DESIGNING QUICKTIME INSTRUMENTS • ROLAND VP-9000, OBERHEIM OB-12, AND 8 MORE REVIEWS

Electronic Musician®

www.emusician.com

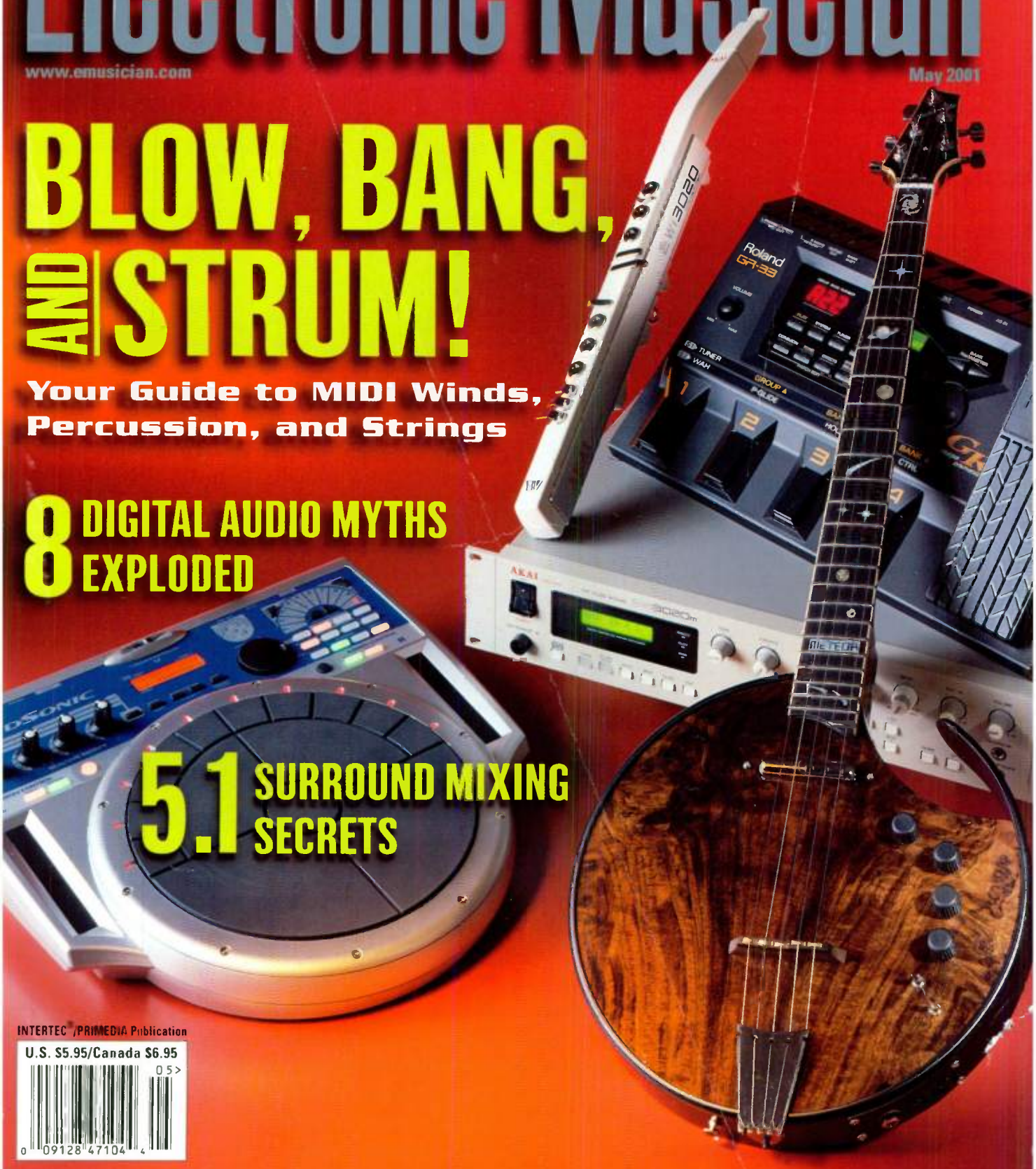
May 2001

BLOW, BANG, AND STRUM!

Your Guide to MIDI Winds, Percussion, and Strings

8 DIGITAL AUDIO MYTHS EXPLODED

5.1 SURROUND MIXING SECRETS



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.

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.

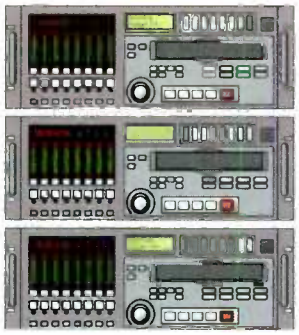
It gives you one-click access to all deck functions without a lot of annoying pull-down/fly-out menus.

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.

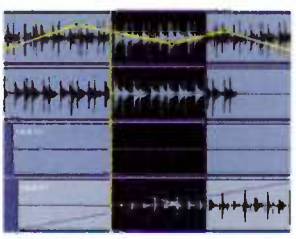
You can mark a segment (or multiple non-adjacent segments) as a *region* and then cut, copy and paste it anywhere — onto a blank track or right in the middle of an existing track without erasing anything (the part of the track after the insert just "slides down").

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

It does more than burn. It sizzles.

Introducing the new Korg D1600 Digital Recording Studio, the most complete and affordable solution for home and project recording. This 16-track digital recorder packs recording, mixing and final CD mastering into a professional quality all-in-one unit. With even more features and capabilities, the D1600 has everything for your music-making needs.

The D1600 comes with a massive 20 GB hard drive for more recording time and less worry about running out of time or space. And thanks to its unique user-swappable design you can easily change drives from session to session using standard IDE mechanisms. The D1600 supports the largest drives possible, so say goodbye to making backups and clearing your drive for the next project. Simply swap it!

When it comes time to master or backup a project to CD you'll appreciate the D1600's internal CD-RW drive bay. (The Korg model CDRW-2 and many ATAPI-compatible devices can be used.) No cables. No additional power supplies. You can even record audio directly from the internal CD-RW drive. Try doing that with an external unit!

The effects power of the D1600 really shines when recording and mixing. Have up to eight Insert effects configured any way you like, plus two Master and one Final effect. It's like having a professional rack of high-quality effects processors with everything from reverbs and delays to compressors, limiters and EQs. Plus, our special REMS™ models of mics, guitar amps and speaker cabinets.

With its user-friendly TouchView graphic display and intuitive operating system, the D1600 is just begging to be touched. Lay your hands on it and let your creativity take over. Once you heat things up, there's no telling what you'll be able to burn.

KORG

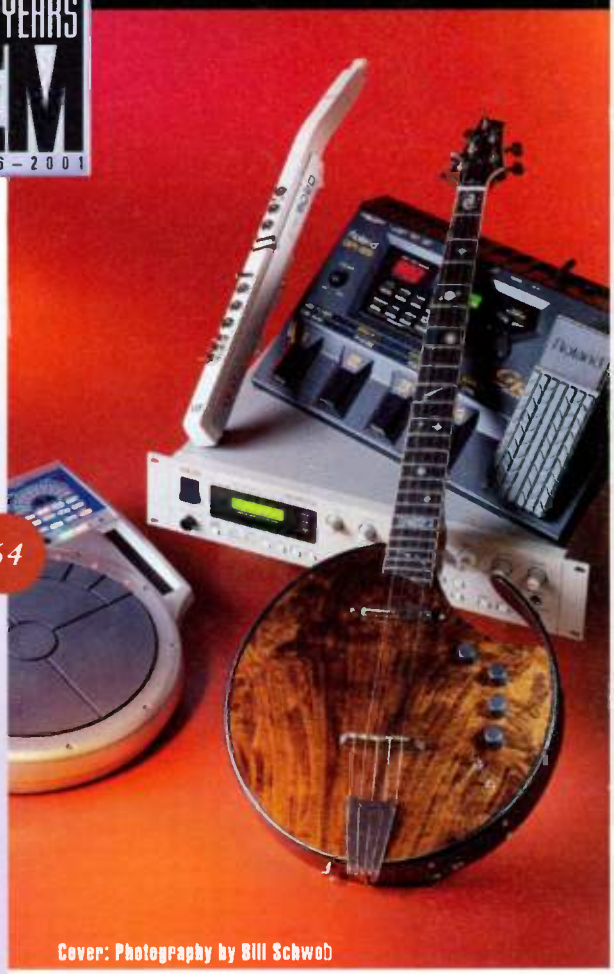
D1600

- Recording Format: 24-bit/16-bit uncompressed, 44.1 kHz
- 8 track recording/16 track playback @16-bit mode
- Total of 128 tracks (8 virtual tracks per track)
- 24 channel, 8 bus digital mixer with scene memory and MIDI automation
- Four XLR inputs w/phantom power
- 215 PCM drum rhythms
- 24-bit A/D, D/A conversion
- 4 track recording/8 track playback @ 24-bit mode
- 100 scenes/4 locate points per song
- 106 effects algorithms
- 24-bit optical S/PDIF I/O
- 3-band EQ per channel
- Built-in tuner

I N S I

15 YEARS EM 1986–2001

FEATURES



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Cover: Photography by Bill Schwob

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DEPARTMENTS

Electronic Musician® (ISSN 1094-4710) is published monthly by Intertec Publishing, 6400 Hollis St., #12, Emeryville, CA 94608. © 2001. Vol. 17, Number 5, May 2001. One year (12 issues) subscription is $36 outside the U.S. is $60. Periodical postage paid in Oakland, CA, and additional mailing offices.

Electronic Musician®
MAY 2001 VOL. 17, NO. 5
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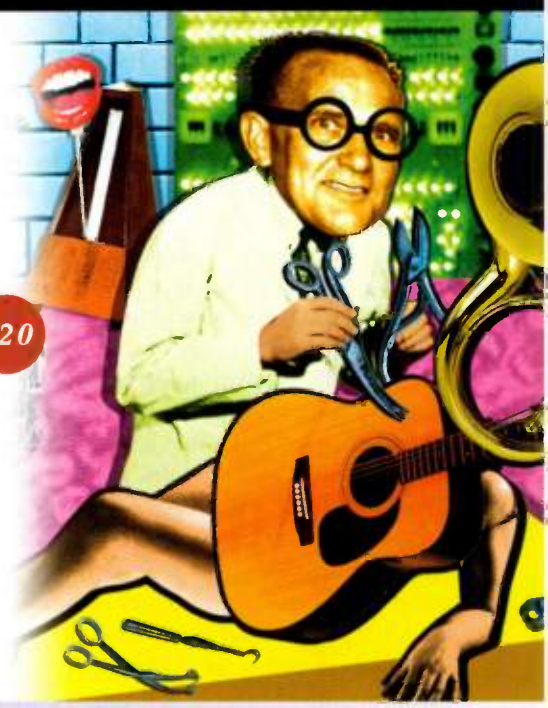

COLUMNS

REVIEWS

Studio Integration


ANTHONY PIDGEON

One of the biggest reasons for the personal studio's explosive growth during the 15 years **EM** has been around is the establishment of the MIDI specification. Before, some musicians bought a few expensive synthesizers and perhaps a step sequencer. With luck you could get your hands on a MIDI guitar, but many early units were not ready for prime time.

Different companies' products rarely worked well together, so integrating gear was a crapshoot. Synthesists had fun, but we were the few, the proud, the masochists. Manufacturers fought for sales, and they rarely agreed on anything—from CV values and nomenclature to the program-numbering system when programmable synths arrived.

MIDI changed that, though not all at once. It opened the door to the modern sequencing era, sound modules, programmable effects, fader boxes, and instrument controllers. Some additions to the MIDI spec—such as General MIDI, Standard MIDI Files, and MIDI Show Control—broadened MIDI control's influence considerably.

Given that MIDI opens so many doors, it should be no surprise that today's electronic musicians buy a variety of mainstream MIDI controllers—not just keyboards but MIDI guitars, wind controllers, and an assortment of percussion instruments. Exotic MIDI controllers are available too; we did a major article about exotic controllers (MIDI and non-MIDI) in our August 2000 cover story, "The Outer Limits."

EM boasts MIDI wind-controller expert Scott Wilkinson, string-controller wizard Marty Cutler, and MIDI percussionist Gino Robair. Cutler and Robair wrote the aforementioned story about exotic controllers, and they were champing at the bit to do a similar story about their favorite mainstream controllers. So I let all three editors out of their cages and sent them out to get the story of today's MIDI string, wind, and percussion controllers. I think you'll agree that their article ("In Control," p. 64) is a must-read for musicians interested in those types of controllers.

Such established formal standards as AES/EBU, S/PDIF, word clock, and SMPTE time code and de facto standards such as ADAT Optical and Tascam TDIF have helped fuel the digital-audio revolution. DirectX, the VST plug-in format, the WAV and MP3 audio-file formats, and ASIO audio-card drivers have been a huge help to computer-based musicians. Digidesign's TDM is the centerpiece of a thriving development community, although it is not an open standard.

All this and the concurrent growth of codevelopment alliances between manufacturers makes our lives as recording musicians a whole lot better. It also helps the music industry grow in more ways than we can count. Today it is a given that manufacturers should think about ways to make their products "play well with others." Larry the O alludes to this in his "Final Mix" column ("Playing Card Games," p. 210).

But achieving tight studio integration is as much the studio owners' responsibility as it is the manufacturers'. We end users need to think in terms of purchasing gear with integration in mind. In future issues, we'll address the concept of creating a studio so well integrated that it can be treated as a single device.

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

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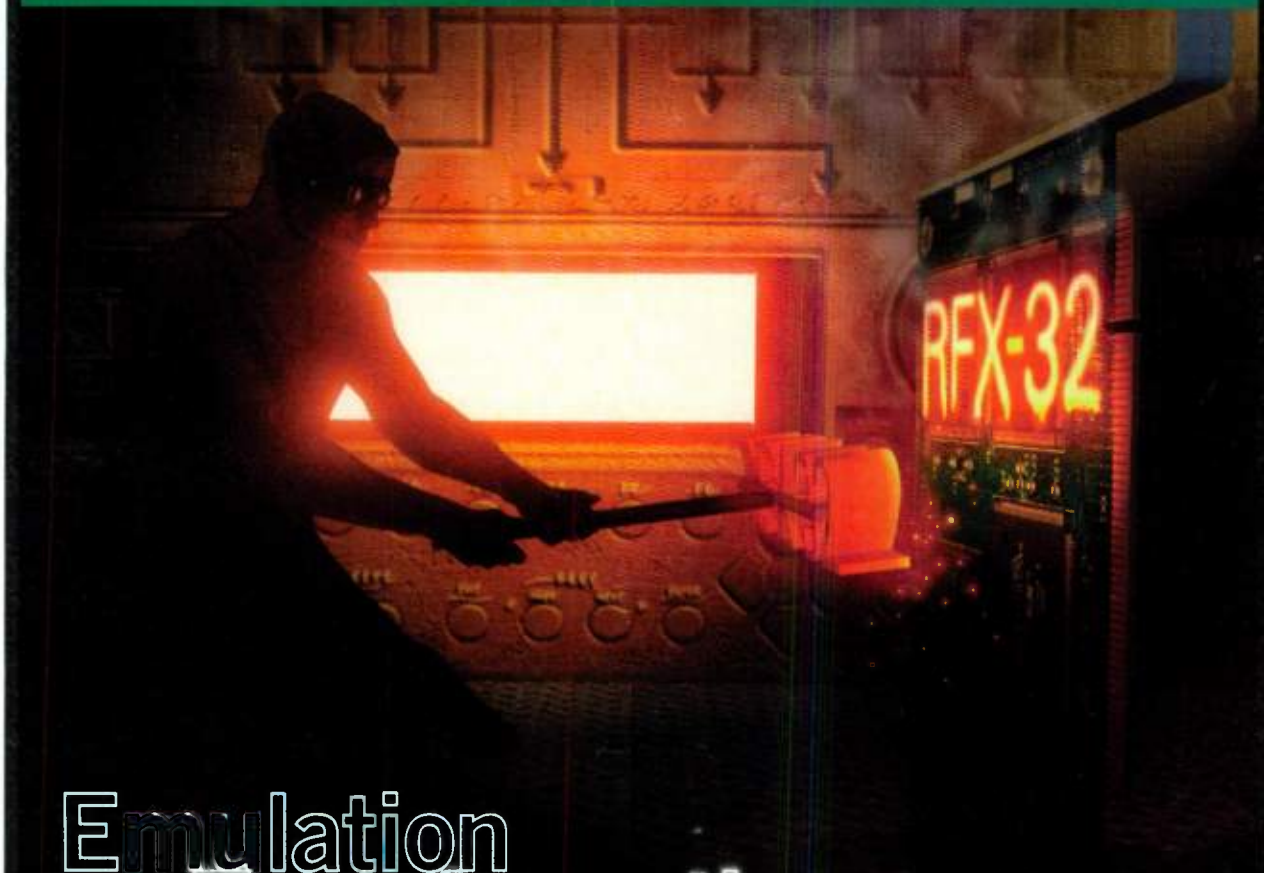

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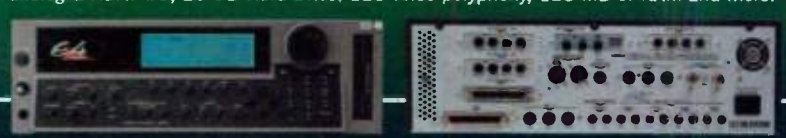

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Left Brain

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8 stereo/16 mono effects processors*

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

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

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Audio CD-burning capability**

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*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.

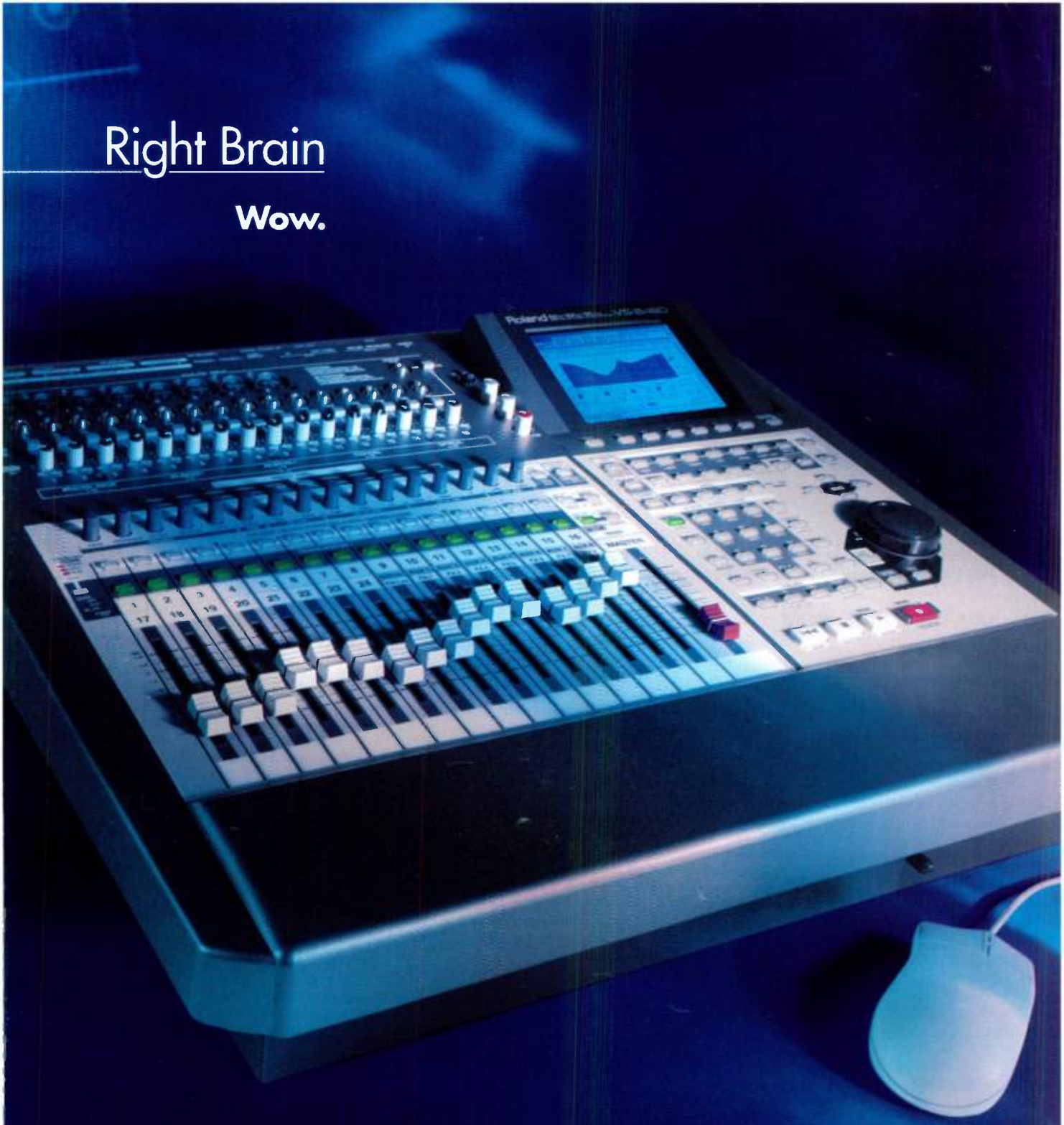
A VGA output confirms playlist, mixer settings, routing and more using an optional computer monitor.

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

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.

MIKE CRUZ

USE THE FORCE, MIKE

Kudos to Jedi master Mike Sokol for his March 2001 article "Testing, Testing, 1, 2, 3." Unfortunately, the troubleshooting sequence he used in his "assume that one side of your P.A. is down" scenario is backward. The correct order is to check the speakers first and then the cable amp, cable, crossover, cable, EQ, cable, processing, cable, console, insert, cable, snake, splitter snake, cable, mic, and finally the dummies at both ends of the chain. Checking in that order enables you to know exactly what's wrong with what you have. Long live the Renaissance man engineer.

Chris Finney
via e-mail

Chris—Some say "po-tay-toe," and others say "po-tah-toe." I don't think it's important which direction you go, as long as you pick a logical path and start troubleshooting. Because many of my P.A. systems have flown speaker stacks and separate amp racks, it's much simpler to start with the closest end (the console output) and work down the line in the direction of signal flow. Moreover, for systems with multiple speakers, it's much more likely that a single component (for example, an equalizer) will fail than that a dozen speakers will fail simultaneously. For club systems with single speaker cabinets and amplifiers in a common rack, it may indeed make more sense to start by swapping speaker leads and continue working backward up the line. The key is to use an orderly progression for testing, not to just swap gear around willy-nilly. That is sure to get you in trouble. Live long and prosper.—Mike Sokol

HE SHOOTS, HE SCORES

The article "Score with QuickTime 4" in the January 2001 issue was useful, but I couldn't figure out how to gain access to the controls for the QuickTime Musical Instrument sounds depicted in **Fig. 6.** Is this a third-party application? It appears that a user can edit and customize the QuickTime Musical Instrument sounds, but no information about how to do that is offered, just a very intriguing screen shot.

Benjamin Furstenberg
via e-mail

Benjamin—"Score with QuickTime 4" focused mainly on using QuickTime with a sequencer to create movie soundtracks, so it didn't fully explore the editing possibilities that Apple provides for QuickTime's built-in instrument sounds.

If you'd like to delve deeper into QuickTime Musical Instruments, first purchase an upgrade to QuickTime Player Pro *from Apple ($29.99; www.apple.com/quicktime). The* QuickTime Player *utility that comes with the Mac OS does not provide the necessary editing capabilities.*

After you upgrade to QuickTime Player Pro, *open a QuickTime movie containing a MIDI music track or create a new movie by importing and converting a Standard MIDI File with the Import command in the File menu. Choose Get Info in the Movie menu to open a dialog box with two drop-down menus at the top; select Music Track on the left and Instruments on the right to produce a list of the individual instruments in the movie. Option–double-click on any instrument name to open a new dialog box and click on the Edit button to reveal a basic set of editing parameters. Click on the Lock icon in the middle of the dialog box to open an array of advanced controls, including the Pitch parameters shown in the figure from January's article.*

For a closer look at working creatively with QuickTime Musical Instruments, see this month's "Desktop Musician" column, "Customizing QuickTime MIDI," on p. 120. —David Rubin

HEY, I UNDERSTOOD THAT!

I've subscribed to your magazine for almost a year, and I generally agree with Gene Yoknis's letter in the February 2001 issue. Many of the articles are way over my head. I think your general readership would indeed benefit from more articles aimed at the technically challenged. If **EM** isn't the avenue for it, perhaps another less technically verbose magazine can be considered.

However, I would like to commend Michael Cooper for his well-written article "The Big Squeeze: A Comprehensive Guide to Compression and Compressors" in the February 2001 issue. Although the topic was quite technical in nature, Cooper did an excellent job of making the information understandable, educational, and interesting to nontechies. That was surprising, because when I saw the cover I was intimidated.

Cooper's article illustrates that even complex technical subject matter can be made understandable to the nonengineer. Perhaps more of your writers can use his piece as a template for handling technical subject matter.

D. McCormick
via e-mail

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BEHRINGER

JUST LISTEN.

FIFTEEN YEARS AGO IN EM

Ah, it's May, and young folks' thoughts turn to . . . MIDI? It sure seemed so in our May 1986 issue, which featured a wealth of MIDI-oriented features. We got the ball rolling with an article by Walter K. Daniel about incorporating MIDI into the home studio. Daniel discussed the still-new specification's impact on musicians' approaches to sequencing, synchronization, effects processing, and synths.

We followed that with a Craig Anderton tutorial about the MIDI parameters found in synthesizers, including definitions, concepts, and applications tips. Terry Fryer then stepped us through the process of using MIDI-controlled synths to create ambiences in an era before synths had onboard effects. Then it was Anderton's turn again, as the Jedi master of MIDI presented his favorite tricks for using the IVL Pitchrider 4000 as a guitar-to-MIDI converter. Pauline Strom added her inspirational ideas for sound programming with MIDI synthesizers, and Tim Dowty topped it off with a DIY project for building your own Commodore 64 MIDI interface.

Of course, we had plenty of other goodies in our bag. Digital-audio recording using pulse-code modulation (PCM) was fast becoming a practical option for home studio, even though you could only record two tracks at a time. Freff gave us a complete roundup of PCM encoder/decoders, including products from consumer-electronics powerhouses Sony, Sansui, JVC, Nakamichi, Aiwa, and Technics. Sony and Nakamichi offered the only 16-bit encoders; the others were 14-bit.

Anderton delivered yet another winner with one of the early stories about how to sample and process analog synthesizers. DIY stories also included Glenn Flood's low-impedance, balanced to high-impedance, unbalanced signal converter, and a slick Thomas Henry modification that added a polyphonic organ to monophonic synths.

After all that, the cover story could have been a letdown, but it wasn't. Robert Carlberg gave us a fine interview with Weather Report's Josef Zawinul, discussing how this all-time keyboard great approached his music, gear, song structures, musical concepts, and life in general.

As usual, we published several interesting reviews. Alan Gary Campbell test-drove the E expansion board, which added important features to the super-hot Yamaha DX7. Geary Yelton examined MacNifty's $130 *SoundCap* software sampler for the Mac; Richard Einhorn checked out Magnetic Music's *Texture* 2.0 pattern-based sequencer for the PC; and Dean Heinbuch gave us the lowdown on Fostex's Model 80 2-track, open-reel tape deck, which became hugely popular in personal studios.

Departments included a short section called "Operation Help," in which readers wrote in with appeals for help, and other readers offered the answers; a glossary titled "DataBank"; and an opinion piece on industry trends.

Among the new tools we unveiled were Ensoniq's classic ESQ-1 synth; Korg's DVP-1, which was one of the first digital voice processors; and two very different digital reverbs: Alesis's budget-friendly MidiVerb ($399) and Ursa Major's high-end ADR-68K ($3,995).

—Steve Oppenheimer

● LETTERS

KUDOS TO KEATING

I found Carolyn Keating's article ("Breaking the Sound Barrier," February 2001) to be well written and very informative. I was impressed with her questions and enlightened by the answers she received. I would like to know more about her *Digital Home Recording* project. Does she have a Web site?

Also, I am an artist with a guitar pick, but I am an absolute dud with a pencil. However, for years I have enjoyed the creativity and imagination of your graphic arts department. I think the staff does a marvelous job with MIDI pins and mannequins alike.

Ken Schleimer
via e-mail

Ken—Carolyn Keating does not have a Web site, but you can e-mail her at sam21@ix.netcom.com.—Steve O

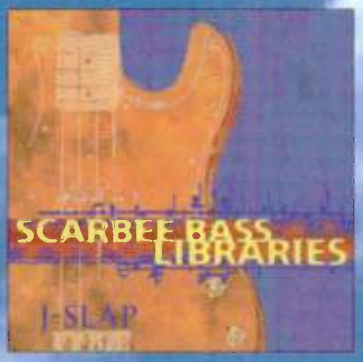
I commend Carolyn Keating on an excellent assessment of the state of women in audio. I am especially grateful to Lora Hirschberg for taking it upon herself to start a mentoring program. I was well into my career when, quite by accident, an engineer I was working with noticed that I wasn't just an artist and producer but that I had some serious clues about the technical stuff. He took me under his wing, and I learned enough to open my own studio.

Women are not socialized in the art of jargon slinging. K.K. Proffitt's comment about knowing your stuff applies to anyone considering a professional career. As a woman, I remember when an engineer I was working with was really slinging the jargon around the control room. He was covering his incompetence up with a lot of bull, and I knew it. Competent people want to work with other competent people.

As a tracker, I have a soft spot for DJ Rap. I hope that most of the young women coming up today have her attitude. By her example, girls will be inspired to pick up some gear, plug it in to their computers, make music, and spread it around.

Kearney Kirby
Dorchester, Massachusetts

Room to Play



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CHANGING GEARS

It was great to see the Wurlitzer EP200a on your "Vintage Page" (February 2001 issue). I'm curious, though: author Julian Colbeck states that the tremolo is speed alterable, but the tremolo knob on my Wurlitzer alters the amount of tremolo while the speed stays constant. Was there another model made with a different feature set?

Joe Griffin
via e-mail

Joe—I can't think of a reply more zippy than "Yes, I think you're right. Tremolo speed is set; it's depth that's alterable." —Julian Colbeck

REVIEWING RESOLUTION

Many software reviews in your magazine are deceptive, and here's why. These days you can get a 19-inch monitor that runs at 1600×1200 for less than $400. On a poor man's budget like mine, this is the appropriate equipment and setting for running sequencer software, such as Cakewalk's *Pro Audio* or Steinberg's *Cubase VST*. If the text on your screen is too small, you can make it larger by scaling it in the Control Panel (or Mac equivalent). Once your computer is set up this way, you don't change to a lower video resolution to run other programs because it messes up your icons and screen layouts; nothing fits anymore. Besides, you will probably want to run several programs at the same time.

However, many programs you review have cute graphical interfaces that assume you will run the programs at much lower resolutions, say 800×600 or 1024×768. When I run them at high resolutions, they don't look anything like the photos in your magazine. Instead, they are tiny rectangles with tiny features and minuscule, unreadable text.

When you switch your computers to the best resolution to show off those programs, you are doing something your readers will not want to do. This unfairly shows those programs in a good light when, in fact, they are poorly designed.

I think you should review programs in a realistic environment. Set up your system like mine to be optimized for the sequencer software and then leave it that way.

For the other programs, let the chips fall where they may. If this means your screen shots show a mostly blank screen with a tiny graphical interface in one corner, that's a fair treatment of the program. That's how they ought to be reviewed.

David Brumley
San Diego, CA

David—All of our reviews are real-world field tests, and our authors create their own screen shots with whatever computers and monitors they use to make music. We do not alter the screen shots or the display settings to make the programs look better, nor do we want our authors to do so. We do not edit the screen shots except to crop extraneous stuff that is not part of the music software, such as icons on the surrounding desktop.—Steve O

ERROR LOG

March 2001, "Yamaha AW4416," p. 140: Mix automation extends to the inputs, aux sends, and aux returns.

March 2001, "What's New," p. 28: Roland's *V-Producer* costs $395.

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WHAT'S NEW

By Marty Cutler

AUDIX MD-10

When miking drums for recording, you want to ensure that the instruments are as isolated from each other as possible. Additionally, microphones should not interfere with the drummer's playing. Audix's MD-10 ($259) is a dynamic microphone designed for drums and percussion that provides a solution to these challenges. The hypercardioid pattern provides extreme isolation for individual drums in studio and stage applications.

Due to the mic's small size—2 inches long and 1⅛ inches in diameter—it can fit into tight places, such as the space between cymbals and toms. The XLR connector is mounted on the mic's built-in gooseneck for flexible positioning. A low-profile clamp lets you mount the mic out of the drummer's way. Frequency response is rated at 70 Hz to 15 kHz. Audix USA; tel. (800) 966-8261 or (503) 682-6933; e-mail info@audixusa.com; Web www.audixusa.com.

CREST AUDIO FB-88

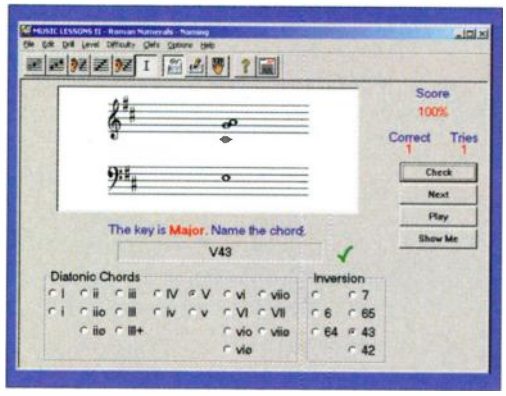
The FB-88 ($1,600) from Crest Audio is a crossplatform FireWire (IEEE-1394) audio interface that supports ASIO and WDM drivers. The FB-88 has two software-selectable operating modes. In Analog mode, you can use the analog inputs, and S/PDIF is available from the optical output. The ADAT mode offers eight channels of ADAT I/O using the optical ports.

The device has a 24-bit recording resolution with selectable sampling rates of 44.1, 48, 88.2, and 96 kHz. Crest Audio claims it reduced monitoring latency to the single sample. You can select audio levels and panning for each source and use the output trim (+4 dBu to –10 dBV) for the monitor outputs. Each channel has a ten-segment LED bar graph for monitoring.

The 2U rack-mount FB-88 has eight balanced inputs on Neutrik combination jacks; eight individual analog outputs on ¼-inch TRS jacks; a pair of balanced ¼-inch jacks for monitor outs; BNC jacks for word clock; optical output configurable for ADAT or S/PDIF; ADAT optical input; and MIDI I/O. Crest Audio; tel. (201) 909-8700; Web www.crestaudio.com.

MIBAC MUSIC LESSONS II

Music Lessons II (single copy, $149; lab five-packs, $447; site license, $999; Mac/Win) from MiBAC Music Software is an educational software application that focuses on chord construction and harmony. The software aims to develop ear training, chord-shape recognition for keyboard and guitar, and reading skills. The program includes keyboard and fretboard displays.



Study areas include spelling and recognizing triads and seventh chords by ear and identifying chords by Roman numerals. You can choose from hundreds of naming, writing, and playing activities for each area of study. The activities have multiple levels of difficulty, and you can create customized drills for targeting specific areas of study. *Music Lessons II* offers a built-in music-theory reference guide that explains drill-related concepts. When you're ready, you can print a detailed progress report that tracks individual assignments or cumulative score totals.

Music Lessons II runs with Windows 95, 98, NT4, and 2000. You'll need a least a Pentium II/200 MHz computer with 4 MB of RAM and any Sound Blaster or compatible sound card. Macintosh users can use anything from a 68000 processor to a PowerPC. OS 7.11 or later and 4 MB of free RAM are required. The program supports Open Music System (OMS) and FreeMIDI. 360 Systems (distributor); tel. (818) 342-3127; e-mail info@mibac.com; Web www.mibac.com.

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YAMAHA DX200

If you've ever wanted a DX7 with knobs instead of a complex hierarchy of menus, you're in luck. Yamaha's DX200 ($629.95) combines FM synthesis, sample playback, and an analog-style step sequencer in a desktop unit laden with real-time controls.

The DX200's factory sounds were developed specifically for contemporary dance music. The unit features the same 32-algorithm, six-operator FM synth engine as the DX7. However, unlike the DX7, the unit includes a resonant multimode filter and, for FM and sampled sounds, a choice of lowpass, bandpass, notch, or highpass filters. The lowpass filter has a dedicated envelope generator, and you can select a slope of 12, 18, or 24 dB. Because the DX200 is fully compatible with DX7 System Exclusive, you can choose from the DX7's enormous back catalog of sounds. The 16-voice FM synth is accompanied by a 32-voice sample-playback engine featuring drum, bass, and percussive sounds.

The DX200's sequencing section provides 256 built-in patterns to get you started and 128 user slots for saving your patterns. Front-panel buttons provide track settings such as octave shift, swing, pattern select, and synth type. When you finish recording your patterns, you can then link them into song form as you would with a drum machine. Pattern looping in edit mode lets you audition your changes as you work.

The step sequencer gives you one track of FM synthesis and three tracks of sample playback, and each track can be assigned its own MIDI channel. The DX200 is four-part multitimbral and can send MIDI Clock or synchronize to external MIDI Clock. The Free EG (envelope generator) provides four tracks for recording parameter changes, giving you complex sound motion. You get 15 knobs for controlling parameters including filter cutoff and resonance, portamento speed, harmonic content, FM depth, and noise level. The DX200 also provides two Scenes per track; a scene lets you change instruments instantly or morph between two sounds.

The DX200 comes with a CD-ROM containing OMS 2.38, *DX200 Editor* for the Mac, and a collection of additional patches. Two ¼-inch, unbalanced audio jacks, a ¼-inch headphone jack, and MIDI In and Out ports complete the package. Yamaha Corporation of America; tel. (714) 522-9011; e-mail info@yamaha.com; Web www.yamaha.com or www.yamahasynth.com.

STEINBERG GRM TOOLS, VOL. 2

GRM Tools, vol. 2 ($199; Mac/Win) from Steinberg is a collection of four VST plug-ins designed by GRM at Paris's Institut National de l'Audiovisuel. Despite the fact that the plug-ins' names seem rather conventional, each effect actually stretches the capabilities of the processing domain.

Reson is a multimode 128-band filter. Each band can be a resonant highpass, lowpass, or band-reject filter, and each can be as small as a single frequency. By emphasizing specific frequencies, even inharmonic sounds can be given a melodic element.

The *Doppler* plug-in goes beyond traditional Doppler effects with a two-dimensional axis for manipulating audio. *Doppler* provides a two-way potentiometer for controlling the effect.

Freeze can create 32 loops within a three-second sample. You can control the number of loops and timing, duration, synchronization, and speed of the replay.

Delay delivers a maximum of 128 simultaneous delays, and you can vary amplitude and timing for each one in real time. When using the plug-in in stereo, delays alternate between the left and right channels.

You can send settings to any of the four processors with a single mouse-click or define a time frame in which settings morph between presets. All the time-based parameters are adjustable in musically relevant units. To run *GRM Tools*, you will need at least a Pentium II/200 MHz running Windows 95, 2000, ME, or NT, with 64 MB RAM. Mac users will need a G3 604e/166 MHz with Mac OS 7.5 and 24 MB RAM. Both platforms require a VST-compatible host program. Steinberg North America; tel. (818) 678-5100; fax (818) 678-5199; e-mail info@steinberg.net; Web www.us.steinberg.net or www.cubase.net.

They say, "If it ain't broke, don't fix it."

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A major upgrade of the worldwide standard in professional pitch correction

Hailed as a "holy grail of recording" by *Recording Magazine*, Auto-Tune is used daily by thousands of audio professionals around the world. Whether to save studio and editing time, ease the frustration of endless retakes, save that otherwise once-in-a-lifetime performance, or even to create unique special effects, Auto-Tune has become the professional pitch correction tool of choice.

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AUTO-TUNE 3's AUTOMATIC MODE corrects the pitch of a vocal or solo instrument in real time, without distortion or artifacts, while preserving all the expressive nuance of the original performance.

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KEY NEW FEATURES OF AUTO-TUNE 3 INCLUDE:

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Auto-Tune 3 will be available in TDM, MAS, RTAS, Mac VST, and DirectX versions. Upgrades are available for registered Auto-Tune owners. Check our website for details.

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ROLAND RS-5 AND RS-9

Roland's RS-5 and RS-9 synthesizers ($795 and $1,295, respectively) are 64-note-polyphonic synths, with built-in effects processors and arpeggiators that include the waveforms and real-time performance capabilities of Roland's XV-series synthesizers. The RS-5 has a 61-note unweighted keyboard, and the RS-9 has 88 weighted keys and instant access to piano presets.

The RS-5 and RS-9 have 512 Presets, 256 of which are General MIDI Level 2 programs. In addition, there are velocity-switched scat vocals, sampled synths from Roland's collection of expansion boards, and new drum kits. The multi-effects processors offer reverb, chorus, and delay, as well as exotic effects such as the Slicer, a gating effect derived from Roland's Grooveboxes. The Category Search button facilitates navigating through the presets, and you can bookmark your favorite presets for quick access.

Both synths give you real-time control knobs for filters' cutoff frequency, resonance, LFO speed, and attack and release. The RS-5 and RS-9 are not fully programmable, but you can change modulation routings, layer sounds, and save patches altered by the control knobs. The arpeggiators are derived from the XV-88 synthesizer and have adjustable accent, shuffle, tempo, and octave parameters. They can also be synched to MIDI Clock.

The RS-5 and RS-9 include a stereo pair of ¼-inch unbalanced audio outputs; a ¼-inch headphone jack; MIDI In, Out, and Thru; and an expression-pedal input. Roland Corporation U.S.; tel. (323) 890-3700; Web www.rolandus.com.

NATIVE INSTRUMENTS BATTERY

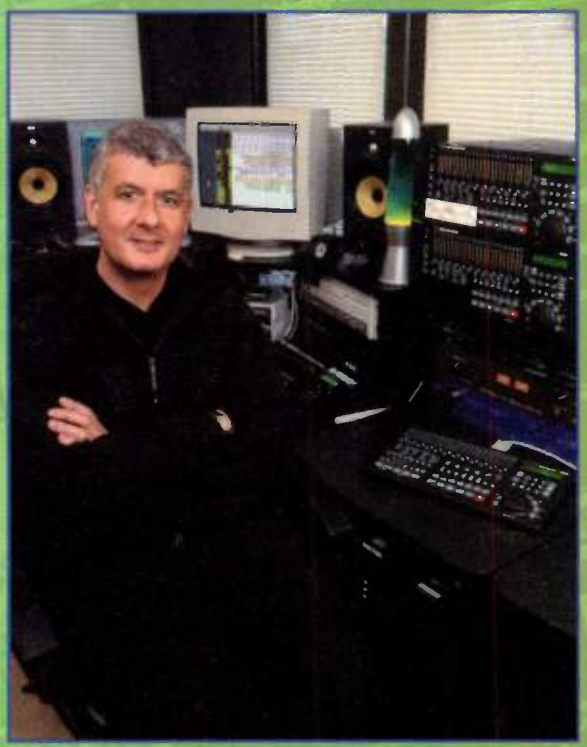
Native Instruments' *Battery* ($199) is a virtual sampler that is designed specifically for drum programming. The application's extensive sound-shaping capabilities cover an ample range, from the realistic to the surreal.

Each of the 54 sample slots can have a maximum of 128 Velocity layers, and you can assign as many as six modulation routings to each of the slots. Every slot has its own effects loop, offering time-stretching algorithms and granular synthesis–like processing. You get an AHDSR amplitude envelope for each slot, a pitch envelope generator, a bit-reduction effect, as well as a dynamics shaper.

Battery comes with 20 sound sets to get you started. The sample loading dialog box includes a preview button. You can also drag and drop files into the application. The sampler is compatible with a number of file formats, including Akai S1000, Steinberg *LM4*, MAP, AIFF, and WAV. *Battery*'s internal resolution is 32 bit, and it accepts samples ranging from 8- to 32-bit resolution.

Battery supports MME, Direct Sound, Sound Manager, ASIO, VST 2.0, and MAS. You can also run *Battery* as a standalone application. For PCs, Native Instruments recommends a Pentium II/300 MHz with 64 MB RAM, running Windows 98. For Mac users, Native Instruments suggests a G3/300 with 64 MB RAM, running Mac OS 8.6. Steinberg North America (distributor); tel. (818) 678-5100; fax (818) 678-5199; e-mail infoUSA@native-instruments.com; Web www.native-instruments.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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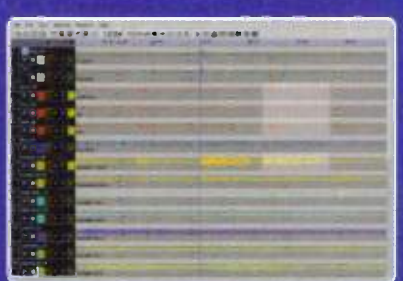
MX-2424 24-TRACK 24-BIT HARD DISK RECORDER/EDITOR



Coming soon: the new MX-View graphic user interface for MX-2424. Native Mac/PC versions. Scrolling real-time tracks with sample-level waveform editing. Onscreen metering. Multi-machine control. Free for all MX-2424 owners.

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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.

great

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.

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SPEC SHEET

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- 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
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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
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- The ability to load new GEs as they are released

MAKING

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ALESIS AIRSYNTH

It may physically resemble the HAL 9000 computer of *2001: A Space Odyssey*, but Alesis's airSynth ($249) is about as user-friendly a synthesizer as it gets. The airSynth offers 50 preset sounds that you play theremin-style by moving your hand through an infrared beam.

You can control as many as five sound parameters in real time by crossing the beam's *x-y* axis. The sounds include a variety of pads, drums, and percussive synths, sampled at 44.1 kHz. The presets are not programmable. However, when you find a sound you like, you can freeze it, which temporarily preserves your settings. A single knob on the airSynth controls freezing, release, tempos, and preset selection. The unit's A/D/A conversion is 24 but with 28-bit internal processing.

A pair of RCA inputs lets you mix an external audio source with the airSynth's output, although it doesn't process incoming audio. The device also has a pair of RCA jacks as outputs, which is useful for interfacing the unit with consumer-level gear. The airFX is strictly a real-time instrument and has no MIDI I/O. Alesis Corporation; tel. (800) 525-3747 or (310) 255-3400; fax (310) 255-3401; e-mail info@alesis.com; Web www.alesis.com.

PSP MIXTREBLE

PSP's *MixTreble* (Mac/Win; $30) is a VST plug-in that uses four algorithms to enhance the clarity of digital-audio tracks, process mixes, or clean up hiss from archived tape recordings. The first algorithm is useful for removing unwanted room reverberation and hiss. The second improves the definition of weak or overly compressed transients. The stereo enhancer algorithm gives you control over spatialization. The fourth algorithm enriches the upper-harmonic content of tracks. You also get a soft-clipping feature, which functions to prevent the tracks from rising above 0 dB.

Minimum system requirements for the PC are Windows 95 or 98 running on a Pentium II/300 MHz. For the Macintosh, you'll need at least OS 8.5 running on a G3/300 MHz. A VST host application is required on both of the platforms. PSP; tel. 48-60-196-3173; e-mail contact@psp-audioware.com; Web www.pspaudioware.com.

SYNTHESIS TECHNOLOGY MOTM-820

Lag processors add variable slew-rate control to discrete voltages in synthesizer systems. Synthesis Technology's MOTM-820 ($249, assembled and tested; $149, kit) has independently adjustable rise and fall times from 500 µs to 5 minutes.

To emulate traditional lag processors, you can use the Up/Down control. Traditional systems often use exponential rise and fall times, but the MOTM-820's Lin/Log control can alter rates from linear to logarithmic. The processor is defeatable from the front-panel bypass switch or by remote control. Switching produces no DC shift. The MOTM-820 has three outputs, each of which can drive cables of as much as 20 feet in length with no decrease in voltage.

Inputs and outputs are on ¼-inch TS jacks. The MOTM-820 has separate CV jacks for controlling up, down, and up/down slew, and a jack for bypass. Synthesis Technology MOTM; tel. (888) 818-6686; e-mail synth1@airmail.net; Web www.synthtech.com.

"REASONS NOT TO BUY A MACKIE D8B...ZERO." —Roger Nichols, EQ Magazine

PLUS 3 MORE REASONS TO GO FOR IT.

OS Version 3.0 NOW SHIPPING!

Download direct from www.mackie.com

1 FREE UPGRADE! NEW OS 3.0 ADDS OVER 30 NEW FEATURES!

Our Programming Department has been chugging the double lattés to create Mackie Realtime OS™ Version 3.0, packed with more new features and enhancements than you can shake a mouse at. Here's just part of what 3.0 adds to the already amazing D8B.

- **New key (sidechain) inputs** for all 48 onboard dynamic processors featuring soft knee architecture and single band 20-20k parametric EQ for frequency dependent processing such as de-essing
- **3rd-party plug-ins** via our new UFX card. Up to 16 simultaneous plug-ins on the first 48 channels, pre or post DSP, pre-fader via up to 4 UFX cards. Each plug-in is available twice – once when tracking, and again at mixdown!
- **Multiple Undo List** — 999 levels!
- New **Snapshot libraries.**
- Externally or internally accessible **inserts across Mains and Buses** plus **channel inserts pre and post DSP.**
- **Updated GUI** including 48-channel fader bank view screen.
- **Time Offset** (delay) adds a delay of up to 255 samples to the signal at the pre-DSP (dynamics / EQ) point in the signal path.
- **New surround capabilities** including depth-of-center control (LCR mixing with divergence), multiple surround panner window, individual LFE channel level control.
- **Multiple direct outs** per channel.
- **Optional level to tape** fader control.
- **Assignable, bidirectional MIDI control** of all parameters.
- **Cross patching** allows substitution of channels between various banks.

The list of top engineers and producers who use the award-winning Mackie Digital 8 • Bus is growing daily. For info on the D8B, new UFX and Optical • 8 cards, 3rd-party plug-ins and how D8B owners can get their free OS upgrade, visit www.mackie.com or call your local D8B dealer.

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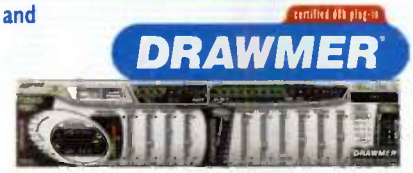


2 DSP PLUG-INS!

Antares' Auto-Tune for the D8B uses advanced DSP algorithms to detect the incoming pitch of a voice or solo instrument as it's being tracked and instantly pitch-correct it without introducing distortion or artifacts. Fully automatable.

Massenburg Parametric EQ. MDW 2x2 High-Resolution Parametric Equalizer plug-in from Grammy-winning engineer/producer George Massenburg. Mono/stereo EQ at 96kHz sample rate for unprecedented clarity and high frequency smoothness.

Drawmer ADX100 includes their industry standard frequency conscious gating, plus compression, expansion and limiting.

IVL Technologies' VocalStudio provides real time vocal doubling, multi-part harmonies and pitch correction in an easy-to-use interface. A free demo is built-into the Digital 8 • Bus. Just add a second MFX card to own this innovative plug-in from a world leader in vocal processing.

TC Electronic Reverb (bundled with the D8B UFX card) provides Reverb 1 and Reverb 2 algorithms from the renowned TC Electronic M2000 Studio Effects Processor.

3 1999 TEC AWARD WINNER!

Normally we don't name competitors in our ads. But in this case, Mix Magazine published the other nominees for the 1999 TEC Award for Outstanding Technical Achievement in Small Format Consoles: Allen & Heath's GS-3000, Digidesign's ProControl, Panasonic's WR-DA7, Spirit's Digital 328 and Yamaha's 01V. Thanks to all who helped us win this prestigious award.

SOUND ADVICE

AMG

Complete Celt 2: Jigs, Reels and Polkas ($99.95, CD-Audio) from AMG is a three-CD set of live Celtic music performances. The collection offers more than three hours of music from a team of heavy hitters in the Celtic music world. Artists include Luke Daniels of De Danaan and Riverdance, Julie Murphy of Fernhill, Paul James, and Simon Mayor of Mandolinquents. The CDs are a sequel to AMG's *Complete Celt;* however, this collection offers a more upbeat, dance-oriented set.

The first CD of *Complete Celt 2* features complete tracks followed by isolated track elements. The other two discs in the set contain solo performances. Instruments include fiddle, uilleann pipes, bagpipes, mandolin, mandocello, accordion, and female vocals. East West (distributor); tel. (800) 833-8339 or (212) 541-7221; e-mail matt@amguk.demon.co.uk; Web www.amguk.co.uk.

KID NEPRO

The Kid is back with a collection of sounds for Korg's MOSS physical-modeling expansion board. *MOSS Special No. 1* ($20) takes advantage of the board's 13 oscillator types and the Triton's arpeggiator and effects section. Sounds range from classic analog synths to evocative textures and special effects aimed at film soundtracks. The collection offers 64 arpeggiator-driven rhythmic patches and 64 sustained sounds in all.

Kid Nepro programmed a great deal of motion into the pads and suggests letting the pads cycle through all of their stages. Owing to the MOSS board's six-voice limit, the collection does not use the Triton's Combination capabilities. Kid Nepro; tel. (246) 420-4504; e-mail kidnepro@aol.com; Web www.kidnepro.com.

BIG FISH AUDIO

SloFunk ($99.95, two-CD set: CD-Audio and CD-ROM) offers chunks of funk and R&B for your sampler or digital-audio sequencer. Producer Rich Mendelson and his cohorts created the previous Big Fish Audio projects *Phatter Phunkier* and *Freaky Jazzy Funky.* On *SloFunk,* they have compiled a set of funk fodder featuring a grab bag of construction kits, loops, guitars, bass, keyboards, and more.

Tempos range from 50 to 120 bpm, keeping the fare on the slower side of the funk groove. If you wish to speed things up, the CD-ROM also includes *Acid*-prepared WAV files and Standard MIDI Files. Big Fish Audio; tel. (800) 717-FISH or (818) 768-6115; e-mail info@bigfishaudio.com; Web www.bigfishaudio.com.

HAL LEONARD

Although best known as publishers of printed music, Hal Leonard has entered the sample-library arena with its Sound Library series ($24.95 each). The first three offerings in the series are collections of royalty-free sampled drum loops and one-shot drum elements. Loops include intros, endings, fills, and variations on the basic patterns.

The three volumes, *Hip-Hop and Rap, Classic Rock,* and *Modern Rock* follow the same format; each includes a book, an audio CD, and a CD-ROM of WAV files. Hal Leonard has not completely abandoned its instructional bent; the books in each collection contain notation for all the patterns, and the audio CD provides 99 tracks, featuring full arrangements for demonstration and play-along purposes. The book also contains a directory that lists the CD-ROM tracks by pattern and tempo. One-shot samples are listed by drum element. Hal Leonard Publishing Corporation; tel. (414) 774-3630; Web www.halleonard.com.

KEY CHANGES

Roland Corporation has formed strategic alliances with **Fender, Brian Moore, Godin, Washburn, Ibanez, ESP, Quest,** and other guitar manufacturers to provide 13-pin divided-pickup outputs for Roland's V-Guitar systems and other MIDI guitar converters (see "In Control," p. 64). . . . **Cirrus Logic Solutions** has forged a strategic alliance with **Red Hat.** The alliance will ease distribution of DSP software and Linux drivers for Cirrus PCI audio cards. New Linux drivers can be downloaded at www.kernel.org. . . . **Emagic** released a full-featured, OEM version of *Sounddiver* for Access Virus synths. The editor/librarian software for Mac and Windows will be bundled with all versions of the Virus. . . . **Yamaha** and Roland agreed to support the new General MIDI 2 (GM2) standard. Both companies will offer open access to Yamaha's XG and Roland's GS formats. The GM2 hardware and software products they develop will be backward compatible with XG and GS instruments. . . . **Digidesign** and **Massenburg DesignWorks, LLC** announced plans to codevelop a high-quality TDM EQ plug-in for Pro Tools systems. The plug-in will be based on Massenburg's MDW 2×2 parametric equalizer technology. . . . **Native Instruments** announced a collaborative effort with UC Berkeley's **Center for New Music and Audio Technologies** (CNMAT). *REAKTOR,* Native Instruments' software synth, will implement CNMAT's Open Sound Control (OSC) protocol, an alternative to MIDI providing communication between computers, synths, and multimedia devices. OSC promises precise timing of musical events over high-bandwidth networks, such as TCP/IP.

WEB PAGE

By Peter Drescher

WEB SITE OF THE MONTH

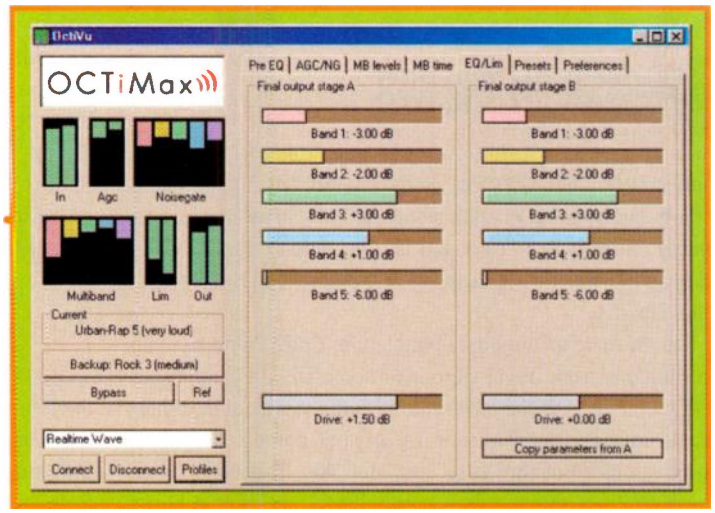
Besides being a resource of books and videos for music-business professionals, artistpro.com (www.artistpro.com) hosts discussion forums with well-known producers and engineers; maintains a huge, searchable database of studios and equipment manufacturers; and publishes free online courses about audio-engineering techniques. The courses—including Understanding the Mixer, Essential EQ Theory, and Microphone Technology—cover a range of topics. Designed by Bill Gibson, the curriculum is based on his popular three-volume *AudioPro Home Recording Course.* Each section contains detailed technical discussions, illustrations, and audio demonstrations. For example, when Gibson talks about boosting or cutting 300 Hz while recording electric guitar, an MP3 and Windows Media file is provided so that you can hear the EQ's effect on the sound. Each course also has a multiple-choice final exam. Registration is free, and courses are available to registered users.

Artistpro.com also provides the *Recording Industry Sourcebook,* a standard music-business reference for more than a decade. The book lists producers, studios, studio-gear manufacturers, CD duplicators, and other services from across the country. Each listing contains locations, phone numbers, contact names, Web sites, and e-mail addresses. By putting all the information into a searchable online database, artistpro.com makes it easy to find what you need. Registered users have free access to the *Recording Industry Sourcebook.*

Another feature provided on artistpro.com is the Advisor Forum, where well-known panelists address an important topic each month, and visitors can post questions or take part in online discussions. The forum's panel includes legendary producer, engineer, and recording artist Alan Parsons; producer and engineer Al Schmitt; mastering veteran Glenn Meadows; and former Fleetwood Mac guitarist Bob Welch.

DOTDOTDOT.COM

Electronic music's history is littered with strange devices built by engineering geniuses. A comprehensive collection of more than 150 instruments from the past 70 years is maintained by the **Audities Foundation** (www.audities.org) for use by museums, recording studios, composers, and researchers. You can find everything from seminal Buchla and Moog synthesizers to Farfisa organs and Rhodes pianos, including a host of devices few people have seen, such as Raymond Scott's Clavivox. The Web site contains photographs of myriad instruments, and you can also order manuals and documentation from the foundation for a nominal fee. . . . **Sonify.org** (www.sonify.org) is a community resource for composers, sound designers, and Webmasters working in the brave new world of online interactive audio. The Web site provides beginning and advanced tutorials explaining how to create sonified Web sites using Flash, QuickTime, JavaSound, and Beatnik. The Gallery includes links to commercially sonified sites, online sound-effects libraries, music-education programs, and sound-art exhibits. Users can discuss technical issues and coding techniques on the Community bulletin board. . . . Need backing tracks in General MIDI (GM) format for your karaoke machine or next cover-band gig? **MIDI Hits** (www.midi-hits.com) has a long list of popular tunes to choose from, in a variety of styles. You can search the catalog by genre, artist, or title and audition many of the tunes through RealAudio. You can download the Standard MIDI Files (SMFs) for a fee or order an audio CD. MIDI Hits will even create custom MIDI transcriptions of published songs for an additional fee.



WEBCAST

Because of its scratchy, fuzzy, and low-resolution audio quality, Web audio usually makes AM radio sound like a marvel of fidelity. The issue, of course, is bandwidth: your Web audio's quality is limited by the number of bits you can push through the wires. Slow modem speeds, data-packet traffic jams, and server overloads can slow the data stream to a trickle, creating a drop in sound quality.

Enter Octiv (www.octiv.com), which seeks to raise Webcast fidelity by preprocessing audio files to make them smaller and better sounding. By compressing and limiting the sounds according to psychoacoustic principles, and dynamically applying spectral normalization, Octiv's products increase audio clarity at the receiving end by reducing the bandwidth that needs encoding. The results are louder, clearer Webcasts at lower transfer bit rates. Octiv's programs support all encoders, including RealAudio, Liquid Audio, QDesign, Windows Media, and MP3.

The Berkeley, California–based company produces two applications designed for different audio types. *OctiMax* divides the input sounds into five frequency bands, performs normalization and peak limiting, and then remixes the audio for streaming. *OctiMax* is best for music files and video soundtracks. On the other hand, *OctiVox* uses only three bands and is primarily for Internet telephony applications.

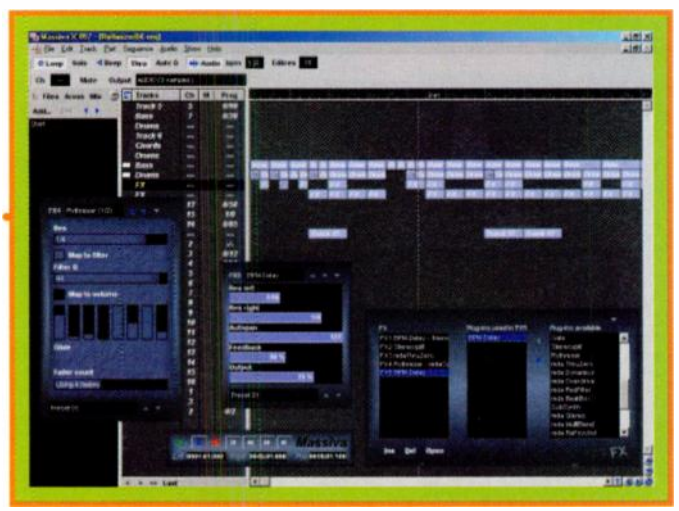
Octiv's programs have very low CPU footprints, run on WinTel servers, and don't require additional plug-ins on the client computer. The company's products are employed by businesses such as iBeam.com—which manages radio-streaming content for its customers (including MTVi.com, Launch.com, MSNBC, and the BBC)—and Firetalk, a provider of Internet-based voice communications systems.

DOWNLOAD OF THE MONTH

Massiva is a full-feature MIDI and audio sequencer for Windows and a free download from http://go.to/massiva. But don't let the fact that it's free fool you. *Massiva* is a powerful application with an easy-to-use menu design and an effects plug-in architecture.

Although you can use the MIDI sequencer to control external hardware devices, it seems best suited for gaining access to the instruments on your PC's sound card. *Massiva* reads and writes Standard MIDI Files, lets you record in real time or in step mode, and quantizes a groove. The application can sync digital audio to MIDI tracks through DirectX, and WAV files can be imported, mixed, positioned, and saved, either as sessions or to disk. *Massiva* also provides graphic editing of Velocity, Program Changes, and other parameters, and you can access effects settings on the SoundBlaster AWE card and save your changes with the sequence.

The application has additional tricks up its sleeve. The auto-compose function produces simple drum tracks using percussion samples, which you can then use as starting points for more creative work. A variety of effects plug-ins can be applied to the audio, including reverb, compressors, resonant filters, delays, flangers, and even a Leslie rotary-speaker effect. The *Massiva* site has documentation and tutorials about how to install and run the program, a bulletin board for trading tips and techniques, and information about the application programming interface, so you can write your own plug-ins.



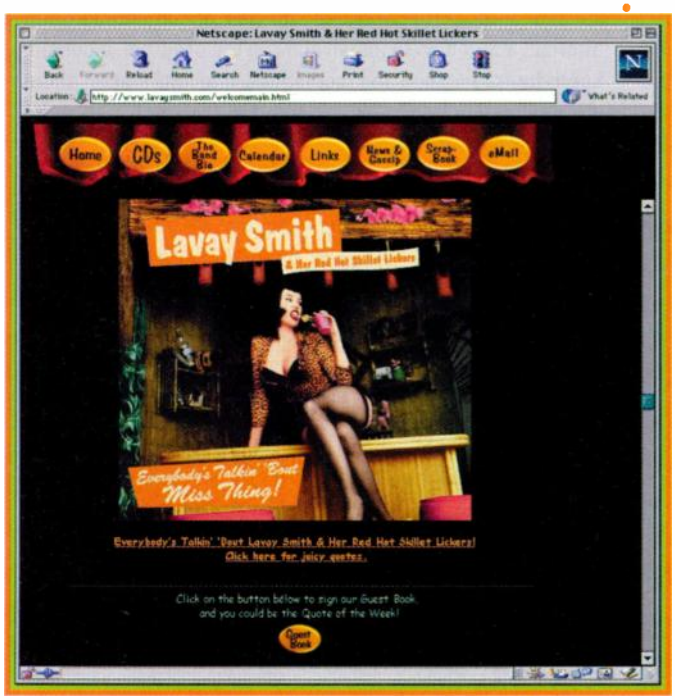
BAND ON THE WEB

You may have heard that swing is king again, at least to a whole new audience of young lindy hoppers and jumpin' jivers twirling and gyrating in slick suits and long, pleated dresses. Holding court in San Francisco is the reigning queen of the swing scene, the incomparable Lavay Smith, with Her Red Hot Skillet Lickers.

The music is arranged by bandleader Chris Siebert—with contributions from David Berger (a noted Duke Ellington authority who also writes for Wynton Marsalis's Lincoln Center Jazz Orchestra) and consists of original compositions and classic gems from the '20s, '30s, and '40s. The eight-piece ensemble (four horns, guitar, piano, bass, and drums) burns through jump blues, boogie-woogie, bebop, swinging dance numbers, saucy ballads, and New Orleans R&B tunes with confident exuberance. That's not surprising because the band is a who's who of Bay Area jazz players. It brings years of experience and some of the biggest names to the stage, including trumpeter Bill Ortiz and saxophonists Bill Stewart and Jules Broussard.

Smith's vocal style evokes blues chanteuse Bessie Smith, with Billie Holiday and Dinah Washington influences mixed in. When not on the road, Smith packs Friday nights at Cafe Du Nord, an oh-so-cool basement club on Market Street in San Francisco's Castro district.

The band's Web site (www.lavaysmith.com) conveys the sultry, glamorous feel of the music and gives fans an opportunity to read about the band's history and biographies of the musicians—including, of course, Smith. You can check out the band's busy gigging schedule and link to Amazon.com to buy its latest CD, *Everybody's Talkin' 'Bout Miss Thing.* The scrapbook section contains stylish publicity photos and some priceless shots of the diva posing with celebrities such as Lucy Lawless (of *Xena* fame) and Bill and Hillary Clinton.



WEB APP

JavaSound is an application programming interface (API) from Sun Microsystems that lets Java applet developers add sound and music to Web sites. JavaSound comes with the Java2 Software Developer's Kit and the Java Media Framework, and is slowly being incorporated into Java implementations for various computer platforms. When it is installed on a client's machine, JavaSound applets perform an array of interactive audio tasks without additional browser plug-ins, which is ideal for easily and efficiently sonifying Web sites and Web-based systems.

The original code for the audio engine was licensed from Beatnik in April 1997 and has been extensively modified to provide Web audio services. JavaSound not only plays AIFF, WAV, AU, MIDI, and RMF files but also records MIDI and audio data, mixes as many as 64 channels, and can output streaming audio or various sound-file formats. Because JavaSound is part of the extraordinarily powerful Java Virtual Machine environment, applets can be written that process MP3, RealMedia, Windows Media, or any other file format desired. Built-in control objects let programmers set reverb and gain levels, do stereo panning, or apply custom effects.

JavaSound also has a sophisticated MIDI synthesizer capable of rendering General MIDI (GM) files using a built-in sampled-instrument library. You can use one of three GM sets (small, medium, or large) provided by Sun or create a set of sounds for your applet. MIDI data can be routed to external hardware if the client system has an outboard device connected, or MIDI input can be received and recorded from an electronic keyboard.

JavaSound has diverse uses. It is designed to facilitate the development of Internet telephony applications, streaming media players, multiuser Web games, online-content creation tools, and more. Because it is platform independent and processor efficient, it may eventually add sound to cell phones and other handheld devices. Like related APIs such as Java 2D, Java 3D, and Java Speech, JavaSound makes sophisticated interactive audio and video systems possible. Other Web technologies are competing for control of the online audio environment, so stay tuned to http://java.sun.com/products/java-media/sound for updates.

TWIN POWERS... ACTIVATE!

- Polyphony: 20 Voices
- Multitimbre: 4
- Sound Types: Subtractive & FM
- Waveforms: 6 Shapable per Oscillator
- Unison: 10 Oscillator, Retains Full Polyphony
- Morphing: 26 Parameters by 4 Groups per Sound

nord lead 3
performance synthesizer

nord lead 2
virtual analog

KA-BOOM!

KA-BLAM!

- Polyphony: 16 Voices
- Multitimbre: 4
- Sound Types: Subtractive
- Waveforms: 5
- Unison: 2 or 4 Voices per Note
- Morphing: 24 Parameters per Sound

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VINTAGE PAGE

By Julian Colbeck

Oberheim OB-8

Produced: 1983–85
Made in: United States
Designed by: Tom Oberheim
Number produced: 3,000
Synthesis system: analog, subtractive
Price new: $4,545

Today's prices:		
	Like new	*$1,000*
	Like, it's okay for its age	*$700*
	Like hell	*$500*

The OB-8 was last in the line of classic Oberheim analog synthesizers that included the OB-X, OB-Xa, and OB-SX, each of which is well regarded for its warmth and richness. Although Tom Oberheim said that the OB-8 is too perfect, lacking the earlier models' grit, it's still a human-sounding instrument. Most synthesizer aficionados agree that the OB-8 doesn't sound inferior to the OBXa, and they appreciate the OB-8's extra programming facilities, stability, and economy.

The OB range was keenly embraced by merchants of rock 'n' roll, R&B, and dance music in the late '70s and '80s. The block synth chords on Van Halen's "Jump"—the keyboardist's equivalent to Led Zeppelin's "Stairway to Heaven"—were played on an OB-Xa, and the conspicuous synth riff on Prince's "1999" was an OB-8. The OB-8 was also the weapon of choice for Styx's Dennis de Young.

During the mid-'80s, the OB-8 exemplified the archetypal L.A. sound—glossy, expansive, and expensive. Today the Rappino Brothers, a top Italian remix team, use an OB-8 as their primary purveyor of analog pads and gate-effected rhythm synth parts. Recently Trent Reznor, Jimmy Jam, Janet Jackson, and others have tapped into the OB character and groove.

The OB-8 has two voltage-controlled oscillators (VCOs; based on the Curtis CEM 3340) per voice, each with sawtooth, pulse, and triangle waveforms. For searing, hollow lead lines, the VCOs can be tuned separately and then shackled together in hard sync. Departing a bit from the earlier OBs' filter design, the OB-8 offers a choice between 2-pole or 4-pole filter slopes. The OB-8's voltage-controlled filter (VCF) is certainly precise, which likely accounts for Tom Oberheim's slight misgivings about the instrument. An ADSR envelope generator (EG) is dedicated to controlling the filter.

The low-frequency oscillator's (LFO) wave shape can be triangle, square, positive or negative ramp, noise, or sample-and-hold. The LFO can modulate VCO frequency or pulse width, VCF cutoff frequency, or the voltage-controlled amplifier (VCA). Probe deep into the programming pages and you'll find additional LFO functions for altering the LFO's sweep in half steps and "unsynching" the LFO, which results in excellent out-of-phase effects. The LFO can effectively track the keyboard, speeding up as you play higher and higher. There are plenty of neat tricks here.

Many advanced features are hidden in Page 2 mode. Pressing the Chord/Page 2 button twice activates a second set of programming parameters controlled by the front-panel knobs and switches. The Page 2 concept caught on to such an extent that, for $150, Oberheim offered a front-panel screen that labeled these cool functions.

COURTESY AUDIO PLAYGROUND SYNTHESIZER MUSEUM

Powerful, versatile, and stable, the OB-8's reputation for being too clean is overstated and overlooks the instrument's impressive arsenal of sound-generating, -modulation, and -processing features.

Seamless Integration

of

Midi & Audio

Introducing the Integrated Sampling Sequencer

Often truly amazing products are greater than the sum of their parts. Motif and RS7000 are a new breed of products that combine the features of a synth, sampler, sequencer and digital effect processor in all-in-one music production workstations. They will revolutionize the way music is made. Imagine the sonic power of a great sounding synthesizer combined with the hands-on inspiration of a cutting edge groove box. Then add a brand new concept – an Integrated Sampling Sequencer (ISS) – that seamlessly integrates audio sampling and MIDI in a way never achieved before. Control it with a user interface that puts all that sonic firepower literally at your fingertips for non-stop hands-on creativity. Now you're starting to imagine the possibilities.

Motif and RS7000 both feature an Integrated Sampling Sequencer which is designed to seamlessly integrate audio and MIDI. The ISS automatically analyzes and "slices" audio into discrete pieces (based on time segments and amplitude peaks). It then automatically maps the slice to the keyboard and generates an extremely accurate MIDI sequence. Sliced audio phrases of different tempos can then be synched together or modified changing the Tempo, Swing, or any other musical parameters controllable by MIDI. So if you want to be on the leading edge of music production, check out these web sites for more info and look for Motif and RS7000 at a Yamaha dealer near you in June.

YAMAHA DMI DIGITAL MUSICAL INSTRUMENTS MOTIF RS7000

www.yamaha.com www.yamahasynth.com

In addition to playing individual timbres, the OB-8 keyboard can be split or doubled (layered). The internal memory contains 120 patch programs, 12 split programs, and 12 double programs. Although the cassette interface provided the original medium for external patch storage, patch data can be dumped and loaded through MIDI on later versions.

The OB-8 was released before Oberheim adopted MIDI, which was later offered as a retrofit. From software revision B onward, MIDI was standard on the OB-8. It was obviously a bit of a rush job; Oberheim's official MIDI version can communicate only on channels 1 through 9. Only Note On, Program Change, SysEx program dump, and Modulation lever information can be transmitted. A ray of sunshine here is that in split mode, the two parts transmit on separate channels.

Although the OB-8 is sizable, it's not particularly heavy; at 45 pounds, it's about 12 pounds lighter than a Roland Jupiter 8. The keyboard has standard weighting for a synth of this vintage, but it has too much bounce and can be rather noisy. It offers neither Aftertouch nor Velocity sensitivity. You can select from smooth or quantized portamento, and polyphonic portamento can make the notes glide at different rates.

The multimode arpeggiator can be synched to an external source through an arpeggiator clock input jack. A maximum of eight notes can be played forward, backward, or in random order. Half a split or a layered combination can be arpeggiated.

The OB-8 does have some quirks. No matter what position a knob is in, it initially functions at the stored setting; you have to twist it fully counterclockwise to activate the entire sweep of control. The flipper-style pitch and modulation levers are idiosyncratic; whether you love or hate them is simply a matter of taste. If you don't have a Page 2 overlay or an instruction manual, operating the OB-8 is hit-or-miss.

Here's a tip you probably won't find without a manual: to discover your OB-8's software revision, press Page 2 twice, hold the button down, and then press Sync. The number revision will display on the programmer's LEDs.

Aside from the clichéd sawtooth-brass patch made popular by "Jump," classic OB sounds provide a wide timbral range. Lush, silky pads can be spiked with a touch of resonance, and the eight notes can be panned across the stereo spectrum, adding to the sound's expansiveness. A little detuning can "phatten" up organs and strings. Fierce lead and bass patches can take advantage of the instrument's unison mode, portamento, and slightly grainy resonance, giving sounds density and power.

The OB-8's real presence helps establish its sound in a mix. Many keyboardists overplay simply because their sounds lack sufficient character, so presence is a crucial attribute. The OB-8 has no built-in effects processing, which also helps prevent aural clutter.

The OB-8 was the hub of the Oberheim Synthesizer Performance System, which linked the synth to a DMX drum machine and a DSX sequencer. Before MIDI blew the system's restricted capabilities to bits, it was the unit to have.

You can find downloadable manuals and support at a number of Web sites, including www.tcapp.com/synths/oberheim_heaven. For parts and repair services, try Kurt's Amps and Keyboards at kurtsamps.com. In the Los Angeles area, service and repair specialists include Advanced Musical Electronics (310-559-3157) and MusicTech Services (818-506-4055).

The OB-8 is a superb instrument for players and programmers. Although OB-8s are not plentiful, they are still somewhat of a bargain at current prices and well worth looking out for.

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

Price Guide: The quoted prices reflect typical street prices you must expect to pay in U.S. dollars. The buy-in on vintage instruments, as with vintage cars, is just the beginning, however. Most of the original manufacturers are long gone, so maintenance and repairs are expensive.

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Hammerfall

DSP System

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Digiface

Multiface

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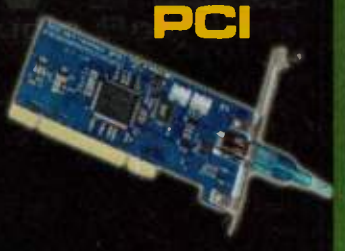

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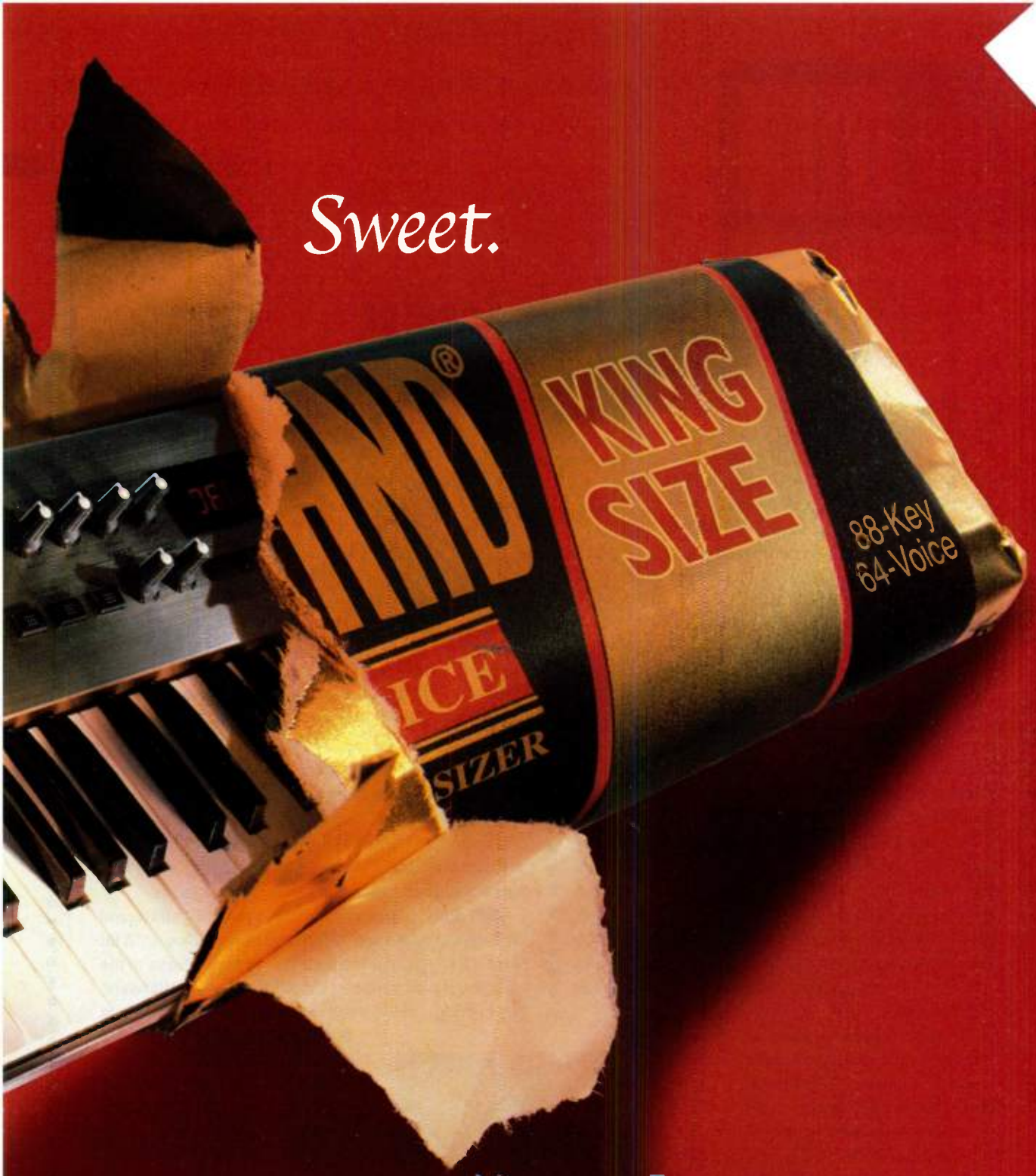

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PROFILE

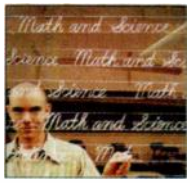
By Matt Gallagher

School Is in Session

Math and Science, aka John Wolf, is a one-man band. His self-titled debut for Brick Red Records is an album of radio-friendly alternative pop. "A lot of my heroes were front men in bands, and I loved well-written pop songs," he says. Wolf has no formal musical training, aside from drum lessons during the fifth grade; he taught himself to play guitar, bass, and piano.

Wolf relocated from his native Indianapolis to Los Angeles, landed a gig playing drums with Columbia recording artist P.J. Olsson, and distributed demo CDs. The Brick Red label appreciated the quality of his demo. "I was preparing to work in a big recording studio with a producer," Wolf says, "and what I didn't realize was the harder I tried, the more I was taking on those roles myself."

When it comes to making a record, Math and Science is mostly self-taught.



When Brick Red proposed a recording budget, Wolf purchased equipment. He built a studio around a 450 MHz Mac G4 and a Pro Tools/24 Mixplus system equipped with one Mix Farm DSP card and one Mix Core card. "We saved some money for mixing in a pro studio," he says. "It was like building an airplane in your basement. Once I got it finished, I had to figure out how to squeeze it out the door."

A rehearsal studio served as his recording space. "Most bands are in here at nighttime," Wolf says. "During the louder hours, I could do live drums and electric guitar." He miked his drums and guitar amps with Neumann M 147, AKG C 1000, Shure SM57, and AKG D 112 microphones. "I tried some double-miking techniques [on the amps], but nothing worked as well as getting the sound I wanted," Wolf says.

Keyboardist Aram Arslanian, bassists Matt Fitzell and John Fremgen, and P.J. Olsson contributed to a few tracks on *Math and Science*. Wolf also sought advice from a friend, Goldo, an experienced Pro Tools user. "I had him as a spiritual adviser," Wolf says.

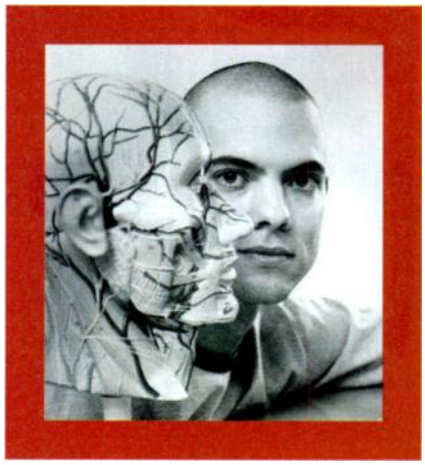
Wolf created all of the samples and loops on *Math and Science*. "A lot of time was spent editing my live drum tracks," he says. "I felt that any sacrifice of sonic quality might be made up for with pure inspiration or a personal vibe. I never bought a sample CD in my life."

His setup includes a Kawai MP9000 digital piano, Roland JP-8000 synth, and Roland SP-808 phrase sampler, which played a key role: "I used it as an effects processor, an idea box, or a toolbox for weird sounds." He also used a consumer-model Casio keyboard and Koblo's Studio9000 software synth bundle. Digidesign TDM plug-ins handled pitch-shifting, lo-fi processing, EQ, and compression. "I had [Line 6's] *Amp Farm* [plug-in], but I didn't use it for the guitars," Wolf says. "I used it for some keyboard overdrive and to thin out some drum loops."

Math and Science sounds like a polished effort, and Wolf says that he spent three months recording it. "A lot of tracks were recorded quickly," he says. "None of the parts are played perfectly; it's all in the editing afterward. I try to bring a real 4-track cassette attitude to the whole thing. It's just that I have more processing power now.

"This production was in support of the songwriting, as much as I love loop-based music," Wolf says. "It's a real challenge in a pop song to try and use production elements that people like in more of a DJ scene, without wrecking the song's quality—so I'm having a good time trying to combine the two. But if I had to pick one, I'd have to go with the songwriting."

For more information, contact Brick Red Records; tel. (310) 264-7839; Web www.brickredrecords.com or www.mathandsci.com.



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By Dan Phillips

Debunking Digital-Audio Myths

Get the lowdown on common digital-audio fallacies.

The Information Age is a wonderful time, isn't it? With global media and the Internet, you can find data on just about any topic. Unfortunately, a lot of conflicting information is floating around out there, and it's often hard to tell fact from fiction. This article attempts to clear the air by addressing some common misconceptions about digital audio.

Myth No. 1: Copies of files aren't always perfect. Dubs between analog tape decks aren't perfect; every time you make an analog copy, the signal degrades. It's therefore natural to assume that all copying methods share that characteristic. Copying an audio file on a computer, however, is completely different from making an analog copy.

Digital Audio Myths

When you copy a file on a computer—whether it's an audio file, a Microsoft *Word* document, or a shareware program—the operating system has to ensure that every byte of data copies correctly. If one byte in a *Word* document goes astray, you might get spelling errors, formatting problems, or worse. If one byte in a copy of a shareware program goes south, the software might not run at all.

Because of this situation, accurate copies of any file type are crucial, and digital-audio files are no exception. To prevent problems, the operating system uses a verification scheme to establish that all copies are byte-for-byte perfect. In the unlikely event that an error appears in the copy, the computer lets you know.

So when you copy an audio file from one hard drive to another or back up data to a tape drive or CD-R drive, rest assured that you're creating a perfect duplicate.

Myth No. 2: All file compression degrades audio. Compressed audio formats, such as MP3, have truly changed the face of recorded media by letting music be exchanged easily over the Internet. The MP3 format shrinks audio files using "lossy" compression, which means that not all of the musical data is actually stored in the MP3 file. The more important data is maintained while less important data is thrown away. The audio file is then reconstructed on playback with varying results in audio quality (see **Fig. 1**). In any event, MP3 audio quality is degraded somewhat with respect to the original file.

FIG. 2: Emagic's *Zap* is specifically designed to compress audio files without affecting the audio quality.

Because MP3 is one of the most widely known audio-compression formats, many people assume that all methods of compressing audio files work the same lossy way. However, not all of them do. Some programs, such as Emagic's *Zap* and Waves' *TrackPac*, are specifically designed for lossless audio compression (see **Fig. 2**). Those programs can't shrink files as much as MP3 does, but they do retain all data while compressing files to about 50 percent of their original sizes.

Also lossless by design are general-purpose compression programs such as PKWare's *PKZIP*, WinZip Computing's *WinZip*, and Aladdin Systems' *StuffIt*. To these programs, an audio file is just like a Microsoft *Excel* document; every byte of data must be retained. Again, the file-size reduction isn't as dramatic as with MP3 compression (and it's often less effective than audio-specific compression programs), but you can be sure that the quality of any zipped or stuffed audio file is completely unaffected by the compression.

Myth No. 3: CD quality. What the heck does "CD quality" mean, anyway? My cumulative annoyance at the misuse of this phrase leaves me feeling like a cranky old curmudgeon when I hear it. Sure, I'll accept the description for any device that operates at 16 bits and 44.1 kHz—a CD player, for example—as long as its real-world performance measures up to the potential implied by those specs.

Unfortunately, the term is often used to describe almost anything that can spit out a tune. I've seen a $30 sound card with a 65 dB signal-to-noise ratio boast CD quality, even though 16 bits should offer a signal-to-noise ratio closer to 90 dB. Moreover, I've seen MP3 and MiniDisc players claiming CD quality, though those devices start with CD-quality audio and then shrink it using lossy compression, reducing both file size and fidelity. Soon we'll have 4-bit digital toasters claiming their beeps are CD quality. Give me a break!

Even worse is the phrase "near CD quality." For those unfamiliar with marketing doublespeak, "near" is the same as "virtually." In plain English, both words translate to "not." So what was once a technical term is now simply advertising gibberish.

Finally, I have to ask: is CD quality still supposed to be a good thing? At one time, 16-bit, 44.1 kHz audio was synonymous with state-of-the-art digital technology. But that was then. In today's

FIG. 1: Apple's new *iTunes* application lets you import audio files from compact discs, convert the files into MP3 format, and create playlists for listening.

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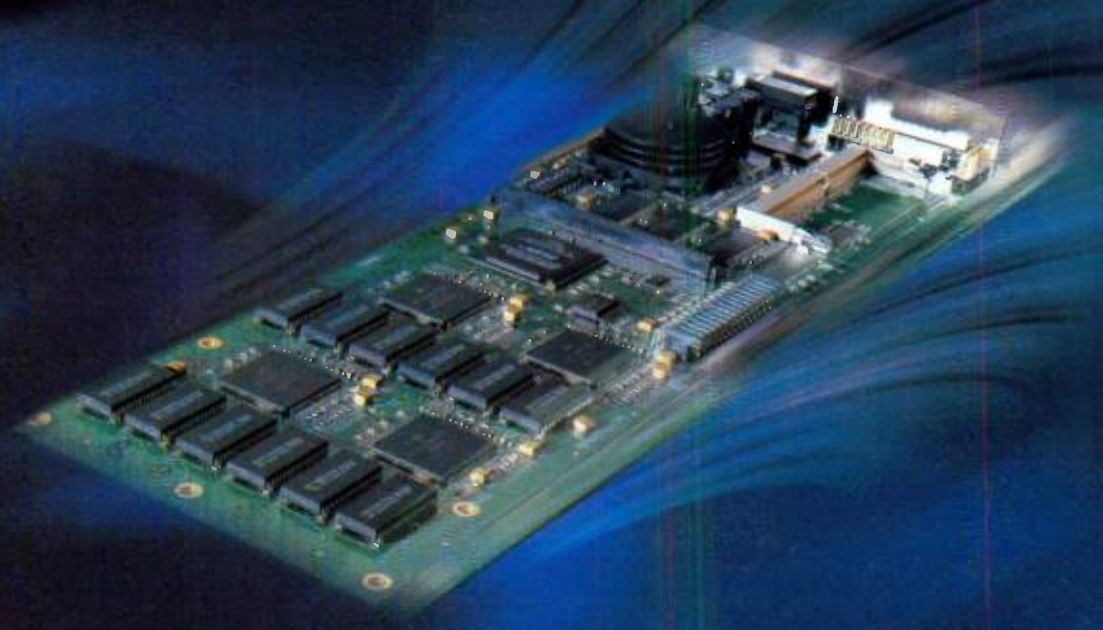

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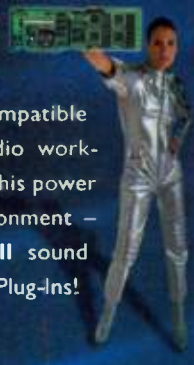

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Digital Audio Myths

24-bit world (with 96 kHz sampling rates gaining in popularity), those CD specs are looking a bit long in the tooth. Maybe instead of CD quality, the industry can agree on a more appropriate term like "real old-fashioned CD goodness." It's just a thought.

Myth No. 4: 24-bit is 24-bit is 24-bit. Resolution is an easy way to specify a digital device's quality. Unfortunately, it is not a reliable benchmark. I remember a meeting with a representative from a major digital-audio–chip manufacturer in which two of the manufacturer's models of 20-bit D/A chips were evaluated. When asked why one of the chips was abnormally noisy and performing more like a 14-bit D/A than its 20-bit spec suggested, the representative responded that it was "20 bits—with 6 bits of marketing."

So what's the moral of the story? Just because two devices are both "24-bit" does not mean they exhibit the same audio quality. In fact, fidelity can vary so widely that a well-designed 16-bit device may sound better than a poorly designed 24-bit instrument.

One variable is the quality of the D/A or A/D chip. The major manufacturers of these chips may have a line of parts with the same general specifications (such as 24-bit, 44.1 to 48 kHz) but with widely diverging noise amounts and differing prices. The clock-circuit quality is also important for minimizing jitter. (For more on jitter, see Myth No. 5.) In fact, several high-end A/D/A manufacturers specifically cite the their clocks' stability as an important selling point (see **Fig. 3**).

Finally, remember that the *A* in D/A stands for "analog." You know that there are good and bad sounding analog mixers, preamps, and other gear, so it should come as no surprise that a "digital" device's analog parts can make a real difference in its overall sound quality. High-quality analog parts and clever analog design are absolutely essential for a digital device to realize its true potential.

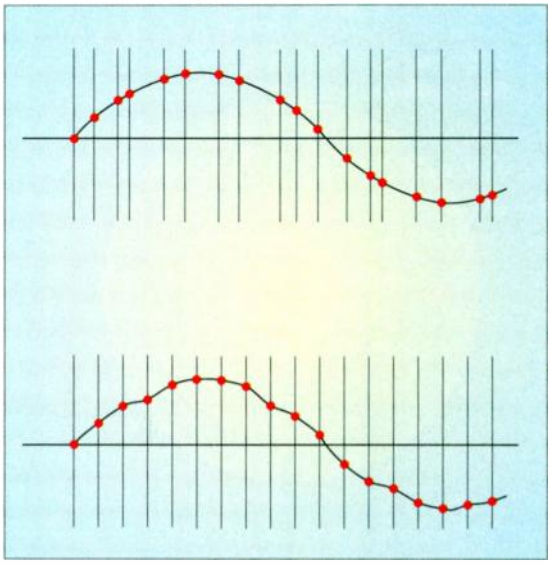

FIG. 4: During a jittery recording, the sampling points are not spaced evenly in time, though they follow the curve (top). During playback from a device with low jitter, the points are spaced much more evenly, but they retain the amplitudes of the jittery recording (bottom). After the timing is corrected, the amplitudes no longer create the original shape.

Myth No. 5: Jitter is recorded during digital dubs. In a perfect world, each digital-audio sample is recorded and played back at exact, even intervals derived precisely from each tick of the digital-audio word clock. For instance, a 44.1 kHz system should sample the incoming audio exactly 44,100 times per second. Real-world clocks aren't quite perfect, however, and each tick of the clock may be slightly behind or slightly ahead of where it's supposed to be. That difference between the ideal timing and the actual timing is called *jitter.*

Jitter causes distortion in digital audio, but it's different from what you generally think of as distortion. Instead of distortion in amplitude, such as overdrive in a guitar amp, jitter is distortion in time that causes slight variations in the audio waveform's shape. In a sine wave, for example, varying each sample's timing causes the waveform to bulge out and cave in at different points, as opposed to following the ideal smooth curve (see **Fig. 4**).

Every digital-audio device produces some amount of jitter, but some devices exhibit much more than others do. Jitter can also be cumulative: as a signal passes through multiple signal processors, mixers, and so on, the jitter may get progressively worse. Jitter becomes "frozen" when you record an analog source with a digital system. In other words, every time you play back the audio, you hear the effect of the jitter that was present during the recording. You also hear the jitter produced by the digital-to-analog converter.

However, recording from one digital device to another is different; as long as the data stays in the digital domain, jitter is not recorded. The only thing actually captured is a sequence of amplitude values; digital media simply have no provisions for storing information about individual sample timing. The timing is based implicitly on the sampling rate and is freshly re-created by the digital-to-analog converter's clock every time the audio is played back.

Even digital-audio tape systems don't play audio directly from the tape. Instead, they pass the data through a RAM buffer from which a clock pulls individual samples and sends them to

FIG. 3: The clock stability in Apogee's AD-8000 is an important selling point that the company touts in its ads.


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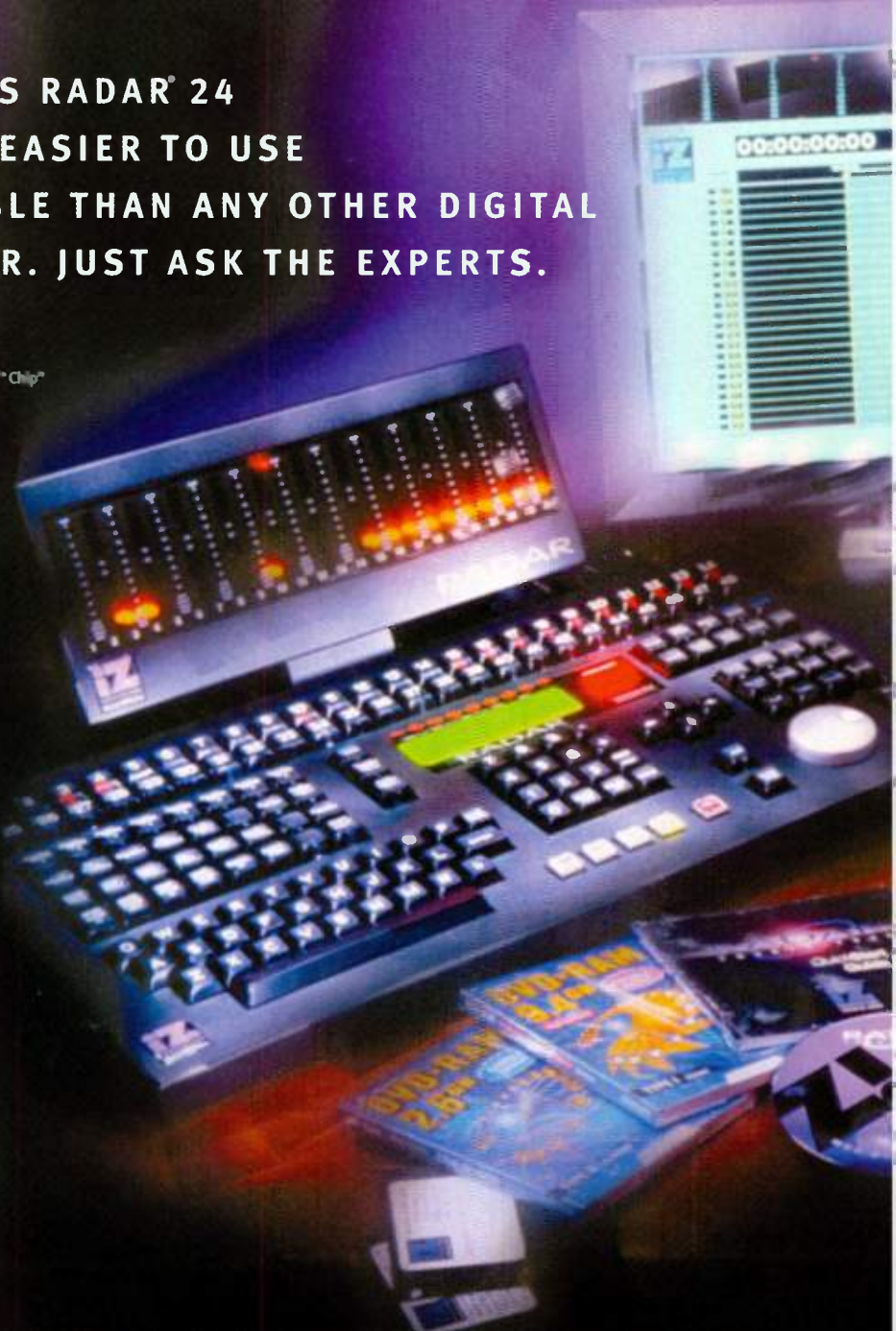

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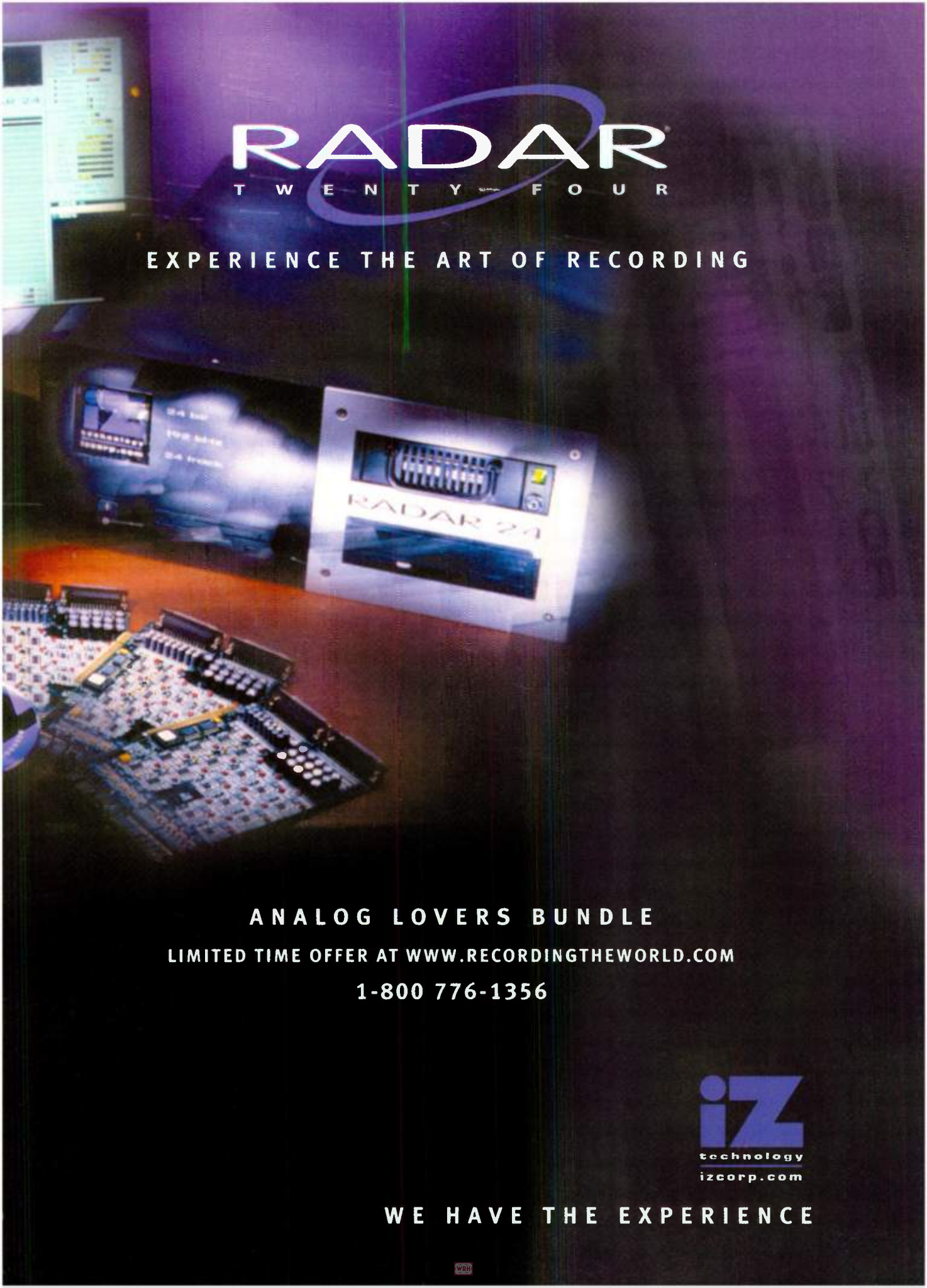
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Digital Audio Myths

the outputs. As a result, variations in tape speed or data spacing aren't reflected in the output data.

Although jitter causes distortion on playback—and can certainly generate unalterable distortion during the A/D process when recording from an analog source—it is not recorded when making a digital dub or when recording between digital devices. On the other hand, if the jitter of one device involved in a digital dub is bad, it can cause problems of a different sort, as I will discuss in the next myth.

Myth No. 6: Digital dubs are perfect copies. If you copy audio between DAT decks, CDs, or modular digital multitrack (MDM) tape machines, you might expect the copy to be perfect. After all, digital audio is just ones and zeros, right? As I described previously, copies of audio files on computers are indeed perfect. However, when you use tape and CD-audio media, those zeros and ones are being assisted, and sometimes created, by error correction.

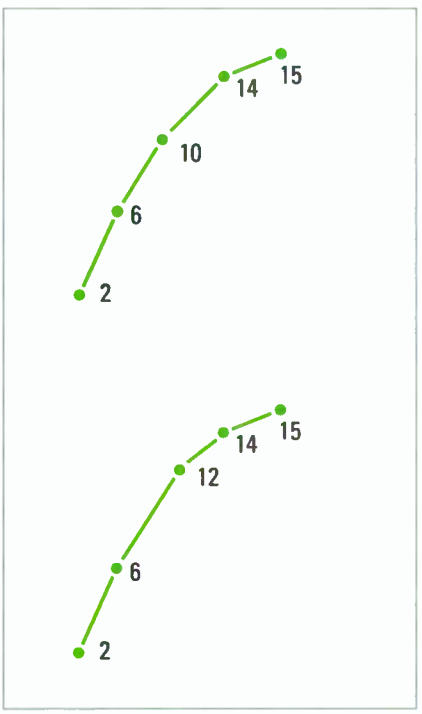

FIG. 5: For simple error correction, the linear interpolation draws a straight line between the points on either side of the error (top). Higher-order error correction takes into account the curvature around the error and uses multiple points on each of the sides to reconstruct a more complex, and hopefully more accurate, shape (bottom).

Here's the problem: If an error occurs when a computer reads a file from a hard drive, the computer can go back and try again. A backup tape drive can do the same thing, rewinding the tape as necessary. But with an audio DAT and other digital media, the tape or disc must always keep moving; otherwise, you hear a pause in playback. When errors occur, and they always do, going back and trying again simply isn't an option. Instead, the DAT and CD formats include several methods for real-time error correction.

The first and most effective error correction is recorded onto the tape in the form of Reed-Solomon error-correction codes. These codes take up more than 25 percent of the data on a DAT tape or CD, and they allow most errors to be completely corrected, yielding data that is byte-for-byte perfect.

Occasionally, even this sophisticated error-correction mechanism can't recover the data, resulting in one or more completely blank samples. In that case, the second level of error correction comes into play. This technique, called *interpolation*, considers the data before and after the blank sample or samples and then makes a guess as to what value might have been in that blank space.

Say you have the following sequence of samples: 2, 6, <error>, 14, 15. Simple interpolation might draw a straight line between the samples just before and just after the error so that the sequence becomes 2, 6, (10), 14, 15. More sophisticated interpolation constructs a curve based on two or more samples on either side of the error. This procedure recognizes that the two samples after the error have closer values than the two before the error, and it tries to reflect that curvature in the corrected data. Its reconstruction of the data

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Digital Audio Myths

might look more like 2, 6, (12), 14, 15 (see **Fig. 5**). Generally, the more points you look at during interpolation, the more accurate of a guess you can make as to the error's original value, though it's still just a guess.

Audio is almost always a continuous waveform, so the results of interpolation are good enough for musical use; it's nearly impossible to hear a single error. However, if a tape is in not in perfect condition or the deck's heads haven't been cleaned recently, you might have enough errors to cause a general degradation of audio quality, which passes on to any copies you make—digital or analog. Some DAT machines and MDMs display the current error rate. If yours does, monitor it from time to time.

So far I've only covered minor imperfections in digital dubs. Some problems can be more severe. For instance, if a DAT tape has too consecutive many errors, the error correction may not work at all, and you'll hear digital noise instead of your recording.

Jitter is another issue. As I discussed previously, it shouldn't affect purely digital connections. AES standards specify maximum allowable jitter on output and minimum jitter tolerance on input, which defines the greatest amount of jitter that the input signal can include and still be received properly. The current standard specifies a minimum jitter tolerance of several times the maximum output jitter to allow for chains of devices and maximal interoperability. Devices that conform to these standards shouldn't have jitter-related difficulties. Not all devices meet the necessary specs, however, and some older devices may have been built prior to the adoption of the current standards.

If a device has extremely high jitter at its digital output or if the device receiving the data can't handle much jitter at its input, their communication can fail, causing pops, clicks, and other artifacts. That holds true for connections between all digital devices, including digital audio workstations (DAWs), sound cards, and effects processors.

Likewise, digital cables can fall prey to most of the same gremlins as their analog counterparts, including loose connections, defects, and impedance mismatches. You can always get errors in DAWs from disk-related problems (such as buffers set too small), or processor spikes caused by brief overloads in system activity.

Finally, many digital-audio glitches—clicks, pops, low-level "fizz," and the like—can be caused by a simple problem: improper word-clock settings. Two devices that are connected digitally but are not in agreement on the same word clock form a recipe for real trouble. In my experience, this is the source of many erroneous complaints that digital

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transfers are error prone. If you merely ensure that all connected devices agree on a single word-clock master, you can eliminate this common headache.

In summary, to ensure premium digital dubs, keep tape heads clean, preserve media (such as DAT tapes) in safe storage environments, set word clocks correctly, pay attention to error rates, take the same care with digital cables as you would with analog cables, make sure that your equipment has reasonable jitter characteristics, and set your DAW buffer sizes conservatively. As long as you take those precautionary steps, you can expect digital dubs to work well.

One other point you should keep in mind is to always monitor while you dub, just as you would with analog tape. Your ears should be your final reference. Remember, the recording you save may be your own.

Myth No. 7: All digital synths and effects sound the same. This myth is also known as: All digital EQs sound the same, All virtual analog synths sound the same, and All digital compressors stink. This is as true for digital gear as it is for analog gear, which is to say, not at all.

With analog devices, you have great-sounding EQs and lousy-sounding EQs. What's more, a couple of great-sounding EQs (or compressors or synthesizers) may sound totally different from each other. It should be no shock that the same situation exists for hardware and software in the digital domain.

What makes a good or bad digital EQ, compressor, filter, or oscillator? Many issues of digital-audio quality arise from one source, and it happens to be one of the major differences between analog and digital audio: frequency range. Analog audio has a theoretically infinite frequency range, whereas digital audio (software and hardware) has a hard limit on high frequencies, as determined by the sample rate.

Many analog processes take "infinite" frequency range for granted, but they can't do the same in the digital domain. For example, a standard analog peaking EQ has a bell curve that is symmetrical around the center frequency; one side slopes to 0 Hz, and the other slopes toward infinite Hz.

You can implement the same EQ in the digital domain, but infinity is suddenly much closer. In fact, what was infinite Hz is now the Nyquist frequency (half the sampling rate) or 22.05 kHz at a sampling rate of 44.1 kHz. This difference in the proximity of infinity results in an EQ curve with a dramatically lopsided shape (see **Fig. 6**).

Things can get stranger as the EQ's center frequency approaches the Nyquist frequency. At those high frequencies, I've seen digital EQs that started to take on weird globular shapes and even go down in actual frequency as I turned up

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Digital Audio Myths

FIG. 7: Waves' powerful L2 Ultramaximizer is available as a software plug-in and as a standalone hardware device. Both offer comparable features and audio quality.

the frequency knob. I've even encountered a peaking EQ that looked much more like a resonant highpass filter.

Those problems can be avoided or at least minimized by clever programming. The degree to which the programmer is successful defines, to a great extent, the differences between good and bad digital EQs.

Besides the creation of a more-or-less correct EQ curve, there are also matters of taste and personality, just as in analog EQs. The way a programmer chooses to approach these infinite-frequency quandaries affects the overall sound. Moreover, some products emulate the more esoteric sonic distinctions among classic analog EQs, such as slope and overshoot characteristics.

Compressors and limiters also have frequency-related issues. You're probably familiar with aliasing—it causes audio artifacts when sampled audio contains frequencies higher than the Nyquist frequency. Aliasing doesn't occur only during sampling, however; it can also happen entirely within the digital domain.

For instance, compression and limiting work by modulating one audio-rate signal (the input) with another audio-rate signal (the compressor or limiter's automatic gain control, which operates in the audio range when the attack and release envelope times are fast). When you modulate one audio-rate signal with another, it has the effect of adding the two signals' frequencies; if the total exceeds the Nyquist frequency, you'll get some aliasing.

A full-bandwidth audio signal processed with a limiter or a compressor with fast attack or decay times falls into that category; the faster the attack or release and the greater the compression or limiting amount, the more aliasing you hear. That is the cause of the crunchiness many people hear in digital-dynamics processors. Again, clever programming, especially oversampling, can minimize these aliasing artifacts.

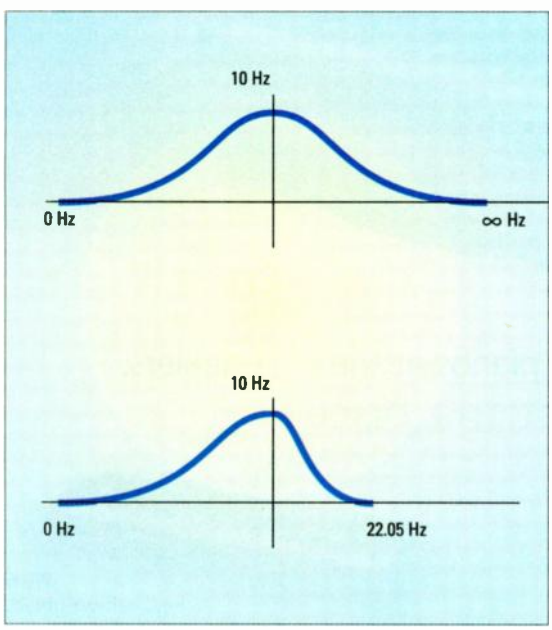

FIG. 6: With an analog peaking EQ, the bell curve is symmetrical around the center frequency; one side slopes to 0 Hz, and the other slopes toward infinite Hz (top). If a digital EQ is uncorrected for digital's closer infinite frequency, the curve's top part becomes mapped into a much smaller frequency space, resulting in a lopsided shape (bottom).

You'll find similar predicaments in synths. Resonant filters suffer from the same infinity-is-much-too-close syndrome as digital EQs, and various synths differ widely in their success at addressing the problem. For instance, standard Chamberlin digital filters (the most common type) only work correctly to about one-sixth of the sampling rate. For a synthesizer running at 44.1 kHz, that means the resonance tops out at about 7 kHz.

Oscillators have problems similar to compressors. For example, a square wave at, say, 4 kHz is actually generating frequencies well above the Nyquist limit, because of the waveform's sharp edges. Untamed, that can cause excruciating aliasing, especially toward the top of the keyboard (as you can hear in some popular products). Similar aliasing can also happen when samples are transposed above their original pitches. Techniques for dealing with these complications vary and account for some of the sonic differences among synthesizers.

Finally, it's worth noting that some solutions are common knowledge and in the public domain, whereas many others are protected by patents or kept close to the vest as trade secrets. In short, different products use different techniques for dealing with frequency-related obstacles, and some are simply more successful and pleasant sounding than others.

Myth No. 8: Hardware sounds better than software. Defining an audio process as a mathematical equation is essentially what digital hardware and software is all about. Whether you're using a synth or effects processor with dedicated hardware, an algorithm running on a DSP chip, or a plug-in on a Pentium or PowerPC, it's still just a numbers game.

The thing that creates sound quality in a digital synth or effect is the math itself, or the algorithm. As long as the math stays the same, it can run on custom hardware, off-the-shelf DSPs, Pentiums, or PowerPCs and still produce the same output. To look at it another way, the method that converts the math to a form

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Digital Audio Myths

you can use (a software plug-in or a hardware box, for example) is unimportant; only the math matters (see **Fig. 7**).

So hardware should sound the same as software, right? In general, yes, though several factors complicate the matter. Some issues are technical; others are simply practical.

On the technical side, you may not always be able to run exactly the same math on different hardware. You have two common approaches to performing math on computers: one is called *fixed point*, and the other is called *floating point*. Without getting overly specific, I'll just say that the same mathematical operation, such as adding two numbers, may produce slightly different results depending on which method you use.

Many popular DSPs, such as the Motorola 56000 series, perform only fixed-point math; others, such as the SHARC from Analog Devices, practice floating-point math. Desktop processors, such as the PowerPC and Pentium, can handle both calculation types but, in some cases, may do one better than the other. As a result, it may not always be practical—or even possible—to perform the same math on two different machines. In that case, the algorithm designer must write the algorithm specifically for each processor. With careful work, the algorithm may sound exactly alike on each machine, even to a golden ear. In some cases, however, slight differences may remain.

Technical issues aside, there are also practical reasons why hardware and software products may sound different. The underlying algorithms of two products may be very different, for example. If you compare a hardware product from one manufacturer with a software product from another, chances are that the algorithms will not be the same.

The factory presets are important factors in synthesizers' and effects processors' overall sound. Without good sound design, even the best algorithm may not sing as sweetly as it could. Conversely, talented sound designers can sometimes make a mediocre algorithm sound surprisingly good. So even if the two products' underlying algorithms are similar, the talent of the factory sound designers can make all the difference in the world, and that varies from one factory to another.

There is no theoretical reason why hardware should sound different from software. Any differences you encounter are most likely the results of comparing apples and oranges, because few products are offered in identical hardware and software forms.

Dan Phillips *is a Bay Area–based composer and producer, and he is product manager at Korg R&D. Check out his Web site at www.danphillips.com.* *Thanks to Andy Leary, Rudy Trubitt, and Benny Rietveld for their assistance with this article.*

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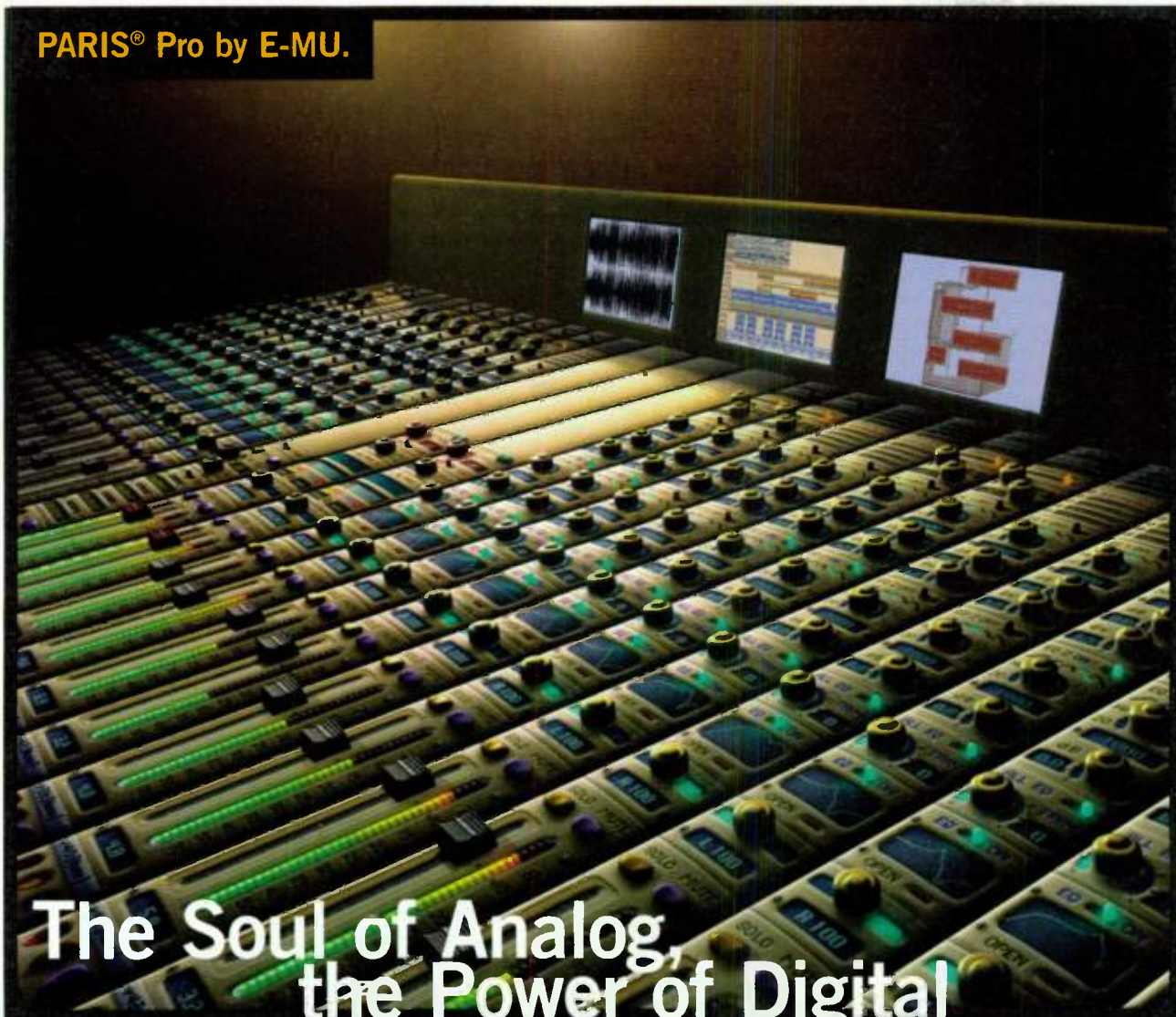

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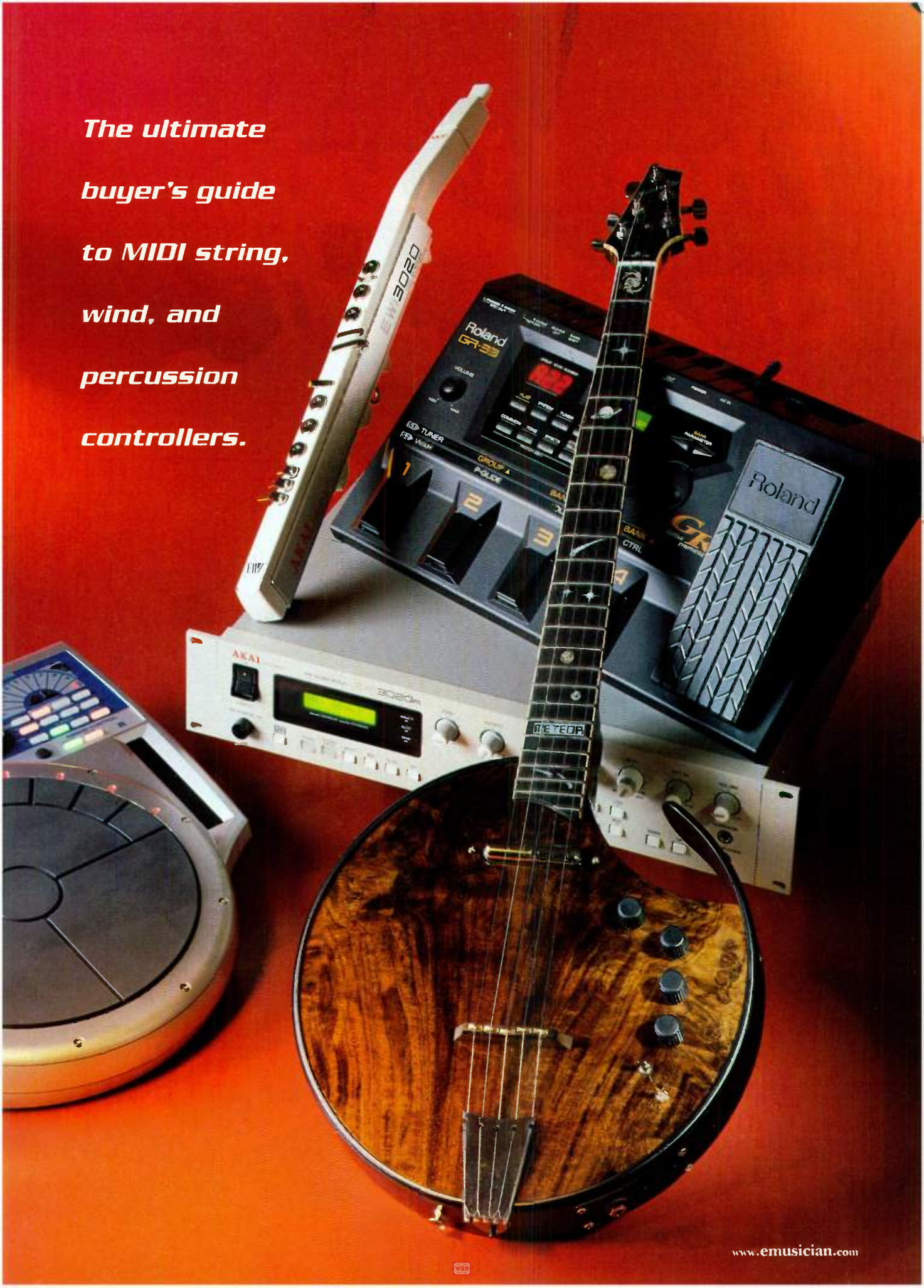
In Control

By Marty Cutler,
Gino Robair,
and Scott Wilkinson

When most musicians think of a MIDI controller, the keyboard immediately comes to mind. This makes sense, considering the MIDI spec was created to accommodate keyboards and sequencers. However, if you think keyboards are the only mainstream MIDI controllers in the universe, think again. Wind, string, and percussion controllers are the most popular and widely used controllers after the venerable keyboard—and recent technological improvements have made them more powerful than ever.

To examine the range of mainstream MIDI controllers, we called on three of our experts: Assistant Editor Marty Cutler, who knows enough about string controllers to have coauthored the book *MIDI for Guitarists* (AMSCO); Technical Editor Scott Wilkinson, who has had years of experience using MIDI wind controllers; and finally, Associate Editor and percussionist Gino Robair, who surveys the wide world of percussion controllers.

Photography by Bill Schwob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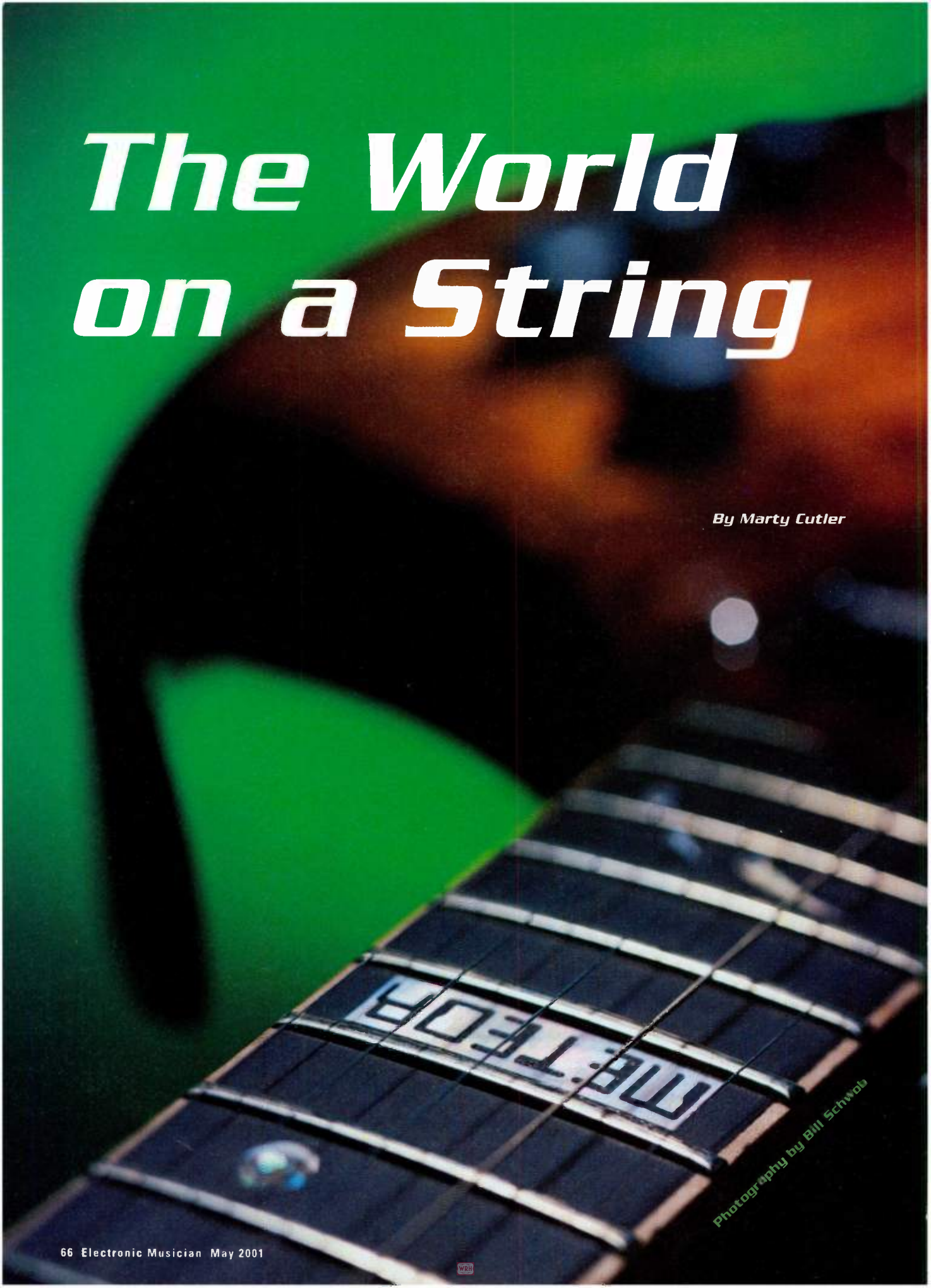
The World on a String

By Marty Cutler



Photography by Bill Schwob

Electric guitarists have a tradition of experimentation with sound. Fuzz tones, phase shifters, and envelope followers have been a part of the guitarist's bag of tricks for some time now.

Ironically, MIDI guitar has been slow to catch on as a guitarist's sound-shaping tool. Quirky user interfaces, prohibitively costly instruments, and, above all, tracking problems have impeded the success of the guitar controller. That is all about to change.

Roland has long been an innovator and supporter of MIDI guitar and guitar synthesis. The Roland exhibit at the 2001 Winter NAMM convention included an entire wall covered with a variety of manufacturers' guitars—all MIDI capable (see "What's New," p. 20).

Thankfully, manufacturers of MIDI guitar systems seem to have fallen in step with Roland's choice of the 13-pin cable. This is no small accomplishment; nonstandard, bulky multipin cables are gone, and the 13-pin cable is compatible with all current MIDI converters (see **Fig. 1**). Some guitars even offer a built-in converter with direct MIDI output. MIDI guitar is now officially part of the mainstream.

DEFINE CONTROL

It's a good idea to make a distinction between guitar synthesizers and MIDI guitar controllers. Guitar synths have been around longer than controllers have; typically, a guitar synthesizer shapes sound directly from the pickup's output or converts pitches to voltages that trigger an analog synthesizer. The Roland VG-88 is an excellent example of a guitar synthesizer, although Roland avoids describing it as such. When you play a string, the signal from the pickup is filtered to produce the purest tone possible. The signal is then physically modeled to replicate your choice of sounds, be it a vintage Les Paul, a 12-string acoustic guitar, or a brass section. However, the VG-88 cannot record your performance to a MIDI sequencer.

MIDI guitar controller systems, on the other hand, convert the string's pitch to MIDI note data and send the data to a connected device. This is not a subtle distinction: it is crucial to understanding how to make string-based controllers—whether they are guitars, violins, harps, or banjos—work for you.

SOME OF ITS PARTS

The majority of string-driven MIDI controllers consist of component systems. Some units, such as the Parker MIDIFly, offer direct MIDI output via a 5-pin MIDI jack. Pitch-to-MIDI conversion is built in to these guitars. Others have a built-in piezoelectric bridge-and-preamp system with a 13-pin output that is suitable for connecting to a guitar-to-MIDI converter. Still other systems require you to mount a hexaphonic, or divided, pickup on the instrument to gain access to MIDI converters using the standard 13-pin cable. With a divided pickup, each string has its own isolated pickup. Each type of MIDI guitar controller has its pros and cons.

The most flexible string-based controller system is a divided pickup carefully mounted near the bridge of your chosen instrument and used with a MIDI converter. This setup lets you blend your synth sounds with those of your favorite guitar. Divided pickups are available from Roland, Blue Chip, and Yamaha. All come with the same 13-pin jack, and all offer a single programmable knob and two assignable switches. The downside of this system is that it requires you to drill holes in your instrument in order to permanently mount the divided pickup; owners of vintage gear may be reluctant to do this.

Instruments with built-in 13-pin connectors rely on piezoelectric saddles and a preamp. The volume knob and switches are cleanly built in to the bodies of these instruments, so all you need to do is connect the 13-pin output to your favorite MIDI converter. Instruments with piezoelectric systems are typically more accurate in their tracking capabilities. Because the string is sitting directly on the pickup, you don't need to adjust the pickup's distance from the string.

Instruments with direct MIDI output are certainly convenient; all you have to do is connect your controller to your synthesizer using a MIDI cable. These systems are less cumbersome and easier to set up and transport than component systems, and they provide an easy entrance into the realm of MIDI controllers. However, direct-to-MIDI systems tend to have an overly simplified MIDI implementation, thereby limiting expressive MIDI control. When buying a guitar controller with 13-pin or direct MIDI output, make sure you're happy with the instrument's playability as well as its sound as a guitar.

GETTING CONVERTED

The technology behind converting a string impulse into MIDI has steadily improved throughout the years, and two methods predominate. First, when you pluck, bow, or tap a string, the beginning parts of the produced waveform consist of the noise and attack transients created by the excited string. Some converters (such as Roland's) filter out the noise component and require a cycle or two of string vibration to convert the string's pitch into reliable MIDI data. This method creates a bit of a delay between the time the string is plucked and the time a Note On message is sent. The lower the pitch of the string you play, the longer the delay is. Roland has developed a few tricks, such as a defeatable noise filter, to improve tracking speed and accuracy, resulting in an improved performance of its recent line of MIDI controllers.

Other MIDI-string converters, such as the Blue Chip Axon, use a conversion method, similar to radar, that extracts the necessary information from the onset of the string impulse and minimizes conversion delays. These systems measure the time it takes for a string's attack to propagate the initial vibrations both to and from the bridge; they do not need to wait for the string to achieve stability, nor do they need to read the steady state of the vibration. As a result, units employing this early-detection technology provide the fastest tracking available.

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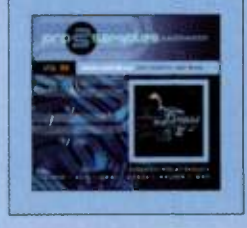

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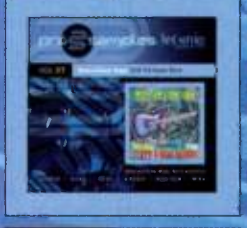
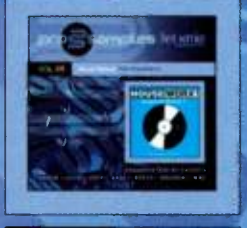


Dancefloor Bass
from XX-Large Bass
This very comprehensive bass sample compilation from Best Service contains bass notes, single bass hits, multi-sampled basses and quick licks. It includes analog synth bass sounds and real, electric basses, acoustic basses, bass licks and slap bass samples - a bass for every occasion!

VOL 28



Vocal House
from Houseworx!
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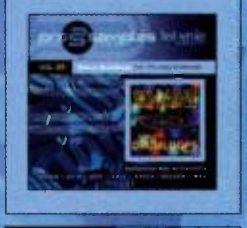
VOL 29



Dance Drumloops
from XL Drumloops
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VOL 30

World Instruments from Ethno World
Hear the squeaking and scraping of strings, the breathing of woodwind instruments and the decay of every single note or sound. This version of Ethno World includes; stringed instruments, bell and metal type instruments, woodwinds and global percussion instruments.

FIG. 2: Blue Chip's Axon AX100 exemplifies the new crop of MIDI guitar converters; its ability to extract pitch data from the onset of a plucked string's vibration provides fast and accurate tracking. FFT analysis of the attack transient can create Control Change data from pick position.

MIDI BRAINS

A number of companies market converters that translate stringed-instrument gestures into MIDI data. The converters described below accept analog signals from instruments with divided pickups and 13-pin cables.

Blue Chip. Blue Chip offers two versions of the Axon MIDI converter: the AX100 ($1,195) and the AX100SB ($1,395). The only difference between the two is the latter's onboard XG sound card. Both units offer the same robust MIDI implementation. The AX100 (see **Fig. 2**) arguably tracks faster than other converters because it extracts a Note number at the onset of the string's waveform rather than relying on pitch-to-MIDI conversion.

The ability to trigger blinding flurries of notes is not the sole benefit of fast tracking. Accurate tracking is important for chord strums and fingerpicking because it keeps the lower notes in their proper place in time. Faster tracking lets you feel as though you are playing the synthesizer rather than simply triggering notes. With the AX100, Pitch Bend is extremely smooth—assuming your synth's implementation of Pitch Bend is smooth as well.

The AX100 is also adept at tracking bass. However, tracking time is slower than it would be with a guitar due to the slower propagation of the attack transients on strings with greater mass. When I tried playing a bass with the AX100 attached, the delay between pluck and Note On seemed no longer than that of an older MIDI guitar system—not ideal but still very playable.

Axon converters have settings for violin and cello in addition to bass and guitar, but I did not have the opportunity to test these. They also have a ¼-inch, unbalanced jack for microphone input and a front-panel gain knob for a monophonic pitch-to-MIDI converter that works surprisingly well.

Controller capabilities are plentiful on the AX100. The unit provides two freely assignable foot-switch jacks and two inputs for expression pedals. The AX100 can send Control Change messages and modulate values based on the pick's position between bridge and neck. To do this, the unit performs a fast Fourier transform (FFT) on the initial attack. The variations in overtone content are converted into digitized values, which you can assign to controllers. You could, for example, assign continuous controllers to open and close a filter or to modulate Pan position depending on where you are picking in relation to the bridge.

Modulating continuous controllers by pick position takes some getting used to. Messages will jump to a discrete value with each Note On rather than sweep through values as they would if you were using a Modulation wheel or key pressure. Fortunately, you can scale values by limiting high and low ranges. Aftertouch messages are not implemented, but the AX100 supports any Control Change message.

The AX100's capabilities allow you to assign different sound programs to individual strings. For example, you could play a bass patch with the lower strings and a piano or pad with the higher strings. A Fret-Split feature lets you assign different sounds to ranges of a single string. You can set up zones in which pick position will call up a different patch, and you can even combine splits, zones, and pick control.

Use the Global menu to set pickup sensitivity and Pitch Bend range, send System Exclusive dumps, and more. Setup changes are automatically stored in nonvolatile RAM, and you can store settings for four different instruments.

Other performance-oriented features include the ability to sustain and then play over sounds with another patch. You can also program a second synthesizer voice to layer a sound or call up the layer when the Hold pedal is activated. The AX100 also has a built-in programmable arpeggiator and a sequencer that's useful as a sketch pad. The arpeggiator and sequencer allow you to solo over background patterns.

The AX100SB includes a 16-part multitimbral XG-compatible sound card with a solid, if unspectacular, set of sampled waveforms. Presets combine your choice of sounds in conjunction with controller settings, and you can store your edits in any of the first 128 slots.

FIG. 1: The 13-pin jack has become the standard conduit for the divided string pickups to the converter unit, where the analog signal is converted to MIDI data.

Transposition of MIDI output and settings for finger-picking techniques (which require turning off the unit's early-detection capabilities) are embedded in the Preset menu for each patch. I prefer to reach these parameters using either a dedicated button or the global menu. However, you can store your favorite settings in presets and switch them with Program Change messages.

Yamaha. The Yamaha G50 ($749.95) offers fewer bells and whistles than the other converters. Unlike the Axon and the Roland GR-33, the G50 has no built-in synthesizer. However, it tracks quickly and accurately and offers a host of real-time control capabilities, thanks to pitch-detection technology licensed from Axon. The unit has a switch on the rear panel for bass, and Yamaha offers the G1D divided pickup ($199) for guitar and the B1D ($249) for bass.

The menu is laid out logically, and tailoring the G50 to your playing style is easy. The unit provides the same position-sensing MIDI control of the Axon and adds a Touch Control feature, which allows the plucked string's envelope to be assigned to send MIDI continuous controller messages. The G50 provides System Exclusive messages embedded in ROM for certain Yamaha synthesizers, including XG-compatible synths, the VI1, and the VL70M. The System Exclusive setup deploys Control Change messages to enable expressive use of the physical modeling capabilities, including touch control of breath noise, or pick position control of embouchure or tonguing. Although playing monophonic synthesizers with a guitar requires some getting used to, it's a lot of fun.

You get a ¼-inch jack for the hold pedal but no input for an expression pedal. Although the pick-sensing capabilities can be assigned to any CC, you get smoother real-time control with Yamaha's MFC10 MIDI Foot Controller ($349.95), which adds a built-in assignable foot pedal and includes inputs for four more pedals.

Roland. Roland's GR-33 ($695) benefits greatly from its lush, expressive onboard sound set and imaginative use of expressive controller assignments. The GR-33 is a floor unit with a built-in expression pedal for controlling volume, timbre, balance between synth sounds, portamento time, arpeggiator tempo, and other parameters. The pedal can also send Control Change messages for controlling external synthesizers.

A number of the presets are a delight to play. For example, you'll find a variety of different sounds with tasty drum or hand-percussion loops assigned to the low string. Hit the Hold pedal, and you can solo or play pads over your groove. The GR-33 also includes a variety of techno and guitar patches with funky arpeggiator patterns, and wah-wah pedal control over the filters.

The internal synth offers 48 voices and six independent channels. However, the unit is not multitimbral in the conventional sense; you can only use a single MIDI channel with the GR-33 set to Poly mode, and six MIDI channels in Mono mode. The GR-33 allocates two tones (Roland-speak for a synthesizer voice) per channel. In Mono Mode, you can sequence realistic guitar parts, and the unit's synth receives Pitch Bend on separate channels. The unit will not play back polyphonic parts from a sequencer on each channel.

You can adjust the GR-33 to suit various dynamics and playing styles, including finger-picking and tapping. The built-in synthesizer has fast, reliable, and stable tracking, but it is somewhat slower when addressing external synthesizers in your MIDI system.

Zeta Music Systems. MIDI violin controllers have been around nearly as long as their guitar counterparts, largely due to the efforts of Zeta Music Systems. The Synthony II ($2,495) MIDI converter is a collaborative effort between Blue Chip and Zeta. The unit combines the hardware and user interface (but not the transient-extraction capabilities) of the Axon AX100 with Zeta's algorithms for analog-to-digital conversion of bowed string instruments. Settings are tailored to your instrument of choice: violin, viola, cello, or bass. Additional settings accommodate one of Zeta's pickup systems.

The Synthony II features the same XG sound set as the AX100SB. However, because the unit does not have the Axon's fret-switching or pick-sensing capabilities, the presets are different. Nonetheless, the two rear-panel expression pedal inputs offer real-time control of sounds using MIDI Control Change messages. The unit also features a programmable arpeggiator and drum sequencer.

READY FOR MIDI

Now I'll turn to stringed instruments that can be used with MIDI converters. Some of these instruments have onboard MIDI converters and a MIDI Out jack that can be connected directly to a sound module, signal processor, or sequencer. Others have a 13-pin output that requires you to use one of the MIDI converters listed previously.

Brian Moore Guitars. Brian Moore Guitars has an extensive collection of controllers. These include MIDI-ready

FIG. 3: The P5 Mandolin from Brian Moore Guitars comes with eight strings. The 13-pin connector gives access to MIDI converters but only outputs MIDI from one of each pair of strings.

guitars with 13-pin outputs, full-blown MIDI guitars with built-in MIDI converters, two solid-body electric basses with MIDI capabilities, and even a couple of MIDI-ready electric mandolins. The iguitar 2.13 ($1,695) and iguitar 8.13 ($1,395) offer 13-pin output jacks for accessing the current MIDI converters or Roland's VG-88. MIDI In jacks let you update software and set up the guitar's MIDI channels and basic MIDI parameters, such as Pitch Bend Range.

The iguitars offer the standardized MIDI controls that appear on Roland divided pickups, including an assignable knob and two switches. The default knob control is MIDI Volume (CC 7), but you can program it to send Modulation Wheel or just about any other Control Change message. The switches are generally used to send Program Changes to connected synthesizers, but you can also use them to edit parameters in your MIDI converter. With 13-pin guitars, the switches are more context-sensitive, allowing you to set your MIDI converter's parameters, including transposition, Channel Mode messages, and even the built-in synth's voicing parameters.

FIG. 4: Jordan Violins feature an unusual ergonomic design and MIDI access via a preamp and 13-pin output.

The company also offers the P5 MIDI mandolin controller ($3,795). The mandolin has eight strings (see **Fig. 3**), though only one of each pair of strings outputs MIDI. This is an understandable design choice because MIDI guitar converters don't output more than six channels at once.

Jordan Electric Violins. Some electric-violin makers remain faithful to the basic contours of acoustic violin; John Jordan has another idea (see **Fig. 4**). This company offers a unique design, the most striking aspects of which are the relocation of the tuners behind the instrument's bridge and the elimination of the violin's scroll.

You can order Jordan Electric Violins with a variety of preamp options, which come as breakout boxes or with the electronics and controls built in to the instrument body. Access to MIDI output is via a 13-pin jack.

Zeta Music Systems. In addition to numerous MIDI violins, violas, and cellos, Zeta Music Systems sells several basses with MIDI capabilities. The Fusion Upright bass ($2,995) is a fretless solid-body that features the Zeta Strados pickup with a 13-pin output (see **Fig. 5**).

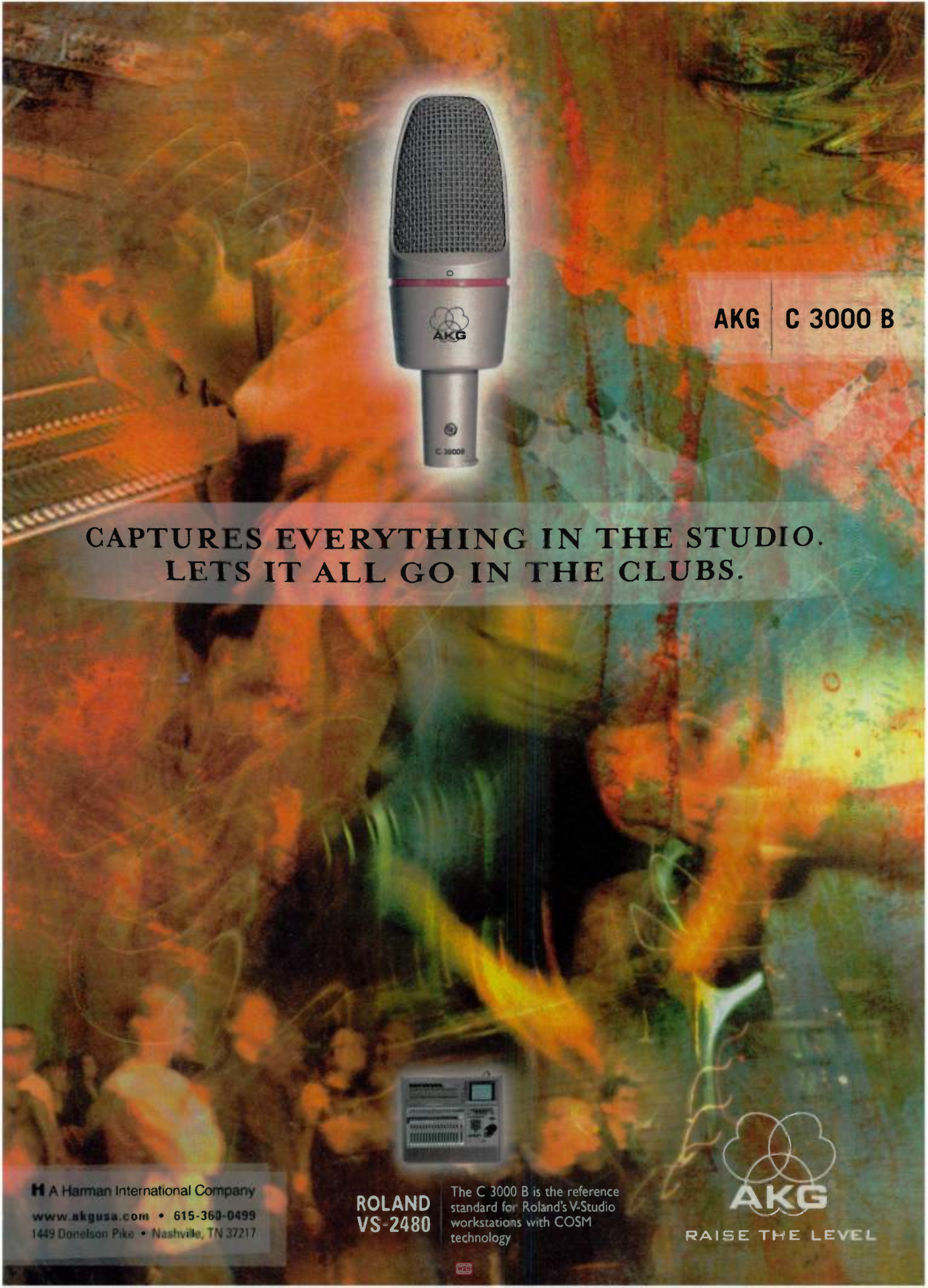
Parker Guitars. The Parker Guitars MIDIFly ($3,611) features uncomplicated direct access to MIDI with its built-in MIDI converter. All you need to do is connect it to your synth with a MIDI cable, and you're ready to play (see **Fig. 6**). The guitar has both MIDI In and Out jacks. It doesn't have an internal synthesizer, but the MIDI In jack allows for System Exclusive software upgrades and setting control parameters. You can also use it as a MIDI merger for other MIDI devices, such as a breath controller or MIDI controller pedal. Any Channel Voice messages received will be passed through to the MIDI Out.

Onboard controls include a MIDI Volume control knob, a switch to toggle between single-channel Poly modes (with or without Pitch Bend) and Mono mode, and a three-way transposition switch (Octave down, Normal, and Octave up). The MIDIFly comes with software for Windows computers that allows you to set up sensitivity, Pitch Bend Range, Velocity curves, and other parameters.

Nechville Musical Instruments. Bluegrass banjo technique seems to lend itself to arpeggiator-like synthesizer performance. Thus, the marriage of MIDI control to a banjo is a match made in heaven.

Tom Nechville is renowned for his innovative designs for both acoustic and electronic banjos. Imitating the banjo's rounded shape, the design of the Cosmos Meteor banjo controller ($3,250) is modern, with a single cutaway where the neck joins the body (see **Fig. 7**). The fifth string, which typically has a tuner at the fifth fret, travels through the neck to emerge at the headstock. The instrument evaluated for this article had a hollow body, a lipstick pickup, a one-piece figured-wood soundboard, and a specially designed banjo bridge. The bridge is mounted with piezo-electric pickups routed to the onboard preamp that feeds the 13-pin output. Just connect it to the MIDI converter of your choice and play.

FIG. 5: The Zeta Music Systems Fusion Upright bass works well with Zeta's Synthony II converter; thanks to the Synthony's specialized algorithms for bowed instruments, the Fusion can be played pizzicato or bowed.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RAISE THE LEVEL

The tracking speed of the Cosmos Meteor was excellent, but it occasionally sent out spurious notes when I tried it with the GR-33. However, after I spent more time adjusting the GR-33's pickup settings, I was able to eliminate the problem. The Cosmos Meteor does not have a banjo head, but other models offer a 6-inch banjo head to retain as much of the banjo's look, feel, and sound as possible. The modular design of Nechville's instruments allows his acoustic banjo pots (the head and rim assembly) to be replaced with a MIDI controller Module.

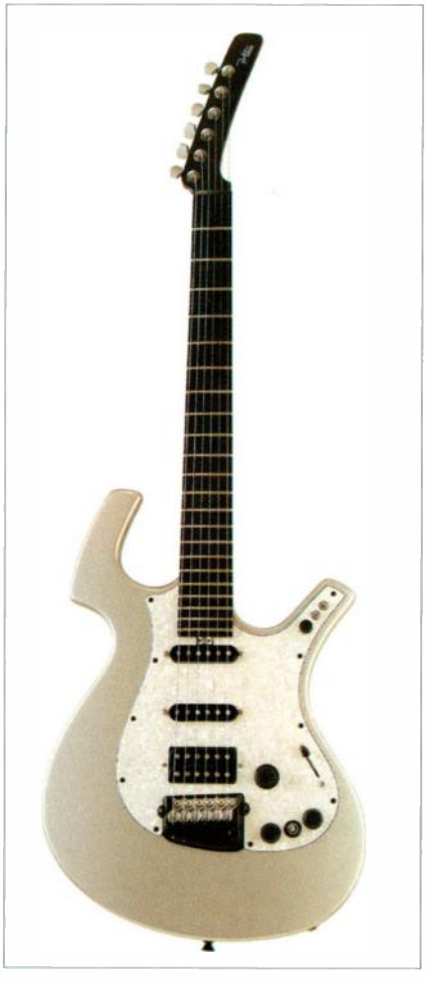

FIG. 6: The Parker MIDIFly combines guitar and MIDI converter in one instrument. The MIDI In jack allows software updating and provides a MIDI merger, letting you connect a MIDI controller pedal, breath controller, or other device.

Stick Enterprises. The Chapman Stick seems like another natural contender for MIDI control. The Stick comes in 10- and 12-string configurations and is played by tapping the string to the fingerboard. Instruments with 10- and 12-strings offer great possibilities for an orchestral approach to MIDI control; however, the Stick's string spacing is incompatible with stock divided pickups. Not only does the stick differ from standard guitars in the number of strings it has, but its bridge also is not arched like a guitar's.

Nonetheless, Stick Enterprises offers modified Roland GK-2A divided pickups that accommodate five or six strings ($330). You can MIDI-fy the bass or treble strings with a single pickup (see **Fig. 8**), or you can opt for two pickups and take advantage of the Stick's full range. Dual pickup systems will require two MIDI converters because of the 6-channel limitations of guitar-oriented MIDI converters.

ROLL YOUR OWN

Guitars and violins are not the only instruments capable of adapting to MIDI control. With a bit of ingenuity, seemingly unlikely instruments are up to the task. In some cases, it's best to abandon some of the physical attributes of the instrument. For example, in order to create a MIDI banjo controller, I found it was necessary to work with a solid-body instrument; mounting a MIDI pickup on an instrument with an extremely resonant head would cause serious tracking problems.

Harpist Gary Garritan (profiled in the July 1995 issue) installed six custom preamps to account for his harp's 36 strings in the MIDI domain.Other instruments may require custom controllers because of atypical string arrangements and tunings (such as those found on banjos, mandolins, and pedal steel guitars). In some cases, string outputs may need to be wired to different converter inputs. The five-string banjo, with its high-pitched fifth string, is a case in point. The highest pitched string is adjacent to the lowest; this arrangement confounds a standard divided pickup because the high fifth string sits under the pickup that conventionally expects to see a guitar's low A string. The disparity in pitch can cause the MIDI converter to filter out the higher frequencies, and any notes played on this string could register as a low-Velocity glitch.

Nylon-string guitars do not work with a stock divided pickup. However, the Godin Guitars catalog has several nylon-string models with piezo saddles, preamps, and 13-pin jacks installed. Alternatively, you can install a custom piezoelectric saddle, which can pick up the nylon string's signal. The RMC Pickup Company offers the Acoustic Gold saddle set for nylon-string guitar ($250). For driving MIDI gear, you will also need a Poly-Drive II Preamp ($350; see **Fig. 9**). You will probably need a luthier to install the saddles; visit the RMC Web site for a list of authorized installers.

RMC's Richard McClish designs and supplies pickup and preamp systems for myriad stringed-instrument manufacturers, as well as individuals needing specialized adaptations for MIDI control. Those with a DIY bent will find a wealth of information from McClish at the RMC Web site.

STEELIN' MIDI

The slippery contrary motion of its string bends, its powerful sustain, and its unique voicings would seem to make the pedal steel guitar a natural choice for a MIDI controller. Even pedal steel giant Buddy Emmons has experimented with MIDI. The unfortunate truth is that pedal steel MIDI controllers enjoyed a brief blaze of glory in the late '80s and have since all but vanished. Adapting pedal steel guitars to MIDI has a number of potential pitfalls.

Pedal steels usually have at least ten strings. Because guitar-to-MIDI converters furnish only six MIDI channels, a dual-pickup, dual-converter arrangement is necessary. Pedal steel guitar poses unique problems for pickup installation because the string saddle is part of a moving mechanism that bends strings; this means piezoelectric saddles are out of the question. In addition, the string spacing necessitates customized pickup placement.

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Pedal steels have several different tuning and pedal systems, and the top two strings of the E9th (the traditional tuning system) has a flatted fifth and a ninth tuned below the pitch of the third string. This would require careful rewiring of the pickup outputs for proper tracking.

No MIDI converter system is commercially available for pedal steel. However, it is certainly possible to retool stock divided pickups (as Stick Enterprises does) to fit the pedal steel guitar's string spacing. The MIDI pedal steel players I spoke with use legacy systems, such as the Digitech/IVL Steelrider or a customized system with two Photon MIDI guitar converters. Unfortunately, neither of these systems is manufactured anymore. Ned Selfe reviewed the Digitech/IVL Steelrider in the September 1987 issue and still relies on this system today.

STRING CONTROLLERS 101

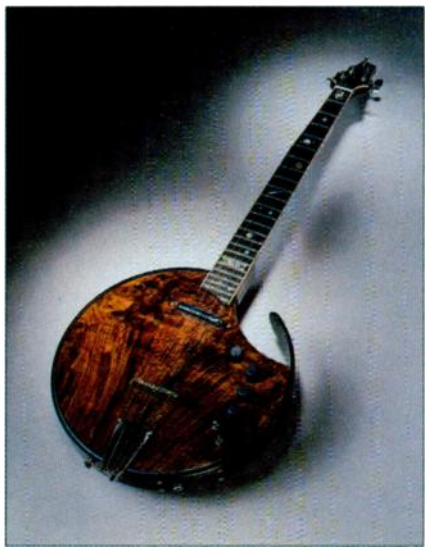
A MIDI controller by itself is like a musician without an instrument; you can have all of the musical ideas in the world, but without your instrument, you can't reproduce a note of them. You not only need to know the controller but also need to understand the controllee.

The following are essential issues that you will need to come to terms with. Once you have learned a few basic tenets of MIDI control, your musical experience will be more rewarding.

A LA MODE

MIDI Mode 4 is also known as Mono mode or Omni Off Mono. Regardless of title, understanding and using it properly is crucial to eliciting guitaristic behavior from your controller. Basically, MIDI Mode 4 is a setup for the synth on the receiving end of your MIDI guitar rig. With Omni Off Mono, the synthesizer is channel-selective, and the Mono part of the equation ensures that the device can only play one note per channel at a time.

Why is that important? You may take for granted that you can bend notes on strings independently. However, a MIDI Pitch Bend message affects all notes played on a single MIDI channel. With MIDI Mode 4, each string of your MIDI controller can play on a separate MIDI channel, so Pitch Bend for each string is also sent separately. Because your sound source receives this data on separate channels, each voice reproduces the bend independently, just the way a real guitar does.



BILL SCHWOB

FIG. 7: The Cosmos Meteor MIDI banjo controller adheres to the basic shape of the banjo but offers contemporary design,with its cutaway circular head and the fifth-string tuner mounted at the headstock.

Monophonic MIDI channels are important because guitars can only elicit a single note per string at a time. If your synth is playing a sound with a long release time, successive iterations of notes on the same string will run together, muddying your sound and stealing available voices from your synth. If each channel is monophonic, a new note will shut off the previous note, and your notes will remain only as long as you need them.

Another benefit of having an individual channel for each string is the ability to assign different sounds to each string. Finger pickers and chord-melody guitarists will delight in the ability to divide performances into multiple sounds. Conventional wisdom suggests bass and piano splits, but try playing brass parts with each member of the ensemble on a different string, or separating contrabass, cello, viola, and violin parts. One of my favorite tricks is playing a sampled groove with a low string, hitting the hold pedal to keep

STRING CONTROLLER CONTACT INFO

Blue Chip/Music Industries (distributor) tel. (800) 431-6699 or (516) 794-1888; e-mail mail@musicindustries.com; Web www.musicindustries.com
Brian Moore Guitars tel. (800) 795-7529; e-mail bmcguitars@aol.com; Web www.bmcguitars.com
Jordan Electric Violins tel. (925) 671-9246; e-mail jjordan@jordanmusic.com; Web www.jordanmusic.com
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THE BENDS

As mentioned previously, guitarists are used to bending notes. They have developed the skills to stretch notes to just the right pitch and to release the bend with just the right timing. Furthermore, guitarists can bend multiple strings to different intervals.

Yet these skills don't come easy with MIDI gear. For one thing, you will need to match the synth's Pitch Bend range with your controller's; mismatched ranges can sound really ugly. Some MIDI controllers send Pitch Bend Range messages and automatically set up the receiving synth with the proper bend range, but some synthesizers require that you wade through menus to set them up properly.

SENSITIVITY TRAINING

Setting pickup sensitivity and keeping your instrument in tune are crucial to proper tracking. Poorly calibrated systems create delays, glitches, dropped notes, and, worst of all, an embarrassing performance. All MIDI converter systems provide sensitivity calibration and tuning indicators. Take advantage of them!

It's been said before, but it bears repeating that you need to play to the sound. Remember that your synthesizer's envelope generator still rules, and blazing leads with a slow pad sound will get you nowhere. If you feel the need for speed, choose a synth patch with a fast attack or learn to program your own sounds. Often you will have to adjust the synth program's attack rate until the synth speaks the way you want it to. Sometimes dialing in a quicker release rate will also help. Remember that some synthesizers don't respond as quickly to incoming MIDI data as others, so you may need to look elsewhere for a better-quality tone generator.

While you're at it, take time to get familiar with your synth's basic MIDI architecture. Learn where your MIDI Channel and Mode settings are. The majority of self-contained MIDI controller and synthesis modules offer playback from external MIDI devices, such as sequencers. The ability to develop and edit musical ideas from a hardware or computer-driven sequencer is one of MIDI's coolest aspects. It certainly beats your controller's built-in four-bar sketch pad.

FIG. 9: Piezoelectric bridge, saddle, and preamp sets are necessary for using nylon-string guitars as MIDI controllers.

MY AXE AND YOUR PHASE

Don't forget that MIDI encompasses control of signal processors too. Even if you are not using a synthesizer, you can enhance and animate your instrument's sound with some MIDI-controlled DSP.

Your processor's manual will show you how to set up real-time control of reverb, chorus rate, phase-shifter modulation depth, and more. For example, if you have an AX100, try modulating delay time or feedback with Control Change messages generated by pick position.

From its shaky start with the earliest MIDI guitar systems, MIDI has grown to be a completely viable tool for guitars, violins, mandolins, banjos, and other plucked, bowed, and tapped stringed instruments. Clearly, there is great potential in MIDI for instruments outside of the guitar and violin families. Now, hopefully, you have a few clues to joining in with your favorite instrument.

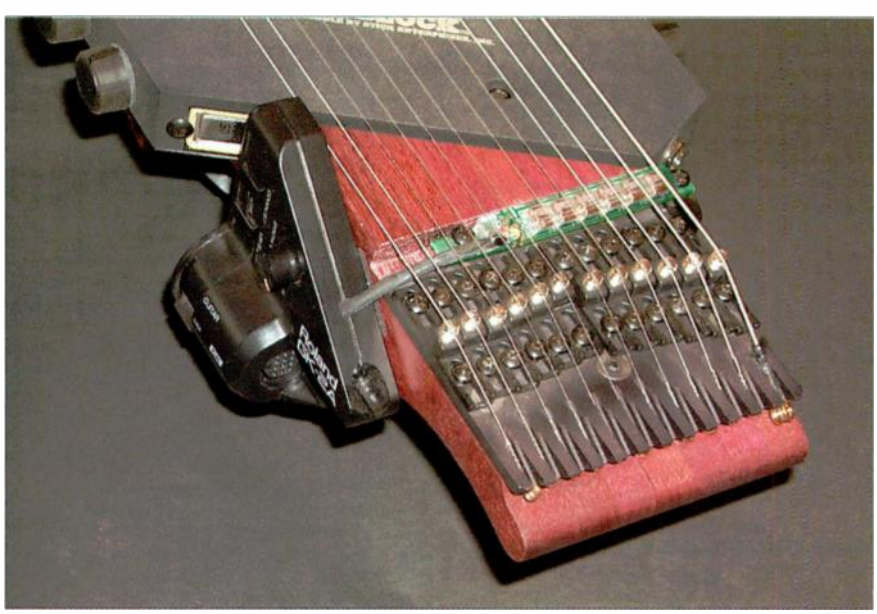

FIG. 8: Instruments with unusual string spacing require customized pickups. Here, a Chapman Stick is outfitted with a retooled Roland divided pickup mounted under the first six strings. Stick Enterprises can install a second pickup, but you'll also need a second MIDI converter.

EM *assistant editor* **Marty Cutler** *played pedal steel guitar with Hank Williams Jr. for a* Sesame Street *recording. Marty is now a lapsed steel player.*

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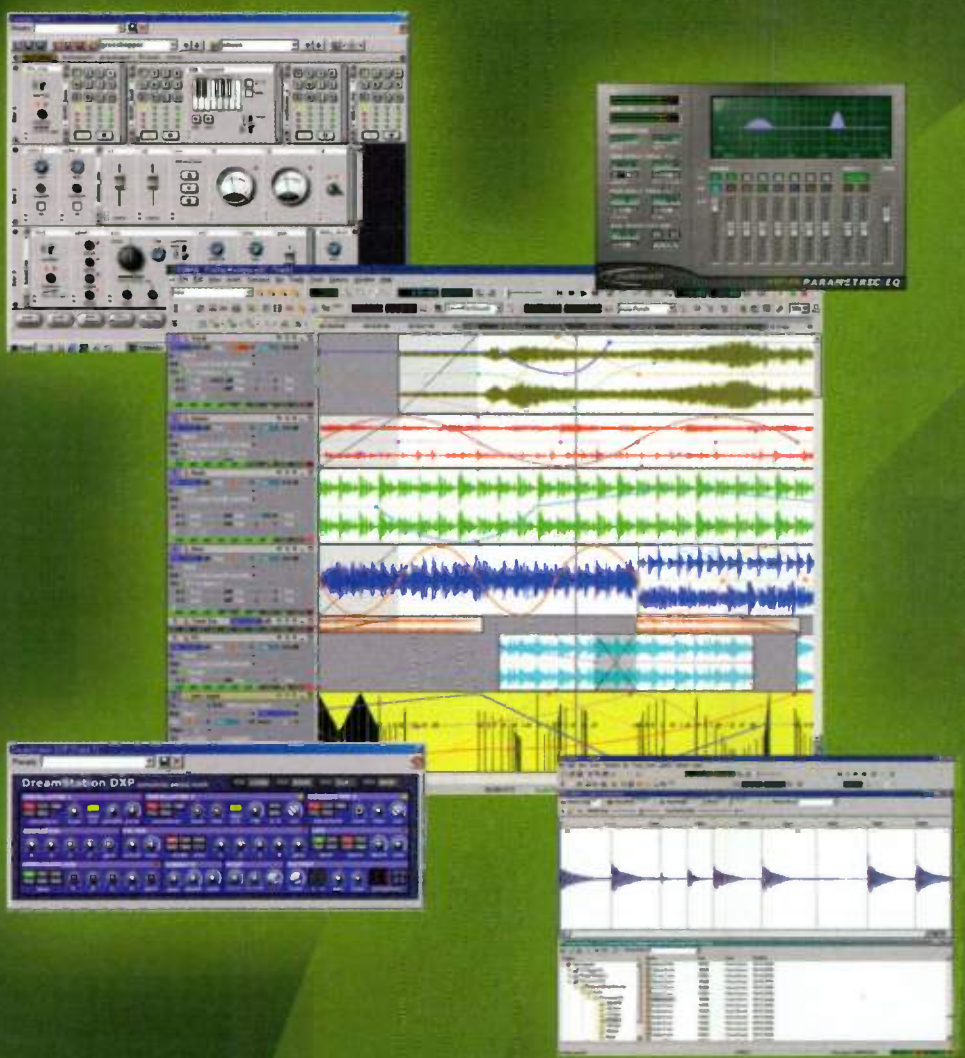

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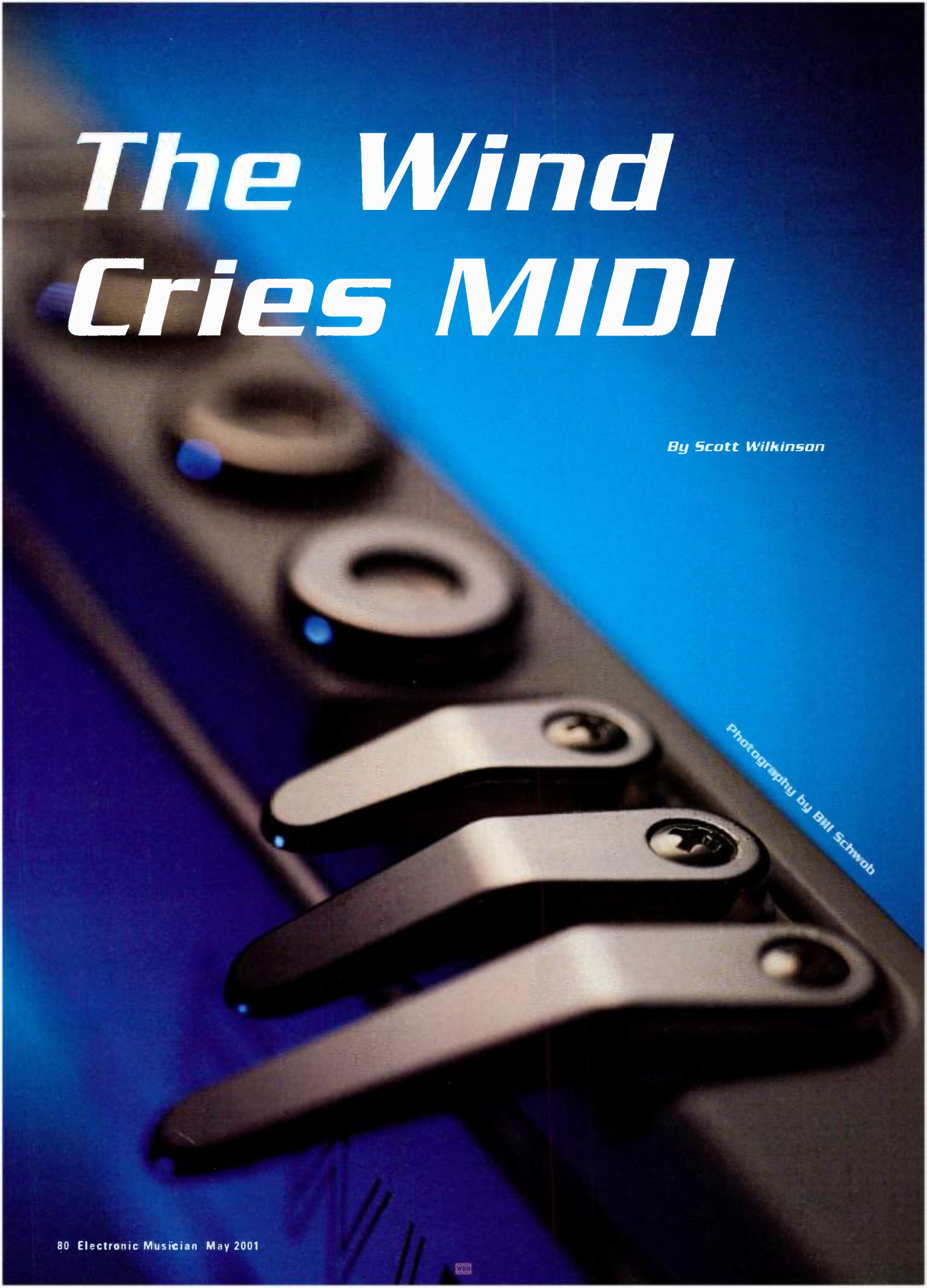
The Wind Cries MIDI

By Scott Wilkinson



Photography by Bill Schwob

I come from a very musical family. My father was a professional woodwind player and music educator, and my mother was a gifted coloratura soprano, so it's no surprise that I was bitten by the musical bug at an early age. However, I've always been a keyboard klutz, so I gravitated toward woodwind and brass instruments, for which I have a natural aptitude.

When I discovered synthesizers in college, I immediately longed for a way to play them with a wind-style controller instead of the ubiquitous keyboard, but such instruments were very rare and expensive. So, I plodded along on the monophonic keyboard instruments that inhabited the electronic-music lab.

Fortunately, things have changed quite a bit since then. Today, there are several MIDI controllers that resemble woodwind and valved-brass instruments and send MIDI messages in response to different fingerings and varying breath pressure. They also sport other controls that send various messages to enhance the expressive capabilities of those instruments. In fact, anyone who thinks that electronic music is inherently lacking in expression hasn't heard a good wind-controller player in action.

BASIC ISSUES

A number of issues face those who want to play a MIDI wind controller (MWC). First and foremost, an MWC is not an acoustic wind instrument; it makes no sound of its own. As a result, it doesn't feel the same as playing a saxophone or other wind instrument. You must develop new playing techniques if you want to get the most out of an MWC.

For example, most wind instruments rely on overblowing to play in different octaves, and the fingering of a particular note is often different in one octave than another. On an MWC, however, different octaves are played by pressing octave keys with the left thumb. Other than that, each note is fingered the same way in every octave. This gives an MWC a much greater pitch range than most acoustic instruments, although it takes some getting used to.

MWCs that emulate a saxophone often include a reed on the mouthpiece. However, that reed doesn't vibrate like the reed on an acoustic sax. Instead, it is used to send Pitch Bend or other MIDI messages when the player bites on it. Many MWCs also provide a control under the right thumb that sends Pitch Bend or other messages. These controls should be used to generate vibrato with the jaw or right thumb, because this sounds much more natural than using the synth's low-frequency oscillator (LFO) for vibrato.

Another important issue is a controller's MIDI implementation. Of course, all MWCs send Note On, Note Off, and Pitch Bend messages, as well as at least one continuous controller message, in response to changing breath pressure. Most modern MWCs can send several messages in response to breath, including Channel Pressure (Aftertouch), Modulation (CC 01), Breath Controller (CC 02), Volume (CC 07), and Expression (CC 11), which affords a great deal of expressive potential. Some instruments can even send several of those messages at once, but this can clog the MIDI bandwidth, causing the receiving sound module to choke. Besides, there's not much point in sending multiple continuous controller messages with the same values unless different parameters in the receiving synth can respond only to certain messages and not others.

As you might expect, the Velocity portion of each Note On is derived from the initial breath pressure for each note. But what if you play a sustained note with a low Velocity and then try to crescendo to full volume? In most cases, you won't get very far. For sustaining sounds, it's important to have an MWC that lets you disable Velocity sensitivity and send all Note On messages with a fixed Velocity of 64 to 127. (Alternatively, you may be able to disable the sound module's Velocity response.) When playing instruments that have percussive sounds with naturally decaying envelopes, such as piano, guitar, or drums, it's best to leave Velocity sensitivity on, although these sounds are more prone to glitching with their quick attacks. Velocity can also be used to bring layered sounds into and out of a multitimbral setup.

Most MWCs provide some way to adjust the instrument's sensitivity to breath and reed pressure; after all, each player is different, and their particular style of playing must be mapped to a linear range of MIDI values. Some MWCs even provide several response curves to tailor the response of the controller to different players.

Unless they are played using multiphonics, most acoustic wind instruments can produce only one note at a time. On the other hand, MWCs can play several notes at once by sending the appropriate Note On and Note Off messages. There are several specific harmony functions available on different controllers. For example, some MWCs let you start one or more drone notes that are held while you play melodic lines over them. Others offer the ability to play user-specified parallel chords above or below the performed notes.

FINGERS FLYING

One of the most vexing problems facing MWC players is called *glitching*. When moving from one note to another on any wind instrument, several fingers often have to move simultaneously to press or release their respective keys. Unfortunately, it is difficult, if not impossible, to do this perfectly. In the case of an acoustic instrument, it takes a couple of milliseconds for the air column to reach full resonance between notes, so slight inaccuracies in fingering are not noticeable.

On an MWC, however, each combination of keys—no matter how short its duration—is counted as a note, and the instrument sends a corresponding Note On. As a result, you often hear many unwanted, short "glitch" notes between the notes you intended. Fortunately, most MWCs now include a parameter that lets you set the instrument's response speed; at slower speeds, the instrument ignores very short notes, which greatly reduces glitching. (If you set the response speed too slow, you won't be able to play fast passages; the trick is to find the right balance.) Glitching is also affected by the envelope attack of the sound you're playing; the faster the attack, the more glitching you will hear.

As with any MIDI controller, the ability to send any Program Change is very important. In most cases, this is done by pressing a special button with a specific combination of note keys on the instrument. Some instruments also provide a program increment/decrement control, which is handy if you store the programs you will need in consecutive memory locations of the synth.

FIELD OF MIDI WINDS

As of this writing, there are four commercially available MWCs designed for professional applications. (A couple of controllers are designed for the educational market, but they are quite limited, so I won't cover them here.) The first three are woodwind-like instruments that more or less resemble a saxophone, and the last one is based on the valved-brass paradigm.

Yamaha WX5. Yamaha has been in the MWC business for many years, starting in 1989 with the WX7. That model was replaced in 1993 by the WX11, which was quite a bit more limited than the original WX7. Fortunately, Yamaha removed those limitations and added a number of new features to its current MWC model, the WX5 ($750).

The WX5's key layout is much like that of a standard saxophone, and there are four selectable fingering patterns (see **Fig. 10**). In addition, you can select three transpositions—C, B♭, and E♭—and shift the normal playing range (8½ octaves) by three octaves up and down.

The sax mouthpiece includes a reed that sends Pitch Bend or Modulation messages when you bite it. In addition, you can set the instrument to send General Controller 3 (CC 18) along with Pitch Bend or Modulation in response to lip pressure. The range of values can be normal (restricted range) or wide (full range).

You can set the instrument to play in Tight Lip or Loose Lip mode. Tight Lip mode requires moderate nominal pressure on the reed while playing; more pressure bends pitch up, less pressure bends pitch down. This mode more closely resembles sax technique, but it's difficult to maintain a steady pitch. In Loose Lip mode, you apply no nominal pressure while playing. When you do apply pressure, the pitch bends up only. (If you set the instrument to send Modulation from the reed, nominal pressure sends a value of 64 in Tight Lip mode and a value of 0 in Loose Lip mode.)

You can set the WX5 to send Breath Controller, Volume, or Expression messages in response to breath pressure, but you can't send more than one of these messages at a time. The Velocity of each Note On message can be determined by initial breath pressure or fixed at a value of 100.

The Response mode determines how quickly the WX5 responds to each note as it's played. In Fast mode, a new Note On is sent the instant any key is pressed or released, which contributes to glitching. In Slow mode, fewer glitch notes are generated by imprecise playing. This feels more like an acoustic instrument, and it doesn't seem to impede playing speed.

One of the most significant improvements over Yamaha's previous MWC models is the presence of a MIDI Out jack on the body. There's also a WX output, which uses the same type of multipin cable and connector found on the WX7 and WX11. You can use this output to control a Yamaha VL70-m sound module instead of using MIDI, which is advantageous because the cable supplies power to the instrument. When using the MIDI output, power is normally supplied by six AAA batteries in the instrument body.

In addition to the lip sensor under the reed, the WX5 includes a spring-loaded rocker under the right thumb. This rocker can be set to send Pitch Bend up and down, Modulation up and Pitch Bend down, General Controller 1 (CC 16) up and General Controller 2 (CC 17) down, or Brightness (CC 74) up and down.

The high D and D♯ keys can play notes or send MIDI controller data. The high D key sends General Controller 6 (CC 81) in a momentary fashion (value 127 when pressed and value 0 when released). The high D♯ key sends General Controller 5 (CC 80) in a toggle fashion (value 127 and 0 alternately each time it's pressed).

The WX5 has four Hold modes. Normal Hold mode sustains one note while you play other notes over it. Follow Hold mode plays a second note at a fixed, user-specified interval from the fingered note, resulting in a parallel melodic line. (Of course, those modes only work with a sound module that can play polyphonically.) Sustain mode sends a Sustain On/Off message (CC 64) each time the Key Hold button on the underside of the instrument is pressed, and Portamento mode sends a Portamento On/Off message (CC 65) each time the button is pressed.

Unlike its predecessors, the WX5 can send any Program Change and Bank Select message. However, it takes practice to learn the required fingering combinations. You can also increment and decrement the program number in the receiving synth.

The soft case that comes with the WX5 offers little protection from bumps; the keys are particularly vulnerable to damage. Fortunately, Yamaha now offers an optional hard-shell case, the YCWX5 ($150), which includes molded foam compartments for the instrument itself,

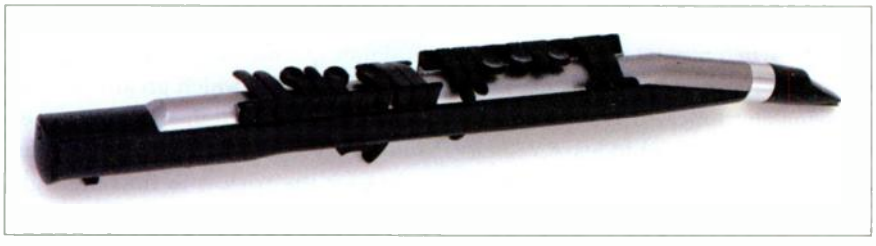


FIG. 10: The WX5 is Yamaha's third-generation MWC, with a flexible MIDI implementation and a MIDI Out on the instrument body.

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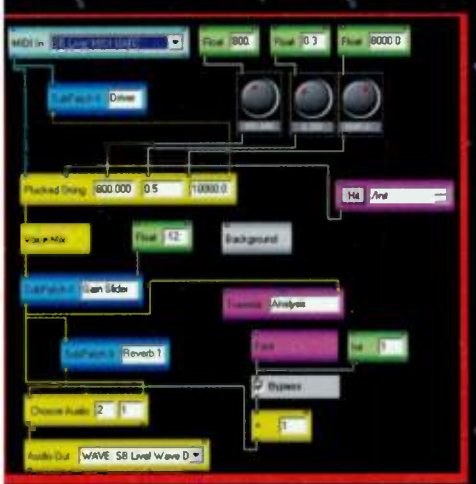

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The WX5 can be used with any MIDI sound module, but it is ideally suited to the VL70-m ($800; see **Fig. 11**). This half-rack monophonic module uses Yamaha's physical-modeling technology, which is expressly designed to respond to breath-controlled messages. Together, these two devices make an excellent portable MIDI-wind system.

Akai EWI3020. Akai has also been in the MWC business for many years, and its EWI electronic woodwind instrument has been through several generations. Like its predecessors, the current EWI3020 model (see **Fig. 12**) is based on a design by controller developer Nyle Steiner.

Instead of moving keys that simulate the feel of a saxophone or clarinet, the EWI's keys are capacitive touch-sensitive metal buttons that don't move (although an optional Finger Rest kit is available to add moving keys). The touch sensitivity is adjustable, and you can specify a delay between fingering a note and sending Note On. Both of those controls can help reduce glitching.

FIG. 11: The Yamaha VL70-m is ideally suited to the WX5 with its extra multipin connection, but it also works well with any MWC.

In another departure from tradition, the mouthpiece does not resemble a sax or any other acoustic instrument. It's a flattened plastic tube with an internal sensor to detect the player's bite pressure. The EWI3020 also has an airway that lets the player's breath pass through the instrument, although previous generations of the EWI did not have an airway.

As usual, the left thumb operates the octave keys, which are rollers on the EWI. Those rollers give the instrument a normal playing range of eight octaves, which can be further shifted down a minor sixth or up a minor third in half-step increments using the transposition function. A metal strip runs alongside the rollers and is used to send Portamento On/Off and Rate. The right thumb rests on a grounding plate, which is flanked by separate Pitch Bend Up and Down plates.

The EWI3020 is the only available MWC that must be used with a particular sound module (see **Fig. 13**); you can purchase the controller with the EWI3020m analog module ($1,399) or the EWI3030m sample-based module ($1,785). You can also buy those

modules separately, and you can control several modules with one EWI. Both modules are basically monophonic, although the two oscillators can be tuned to different pitches. More importantly, they are designed specifically for the EWI. For example, breath pressure and Pitch Bend can be used as modulation sources for as many as ten sound parameters.

The controller connects to either module with a multipin cable, which conveys the player's breath pressure, fingering, mouthpiece pressure, and other performance gestures to the module. In addition, both modules include a MIDI Out port, which lets the instrument control other MIDI synths, and a MIDI In port, which means you can sequence parts for them.

The mouthpiece is sensitive to changes in biting pressure rather than the absolute amount of pressure; changing pressure bends the pitch in the Akai modules and sends Pitch Bend messages from the MIDI Out. If you bite harder, the pitch goes up; if you reduce bite pressure, the pitch goes down. Once the bite pressure stops changing, the pitch returns to its nominal value. This lets you bend up and down from the mouthpiece without having to maintain a specific nominal pressure, but the pitch does not stay bent for long. Breath pressure can be set to send Aftertouch, Modulation, Breath Controller, or Volume but not multiple streams.

FIG. 12: The EWI3020, Akai's third-generation MWC, uses touch-sensitive buttons rather than moving keys.

Velocity can be determined by initial breath pressure or fixed at any value from 1 to 127. However, there is a slight bug in the EWI3020m: if Velocity is set to vary depending on breath pressure, it is not updated for any slurred notes, even if you play them with more or less pressure. This bug has been fixed in version 1.02 of the software, but the new software is not shipped with the unit because it hasn't been bug tested; you must request the updated chip from Akai and use it at your own risk.

The EWI3020m module can send Program Changes 1 to 100; the EWI3030m can send 1 to 128. Bank Select is not supported. The bend plates and mouthpiece

pressure send only Pitch Bend messages; they cannot be programmed to send other messages.

Although the Akai modules are basically monophonic, they can transmit four simultaneous Note Ons in chords. This function is quite flexible; you program as many as 16 different chords based on interval relationships with the note you play on the controller, and then you assign one of these chords to each note in the chromatic scale.

One of the EWI's coolest features is the ability to process an external sound source through the module's signal path. This lets you send the external sound through the filter and amplifier while controlling them with the EWI, providing analog changes in timbre and volume with no MIDI stair-stepping effect. You can also combine the external sound with one of the internal oscillators. To use this feature, you connect the MIDI Out from the EWI to an external synth's MIDI In and the audio output from the synth to the audio input on the Akai module.

Softwind Synthophone. For those who really want an instrument that feels exactly like a saxophone, there is only one alternative: the Softwind Synthophone ($3,150–$4,395; see **Fig. 14**). Switzerland-based Softwind starts with a Yamaha YAS-275 or Selmer Super-Action II alto sax (the price depends on which model you choose) and crams the body full of sensors and electronics. Of course, the instrument no longer plays acoustically (in fact, the bell is completely sealed with a metal plate), but it is arguably the most sophisticated saxlike MWC on the market.

The removable bell plate hides an EPROM chip that can be replaced when new software is developed, and all functions are activated and controlled by specific command fingerings. The MIDI Out jack at the base of the bell is connected to the MIDI In on an outboard box, which supplies power to the instrument through the two unused conductors in a standard MIDI cable. The power supply also includes two MIDI Out jacks, which send the MIDI messages from the Synthophone to external MIDI devices.

Each key includes its own sensor, and there are five Key Speed settings to minimize glitching. Like the other sax-oriented MWCs, the Synthophone can be transposed into C, B♭, or E♭. In addition, the normal playing range of four octaves can be transposed up or down two octaves.

The specially adapted mouthpiece includes two sensors: one for breath pressure and one for lip pressure on the reed. There's also a special sensor for the right thumb. This Thumb-X-Press is pressure-sensitive and can be programmed to do a variety of tasks, such as raise the pitch one octave, send on a different MIDI channel, or affect the harmony function. It can also be programmed to send Pitch Bend, Aftertouch, or Sustain On/Off.

Lip pressure on the reed can be programmed to send Modulation and Pitch Bend at one of six sensitivity settings, from 1/16 range to full range. If Pitch Bend is selected, increasing pressure on the reed can send Pitch Bend up or down; alternatively you can select a symmetrical mode that bends the pitch up or down by increasing or decreasing a nominal pressure on the reed. The symmetrical mode implements a dead zone in the middle of the range, making it a much easier matter to maintain a constant nominal pitch on the Synthophone than on the Yamaha WX5.

FIG. 13: The Akai EWI3020 MWC must be used with either the analog EWI3020m (top) or the sample-based EWI3030m (bottom) sound module.

FIG. 14: The Softwind Synthophone packs sensors and electronics into an actual alto sax, which then sends MIDI data instead of making an acoustic sound.

In addition to sending Pitch Bend and Modulation, lip pressure can also be programmed to perform one of several switching functions. These include changing MIDI channels, Sustain On/Off, Portamento On/Off, or various harmony functions.

Breath pressure can be programmed to send Aftertouch and Breath Controller at one of six sensitivity settings, from 1/16 range to full range. Breath pressure can be programmed to send Volume; in this case, one of five exponential response curves can be selected, or the Volume can be fixed at 127.

All of the continuous MIDI messages sent in response to lip and breath pressure can be programmed separately, so you can select multiple streams and specify their sensitivities. You have a lot of flexibility here, but again, some synthsesizers will choke if you send too much data at once.

You can choose from five limited Velocity ranges, each of which encompasses about 30 values. The Velocity of each note is variable in the selected range, and it's derived from initial lip pressure when you attack new notes and from initial breath pressure when you play legato. The instrument cannot send the full range of Velocities, nor can it be fixed to a single value.

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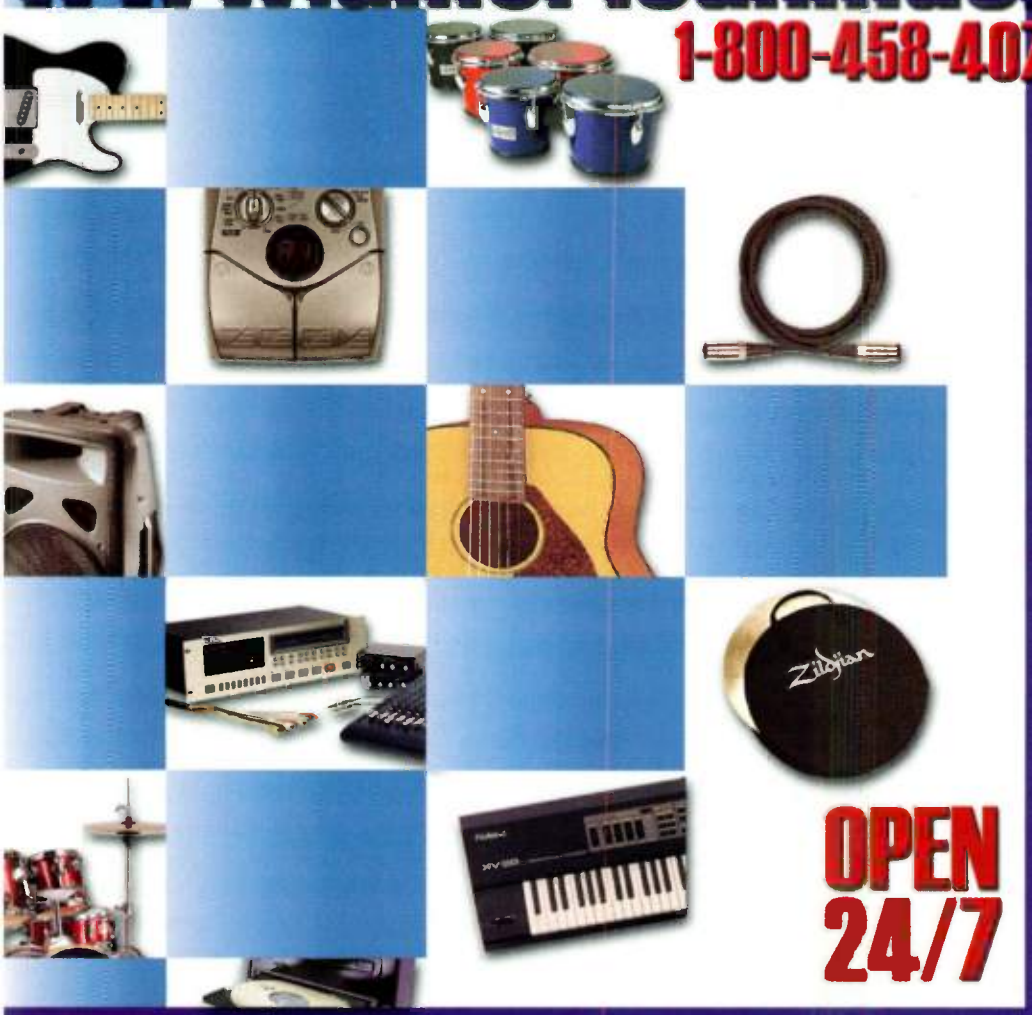

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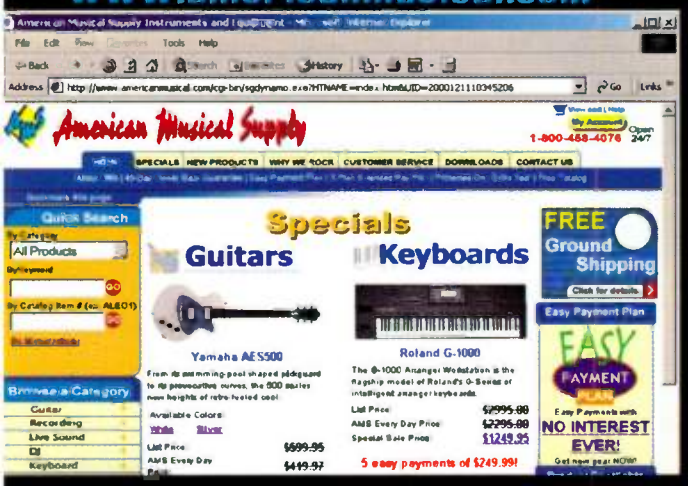

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The Synthophone's harmony functions are very sophisticated, with the ability to play up to five-note chords. The simplest mode is Freeze harmony, which generates completely parallel chords based on the intervals of the last chord played. Lip pressure, Thumb-X-Press, or a specific command fingering can be used to enable or disable Freeze harmony.

Dynamic harmony plays chords based on a user-selected diatonic key that can be changed on the fly. In addition, there are nine harmonization tables—three presets in ROM and six user tables in RAM—that define the harmony for each note in the chromatic scale. Finally, lip pressure can vary the chords as you play in one of five basic ways: it can change the harmony table being used, change the inversion of the chord, play a ♭II (dominant) substitution, change the number of voices in the chord, or switch between chordal and monophonic operation. (Pressure on the Thumb-X-Press can control the number of voices in a chord and play a ♭II substitution as well.)

All Synthophone parameters are stored in one of 32 user Patches, which can be recalled at any time. Each Patch can include a Program Change number that is sent when the Patch is called up, but you can't send arbitrary Program Change messages directly from the instrument. However, you can increment and decrement the program number of any connected synths.

At the 2001 Winter NAMM convention, Softwind introduced a new software program for Windows 95/98 computers. *MIDI Sax Editor* provides full on-screen access to all Synthophone parameters, making configuring the instrument much easier; any changes you make on the screen are immediately sent to the Synthophone and vice versa. You can also create as many custom harmony tables as you want and store them along with your Patches on your computer.

Steiner MIDI EVI. Nyle Steiner is one of the early pioneers in the development of MWCs. As a professional trumpet player, he wanted to play synthesizers with a valved-brass–type instrument controller, so he designed the electronic valve instrument, or EVI, in the 1970s. Soon, woodwind players wanted something similar, so he developed the EWI in 1981. In their initial incarnations, both instruments controlled a dedicated analog sound module and had no MIDI capabilities.

Steiner later licensed both instruments to Akai, which has continued to develop and market the EWI. However, the EVI was discontinued not long after its initial release. Eventually, Steiner decided to make MIDI-capable EVIs for anyone who places an order with him directly.

Steiner's philosophy has always been to build an instrument that only loosely resembles an acoustic trumpet, but that offers maximum flexibility as a MIDI controller. This means that his controllers require more time to learn than those that more closely resemble their acoustic counterparts, but that time pays off in far greater capabilities.

The MIDI EVI ($750) is a compact, self-contained, battery-powered instrument (see **Fig. 15**). Like the Akai EWI, it uses touch-sensitive buttons instead of moving keys, and their sensitivity is adjustable. The three main buttons on the top behave like the first, second, and third valves of a trumpet, lowering the pitch by a whole step, half step, and minor third respectively. By pressing them in various combinations, you can lower the pitch by as much as a tritone, but what about the rest of the octave? Acoustic trumpets depend on overblowing to excite different resonant modes, and different notes within one octave are fingered identically.

The solution is to add a fourth valve that lowers the pitch by a perfect fourth. This valve is much like the fourth valve on many tubas and other low brasses. In the case of the EVI, the "valve" is actually a metal strip that extends around the barrel-shaped octave controller at the end of the instrument. This barrel is manipulated with the left hand; rotating it moves the left thumb over a series of rollers much like the octave rollers on the Akai EWI. With the main valves, these controls let you play seven chromatic octaves, and you can further transpose the instrument's pitch by more than three octaves in

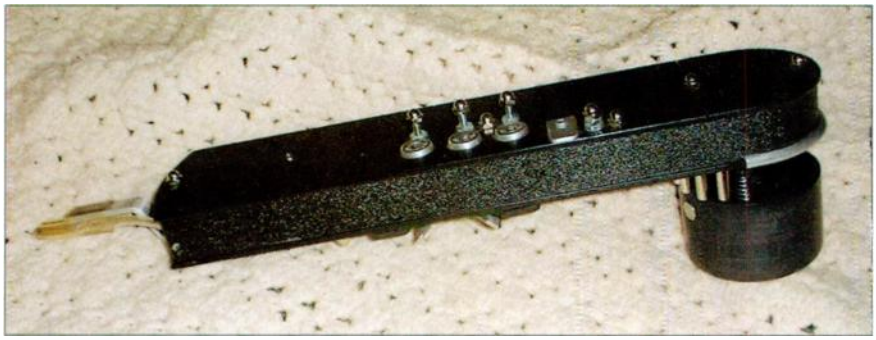

FIG. 15: Nyle Steiner makes the MIDI EVI to order. Like the Akai EWI, the EVI uses touch-sensitive buttons, but it is fingered like a trumpet rather than like a sax.

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semitone increments in either direction.

Unlike any acoustic brass instrument, the MIDI EVI includes three "trill" buttons next to the main valves. The first, second, and third trill valves raise the pitch by a whole step, half step, and major third, respectively. These buttons make certain trills much easier than they would otherwise be, and they provide alternate fingerings.

The instruments' response time is user adjustable, and Steiner presets it to the valve he has determined to minimize glitching. This control is not mentioned in the documentation, but users can contact Steiner if they want to change the setting.

On the underside of the instrument, bend-up and -down plates for the right thumb operate in a manner similar to that used with the Akai EWI. There's also a button that reduces the pitch-bend range by half. Between the bend plates is a vibrato sensor that is sensitive to motion and sends Pitch Bend values in response to movements of the right thumb.

The mouthpiece is a simple plastic tube and includes breath-pressure and bite-pressure sensors, but unlike other current MWCs, the MIDI EVI does not pass the player's breath through the instrument. To simulate this feeling, you must let some air escape from the corners of your mouth while playing. (To see what this is like, lightly bite the tip of your smallest finger with your teeth and blow air past it.) On the other hand, you can play phrases of any length by sealing your lips around the mouthpiece and breathing through your nose, which is a variation of the technique known as circular breathing.

In response to breath pressure, the MIDI EVI can send any combination of Aftertouch, Breath Controller, Volume, and Expression. Velocity can be derived from breath pressure or fixed at any value between 1 and 127.

Biting the mouthpiece does not send Pitch Bend; instead, it sends Portamento On, and changing the bite pressure changes the Portamento Rate. Reducing the bite pressure to zero sends a Portamento Off message. You can disable the mouthpiece's ability to send Portamento messages if you wish.

The MIDI EVI's chord modes include Slur Sustain, which sends a Sustain On message when you tongue a note. After that, all notes played without tonguing are sustained until you stop blowing, at which time a Sustain Off message is sent. As many as the last ten notes played in a single Slur Sustain passage are stored in a memory buffer, and the intervals between these notes can be used to play strictly parallel chords in Parallel mode. The EVI's other chord mode is Sub Octave mode, which plays notes one octave below the fingered notes. Interestingly, you can engage Slur Sustain and Sub Octave modes simultaneously, but in that case the sustained notes are not stored in the memory buffer.

The MIDI EVI can send any arbitrary

Program Change number from the instrument. You can also increment and decrement the program number in the receiving synth.

PROGRAMMING TIPS

Playing on an MWC is only half the story—you must also think about the sound module you're controlling and how it is programmed. There are three basic sound module types to consider: samplers and sample-based synths, analog synths (either real or modeled), and Yamaha's VL series of physical-modeling synths. (Yamaha's older FM synths can also be used to good effect with MWCs, but they are no longer manufactured.)

As mentioned earlier, the VL-series synthesizers are expressly designed to respond to breath-controlled messages, so they work extremely well with all MWCs. The current model VL70-m offers many useful presets, but the original VL1 keyboard and VL1-m rackmount module are even better, with two sound-generating Elements instead of one and better effects. However, these synths are not made anymore, and they were much more expensive than the current model. In addition, the VL synths are generally quite difficult to program well, even with the available computer-based editors.

If you're not a programmer, there is one third-party sound company that specializes in patches optimized for MWCs. Patchman Music offers a wide variety of wind-controller sound banks for many current and past synths, including the VL1 and VL70-m. Be sure to check out Patchman's Web site (see the sidebar "MIDI Winds on the Internet").

On the other hand, if you want to try your hand at programming your synth for an MWC, here are a few tips to get you started. These general ideas apply to all sample-based, analog, and FM modules, but the specific procedures for implementing them vary from one instrument to the next.

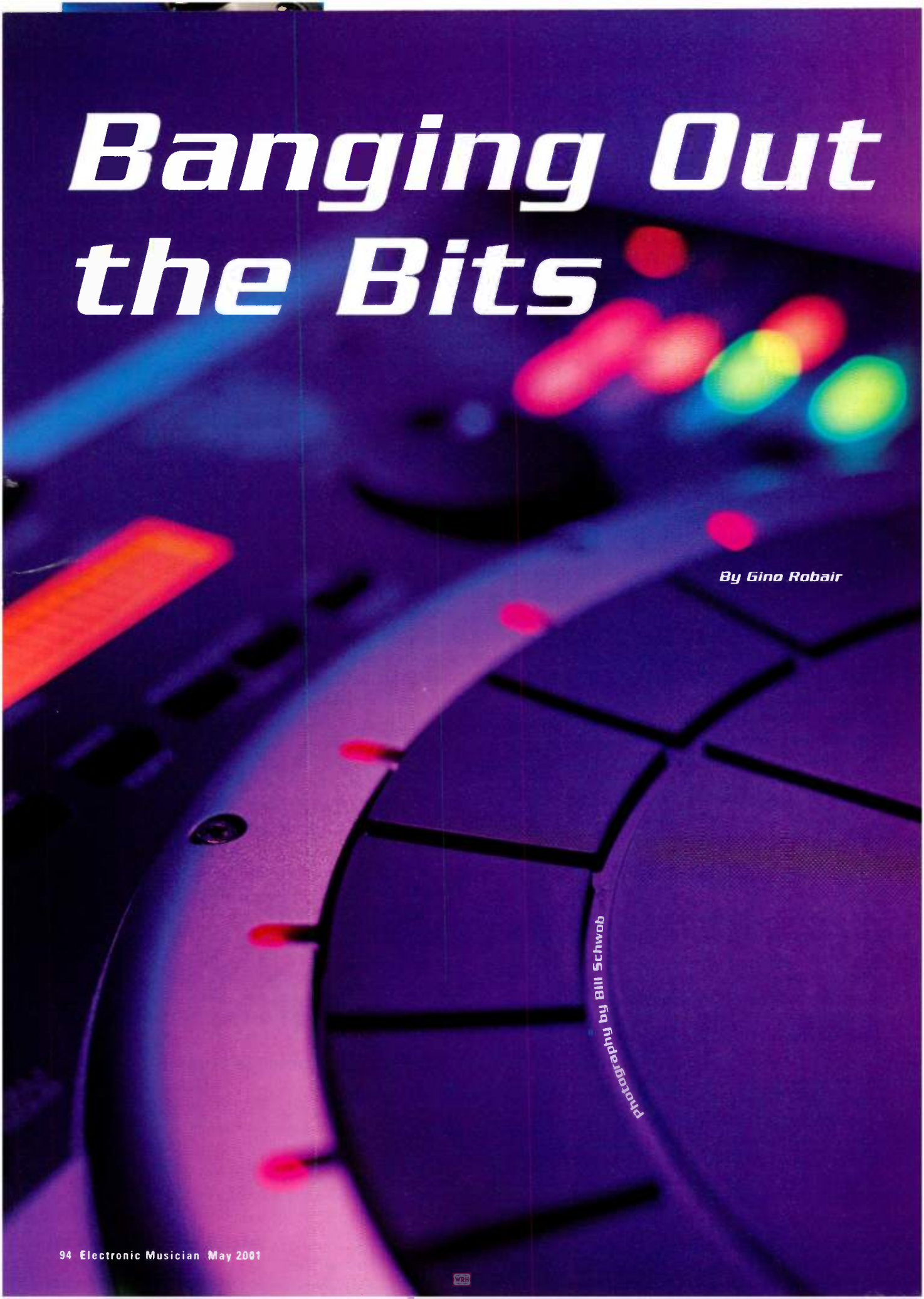
First, it's important to understand that most wind-oriented sounds do not have preprogrammed envelopes. Instead, they are sustained and vary their amplitude and timbre over time according

MIDI WINDS ON THE INTERNET

International Wind Synthesis Association http://windsynth.org
Nyle Steiner Homepage http://members.aol.com/patchman1/Nyle_Steiner_Homepage.html
Patchman Music www.patchmanmusic.com
Wind List To subscribe, send an e-mail to listserv@morgan.ucs.mun.ca and include "subscribe wind <your name>" in the body of the message.

Banging Out the Bits

By Gino Robair



Photography by Bill Schwob

There are plenty of reasons why musicians use MIDI percussion controllers. Some use them to record natural-sounding drum patterns into a sequencer. Others use percussion controllers to supplement or replace an otherwise acoustic live-performance setup. For example, pad controllers, such as the Alternate Mode trapKAT, are lighter, are easier to set up, and require less miking than a full drum set enhanced by a complement of percussion. Of course, you can also place triggers on acoustic drums in situations where you want a mix of real and virtual instruments.

A GOOD FEEL

MIDI percussion is the one category of controllers that doesn't require the player to be a specialist on the acoustic version of the instrument. Anyone can play a percussion controller. The rhythmically challenged can clean up the data in a sequencer later.

If you are a nonpercussionist looking for a simple MIDI device you can play with sticks or mallets, an inexpensive controller will do the trick. On the other hand, if you think your MIDI requirements will expand as you get deeper into an instrument, consider acquiring a full-feature controller that you can grow into.

Percussionists' concerns are slightly different. For you, the primary consideration when choosing a percussion controller is the feel and response of the pads. The smoother the transition from acoustic instruments to MIDI controller, the better, especially if you are going to use the acoustic and electronic instruments side by side.

Fortunately, manufacturers are keenly aware of performance considerations, and they continually improve their instruments' playability. For example, percussionists need to be able to choke a cymbal sound by grabbing the cymbal pad, and most controllers on the market have this capability. Likewise, mallet players should have the option of dampening a note on the mallet controller by softly touching the mallet to the playing surface after the note is struck, just as you would with a vibraphone. The better the controller responds to traditional technique, the easier it is to play right out of the box.

PROGRAMMING FOR RESPONSE

The degree to which you have to adapt your technique depends on more than just the pads. For instance, you may be able to tweak the trigger's threshold levels to alleviate unintended double-triggering problems, but you may also need to play double strokes more crisply to get the best results.

Much of the feel in a percussion controller has to do with Velocity response. The more Velocity curves the controller offers, the more likely you will find one to suit your technique. Some controllers give you limited choices in this regard, in which case you may have to find a sound module that gives you greater options in Velocity control.

Before buying a controller, decide what you want from it. For example, begin by determining whether you need a controller with internal sounds and effects or just a MIDI controller because you already have a sound module. Think about the kinds of projects you may do in the future, and try to estimate the impending technical requirements.

Once you understand your own needs, you can match them to the controller with the most appropriate feature set. At this point, you may not need multitimbral and sound-layering capabilities or the ability to send out Control Change messages, but that doesn't mean you won't want them in the future. Many controllers can layer multiple sounds per pad and let you assign an independent MIDI channel to each layer. Once you begin experimenting with this feature, you may find that you can't live without it. But not every musician needs this kind of power. Sometimes a simpler controller is the better fit for a particular application.

BEYOND TRIGGERING

Using gestural control methods with electronic percussion instruments is a challenge. Foot pedals and ribbon controllers are often inconvenient and impractical for sending MIDI messages because percussionists use both hands and both feet when playing. One solution is the breath controller, which can be held in the teeth while hands and feet work away. Another solution, used by Roland throughout its product line, is the Dimension Beam (DBeam). More esoteric solutions include MIDI theremin and the I-CubeX sensors by Infusion Systems. (For more information on alternate controllers, see "The Outer Limits" in the August 2000 issue of **EM**.)

To get the controller to behave in a way that feels natural will require you to spend time programming and tweaking parameters. The more time you invest in customizing your instrument, the greater the rewards will be.

THE BIG BANG

MIDI controllers in the percussion category include electronic percussion instruments with built-in MIDI capabilities, percussion systems that include triggers and a MIDI sound module, and MIDI sound modules with trigger inputs. Various companies specialize solely in percussion triggers for use with third-party sound modules; because their products do not have immediate MIDI output capability, they are listed separately in the sidebar "Mainly Triggers."

Alesis. The Alesis DM Pro ($899) is a percussion sound module with a trigger-to-MIDI interface (see **Fig. 16**). The DM Pro has 64-note polyphony, is 16-part multitimbral, and includes 1,664 16-bit sounds with a 24-bit DAC. Until recently, Alesis offered the module as part of the DM Pro Kit, which married the module with a set of Hart Dynamics drum pads. Unfortunately, the DM Pro Kit was discontinued, leaving it up to you to choose your triggers.

The DM Pro has ten trigger inputs, five of which are TRS jacks that accept dual-zone pads and are useful for snare-drum and ride-cymbal pads. The remaining trigger inputs include one for the hi-hat controller and four for single-zone pads. The module also sports six ¼-inch TRS outputs; a headphone jack; MIDI In, Out, and Thru; and a pair of RCA input jacks for monitoring an external audio source while you play. The module also includes a PC Card

FIG. 16: The Alesis DM Pro is a trigger-to-MIDI converter and sound module with a wealth of drum and percussion samples.

expansion slot for memory expansion.

The DM Pro includes two independent effects buses—Reverb and Effects—that can be run serially or in parallel. You can run the multi-effects processor's output through the Reverb, but not the other way around. The effects palette includes delay, overdrive, EQ, and stereo flanging.

The DM Pro is a great-sounding module and a powerful MIDI interface with a host of useful features. The module has 15 Velocity curves to choose from, and can send and receive Control Change, Program Change, System Real-time, and SysEx data. The Modulation Matrix lets you assign modulation envelopes to alter the Pitch, Filter, and Amplitude of each sound (or Drum, as Alesis calls it). You can also modify the four settings of the Trigger Parameters for each envelope. As you customize your sounds, you can audition them from the front panel without using MIDI or triggers. However, you don't get Velocity control over sounds played from the front panel.

A feature sure to appeal to gigging percussionists is the Trigger Setup Select, which lets you save four user-defined trigger setups. Those are handy for the musicians who play in a variety of styles and situations and require different instrument setups for each.

Although the DM Pro has no internal sequencing or sampling capabilities, the module is bundled with Alesis's cross-platform *SoundBridge* software. *SoundBridge* lets you import sounds and sequences you created on your computer into the module. The files are sent to the DM Pro through MIDI SysEx and saved to the PC Card for future use.

Alesis also offers the DM5 ($499), a trigger-to-MIDI sound module that features 548 16-bit sounds and 12 trigger inputs, 4 of which accept dual-zone pads. The DM5's front panel looks similar to the DM Pro's but lacks the PC Card slot. This means backups must be done using SysEx. The DM5 also lacks many of the DM Pro's powerful features, such as the ability to edit filters and envelopes. In addition, the DM5 is unable to recognize Aftertouch and most Control Change messages. However, the DM5 costs half as much as the DM Pro, and its relative simplicity makes it useful for percussionists looking for an easy, inexpensive trigger-to-MIDI sound module.

Alternate Mode. Among the most popular percussion controllers are the various KAT instruments distributed by Alternate Mode. KAT controllers use force-sensing resistors (FSR) covered by gum rubber, providing a comfortable playing experience with sticks, mallets, or hands. In addition, the FSRs give the pads a uniform sensitivity throughout the surface area. Consequently, KAT controllers don't require percussionists to alter their technique much.

KAT controllers feature multiple footswitch and trigger inputs and often include a breath-controller input. None of the KAT instruments have data wheels, cursors, or knobs. Editing is done using footswitches and pads.

The malletKAT Pro resembles an acoustic mallet instrument and comes in two varieties: the malletKat Pro WS ("with sounds"; $2,645) comes with an internal sound generator; the standard malletKAT Pro ($1,875) is a MIDI controller only. Both malletKATs are four-foot long, three-octave instruments that can be extended to four and five octaves. The malletKAT is General MIDI compatible. Additionally, the 128 Factory Setups in both MalletKAT Pro controllers are General MIDI compatible. Many User Setups in the MalletKAT Pro WS are set up around the sound set of the internal Yamaha DB51 XG synth.

The padded bars are raised above the surface of the instrument, which makes them easy to strike. Unlike an acoustic mallet instrument, the bars of which become gradually smaller as the pitches get higher, the malletKAT's bars are the same size throughout.

The malletKAT features MIDI In, two MIDI Outs, three footswitch inputs(two for sustain and one for Edit mode), two control pedal inputs, and a dedicated breath-control input. The foot

MAINLY TRIGGERS

In the field of trigger devices, there are many options, whether you are looking for a complete trigger system or simply a single pad to enhance your current controller. The companies listed here make percussion triggers that can be used with most of the trigger-to-MIDI modules covered in this article. The products range from natural-feeling drumpads to simple contact pickups that attach to acoustic instruments.

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Drum Tech tel. (818) 886-1348; e-mail info@drumtech.com; Web www.drumtech.com
Hart Dynamics tel. (800) 769-5335; Web www.hartdynamics.com
K&K Sound Systems tel. (800) 867-6863 or (541) 888-3517; e-mail info@kksound.com; Web www.kksound.com
Pintech tel. (800) 445-0506 or (864) 288-1500; Web www.edrums.com
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controllers can be assigned their own MIDI controller numbers. Audio I/O on the malletKAT Pro WS includes two inputs, two outputs, and a headphone jack.

The malletKAT Pro can layer a maximum of three sounds and split the keyboard into two controllers. The split point can be set so that the end notes overlap. You can configure the controller to work like a traditional mallet-percussion instrument or as a keyboard controller. For example, in Dampen mode, notes are silenced by pressing softly into the bar. In Normal mode, the note is sustained by holding the mallet to the bar, the way you would sustain a note by holding down a key on a synth. In Aftertouch Mode, pressing on the bar sends MIDI Aftertouch messages. Once you know what you want the malletKAT to do, the rest of the work is in the programming.

Alternate mode also sells a mallet controller with real hardwood keys called the Xylosynth ($4,040 for three octaves; $4,995 for four octaves). Like the malletKAT's, the Xylosynth's bars are all the same size. In this case, they are 1¼ inches wide and 5¾ inches tall. Each bar and its trigger is mounted separately to the instrument's frame. Because the bars are a uniform size and are mounted independently, you can carry extra bars with you and swap out malfunctioning or broken ones.

The Xylosynth allows three keyboard splits per patch, but it is not multitimbral, so you cannot layer sounds. Alternate mode provides a collection of stereo samples in the E-mu EOS format that includes 23 instrument setups, among them vibraphones, xylophones, marimbas, orchestral percussion, and tuned effects.

All connections are made on the front of the control unit, which sits below the bars. The Xylosynth includes input jacks for a patch change pedal, and a sustain pedal, an XLR audio output jack, and a MIDI Out jack.

The Xylosynth has five performance modes. These include Roll mode, which increases the instrument's tracking speed; Damping mode, which lets you dampen a note by softly touching it with a mallet; and Quiet Mallet mode, which gives full Velocity even when the bars are struck lightly. The Xylosynth is made to order only, and additional performance options are available on request.

The four percussion controllers offered by Alternate mode are the dk-10 ($440), the drumKAT 3.8 ($945), the drumKAT Turbo 2000 ($1,212), and the trapKAT ($1,075). Although none of these instruments have internal sound modules, each ships with a collection of FactoryKits, which are predefined MIDI setups for use with General MIDI (GM) modules. UserKits for storing customized MIDI setups are also included.

The dk-10 and drumKATs have a layout of ten playing surfaces in a shape resembling a Mickey Mouse hat. However, the controllers are quite different from each other. The drumKAT gives you a wider range of MIDI, controller, and performance options than the less-expensive dk-10. For example, the drumKAT 3.8 has two MIDI inputs, four MIDI outputs set in pairs, nine independent trigger inputs and a CV input for hi-hat, four momentary-footswitch inputs, and a breath-control input. You can play eight-note layers per pad, step through user-assignable or randomized

FIG. 17: Alternate Mode's drumKAT Turbo 2000 has a ten-pad playing surface, a breath-controller input, and significant software upgrades over earlier versions of the drumKAT.

PERCUSSION CONTROLLER CONTACT INFO

Alesis Corporation tel. (800) 525-3747 or (310) 255-3400; e-mail info@alesis.com; Web www.alesis.com

Alternate Mode tel. (413) 594-5190; e-mail kat1993@aol.com; Web www.alternatemode.com

Clavia/Armadillo Enterprises (distributor) tel. (727) 519-9669; e-mail info@armadilloent.com; Web www.clavia.se

Nearfield Multimedia tel. (310) 518-4277; e-mail multimedia@nearfield.com; Web www.multimedia.nearfield.com

Roland Corporation U.S. tel. (323) 890-3700; Web www.rolandus.com

Yamaha Corporation of America tel. (714) 522-9011; e-mail info@yamaha.com; Web www.yamaha.com or www.yamahasynth.com

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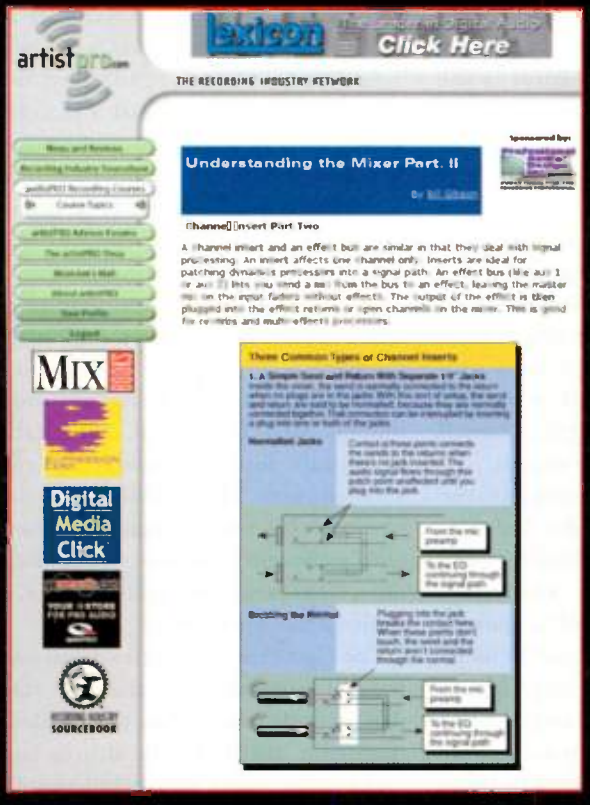

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note sequences with each pad in Alternate mode, and work with 32 MIDI channels. Each pad can be assigned individual settings for MIDI Note number and Channel, a Velocity curve, minimum and maximum Velocity values, and gate time.

The drumKAT Turbo 2000 is an upgraded version of the drumKAT 3.8 (see **Fig. 17**). Turbo 2000 has a faster processor, more ROM, and enhanced software. The controller allows you to program and play melodies of 128 notes using Alternate 128. Soundpath lets you assign volume and panning trajectories to a sound. Auto Play puts the Alternate mode feature under internal or external clock control. The Link feature lets you link three pads together so that one pad controls two additional pads. The Turbo 2000 can send Program Changes, Most-Significant Bit (MSB) and Least-Significant Bit (LSB) Bank Changes, and continuous controller messages.

By comparison, the dk-10 has fewer features and is designed for musicians who want a simple and inexpensive controller. The dk-10 has one MIDI In and one MIDI Out jack, two trigger inputs, two footswitch inputs, and one external controller input. The controller offers four velocity curves, and you get one note per pad.

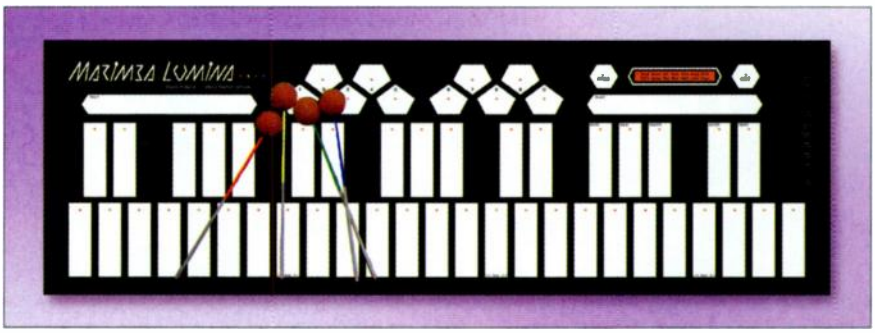

FIG. 19: The control surface of the Nearfield Multimedia Marimba Lumina features bars, pads, and strips that are played with four specially designed color-coded mallets.

Similar to the dk-10 in features but more extensive in pad layout is the trapKAT 3.0. It has 24 pads, one MIDI In, two MIDI Outs, four footswitch inputs, one trigger input, and a breath-controller input. The playing surface includes ten thin pads that line the sides and top of the instrument. In the FactoryKits, the side pads can be used to trigger preset groove sequences. However, you can assign your own sounds to all 24 pads and to the two trigger-pedal inputs using the UserKit selection, for a total of 26 sounds.

FIG. 18: The Cast Precision pads from Clavia's ddrum4 Electronic Drum System have XLR jacks. You will need to connect the pads to the drum brain using XLR-to-¼-inch cables.

Like the drumKATs, the trapKAT includes Alternate mode for playing user-defined note sequences, note layering of as many as four sounds, and Velocity switching. The trapKAT was designed to be compact and easy to use but to provide sounds equivalent to those of a well-stocked trap table.

Clavia. The ddrum4 Electronic Drum System ($3,595) from Clavia includes the ddrum4 sound module, five Cast Precision drum pads, two Cast Precision Cymbal pads, a Cast Precision Hi-hat trigger, cables, and a steel rack that holds everything but the hi-hat controller (see **Fig. 18**). The sound module is a 16-bit sample player that holds 8 MB of compressed samples, which the company says is equal to between 32 and 48 MB of uncompressed samples. Clavia reduces the size of the samples at a ratio of 8:1 using a proprietary compression scheme.

Additional sounds are loaded into the ddrum4 through MIDI SysEx. The samples can be in the ddrum format or MIDI Sample Dump Standard format. No memory expansion slots or storage cards are available for the ddrum4, which is unfortunate because Clavia's new Mega Drumkits multisamples require more storage space than other samples.

The ddrum4 module has six audio outputs, MIDI In and Out, and ten trigger inputs, four of which accept two-zone triggers. The module sends and receives MIDI, but in a limited fashion; it ignores System Common, System Real-time, Pitch Bend, and all but one (CC 4) Control Change message.

The Cast Precision–series drum pads have aluminum shells that use standard tunable tension lugs to hold down the drum heads. All the drums have eight strike zones, with a full Velocity range, for use with multisamples. Of the factory preset sounds, only the snare multisamples can take advantage of the eight strike zones. Clavia's Mega Drumkit sound sets contain multisamples that allow full use of all zones on the other drums.

Remarkably, ddrum4 owners have unlimited access to the Clavia sound library on its Web site. The free availability of complete online sound libraries is a major attraction to the ddrum4 system for many drummers.

Each of the ddrum4 trigger pads has an XLR output jack, except for the snare, which has two (one for the head and the other for the rim). The ddrum4 system includes enough XLR-to-¼-inch cables to hook all of your components up to the ddrum4 sound module.

The Cast Precision Cymbal and Hi-hat are both 10-inch multizone metal plates with rubber pads covering more than 75 percent of their surfaces. The rubber pads provide a nice rebound and are fairly quiet. The Cymbal and Hi-hat have three zones, which include the choke. You can play the bell zone by striking near the top of the padded area. To choke a cymbal, though, you must grab more of the cymbal pad than just the edge.

In addition to the pads, two types of triggers in the ddrum line feature transducers utilizing Clavia's patented Vectored Amplitude Measurements (VAM) technology. The Acoustic Triggers (five-piece kit $320; bass drum $75; snare $85; tom $65) clip on to standard drum hoops, and their own drum lug secures them in place. Acoustic Triggers are available for toms, kick drums, and snare drums. The Snare Trigger includes a second sensor that tracks rim shots. All the Acoustic Triggers have XLR jacks, so you will need a cable with a ¼-inch plug on the other end in order to interface with the ddrum4 sound module.

The Red Shot trigger (bass drum $35; snare and tom $27) uses the same sensor as the Acoustic Triggers, but is housed in a less-expensive clip. Also, the Red Shot snare sensor doesn't include the rim sensor. The Red Shot is attached to the drum by running one of the drum lugs through it before the lug goes through the rim into the lug casing. This makes it more difficult to add or remove the Red Shot, but once it's attached it's there to stay. These triggers have ¼-inch jacks.

Nearfield Multimedia. Although the Marimba Lumina ($2,995) resembles a mallet controller, its capabilities go far beyond traditional expectations (see **Fig. 19**). The Marimba Lumina is a GM compatible, multitimbral MIDI controller with 32-note polyphony and a built-in Yamaha DB51 XG synthesizer. The playing surface has 42 bars, 10 pads, and 2 strips. Programming func-

PERCUSSION TIP

Sometimes triggers can be set off by loose hardware connections or sympathetic vibrations from an instrument nearby, such as a cymbal. If false triggering occurs, adjust your percussion controller's sensitivity or triggering threshold.

If you use triggers on acoustic instruments, make sure they are well secured. Also, don't let the wire that runs from the trigger to the jack rest on the instrument, as that may also cause triggering problems.

tions are performed from the bars, pads, and strips. The Marimba Lumina has two audio outputs, a pedal input, two footswitch inputs, a trigger input, and MIDI In, Out, and Aux/Thru.

The traditional mallet player will find the Marimba Lumina challenging for several reasons. To begin with, it doesn't have raised pads. Instead, the bars, strips, and pads are printed on the controller surface. Furthermore, the Marimba Lumina requires special foam-covered mallets that are exceptionally lightweight and don't rebound off the instrument in the usual manner.

The Marimba Lumina ships with the four color-coded mallets, each containing tuned circuitry tracked by a radio antenna embedded in the bars, pads, and strips. The antennas identify and track the mallets, including their position on the controller surface. The mallets can be given independent functions. For example, each mallet can be assigned its own MIDI Channel and gestural properties. You can program the controller so that a particular mallet sustains a note when the mallet is held down on a bar, and you can assign vertical sliding motion on the bar to change filter settings. At the same time, another mallet can be programmed to play a different note for every downstroke and upstroke of the mallet.

Control options go beyond individual mallet choices. The vertical position of a mallet on the bar or the speed of the notes being played can be used to generate MIDI data. You can also specify key maps, pitch sequences, layers, and keyboard splits.

MIDI CONTROLLERS REVIEWED IN EM

Reviews	Issue
Alesis DM Pro	September 1999
Alesis DM5	September 1996
Alternate Mode drumKAT Turbo	July 1998
Alternate Mode trapKAT	September 1995
Blue Chip Axon NGC 77	October 1997
Nearfield Media Marimba Lumina	June 2000
Roland HPD-15 Handsonic	April 2001
Softwind Synthophone	December 1988
Yamaha WX5 MIDI Wind Controller	June 1999

Ride. Without the expansion board, the CY-15R has a two-trigger response.

The CY-15R includes two TRS outputs. When used with the TDW-1 expansion board, the TD-10 lets you assign each of the three cymbal sounds to the CY-15R. The other V-Cymbals, the CY-12H hi-hat and CY-14C crash cymbal, are two-way triggers. All the V-Cymbals let you choke off the sound by grabbing the edge of the pad.

The V-Cymbals are made of heavy rubber and shaped like real cymbals. The material and density feel more realistic than those of other cymbal pads on the market. Although there is an obvious difference between hitting a rubber disk and a metal disk, the way the V-Cymbals behave when struck mimics a real cymbal quite well. The bell of the CY-15R, in particular, has a nice feel.

The next system in the line is the V-Concert set ($4,995). The V-Concert Set comes with the TD-10, but without the TDW-1 expansion board. The shells of the V-Concert pads are purple.

Both drum-set systems include redesigned clamps and T-fittings that let you move the instruments without taking the entire support structure apart. The fittings use standard drum lugs to hold the hardware together, so a drum key can be used for most adjustments. The ribbed aluminum stands on the V-Session allow the new hardware to attach firmly. The V-Concert set comes with powder-coated steel stands that seem a bit more rugged and may withstand the wear of a tour better than the aluminum stands.

The TD-8 V-Drums Percussion Sound Module ($995) is also multitimbral, GM compatible, and offers many of the same features as the TD-10, such as COSM-modeled, V-editable drums. The sequencer includes over 700 sequenced patterns—more than the TD-10—with backing tracks. In addition, the TD-8 has more nonpercussion instruments than the TD-10, including guitars, basses, and keyboards. However, the TD-8 has only four individual outputs, a shorter selection of V-editable instruments, and fewer editing options. The TD-8 includes five dual-zone and five single-zone trigger inputs, a hi-hat input, and a footswitch jack.

The V-Custom Set ($3,295) comes with the TD-8, five V-Series drum pads, two cymbal pads, a hi-hat pad, the FD-7 hi-hat controller, and the rack. The V-Studio Set ($2,595) combines the TD-8 with Roland's rubberized PD-series pads.

Roland's line of percussion controllers with internal sounds includes the SPD-20 ($895), the SPD-6 ($295), and the HPD-15 HandSonic controller ($1,295). The playing surface of the HPD-15 features a 15-segment pad, two ribbon controllers, and a D-Beam controller. This instrument is designed primarily for use with hands and soft mallets. Roland recommends against using sticks as they may damage the triggering surface.

The HPD-15 comes with 600 pad-controlled percussion sounds, 54 backing instruments, reverb, multi-effects, and a 4-track pattern sequencer. It offers 160 preset patches and 80 user patches, and it has jacks for a dual footswitch, an expression pedal, a dual trigger, and MIDI In and Out/Thru. (The Out/Thru is more like a MIDI Out/Merge.) Each pad and control surface can be assigned a MIDI note, and the ribbons and D-Beam can send continuous controller data. However, the MIDI information is sent on only one channel.

Roland tweaked the HPD-15 to appeal to hand-drummers. Many of the patches are programmed to respond like the real instruments. For example, you can dampen many instruments by touching the pad with your hand, just as you would the real hand drum.

The SPD-20 has eight Velocity-sensitive pads, an internal sound module, and a multi-effects processor. Besides MIDI In, Out, and Thru, the SPD-20 includes four dual-zone trigger inputs for use with Roland PD-, FD-, and KD-series pads or acoustic drum triggers. The controller can be played with sticks or hands, and

FIG. 21: Yamaha's DTXtreme electronic drum-set system combines a GM-compatible multitimbral drum module with a selection of Real Head Pads.

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there is a sensitivity-scaling option for both. Each pad on the SPD-20 can have its own MIDI channel, and you can layer two sounds per pad.

The newest percussion pad in the line is the SPD-6, a simplified controller with six velocity sensitive pads. The SPD-6 has MIDI Out, includes two pedal inputs, and can be powered by six AA batteries. It includes a sensitivity button for setting the instrument to respond to hands or sticks.

The SPD-6 comes with 113 sounds, 16 preset patches, and 16 user-definable patches, and you can layer two instruments per pad. The trade-off is that the SPD-6 doesn't have a numerical display and can send on only one MIDI channel at a time. But at its price point, the SPD-6 is perfect for musicians who need an inexpensive and basic MIDI percussion instrument.

Yamaha. Yamaha's top-of-the-line percussion module is the DTXtreme ($1,295). This multitimbral module has 64-note polyphony, is GM compatible, and comes with 1,757 sounds, 90 preset drum kits, and 40 user-definable drum kits. The built-in 2-track sequencer holds 164 preset Songs and 32 user-definable songs. The DTXtreme accepts a Smart Media Card that can hold additional sequences in Standard MIDI File (SMF) format or audio files in AIFF. An additional 99 drum kits can be stored on each card.

DTXtreme lets you stack six notes per pad. You can also assign a sequence of as many as nine notes per pad. Each time you strike a pad with an assigned sequence, the next note in the sequence plays. The module can even send nine Program Change messages at a time.

The top panel has tape machine–style transport buttons for controlling the sequencer and ten volume sliders, one for each percussion-instrument group (for example, one slider covers all cymbals), headphone, click, accompaniment and reverb send, and main output. Five rotary controls are included for dialing in parameter changes.

Rear-panel I/O includes inputs for eight dual-trigger and eight single-trigger pads. There are eight audio outputs (a stereo pair and six individual outputs), a footswitch input, and MIDI In, Out, and Thru jacks. The To Host port lets you connect the DTXtreme directly to the serial port of a Mac or PC. This allows the DTXtreme to exchange MIDI data with your computer while the MIDI jacks are used with other MIDI instruments. A stereo audio input is also included, so you can play along with your favorite recordings.

The DTXtreme gives you control over volume, tuning, effects, stereo position, layering, filter, and EQ settings for most of the samples. The snare drums include a modeling-style editing architecture, with parameters such as shell type, snare quality, muffling, and strainer tension.

The DTXtreme is available in a five-drum (DSXT10: $4,300) or six-drum setup (DSXT11; $4,600; see **Fig. 21**). The additional drum on the DSXT11 is an 8-inch tom with the mounting bracket. The kits include Yamaha's new Real Head Pads (RHP), cymbal and hi-hat pads, rack, clamps, and the necessary cables.

The RHPs feature a drum head attached to a 3-inch deep, seven-ply birch and mahogany shell with a rubber-coated rim. (The one exception is the KP120 Kick Pad, which has a metal rim.) The RHP line includes the RHP120SD 12-inch snare pad; the RHP80 8-inch, RHP100 10-inch, and RHP120 12-inch tom pads; and the KP120 12-inch bass drum pad.

The PCY80S cymbal pads that come with the DTXtreme sets are triangular but have a raised edge that is easy to grasp. They can trigger three independent sounds or two sounds that can be choked. The DXTreme set also includes the PCY10 Cymbal Bell Pad, which gives a realistic bell-like object to hit.

The RHPs are comfortable to play and have a natural feel. The raised rubber rims are easy to strike, and it's very easy to trigger two notes by striking the rim and head together. The raised edge of the rubberized cymbals is an easy target; however, it is just as easy to hit it by accident when you play a ride pattern in the middle of the pad.

A less-expensive alternative in the Yamaha line is the DTExpress kit ($1,295). The module is multitimbral, lets you layer five notes per pad, and comes with a 2-track sequencer. The DTExpress module accepts eight dual-zone inputs and two single-zone inputs.

The DTExpress package includes five TP60 single-zone 8-inch pads, a KP60 kick pad, one HH60 hi-hat controller, and two PCY60 cymbal pads. A mounting rack and cables are also included. The pads in this kit resemble practice pads. However, their rubberized surface keeps them quiet, so they work well in situations where live mics are in the room.

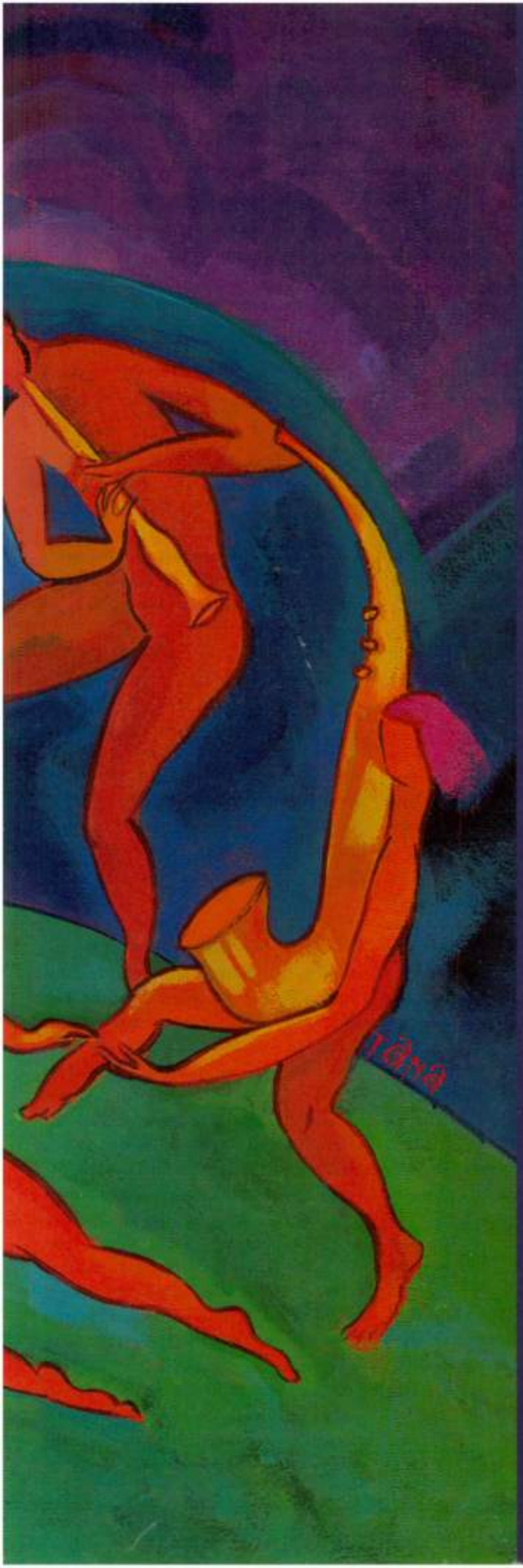
LAST SIGNIFICANT BIT

Percussionists often want a controller that gives them a realistic playing experience. Nonpercussionists, on the other hand, aren't as burdened by this desire, and they may find that any controller works for them as long it has the right sound and control features.

Whether you want complete MIDI functionality or simply to fire off drum samples, there's a percussion controller that will work for you. The more you know about your particular needs, the more informed your purchase will be and the more you will enjoy playing your instrument.

When not exploring polystyrene control interfaces, **Gino Robair** *is an associate editor at* **EM**. *Special thanks to Larry the O.*


Illustration by Tana Powell



MIXING in the Round

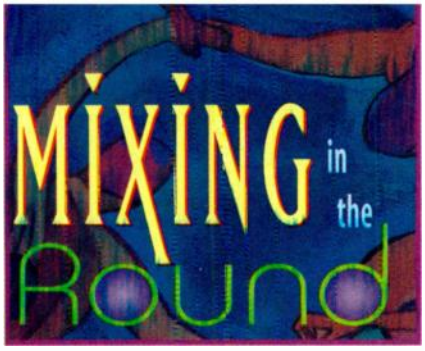
By Mike Sokol

Wouldn't you know it? Just when recording engineers have mixing in stereo down cold, 5.1-channel surround sound comes along. Of course, movie soundtracks have been using surround sound for years, but the basic formula is pretty straightforward: dialog in the center, music in the front left and right, suround effects in the rear, low-frequency effects (explosions, earthquakes, and so forth) in the subwoofer.

Now audio-only music recordings are being mixed in 5.1 surround, and the old rules have been thrown out the window. Where do you place the listener with respect to the performer—in the "audience" or in the midst of the ensemble? With five main channels surrounding the listening position, the number of mixing decisions has increased substantially compared with stereo, and engineers are only starting to comprehend the enormity of the task.

I like to think of 5.1 surround mixing as similar to using different camera angles for shooting a movie. Sometimes up close and personal is the right approach, but other situations call for a wide panoramic shot. In any event, you need to understand surround-mixing technology before you jump in head first; if you are unfamiliar with this technology, see "You're Surrounded" in the October 2000 issue of EM.

A wealth of choices can be a blessing and a curse.



SOUND FIELD OF DREAMS

Consider a typical stereo sound system with two speakers placed in front of a listener centered between them. The space between the speakers is called the *stereo sound field*, and individual sounds in a mix can be placed at any location within this space. Two basic principles of psychoacoustics let engineers do this: *relative level* and *interear time delay*.

Relative level is the way in which a sound's volume at each ear helps determine its source's location. In a stereo mix, each input channel's pan pot determines the relative level of the corresponding signal in the right and left speakers, and the main fader controls the signal's overall level (see **Fig. 1**). If the pan pot is centered, the signal's level is equal in both speakers, and the listener's brain is fooled into believing that the sound is coming from the point halfway between them. It's as though there were another speaker at that location; in fact, this virtual speaker is often called a *phantom center*. If you move the pan pot to the left, the signal's level is greater in the left speaker, and the apparent sound source moves to the left of center. Move the pan pot to the right, and the apparent sound source shifts to the right because that sound's level is greater in the right speaker.

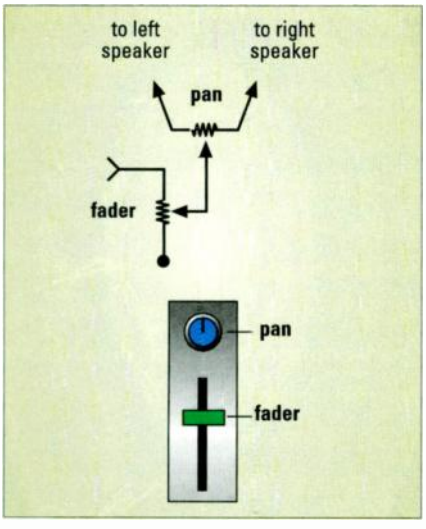


FIG. 1: In a stereo mixer, each input has a main fader, which controls the input-signal level, and a pan pot, which controls the relative level of the signal in the right and left outputs.

The other psychoacoustic principle, interear time delay, helps you localize a sound source according to the difference between the instants at which a sound arrives at each ear. For example, if a sound source is to your left, the sound arrives at the left ear before it arrives at the right.

This principle is best simulated in a stereo recording by using a pair of microphones to pick up an entire ensemble, rather than combining multiple tracks through a mixer (see **Fig. 2**). If the microphones are placed too far apart, you lose the interear effect. An *Office de Radiodiffusion-Television Française* (ORTF) configuration works quite well: simply place two cardioid mics at an angle of about 110 degrees with the capsules roughly seven inches apart (the average ear-to-ear distance on a human head).

With this technique, what you hear is what you get. You can adjust each instrument's volume by moving the musicians nearer to or farther from the mics, and you can change each instrument's stereo placement by moving the musicians to the left or right in front of the mics.

Unfortunately, listening to such a recording's playback on speakers can result in *speaker crosstalk*, which occurs when the left speaker's sound reaches the right ear and vice versa. This can obscure the interear effect in the recording, but separating the mics by 10 to 12 inches reduces the problem. Listening on headphones eliminates the problem altogether.

This procedure has been employed on some of the finest orchestral and acoustic recordings. It's more difficult to do it well because you must think about the mix from the very beginning of the recording, and many engineers and musicians don't want to give up the luxury of fixing it in the mix with punch-ins and pitch correctors. That's a pity; this technique can make a beautiful stereo sound field that simply can't be duplicated with separate tracks and pan pots. All you need to record in this manner is a nice pair of microphones, a great room, and a stereo recorder.

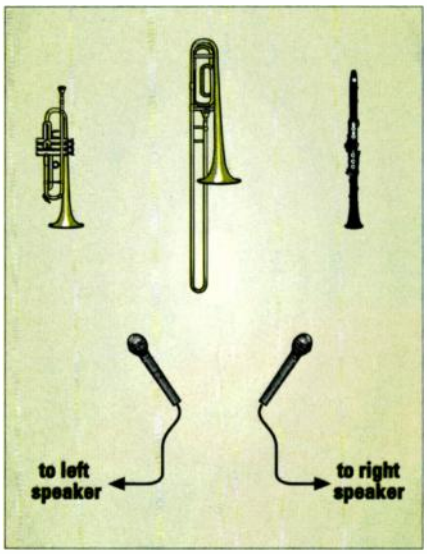


FIG. 2: Recording an ensemble with a stereo pair of microphones preserves the interear time delay, which helps localize instruments in the group.

GOING SURROUND

The same two principles can be applied to 5.1-channel surround recordings, which are played back with a surround-speaker system that includes front left, center, and right speakers; left and right surround speakers; and one or more subwoofers, all arrayed around the listening position. You can start with a multitrack master and send all the tracks through a surround mixer. But instead of a simple right-left pan pot, each input channel includes a surround-panning control, which functions like a joystick (see **Fig. 3**). Such a mixer might be a hardware device, or it might be implemented in software that runs with a multitrack digital-audio program.

If you want an instrument or voice to sound as though it's coming from a particular speaker, simply grab the panning control and pan the sound to that

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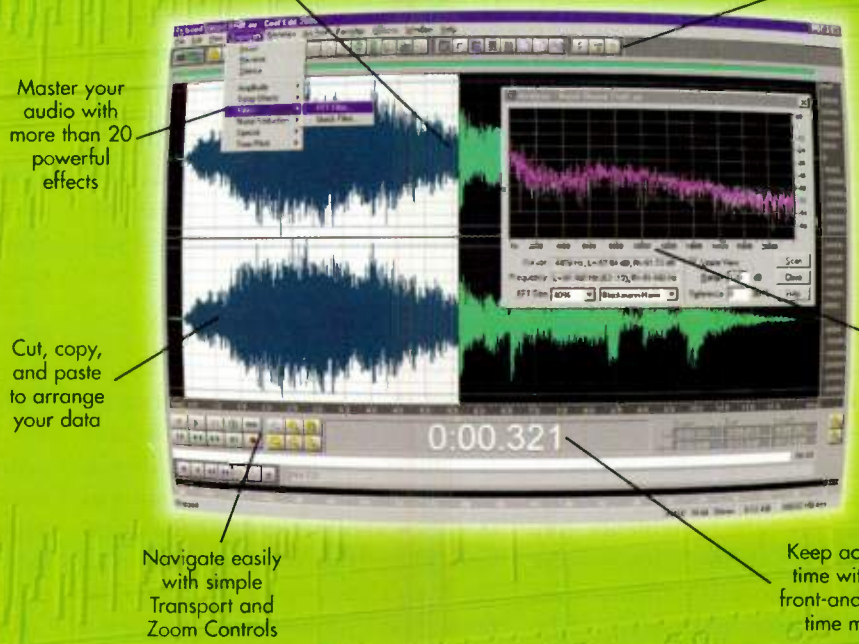

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speaker. What's more, you can adjust each track's apparent location anywhere between the speakers by moving the panning control to any available position. For instance, you can spread the drum kit across the three front speakers and place the guitar anywhere you like in the front or back. It's just like stereo mixing, but now you can decide whether you want to place the listener in front of the band, in the middle of the stage, or in some other strange place.

You can also record ensembles with a surround-microphone array, which is just an extension of a stereo array. However, you have to choose where to place the instruments in the surround sound field, which determines the listener's perspective. For example, you can position the ensemble in front of the array, using the rear microphones to pick up the room's ambience (see **Fig. 4a**), which puts the listener at the conductor's position. Alternatively, you can place the array in the center of the ensemble, thereby putting the listener within the group (see **Fig. 4b**). In either case, the sound field in the surround speakers is particularly effective because these speakers are frequently positioned to the sides of and just behind the listener, sort of like oversize headphones.

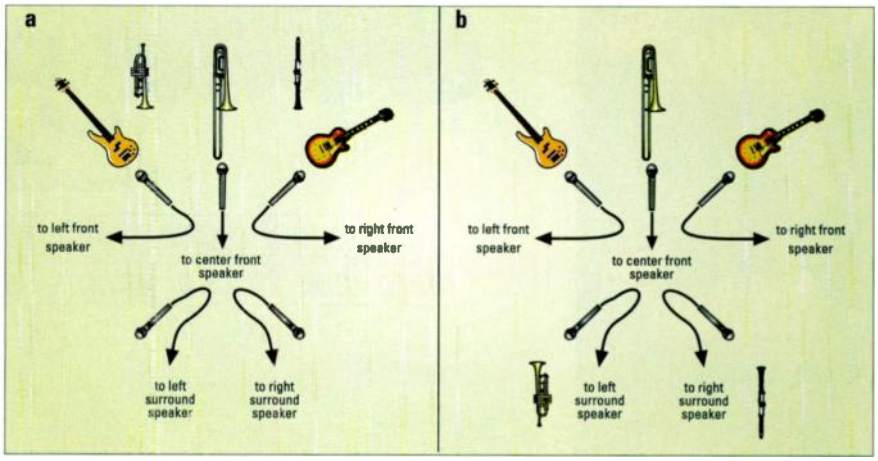


FIG. 4: Placing a surround-microphone array in front of an ensemble provides the listener with a perspective from the conductor's position (a). Placing the array in the middle of the ensemble puts the listener amid the band (b).

OFF CENTER

All 5.1-channel surround systems include a physical center-channel speaker that offers yet another choice: do you put the center-channel information in the physical center speaker, the phantom center (that is, equal volumes in the front right and left speakers), or both? Many joystick panners have a width or focus control that determines the proportion of a track that is routed to the physical center and phantom center (see **Fig. 5**). For instance, you can set a joystick panner so that a center pan puts the track exclusively into the physical center speaker, equally in the left and right speakers, or a combination of both in any degree.

Here is a center-channel goof that even some famous engineers have made: if you place the dry lead vocal in only the center speaker and pan the return reverb from that track to the left and right speakers, you have a potentially embarrassing situation. If a consumer turns on only the center speaker and thus solos the lead vocalist without reverb or delay support, it can sound pretty bad. This can even happen if the listener stands next to the center speaker.

Few singers sound great perfectly dry (without reverb or delay), and there's the potential to hear all sorts of sniffs, grunts, and other lip noises, which are not flattering. That's why anything panned to the center speaker should have a small amount of reverb and delay. It doesn't need to be as heavy as the returns to the left and right speakers, but it should be there nonetheless.

Furthermore, it's generally a bad idea to put your lead vocalist exclusively in the center speaker. Some home-theater playback systems rely on the television's speaker to serve as the center-channel speaker, but I wouldn't want my vocals to be piped through that little thing. Also, some people forget to turn the TV on when listening to music, and others do not have a center speaker. As a result, I like to pan some of the vocals to the left and right phantom center, with the majority of sound going to the physical center speaker with its own reverb and processing.

Why bother to use the center speaker at all? Some great engineers, such as Al Schmitt and Alan Parsons, simply don't use the center speaker on some of their projects, effectively making a quad mix. I don't agree with that philosophy, and I think they're missing a mixing opportunity. If you use the

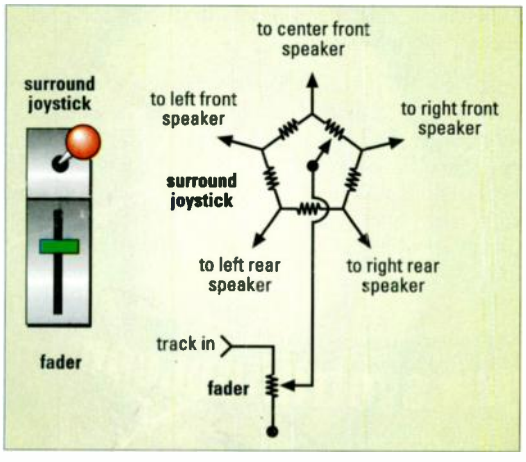
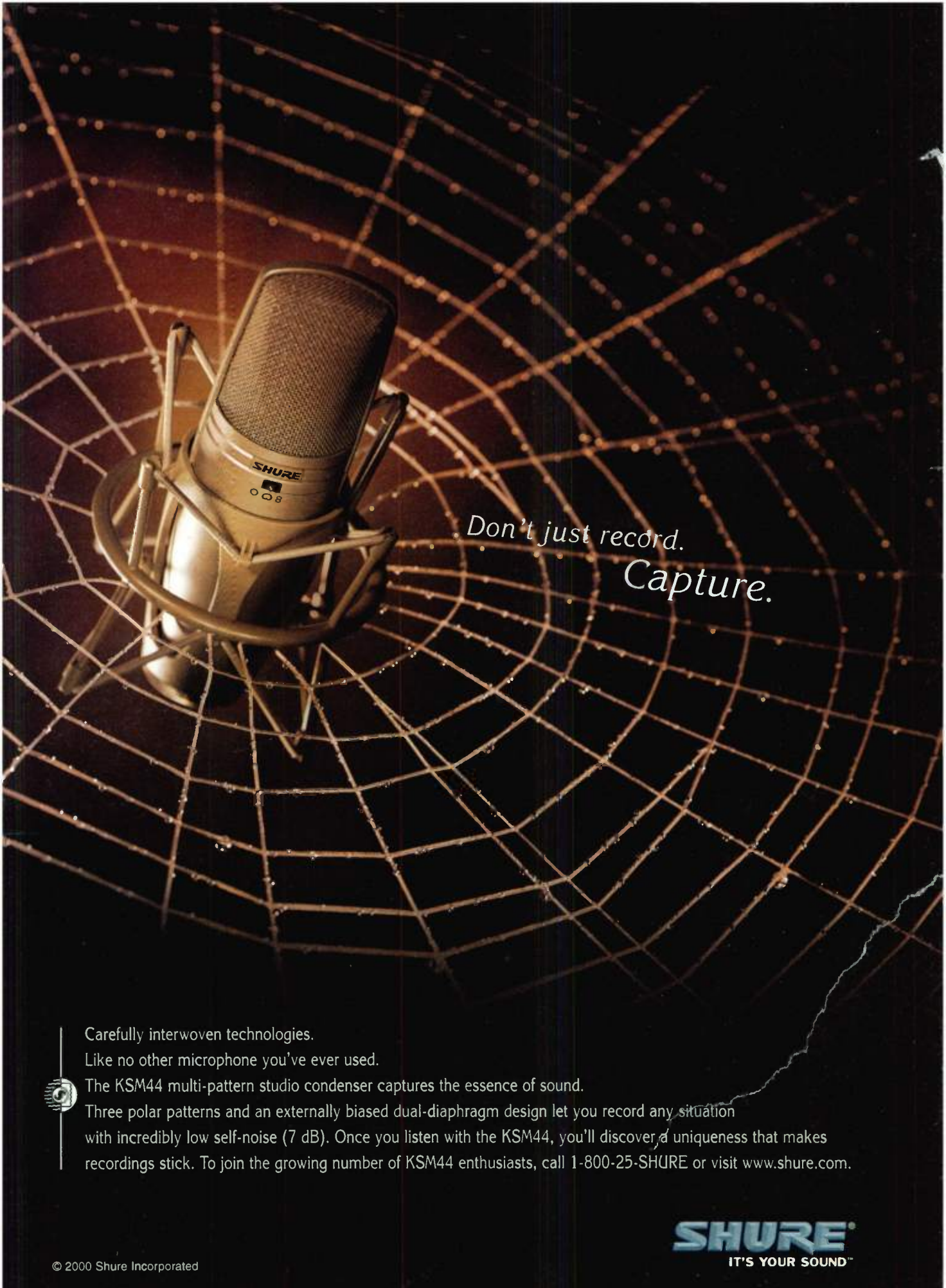


FIG. 3: In a surround mixer, each input includes a main fader and a surround panner that controls the relative level of the input signal in the five main outputs.



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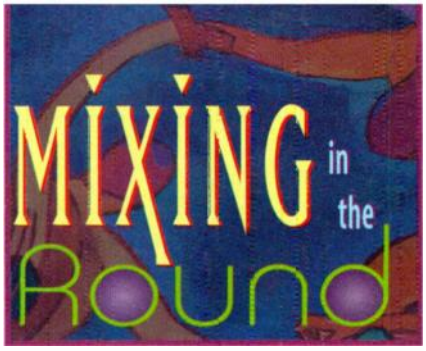

center speaker properly, you can widen the front sound field for more of the listening audience you find in a typical living room.

For instance, with a pair of front speakers, there is a very narrow sweet spot in which the stereo sound field is correct. Move a few feet to the left or right, and the image collapses to that side. A center speaker adds focus to the stereo image in the front, effectively widening the sweet spot so that everyone can hear the vocals (or whatever musical element you put there) coming from the center. The stereo sweet spot with a phantom center can never be as wide.

In addition, I have done various surround mixes during which I treated the left-to-center pair as one stereo mix and the center-to-right pair as yet another. That configuration works great with two percussionists, such as a conga player on one side of the stage and a regular drum kit on the other side. Pan the congas between the left front and the true center speaker, and the drum kit between the true center and the right front speaker. Remember that I'm talking about a virtual mixing stage; it has nothing to do with the original positions in the studio. If you have the properly isolated instruments on separate tracks, you can build your own surround stage with the joystick panning controls.

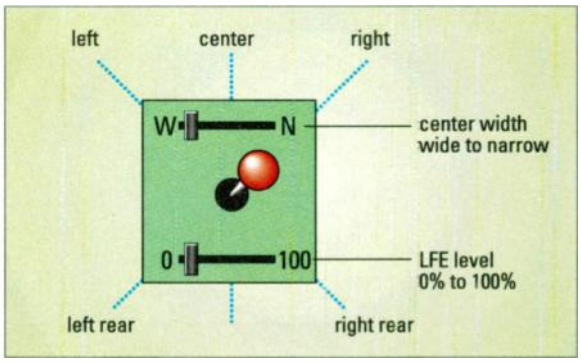

FIG. 5: The panner often contains a center-width control, which regulates how much of a center-panned signal goes to the physical center speaker (N) and how much is sent to the phantom center (W).

THE BIG BAD LFE

The low-frequency effects or LFE channel (the *.1* in 5.1) is the most controversial part of surround mixing, and it certainly offers the greatest potential for screwing up the mix. Its bandwidth is specified as 5 to 120 Hz. But do you need to put anything in it at all? If you choose to put some bass sound in it,

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do you exclude that information from the main or surround speakers? These are all good questions, some of which have not been thought out by some big-money mixing engineers.

First of all, you don't really want to use the entire top end of the range all the way to 120 Hz. A brickwall filter at 120 Hz with a 48 dB/octave slope is applied to the LFE track when it's encoded as DTS or Dolby Digital. That filter sounds pretty bad, so it's better to insert your own 24 dB/octave filter at 80 Hz or even 60 Hz.

In addition, don't remove the bass from the other tracks and place it in the LFE channel exclusively. If the listener chooses to listen to your surround music in stereo (a process called *downmixing* that is performed in the receiver or surround processor), the LFE track is thrown out. If you take all bass below 80 Hz from the kick drum or bass guitar and place it only in the LFE track, that information will disappear if your listeners choose to downmix.

For music mixing, you never really have to put anything in the LFE channel. All home-theater systems employ a process called *bass management*, in which any low-frequency information is redirected to the subwoofer by filters in the receiver or surround decoder. It is better to save the LFE track for truly bottom-heavy things, such as the cannon shots in the *1812 Overture* or an octave-down synth bass that goes down to 18 Hz. That's how the LFE channel is supposed to be used.

Nevertheless, LFE bass is like a drug, and most mixing engineers can't stop tweaking up the LFE channel to make the mix really thump. The LFE channel has 10 dB more headroom than the other five full-range channels, but that doesn't mean home listeners have 10 dB more power reserve for their subwoofers. Most home subwoofers are seriously underpowered and will run out of bass headroom long before the five full-range channels top out.

TREATMENTS

As mentioned previously, in stereo you can only pan each track left to right in front of the listener's ears. But in 5.1 surround, you can pan left to right and front to rear, thus creating a whole new array of audience positions. This enables you to make the band sound as though it is in front of the listener (with audience around it and slap echo coming off the back wall, as in a concert), or you can position the listener in the middle of the group or any combination thereof. You also can make the room spin around the listener's

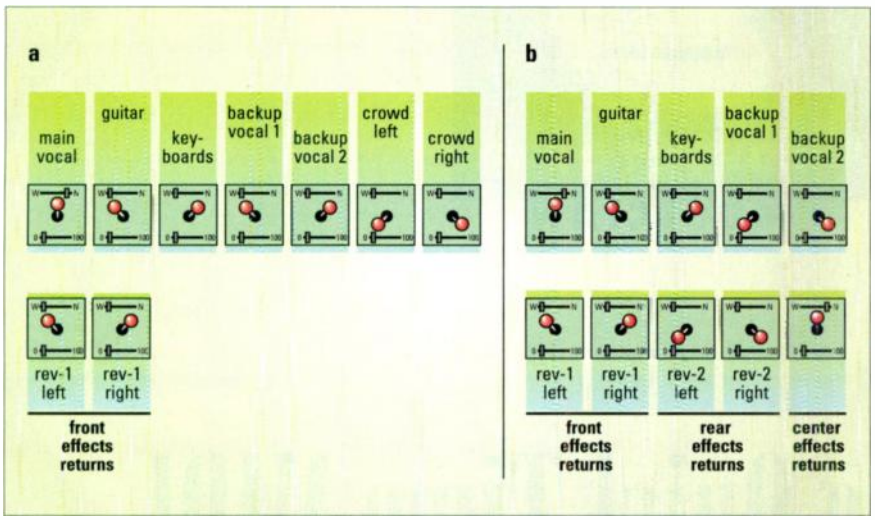

FIG. 6: In the first mix (a), the lead vocal is panned to the center speaker and the rest of the primary parts are panned to the front left and right speakers along with the reverb. The audience and room sounds are panned to the rear speakers. In the second mix (b), the backup vocals are panned to the rear speakers along with some lead-vocal reverb.

head, put sound effects in the rear speakers for realistic acoustic segues, and place your backup singers in the rear of the room. The possibilities are endless.

Here are a couple of examples of different treatments for the same basic tracks. In the mix depicted in **Fig. 6a**, I panned the lead vocal to the center speaker, the guitar to the left front speaker, the keyboards to the right front speaker, and the stereo crowd mics to the rear speakers. I also put the backup vocals in the left and right front speakers. This setup gives a real room sound to the mix because the crowd mics pick up the slapback echo off the rear wall and add room ambience. Reverb and vocal echo are returned to the front speakers, as in a traditional stereo mix.

In **Fig. 6b**, I panned the backup vocals to the left and right rear speakers and then added some delay and reverb to the center lead vocalist that is returned to the rear speakers by its own surround joystick. This makes the listeners feel as though they're positioned in the middle of the band. A second stereo reverb processor can be used on the same vocalist and returned to the left and right front speakers.

That's the primary reason you need multiple reverb and delay processors for surround mixing. You really don't need to pay $5,000 to $25,000 for the latest surround reverb processor from Sony, Eventide, or TC Electronic (as fabulous as their reverbs certainly are). Indeed, you can create great surround mixes with just two or three stereo reverbs and delays. One reverb is returned to the front right and left speakers, a second reverb is returned to the rear left and right speakers, and a third reverb can be returned to the center speaker.

Surround sound is becoming more and more important for music as well as movie soundtracks, and it behooves engineers at all skill levels to begin exploring this vast new frontier. Hopefully, the information I have presented here will help you to develop your surround-mixing skills to the point that groups will start beating a path to your studio. But until that time, practice the techniques I mentioned and try out your own ideas, which will undoubtedly lead you in some interesting directions.

Mike Sokol *is a live-sound and recording engineer with 30 years of experience on both sides of the console. He conducts free surround-mixing seminars at recording schools; see www.modernrecording.com for tour dates.*

DESKTOP MUSICIAN

Customizing QuickTime MIDI

Working with custom instruments in the QuickTime synthesizer.

By Peter Drescher

In 1991, after finishing my last tour with bluesman Joe Louis Walker and the BossTalkers, I sent résumés to every music-software developer I could find, hoping to get into a new line of work. Steve Hales had the foresight and generosity to offer this burned-out road dog and blues-piano player a job as studio director of his new company, Halestorm.

While at Halestorm, I provided content for SoundMusicSys, a software sample-playback synthesizer developed by Hales and his partner Jim Nitchals. They formed Halestorm to license the SoundMusicSys technology to game developers and other creators of multimedia products, and business was brisk. In fact, seed money to get the company growing came from the first big licensee, Apple Computer.

BEN FISHMAN

The idea behind SoundMusicSys was simple: use MIDI data to fire off instrument samples at the correct times and pitches. The files could be small, the code would be efficient, and the resulting music would sound as intended on any computer. Apple wanted to incorporate the technology into its QuickTime system extension to render Standard MIDI Files, and it licensed a GM sample library from Roland Corporation to provide the instrument sounds. Apple released its version of the software synthesizer, QuickTime Music Architecture (QTMA), in 1995. (To find out more about the SoundMusicSys family tree, see the sidebar "A Rose by Any Other Name.")

QTMA has continued to evolve. With a bigger, better sample library and a host of new features and audio-compression algorithms, PCs and Macs can playback Standard MIDI Files with

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an audio quality rivaling that of hardware sound cards. Of course, QuickTime also has the added advantage of providing soundtracks that are locked to picture. That is a common requirement in the film and TV worlds, but it is often difficult to manage in the chaotic multimedia environment.

HIDDEN TREASURE

The greatest strength of QTMA's software synthesizer is that it can create custom instruments. General MIDI (GM) is, by definition, a finite palette of sounds, and multimedia musicians typically prefer to be limited only by their imaginations and engineering skills. With QTMA, however, you can include your own samples and trigger them at the appropriate times and pitches, which lets you write for instruments outside the GM specification. Vocals, guitar solos, drum loops, horn-section riffs, explosions, bird calls—whatever kind of audio you want—can be bundled with the MIDI data and transmitted over the Internet.

This feature has been hidden in QTMA for a long time, but the latest version of *QuickTime Player Pro* (4.1.2 as of this writing) provides access to the Instrument parameters. I put together a QuickTime movie that consisted of a Standard MIDI File enhanced with custom samples. Putting all the pieces together was a little tricky; it required careful planning and a lot of trial and error.

PUZZLE PIECES

I began with a Pro Tools session (mainly drum loops and horn riffs) created by house-music producers Agent K and Division 6. Next I cut up the digital-audio tracks into short sections starting on the beat. I converted the audio into 16-bit, 22 kHz System 7 format sounds with *SoundApp*, a versatile audio-conversion utility. That produced a series of small SFIL Mac files with the audio data stored in an SND resource. The Mac OS can play this native format when you simply double-click on the audio file's icon, so it's easily recognized and imported by QuickTime.

I then created a Standard MIDI File containing one track for each sample, with a middle-C trigger note at each place I wanted the sample to play. For example, the "beat1" sample is one bar long starting on the first beat, so I placed a C3 whole note in each bar, starting at bar 10, to keep the beat in sync (see **Fig. 1**). Other tracks played the additional beats or fired off the vocal and horn riffs at the correct times. I also included the GM piano, organ, and percussion tracks from the original Pro Tools session.

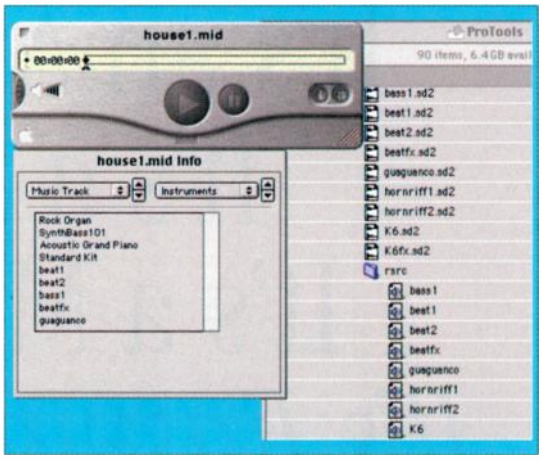


FIG. 2: System 7 sounds get dropped onto the Music Track dialog box to create custom Instruments.

I imported the MIDI file into *QuickTime Player Pro* and saved it as a movie (MOV) file. (You can purchase *QuickTime Player Pro* for $29.99 at www.apple.com/quicktime.) When I selected the Get Info command from the Movie menu, a dialog box appeared, offering access to the Music Track section and its associated Instruments list. The tracks I laid out in my sequencer were displayed in the same order, so I knew which tracks went with which samples. I then dragged and dropped the appropriate System 7 files onto the correct tracks and hit Play (see **Fig. 2**). Voilà! (You can download the results at www.twittering.com/K6.)

LOCK, STOCK, AND BARREL

The Instruments list also provides access to the full range of Roland's GS sound set. This GM specification extension contains lots of great sounds, including nine drum kits, myriad synths, sound effects, and ethnic percussion, as well as some nice variations on the more standard instruments. I chose the patch for the MIDI bass line by double-clicking on the track

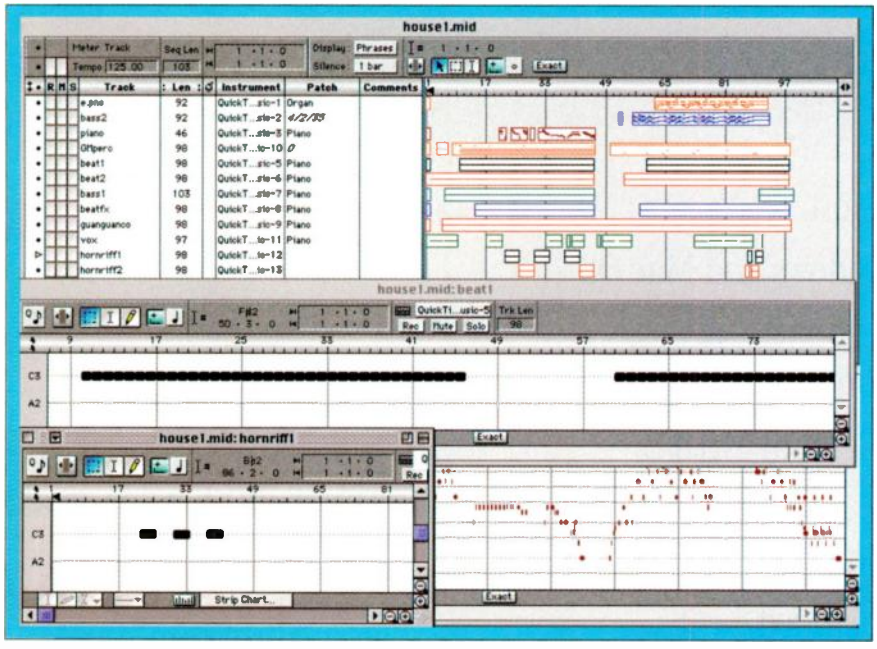
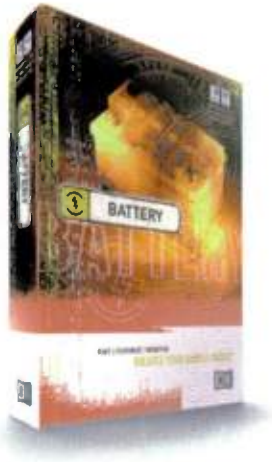


FIG. 1: This sequence combines General MIDI data in the first four tracks with notes for triggering QTMA samples.



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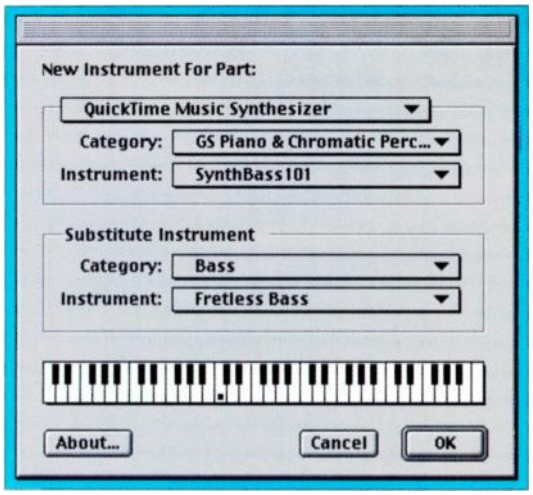


FIG. 3: You can take advantage of an extensive range of sounds in the Roland GS instrument library.

and selecting Synth101 from the GS Piano and Chromatic Percussion category (see **Fig. 3**). You can also audition instrument sounds on the little piano keyboard at the bottom of the dialog box.

When you drop a sample onto a track, *QuickTime Player Pro* automatically creates an Instrument definition consisting of preset envelope, LFO, and effects data. The default volume envelope has a fast decay, which is unfortunate if you just want to fire off your sample. The sound fades to silence quickly, so I had to open the envelope editor by Option–double-clicking on the track name.

That caused a new Edit button to appear on the New Instrument for Part dialog box, which provided access to a basic set of Instrument parameters (see **Fig. 4**). I put the screen into expert mode by clicking on the lock icon; then I opened the Volume parameters (see **Fig. 5**). There, I found the culprit. The Sustain Level was set to 50 percent, and the Sustain Time was set to 5,000 ms. This meant that the sound would fade to half volume within five seconds. Well, I didn't want my sound to fade, so I set the Sustain Level to 100 percent and checked the Infinite Sustain box. I also used the Overall Volume slider to adjust the instruments' mix levels.

Expert mode offers a large number of parameters to play with, and many can radically alter an instrument's behavior and sound. For example, resetting the default Release Time to the maximum value effectively creates an instrument that plays the entire sample regardless of the triggering MIDI note's length. This is good for percussion, but don't use it on a looped sample—the loop will never stop playing.

Other parameters create a wide range of effects. The Pitch and Volume LFO parameters can be set to add delayed vibrato to a flute or tremolo to an electric piano. You can set stereo placement defaults, play around with the filter effects, or transpose the instrument to a different key. You can also modify the instruments' settings from the Roland GS bank to create wild new sounds.

TRY, TRY AGAIN

After I loaded my samples and set the envelopes, I simply played the movie to hear the MIDI file with the triggered samples. Of course, I didn't get it right on the first try; some samples were out of place, the bass wasn't loud enough, the hi-hat was too loud, and so forth. All I had to do was modify the MIDI data and reimport the file.

QuickTime Player Pro's editing limitations, however, made this process tedious: I had to reload the samples and reset the envelopes each time I imported a new version of the MIDI file. When I finally mixed everything correctly, I selected the Save As Self-Contained Movie command, which compacted the file to about 1.6 MB. That was a bit larger than I hoped it would be, so I downsampled the sound files to 8-bit, 22 kHz, which is the resolution the Roland sound set uses. After importing the audio and resetting the envelopes for the umpteenth time, I ended up with a file size of 770 KB for my three-minute song.

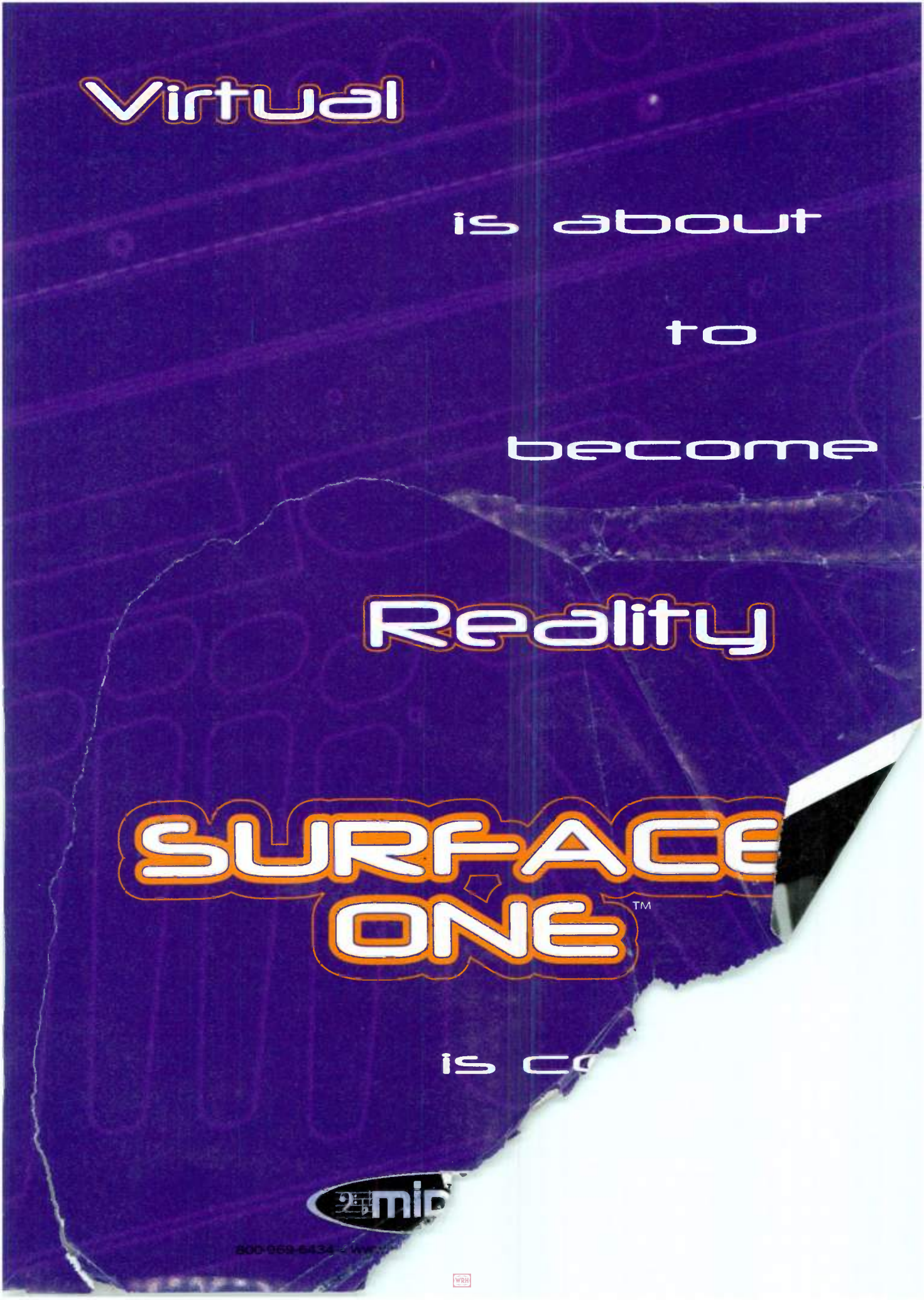
Whereas creating an entire song this way pushes the technology's limits—and my patience—a simpler approach can also prove to be quite effective. Say you want to use your own kick and snare sounds to enhance a mediocre-sounding GM rhythm track. You can easily break out the kick and snare trigger notes into separate tracks, import the MIDI and audio into *QuickTime*

A ROSE BY ANY OTHER NAME

During the mid-1990s the SoundMusicSys technology that gave rise to Apple's QuickTime Music Architecture (QTMA) underwent a number of incarnations. Steve Hales and Jim Nitchals started a new company called Igor's Software Laboratories to develop their technology for Internet applications. By that time, I was independent but still providing content for the system; I worked on sample libraries for Be and WebTV, which had already licensed versions of the synthesizer for their operating systems.

That's when Thomas Dolby got involved. He had a company called Headspace and ideas about implementing interactive audio on the Internet. He discovered the Igor synth while writing music for the WebTV box; he liked it so much, he bought the company. Renamed the Headspace Audio Engine, the system went through further changes and eventually emerged as Beatnik, the premiere interactive audio plug-in for "sonified" Web sites.

The fact that SoundMusicSys, QTMA, and Beatnik share a common ancestry explains why QTMA and Beatnik have so many similar features and parameter options. I had a definite sense of déjà vu the first time I opened the Instruments editor in *QuickTime Player Pro*. The parameters had familiar labels because they were based on the same set of data fields that I tweaked for years while designing instruments for Beatnik.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Player Pro, and then save it as a QuickTime movie. Adding even a couple of sound effects, vocal riffs, or guitar lines in that manner can liven up an otherwise ordinary MIDI composition.

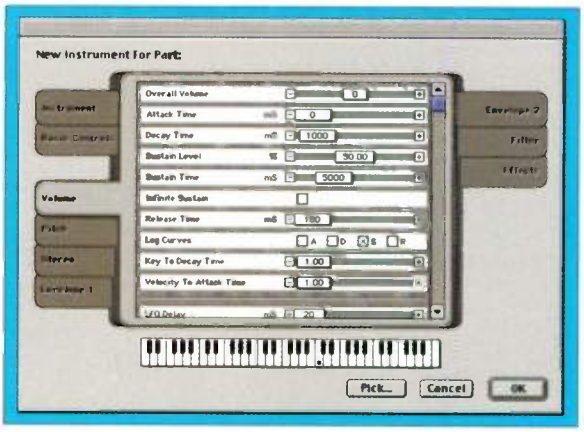


FIG. 5: The default instrument's sound fades quickly. Change the Sustain Level to 100 percent and check the Infinite Sustain box to create an instrument with no decay.

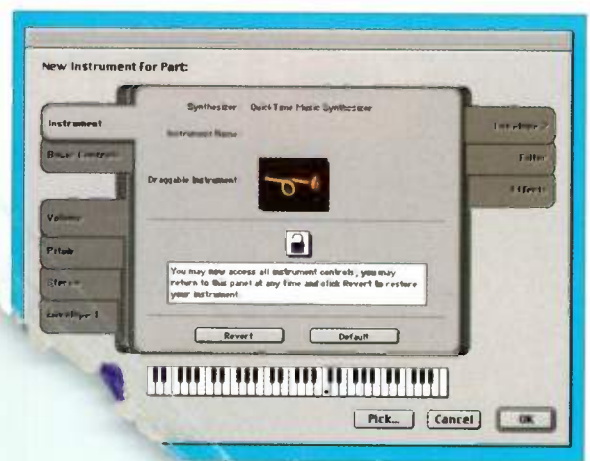
LOOKING AHEAD

Despite the difficulties, developing this kind of content for QTMA has advantages over other Internet audio systems. More than 100 million machines have QuickTime, which means your music has a huge potential audience. You can also use the system to create high-quality, low-bandwidth audio-enhanced MIDI scores for QuickTime videos, and the audio will lock to picture just like with a real movie.

On the other hand, QuickTime has its limitations. QTMA does not support compression when working with individual samples, even though QuickTime audio tracks can be compressed with the excellent QDesign algorithm. If I could have used compressed samples within my MIDI tracks, the three-minute song could have been reduced to about 100 KB. There are other stumbling blocks as well. You can't create multisampled instruments; you can't select custom instruments in your tracks using MIDI Program Change messages; and you can't play your custom instruments from your sequencer (but you can gain access to the internal Roland bank through the Open Music System).

Fortunately, assistance is on the way. QuickTime 5 is already in beta release (the final version may be available by the time you read this article), and it includes a major upgrade and overhaul of the MIDI architecture. DLS and SoundFont banks will be supported, which will make the entire content-development process easier because of the many tools available for creating audio in those formats. QuickTime is such a practical Internet streaming-media technology that a widespread cross-platform installed base is guaranteed.

In any case, I will be watching my favorite software synthesizer's evolution. The newest incarnation appears to be emerging as an audio engine for cell phones and other wireless devices. Who knows where it will pop up next?



ime MIDI instrument editor to gain access

Peter Drescher *is a composer, piano player, and owner of Twittering Machine, a project studio in San Francisco. He maintains his Web site at www.twittering.com.*

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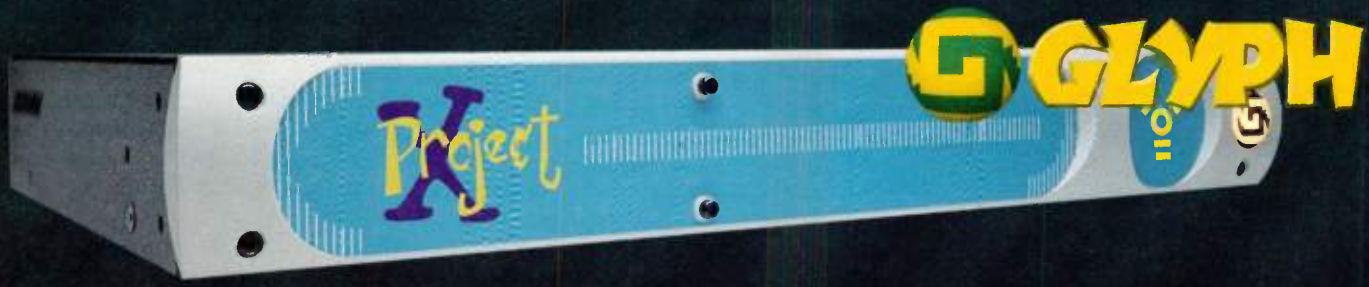

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REVIEWS

ROLAND

VP-9000

Bend and shape sound anyway you want.

By Rob Shrock

When the Roland Corporation unveiled the VP-9000 at the winter 2000 NAMM convention, I was impressed. This unassuming black box performed magic tricks I'd never seen and stretched sound as if it were elastic. Everyone who saw that demonstration agreed that the VP-9000 was difficult to describe; you just had to experience it for yourself. I couldn't wait to get my hands on one.

The VP-9000 is the first device that incorporates Roland's VariPhrase technology, which combines the functionality of a phrase sampler, a loop remixer, and a vocal processor. Among its many tricks, VariPhrase processing lets you remove the pitch information from a musical phrase, then replace the original melody by playing a MIDI instrument while retaining the original phrase's nuances of rhythm and articulation.

That technology can even correct a sample's formant structure so that when you transpose it across a wide range of pitches, it sounds perfectly

FIG. 1: The VP-9000 combines the functionality of a sampler, a vocal processor, and a Groovebox behind its mild-mannered exterior. An assortment of buttons and knobs gives you hands-on real-time control over parameters that were once the sole domain of computer software—and more.

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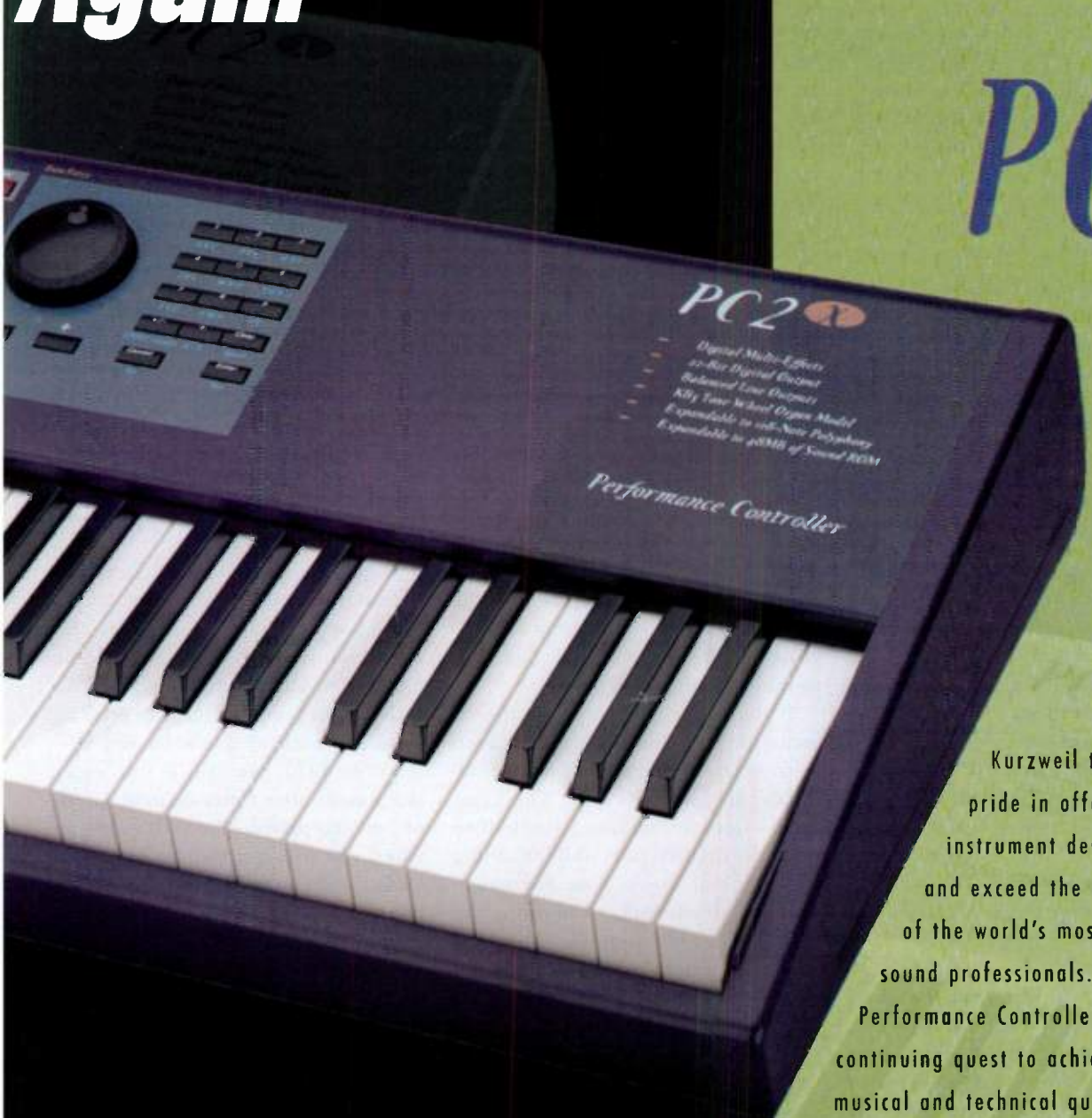

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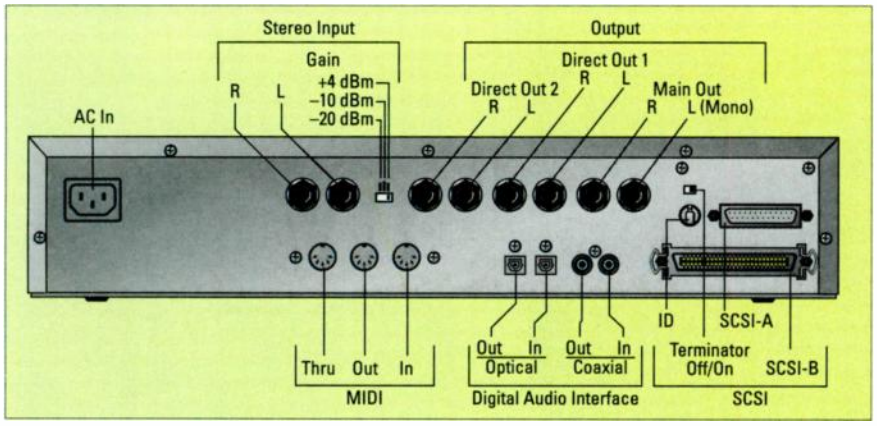

FIG. 2: Three pairs of audio outputs, two audio inputs with a three-position gain switch, optical and coaxial S/PDIF I/O, a trio of MIDI jacks, and two SCSI ports populate the VP-9000's back panel.

natural. In many cases, this capability greatly reduces the need for multisampling. Normally, shifting a sample's pitch also transposes its formant structure; this doesn't happen when you change pitches with the original acoustic instrument.

In addition to altering formants, the VP-9000 can change the pitch, length, and groove of sampled sounds and phrases in real time, either with MIDI controller messages or the front panel's knobs. Pitch can be shifted without affecting tempo and vice versa. The VP-9000 can take several loops recorded at different tempos and in different keys and play them back at one tempo in one key. In addition, it can automatically split a loop into any number of separate segments. The VP-9000 can even bend gender, turning a voice from female to male or male to female.

Those capabilities are the stuff of dreams for dance music producers, remixers, and sound designers, who often employ several computer programs to achieve what the VP-9000 can do alone. Instead of using one program to shift pitch and change tempo, another to split audio loops into segments, and yet another to reorganize edited loops, you can use the VP-9000 to execute all those operations in less time and without the effort of shuttling data from one program to another.

IN PLAIN VIEW

At the heart of the VP-9000's Vari-Phrase control capabilities are three front-panel knobs labeled Pitch, Time, and Formant/Groove (see **Fig. 1**). The biggest advantage of real-time controls is that you instantly hear when you've stretched things too far. MIDI controllers such as a mod wheel, a pitch bender, or any MIDI Control Change message can be assigned to perform the same functions as the control knobs. You can even set up one knob to control pitch, time, and formant simultaneously.

As you turn the Pitch knob, the selected sample changes pitch as much as an octave up and down without affecting the playback rate. The Time knob alters the tempo, from half to twice the original rate, while retaining the original pitch. The Formant/Groove knob defaults to adjusting the formants in a monophonic sample. At the knob's extremes, the effect can be described as changing vocal characteristics from a duck's voice to a giant's voice. To set the knob to control Groove, press the Groove button and turn on the soft switch that appears in the LCD. Turning the knob to the right then introduces swing, and turning it to the left introduces lag.

Below the LCD, six function buttons change their identities according to what's shown on the display. To their left, six dedicated buttons access the various modes: Performance, Sample, Sampling, Utility, System, and Disk. Sample mode lets you specify sample parameters such as name, original pitch, Velocity settings, playback mode, and so on; Sampling mode initiates the sampling process and lets you edit your samples. It might be less confusing if these two buttons had names that were distinctive enough to be easily differentiated.

Instead of pressing the Volume knob as you do with other Roland instruments, you press the VP-9000's Preview button to audition sounds. You can set this button to Gate, Trigger, or Drum mode. Gate mode plays the selected sample as long as the button is held down. Trigger mode toggles the sample on and off with each press of the button. If Loop mode is turned on, the sample repeats until you press the button again; if Loop is turned off, it plays only once. Drum mode plays an entire sample or loop one time. All modes can be set to play any or all Parts in a Performance, and the Preview button can be latched to remain on without the user's having to hold down the button.

The large backlit LCD shows all menus and detailed graphics. It also shows samples, editing parameters, and so on, but it doesn't display real-time changes to pitch and tempo. You can set a specific tempo or pitch by pressing the Performance button. To help preserve the LCD, you can set it to enter sleep mode after a user-defined length of time has passed. The LCD wakes up when you touch a button or turn a knob, or when the unit receives a MIDI message.

The VP-9000 is not short on connectivity (see **Fig. 2**). In addition to a pair of balanced ¼-inch TRS inputs with a three-position gain switch on the back panel, a balanced ¼-inch TRS input on the front panel facilitates quick sampling of monaural sources. The back panel has three pairs of balanced ¼-inch TRS analog outputs, and the front panel offers a ¼-inch headphone jack. The Main output pair can be routed through the internal effects (reverb, chorus, and so on), but both Direct output pairs are dry. Digital I/O is available on optical and coaxial S/PDIF ports simultaneously.

To supplement the front panel's Zip 250 drive, there are 25-pin and 50-pin SCSI connectors with a single

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*Cubasis VST for Macintosh available later this year

termination switch in the back. External drives, such as CD recorders, can be connected to both SCSI ports. Standard MIDI In, Out, and Thru ports are also on the back.

LONG-TERM MEMORY LOSS

Roland ships the VP-9000 with 8 MB of RAM. This can be upgraded with an additional 128 MB using four SIMM slots you can gain access to through a plate in the top panel. The basic 8 MB provides just 50 seconds of monaural sampling time or 25 seconds of stereo. In any case, those are the maximum lengths for a single sample in mono or in stereo; you can't record a longer sample, even if you have more RAM installed.

Traditional samplers require approximately 10 MB per stereo minute, but the VP-9000 requires almost twice that amount of storage for the same amount of time. The extra memory is gobbled up by all the data that's created when samples are encoded for VariPhrase processing. With 136 MB of RAM installed, you can have about seven minutes of encoded stereo samples.

The VP-9000 holds one Performance in RAM at a time. A Performance includes as many as six Parts, and each Part contains one mono or stereo sample. If all the samples are stereo, the Performance can contain no more than three Parts. Stereo and mono Parts can be combined in the same Performance, but the VP-9000 can only play a maximum of six notes at a time. Each Part has its own MIDI channel, tuning, level, and pan position, as well as a number of keyboard assignment parameters.

Although there's a maximum of six mono Parts or three stereo Parts in a Performance, the samples in these Parts can be changed on the fly. Fully expanded memory is able to hold 1,024 samples in RAM, and you can instantly gain access to them with Program Changes. This feature allows you to call up multiple samples within a single Performance.

SAMPLING SUPREME

Samples can be loaded into RAM from the built-in Zip 250 drive or from other storage devices connected to the SCSI ports. In addition to reading its native files, the VP-9000 can import data in Roland S-700, Akai S1000, WAV, and AIFF formats. The unit reads Roland samples without difficulty, but I had problems loading Akai samples. When I tried to import stereo samples, some would only load as mono files. (Roland says it's been unable to verify this problem, and it may have been the result of an older system bug.) In addition, Akai samples must be imported individually at the sample level; you can't import multisampled programs.

VariPhrase samples are recorded and stored in 16-bit format at 44.1 kHz. You can import 8- and 16-bit samples recorded at rates from 8 to 48 kHz; however, they're converted to 16 bits at 44.1 kHz before VariPhrase processing can take place.

To record your samples, route a mic or line-level signal into an input. You can sample through the internal preeffects: compressor, limiter, and noise suppressor. You begin recording by pressing a button, by exceeding a user-selectable threshold level, or by sending a MIDI Start command. To ensure that attack transients are not lost, you can define a pretrigger buffer in milliseconds. A built-in metronome helps you maintain a consistent tempo. (Knowing the tempo may be important when you reach the encoding stage.)

As a bonus, the VP-9000 can resample signals routed to its outputs, which includes signals processed through the effects and preeffects. Its ability to internally resample itself helps the VP-9000 offset its limited polyphony.

The VP-9000 provides eight preset and eight programmable sampling templates. These templates are designed for typical sampling situations such as recording from a microphone, a CD, or the VP-9000's outputs. These templates store settings such as the trigger mode, which input is used, metronome count in, and so on.

The VP-9000's waveform-editing capabilities are among the best I've seen in a hardware device, but editing is still more cumbersome than using computer software. There is no Undo edit buffer, so all edits are destructive. If you want to experiment with edits, do so with a copy of the file in case you don't like the results.

Samples can be graphically edited with a variety of commands, including Cut, Paste, Truncate, Normalize, Trim, and Reverse. Loop start and end points can be locked, letting you shift a portion of fixed length (two measures, for instance) within a longer sampled phrase. Although there's no autolooping, a zero-crossing search function can help you find good loop points.

BEHIND THE CURTAIN

To allow VariPhrase processing, samples must first be encoded by the VP-9000. The encoding process divides a sample into separate segments by analyzing it for amplitude level changes and inserting an Event marker when there's an

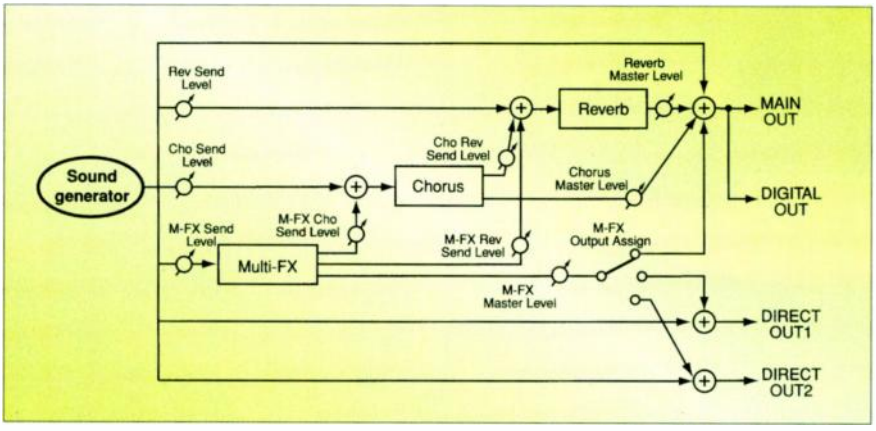

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FIG. 3: Samples routed through the multi-effects processor can be further effected by the independent chorus and reverb processors.

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abrupt change. The threshold is defined by default, but you can change the Encode Depth parameter to produce more or fewer Events. Each Event marks the beginning of a new segment. Unlike the results of time slicing, the results of encoding are nondestructive; the original sample data is preserved intact.

If you are encoding sampled phrases and you know their tempos, you should input that information into the corresponding Part before encoding. The VP-9000 is also able to determine a loop's tempo if you cleanly truncate the phrase and provide the number of bars and beats.

By dividing the sample into segments, encoding lets you stretch, bend, and warp audio in several creative ways. For example, encoding makes it possible to manipulate a loop's separate timing elements. After encoding, the start and end times of individual segments can be manually adjusted, as well as inserted and deleted. I stretched a snare sample to create a longer decay time, with great results.

There are three encoding algorithms, which are selected based on the audio source material. Solo encoding works best for monophonic instruments such as solo voice or saxophone. For rhythmic percussive sounds with clean, sharp attacks, use the Backing algorithm. Ensemble encoding is designed for sustained sounds, especially if they're polyphonic.

Solo encoding lets you take advantage of pitch shifting, time stretching, and formant correction. Samples encoded with the Solo algorithm can be played polyphonically, which lets you play vocal harmonies from a single mono sample, for example. Solo samples must be completely monophonic—with no effects, overlapping notes, or bleed from other tracks—to apply formant correction.

The Robot Voice function is only available with Solo encoding. It removes all pitch information from the sample and replaces it with whatever you play on the keyboard. With this function, you can sample someone with no singing ability and make that person sound like a vocalist—sort of. Robot Voice sounds quite unnatural, but it's much clearer than a vocoder. The effect is cool—a cross between a vocoder and Cher's infamous Auto-Tune sound—and it will likely make its way into many club mixes.

The Backing algorithm is especially useful for rhythmic loops. It lets you change pitch, tempo, and groove, but not formants. By changing the groove, tracks with a straight feel can swing. There are only four groove templates: two 8-beat and two 16-beat swing feels. Although real-time groove control is moderately useful, I prefer the groove templates found in software sequencers. I hope Roland plans to offer additional grooves in an update.

Ensemble encoding also lets you change pitch, tempo, and groove, but not formants. It's the preferred method for encoding strings, vocal ensembles, and mixed audio tracks. If a solo instrument is recorded with effects, use Ensemble.

You can achieve some excellent sonic warping by deliberately encoding sounds with the "wrong" algorithms. For instance, I transformed a four-bar guitar loop by encoding it with the Solo algorithm and automating the formant control with a sequenced MIDI controller. The resulting effect was much hipper than simple filter modulation.

Whichever encoding method you choose, the process takes only a few seconds and needs to be performed only once. After you encode and save a sample in native VariPhrase format, you can preview two seconds of sound directly from the disk before loading it into RAM. Samples can be renamed and classified into preset categories that you can gain access to with the touch of a button.

After encoding, phrases in separate keys and tempos can be transposed to the same key and tempo, then altered in real time. Parts can also be excluded from selected VariPhrase processes. For example, pitched instruments—such as bass, guitar, and vocal—can follow key changes in real time, while drums remain unaffected. Turning the Time knob can still make all Parts speed up or slow down. Altering some Parts in real time while others remain unchanged is a stunning and magical effect.

For artists who want to experiment with tempo and key of a basic groove before committing to it, the VP-9000 is a real time-saver, especially when it's

VP-9000 Specifications

Sound Engine	VariPhrase
Analog Audio Outputs	(6) ¼" TRS (3 stereo pairs); ¼" stereo headphone
Analog Audio Inputs	(2) ¼" TRS (rear); (1) ¼" TRS (front)
Digital I/O	S/PDIF optical and coaxial
MIDI I/O	In, Out, Thru
SCSI Ports	(1) 25-pin; (1) 50-pin
Internal Disk Drive	250 MB Zip
Internal Memory	8–136 MB
Maximum Polyphony	6 notes (stereo samples use 2 notes each)
Maximum Samples in RAM	1,024
Data Format	16-bit/44.1 kHz sampling
Signal Processing	20-bit A/D and D/A; 24-bit internal
Effects	chorus (8 types); reverb (9 types); multi-effects (40 types); preeffects (compressor, limiter, noise suppressor)
Main Display	240 × 64-pixel, backlit LCD
Dimensions	2U × 11.94"
Weight	11.94 lbs.

coupled with a digital-audio sequencer. First create your basic groove, then play with the tempo, feel, and key to create new melodies or harmonies, and then record them into your sequencer.

The optional *V-Producer* software package ($395) allows easier editing of VP-9000 parameters (see the sidebar "*V-Producer*"). It's available for Windows and should ship for the Mac OS by press time.

HARMONIC CONVERSION

Samples can be played back in several ways. The Key Assign mode specifies whether samples are played polyphonically (Poly) or monophonically (Solo). In addition, there are four Playback modes: Retrigger, Step, Legato, and Time Sync. Retrigger mode simply plays the sample from the beginning each time a key is pressed. Step mode plays a sample to the beginning of the next Event and then stops, letting you play each segment with a different key by assigning each one to a MIDI note.

When Key Assign is set to Solo, Legato mode transposes the phrase during playback whenever you hit a new note on the keyboard. When Key Assign is set to Poly, Time Sync mode begins playing a transposed copy of a sample from the point at which the original is already playing. If you hold a key down to play a phrase and then press other keys as the phrase is playing, the new notes harmonize from the middle of the phrase, in sync with the original.

This is very cool, and I've never seen computer software that can do the same. For example, suppose you sample a vocal melodic phrase, "Ooh, I love you, baby," and play it back by holding the C3 key. When the phrase reaches "baby," you press the E3 key, and the word "baby" is harmonized at an interval of a major third—in perfect sync with the original. It sounds as if someone is singing harmony.

I took the Time Sync concept a step further by using an alternate take of a lead vocal as the source for a new harmony. I was rewarded with a backing vocal that hadn't existed previously and that retained the subtle nuances of a different performance, which resulted in a more natural sound.

Of course, harmonizers have been around for years, but the VP-9000 offers on-the-fly harmonization at the touch of a keyboard. The results are often stunning and immensely useful for producers and remixers alike.

V-PRODUCER

Roland introduced *V-Producer* ($395) at the AES convention in September 2000. This software serves as a computer-based environment for as many as six VP-9000s connected to a MIDI network, letting you graphically edit pitch, time, and formant data. It provides drag-and-drop sequencing of VP-9000 samples into complete songs, as well as control of mixing and effects routing. Sequences can be exported as Standard MIDI Files. *V-Producer* can synchronize with sequencers using MIDI Time Code or MIDI Clock.

In addition to *V-Producer*, the software package contains *V-Trainer*. This program lets you perform Vari-Phrase encoding on your computer, then transfer data to the VP-9000 by copying it to a Zip disk or through SCSI to a hard drive. *V-Trainer* can also batch-encode AIFF or WAV files from CD-ROMs.

V-Producer is available for Windows, and it should ship for the Mac OS by press time. Minimum requirements are a Pentium II/233 MHz running Windows 98. For the Mac, you will need at least a G3/233 MHz that runs OS 8.6. Both of the versions require a MIDI interface, a CD-ROM drive, 64 MB of RAM, and 20 MB of hard-disk space. Your computer will also need a Zip drive so that you can transfer samples.

CAUSE AND EFFECTS

The VP-9000 includes an excellent effects section. Reverb, chorus, and multi-effects processors are simultaneously available. There are nine different reverbs, and the chorus processor provides five chorus types, two short delays, and a flanger. The multi-effects include 40 algorithms that should be familiar to anyone who has used Roland's VS-series digital audio workstations or XV-series synthesizers.

The multi-effects algorithms range from EQs and filters to a bit-rate converter and a tape-echo simulator. Five algorithms combine an assortment of effects tailored for vocal, guitar, bass, Rhodes, or keyboard. Each effects block offers a respectable number of user-editable parameters, and most time-related parameters can be synched to MIDI Clock.

Roland's approach to effects busing becomes more versatile with each new product: long gone is the limited busing of the JV-series synths. However, the VP-9000's new interface was a bit confusing at first. Multi-effects are inserted

PRODUCT SUMMARY

Roland
VP-9000
sampling effects processor
$3,295

FEATURES	4.0
EASE OF USE	4.0
AUDIO QUALITY	4.0
VALUE	3.0

RATING PRODUCTS FROM 1 TO 5

PROS: Real-time control of pitch, tempo, formant, and groove characteristics. On-the-fly harmonization. Versatile keyboard triggering modes. Excellent effects. Internal Zip drive.

CONS: Only one Performance at a time. Six-note polyphony. No Undo function. Not enough Groove templates. Maximum tempo resolution is one-tenth of a beat. Expensive.

Manufacturer
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into each Part's signal path. Each Part includes its own send level, and multi-effects can be routed into chorus or reverb with control over each effect's depth (see **Fig. 3**).

ROOM FOR IMPROVEMENT

The VP-9000 contains no filters, unless you count the multi-effects' EQ section. This is a glaring omission, especially considering the unit's price; filtering is common in loop-based music. Also, the tempo resolution is limited to one-tenth of a bpm (one decimal place).

The VP-9000's User Guide and Reference manual are written in true Roland form. They're often difficult to understand, and they contain a few peculiar turns of phrase. On the other hand, a third-party instructional video available from Roland is helpful and detailed. In defense of the VP-9000, however, I easily found my way around in about half an hour without consulting either manual.

THE BIG PICTURE

The VP-9000 does some amazing things, and it does them fast. Although you may arguably get higher-quality results with a software program, the audio quality is excellent. VariPhrase processing works well with many types of source material.

Several software programs are adept at converting loops with different tempos and keys to a single tempo in the same key. Other programs cut loops into separate segments so you can manipulate playback order and tempo. Practically all audio sequencers can time-stretch and pitch-shift. But the VP-9000 does all those things in a single hardware product.

The strongest argument for preferring the VP-9000 to software is its immediacy. For those who like to work quickly and specifically need what the VP-9000 provides, it can't be beat for pure productivity. Computer software usually takes longer to get the same results as the VP-9000, and certain tasks just can't be accomplished with software. No software package lets you harmonize on the fly like VariPhrase's Time Sync function does—which may be the sole reason some people will buy a VP-9000.

Its limitations can't be overlooked, however. I wish multiple Performances could reside in memory, limited only by available RAM. Considering that the VP-9000 is probably at its best when used with a computer-based sequencer, it's an expensive tool compared with sample editing and looping software.

Nonetheless, the VP-9000 is truly a breakthrough piece of hardware. Its usefulness depends on your musical needs, your working style, and your budget. Once you've heard what it can do, the VP-9000 might open doors to creativity that simply weren't there before.

Rob Shrock *served as one of the music directors for the 72nd Academy Awards. He has worked with Burt Bacharach, Elvis Costello, Whitney Houston, Chrissie Hynde, Dionne Warwick, Stevie Wonder, Wynonna, and many others.*

ALLEGROASSAI

OPUS 2.6 (MAC/WIN)

A powerful notation program with online-publishing ties.

By Brian Smithers

Allegroassai (formerly Sincrosoft) is making a play for the hearts and minds of well-connected 21st-century musicians. The Italian software company has recently developed an integrated system of notation software and Web-based music publishing and is actively creating its own online community for musicians. At the center of this system is an ever-growing collection of downloadable scores and a family of programs that let users view, print, personalize, and edit those scores. (For more information on the company's approach to online music publishing, see the sidebar "Scores Online.") For this review, I'll focus on *Opus* 2.6, Allegroassai's flagship notation program, but other "lite" versions of the software are also available (see the sidebar "The Opus Family").

SCORING BIG

Opus 2.6 is a full-feature program able to hold its own in many respects with the biggest names in the notation-software arena. It allows an unlimited number of staves in a score and supports pages of any size. You can have as many as eight voices per staff, choose from six time signature formats (see **Fig. 1**), draw tuplets ten different ways, and have 30 documents open simultaneously.

If you are not pleased with the program's automatic spacing, you can always drag any element of an *Opus* score to a different position. You can create multiple lines of lyrics and incorporate different text fonts. You can also customize the default spacing of many elements, from ties to dots to accidentals.

The Toolbar features eight icons that provide one-click access to functions in the Edit, Notes, Score, and Tools menus. You can customize the Toolbar as well, and ensure that your most-used functions are always at your fingertips. To get you started quickly, *Opus* provides a number of score templates for common types of ensembles.

Opus was originally written for the Macintosh, but it has been available for Windows since version 2.0. Its Mac heritage shows up in little ways: the program has no right-click functions, no pop-up tool tips, and no F1 Help. In addition, the Windows version seems a bit less finished in a few places in the user interface and documentation. My primary test platform was a Windows 98 machine, but I also took *Opus* for a spin on a Mac G4 and found that the two versions are essentially the same in appearance and function. You can share files between platforms, but you must export your score to the other platform's file format first.

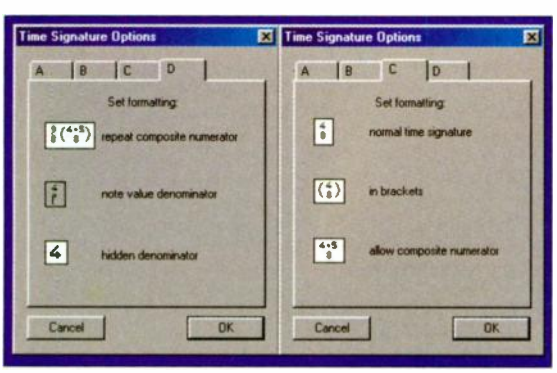

FIG. 1: Among the many custom-formatting options that *Opus* provides is the ability to use any of six different formats for time signatures. For some reason, the six choices are spread across two separate tabs of the dialog box.

DA CAPO

Installing *Opus* is easy and straightforward with the refreshingly simple anti-piracy process of entering a serial number and password from the back of the manual. The installation asks you to choose among five languages: French, Italian, German, English, and Spanish. The Mac installation looks for Opcode's Open Music System (OMS) and installs it if necessary.

Minimum System Requirements

Opus

PC: Pentium processor or equivalent; Windows 95/98/NT/2000; 16 MB RAM (32 MB recommended)

MAC: 68040 processor (PPC recommended); Mac OS 7 or higher; 8 MB RAM (16 MB recommended)

When you create a new document, a three-tab dialog box lets you specify the page size and margins, and it lets you choose the number and type of staves along with their sizes, spacing, and names. These are not, however, "intelligent" instrument assignments that understand customary clefs and transpositions; they're merely staves with names.

To set up a transposed score, therefore, you must assign an appropriate key signature to each transposing instrument's staff and then set a transpose value elsewhere in the program to ensure proper MIDI playback. If you then copy something to a staff with a different transposition, the notes are copied as written, not sounded, which requires you to transpose them manually. If one part changes instruments, say from oboe to English horn or flute to alto flute, you have to sacrifice proper appearance or proper sound. This is a frustrating set of shortcomings to someone who writes for a lot of woodwind doublers.

Moreover, *Opus* only lets you choose European page sizes. You'll find everything from A0 to B5, but you won't find U.S. letter or legal sizes. American users are left to specify those page sizes as custom settings. This minor annoyance is made worse by the fact that the hard-copy manual doesn't say what the units of those custom settings are. The Help file cites a conversion of 1,420 units per inch; Allegroassai claims the actual number is approximately 1,512 units per inch. A letter-size page is therefore 16,641 by 12,859. Margins are measured in the same way.


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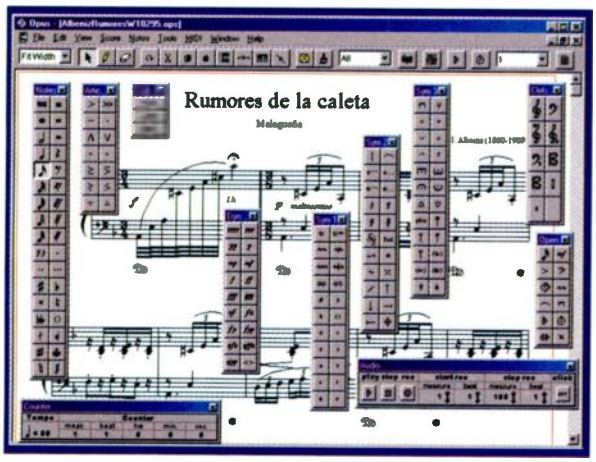

FIG. 2: The marks and symbols that are required for most musical situations are presented in a collection of palettes. To enter a note, articulation, clef, or other marking, simply click on a symbol and click in the score to place it.

One other point should be kept in mind while you're in the New Document dialog box: once you choose the order of staves, you can't change it. You can change your mind about almost anything else in *Opus*, but if you decide at a later time to bring a solo trumpet part to the top of the score, for example, you're out of luck.

To ensure proper playback of your score, you must set up the proper program changes in the MIDI Mixer window. The Mixer controls the channel assignments, pan, and part volume, along with Solo, Mute, and Record status. Several patch maps are conveniently provided; among them are General MIDI, E-mu Proteus 1 and 2, and Korg M1. You can also create as many as three custom patch maps for your own devices. Intelligent MIDI playback of dynamic markings is supported as well.

The playback tempo and your score's notated tempo are the same, although you can hide the "real" tempo and enter a display-only tempo as a text marking. Through the Tempo Options dialog box, *Opus* also lets you assign a metronome reference click that is different than the time signature's denominator. This is a great way to get around the problem of translating a fast 6/8 tempo into a more practical dotted-quarter-note pulse. You can even assign a tuplet value as your metronome pulse.

NOTEWORTHY POINTS

Opus lets you enter notes in any of four ways: mouse-clicking, real-time MIDI recording, step-time MIDI input, and importing Standard MIDI Files. Mouse entry is by far the simplest and most direct way to enter notes and markings, but it is also the least efficient. Nonetheless, in any notation program I find myself relying on mouse entry at least part of the time.

The program also provides a healthy assortment of palettes from which to choose notes, rests, symbols, and markings (see **Fig. 2**). For a novice, this makes data entry a simple matter of selecting an item and placing it on the page with a click. To speed things along, *Opus* lets you select a note's duration with your computer keyboard's number keys. In fact, when you select a rhythmic value in this way, *Opus* thoughtfully sets the mouse pointer to the Pencil tool, so you're ready to enter notes. You can also turn any note into a rest by pressing the R key on your keyboard.

This keyboard and mouse synergy is one of my favorite aspects of *Opus*, because it saves me from having to go back to the Note palette to select a new rhythmic value. It would be even better if you could add a sharp, flat, natural,

SCORES ONLINE

Allegroassai has leveraged its experience in developing notation software into a push to become a major online music publisher. The company has more than 1,700 titles for sale in its *Opus* file format, and you can purchase and download the scores even if you don't own *Opus* 2.6.

A display-only version of the software, *Opus Viewer*, is available as a free download; it lets you view and print the scores that you purchase. Two reduced-feature versions of *Opus* are also available at a modest cost, so you can customize your scores (see the sidebar "The Opus Family"). These programs let you perform such tasks as transposing the score, changing articulations, and adding fingerings.

So far Allegroassai's catalog consists mainly of standards from the romantic, classical, and baroque periods, which are in the public domain. Certainly thousands of pieces from these periods are worthy of study and performance, but one has to hope that eventually Allegroassai will also offer newer works.

At the Allegroassai Web site, you can browse the catalog or search for specific titles. When you find something of interest, you can obtain additional information and then decide whether to purchase the music. Allegroassai has made first-page previews available for most of its titles to help you locate and identify a particular composition.

According to the company, each score undergoes at least four quality-control steps to ensure that the online scores are equal to or better than most published hard-copy scores. In addition, particular attention is paid to the layout of the scores so that they fit various printer formats, including U.S. letter size.

Online music publishing has great potential because it lets you edit and customize parts and scores and keeps the cost low through nonphysical distribution. Allegroassai has made the process simple while providing for high-quality results.

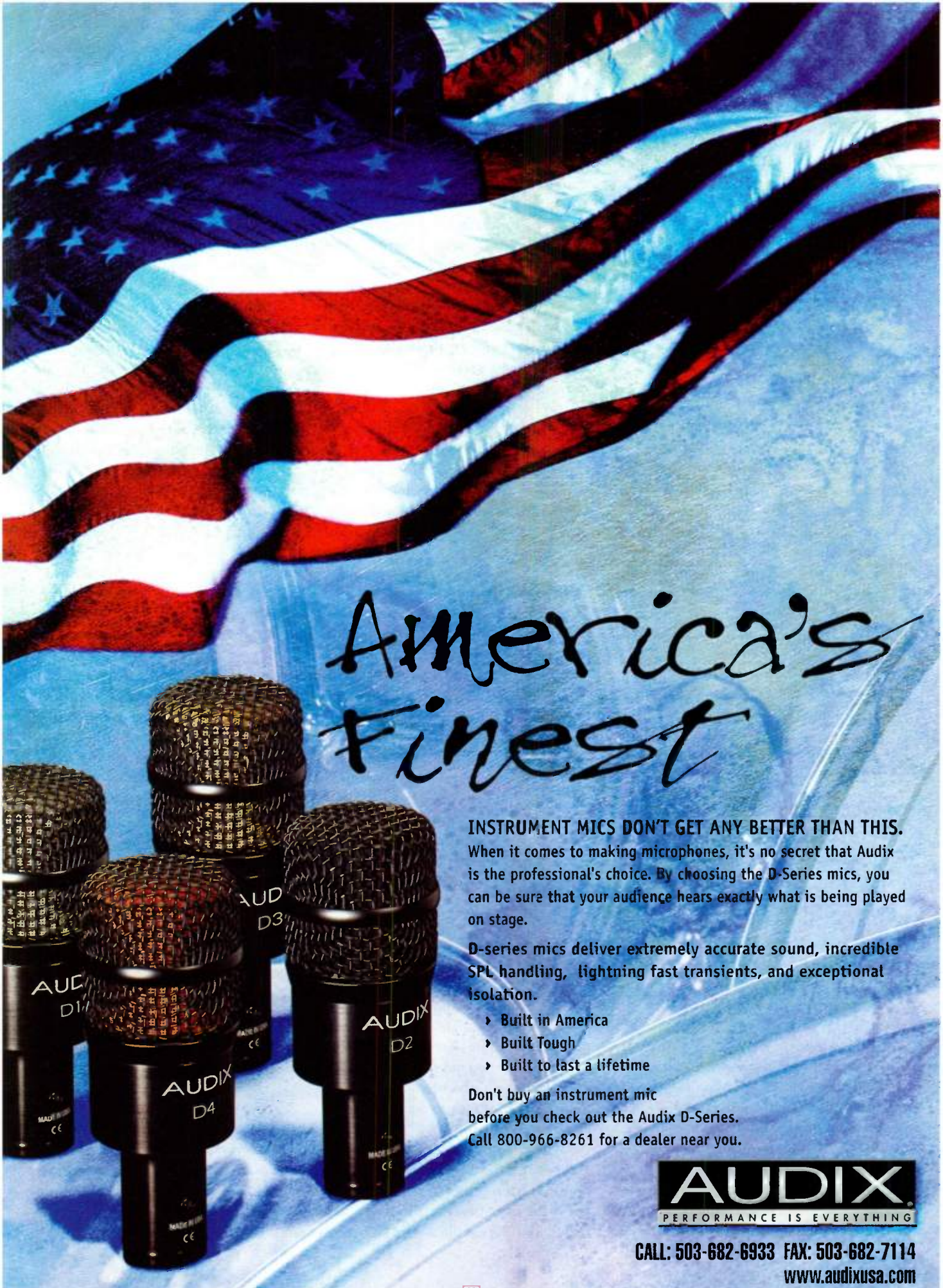

FIG. 3: The Record Setup window allows you to set the quantization level for real-time MIDI input or to specify step-recording instead.

or dot to a note as you enter it. Unfortunately, to make a dotted note you must enter the note without the dot, choose the dot from the Note palette, and click on the note head. Accidentals have mnemonic hotkeys but must also be added by clicking on a note after the note has been entered. This breaks the flow of what would otherwise be an efficient method of note entry.

MIDI ME

Real-time MIDI recording in *Opus* is simple and effective, but the setup procedure is a bit quirky. In the Record Setup dialog box (see **Fig. 3**), you can select the MIDI input device, provided you know to click on the device's name. The documentation instructs you to click on the Receive Input on Port box, but no such box exists in the Windows version.

Next you must record-enable a staff from the Mixer window. There again *Opus* clearly favors simplicity over efficiency, because enabling a different track requires another trip through the Mixer. If the Mixer window had a hotkey (or could be minimized or resized in the Windows version), the annoyance factor would be considerably reduced.

Last, you must set a recording start and end time in the Audio (transport) window. This lets you set precise punch-in and punch-out points, but it means that you can't just click on the bar where you want to start recording as you generally can in other programs.

Step-recording with MIDI input shares good and bad points with mouse entry. Selecting notes from the MIDI keyboard with one hand while you select durations from the computer keyboard with your other hand is a recipe for speedy copying, but the dotted-note problem is even worse here because *Opus* won't advance to the next bar until the current bar is rhythmically full.

Opus does a respectable job of importing MIDI files and provides control over quantization, tuplets, and voice splitting. After you import the file, you'll probably want to set a key signature for the score, and this can require much reworking of accidentals. The Notes menu has tools to expedite the process, but it still demands a good deal of manual effort.

ESPRESSIVO

Entering dynamics, articulations, fingerings, and other expressive markings from a collection of palettes is a tried-and-true system, and *Opus* offers a range of markings covering most classical-music situations. Bowings, fingerings, mallets, mordents, rolls, repeats, harmonics, and harp pedalings are easily entered. However, jazz markings such as bends and falls are conspicuously absent, and there is no provision for importing custom symbols or for creating them from scratch.

The Text palette enables you to enter expressive instructions, guitar chord symbols, tempo markings, and lyrics. This is a straightforward procedure once you guess that you must double-click on one of the palette's buttons to open a dialog box (in the Windows version)—a minor but frustrating omission from the written manual that is corrected in the Help file.

The Text, Lyric, and Frets (guitar chord) dialog boxes employ a similar approach. They first ask you to enter the desired text or choose the appropriate chord. When you close the dialog box by clicking OK, the cursor turns to a crosshair with which you place the marking into the score. You can apply the same lyric, text marking, or chord symbol repeatedly without retyping it, because the crosshair remains "loaded" until you select another tool. In fact, *Opus* remembers the last text entered, so if you want to use it again, you can simply click once on the Text button, and the crosshair is armed and ready to go. The Frets and Text dialog boxes are somehow intertwined, though, and I sometimes got strange results, such as a text marking showing up in the OpusFrets font.

The procedure for entering text clearly shows the program's preference for simplicity over power, a good or bad thing depending on your perspective. Each time you want to enter a text marking, you have to type it into the dialog box, rather than select it from a user-definable list of often-used words. Instead of editing lyrics, chord symbols, or text, you simply delete the original marking and create a new one from scratch. Fortunately, you can delete individual syllables of lyrics and replace them, saving you the nightmare

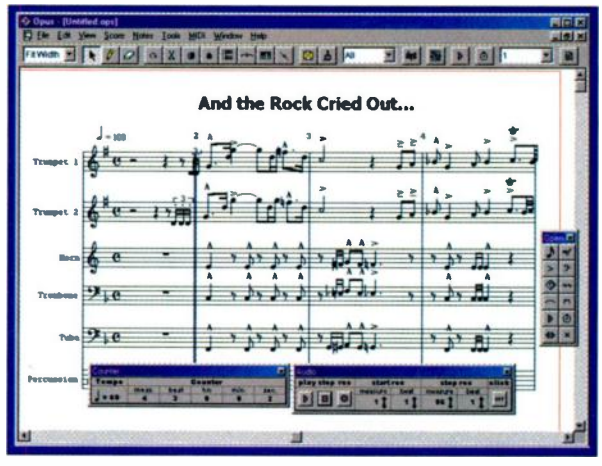

FIG. 4: If the score gets too busy, *Opus* has a hard time keeping elements from crashing into each other. Notice the default spacing of Trumpet 1 in bars 1 and 2. I've fixed the spacing manually in Trumpet 2. Similar situations arose in the lower voices in bar 3 and the trumpets again in bar 5.

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of replacing an entire verse because of a single typo.

Jazz and commercial musicians will find the Frets function inadequate for the lead-sheet chord notation common in those genres. You can't display the chord name without the fretboard fingering display, so chord changes end up looking like commercial sheet music instead of professional lead sheets. Getting the traditional look requires entering chord symbols as regular text markings, and if you need chord slashes, you must enter them free-form from one of the Symbol palettes.

SPACING: THE FINAL FRONTIER

Written music is an extremely complex language, and designing appropriate rules of spacing and layout is the biggest challenge in writing notation software. *Opus* has an easy-to-read appearance in its default spacing onscreen and in print, but the program sometimes lets elements overlap when they shouldn't (see **Fig. 4**). The fact that you can drag any symbol to a better location mitigates the problem considerably, but a serious notation program shouldn't let symbols collide under most conditions.

It would also be nice if *Opus* recognized more related items. For example, I moved the notes of a triplet down a line, and the beam and slur didn't move with them. Articulations move with notes, but you must drag beams and slurs manually.

Opus offers flexible control over the beaming of notes, and the two pertinent dialog boxes provide helpful graphic examples of the alternatives. You can specify the default position, length, or width of stems, ties, beams, dots, and other elements for a custom appearance. Four alternative note heads are provided, and any symbol from any installed font can be used as a note head. Complex slurs can be created by dragging the four handles of a slur, and slurs and hairpins automatically continue onto the next line, a very handy feature.

Although a wide range of zoom settings is available, the program lacks scroll and two-page views, as well as a true print preview. The only available view is a sort of page view on a white background, with the edges of the page represented by a red line if you choose to show margins.

PARTS DEPARTMENT

The behavior of *Opus*'s part-extraction function was at times unpredictable; I found it difficult to know which score markings would carry over into the extracted parts. On the positive side, *Opus* lets you mark certain instructions, such as tempo, dynamics, and text-based repeats on a score's top staff and then specify which markings are to be included in the extracted parts. The Text dialog box offers the option of attaching your tempo marking to the page, to the selected staff, or to all staves. When I attached my marking to all staves, each extracted part properly specified the tempo.

Unfortunately, other markings don't offer the same choices. For example, I entered a *D.S. al Coda* instruction through the Score menu, and it would only display correctly in the extracted parts if the measure in which it had been placed wasn't part of a multimeasure (consolidated) rest. The *Segno* and *Coda* markings to which the instruction referred are on one of the Symbol palettes, and they didn't appear in the parts unless I placed them individually in each staff of the score. Even then I couldn't count on them appearing in the right spot in the extracted part if they fell within a multimeasure rest.

THE OPUS FAMILY

For the musician who doesn't need industrial-strength notation software or for someone seeking an inexpensive way to view, edit, or annotate downloaded *Opus* scores, Allegroassai has some little "opi" from which to choose. *Amadeus Opus Lite* ($89) is the company's entry-level notation program. It has the same interface as *Opus* but a reduced feature set. It lets users create scores with as many as 16 staves yet still permits eight voices per staff. *Amadeus* features the same note-entry techniques as *Opus*, except that it won't accept tuplets when importing a MIDI file.

Amadeus can open only two documents at once; supports only a five-line staff or percussion staff; has fewer zoom options; and can hide only rests, not note heads, stems, or tuplets. It won't insert quarter-tone accidentals, but it will display them in a score prepared using *Opus*. Its palettes are otherwise nearly identical to those in *Opus*. *Amadeus* won't do tweaky little things such as display stems on rests or extend beams to the next rest, but in the features that count the most—note entry, spacing, layout, and output quality—it's virtually identical to *Opus*. Although it shares the same shortcomings, those shortcomings are much easier to forgive at less than $90 than they are at nearly $300.

Purchasers of Allegroassai's downloadable scores can save even more money by getting *Opus Editor* ($19.95). This extremely stripped-down version of *Opus* can edit articulations, add notes, and play and print downloaded scores. It cannot create new documents, but it can open scores created in *Opus* or *Amadeus*. Only mouse entry of notes and symbols is supported, but *Opus Editor* does let users transpose scores.

Finally, Allegroassai offers the free *Opus Viewer* for viewing, printing, and MIDI playback of downloaded scores. Its features include changing MIDI instrument assignments and allowing as many documents to be open simultaneously as users want. The system requirements for *Amadeus*, *Opus Editor*, and *Opus Viewer* are the same as for *Opus*.

To extract individual parts from a score, simply choose Extract Parts from the Tools menu and select what you want to extract from a list of all the staves. If you select all the staves for extraction, though, you end up with a copy of the score. The dialog box isn't asking which individual parts you want to end up with, it's asking which staves you want included in the single part you're extracting. This makes it easy to generate parts such as Violins 1 and 2 or a combined percussion part with multiple staves, but for every part you want to extract, you must go through the dialog box process manually. A 15-staff score requires dozens of mouse clicks, not to mention typing a file name for each part.

AL FINE

Several little things give *Opus* an unnecessarily cumbersome feel. For instance, no keystroke is provided to move from page to page within a score; you must use the Go to Page dialog box or the Page pull-down menu on the toolbar. In general, the user interface relies too heavily on multiple-tab dialog boxes that force you to page through small groups of parameters to find a particular setting. Larger dialog boxes with all the parameters visible at once would greatly streamline the program.

Although you can drag notes and accidentals wherever you want, editing slurs and some other markings requires displaying their Control Points using the Tools menu. That would be fine, except you have to select each marking type (slurs, ties, tuplet brackets, and so on) separately from a pull-down menu. The Control Points are shown for only one type of mark at a time. When you delete one of the related items in the score, all remaining Control Points disappear, forcing you to select them again from the menu. Drag-copying and drag-moving are not supported except for moving individual notes, and *Opus* only offers a single level Undo command.

In spite of a relatively simple and straightforward user interface, some common tasks are surprisingly convoluted in *Opus*. To add a pick-up note to the beginning of a 6/8 score, for example, you must start with a bar of 1/8, then insert a 6/8 time signature for the rest of the piece. Next you must hide both time signatures and use the Text tool to enter a 6 over an 8 at the beginning of the first bar. (This information isn't provided in the manual or the Help file.)

I look forward to better things from *Opus* in future releases. Allegroassai has already solved the hardest problem: getting good output without a steep learning curve. If the company brings the program's interface up to the level of its notation capabilities and adds a few more features, *Opus* might become a serious contender in the notation-software realm, especially considering Allegroassai's strong commitment to Internet music publishing.

PRODUCT SUMMARY

Allegroassai

Opus 2.6 (Mac/Win)
notation software
$299 (educational/theological discounts available)

FEATURES	3.0
EASE OF USE	3.5
DOCUMENTATION	2.0
VALUE	2.5

RATING PRODUCTS FROM 1 TO 5

PROS: Good print quality. Easy to learn. Good complement of traditional markings. Good control over spacing and layout.

CONS: Inefficient user interface. Weak part extraction. Poor implementation of jazz and commercial markings. Too dependent on menus and multiple-tab dialog boxes. Poor Help function.

Manufacturer

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e-mail info@allegroassai.com
Web www.allegroassai.com.

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 members.aol.com/notebooks1.*

OBERHEIM

OB-12

Is this the reincarnation of a modern classic?

By Geary Yelton

From the mid-1970s until the early '90s, Oberheim was one of the premier American synthesizer makers. Many hit records featured the sounds of the Xpander, the OB-8, the FVS-1 (popularly known as the Four-Voice), and other great Oberheim synths. Oberheim developed "The System," which linked a synth, a digital sequencer, and a drum machine into a pre-MIDI network for electronic composition and performance.

The Oberheim name was passed from one owner to another beginning in the late '80s; it eventually ended up with Gibson, the long-standing guitar manufacturer. More recently, Gibson licensed the name to Italian keyboard maker Viscount (rhymes with "pie count") while still retaining ownership of the Oberheim brand. In addition to its own line of electric pianos and organs, Viscount made instruments for companies, including Gibson, with more familiar names for years. Under the name Oberheim Viscount Joint Venture, the company has released its first instrument, the OB-12 Z-Domain Synthesizer.

The OB-12 is an analog modeling synthesizer, but in the face of stiff competition, it's being touted as a unique digital instrument providing sounds you cannot get elsewhere. It certainly looks like a virtual analog synthesizer; the oscillators offer standard analog-type waveforms, and the front panel offers all the functionality of an analog synth. The OB-12 has a few other tricks up its sleeve, though, including a Phrase Recorder, a Motion Recorder, and Morphing. The Phrase Recorder is a MIDI note sequencer, and the Motion Recorder is a MIDI control message sequencer. Morphing is the ability to transition from one sound to another.

You can download updates to the OB-12's operating system, as well as its sounds and effects, from Viscount's Web site. Oberheim instruments are distributed in the United States by Armadillo Enterprises, which also distributes Clavia's Nord Lead synthesizers and ddrum percussion modules and pads.

EXPLORING THE SURFACE

The OB-12 is an all-digital synthesizer with 12-note polyphony and four-part multitimbrality that responds on four MIDI channels at the same time. Each voice has two oscillators, two LFOs, two multimode filters, and three envelope generators. In addition, reverb, delay, chorus, and overdrive are always available simultaneously.

Initially, the OB-12's bright blue color and profusion of front-panel controls are its most striking characteristics (see **Fig. 1**). The front panel has 87 buttons, 28 knobs, 25 sliders, and a data wheel (which the user manual calls the "rotary dynamic encoder"). Most buttons have LEDs either embedded in them or immediately above them. A numeric keypad lets you quickly enter parameter values or program changes. All those devices give the user tremendous real-time control of the OB-12's sounds. If all the front-panel controls aren't enough for you, inputs for two footpedals and two footswitches are on the back.

I really liked the large clear display; the 240-by-64-pixel backlit LCD is reversible, displaying either dark on light or light on dark. It displays the values of front-panel parameters whenever you change them and shows them graphically when appropriate. Program and Timbre names appear in type that's large enough to read from halfway across a room. Text can be entered in upper- and lowercase. Combined with all the front-panel graphics, the display makes it easy to find your way around.

The 49-note keyboard has an unweighted action. There are buttons to turn Velocity and Channel Aftertouch on and off, though I can't imagine why anyone would want to disable Velocity, except for some of the organ sounds. A ribbon controller to the left of the keyboard supplements the usual Pitch-Bend and Modulation wheels. The ribbon and foot controllers can duplicate the function of almost any front-panel control. Pressing the Hold button latches the ribbon's value. Pressing the Relative button defines the ribbon's center value as the first place you touch the ribbon.

Two pairs of outputs are on the back panel. Each of the four parts is assignable to the main stereo outputs, the auxiliary outputs, or any individual output. In addition, there's a stereo S/PDIF output, always a welcome feature on any digital musical instrument.

It also has jacks for two footpedals and two footswitches. Their functions are assignable per Program rather than globally, which might be a bit confusing

FIG. 1: Dozens of knobs, sliders, and buttons are arranged in functional blocks on the OB-12's front panel and provide plenty of hands-on access to real-time control.

if you expect the sustain pedal to always be a sustain pedal.

MODUS OPERANDI

The primary mode for playing the OB-12 is the Program mode. Programs are made up of as many as four Parts, each Part containing one Timbre. A Program is what most synthesizer makers call a Performance or Multi, and a Timbre is what most call a Program. The OB-12 has 256 Programs and 256 Timbres available. They are all in nonvolatile RAM, so you can overwrite any or all of them.

In addition to assigning a Timbre to each Part, a Program specifies controller assignments, effects, equalization, arpeggiation, output busing, and other parameters. In the Part Settings page, you can determine the level of each Part, its transposition, and its keyboard zone.

You can also play in Timbre mode, but you lose control of some parameters found in Program mode. Within Timbre, you determine left-hand controller parameters, such as turning the Mod Wheel on and off, controlling the function of the ribbon controller and Aftertouch, and specifying the Pitch-Bend depth.

Because the Pitch-Bend depth is programmable at the Timbre level, each Part in a Program can react to the pitch bender differently. When you push the wheel, the pitch of one Part can go up an octave, another a third, and another a perfect fifth while the fourth Part stays the same pitch. This makes it possible to bend a note into a chord.

CHANNEL Z

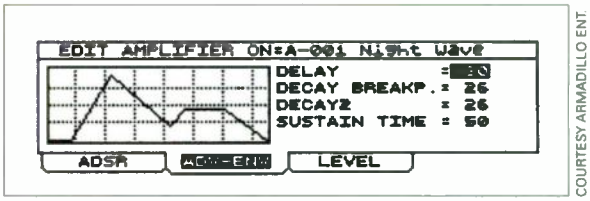
Oberheim's OB-12 is a *Z-Domain* synthesizer. The *Z* references time, whereas *Z-Domain* refers to morphing and the Motion Recorder. Those features hardly constitute a new form of synthesis, but because synth makers find it desirable for the technology in new instruments to be perceived as a fresh approach, "Z-Domain Synthesis"

▼

It's easier to be spontaneous when all you have to do is press a couple of buttons and go.

is what it's called. However, it appears to be indistinguishable from virtual analog synthesis.

The oscillators produce the standard pulse, sawtooth, and triangle waves, but Oscillator 1 offers more variable waveshapes. Its Wave Control knob, in addition to changing the width of pulse waves, changes the shape of sawtooth and triangle waves (see **Fig. 2**). Changing a triangle wave's Wrap simply adds harmonics, making the tone brighter. Making a change to a sawtooth wave's Spread detunes the wave with itself; the effect is like doubling the wave and shifting the frequency of the second version in relation to the first. At low settings adding Spread sounds like chorusing; at high settings it sounds like severe detuning. I was a little disappointed that although pulse width can be modulated with either LFO, Wrap and Spread can't. An FM knob in Oscillator 1 lets you modulate its frequency with a signal from Oscillator 2.



COURTESY ARMADILLO ENT.

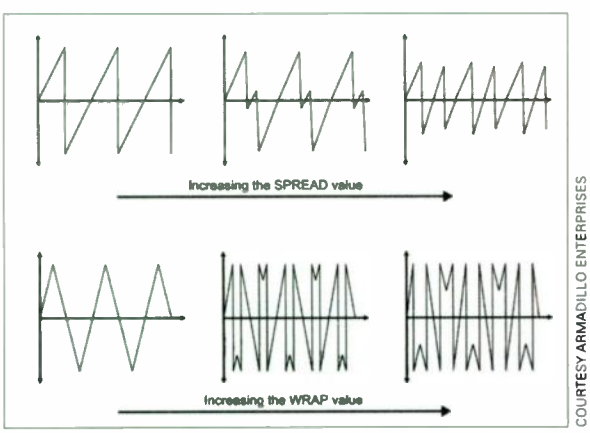
FIG. 3: If you know where to look, the amplifier and filter's envelope generators allow more user-definable stages than the average ADSR generator.

Oscillator 2 has a knob for changing only the pulse width. There are also coarse and fine-tuning knobs for shifting the pitch up to two octaves above or below Oscillator 1, as well as a button to enable keyboard tracking. Like the second oscillator on a true analog synthesizer, it can sync to Oscillator 1.

The Oscillator Common section is the OB-12's version of the mixer. Rather than individual sliders for each oscillator, the ring modulator, and the noise generator, the OB-12's three sliders are balance controls. One controls the balance between Oscillators 1 and 2, with equal gain in the center position. The second slider balances the ring modulator with the oscillators, and the third slider balances the noise generator with the oscillators and ring modulator. I don't understand why the OB-12's designers chose this design; a more traditional setup would require only one more slider.

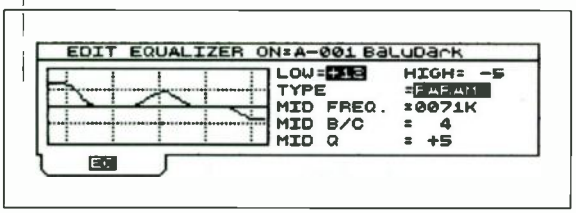
Two resonant filters provide lowpass, highpass, and bandpass filtering. At the highest resonance settings, they fall just short of self-oscillation. The filters can be configured in series and parallel; therefore, you effectively can change the cutoff slope by combining the filters. That feature adds a lot of flexibility. The filters also offer split routing, which lets you route one signal from the mixer to one filter, and another signal to the other filter.

Because there's only one set of knobs, the resonance and keyboard tracking parameters are identical for both filters. In the Edit Filters page, the cutoff



COURTESY ARMADILLO ENTERPRISES

FIG. 2: The OB-12 generates sounds with greater harmonic content than traditional analog synths, thanks to Oscillator 1's ability to change the shape of sawtooth (top) and triangle waves (bottom).



COURTESY ARMADILLO ENT.

FIG. 4: The OB-12 graphically displays parameter information whenever there's an opportunity.

frequency of the second filter can be offset in semitones relative to the first filter, from eight octaves lower to two octaves higher. Both filters also share an envelope generator and modulation routing.

At first glance, the envelope generators seem basic. ADSR generators modulate the filter and amplifier, and the pitch envelope lets you change attack and decay times. Dig a little deeper, though, and you'll find more. In the Advanced Envelope page—accessed from the Edit Filters or Edit Amplifier pages—you can control additional envelope stages (see **Fig. 3**). You can delay the onset of the attack stage, add a second decay stage, specify a breakpoint between the two decay stages, and specify the sustain time. If the sustain time is shorter than the length of time a key is pressed, the tone decays at the rate determined by that parameter. When you change any of the envelope parameters, a graphic of the envelope is displayed.

EQ OUT IN FRONT

I was quite pleased to see that there are five equalization sliders on the front panel. They can be assigned to either the graphic or parametric equalizer at the touch of a button. Whenever you move an equalization slider, a graph of the EQ curve appears in the display (see **Fig. 4**).

Only one type of EQ can be used at a time. In graphic mode, the sliders control the boost or cut at five fixed frequencies. In parametric mode, the top and bottom sliders manipulate the gain of fixed high and low frequency bands; the three sliders in the middle control the center frequency, the boost or cut, and bandwidth of the middle band.

The effects selection—reverb, delay, chorus, and overdrive—is not spectacular, but it is a valuable element of the OB-12's sound. There are ten overdrive types and six kinds of reverb. The delay effect is straightforward, with no choice of delay types. You can, however, modulate the delay time, which results in some bizarre pitch-shifting effects. The chorus provides all the typical parameters, including depth, level, modulation rate, feedback level, and predelay.

The maximum reverb time is a whopping 24 seconds. Except for reverb, all time values are given in arbitrary numbers from 0 through 100, rather than in seconds and milliseconds. Delay times and modulation rates can sync to MIDI Clock.

Each of the four effects has a dedicated knob and button. Normally, the knobs control each effect's depth. Turning a knob also changes the display to show the edit page for each effect. When you press the Level/Parameter button, each knob controls the value of one parameter for each effect, giving you immediate real-time control. In the edit pages, you can select which parameter the knob affects.

PLAYING ARPEGGIOS

Many of the OB-12's Programs depend on the Arpeggio function to make them interesting and useful. For the most part, the arpeggiator is quite basic. It has the usual up, down, up-down, and random patterns, called Modes. You can set the Range as much as three octaves higher than the original notes. Pressing the Hold button latches the arpeggio when you release the keys, as expected. In addition to a dedicated Tempo knob, there's a Tap Tempo button for manually entering tempo data. Velocity can be either fixed or as played.

Within a Program, the arpeggiator plays only the Parts you specify. A split key defines the point above which notes won't trigger arpeggiation. Above the split key, the other Parts can be played from the keyboard in the usual fashion.

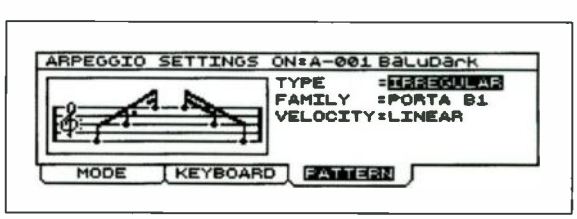
Arpeggios are divided into two Types: regular and irregular. These are further divided into Families. Regular Families contain notes of equal duration, from quarter notes to 32nd notes, including triplets. There are seven irregular Families that contain a measure's worth of notes with different values, forming a rhythmic pattern. Four of the irregular Families are nicely syncopated, and the other three are pretty unusual.

I expected the display's musical staff to reflect every change I made when editing the arpeggio parameters. Instead, it only changes when you switch from one Mode or Type to another. Because it doesn't indicate changes in Family, the pattern you see in the display may be different from what you hear (see **Fig. 5**).

TO COIN A PHRASE

The Phrase Recorder is the OB-12's note sequencer. It records and plays as many as four different Sets, each containing as many as 49 Phrases. Each Program can gain access to any Set. The maximum length of any Phrase is 32 measures. The Phrase Recorder stores as many as 16,000 notes, and sequences can be transmitted to external instruments through MIDI.

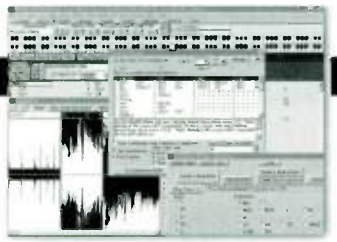
You can specify any key to trigger playback. The Phrase plays in a loop as long as you hold down that key. If the Hold function is turned on, the Phrase plays until you shut it off. As a sequence plays, you can vary the front-panel controls to change sound parameters. The Phrase Recorder is disabled when the arpeggiator is active, and vice versa.



COURTESY ARMADILLO ENT.

FIG. 5: What you see isn't always what you get when you're editing an arpeggio pattern.

BAND-IN-A-BOX® 10 IS HERE!



** NOTE: Band-in-a-Box for Macintosh® is currently available at version 8.0*

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NEW IMPROVED GUITAR SUPPORT. *Animated Guitar Fretboard Window – displays any track; Guitar tablature – on-screen or print out notation complete with Guitar TAB.*

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A Phrase can be assigned to play any or all of the Parts in each Program. If a Part is assigned to the Phrase Recorder, it can't be played from the keyboard while a Phrase is playing. Otherwise, you can play the keyboard normally as long as you avoid the keys that trigger sequence playback.

Before recording a Phrase, you can choose its Set, trigger note, length, tempo, time signature, and other essential parameters. By enabling the Overdub feature, you can record multiple passes and add more notes as desired. Because there are no tracks in a Phrase, you can't assign notes to individual Parts, so it's not multitimbral.

After recording a sequence, you can use the Phrase Event Editor to make changes. This presents an event list that displays the location, pitch, MIDI Velocity, and duration of each note. You can either play the keyboard or use the front-panel controls to change pitch and Velocity. Location and duration must be entered numerically.

PRODUCT SUMMARY

Oberheim
OB-12
analog modeling synthesizer
$1,999

FEATURES	3.5
EASE OF USE	4.0
SOUND QUALITY	2.0
VALUE	3.0

RATING PRODUCTS FROM 1 TO 5

PROS: Large graphic display. Lots of real-time controls and external controllers. S/PDIF output. Firmware upgrade through MIDI bulk dump.

CONS: Mediocre sound programming. Confusing mixer. Sliders that feel cheap. Poorly translated manual.

Distributor

Armadillo Enterprises
tel. (727) 519-9969
e-mail info@armadilloent.com
Web www.armadilloent.com

IT'S THE MOTION

The Motion Recorder memorizes any buttons you push, knobs you twist, and sliders you move in real time. These are recorded into one of two sequence loops that play back at the touch of a button. When you play back a motion loop as you're playing the keyboard, a phrase sequence, or the arpeggiator, it sounds as if you're manipulating the front-panel controls as part of your performance.

Unfortunately, when you stop or disable motion playback, the controls don't return to their original values; they freeze at their current values wherever they happen to stop. A loop can be as long as 32 measures. If you don't want the motion sequence to repeat, you have to stop it before the loop is complete. I'd like to see an option to have it play once without repeating.

As the Motion Recorder is recording, you can change filter settings, oscillator waveforms, effects parameters—in fact, any of the front-panel settings. Only

ALTER YOUR EGO.

Our WaMi Rack 24 is a machine of many faces. Interfaces, that is. Where else can you find a box that acts as a professional audio interface, a MIDI interface, a SMTPE interface, and a Word Clock Sync? Not to mention the fact that it has preamps on all four balanced inputs - all at a cost that won't break your bank account? So go ahead. Alter your ego. Then alter your creativity.

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changes to the front-panel controls are recorded, however, and not the left-hand controllers. By enabling the Overdub feature, you can even record multiple passes and add more layers of control messages from the front panel, just like sequencing with the Phrase Recorder.

When you've finished recording, you can view an event list of the recorded changes. In the Motion Event Editor, you can change the value, location in time, and type of individual events. Because editing every event in this list can be tedious, it's often easier to begin a new sequence. Without an Undo function, you have to discard your work every time you mess up an overdub.

Is the Motion Recorder necessary? All the knobs and sliders send either Control Change or SysEx messages, so why not record and play back these changes on a "normal" sequencer? Unless you're dealing with many simultaneous parameter changes, you could even change them in real time with footpedals and switches. But if simultaneous parameter changes are going on, some sort of sequencer is essential. Why would anyone prefer a specialized sequencer for recording control messages?

What the Motion Recorder provides is immediacy. It's easier to be spontaneous when all you have to do is press a couple of buttons and go. The Motion Recorder is always at your fingertips; you don't have to boot up a computer or switch your synth out of Performance mode. Specialization equals convenience, and anything that speeds up the process of creating electronic music is worthwhile. Technology should help you rather than stand in your way. Of course, whether you find the Motion Recorder convenient depends on how you work—you may find it utterly worthless.

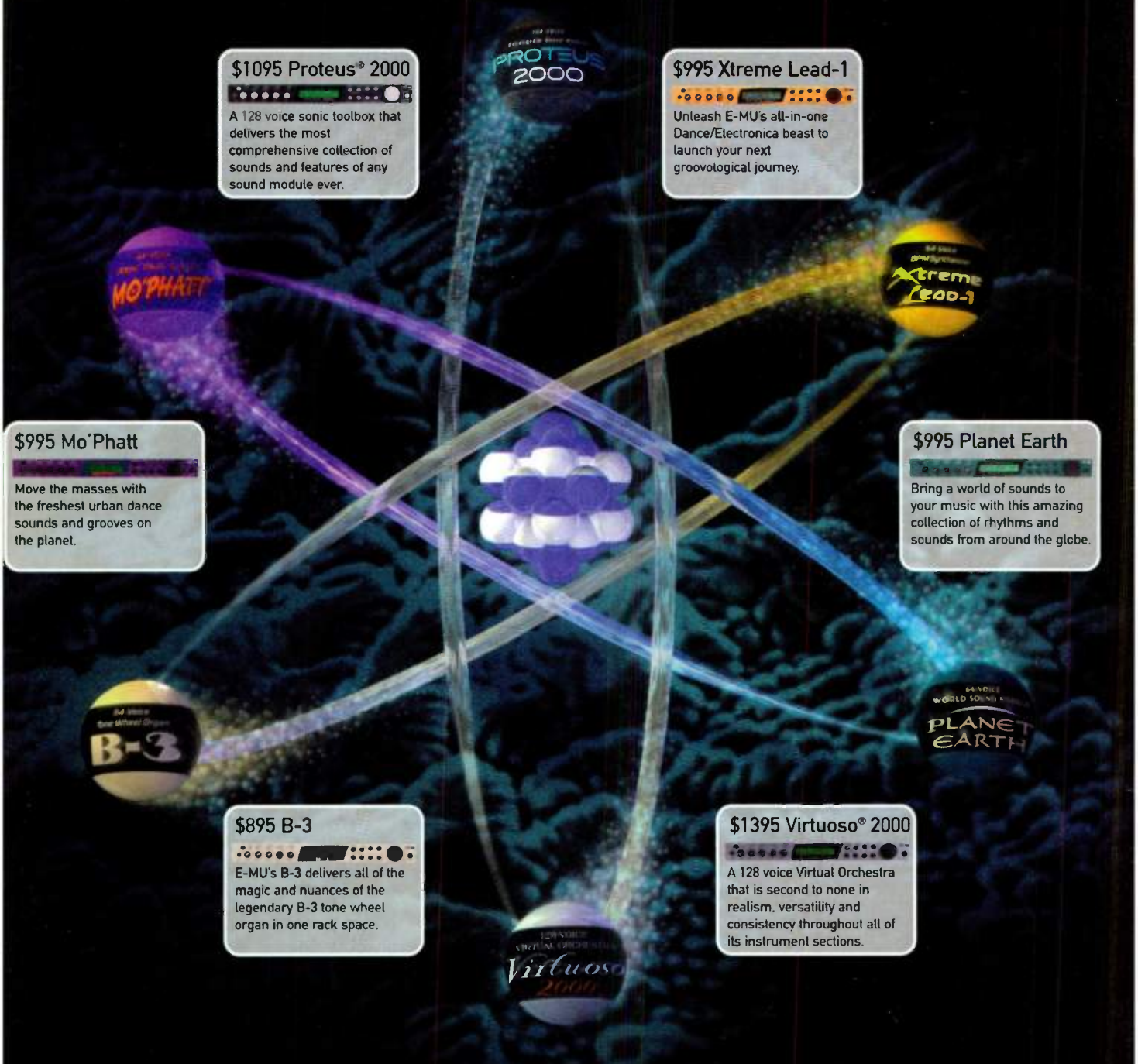
MIGHTY MORPHING

One of the features that puts the *Z* in Z-Domain Synthesis is its ability to morph one Timbre or Program into another. At the Program level, you can morph as many as four Timbres into four different Timbres. Morphing can be performed manually, using the Mod Wheel or a footpedal, or it can be performed automatically during a specified period of time or number of measures. If an edit page is displayed, you can watch the values change as the morph progresses.

Ideally, morphing should be a gradual transition from one Timbre or Program to another. The problem is that some parameters are switched rather than continuously variable. When switched parameters morph from on to off, for example, the change is quite abrupt. That change occurs at the onset of the morph.

I've discovered that morphing works well with sounds designed with morphing in mind. For best results, create two identical Timbres and then alter them to reflect how you want the morph to begin and end. Avoid switched parameters and sweeping changes that result in bizarre artifacts. Successful morphing requires trial and error, but satisfactory results are possible.

The Quantum Mechanics of Sound



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GOOD SOUNDS, BAD SOUNDS

The OB-12's weakest aspect is its programming. Most of the onboard Programs and Timbres just can't rival the OB-12's competitors. There's some good material, but you have to weed through too many Programs that don't appear useful either in a musical context or for sound design. Virtually all the sounds that emulate acoustic instruments are weak. With some hotshot programmers, Viscount could soup up its sounds and make the most of the OB-12's capabilities. As my elementary school teachers used to say, the OB-12 is simply not living up to potential.

I don't mean to suggest that all of the sounds are awful. Some of the best are Minimoog emulations such as Solo Synth, except that it doesn't make any use of the Mod Wheel unless you do some editing. Crystal PPG is a cool, shimmering bell-like selection. The Program 12 Species brings back memories of *Forbidden Planet* sci-fi noises I made when I was a child. HyperActive is a clicky, hissy sound that I've never heard from another synth. Fooling around with its parameters yields some interesting results. Aryhthmic, despite Viscount's misspelling, makes good use of the arpeggiator's ability to play unusual rhythms. Astronomy sounds as though it might be appropriate in a planetarium.

OB Strings is a slow, atmospheric pad that makes a wonderful underpinning for other instrumental tones; it's one of the OB-12's most musical Programs. As good as it is, nothing is assigned to the Mod Wheel, which gives the impression that the programming is simply incomplete.

A surprising number of sounds don't use the Modulation Wheel at all, and quite a few don't assign Pitch Bend or any other left-hand controllers. When I powered up the OB-12 for the first time, I couldn't get the Pitch Bend, Mod Wheel, or ribbon controller to work with Program A-001, called OB Fat Pad. I soon discovered that controllers are programmed at the individual Timbre level, and the Fat Pad Timbre doesn't have any of those controllers assigned to it. It seems that Viscount would want the first sound to show off the OB-12's capabilities, but it appears that no one thought of that.

I don't understand why many of these Programs exist except to fill space. Many of them aren't useful, aren't pleasing to the ear (even if you're looking for rude sounds), and aren't even cleverly programmed. Bass & Strng sounds as though someone new to synthesizer programming created it. The two halves of Bass+Piano sound like neither bass nor piano. Atmosphere is anything but atmospheric. Funked Up is not funky at all unless you mean it in a negative sense. The percussion sounds, such as SY Timpani and Analog Kit, are disappointing. A lot of programs have humorous names like Drunken Fly and Smelly Cats, but they don't sound as comical as some of the supposedly serious sounds.

In the right hands, this could have been a cool-sounding synthesizer. Unfortunately, it fell into the wrong hands. With only 256 locations for Programs, all the locations should be filled. The last six Programs in memory, named Test, are essentially blank, reinforcing the notion that the OB-12 is a work in progress.

LOST IN THE TRANSLATION

The operating manual is a little difficult to read at times. It's divided into two languages: the first half is Italian, followed by a translation in English. The translation, for the most part, isn't very good. For example, an overview of the OB-12's architecture is given in a section titled, "How to Be OB-12 Is Organised." A lot of British terms and spellings crop up, such as calling a quarter note a "crotchet." Considering that this instrument is being marketed to Americans, it would have helped to hire an American editor to read through the manual and fix translation problems.

The manual lacks an index, and the table of contents isn't always detailed enough to help you find what you need quickly. Most of the time, however, the operating system is straightforward enough that it's difficult to get lost.

There's no documentation other than the manual. A list of the Programs and Timbres would be helpful. Considering that these banks are subject to change, such a list should at least be available on the Web site where you download the new banks, but it isn't.

OB OR NOT OB?

I've owned a number of Oberheim synthesizers in the past, including a Two-Voice, a Four-Voice, an OB-1, and a Matrix-12. Sorry, Viscount, but the OB-12 neither looks, sounds, nor feels

OB-12 Specifications

Keyboard	49-note unweighted; Velocity- and Pressure-sensitive
Polyphony	12 notes
Multitimbral Parts	4
Sound Engine	analog synthesis modeling
ROM/RAM Programs	0/256
ROM/RAM Timbres	0/256
Removable Storage	none
Sequencers	Phrase Recorder, Motion Recorder
Effects	reverb, delay, chorus, overdrive
Equalization	5-band graphic, 3-band semiparametric
Analog Audio Outputs	(4) ¼" TS unbalanced; (1) ¼" stereo headphone
Digital Audio Output	RCA S/PDIF at 44.1 kHz and 16-bit resolution
Additional Ports	MIDI In, Out, Thru; (2) ¼" TS footswitch; (2) ¼" TS continuous footpedal
Display	240 × 64-pixel backlit LCD, reversible
Dimensions	36" (L) × 3.5" (H) × 15" (D)
Weight	37 lbs.

like an Oberheim. Overall, it sounds more like an Oberheim than, say, a Moog, but it will never replace either. Like the tone of a classic analog Oberheim, the sound is smooth and warm rather than searing or punchy. The OB-12 can probably come closer to recreating the sounds of a classic Oberheim than the other way around.

I had hoped the OB-12 would be a modernization of the Matrix-12, but it falls short in several areas. The Matrix-12 could send and receive on 12 MIDI channels at once, and its flexibility with modulation routing was staggering. On the other hand, the Matrix-12 stored only 100 Programs and 100 Multis, and it had no graphic parameter display, no effects processing, no arpeggiator, and no sequencer.

WINDUP AND PITCH

If the OB-12 is your primary instrument, its unique sound might help you get noticed. If you already have enough synthesizers to cover all the other bases, adding an OB-12 to your arsenal will broaden your timbral palette. If you're adept at synthesizer programming, the OB-12 offers a nice toolbox for crafting new sounds.

Lackluster factory programs aside, the OB-12 looks and sounds good but not great. If Viscount would hire some talented programmers to develop enough dynamite patches, it might have a winner on its hands. But the present incarnation of the OB-12 just doesn't have any great hafta-have-'em, can't-live-without-'em sounds.

If you want to check out an OB-12 in a music store, listen to as many sounds as possible. Pick out the sounds you like and play with them for a while. Don't form your opinion based on what you hear when you first turn it on. The OB-12 doesn't have a demo sequence, so ask a salesperson who has spent some time with it to show you the ropes. You'll know if it's the right instrument for you.

Geary Yelton *has been programming and playing synthesizers since the early 1970s. He still owns an Oberheim TVS-1 he bought in 1979.*

TACTEX CONTROLS

MTC EXPRESS

A new generation of controllers through the magic of Smart Fabric.

By Scot Gresham-Lancaster

There have been a number of developments in controllers that work beyond the MIDI specification's confines. An important new entry in this field is Tactex Controls' MTC Express (see **Fig. 1**). The MTC Express features a pad made from Smart Fabric, a soft material that gives users a multipoint, three-dimensional control surface. The result is a programmable controller that is highly responsive and lets musicians realize the potential of electronic instruments.

INSIDE THE PAD

The MTC Express's Smart Fabric is based on a patented pressure-sensing technology developed by the Canadian Space Agency. Smart Fabric consists of thin cellular elastomers, typically made of urethane or silicon, with an outer skin that protects the fabric and serves as a wear surface. Intended for space-based robotics, the fabric provides touch-based feedback to remote telerobotic operators.

Within the Smart Fabric are overlapping pressure sensors, called *taxels*, connected to fiber-optic cables. An LED generates a measured amount of light, which is sent to the taxels through the fiber-optic cables. Pressure on the taxels restricts the flow of light. Each affected taxel returns a reduced amount of light to a light sensor, which tells the unit's CPU the amount of pressure exerted in a specific location.

The MTC Express's active area contains a grid of 72 taxels, with taxels spaced about one centimeter apart. Although future Smart Fabric products can be almost any size and configuration, the MTC Express has a 5¾-by-3¾-inch control surface, which is roughly the size of a mouse pad or a small Wacom art tablet.

GENEROUS CODING

The MTC Express includes the necessary hardware and cross-platform application program interface (API) for developing custom instruments and controllers. The API consists of a set of C-language libraries to which developers can link their custom code.

Cycling 74's *Max* and *MSP* are the best environments for developing your ideas for the MTC Express. Researcher Matt Wright and others at the Center for New Music and Audio Technology at the University of California at Berkeley have created external drivers for the *Max* graphical programming environment.

COURTESY TACTEX CONTROLS

FIG 1: The Tactex MTC Express comes with a cross-platform application program interface for creating instruments and controllers.

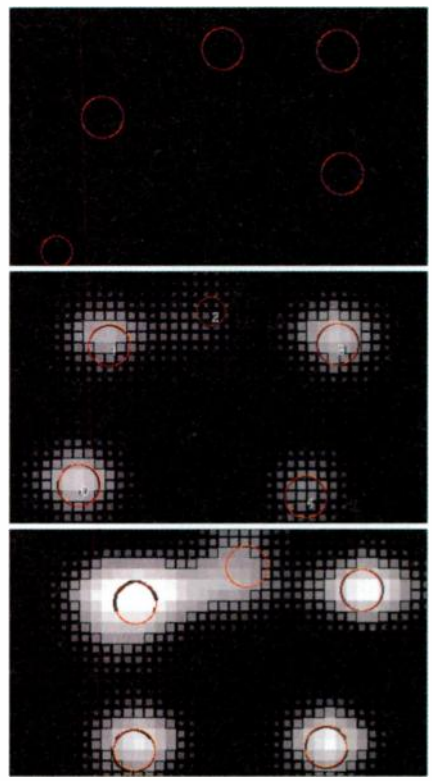

FIG. 2: The same pressure points on the pad can be interpreted in a variety of ways, depending on the computer algorithm used.

Most of the development work in *Max* has been to create external objects that include the MTC Express Pad as an input. Of course, a resourceful programmer can make application-specific input drivers for any Mac or PC program by using the API libraries.

After I unpacked the controller and installed the Tactex object, it only took me five minutes to get things working enough to receive coordinates and pressure readings when I touched or tapped the pad. I am an experienced *Max* programmer, but a novice user could use the Tactex pad to create custom controllers within a day.

SEE ME, FEEL ME

The MTC Express's internal electronics scan the sensing surface and convert the pressure and coordinate data of five points into digital information that is sent to the computer through a serial connection at 115 kbps. A computer

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If you told me that one day I'd co-write the #1 Country song in America, I probably wouldn't have believed you.

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MTC Express Specifications

Pressure Resolution	8 bits
Transmission Rate	115 kbps
Minimum Activation Pressure	0.4 psi
Connector	DB9 or Mac serial adapter
Dimensions	0.8" (H) × 7.5" (W) × 6.69" (D)
Weight	17 oz.

program interprets this information and then creates a map of the contact points. That is different from how an art tablet operates: the computer gets the pressure information from the tip of a stylus and communicates information about that single point.

Fig. 2 shows how the same left-hand position on the pad can be interpreted differently, depending on the computer algorithm. **Fig. 3** gives an example of how the pad can be used for tracking a moving point across the pad. Those visual examples show the variety of ways the MTC Express can be used. In the context of musical control, they suggest an array of exciting possibilities.

For example, the control surface can be set up as multiple dynamically interactive control areas. In one mode, the pad's surface can be used as a collection of virtual volume faders, like on a mixer. In another mode, note density and filter settings for a synthesizer can be controlled by finger position and pressure.

I wanted to use the pad to develop a map of virtual keys across the surface. The layout was based on the tonality diamond of microtonal-music pioneer Harry Partch. When I discerned the scanning pattern of my Tactex object, I was surprised to see a stream of numbers coming from locations I had not been touching. The MTC Express owner's manual revealed that I needed to normalize the pad before using it so that a baseline surface pressure could be determined.

Normalizing the pad eliminates the individual variability in taxel response. The procedure can be automated in software and made part of the initial startup of software using Smart Fabric. Once normalized, the taxels' range of pressure response is 0 through 1,023. This degree of accuracy is finer than the 0 to 127 data byte of a standard MIDI controller. After I normalized the pad, I received reliable results.

In my review unit, some taxels were slow to recover after being touched. When an area is depressed, each taxel should return immediately to its normalized state. However, that didn't always happen. The manufacturer says this problem has been fixed on subsequent pads.

Once properly calibrated, the pad sends out two numbers for each taxel that receives pressure. The first number represents the location, and the second is the degree of pressure. As pressure and location change, the new values transmit with the next scan.

After I finished creating my tonality diamond, I built a mixer control surface. I then realized that those different designs could be separate states within a single instrument design. The possibilities are staggering.

FUTURISTIC SCRATCH PAD

MTC Express's most intriguing aspect is that it provides continuous control of multiple user-definable parameters simultaneously. Imagine controlling pitch, filter cutoff, and synth amplitude at the same time without adapting traditional keyboard performance techniques. This could lead to specialized instruments based on a synth's capabilities, rather than outdated acoustic models.

FIG. 3: The MTC Express can be programmed to follow the trajectory of as many as five pressure points across the pad's surface.

An attractive attribute of the pressure-based approach of the MTC Express is its physicality. The performer deals with the surface in a discreet way, so the music is the direct result of fine muscle control and purpose, which have always been the prerequisites of making music but have been limited by most electronic controllers. The MTC Express is a great tool for realizing the promise of electronic musical-instrument design.

PRODUCT SUMMARY

Tactex Controls

MTC Express
control surface
$495

FEATURES	4.5
DOCUMENTATION	4.0
EASE OF USE	3.0
VALUE	4.5

RATING PRODUCTS FROM 1 TO 5

PROS: Good for designing customized controllers. Senses and tracks five contact points simultaneously. Includes application program interface.

CONS: Taxels sometimes slow to recover from pressure. Not for novices. Requires knowledge of the C-programming language or the *Max/MSP* programming environments.

Manufacturer

Tactex Controls
tel. (250) 480-1132
e-mail sales@tactex.com
Web www.tactex.com

Scot Gresham-Lancaster *is an electronic technician, computer-music lecturer, and recording engineer at California State University at Hayward's music department, as well as the fuzz in the electronic-music trio, Fuzzybunny.*

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FIRST WE LISTEN

SYMBOLIC SOUND

KYMA SYSTEM 5.11 (MAC/WIN)

A powerful system gets a major update.

By Dennis Miller

When you have a product that **EM** editors already billed as "the most powerful sound-design workstation on the planet," what do you do for an encore? Symbolic Sound, maker of the Kyma System, faced that challenge. With the recent release of Kyma 5.11, Symbolic Sound found a way to make the system more powerful, easier to use, and less expensive. That combination should make Kyma appeal to a large number of people.

Among the most important additions in this release are a multitrack timeline for scheduling sounds and processes, enhanced customization options, and a slew of new sound modules. Kyma's prototype algorithms are also better organized, and the new Sound Browser provides easier access to project files. A number of new tools target dance and remix artists. All in all, there is much to like in this significantly enhanced new version.

Because we have looked at Kyma several times (see the review in the January 1998 issue and the 2001 Editors' Choice Awards in the January 2001 issue), I'll give a short overview of the system before diving in to the new features. To hear some examples of what Kyma can do, check out www.symbolicsound.com/hearkyma.html.

Minimum System Requirements

Kyma System

MAC: Power Mac; 32 MB RAM; OS 7.05; NuBus or PCI slot

PC: Pentium 120; 32 MB RAM; Windows 95/98/ME

WHO, WHAT, WHERE

The Kyma System combines a DSP-based "mainframe" called the Capybara Sound Computation Engine (see **Fig. 1**), with Kyma, an elegant graphical sound-design language. The Capybara is a 3U rack-mount unit that contains four Motorola DSP 56309s and 96 MB RAM and ships with four 24-bit, 100 kHz A/D/A converters (expandable to eight). It supports an additional 2 to 12 expansion cards ($595 per card), each with two more Motorola DSP chips and 48 MB RAM. A PCI card connects the Capybara to your computer. (A PC Card interface is available for connecting the unit to a laptop.)

The Capybara provides the raw horsepower needed to generate the sounds and processes you design on your Mac or PC while running Kyma. In effect, the system is a hardware-accelerated virtual synthesizer that employs dozens of sound-synthesis methods, effects processes, and a lot more.

As with a soft synthesizer, you design sounds of any complexity using the hundreds of generating or processing algorithms Kyma provides, then download them to the Capybara for instantaneous playback. What moves Kyma well beyond the modular-synthesizer world, however, are the enormous range of functions the system offers, the total flexibility with which you can employ them, and the tremendous processing power at your disposal. More than 300 customizable algorithms, called Prototypes, can be combined in nearly any way, and there are no limits on the number of algorithms or the manner in which they can be arranged into a finished design. You can assign Program Changes to switch among sounds, use nearly any type of information to control a sound's parameters, and, of course, build vast libraries of your custom patches.

But you don't need to build your own sounds—more than 1,000 factory examples in a wide range of categories ship with the system and will keep you busy for hours. The examples have settings that make them useful right out of the box, and in short order you'll have your own collection of favorites.

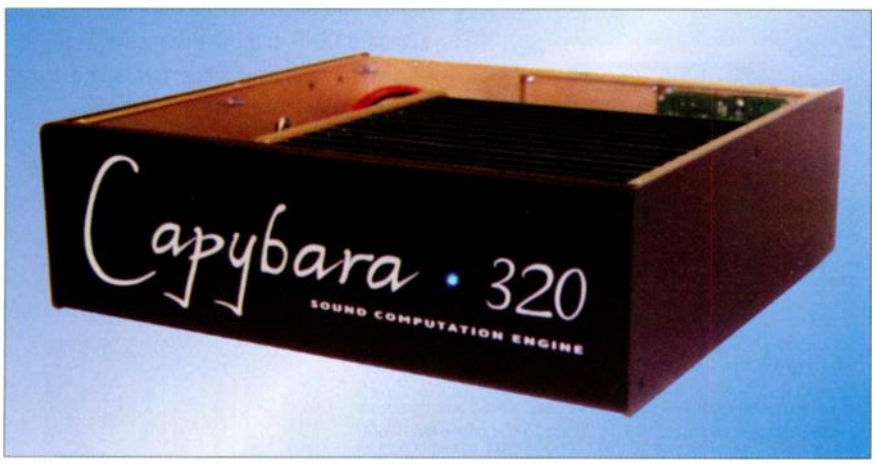


FIG. 1: Symbolic Sound's Kyma System combines an external sound-computation engine with a graphical sound-design language. The system supports 2 to 12 expansion cards, each with two Motorola DSP 56309s and 48 MB RAM.

WHAT'S IN A NAME

Kyma's naming conventions can cause some confusion. For example, all synthesis and processing algorithms are called Sounds. Those Sounds can be anything from a process to read a file from disk (the DiskPlayer), a filter (the 2-FormantElement), one of many synthesis methods (including FM, AM, and subtractive), or even a live multitrack looper (the Four-track looper). Individual Sounds can be combined into larger structures, also called Sounds. To hear a Sound, compile and load it into the Capybara, then send it any needed real-time control information, such as MIDI messages or live audio

input. Most Sounds can be tweaked so that they play back with no user input—in most cases, you can tell the Sound to read data from a preexisting MIDI file on your hard drive or use a script to generate the control data it needs.

To build new Sounds, open a Sound file and drag Prototypes from the Prototype strip into it (see **Fig. 2**). Prototypes are the basic building blocks in Kyma and are not editable; when you drag a Prototype to a Sound file, you always work on a copy of the original. There are numerous shortcuts for creating Sounds, such as MIDI Learn, in which moving a physical controller attached to Kyma assigns that controller's number as the value to control a selected parameter. To use one Prototype (such as an oscillator) to control another's parameter, just copy the first Prototype and paste it into the desired parameter field of the second Prototype, and you're set.

Kyma uses the term *Hot parameters* to describe those parameters of a Sound that can be updated in real time. Nearly every setting of a Sound can be a Hot parameter, and when you first compile and load a Sound, a Virtual Control Surface (VCS) containing sliders and knobs for all the Hot parameters anywhere in your design appears on the screen (see **Fig. 3**).

You can save VCS presets, which are snapshots of parameter settings; associate a group of settings as the starting values when the Sound is run the next time; and even use a random-settings generator (called "rolling the dice") to experiment with new settings. Any parameter can be locked out of the randomization process; that option is very useful for avoiding amplitude levels that pulverize your speakers. A robust VCS editor lets you change the type of interface elements that control parameters or rearrange their layout on the screen.

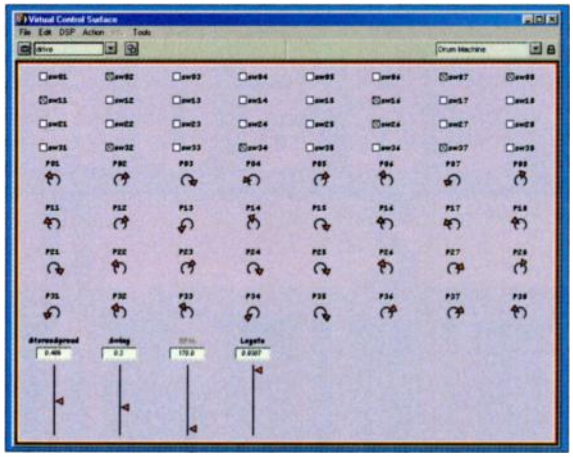


FIG. 3: Hot parameters for each Sound appear on the Virtual Control Surface, where you can adjust them in real time.

SOUND AROUND

One major new feature in Kyma 5.11 is the Sound Browser. Like the older File Organizer, the Sound Browser provides an alphabetically sorted view of the files on your hard drive that Kyma can use (see **Fig. 4**). But now you can audition anything from raw samples to complex, multilayered effects directly from within the Browser. You can even have separate Browsers for different projects or limit the Browser display to certain file types, drives, or directories.

The Sound Browser also gives you access to the new Replaceable Input (RI) feature. The RI feature allows you to specify a sample or audio file that will be used by default as the basis for any Sounds that use preexisting audio.

For example, if you do sound design for a game and want to try out numerous effects on a vocal sample, just assign that sample as the RI, scroll through the list of effects Sounds that appear in the Sound Browser, and play any one you like. Kyma substitutes your sample for the one that the effect uses by default. That is an enormous time-saver and lets you experiment with a vast range of sonic transformations quickly and easily.

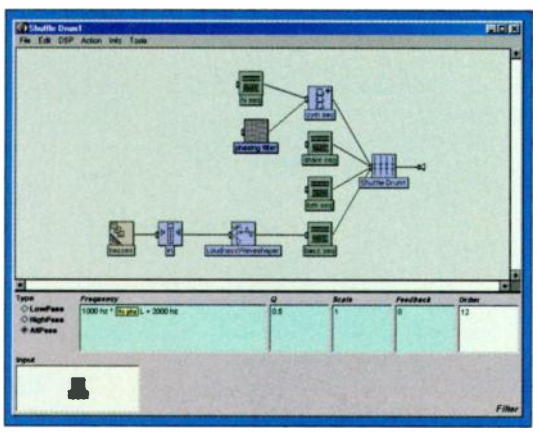


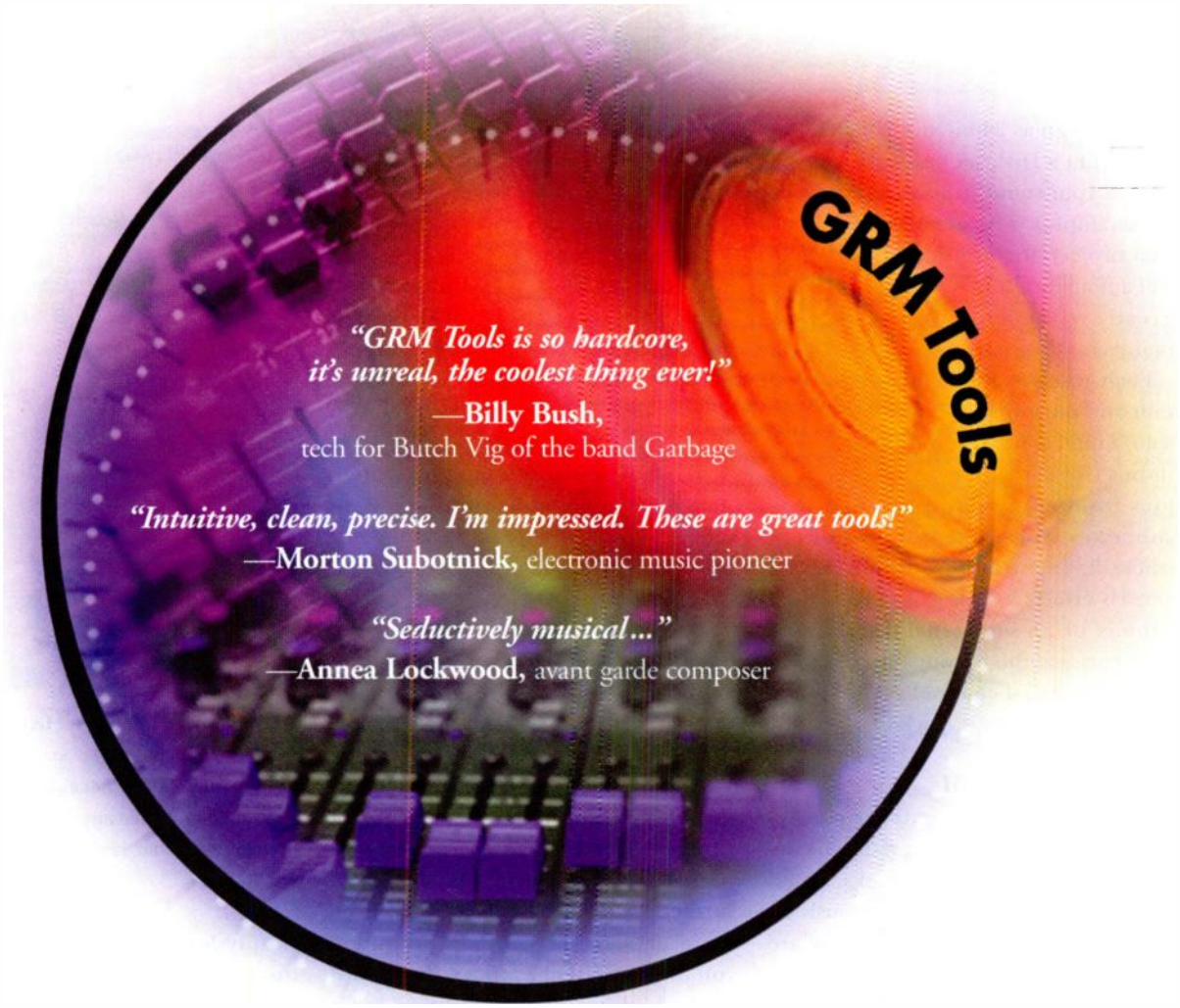
FIG. 2: The Sound Editor has a two-part display that is used for chaining Prototypes together (top) and editing individual modules' parameters (bottom).

TIME IS ON MY SIDE

For anyone doing computer-music composition, sound for film or games, or even live, interactive performance work, the new Timeline is a major attraction. In fact, it is easily the most significant new feature in the release. Like a sequencer or multitrack audio editor, the Timeline offers a two-dimensional, multilayer grid on which you place Sounds. But unlike a sequencer or editor, the Timeline lets you build time-varying synthesizers or effects that can overlap or morph into one another.

For example, by dragging only a few Sounds into the Timeline from the Prototype strip, I created a patch that is a subtractive synth for 30 seconds, morphs into an additive synthesizer for 60 seconds, then becomes a granulating sample player, all with no user input (see **Fig. 5**). Because any Kyma Sound can be used on the Timeline, you can layer processed real-time audio input with synthetic Sounds and samples. If you want to apply an effect to a Sound in the Timeline, just drag the icon representing that effect from the Prototype strip or Sound Browser and drop it on top of the Sound you want to modify. It doesn't get much easier than that.

There's no limit to the number of tracks or Sounds you can have in the Timeline, though at some point you may run out of real-time processing power (check the FAQ at Symbolic Sound's Web site for performance benchmarks). If that happens, simply save the entire project to disk as an audio file (WAV, AIFF, and other common audio formats are supported at



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rates as high as 24 bit and 100 kHz) or use Kyma's DiskCache to prerender part of your sound (the synthesis layer, for example). The next time you load that project, the prerendered segment will automatically play back as a sample, greatly reducing the processing demands on the system.

Each track in the Timeline has numerous parameters, which include solo/mute, volume and pan, angle and radius (for surround mixing), and various routing options. You can create submixes if, for example, you want tracks 2, 4, and 6 to route through a reverb effect, and it's easy to send a submix or an individual track to the Capybara's audio outputs. You can also assign any MIDI channel as the source of control data for a track.

TAKING CONTROL

The Timeline offers extensive automation features that you can use to control individual Sounds, tracks, or all events in your project simultaneously. At the bottom of the Timeline window are displays for graphically editing parameter types. You can draw the control data for a Sound's parameters—for example, a reverb's fade time or a granulator's grain size—and you can also automate any of the track parameters previously mentioned. Also, you can use the BPM parameter to slow down or speed up a project's playback.

There are numerous tools for manually entering new data and manipulating preexisting control data, and linking controls is easy. For example, one parameter might use an inverted version of another's control data. You can even import an audio file, have Kyma analyze its frequency or amplitude envelope, and then use that envelope to control a Sound's parameters; the entire process takes no more than two or three steps.

In addition to drawing or importing automation data, you can use the VCS to send parameter values to one or more Sounds as they play in the Timeline, and you can even record VCS-fader movements directly into the automation-editor window. You can perform the same type of operation using an external MIDI control surface (or sequencer running on the same or another computer), and if you own a CM Labs Motor Mix, you'll find a high level of integration for it within Kyma. You can also assign fixed values for each Sound's parameters before you start playback and simply let your compositions evolve unattended.

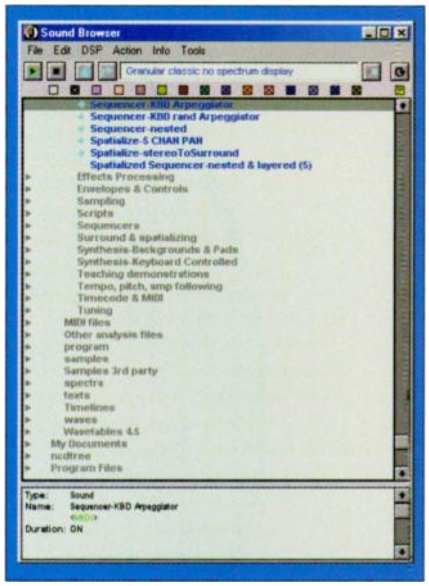

FIG. 4: The Sound Browser lists the file types that Kyma supports and is useful for organizing project files. The Replaceable Input, a sample used by default for any Sound that includes prerecorded audio, is set in the Sound Browser window.

Kyma has a number of features optimized for surround mixing. These include the ability to set the pan position of both an entire track and an individual Sound on a track. Also, you can design a surround mix even if you have only four outputs—just tell Kyma to render the Timeline to six or eight surround files on your drive. Then send the files to your client, who can load them into, say, a multichannel Pro Tools system and hear the exact spatialization and panning you designed.

Though you can't display video directly in the Timeline, by putting the system in Time Code mode, you can control it from a MIDI program, such as a digital-audio sequencer, or a video deck. Kyma syncs to word clock, LTC, VITC, MTC, and house sync.

NEW MILLENNIUM MODULES

Kyma has always offered numerous ways to generate and process sound, but the new release provides dozens of new Prototype Sounds and a much-improved system for organizing them (see **Fig. 6**).

Kyma Specifications

Analog I/O	(4) XLR balanced standard (expandable to 8)
Digital I/O	(2) XLR stereo AES/EBU or (2) RCA stereo S/PDIF
Other Connections	MIDI In/Out/Thru; (1) BNC word-clock input; (1) BNC house sync input; (1 pr.) RCA VITC I/O; (1 pr.) RCA LTC I/O
Output Level	+14.5 dBu
Input Clipping Level	+14 dBu
Resolution	24-bit
Internal Processing	24/48/56 (algorithm dependent)
Sample Rates	All standard rates from 32 to 100 kHz
Dynamic Range (A/D)/(D/A)	110 dBA/107 dBA
Frequency Response	20 Hz–20 kHz (+0.04/–0.26 dBu @ 44.1 kHz)
Input Impedance	10 kΩ
Crosstalk	–110 dB
Noise (A/D)/(D/A)	110 dB/105 dB
Tuning Resolution	0.0026 Hz
Prototype Algorithms	>300
Factory Patches	>1,000
Dimensions	3U × 16.5" (D)
Weight	15 lbs.

The Sounds are grouped into categories by function and include spectral processors, numerous synthesis methods, pitch and formant shifters, and vocoders. A large number of filters, waveshapers, dynamics processors, and looping tools are just some of the list's more traditional algorithms. Keep in mind that any process can be combined with any other—Kyma sets no limits on the type of signal paths you can create or the number of processes you can chain together.

Some of the Prototypes have names that belie their exact function. For example, the Spectrum Discombobulator introduces controllable amounts of random variation into the timing, amplitudes, and frequencies of the sound spectrum, and the FmntOscilBPMFilter KBD is a keyboard-triggered synthesis module that generates trancelike, analog-style backgrounds synched to the bpm. The ResynthesizeRandomFrames is handy for freeze-framing your vocals at the bpm rate, and the SampleBitsBPM happily snips small bits out of your loops so that you can rearrange them if you so desire.

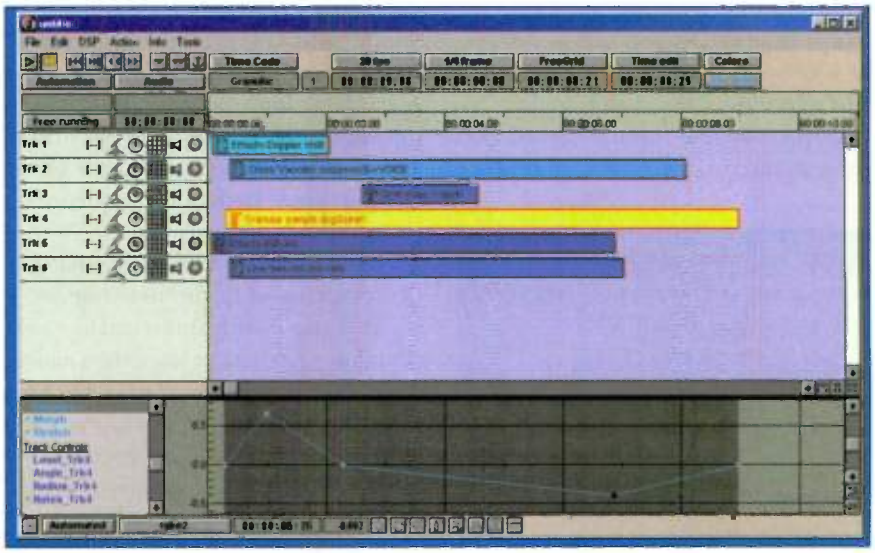

FIG. 5: The new Timeline is similar to a multitrack sequencer or audio editor and has a graphical editing window (bottom) for drawing or recording parameter data.

For dance, trance, and techno lovers, Kyma includes numerous tempo-based sample players, various sequencer types, and several drum machines. The

BPMRandoMiniLoops, for example, jumps around randomly within a sample at a rate determined by the bpm setting and picks segments of random durations, playing some forward and some backward. You'll be the hit of the rave with the DerangedSampleBits Sound, which grabs bits of a loop at user-defined points and then uses the AnalogSequencer module to play through those bits in different orderings. Using the VCS (or a Motor Mix), you can toggle steps of the sequence in real time.

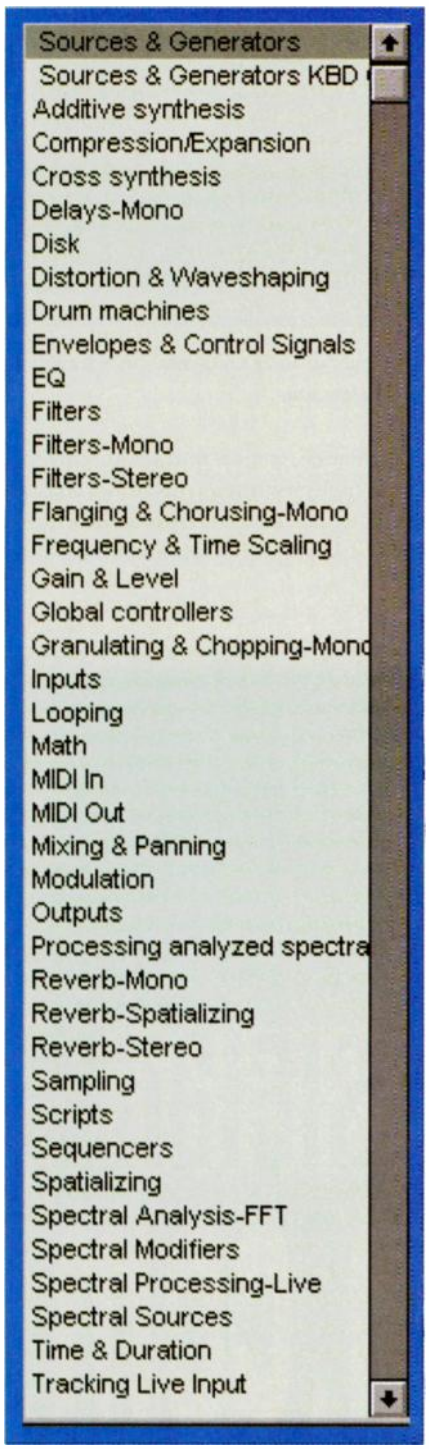

FIG. 6: Kyma's basic algorithms are located in the Prototype strip and are organized into distinct categories.

Remixing is yet another area that has been enhanced in the new release. I set up a patch with three tracks, each containing a different loop, then added controls to change the playback tempo without changing the pitch, the start position within each loop, each track's volume, and the pan position. This set is ready to take on the road, and the production time was a mere 30 minutes. For gathering and preparing source material, there are all sorts of rhythmic choppers, shufflizers, and live-audio capture tools, which all work in real time.

OUT OF THE BOX

You'll have no trouble making new Sounds with the Prototypes, but you will certainly spend considerable time with the system's 1,000-plus example Sounds. (Also check out contributions from Kyma users at the new users' forum at Symbolic Sound's Web site.) The examples incorporate the Prototypes in various ways and are organized primarily by task. Looking for things that go bump in the night? Try the Whooshes, Hits, and Bys category. Working on a live performance piece? Look into the Tempo, Pitch, and Amp Following folder for ways to start and stop a MIDI sequence or audio file, using nothing but your voice. If you really want something unique, let Kyma slow down your voice in real time using its powerful live analysis and resynthesis tools. (Hint: look in the Time-scaling category.)

There are also examples that show the extensive new spectral-morphing features and more-powerful vocoders, and Kyma even includes a new set of additive-synthesis examples that show off the system's power. The Backgrounds and Pads group looked particularly intriguing, though I managed to try out only a few of the several dozen Sounds in that category. The examples cover nearly every Prototype the system offers and are great starting points for your explorations.

Kyma's developers have always managed to extract significant processing power from the hardware, but this release includes even more optimization. That means you get more power from your existing Capybara hardware just by upgrading your software. The Capybara itself was also significantly enhanced and is available in several versions.

The Capybara's new 24-bit, 100 kHz converters also sound fantastic, though Windows users still can't gain access to the hardware from their other audio applications. Mac users, on the other hand, can test the beta ASIO drivers available from Symbolic Sound. There's currently no support for NT, but users should expect NT and Windows 2000 compatibility later this year.

Kyma's extensive documentation includes a 550-page printed manual and nearly 100 pages of electronic text relating to the new release. The printed manual has some out-of-date information: for example, it mentions some Prototype Sounds that have new names

PRODUCT SUMMARY

Symbolic Sound
Kyma System 5.11 (Mac/Win)
sound-design workstation
$3,300 base system

FEATURES	5.0
EASE OF USE	4.0
SOUND QUALITY	5.0
VALUE	4.5

RATING PRODUCTS FROM 1 TO 5

PROS: Vast range of sound-processing and -generating tools. Intuitive graphical interface. More than 1,000 included Sound examples.

CONS: Insufficient beginner's tutorials. Some Sounds not intuitively named.

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

or contain renamed parameters. But that is a minor problem that won't stop you from understanding how the Sounds work. Numerous tutorials guide you through the system's intricacies, though I wish more of them were aimed at the beginner's level.

There's flyby assistance for all the main system controls, and nearly every parameter of every Sound is documented with context-sensitive help. Symbolic Sound's Web site also includes a fairly thorough FAQ and answers to common questions in the users' forum. Free e-mail and telephone tech support round out the package.

▼

I can't recall a single system crash.

COME ON DOWN

The Kyma System is a real engineering feat, and its designers are to be commended for the ongoing and significant enhancements they have provided during the past ten years. The system is remarkably stable—I can't recall a single system crash in the many years I've used it—and when its price is compared with that of even a moderately loaded hardware sampler, it looks like a real bargain.

Kyma stands alone as a mature, hardware-accelerated sound-design platform. It provides a vast number of tools for nearly any type of audio work and the resources for building your own tools when you need them—no $100 third-party plug-ins required here. For sound design, live performance, computer-music composition, dance music, remixing, and even scientific and engineering applications, Kyma is about as good as it gets.

EM *associate editor* **Dennis Miller** *lives in the Boston suburbs with his wife, two daughters, cat, dog, and six computers.*

EMAGIC

EXS24 1.0 (MAC/WIN)

Could a Logic Audio plug-in replace your hardware sampler?

By Alex Artaud

As computer performance has improved dramatically in recent years, software samplers have moved into what was formerly the turf of hardware titans. *Emagic Xtreme Sampler 24 Bit (EXS24)* 1.0 is Emagic's sampler plug-in for *Logic Audio* and a complement to its analog-modeling software synth, *ES1* (reviewed in the November 2000 issue of **EM**).

EXS24 offers almost all the features of a hardware sampler. It provides an intelligent user interface without the hassle of coaxing your computer to communicate with external hardware. *EXS24* is smoothly integrated within *Logic Audio,* and it can harness *Logic*'s solid waveform editor and native plug-in processors. *EXS24* is an intuitively designed tool that helps you focus on making music.

With *Logic Audio* 4.1, Emagic introduced a new type of audio object, the Audio Instrument. The Audio Instrument category was designed with virtual instruments like *EXS24* and *ES1* in mind. As many as 16 *EXS24* Sampler Instruments can be used at once, each with a maximum of 64 mono or 32 stereo notes of polyphony. The number of available notes depends on your computer's processing speed.

EXS24 reads AIFF, WAV, and SDII formats and can handle 8- to 24-bit resolution and sample rates as high as 96 kHz—something no hardware sampler I know of can do yet. *EXS24* can also import Akai S1000/3000 file formats, and support for more formats is on the way.

EXS24 requires version 4.1 or later of *Logic Audio Silver, Gold,* or *Platinum,* or *MicroLogic AV.* If you have version 4.0, it will automatically update when you install the plug-in. *EXS24* works well on the Mac or Windows platform. For this review, I used *Logic Audio Platinum* on a Power Mac G4/450 MHz with 256 MB of RAM.

Minimum System Requirements

EXS24

MAC: 604/200; 128 MB RAM; Mac OS 8.6 (USB requires 9.0.4); CD-ROM drive; *Logic Audio* or *MicroLogic AV* 4.0

PC: Pentium/200; 128 MB RAM; Windows 98 (USB requires 98SE or ME); CD-ROM drive; multimedia-compatible sound card; *Logic Audio* or *MicroLogic AV* 4.0

PLUGGING IN

Getting started is simple. *Logic Audio* 4.1 comes preconfigured with an Audio Instrument object already in place. You can insert the *EXS24* plug-in into an Audio Object by setting the Channel parameter to Instrument. (The plug-in comes in mono and stereo.) Select the *EXS24* plug-in by clicking on the top insert slot within *Logic*'s virtual mixer and holding the mouse button down. Then double-click on the blue *EXS24* label to bring up the main Editor window, a very sleek control panel with a decidedly analog look (see **Fig. 1**).

Working within *EXS24*'s main Editor is easy. A flip menu (Emagic's version of a pop-up menu) lets you load Sample Instruments from your hard drive into RAM and then play them back in *Logic.* Any adjustment made in this plug-in window can be saved. You can quickly switch to its companion, the Instrument Editor.

EXS24 Editor features a lowpass filter with four selectable modes: 12 dB, 18 dB, 24 dB Fat, and 24 dB Classic. The resonance qualities of the two 24 dB filter modes resemble the sound of analog filters. A Drive knob lets you overdrive the filter, and you can link the Cutoff frequency and Resonance knobs for simultaneous control. The Key knob determines how much the filter's cutoff frequency tracks the note number.

The low-frequency oscillators, LFO1 and LFO2, are polyphonic and monophonic, respectively. Whereas LFO1 starts its cycle every time a note is struck, LFO2 is always on. LFO1 is applied separately to each *EXS24* note, whereas LFO2 modulates all notes identically. Both LFOs have rate controls that can be set in note values or hertz, and LFO1 has an additional knob to adjust the decay or onset delay times. The LFOs provide seven wave shapes, including triangle, sawtooth, square, and random, which you

FIG. 1: *EXS24*'s main Editor control panel has an intuitive user interface that includes an excellent lowpass filter, two LFOs, and two ADSR envelope generators. Many of the sliders in the window's upper portion are split, letting you set a modulation range.

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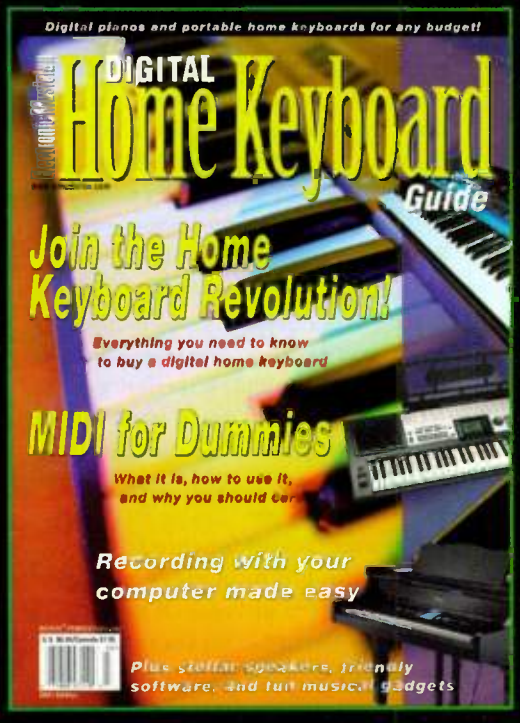

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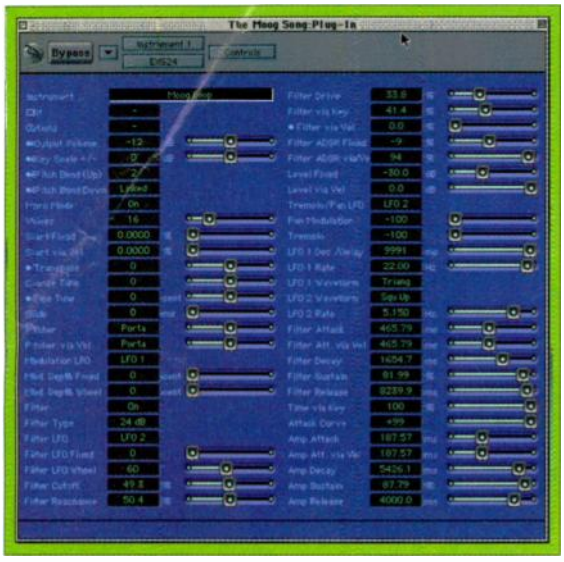

FIG. 2: *EXS24*'s Controls view provides a detailed graphic display of the available parameters.

select by clicking on corresponding radio buttons.

Dedicated ADSR envelope generators modulate the filter and amplifier stages, and there are selections for monophonic, legato, and polyphonic performance modes. Like some old analog keyboards, *EXS24* features glide, which can be used in mono and legato modes.

Sliders are available for controlling sample start time, tuning, pitch, glide, ADSR values, LFO1 and LFO2 modulation range, and amplifier level. Some sliders are split with an upper and lower control that establish a modulation range for Velocity and the mod wheel. You can move the entire segment by clicking and dragging in the area between the split sliders.

Although *EXS24*'s onscreen control surface is compact, it's easy to navigate and tweak settings. You don't have to step through multiple screens to get to a given feature as you would when using a hardware sampler. You can also automate all your *EXS24* fader moves while recording in *Logic*.

However, not all functions are available in the Editor. A more extensive Controls screen includes all parameters in the Editor and extra controls for adjusting pitch bend, transposition, fine-tuning, filtering using Velocity, key scaling, and output level (see **Fig. 2**). The additional parameters are marked with bullets next to their names.

The Instrument Editor lets you assign, edit, and map samples across a keyboard (see **Fig. 3**). There, sound files on your hard drive are assigned to Zones, and Zones can be arranged into Groups. Within each Zone you can set each sample's key note and playback range on the keyboard. There are also fields for reverse, one-shot, and loop modes. With loop mode engaged, you can set autocrossfade times.

Groups provide global settings for the Sample Instrument's volume, polyphony, panning, Velocity range, ADSR offset, filter cutoff, and resonance offset. Resonance offset lets each Group have a resonance value that's distinct from the value displayed in the main plug-in window.

PUTTING IT TO WORK

While using *EXS24*, the first thing I noticed was how quickly I could audition, assign, and shape sound files (see the sidebar "Multisampling Audio CDs"). It was easy to get blissfully lost in creative reverie as I fiddled with the LFOs and filter settings. Editing mundane sounds gave them a warped new life, resulting in rich bleeps and gurgles instead of the sterile woodwind I started with. Generating alternate mixes became easier, too, as I could quickly alter a drum kit's sounds, deepening bass tones and importing new percussion samples. *EXS24* is an on-the-fly kind of sampler.

I longed for the ability to use *Logic*'s arpeggiator to control *EXS24*, but the sampler doesn't respond to arpeggiator data. I'm told that the problem is with *Logic Audio* rather than *EXS24*. Also, some *Logic Audio* functions—the looping function in the upper-left parameter box, for instance—do not work with Audio Instruments such as *EXS24*. Emagic is aware of these problems, and an update should be available soon.

If you have a library of Akai S1000 or S3000 CD-ROMs, expect smooth importation of samples into *EXS24*. I could simulate the sound of my Akai S6000's filters, but I missed the power and flexibility of the S6000's filter options.

Having plenty of RAM is crucial to obtaining the maximum 64-note polyphony. After *Logic Audio* takes its portion, *EXS24* quickly consumes memory. With 256 MB in my computer, I could use *EXS24* with *Logic Audio*, but adding another 128 MB of RAM would definitely be in order.

When I used the single-processor G4/450 MHz, I could use all 16 instances of *EXS24* with a couple filters engaged. That's a lot of samplers, and I didn't

MULTISAMPLING AUDIO CDS

Here is a multisampling tip from Emagic that harnesses the power of *Logic Audio*'s editing features for use with *EXS24*: With an audio CD, utilize *Logic Audio*'s Open Movie command to select a track you want to sample. Import the track into the Audio Window. Drag the audio data into the Arrange window, and then go back to the Audio window and select the Strip Silence command. This splits the file into separate audio regions in the Arrange window. The number of regions depends on the threshold percentage you set; the higher the percentage, the more regions you get.

In the Arrange window, select Convert Regions to Individual Audio Files. This results in separate files you can save on your hard drive. Once the files are saved, you can open up *EXS24* Instrument Editor, activate Load Multisample, and select the files you just created. Each sample will be assigned to its own Zone. You can then assign them to Groups and tweak their global performance.

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encounter any problems until I started adding more filters. There were no crashes, but I experienced repeated Direct Input/Output driver errors because I hadn't set up the system parameters correctly.

As it turns out, filtering rapidly uses up CPU headroom. To avoid problems, set your driver's buffer I/O size according to the application. Setting a smaller buffer length results in less latency and more playability, but it also consumes more of your CPU's horsepower. During mixing, you can reset the buffer and engage more filters. You can also bounce your performances down to audio files to prevent overtaxing the CPU.

ON THE HORIZON

EXS24 is superb for crafting sound files, but its file-management system is lousy. Sample Instrument files are stored in only one folder. As Sample Instruments are added and the folder grows, it becomes more difficult to sort though the selections.

At the winter NAMM show in January, Emagic announced that a hierarchical filing system will be available in *Logic Audio* 4.7, which is due about the time this article goes to print. The new version will feature a hotkey to provide easy access to *EXS24* parameters. In addition, *Logic Audio Platinum* 4.7 will allow as many as 24 copies of *EXS24* to run simultaneously.

Emagic also announced the forthcoming release of *EXS24 TDM* at the NAMM show. That version will be compatible with DAE, making it possible to use the plug-in with TDM-compatible systems. Combining *EXS24* with TDM's power will save users from the inconvenience of constantly switching between DAE and Direct I/O. Other new features will include as many as 32 copies running simultaneously, direct-from-disk streaming, and close integration between *EXS24 TDM* and *Logic Audio Platinum*. Another new version, *EXS24 VST*, will be compatible with any VST 2.0 host application. Both new versions will import SampleCell and SoundFont2 formats from Windows and Mac operating systems.

KEEP ON JAMMING

Even with a couple of minor drawbacks, *EXS24* is an exceptional addition to the *Logic* platform. It won't put your hardware sampler out of business yet, but you might find your old friend getting lonelier by the week.

As more laptops show up onstage, you might consider using this software in live performance. The only stability issue I encountered occurred because I hadn't properly set the buffer I/O to avoid overloading the CPU. Unless you need *EXS24* to function as 16 samplers onstage, overloading your processor shouldn't be a problem. With a properly configured MIDI controller addressing faders in the main Editor, you could jam for hours with *EXS24*. Its portability in a laptop also makes *EXS24* the perfect travelling sampler for doing studio work.

Even for those who have never used a sampler, *EXS24* is easy to learn and a snap to navigate. The minimum processor speed for running *EXS24* is 200 MHz, but that speed barely scratches the surface of what the software can do. I'd recommend at least a G3/350 MHz with a minimum 256 MB of RAM. Anything less will hamper performance.

If you own *Logic*, there's no excuse not to have *EXS24*. Considering everything that it does, it's a great value. It's inexpensive, it's tons of fun, and it might just change the way you work in *Logic Audio*.

PRODUCT SUMMARY

Emagic
EXS24 1.0 (Mac/Win)
software sampler
$399

FEATURES	3.5
AUDIO QUALITY	4.0
EASE OF USE	4.0
VALUE	4.5

RATING PRODUCTS FROM 1 TO 5

PROS: Smooth integration with *Logic Audio*'s editing and processing capabilities. Great synthesis features. 24-bit/96 kHz compatible. Reads Akai-format CD-ROMs.

CONS: Poor file management. Requires fast computer with lots of RAM. Not all *Logic* features work with *EXS24*.

Manufacturer
Emagic Inc.
tel. (530) 477-1051
e-mail emagic@emagicusa.com
Web www.emagic.de

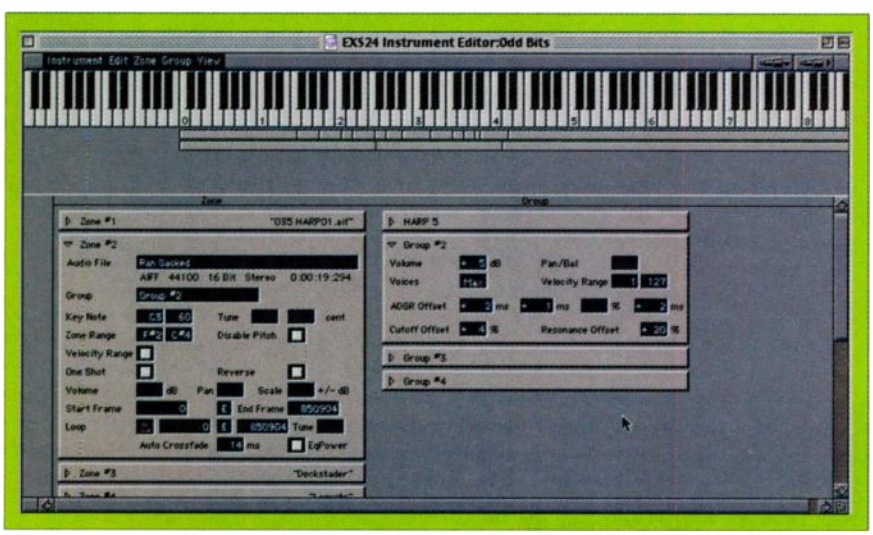

FIG. 3: *EXS24* Instrument Editor provides an intelligent work surface on which to assign sound files to Zones and organize them into Groups. Here the author's "Odd Bits" instrument is shown, along with corresponding Zones, Groups, and key assignments.

Alex Artaud *is a Bay Area musician and recording engineer who has worked in the music industry for more than a decade.*

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Quick Picks

ART VISTA PRODUCTIONS

Malmsjö Acoustic Grand (GigaSampler)

By Zack Price

Art Vista's *Malmsjö Acoustic Grand* ($100) is a two-CD set providing a multisampled 19th-century Swedish grand piano in GigaSampler format. Established in 1843, the J.G. Malmsjö (pronounced: Molm-sheu) piano company was particularly renowned for its finely crafted 6-foot salon grands. These instruments were well suited to smaller performance settings and were praised by Swedish composers Hugo Alfvén and Wilhelm Stenhammar, as well as the Norwegian composer Edvard Grieg.

The piano sampled for *Malmsjö Acoustic Grand* was made in 1894 for Ivar Berg, who gave it as a wedding gift to his wife. Their daughter inherited the piano and sold it in 1975 to the parents of Hans Adamson, Art Vista cofounder and producer of this set.

Taking Notes

Every note of the piano was sampled at four volume levels: *ppp, p, mf,* and *f.* Each key was played at each level with the damper pedal held down, and the sound was allowed to ring until the end of its natural decay. Using the damper pedal yielded a somewhat fuller, more velvety timbre. Careful fast Fourier transform (FFT) analysis and editing ensured that each note would respond appropriately and that normal sustain technique could be used effectively.

In addition to the "Malmsjö Acoustic Grand" patch, the set provides a "Malmsjö Rock Piano" variant. Samples at the loudest level in this patch have been equalized to give the piano a little more bite.

Two additional features of the Malmsjö are worth noting. First, the piano has an 85-note keyboard that stops at A7. The final three notes to C8 have been transposed from the four A7 samples. Second, the piano itself was tuned with a true stretched piano tuning that is slightly wider than is commonly found in synthesizers and some sampled keyboards. Most pianists—indeed most people—prefer the sound of stretch-tuned pianos, so this is a nice provision for virtual pianists.

Setting Up

Malmsjö Acoustic Grand includes a Help file (in *Word* format) that describes how you set up your MIDI keyboard controller to reproduce the response of the real Malmsjö grand piano. (This information is duplicated in both the ReadMe file and the CD booklet.) Because the sampled instrument was designed using a Kawai MP9000 controller, other MP9000 users can easily set touch parameters to the values that are listed in the Help file.

People who use other controllers are provided with a rough guide to the Velocity values for each sample layer as well as detailed suggestions for setting Velocity sensitivity and response curves. Art Vista also provides Web addresses for suggested downloads of MIDI files that offer additional clues to how *Malmsjö Acoustic Grand* should sound when performance settings are properly adjusted. This information doesn't completely eliminate the guesswork involved in setting up other controllers, but it significantly reduces the time spent on tweaking the controller to get the proper response.

Soft Pedal

Hugo Alfvén praised the Malmsjö pianos for their "softness of tone and dreamlike sonority," and I couldn't have said it any better. I also prefer *Malmsjö Acoustic Grand*'s dark mellow tone when I need a more intimate piano sound. It stands in direct contrast to the thunderous Steinway and bright Yamaha sample CDs that I have heard.

On the other hand, the "Malmsjö Rock Piano" patch is inappropriately named. Despite its added EQ, it doesn't cut through a traditional rock mix. Its sound is better suited to jazz and blues pieces.

Overall, the $100 price tag is reasonable, and it's an excellent way to add to your piano collection without taking up additional floor space. I heartily recommend *Malmsjö Acoustic Grand.*

Overall EM Rating (1 through 5): 4.5

Art Vista Productions; tel. (310) 398-4625;
e-mail hadamson@mediaone.net;
Web www.artvista.net

Art Vista's *Malmsjö Acoustic Grand* re-creates a 19th-century grand piano in GigaSampler format with four Velocity levels.

ENCORE ELECTRONICS

Knobby

By Scott R. Garrigus

Are you tired of tweaking synthesizer parameters by wading through multiple menus on a tiny display? Do you cringe at the thought of mixing with a mouse and onscreen faders? The Knobby MIDI controller ($199) from Encore Electronics may be just the tool for you.

Humble Box

At first glance, Knobby looks like nothing more than a 10-by-5-inch metal box topped with five buttons and eight knobs. However, inside that nondescript box is a powerful MIDI controller. Connect Knobby to your computer's MIDI interface,

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Quick Picks

Encore Electronics' Knobby provides a multitude of real-time control options for both hardware and software MIDI devices.

and you can program each of its knobs to send out virtually any type of Control Change, NRPN, RPN, or System Exclusive message. Unfortunately, Pitch Bend, Aftertouch, and Program Change messages don't lend themselves to this kind of adjustment and are not included.

By utilizing the four Group buttons, you can create as many as 120 knob parameter assignments (called *definitions*) separated into 15 groups (15 groups multiplied by 8 knobs equals 120 knob definitions). The Scene button either sends out all current knob values at once or serves as a MIDI panic button, depending on how long you hold it down.

Define SysEx

The hardware is bundled with *KnobbyEd* software (Win 95/NT/ME; the manufacturer states that a Mac version should be available by the time this goes to press). *KnobbyEd* lets you create Libraries of knob definitions for hardware and software devices. Knobby ships with 84 Libraries covering a large selection of MIDI devices. Additional Libraries can be downloaded from the Encore Electronics Web site. Assigning knob definitions is easy: simply drag and drop definitions from the list of Libraries onto the virtual knobs. Libraries can contain more than Knobby's limit of 120 definitions, so you can't drag and drop an entire Library. You can, however, save a Knobby configuration once you have set it up.

You can create your own definitions from scratch. Assigning MIDI controllers to knobs is a simple matter of choosing a channel, controller number, and minimum and maximum value limits. RPNs are just as simple. NRPNs can be more difficult unless you know how to deal with MSBs and LSBs (Most- and Least-Significant Bits). *KnobbyEd* gives you a lot of flexibility with System Exclusive, but if you don't comprehend the SysEx data provided in your synthesizer manual, you'll want to ensure that Encore Electronics provides a Library for your instrument.

I first tried Knobby with my antiquated Roland JX-8P. To my surprise, Encore Electronics provides a Library for this instrument, so I dragged-and-dropped my way to a new Knobby configuration. The JX-8P Library was pretty complete, although it was missing a few parameters (LFO bend depth and MIDI message-filtering settings). I also tried controlling the Console View in Cakewalk's *Pro Audio*. It worked wonderfully. I only had to configure Knobby to send my choice of MIDI controller messages and then set up the *Pro Audio* Console View to respond to those messages. No more mixing with the mouse.

Smooth Operator

In terms of performance, Knobby provides smooth operation. The knobs respond to the slightest touch and switching between groups is instantaneous; no loading time is required. But I did experience a little trouble remembering each knob definition within each group. Operation is easier if you program each group to handle related parameters (such as all oscillator functions in one group and all LFO functions in another), but a small LCD beneath each knob would be helpful. The company says that it is working on that feature for a future version of Knobby. Encore Electronics' Slidemate has exactly the same feature set as Knobby and is designed for anyone who prefers using faders to knobs.

Knobby provides fewer knobs than the Keyfax Software/Hardware PhatBoy MIDI controller; however, Knobby is more programmable and costs less. If you need more knobs, you can connect multiple units together. The controller also has a small footprint and rests nicely on top of most synth keyboards. Knobby is a no-nonsense, versatile MIDI controller that

won't dig too deeply into your personal-studio budget.

Overall EM Rating (1 through 5): 4
Encore Electronics; tel (925) 229-8875;
e-mail sales@encoreelectronics.com;
Web www.encoreelectronics.com

GMEDIA TECHNOLOGY

GForce M-Tron 2.04 (VST, Mac/Win)

By Zack Price

Gmedia's GForce *M-Tron* 2.04 ($69.95) is a VST instrument for Mac and PC that emulates the classic Mellotron keyboard of days gone by. *M-Tron* includes 28 complete sample sets of Mellotron tape banks, such as the well-known Flutes, Choirs, Strings, and Brass sounds as well as the less familiar Rhythms, Accordion Bass, and Mandolin sounds. The plug-in's 16-bit mono samples come from a variety of Mellotrons, including the M400 used by Radiohead. According to the owner's manual, some of the tape samples are more than 20 years old "and as such there is some authentic noise, which adds character to the sounds." Sometimes that character can be a bit intrusive; however, you can do a respectable job of whipping the sounds back into shape with judicious use of the Tone, Attack, and Release controls.

OK Computer

To install *M-Tron,* just pop the CD-ROM into your computer, and an image of the instrument appears. When I selected the Install option on my Windows-based computer, it launched an MS-DOS conversion program. (That's a little too retro for me.) It returned to the familiar Windows installation dialog box shortly afterwards, though.

Once you install the *M-Tron* plug-in, a second screen appears that asks which sound banks you want to install—all 28 are selected by default. New *M-Tron* users will likely want to load all the tapes just to hear how they sound. However, doing that requires 518 MB of hard-disk space, so be sure that you have room.

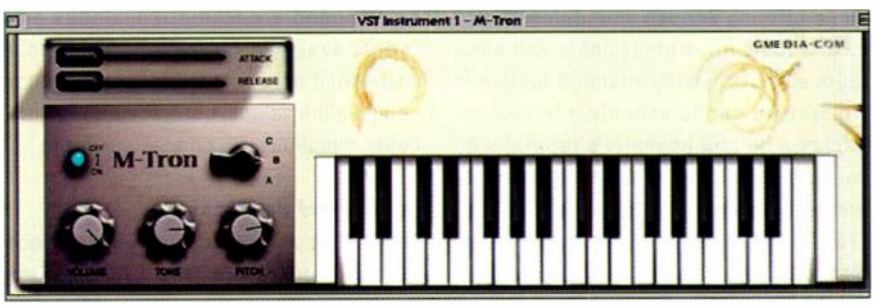
You may not find all the sounds appealing; I wasn't fond of the rhythm banks. Although there's no uninstall feature for erasing unwanted sounds, you can open the *M-Tron* sound folder and delete the appropriate sound bank files.

Knight in White Satin

Gmedia based the *M-Tron*'s appearance on a Mellotron M400 with a white body (complete with coffee stains and cigarette burns); a 35-note keyboard; and Volume, Tone, and Pitch controls. However, the A-B-C switch, which lets the Mellotron user select among the three tape banks, functions differently in *M-Tron.* In position A, the panel lid is closed, and *M-Tron* plays the default or previously selected sound.

Position B opens the panel lid to reveal the Attack and Release sliders. Moving the sliders to the right lengthens the Attack and Release envelope times. *M-Tron,* like the Mellotron, plays its sounds unlooped. It plays a note for the length of the tape (sample) and then stops. That results in a 7-second limit to individual sounds. To get around that restriction, you can lengthen Attack and Release times and retrigger a note before it fades away. You may not get a perfectly smooth sustain, but you also won't get a "hard" retriggering.

Position C opens the panel lid to reveal the Tape Banks list. To select a sound, click



The look of Gmedia's *M-Tron* software synth is modeled closely on the Mellotron M400. The Attack and Release controls appear in the upper-left corner when the A-B-C Switch is set to the B position.

on its name, and *M-Tron* loads it. *M-Tron* can play only one tape bank at a time, so if you want to play a second sound simultaneously, you'll have to load another instance of *M-Tron* into your VST instrument rack. In addition, you can use MIDI Control Change messages to control a number of *M-Tron*'s parameters, including Volume, Tone, Pitch, Attack, Release, Pan, and Reset All Controllers.

A Question of Balance

M-Tron aptly reproduces the widely recognized Mellotron sound. Although the tape library has a couple of clinkers, it also has some pleasant and unexpected delights, such as the Bass Accordion sound. *M-Tron* works in most VST hosts, except for Sonic Syndicate's *Orion* 1.7 and *VST Wrapper* v2 by Audio Ease. According to Gmedia, both companies are aware of the problem and are working to resolve the issue.

If you happen to have $5,200 to spare, and don't mind waiting for delivery, buy a new Mellotron Mark VI. But if your budget is more modest and instant gratification is your thing, get *M-Tron*. It won't leave you moody blue.

Overall EM Rating (1 through 5): 4.5
Q Up Arts (distributor); tel. (800) 454-4563 or (530) 477-8128; e-mail info@quparts.com; Web www.gmedia.com/gforce

NOTAM

DSP 1.0 (Win)

By Howard Jonathan Fredrics

NoTAM's *DSP* 1.0 ($27) is a remarkably inexpensive CD-ROM designed for teaching basic principles of the physics of sound, synthesis, and signal processing while offering serious sound-design and mixing tools for professionals and amateurs alike. Originally intended for use in Norwegian public schools, the disc includes a helpful beginner's tutorial with sound examples for illustrating concepts and techniques.

DSP is a standalone Windows application that installs on your PC, but you must have the CD in your drive to run it. The program consists of integrated synthesis and signal-processing tools for generating and modifying mono WAV files and also has recording capabilities. In the Mixer window, you assemble files into Projects that contain as many as five mono tracks. You can edit the volume and pan settings for each track individually using graphic envelopes prior to mixing down to stereo 16-bit WAV output.

In keeping with the program's budget-conscious nature, *DSP* should work with any standard Windows audio hardware. Although the printed documentation says that the program loads only mono files that are less than ten seconds, I recorded and loaded significantly longer files. The mono limitation, however, makes *DSP* unsuitable for working with stereo submixes.

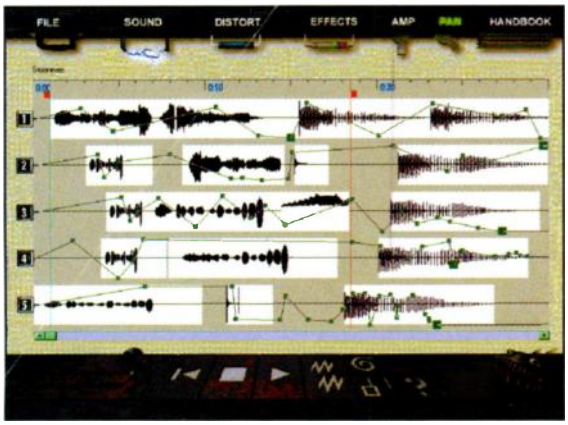
Power and Convenience

DSP's main recording, editing, and synthesis functions are conveniently located within submenus of the Sound menu. There you have access to several synthesis techniques including simple FM, dual-formant buzz, plucked-string physical modeling, a white-noise generator, and 8-partial additive synthesis. Using the onscreen Record and Play buttons to record a sound from your computer's microphone or line input is ridiculously easy. However, you can't adjust input levels from within the program; you must use your system mixer for that. You can have only one file open at a time in the main editing window, so there's no way to cut, copy, or paste between files.

The program provides tools for fading and adjusting the amplitude of selected ranges, and navigation tools include Horizontal Zoom and Fit Selection Within Window. (According to the manufacturer, a vertical-zoom capability was omitted to limit window clutter and to simplify program operation.) Throughout the program, submenus feature a uniform interface with color-coded breakpoint envelopes and sliders available for most parameters. I wish it had precise displays of parameter and timeline values, but for teaching concepts, simplicity is a compelling virtue.

Sonic Food Processing

The Distortion submenu contains various tools for modifying sounds: Granular Synthesis, Time Stretching, Forward/Reverse Playback (scratch), Spectral Sieve, Spectrum Shift, and Random-note Playback. I



NoTAM's *DSP* 1.0 provides user-friendly multitrack mixing, synthesis, and signal-processing tools with breakpoint editing of volume and panning.

found the Spectral Sieve and Spectrum Shift features to be especially unusual but musically useful. The filtering capabilities of the Spectral Sieve are well suited for homing in on varying degrees of the most significant spectral components, letting you create a wide range of sonic variants for a given sound. The Spectrum Shift tool adds or subtracts a fixed frequency from each of 40 analyzed partials, thus transforming harmonic spectra into wildly dissonant collections of inharmonic partials, an effect that works well on the spoken word.

The Effects submenu offers the standard fare of reverb, delay, and chorus, as well as a multimode filter, ring modulator, and harmonizer. Unlike most hardware delay units, *DSP*'s delay has breakpoint envelopes for delay time and feedback amount, as well as wet and dry mix parameters; creating cool Doppler effects is a snap. In addition to the built-in reverb, the program provides a bonus utility for simulating various rooms. With that utility you can use a 3-D graphic to modify the placement of mic and source within a user-defined room size and shape.

Online Extras

NoTAM provides a handy Web site for downloading additional sound samples and exchanging music samples produced using the program. An essential FAQ section offers answers to questions about program features that are not thoroughly documented in the CD-ROM or the program booklet.

DSP has a handful of annoying omissions, including the absence of undo-editing and save-as features, awkward playback-range controls, and inconsistent and sometimes sketchy documentation. Aside from those drawbacks, *DSP* is simple to operate and provides considerable power to anyone interested in learning the basics of synthesis and signal processing while creating real pieces of music. ❁

Overall EM Rating (1 through 5): 3.5

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MOTU Dream Studio 1

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- **MotorMix™** — 8-fader automated control surface for Digital Performer.
- **Auto-Tune™ 3.0** — the worldwide standard for real-time pitch correction.

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MOTU Dream Studio 2

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- **DigiMax™** — 8-channel mic pre-amplifier with 24-bit optical connection to the 2408mkII/computer
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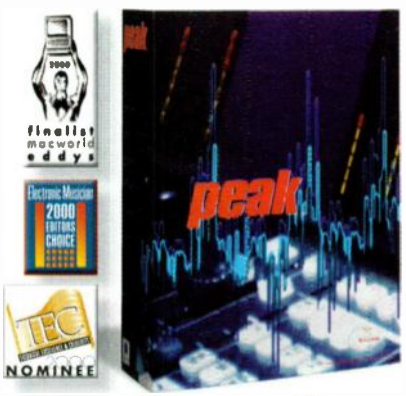

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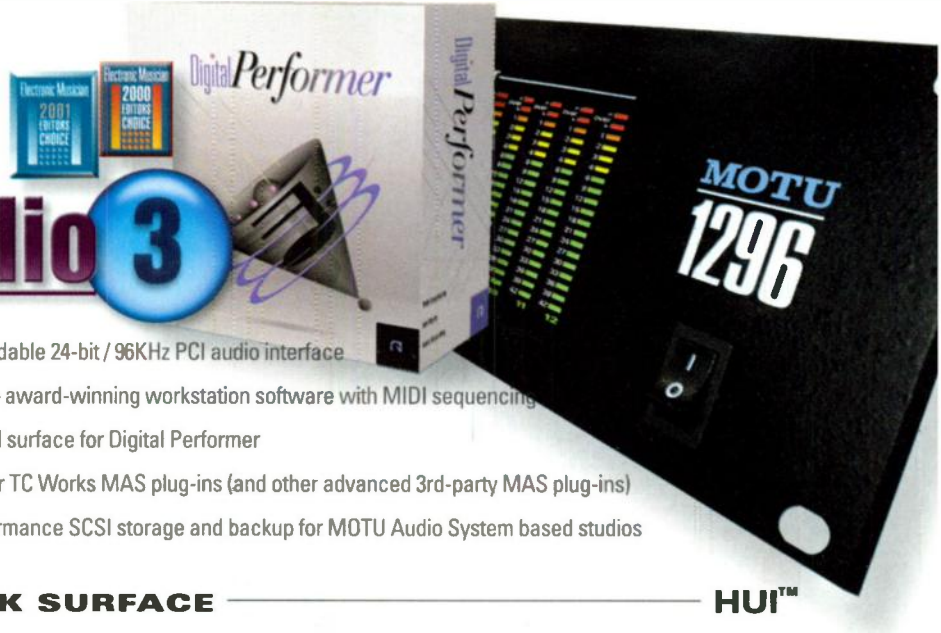

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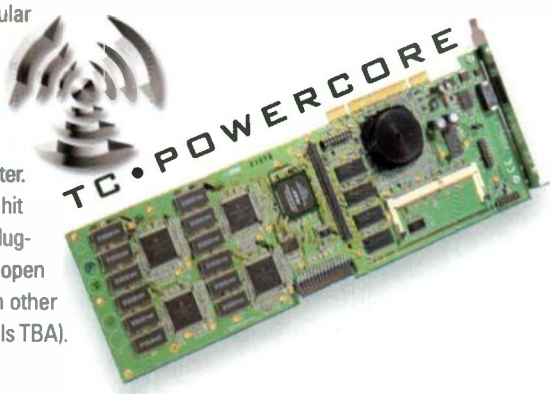
TC | WORKS



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By Larry the O

Playing Card Games

At the January NAMM show, TC Electronic showed the TC PowerCore, a PCI card with sufficiently beefy DSP to run multiple copies of TC's most substantive reverbs. The company intends that this card be an add-on to native-based digital audio workstations to provide the kind of plug-in power that would choke even a dual processor CPU. TC wasn't alone: Kind of Loud (KOL) had its UAD-1 card, which runs KOL's beefiest reverb as well as Universal Audio's compressor plug-ins. Reports circulated at the show about other manufacturers either showing or contemplating similar cards.

What's this all about?

Hardware DSP cards for computer-based DAWs are not new. Digidesign built Pro Tools around its DSP Farm (now Mix Farm) cards; Lexicon made the beautiful but tragic NuVerb, which was essentially a model 300 on a NuBus card; and there have been other such systems for the Mac and PC. Accelerator cards are well established in other arenas, such as video and graphics.

Aside from the obvious fact that manufacturers can utilize more powerful DSP chips than in the past, what is different is that these new cards will not be part of the core system as Digi's Farm cards are, but powerful add-ons. NuVerb fits this description in that it was intended to be an add-on to Pro Tools, but the concept of plug-ins and the requisite effort on interfacing had yet to reach full flower at the time. The new cards will therefore need to integrate closely and seamlessly with the user's software environment. Fortunately, standards exist now that make that easier to achieve.

A key hurdle is that plug-in developers must be convinced it's worth the effort of coding for the card's hardware, which could be more of a marketing challenge than a technical one. If TC Electronic or KOL is alone in the plug-in accelerator market, even for a moderate period of time, they might be able to garner support from third-party plug-in developers. But if several competing cards run card-specific versions of the plug-ins, developers could be pressed to choose among them.

Even with only one card on the market, the numbers sold are likely to be only a fraction of the number of DAWs out there. The special programming effort required to support the cards, combined with relatively modest sales revenue to amortize the expense, suggests that plug-ins for such cards could cost more than native versions.

Bang for the buck is what will make these cards worthwhile to users. If a card costs a couple of thousand dollars but there are oodles of plug-ins that run on it and it will run lots of plug-ins simultaneously, users at many levels will be interested. Even if TC Works' PowerCore, for example, only runs TC plug-ins, the product could still be a good value for those who appreciate TC Works' high-quality software.

Certainly, post houses and other places that need to run lots of heavy plug-ins will fill machines with DSP plug-in cards that run the reverbs and effects they want. But personal-studio owners will look more closely at the cost of entry.

Another question is obsolescence. My NuVerb is a NuBus card that can never migrate to a PCI-based Mac, but it still sounds beautiful as a standalone processor housed in a Mac Centris 650. I'd get nothing for the Mac if I sold it, so I keep it as a NuVerb chassis. Another concern with the new cards is hardware compatibility: how nicely will everyone play together sharing the PCI bus and CPU resources?

DSP accelerator cards have always had their place in workstations, but the context is shifting. The fact that DSP cards persist indicates that manufacturers feel the cards still have intrinsic value that has not yet been displaced by something else. However, drawbacks have dogged the concept throughout its history. Needless to say, the complexities in the situation go beyond what I can summarize in a column this short, and there are too many variables to confidently predict the likelihood of success for these new products. It will be interesting to see how this hand plays out. ●

STEVE CURL

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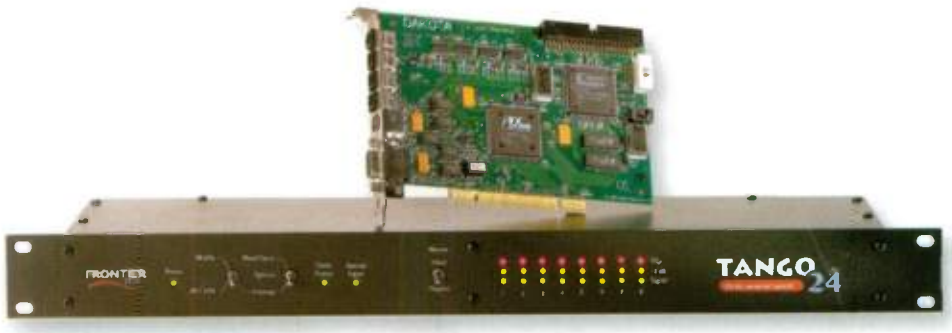

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