a touch of the AM40's sorcery. The shaker was appropriately "sandy" yet not scratchy; the clave was bright but not piercing; the tambourine's jangle did not sound uncomfortably metallic; and the triangle's diminutive tinkle seemed less small. Some of the mic's magic seemed traceable to a "warm spot," a subtle boost between 375 Hz and 600 Hz, that lent a bit of midrange presence to the small percussion instruments. The SM81 also did an accurate job in each of these instances, but it sounded a tad more sterile.

## ROOM TO GROOVE

Of the tracks recorded at Maja, the AM40 did its most impressive work when capturing room ambience, especially in the studio's big room. In one setup, I placed one AM40 at a distance behind the drum kit and the other across the room in front of the kit. The resulting tracks provided a terrific bottom-of-the-giant-tank effect and set the bossa nova beat swimming—but not drowning—in woody ambience. A single AM40 also delivered on a track of backbeat hand claps: the claps were warm and realistic sounding and let the room sound "join the band." The sound quality of the room tracks recorded with the AM40 approached that of similar ambience tracks cut with Maja's vintage Telefunken ELAM 251—a pretty amazing feat, given that legendary mic's down-payment-on-a-home price.

## UNUSUALLY CLOSE

Most engineers use a large-diaphragm condenser mic when recording lead vocals to capture the voice's nuance and subtle quirks. But sometimes a smaller condenser or even a dynamic mic can have just the right sound for a particular song, musical style, or vocalist. To test the AM40 as a vocal mic, I tracked my voice doing a lead part for a folk-rock tune I wrote.

First I cut the lead vocal with the AM40, and then I followed up by doubling the performance with the SM81 and CM-700 on subsequent passes. Compared with the other two mics, the AM40 provided a bit more low-mid detail (around 375 Hz). It also had what sounded like a 3 dB boost around 1.5 kHz, which added a smooth "hi-fi" presence to the track and helped it cut through the wash of guitars. In addition, the AM40 track had a subtle warmth that I could only attribute to "tube voodoo."

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I also used the AM40 to overdub some background harmonies on the same song. The mic again delivered, imparting a warm "tube flair" that helped the harmony lines cohere and made for a nice blend at mixdown.

Typically, small-diaphragm cardioid condenser mics are more prone to bass boosting from the proximity effect than are large-diaphragm cardioid condensers. However, when worked close, the AM40 exhibited less bass boosting than even the large-diaphragm mics I compared it with. I could lean in and work this mic in a way that might have me living in downtown "Boomville" were I using, for example, an AKG C 414 or a Neumann U 87. Of course, this is not to say that the AM40 is better than those studio vocal stalwarts—just that it let me record vocal tracks at very close proximity without building up too much bass.

## GUT FEELING

For another client's demo, I used the AM40s on nylon- and steel-stringed guitars. I positioned the microphones as a spaced pair on each instrument, with one AM40 aimed at the fretboard near the nut and the other close to the sound hole, angled slightly off-axis to mitigate any boominess.

The classical guitar tracks sounded warm and full bodied, yet retained a bright, "spanky" quality. The steel-string tracks were the same; the AM40s provided scads of clear detail in the high frequencies, plenty of midrange girth, and overall a smooth, unhyped sound. In both cases the low mids—around 125 to 375 Hz—were warmly represented but with a distinct lack of boominess. In contrast, a pair of SM81s I set up as a benchmark sounded thinner and less exciting.

While strumming an acoustic steel string at Maja, I heard how a single AM40 stacked up to a Korby Audio CM3 large-diaphragm tube condenser and to an AKG C 414 B-ULS. Impressively, the AM40, though not nearly as robust in the midrange or bass as either of the other two mics, produced the most even-sounding and immediately usable results of the three. The CM3 captured lots of midrange that would probably need to be equalized out during mixdown, and the C 414, with its pronounced proximity effect, tended toward boominess.

I was also impressed by how easy mic placement was with the AM40s. It was a cinch to set them up in front of the guitars and quickly get a good sound, in part because they proved relatively resistant to the proximity-effect bass overloading that often occurs when positioning small-diaphragm condensers on acoustic guitars. If you have to record a fidgety acoustic guitarist, this mic should be a good pick.

## HOLY GRILLE

To record an electric guitar solo with the AM40s, I positioned one mic dead center against the center of the amp's grille cloth and the other several feet back from the amp to take advantage of the AM40's strength as a room mic. The close mic was initially overwhelmed by the amp's high output, so I turned down the master volume a bit and activated the microphone's 15 dB attenuation pad, which cleaned things up considerably.

The AM40's performance was impressive in both cases. The guitar sound through the close mic was full of lows without being too bassy, and the mids were rich and detailed. In addition, there seemed to be a little extra energy from 1.5 to 3 kHz, which gave some edge to the guitar solo. The distant AM40 provided a track of juicy room delay—nice!

## HOLLOW BE THY NAME

I auditioned the AM40s on grand piano during a studio session that required piano tracks to flesh out a jazzy, R&B-inflected number. I positioned one AM40 over the lower strings in the middle of the piano and the other over the treble registers closer to the hammers.

The resulting tracks were usable, but the overall timbre was bright. The AM40s put a little too much emphasis on the high mids (between 1.5 and 4 kHz) and not enough on the lower frequencies (150 Hz and below). On this song, the piano needed brightness and edge to cut through the busy arrangement, so the AM40 tracks worked fine. However, based on the mics' brightness in this application, I suspected they would sound brittle on a solo classical performance or in a spare arrangement that exposed the piano more.

My suspicions were confirmed during a session at Maja in which I compared the AM40 with a variety of mics while tracking grand piano. It was here that the AM40 drew some of its sharpest

## AM40 Specifications

| | |
|---|---|
| **Element** | externally polarized (DC bias) capacitor ("true" condenser) |
| **Diaphragm** | ¾" diameter, 6-micron gold-evaporated Mylar |
| **Polar Patterns** | cardioid (standard AMC1 capsule); supercardioid and omnidirectional (with optional AMC2 and AMC3 interchangeable capsules) |
| **Frequency Range** | 50 Hz–20 kHz (cardioid); 80 Hz–20 kHz (supercardioid); 30 Hz–20 kHz (omnidirectional) |
| **Dynamic Range** | 122 dB |
| **Sensitivity @ 1 kHz** | 6 mV/Pa |
| **Signal-to-Noise Ratio** | 74 dB |
| **Self-Noise** | 20 dBA |
| **Maximum SPL (for <0.013% THD)** | 133 dB (148 dB with pad) |
| **Attenuation Pad** | 15 dB |
| **Highpass Filter** | 75 Hz, 12 dB/octave |
| **Dimensions** | 7.4" (L) × 1.2"(D) |
| **Weight** | 8 oz. |

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criticism. Not surprisingly, the large-diaphragm condensers (both tube and solid-state varieties) captured the most midrange and low end of the bunch; however, I was surprised at how thin the AM40s sounded, even against lower-priced small-diaphragm condensers. Some who heard the playback said that the AM40s sounded "hollow" and "more modern than vintage," and were "missing warmth."

The AM40 also sounded harsh on flute and saxophone. I quickly replaced the AM40 with a warmer-sounding large-diaphragm condenser for a flute overdub. The AM40 fared a little better on a tenor saxophone overdub at my studio, but the track sounded shrill around 1.5 to 3 kHz, and it required a lot of EQ thickening in the low mids to mitigate an unpleasantly nasal timbre. Unless you want a hollowed-out or aggressively bright sound, steer clear of the AM40 for recording sax.

## POLAR EXCURSIONS

I also tested the AM40 with the optional AMC2 (supercardioid) and AMC3 (omni) capsules. Not surprisingly, the AMC2's off-axis rejection was markedly better than the AMC1's, making it a good choice when increased separation is needed between competing sound sources. The AMC2 also proved the brightest and thinnest sounding of the three capsules—a fact I attributed to its low end rolling off at 80 Hz. This would make the AMC2 not a good choice for recording bass instruments and other sources for which low end is critical. But the capsule worked well on higher-frequency percussion sources (egg shaker, triangle, and bell tree), and it also did the trick on hi-hat, in which its tight polar pattern helped minimize snare drum bleed and low resonance from the rest of the kit.

Compared with the AMC1, the AMC3 (omni) capsule has a broader frequency response and sounds fuller in the low end around 120 Hz. This capsule also makes the AM40 sound more "tubey." When positioned as a room mic on a drum kit, the AM40 with the omni capsule colored the sound with an overall tube warmth—a really nice

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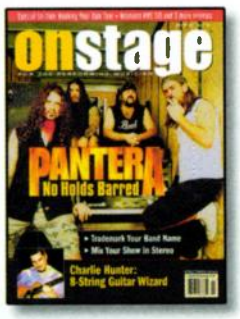

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effect. When positioned, the AMC3 did a good job of fattening up the sound of a bright acoustic steel-string guitar. It did a much better job on wind instruments than the AMC1 cardioid capsule, rounding out the hollow sound nicely. The only concern was SPLs, because the AMC3 proved easy to overload. For that reason, I resorted frequently to the AM40's 15 dB pad when recording with the omni cap, especially on drums, guitar amps, and flute at close range.

## NARROW PATH

The AM40 combines features commonly found in small-diaphragm "instrument" mics (such as the top-address design and interchangeable capsules) with tube circuitry and a medium-size diaphragm, resulting in a good-sounding and quite versatile studio condenser mic. For the most part, the AM40 treads the narrow path between tube warmth and solid-state clarity, managing to sound bright and warm at the same time—at least in some applications. Unlike many small-diaphragm condensers, it does not exhibit excessive bass boosting when used up close. This mic covers a range of duties, including those normally relegated to small-diaphragm condensers and certain applications typically reserved for large-diaphragm mics.

The AM40 is an excellent choice for hand drums and small percussion, and it also worked well on drum kit, both on the snare drum and in a stereo pair as overheads. It was also an exceptionally natural, smooth-sounding choice on acoustic guitars (both steel string and nylon string). I also liked how it stood up to wailing electric-guitar overdubs. The AM40 even proved useful in some vocal applications—a role normally reserved for large-diaphragm condensers—particularly those in which a sharp blade was needed to slice through a dense mix. Perhaps its most impressive performance was as a room mic: the AM40 lovingly captures a room's ambience.

Few mics work well on all instruments, of course. I was least enthusiastic about the AM40 on flute, reeds, and acoustic piano—instruments for which it lacked the warmth that is normally associated with tube mics.

As for the interchangeable capsules, they worked well for 90 percent of the applications I tested. However, if I purchased an AM40, the next items on my shopping list would definitely be the supercardioid and omni capsules. The omni capsule would probably be my first grab; it provides the most extended and accurate frequency response and softens the excessive brightness that plagues the mic in some applications.

---

**John Ferenzik** *has toured and recorded with Todd Rundgren (among others). His current obsession is restoring an old Fender Rhodes electric piano. He also would like to thank John Anthony and Maja Audio Group for their assistance with this review.*


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# ECHO DIGITAL AUDIO

## MONA 24/96 (WIN)

***A multipurpose, high-end audio recording system with a moderate price.***

By Scott R. Garrigus

Since its introduction at the 1999 AES convention, Echo Digital Audio's Mona hard-disk recording system has garnered considerable praise from personal-studio owners. Mona joins the Layla, Gina, and Darla audio interfaces as the newest professional-level, all-in-one solution in Echo's line of cross-platform recording products.

The Mona system includes a PCI interface card and a 1U rack-mount breakout box that houses the 24-bit A/D and D/A converters as well as the analog, S/PDIF, ADAT, and word-clock I/O connections (see **Fig. 1**). A 15-foot cable connects the card to the box and lets you put some distance between the converters and your computer.

### BOX TOPS

On the front of the breakout box are a power switch/indicator, input level displays, a headphone jack with accompanying gain control, and four universal analog inputs with gain controls. There's also an undocumented ¼-inch jack labeled Remote, which Echo says is for a possible remote control add-on.

The rear panel provides six balanced +4 dBu XLR analog outputs with matching –10 dBV RCA jacks and 24-bit S/PDIF I/O on RCA jacks, ADAT optical I/O, word-clock I/O on BNC connectors, and a DB9 port for the cable that connects to the PCI card. The analog I/O uses 24-bit, 128× oversampling converters, and the system supports sample rates between 8 and 96 kHz.

Echo bundles demo versions of several Windows audio applications and an unrestricted version of Syntrillium's *Cool Edit Pro SE*. There's no printed documentation for *Cool Edit Pro SE*, though Mona itself includes a printed manual.

### PLATFORM COMPATIBILITY

Before buying a Mona system, download *Echo Reporter*, a free diagnostic tool (see **Fig. 2**). (A copy is also provided on the CD-ROM that comes with the system.) *Echo Reporter* tests various components of your computer to determine how well it will function with Mona. Echo has specific recommendations for the type of system its card will work with. The company suggests a version 2.1 PCI BIOS and a genuine Intel Pentium processor and chip set or an AMD Athlon/Duron processor with the recent AMD or VIA chip set. (Problems have been reported with certain CPUs and chip sets; see the company's Web site for details.)

Echo also recommends that you disable your computer's system sounds when installing and using Mona. Most system sounds have very low sample rates, and if Windows plays a system sound while you record or play audio, Mona's sample-rate clock will reset. If you lock the sampling rate from Mona's console, you shouldn't have a problem. Alternatively, you might consider using a second sound card for system sounds.

**Minimum System Requirements**

**Mona 24/96**

Pentium CPU (or AMD Athlon with KX-133 chip set) with PCI 2.1 BIOS;16 MB RAM; Windows 95/98/ME

Mona runs on Windows 95, 98, and ME; Mac, Windows NT/2000, and GigaSampler (GSIF) drivers are in beta. BeOS drivers are also in development. The system supports ASIO and DirectSound, and it should work fine with any Windows audio software. The company has a software-compatibility list on its Web site and an extensive FAQ about the system and its operation.

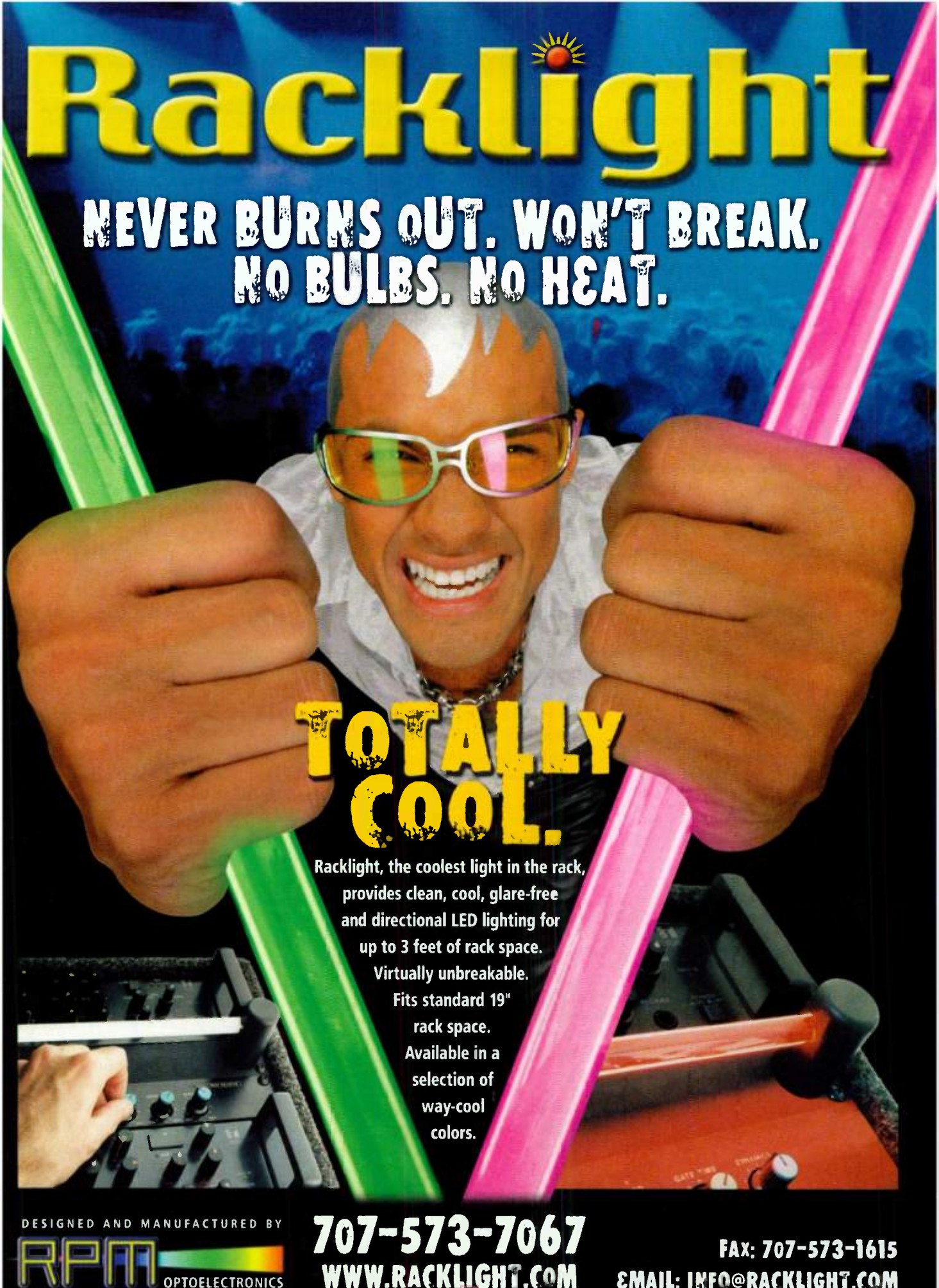
I had no trouble installing Mona on my Pentium III/700 MHz machine running Windows 98 SE. I popped the card into an empty PCI slot and connected it to the breakout box. When I rebooted, Plug and Play worked its magic, and I was all set.

### MONA CONTROL

With the exception of analog input levels, which are set on the breakout box's front panel, Mona's parameters are controlled with the included *Echo Console* software. *Console* provides a single screen of faders and buttons that let you set output levels, select synchronization settings, and adjust input monitoring (see **Fig. 3**).

*Echo Console* is divided into three sections: inputs, monitors, and outputs. Inputs are represented as six meters, two for each input pair and S/PDIF left and right. Below

**FIG. 1: The Echo Mona 24/96 system includes a PCI card and a sleek-looking rack-mount unit. A 15-foot cable connects the two components.**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each set of input meters is a corresponding set of monitor controls. You can adjust each input channel's gain, and each channel can be muted, soloed, and panned. Also, you can gang the faders in each pair.

The most powerful monitor feature is the ability to establish independent input-monitor mixes for each output. For example, you could monitor input pair 1/2 at –12 dB through output pair 1/2, at 0 dB through output pair 3/4, and at +3 dB through output pair 5/6. This capability is especially helpful if you use Mona without a separate mixing console.

*Echo Console* also lets you set sync options. Mona can slave to word clock, S/PDIF, and ADAT. It can also generate those sync signals and even translate one clock format to another. Because there is no MIDI I/O, SMPTE/MTC sync isn't provided.

There's one additional sync option called Esync, which is a proprietary clock signal that lets you lock multiple Mona units together to expand your available audio connections. In fact, you can lock together any number of 24-bit Echo cards (Mona, Layla24, Gina24, or Darla24) using this option—all you need are slots to put them in.

## MULTIPURPOSE MAGIC

Mona's universal inputs are very versatile. In fact, Echo calls them universal because they accept any type of ¼-inch or XLR connector and any analog source, including mic, line, and guitar. When you connect a mic with an XLR jack, Mona activates a built-in mic preamp (which is nice and quiet) automatically, and the gain range of the input's accompanying trim knob is 20 to 60 dB. In addition, the input impedance of the mic pre is 1.5 kΩ. Mona can provide phantom power at the flip of a switch but only does so globally. That means if you have one mic that needs phantom power and another that doesn't, you're stuck. Typically, that is a problem only if you use a ribbon mic.

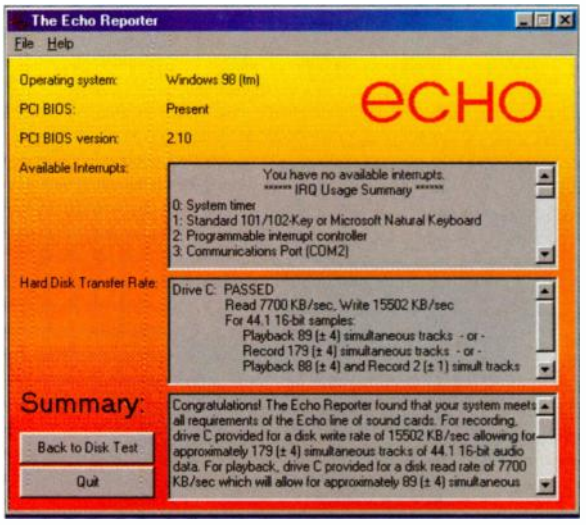


**FIG. 2: *Echo Reporter* is a free diagnostic program available for download from Echo's Web site. It analyzes your computer system and reports on various components that will influence Mona's performance.**

Inserting a ¼-inch connector deactivates the mic preamp and inserts a line-input amplifier. If you use a TS ¼-inch plug, the connection is unbalanced; if you use a ¼-inch TRS plug, the connection is balanced. In either case, the trim-knob gain range is 0 to 40 dB, and the input impedance is 10 kΩ. This impedance is too low for nonactive guitar pickups, so Mona provides a Guitar switch for each input. When activated, the Guitar switch changes the input impedance to 107 kΩ, and the trim-knob range becomes 10 to 50 dB.

My only gripe about the inputs is that there aren't enough of them, especially for live recording. At one point I had a lead vocal, a background vocal, a guitar, and a bass connected to Mona, and that left no room for other inputs, such as synths or electronic drums. There are some work-arounds without adding a second or third Mona. For example, you could premix several sources at your mixing console and then connect the console's output to two of Mona's analog inputs. Alternatively, if you have a mixing console with S/PDIF output, you could premix through it and still have the four analog inputs free.

I don't have a digital console, so I used my DAT deck as a work-around. I connected my mixer's analog outputs to the DAT's analog inputs and then connected the DAT's S/PDIF output to Mona's S/PDIF input. That gave me a flexible stereo mix in which I could include drums and synths, and I still had the four Mona inputs free for other instruments. Of course, the drums and synths had to be premixed, and I was relying on the quality of the A/D converters in the DAT deck. But with a little ingenuity, Mona can be quite flexible.

## IN THE LINE OF DUTY

I tested Mona using a variety of applications, including Sonic Foundry's

### Mona 24/96 Specifications

| | |
|---|---|
| **Frequency Response** | 10 Hz–22 kHz, ±0.25 dB |
| **Dynamic Range** | 110 dB (A-weighted) on inputs; 116 dB (A-weighted) on outputs |
| **Total Harmonic Distortion** | 0.001%, 20 Hz–22 kHz |
| **Analog Inputs** | (4) universal inputs providing balanced XLR, balanced ¼" TRS, and unbalanced ¼" jacks |
| **A/D/A converters** | 24-bit, 128× oversampling |
| **Analog Outputs** | (6) +4 dBu differentially balanced XLR and –10 dBV RCA outputs with 24-bit, 128× oversampling D/A converters |
| **Digital I/O** | S/PDIF (up to 24-bit), ADAT optical |
| **Other I/O** | word clock (BNC), computer (DB9) |
| **Dimensions (breakout box)** | 1.75" (H) × 17" (W) × 5.5" (D) |
| **Weight (breakout box)** | 5 lbs. |

*Sound Forge*, Steinberg's *Cubase VST*, Syntrillium's *Cool Edit Pro*, and Cakewalk's *Pro Audio*—with nary a problem. Windows treats each of Mona's I/O pairs as a separate sound card, so you can easily assign tracks to individual inputs and outputs. In digital-audio sequencers that provide virtual mixing consoles, such as *Pro Audio* and *Cubase*, Mona's output pairs show up as separate mains. I recommend you set the output levels in *Echo Console* and control them from your sequencing software.

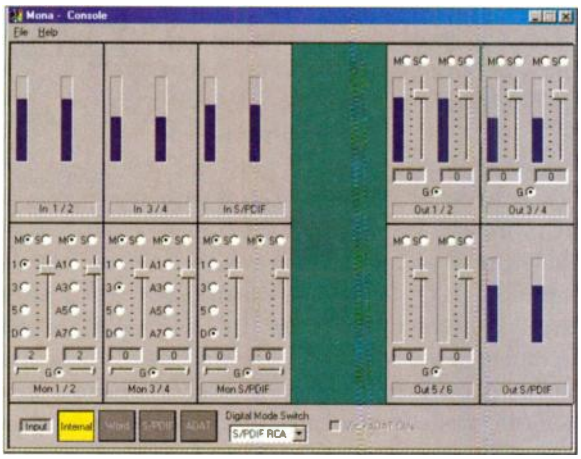


**FIG. 3: *Echo Console* offers onscreen control of Mona's input monitoring and output levels and several other parameters.**

I like Mona's flexible I/O options. You can use analog I/O and S/PDIF (but not ADAT) simultaneously, and the S/PDIF connections can handle up to 24-bit resolution. But I did run into a problem when I connected the S/PDIF output to my DAT deck so I could use the DAT's meters to monitor the signal. My DAT is a consumer model, and Mona was transmitting data in the Professional (IEC-958 Type 1) format, so the DAT didn't recognize the signal. After I opened *Echo Console*'s Preferences dialog box and changed the S/PDIF output format to Consumer (Type 2), I was up and running. Mona also ignores the SCMS copy-protection bit.

Mona's sound was excellent, regardless of which outputs I monitored. Even the unbalanced RCA connections provided amazingly clear audio.

## WISHFUL THINKING

Most of the minor problems I had while working with Mona were easily remedied, though I wish it had more inputs. Perhaps if the input meters on the breakout box's front panel were eliminated (meters are in the software), there would be room for at least two more inputs.

Aside from that, though, I enjoyed putting Mona through its paces. For a personal studio, Mona is useful and convenient. For small sessions or multitrack hard-disk recording, it's an all-in-one solution. A separate mixing console isn't really necessary, and without one, there's less noise in the signal chain.

Mona provides high-quality, clean-sounding analog and digital audio, a variety of sync methods, and 24-bit resolution, all in a sleek-looking, 1U rackmount box. Even at $995, that is one heck of a deal.

### PRODUCT SUMMARY

**Echo Digital Audio**

Mona 24/96 (Win)
digital audio interface
$995

| | |
|---|---|
| FEATURES | 4.0 |
| EASE OF USE | 3.5 |
| DOCUMENTATION | 3.0 |
| VALUE | 4.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Excellent sound. Universal analog inputs. Balanced connections. Multiple synchronization options. Future expandability.

**CONS:** No printed documentation for included software. Not enough inputs. Older AMD and Cyrix microprocessors may not be compatible.

### Manufacturer

Echo Digital Audio
tel. (805) 684-4593
e-mail sales@echoaudio.com
Web www.echoaudio.com

# D U Y

## EVERPACK (MAC)

## *A bundle of fun and powerful plug-ins.*

By Rob Shrock

The new *EverPack* bundle from DUY Research contains five high-quality processor plug-ins: *Max DUY, DUY Shape, DaD Valve, DUY Wide,* and *Z-Room.* All five plug-ins are installed from the same CD-ROM, which provides both VST and MAS versions. *EverPack* uses the ubiquitous challenge-and-response code of the PACE copy-protection scheme, and because the manufacturer is located in Spain, the company issues responses only by e-mail.

*Shape* and *Valve* have been previously reviewed (see the March 1998 issue of **EM**), so this article will focus on the bundle's three remaining applications. *Max* is a limiting application for premastering that raises the overall average program level while preventing digital clipping; *Wide* enhances the stereo audio's spatial imaging and boosts certain frequencies to compensate for loss in the imaging process; and *Z-Room* is a reverb and ambience plug-in that provides detailed control of parameters.

### TO THE MAX

Thanks to hardware boxes such as TC Electronic's Finalizer and software applications such as Waves' *L1,* premastering tools are commonplace in the project studio. *Max* joins the fray as a no-nonsense plug-in that combines level and bit-rate maximization with brick-wall limiting.

*Max* is a single-band processor with 48-bit internal resolution. It employs the proprietary Intelligent Level Optimization (ILO) algorithm, which features control parameters that are updated every sample. According to the manufacturer, ILO uses a psychoacoustic model that creates an output signal based on complex calculations.

Combined with excellent I/O metering, three controls are provided: Input, Max dB (threshold), and Output (see **Fig. 1**). The Input level allows you to trim the incoming signal to prevent clipping. The Output control lets you attenuate the output signal to avoid clipping indicators in any of the connected devices; it's also useful if you want to prevent the signal from reaching full-bit resolution.

*Max*'s threshold slider controls most of the action. As you move it to the left, the overall level is raised. Although a numerical reading shows the highest level reached at the input and output, there's no indication of how much attenuation is introduced by the brick-wall limiting. I would prefer real-time displays showing the amount of gain reduction being introduced and the maximum peak that's been squashed. Although you have to make optimal settings by ear, such a critical process requires as much information as possible, and the lack of visual feedback is a significant oversight. (DUY promises to include improved metering in the next update.)

As for sound quality, *Max* is adequate; limiting is applied to the entire frequency range of the program material. (*Shape* offers multiband compression.) As with most maximizing processes, a little goes a long way; it's easy to apply too much limiting and cause audible distortion. Without visual information about how much compression is being applied, you have to be content using the plug-in's two meters (as well as your ears) to find the appropriate threshold setting. On program material that originally peaks at several decibels below 0 dB, *Max* is able to raise the overall level without audible negative side effects. If your intent is to raise the level of your final mixes and add a touch of brick-wall limiting, *Max* will serve you well.

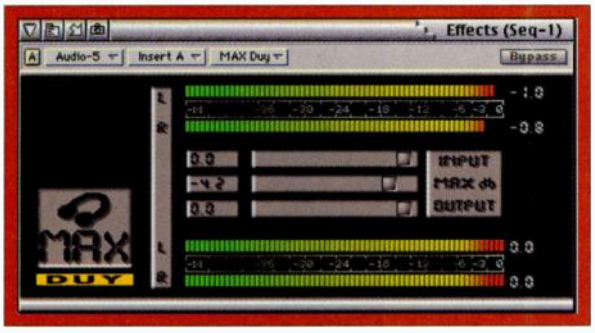


**FIG. 1: *Max DUY* is a premastering plug-in that can prevent clipping as it maximizes signal level and bit rate.**

**Minimum System Requirements**

**EverPack**

Power Macintosh; 800 KB RAM for first instance and 200 KB for each additional instance; Mac OS 8.1 or higher (host program may require a higher OS version)

### WIDE, OPEN SPACES

*Wide* is a spatial enhancer designed primarily to widen the imaging of stereo material. (It doesn't work on monophonic audio files.) Unlike image enhancers that provide only a single control for the amount of processing, *Wide* lets you boost user-selected frequencies to accommodate low-end loss. The plug-in can also flip the phase (polarity) of either or both audio channels. Its internal processing resolution is 48 bits.

*Wide* is intended for enhancing stereo mixes and individual tracks. The metering is excellent; a graph shows the phase correlation in degrees between the left and right signals. This display is particularly handy because higher processing percentages result in less monophonic compatibility between the left and right channels. Values higher than about 40 percent become audibly phase shifted and unnatural sounding, but you might like that effect for some material. In smaller doses, *Wide* does a nice job of spreading out stereo material, especially padlike instruments such as strings and organs. The input control can only be trimmed back from a maximum of 0 dB and can't be boosted if the incoming signal is particularly low. Around –3 to –4 dB seems to be the most common setting for passing a signal through unaffected.

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**FIG. 2. *Z-Room*'s colorful user interface provides control over an impressive array of parameters.**

The Boost function lets you add back some of the low frequencies that are lost during the widening process. The definable frequency range is roughly 100 Hz to 1 kHz, but the boost amount is expressed as a percentage between 0 and 100 percent rather than in decibels. *Wide* has no control for the shape of the boost, which sounds like a simple shelving EQ. The Boost function is not stellar in most cases. For situations in which I added so much widening effect to a sound that it affected the perceived frequency content, I preferred to follow *Wide*'s image processing with a more controllable EQ plug-in.

Overall, *Wide* is useful when it's applied in moderation. Although the Boost frequencies section can be troublesome if misused, the graphic display of the phase relationship between the left and right channels is nice. By leaving the Amount set to 0 percent, the display doubles as a way to check the mono compatibility of a stereo source. Used with taste, *Wide* really spreads out stereo sound in an appealing manner.

## Z-ROOM IS NOW OPEN

Like most good reverb plug-ins, *Z-Room* voraciously eats up computer resources.

However, the exchange of computer power for the excellence of *Z-Room*'s ambience presets is a fair trade-off. Furthermore, the diverse presets collection can be extensively edited and saved for later recall. Unlike EverPack's other plug-ins, *Z-Room* offers 64-bit processing.

*Z-Room* provides great metering. Its interface is divided into six sections: Input, Early Reflections, Diffusion, Mass, Color, and Mixer (see **Fig. 2**). Each section includes three or four editable parameters. A Rehearsal button emits a short impulse tone that lets the user test the current setting's response. Early Reflections and reverb responses scroll along the bottom of the display to provide visual data. To buy back a little CPU power, I'd like the option of disabling that feature.

*Z-Room* runs in Deluxe, Economy, or Earlies mode. Economy mode reduces the draw on computer resources at the expense of sound quality, though the gain in CPU power isn't equal to the loss of fidelity. When I tested *Z-Room* on a Mac G3/400 MHz, Deluxe mode used about 20 percent of the overall CPU power, and Economy mode used 15 percent. If you can run only one or two instances of *Z-Room* as your main reverb, use Deluxe mode. However, on a multiprocessor G4 machine Economy mode may become more useful, because you should have the power to run several instances of *Z-Room* in both Deluxe and Economy mode and apply them according to the importance of the signal.

In addition to Deluxe and Economy, an Earlies mode consists mostly of discrete echoes to simulate early reflections. The sound of *Z-Room*'s early reflections is excellent. Earlies mode uses even less processing power than Economy mode.

Over time, I've grown less fond of reverb plug-ins; to my ears, they usually don't have the front-to-back depth of a great hardware unit or, better yet, a pair of mics recording a real room. However, *Z-Room* in Deluxe mode sounds great on most instruments, especially drums and guitars. It can sound either neutral or colored, imparting its own character to the sound.

If you're looking for a thick, Lexicon-like pop vocal sound, you may be disappointed. If that's what you want, a Lexicon reverb unit is the place to get it. For everything else, *Z-Room* works well if you can afford the CPU resources.

## ALL BUNDLED UP

The *EverPack* plug-ins' graphic interfaces are visually stimulating, but some of the parameters are hard to read because of dark backgrounds or the treatment of the text fonts.

Each *EverPack* plug-in is high quality, and I applaud DUY for designing and including both MAS and VST versions in the same bundle. I especially like the *Valve* and *Z-Room* plug-ins, and *Shape* is a powerful multiband compressor. *Max* and *Wide* are useful tools, but similar products perform the same functions better. As a bundle, however, *EverPack* is a powerful and affordable collection.

**PRODUCT SUMMARY**

**DUY**
EverPack (Mac)
audio plug-in bundle
$499

| | |
|---|---|
| FEATURES | 3.5 |
| AUDIO QUALITY | 3.5 |
| EASE OF USE | 4.0 |
| VALUE | 4.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Good collection of useful plug-ins. Detailed, high-quality reverb sounds. Excellent emulation of analog tape saturation. Good multiband compression.

**CONS:** Some graphics are too artsy and difficult to read. *Max* distorts easily when pushed too hard.

**Manufacturer**
DUY Research
tel. 34-932-174-510
e-mail info@duy.com
Web www.duy.com

**Rob Shrock** *was recently a music director for the 72nd Academy Awards. He has recorded or performed with Burt Bacharach, Sheryl Crow, Garth Brooks, Faith Hill, Mikaila, 'N Sync, and many others.*

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QUICK PICKS

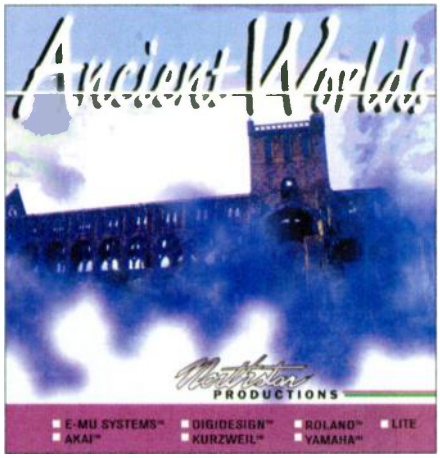
# NORTHSTAR PRODUCTIONS

## Ancient Worlds

*By David Rubin*

The world is awash in sample libraries of modern instruments; violins, flutes, and trombones are practically a dime a dozen. But where do you go when you suddenly have a craving for a crumhorn or a pandourion? No, those aren't traditional holiday pastries; they're among the many unusual and colorful instruments in Northstar's unique *Ancient Worlds* collection ($249) for E-mu E4 and ESI samplers.

*Ancient Worlds* covers a lot of territory with a single disc. Its 56 banks, ranging from 4 to 32 MB, provide important (and some lesser-known) instruments from ancient Greece and the Middle East, as well as Europe from the Middle Ages to the early Baroque. Many of the instruments used in the recordings are genuinely old; other instruments are historically accurate reproductions. All are played by early music experts and recorded at whole or half-step intervals.




**Northstar's *Ancient Worlds* collection offers samples of rare historical instruments from ancient Greece through the late Renaissance.**

The resulting samples are consistently well miked and clean, with each bank offering an assortment of creative variations and controller setups. Some patches, for example, use Velocity switching to change between different timbres or alternate from a straight to a scooped attack. Other patches use Aftertouch to raise the pitch a bit before you release the key. Most patches also include a musical phrase appropriate to the particular instrument, so you can hear how the notes sound in context and get a better feel for the proper performance techniques. The banks with melodic instruments include patches with just-intonation tuning in C major and C minor to give a more accurate sense of how the instruments would have sounded before equal-temperament tuning became widespread.

### String Things

*Ancient Worlds* organizes its banks by instrument type, beginning with plucked stringed instruments, and the first bank is a gem. The medieval 9-string, quill-plucked cittern gives a metallic, harplike sound that could work quite well in a number of ethnic and early music settings. The first patch, with its clean, hard attack, is the best. Solo Mandolin and Tremolo Mandolin banks add a variety of other metallic, plucked sounds, including some interesting layers, an ethereal echo effect, some cool sforzando attacks, and an unusual Slide Mandolin patch that sounds like a strange bowed instrument. The lighter-sounding Hammered Dulcimer bank also incorporates some nice echo effects.

Ancient Greece is well represented by separate banks dedicated to the softer, mellower, plucked sounds of the kithara, pandourion, and lyre.

The Bowed Stringed Instruments category offers only a single bank, but it's a knockout. The 5-string medieval vielle is nicely recorded, with patches that provide legato and spiccato bowing techniques as well as with various Velocity-switched attacks. The vielle is an important predecessor to the modern violin and viola and was prominent throughout the Middle Ages and Renaissance. It's an essential instrument for properly rendering the sound of early music.

### Brass and Reeds

The Brass Instruments category consists of only bass and tenor sackbut. The sackbut was the forerunner of the modern trombone and produces a subtly different, less powerful sound that blends appropriately in Renaissance ensembles.

The Reed Instruments category contributes some of the best and rarest samples in the collection. Complete consorts of beautifully sampled Renaissance crumhorns and rackets from the late Renaissance are provided in eight solo instrument banks ranging from soprano to low bass. The buzzy, double-reed sounds of crumhorns and rackets are highly characteristic of Renaissance ensemble music and vital for properly capturing the sound of that period.

Other double-reed instruments include an excellent bass curtal (a forerunner of the modern bassoon)—with its mellow, reedy sound—and the schreierpfeif, with a sound similar to a crumhorn. Ancient Greece is represented with three banks of aulos samples; these sound similar to the buzzy Renaissance double reeds but with a slightly more Eastern quality.

Celtic-music fans will love the two Uilleann Pipe banks. The first bank provides individual notes and characteristic playing techniques such as cuts, crans, rolls, and glisses. The second bank presents several long phrases performed by Tom Kreegan.

Other wind instruments include a complete collection of recorders. The six banks offer excellent solo samples that range from sopranino recorder to great bass recorder. The instruments were uniformly and carefully recorded to blend well in ensembles and deliver a lovely, characteristically woody sound. The remaining instruments in the category include an ancient Greek bamboo flute, three types of whistles, and several banks of Persian ney samples.

To complete the collection, *Ancient Worlds* offers several percussion instruments, including three banks of Irish bodhran hits and rhythms, medieval drums and tambourines, and ancient Greek shakers.

### Rare Deal

*Ancient Worlds* is an exceptional collection of rarely sampled historical instruments. The cittern, vielle, sackbut, racket, and crumhorn alone are well worth the price of the CD. Providing many of the wind

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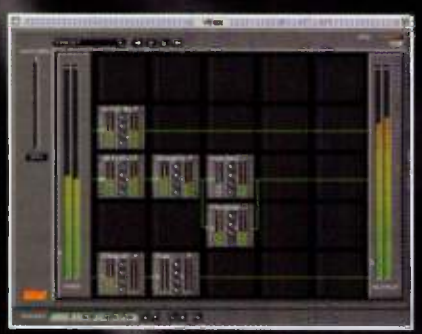

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instruments in complete consorts makes this disc especially valuable for re-creating the sound of Renaissance ensembles. The uilleann pipes and ancient Greek instruments make a wonderful bonus of sounds not commonly found in other collections.

**Overall EM Rating (1 through 5): 4.5**

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## BIG FISH AUDIO

### Things That Go Bump in the Night, vol. 2

*By Jeff Obee*

Big Fish Audio's *Things That Go Bump in the Night,* vol. 2 (audio or WAV/Acid files, $99.95; Akai CD-ROM, $199.95), is a two-CD set bursting with versatile and expressive content. It delivers more than 140 minutes of material from nine sound designers with a variety of perspectives. The sleeve notes state that Big Fish gave the sound designers two rules: "One, if we can identify the source sound, it's out; and two, if we can hum along, it's gone." True, this collection boasts some fairly strange sounds. But don't be fooled into thinking that these samples aren't musical. Despite the prescribed rules, I still found myself humming along to many of the sounds.

**Big Fish Audio's *Things That Go Bump in the Night,* vol. 2, dishes up a feast of intriguing, strangely warped, and largely unidentifiable loops and grooves.**

The CDs offer 16-bit, 44.1 kHz sound files that are divided into 13 categories: Percussive Loops, Pitched Loops, Ambient Wash, Vocal, Noise, Treble, Variable, Video-Atari, Video-Commodore, Short Events, Lumpy, Homogeneous, and Bass. Each track contains between 2 and 16 samples. File lengths vary greatly, ranging from short bleeps and bursts to longer washes and rhythmic loops. The bpm is listed for each of the Percussive and Pitched Loops.

### Mystery Trip

The first 22 tracks feature percussive loops that aren't traditional dance-oriented kits or hand drum samples but rather unusual processed loops created by sampling atypical sources or twisting traditional percussion sounds into something altogether unique. The tracks occasionally have syncopated rhythms that spill over the bar lines or are somewhat (or even completely) arrhythmic.

An immediate favorite is track three, loop two—a haunting 4-bar creation with the sound of an explosion on beat one of each bar, which is followed by a high metallic bowed sound, a reverberating stick-on-metal hit, footstep effects, and a metal-on-metal hit.

Music producers Atom Heart and Jason Jones, who specialize in sampling industrial sounds, created tracks 14 through 16 and 17 through 19, respectively, in the Percussive Loops section. Atom Heart's "Atomizer" tracks tweak the beat in strange ways and utilize distinctive chirping or bubbling bursts and noises. Jones takes things further into the noise realm with his "Titanium" tracks. He uses huge hits, distortion, squealing metal, and over-the-top processing in some insanely cool rhythms.

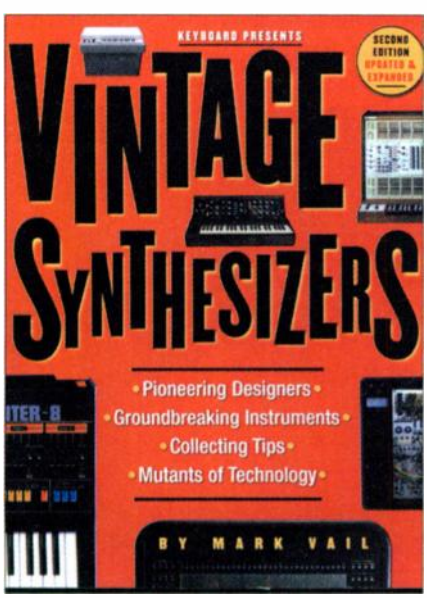
The Pitched Loops are exquisitely off-the-wall, and I have too many favorites to list. Sounds include more metallic sources from hits to scrapes to springs, tube-radio–type sounds, romping synthlike effects, and analog distortion—simply wonderful processing that takes things into new sonic realms. Most of the excellent rhythms fall into a tight pocket.

### It's a Wash

The ten tracks of Ambient Washes contain some stunning samples, most of which are icy and haunting. Their depth and texture suggest that they were created with a certain combination of specialized software and granular or modular synthesis.

"Fog Cluster" and "Open Door" are subdued, droning samples. "Turandot" is brighter but also lush and suspenseful. Other likable samples are the short but luscious "Suspense" that opens track 49, the spacey "Lament," and the monk-chant influenced "Gyoto2."

The second disc comprises 21 Short Events tracks featuring all kinds of exotic panning and dual stereo effects. The Lumpy category is an extensive section consisting of 38 tracks with numerous exciting sounds of varying pitches and textures. I love track 23, "After the Rains," with its two clangorous, cascading bell- and gonglike samples. "Dream Sequence" on track 30 has a rhythmic, synthlike pulse, and "Haunted Teakettle" evokes aural images of—well, of a haunted teakettle. The disc's Homogeneous section contains 15 tracks of equally enticing material, and the disc ends with four tracks of unusual low tones in the "Bass" section.




**Mark Vail's *Vintage Synthesizers*, now in its second edition, is an important reference for anyone interested in classic synthesizers and keyboards.**

### A Sampling Gumbo

The Video-Commodore and Video-Atari sections aren't exciting, but they have their place, and many readers will find uses for them. The rest of the samples are fun, fascinating, challenging, and musical, running the gamut from gorgeous to delightfully weird. If you're preparing a musical meal, whether strictly for listening or for scoring film or video, this double-CD set will provide just the spice you need at an excellent price.

**Overall EM Rating (1 through 5): 5**

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## MILLER FREEMAN BOOKS

### Vintage Synthesizers (Second Edition)

*By Gino Robair*

Since it was first published in 1993, Mark Vail's *Vintage Synthesizers* book has become an important resource for electronic-instrument enthusiasts. Vail's coverage of legendary instruments such as the Moog Minimoog and EMS VCS3 made for an informative and entertaining read. Due to the meteoric rise in popularity of just about every pre-1990s synthesizer, Vail's second edition has been much anticipated.

*Vintage Synthesizers* does not provide an exhaustive technical look at analog and early digital synths. Instead the book covers the stories behind the important manufacturers of the '60s and '70s, such as Arp, Buchla, Moog, and Sequential Circuits, and their instruments.

### Classic Synths Galore

Vail has added more than 40 pages to the second edition, including 6 pages of color photos. The added chapters cover important manufacturers that didn't appear in the first edition, including Serge/Sound Transform Systems, Polyfusion, and Korg. The new material also covers the popular Roland beat boxes—the CR-78, TR-808, and TR-909—and the enigmatic Optigan from Mattel. Not carried over from the first edition are the chapters "Sequencer History in a Nutshell" and "Roland MC-8 MicroComposer."


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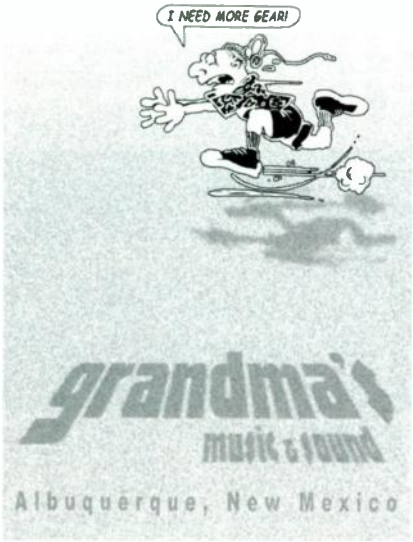


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QUICK PICKS

One chapter of note is Barry Carson's "Electric Pianos, Harpsichords, and Clavichords of the '50s and '60s." Carson covers the Rhodes, Wurlitzer, and Hohner product lines as well as the wonderful keyboards from RMI. For example, RMI's Rock-Si-Chord was favored by artists as diverse as Lovin' Spoonful and Sun Ra. Unfortunately, the book only hints at the analog synthesizers being made today, though it offers major cameo appearances by the digital and not-yet-vintage Clavia Nord Lead, Elektron SidStation, and Propellerheads' software-based *ReBirth*.

The book's final section, the Patch Bay, provides a host of useful reference materials, including recommendations of books, recordings, and Web sites for the synth savvy. The chapters "Buying a Vintage Synth" and "Vintage Synth Support, Service, Rental, and Sales" alone are worth the cover price. Vail has updated the list of vintage instruments and the prices that collectors can expect to pay. Even with the wide variation in price that he gives for many of the instruments, the list already seems out of date in a collecting world dominated by online auctions.

### Balancing Act

Although *Vintage Synthesizers* is an engrossing read, I couldn't help noticing some problems. For example, the depth of coverage each instrument is given is inconsistent. The information presented on the Arp 2600 and Sequential Circuits Prophet 5 is exhaustive; in fact, the chapter on the 2600 includes a wonderfully detailed section about the instrument's various components and how they can be upgraded and modified. Meanwhile, the two pages of text on the venerable—though admittedly less popular—Polyfusion modular synthesizer make that chapter seem like a throwaway.

Likewise, many of the instruments, including the Steiner-Parker Synthacon and EVI, the Aries, and the Ondes Martenot, presented in the color photos added to the second edition, aren't fully covered in the text. Other instruments, such as Star Instruments Synare electronic drums and the British synth-kit company Digisound, are conspicuous by their absence. It's also annoying that the text references to photos weren't updated in this edition.

### Point of Reference

Those minor problems aside, the second edition of Vail's *Vintage Synthesizers* is a fine reference for synth enthusiasts at every level. Even if you already own the first edition, the second is a must-have if you are serious about collecting classic synthesizers.

**Overall EM Rating (1 through 5): 4.5**

Backbeat Books; tel. (866) 222-5232 or (408) 848-8294; e-mail backbeat@rushorder.com; Web www.backbeatbooks.com

## MIL PRODUCTIONS

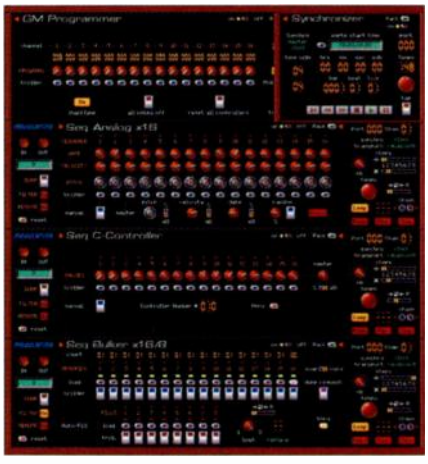
### Modularing 2.01 (Mac)

*By Len Sasso*

**M***odularing* ($99) is a collection of software modules for building just about any kind of step-sequencing gadget imaginable. Although you can create step sequencers in other MIDI applications, *Modularing* is dedicated to this task and offers a broader range of possibilities than most. However, this is definitely DIY country, so be prepared.

### Multitude of Modules

Each of *Modularing*'s 17 modules is a miniature standalone application that performs a specific step-sequencing function. These



**Mil Productions' *Modularing* is a modular step sequencer consisting of 17 modules that you configure into setups called Studios. The Studio shown here, jsbach, plays a 256-note sequence and a MIDI Pan-controller sequence.**

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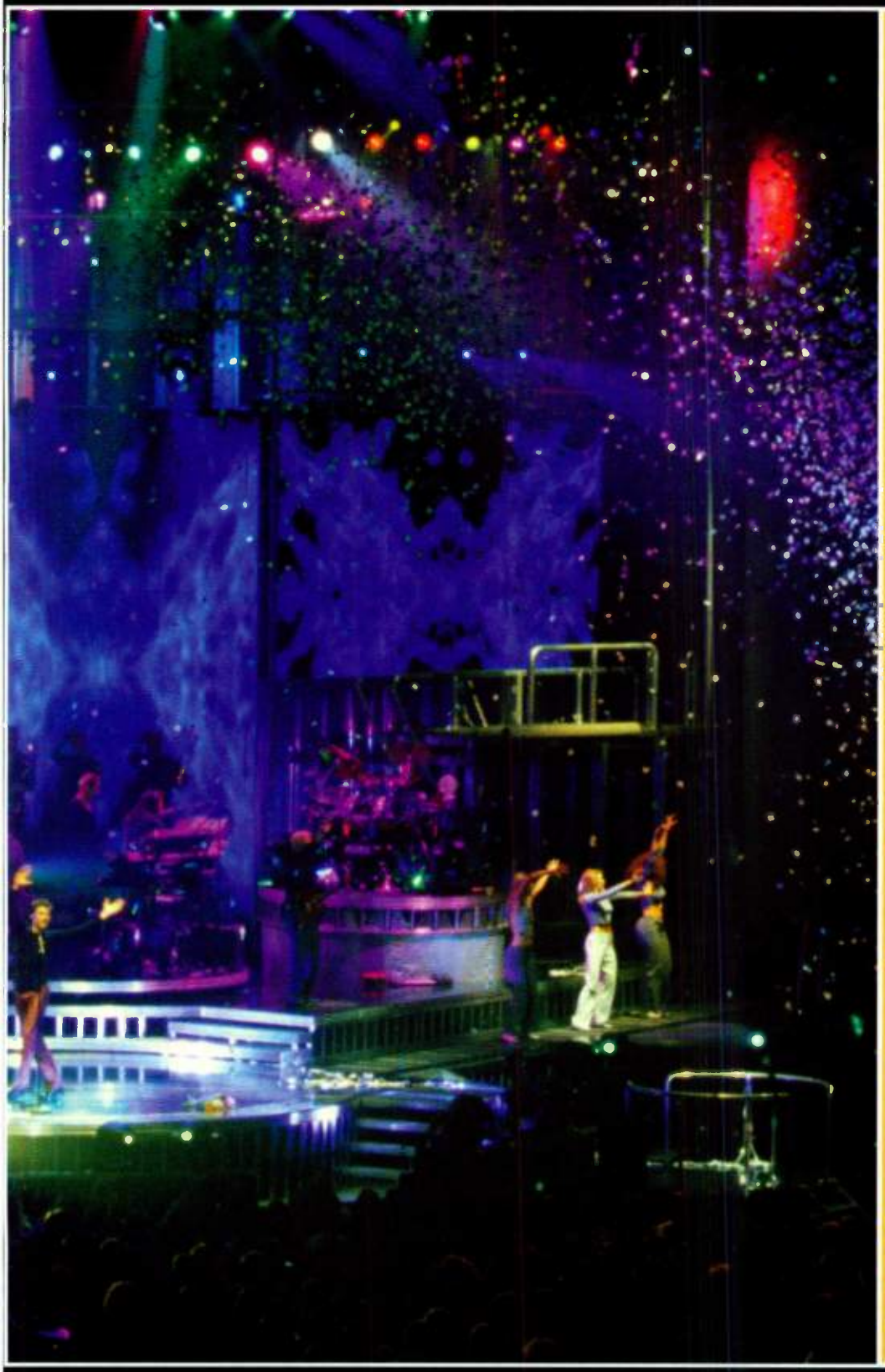

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applications interact using a proprietary protocol called *multimedia application glue* (MAG). Complete multiapplication setups called Studios are launched using *Studio Launcher,* a software tool. To close all the modules in a Studio, you need to use another tool called *Studio Closer.*

For MIDI communication, *Modularing* uses the included *MidiShare* application. Although few software developers support *MidiShare* at this time, the application can communicate with Open Music System, so *Modularing* will work with most other MIDI software and the outside world. (The manufacturer claims that this added layer of processing doesn't add any latency to the timing precision.) *Modularing* and *MidiShare* take a little getting used to, but their installation and basic setup is well documented and fairly straightforward.

### Stepping in

Seven of the *Modularing* modules are sequencers. The program has a basic, analog-style, 16-step sequencer and a virtual digital sequencer for playing back step sequences that you can program with incoming MIDI data. It also has two trigger sequencers for sequencing percussion; a matrix sequencer for step-sequencing chords; a MIDI-controller sequencer; and *Bulker,* which is a SysEx sequencer for transmitting set up dumps to the other modules.

The remaining modules are ancillary and provide either support (such as keyboard, mixer, or synchronizer clock) or effects functions (arpeggiation and delay) to the sequencers. The quickest way to get a feel for the operation and interaction of these modules is to download some of the examples from the Presets section of Mil Production's Web site. One of these, called jsbach, is shown on the previous page.

The jsbach Studio plays a 256-step sequence using QuickTime Musical Instruments. The *GM Programmer* module handles output to QuickTime as well as GM program selection by name or number for 16 MIDI channels. The *Synchronizer* module provides the clock for the three step sequencers that make up the remainder of the Studio. When confronted with a new Studio, look for *Synchronizer* first because it starts playback of all *Modularing* devices.

The modules at the bottom of the screen perform the sequencing. The *Seq Analog x16* sequencer plays the notes, and the *Seq C-Controller* sequencer below it shifts the pan back and forth across the stereo field. The actual note memory resides in the bottom sequencer, *Seq Bulker x16/8.* Each step reprograms the note sequencer with 16 new pitches.

Clearly, *Modularing* can eat up screen real estate quickly, leaving a confusing stack of overlapping modules. Each module's top right corner has a little button labeled Rack that will transform the display into a "rack" full of miniature versions of all the modules. Clicking on the Rack's Rack All button will close all the individual modules. You can then click on the modules to see what they do.

### Stepping out

Once I became used to the *Modularing* way of doing things, I found it a great deal of fun to play with. I was disappointed that it didn't include documentation for the individual modules; some of them are by no means obvious. On the other hand, by playing around with the examples, I was eventually able to build my own Studios with relatively few problems. If you're into step sequencing, you'll find you can do a lot more with *Modularing* than with fixed-configuration step sequencers. Download the 30-day, fully functional demo from Mil Production's Web site, and give it a try.

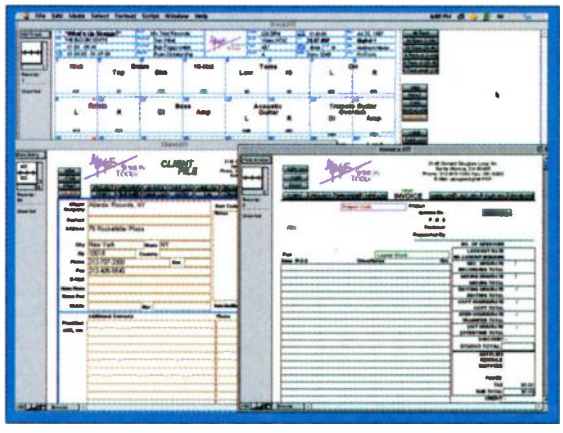
**Overall EM Rating (1 through 5): 3.5**
Mil Productions; tel. 33-474-025-195; e-mail support@milprod.com; Web www.milprod.com

## APOGEE ELECTRONICS

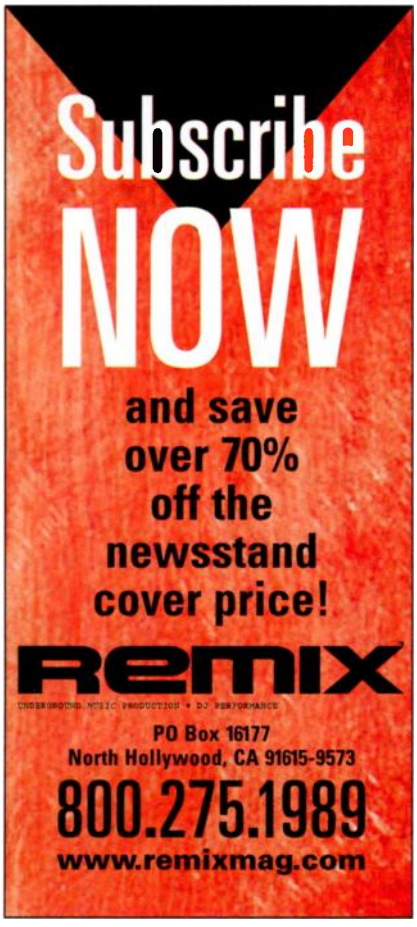
### Session Tools 2.0 (Mac/Win)

*By Peter Freeman*

With the help of Bob Clearmountain and Ryan Freeland, Apogee has released *Session Tools* 2.0 ($349), a *FileMaker*-based database program that addresses important aspects of managing a recording studio. *FileMaker*-based programs are



**Apogee's *Session Tools* database management software helps you organize your recording studio. A wealth of information is available at a glance, including a track sheet, client file, and customized invoice.**

inherently clunky compared with standalone applications. However, it's obvious that experienced studio professionals who know how to organize relevant information designed *Session Tools.*

The program provides Client and Project databases, Session Work Orders (along with related invoices and studio supplies forms), and Tape Library and Equipment Maintenance logs. You will also find a labeling system for tapes and disks, track sheets, and templates in which you can note and recall settings for popular outboard gear.

The outboard gear recall sheets, which are bundled with templates for a number of ubiquitous studio components, are particularly useful. You can create custom equipment templates by importing your own drawings. This is an especially handy feature if you must constantly recall old, obscure outboard gear.

### Making Book

The program does not attempt to function as a complete bookkeeping package; instead, at the end of a project, it generates clear and accurate invoices specially tailored for studio sessions, provided you correctly entered all the relevant session data (hours, rates, additional billable supplies, and so on). The primary invoice form includes a multitude of rate categories that cover hourly recording, a daily lockout rate, mixing, editing, copying, and transfers. A simpler alternate version is available if you don't require such excruciating detail.

For instance, if you run an ADAT-based demo or project facility, you probably won't have much use for a detailed maintenance log or equipment rental list. However, a commercial recording studio of any size can benefit from this program. For those who run a large commercial facility, the program offers several features to simplify the facility's operation considerably. For example, an engineer experiencing problems with a piece of gear can activate a Trouble Alert within the Maintenance History section and enter notes describing the problem. The Find Trouble button lets you immediately find out which units are having problems.

### Keeping Time

At the more prosaic end of the spectrum, the Time Sheet section functions as a time clock would and keeps track of the hours a studio's staff worked. It is possible to network *Session Tools* by installing one main server copy; then you can install satellite copies on your networked machines, which share information from the server copy.

If you need a program to help manage your studio, make *Session Tools* your first choice for evaluation. It's a professional piece of software written by people with real-world experience, and its design and feature set reflect that. ❁

**Overall EM Rating (1 through 5): 3.5**

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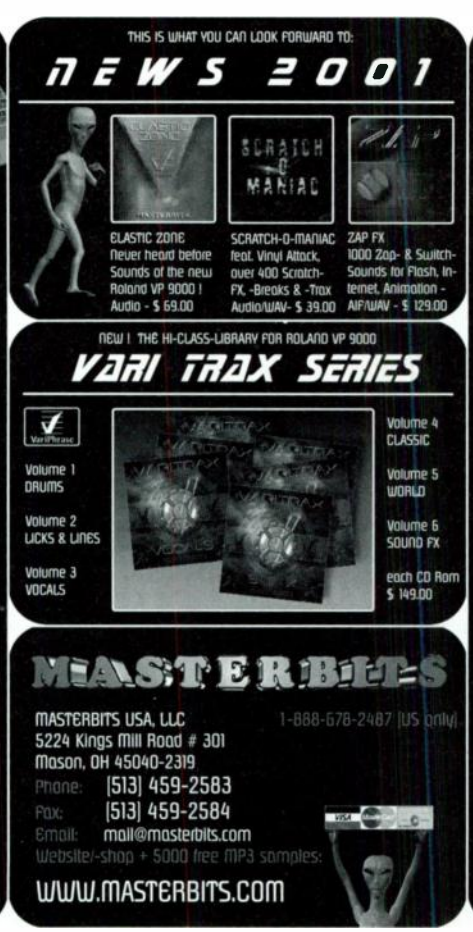

# ADVERTISER INDEX

| ADVERTISER | INTERNET | PAGE |
|---|---|---|
| Adaptec | www.adaptec.com | 13 |
| AKG | www.akg-acoustics.com | 49 |
| Alesis | www.alesis.com | 31 |
| American Musical Supply | www.americanmusical.com | 149 |
| American Educational Music Publications | www.eartraining.com | 180–181 |
| Antares | www.antarestech.com | 69 |
| Applied Acoustics Systems | www.applied-acoustics.com | 91 |
| Applied Research & Technology (A.R.T.) | www.artroch.com | 163 |
| artistpro.com | www.artistpro.com | 157 |
| Audio Computing | www.audiocomputing.com | 78 |
| Audio-Technica | www.audio-technica.com | 53 |
| B & H Photo-Video | www.bhphotovideo.com | 208–209 |
| Bayview Pro Audio | www.bayviewproaudio.com | 196 |
| BBE Sound | www.bbesound.com | 93 |
| Behringer | www.behringer.com | 103 |
| BIAS | www.bias-inc.com | 199 |
| Big Fish Audio | www.bigfishaudio.com | 81 |
| BitHeadz | www.bitheadz.com | 165 |
| Blue Microphones | www.bluemic.com | 59 |
| Cakewalk | www.cakewalk.com | 47 |
| Carvin | www.carvin.com | 127 |
| Conservatory of Recording Arts & Sciences | www.audiorecordingschool.com | 200 |
| CreamWare | www.creamware.com | 106 |
| dbx Professional Products | www.dbxpro.com | 26–27 |
| Digibid #1 | www.digibid.com | 110 |
| Digibid #2 | www.digibid.com | 227 |
| Digidesign (Control 24) | www.digidesign.com | 21 |
| Digidesign (digipronet) | www.digidesign.com | 86 |
| Digital Media Online (DMO) #1 | www.digitalmedianet.com | 45 |
| Digital Media Online (DMO) #2 | www.digitalmedianet.com | 101 |
| Disc Makers | www.discmakers.com | 185 |
| Earthworks | www.earthwks.com | 107 |
| Edirol | www.edirol.com | 131 |
| Emagic | www.emagic.de | 41 |
| E-mu Systems (Paris Pro) | www.emu.com | 9 |
| E-mu Systems (Paris Pro Tour) | www.emu.com | 84 |
| E-mu Systems (Proteus) | www.emu.com | 85 |
| E-mu Systems (RFX-32) | www.emu.com | 173 |
| Focusrite | www.focusrite.com | 95 |
| Fostex | www.fostex.com | 151 |
| Frontier Design Group | www.frontierdesign.com | 15 |
| Full Compass | www.fullcompass.com | 195 |
| Furman Sound | www.furmansound.com | 189 |
| fxpansion | www.fxpansion.com | 200 |
| Genelec | www.genelec.com | 67 |
| Grandma's Music & Sound | www.grandmas.com | 202 |
| Hafler | www.hafler.com | 177 |
| HHB | www.hhbusa.com | 79 |
| Infusion Systems | www.infusionsystems.com | 174 |
| Interstate Music | www.interstatemusic.com | 201 |
| iZ technology | www.izcorp.com | 56–57 |
| Korg (Karma) | www.korg.com | 10–11 |
| Korg (Triton) | www.korg.com | 39 |
| Korg (MS2000) | www.korg.com | 73 |
| KRK Systems | www.krksys.com | 109 |
| Kurzweil | www.kurzweilmusicsystems.com | 147 |
| Lynx Studio Technology | www.lynxstudio.com | 154 |
| Mackie (HDR24/96) | www.mackie.com | 2–3 |
| Mackie (D8B) | www.mackie.com | 169 |
| Mackie (HR824) | www.mackie.com | 55 |
| Mackie (SR1530) | www.mackie.com | 42–43 |
| Mark of the Unicorn | www.motu.com | 228 |
| Masterbits | www.masterbits.com | 205 |
| M-Audio | www.m-audio.com | 19 |
| MediaFORM | www.mediaform.com | 175 |
| Midiman | www.midiman.net | 18 |
| Mt. San Jacinto College | www.msjc.cc.ca.us | 40 |
| Musician's Friend | www.musiciansfriend.com | 161 |
| Musiclab | www.musiclab.com | 108 |
| Music Tech | www.musictech.com | 202 |
| MXL Microphones | www.mxlmics.com | 137 |
| NemeSys | www.nemesysmusic.com | 23 |
| New York Music & Internet Expo | www.newyorkexpo.com | 207 |
| nord | www.clavia.se | 111 |
| Novation | www.novationusa.com | 87 |
| PG Music | www.pgmusic.com | 139 |
| PlayStream | www.playstream.com | 197 |
| QCA | www.go-qca.com | 201 |
| Rane | www.rane.com | 154 |
| Rode Microphones | www.rodemicrophones.com | 75 |
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| Roland (RS-9) | www.rolandus.com | 36–37 |
| Rolls | www.rolls.com | 52 |
| Royer Labs | www.royerlabs.com | 16 |
| RPM | www.racklight.com | 191 |
| SAE Institute of Technology | www.sae.edu | 135 |
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| Samson Technology | www.samsontech.com | 183 |
| SeaSound | www.seasound.com | 63 |
| Shure | www.shure.com | 105 |
| Sonomic | www.sonomic.com | 71 |
| Sony | www.sony.com/proaudio | 153 |
| Sound Chaser | www.soundchaser.com | 77 |
| Sound Quest | www.squest.com | 141 |
| Steinberg | www.steinberg.net | 13 |
| Sweetwater Sound #1 | www.sweetwater.com | 29 |
| Sweetwater Sound #2 | www.sweetwater.com | 142–145 |
| Sweetwater Sound #3 | www.sweetwater.com | 133 |
| Sweetwater Sound #4 | www.sweetwater.com | 223–225 |
| SWR Sound | www.swrsound.com | 171 |
| Syntrillium Software | www.syntrillium.com | 125 |
| Tannoy | www.tannoy.com | 92 |
| Tascam (MX-2424) | www.tascam.com | 25 |
| Tascam (US-428) | www.tascam.com | 123 |
| Taxi | www.taxi.com | 159 |
| TC Electronic | www.tcelectronic.com | 65 |
| TC Works | www.tcworks.de | 17 |
| Ultimate Support Systems | www.ultimatesupport.com | 40 |
| Universal Audio | www.uaudio.com | 83 |
| West L.A. Music | www.westlamusic.com | 188 |
| World Replication Group | www.worldreplication.com | 167 |
| X-Vision Audio | www.xvisionaudio.com | 51 |
| Yamaha (MX20/6) | www.yamaha.com | 35 |
| Yamaha (Loop Factory) | www.yamaha.com | 99 |

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| | | |
|---|---|---|
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| Clearsonic | www.clearsonic.com | 212 |
| Crystal Clear Sound | www.crystalclearsound.com/cdtape | 211 |
| Doc's Proplugs | www.proplugs.com | 210 |
| Earth Disc | www.earthdisc.com | 210 |
| 8th Street Music | www.8thstreet.com | 212 |
| Europadisk | www.europadisk.com | 213 |
| Funk Logic | www.funklogic.com | 210 |
| Gefen Systems | www.gefen.com | 214 |
| Independent Audio | www.independentaudio.com | 214 |
| Lonely Records | www.lonelyrecords.com | 213 |
| Marathon Computer | www.marathoncomputer.com | 213 |
| Media Services | www.mediaomaha.com | 211 |
| MiniMusic | www.minimusic.com | 210 |
| Music Mansion Corp. | www.musicmansion.com | 211 |
| Music Toyz.com | www.musictoyz.com | 212 |
| Neato | www.neato.com | 212 |
| Rainbo Records | www.rainborecords.com | 214 |
| Recording Workshop, The | www.recordingworkshop.com | 212 |
| Shreve Audio | www.shreveaudio.com | 214 |
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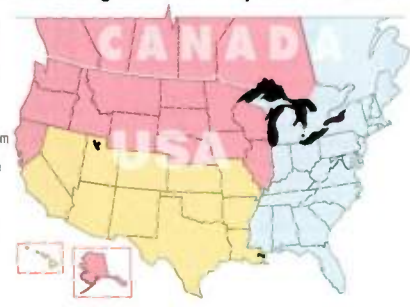


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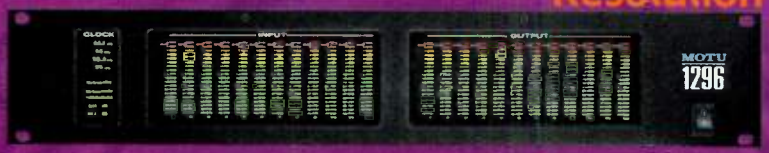


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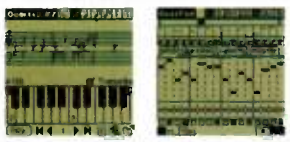

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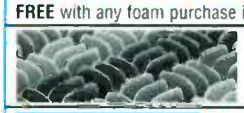

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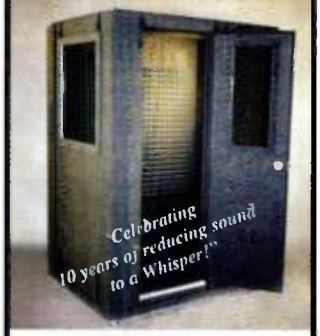


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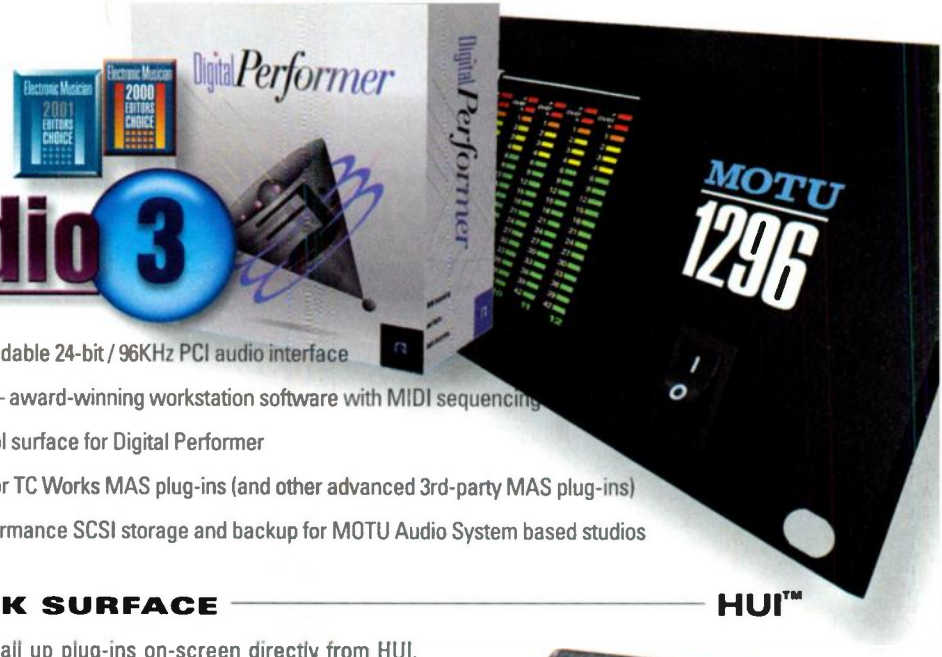


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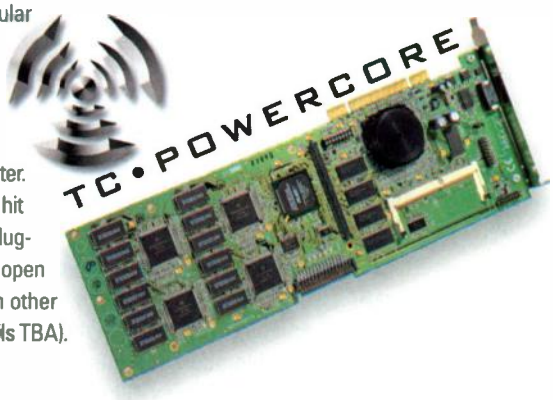
The Human User Interface (HUI) from Mackie is so tightly integrated with Digital Performer, it's like placing your hands on Digital Performer itself. Sculpt your mix with HUI's silky smooth motorized faders. Tweak effects parameters with firm, yet responsive V-Pot rotary encoders. Instantly locate to any position and track in your mix. You can even call up plug-ins on-screen directly from HUI. Keypad and transport controls let you locate Digital Performer's main counter instantly, just like the familiar keypad on your computer keyboard. HUI is an advanced hardware workstation console, complete with built-in monitoring and the user-friendly ergonomics that Mackie mixers are known for. Boost your productivity through direct hands-on control.

MACKIE.

## DSP TURBO™ FOR MAS•POWERCORE PLUG-INS — TC•PowerCore™

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 (sold separately). These powerful TC plug-ins appear in DP'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).

TC | WORKS

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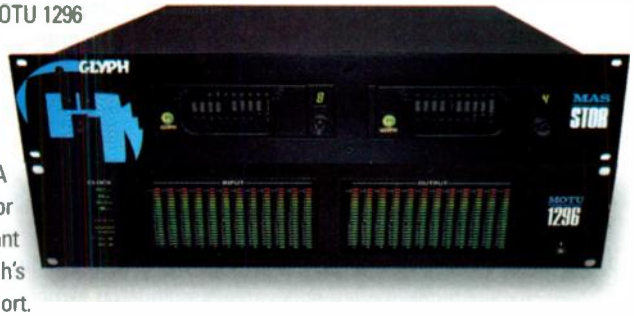


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By Larry the O

# A Matter of Physics

At the January NAMM show, I conferred at the hotel bar with longtime *Electronic Musician* technical editor Scott Wilkinson. Wilkinson writes **EM**'s "Tech Page" (probably because he holds dual degrees in music and physics), and for the past nine years has held the position of head researcher in sensory and perceptual biophysics for Los Angeles' Twolane University. Naturally, our conversation started with a discussion of acoustics. At some point, I remarked on how much mixing sound outdoors messes with your mind when the weather changes. The wind blows up, clouds come in, and the whole show sounds entirely different.

"That's an excellent example of the relative dynamics of perceptual mass," Scott observed. I found this statement curious, because it sounded as though it just might be coherent, in which case—at that point in the evening—I would be rather impressed with his stamina. Taking in the full measure of his statement, I aptly replied, "Say what?"

Scott explained that he had recently been reading several 1970s-era studies by German physicist and psychologist Dr. Poundo Hefeweten, who conducted a series of tests in which subjects performed tasks while he altered the circumstances, taking measurements the entire time.

One test involved 126 people riding stationary bicycles as Hefeweten varied the friction and, by extension, the riders' level of effort. Hefeweten recorded continuous measurements of the actual force applied to the pedals. As one would expect, with more friction applied, the riders delivered greater pressure to the pedals.

Hefeweten's great discovery came by spontaneous inspiration. One morning one of the riders showed up complaining of not sleeping much the night before and proceeded to describe it in some detail. His patience exhausted, Hefeweten moved to stop the rider from continuing his story. But then the doctor noticed that the rest of the riders, who moments ago had been raring to hit the bikes, now were showing signs of tiredness: one rubbed his eyes, another yawned, a third nodded out.

Thinking quickly, Hefeweten announced it was time to get on the bikes and begin. He expected to find the riders exerting more energy to apply the same force than they would have had they felt awake.

In fact, what Hefeweten recorded started a new branch of physics, which later inspired British psychologist Rupert Sheldrake to form his Theory of Causation Involving Morphogenetic Fields (1982). The riders, as expected, did exert more effort, *but they also exerted more force to get the same rotational speed.* The friction being unaltered meant that because the riders believed it was harder to pedal to get the same speed, *it was!*

The implications of this were enormous; it was tantamount to saying that their common perception had changed the physics of the situation. Fantastic as it sounded, further tests continued to support the hypothesis until it became at least respectable to be involved in researching it.

A silvery thought emerged into the squalid darkness of my brain. "Scott, how broadly does this effect apply?" I inquired. "Ah," he said, "you're beginning to get it. And you, a drummer for all these years! I would have thought this would have occurred to you long before. Yes, it applies to band equipment, too. When you move your gear at 2:30 in the morning after playing a full gig, and it feels twice as heavy as when you hauled it out of your house, that might well be because it *is* heavier—measurably so."

My mind was barely able to contain itself as I struggled with what he had said, but it was Scott himself who had once told me, "If you don't think so, don't think." So I ordered a double, and to be honest, I don't remember too much after that. But I must admit that Scott's words about perceptual mass came back to me the next morning when I attempted to lift my head from the pillow.

STEVE CURL

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