KORG'S INCREDIBLE Z1 SYNTH • PLUS 8 MORE REVIEWS

Electronic Musician®

March 1998

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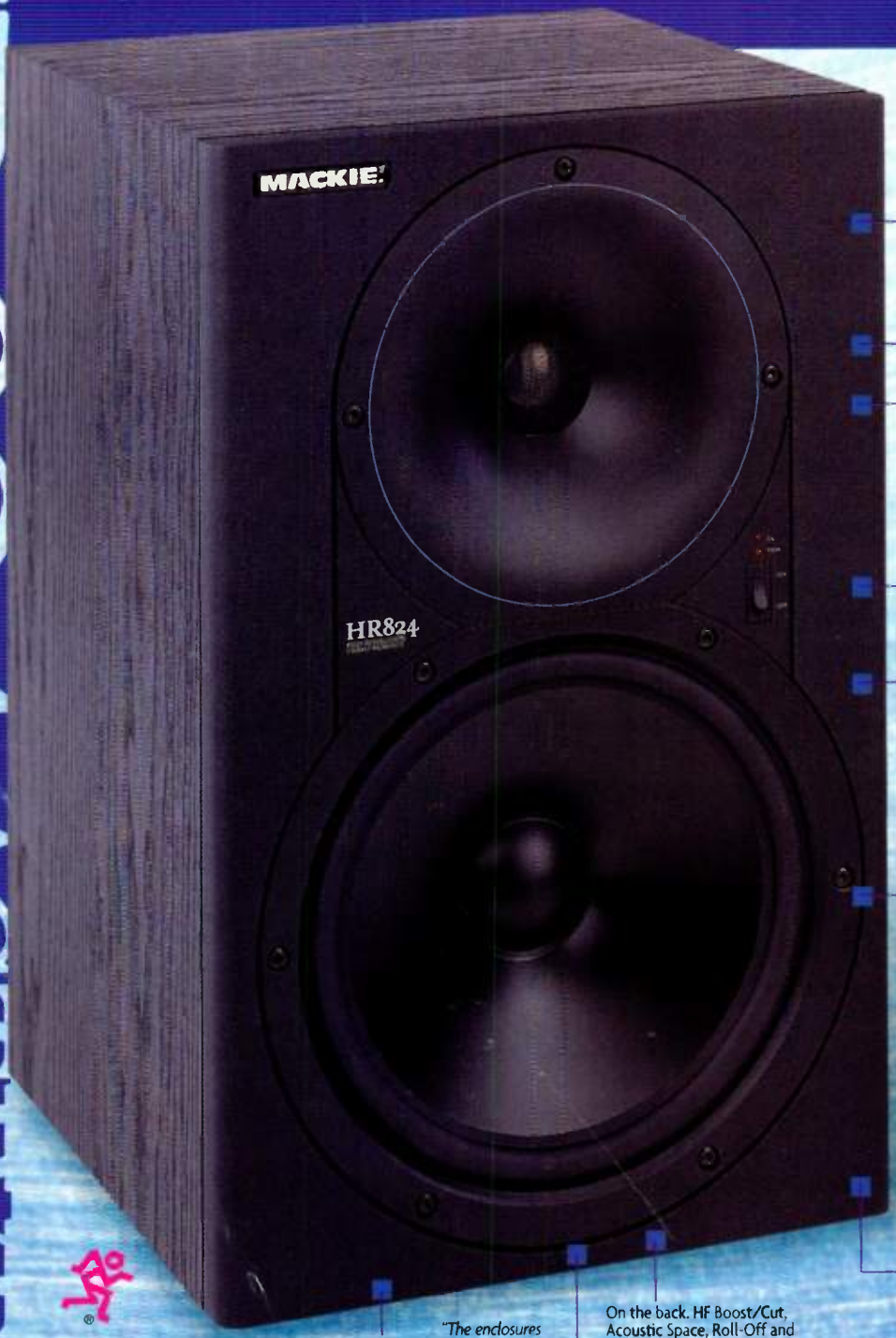
HR824 ACTIVE MONITOR

"Overall frequency was almost hard



Logarithmic wave guide helps accurately propagate high frequencies over a wider area. Result: better dispersion, more precise imaging and a far wider sweet spot.

Edge-damped 25mm high-frequency transducer is directly coupled to its own 100-watt FR Series™ Low Negative Feedback internal power amp.

Alloy dome is free from "break-up" that plagues fabric domes, causing high frequency distortion.

Signal present and overload LEDs.

Instead of a noisy port, a passive honeycomb aluminum transducer on the rear of the HR824 almost doubles the low frequency radiating surface.

"This allows the HR824 to move a large volume of air with minimal low frequency distortion & power compression."
EM Magazine*

Specially-designed 224mm low frequency transducer has a magnet structure so massive that it wouldn't even work properly in a conventional passive loudspeaker. But servo-loop-coupled to a 150-watt FR Series™ amp, it's capable of incredibly fast transient response and extremely low frequency output.

Inside: the HR824 cabinet is 100% filled with adiabatic foam. Result: Unwanted midrange reflections from the low frequency transducer are absorbed **inside** the enclosure instead of being reflected back out through the cone into your listening space.

Actually this paragraph doesn't have anything to do with the HR824. Mackie is further expanding its R&D/Engineering department and is looking for more analog and digital engineers with experience in pro audio. Log onto our web page for particulars.

"The enclosures — dressed in conventional yet classy black motif — are shielded."
EM Magazine*

Inside. Two separate FR Series power amplifiers with a total of 250 watts rated power — the most of any active monitor in the HR824's class.

On the back. HF Boost/Cut, Acoustic Space, Roll-Off and sensitivity controls, balanced 1/4" and XLR inputs. *"The Mackie HR824 is the only system* (in the comparative review) *that doesn't require the user to fumble around with tiny tools in order to make adjustments."*
EM Magazine*

*** Electronic Musician, October 1997, All quotes are unedited.**

response was so flat that it to believe." Electronic Musican Magazine*

Ready to confront reality? The HR824 Active Monitor is now in stock at Mackie Dealers.

Owning a set of HR824 near field studio monitors has the potential of seriously altering your perception of sound.

For the first time, you'll be able to hear **precisely** what's going on all the way through your signal chain — from microphones right through to your mixdown deck. You'll suddenly discern fine nuances of timbre, harmonics, equalization and stereo perspective that were sonically invisible before.

Some tracks you've recorded will amaze you; others may send you back for an immediate remix.

But either way, for the first time, you'll be hearing **exactly** what was recorded — not what a conventional loudspeaker may or may not have been capable of reproducing.

> "In fact, all the sonic details that I can discern on a $45,000 reference system were very well reproduced, although not identically, on the HR824s. That was very impressive."

> "The precise resolution is a major boon for finicky sound sculptors."

> "The imaging and high frequency dispersion is brilliant. I was amazed at how far off-axis I could scoot my chair and still clearly hear what was going on in both channels."

Admittedly, these are pretty brazen claims (which is why we're backing them up with comments from a credible, third-party source).

But all you have to do to become a believer is to visit your nearest Mackie dealer. When you compare HR824s to the competition, you're going to hear some dramatic differences.

First you'll notice far more openness and detail. Critical listeners tell us that it's as if a curtain has been lifted between themselves and the sound source.

Next, you'll notice low frequency output so accurate that you might look around for the hidden subwoofer (some of the world's most experienced recording engineers have done this, so don't be embarrassed). The HR824 really IS capable of flat response to 39Hz. Moreover, it's capable of **accurate, articulated** response that low. Rather than a loudspeaker's "interpretation" of bass, you can finally hear through to the actual instrument's bass quality, texture and nuances.

Each HR824 ships with its own signed Certificate of Calibration attesting to its ±1.5dB 39Hz-22kHz frequency response.

Next, if you can "unlock" yourself from the traditional, narrow "sweet spot" directly between the monitors, you'll discover that the HR824s really DO live up to our claim of wide, dispersion.

Their sweet **zone** is so broad that several people can sit next to each other — or if you work solo, you can move from side to side in front of large consoles — and still hear a coherent, detailed stereo panorama.

> "The low end was robust and present; the electric bass and kick drum thump-ed into my chest the way those huge UREI® monitors did back in the old days."

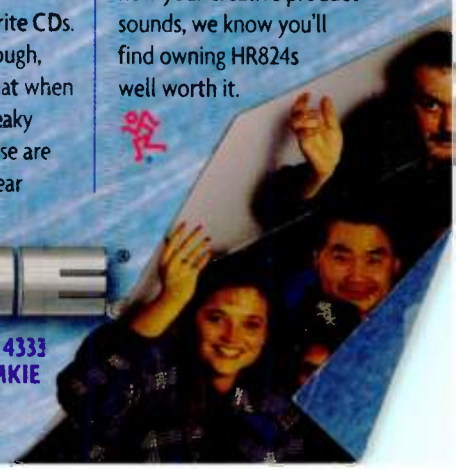
> "Overall, the response was so smooth that I wasn't even aware of a crossover point."

> "Stereo imaging and depth were fabulous."

Finally, let the salesperson go wait on somebody else and enjoy an extended session with one of your favorite CDs. When you're through, you'll discover that when distortion and peaky frequency response are minimized, so is ear fatigue: You can listen to HR824s for hours on end.

One final point... your monitors are the only part of all your studio equipment that you actually **hear**. Along with good microphones, HR824s are the best investment you can make, no matter what your studio budget. And, like premium mics, HR824 monitors cost more than less accurate transducers.

But if you're committed to hearing **exactly** how your creative product sounds, we know you'll find owning HR824s well worth it.



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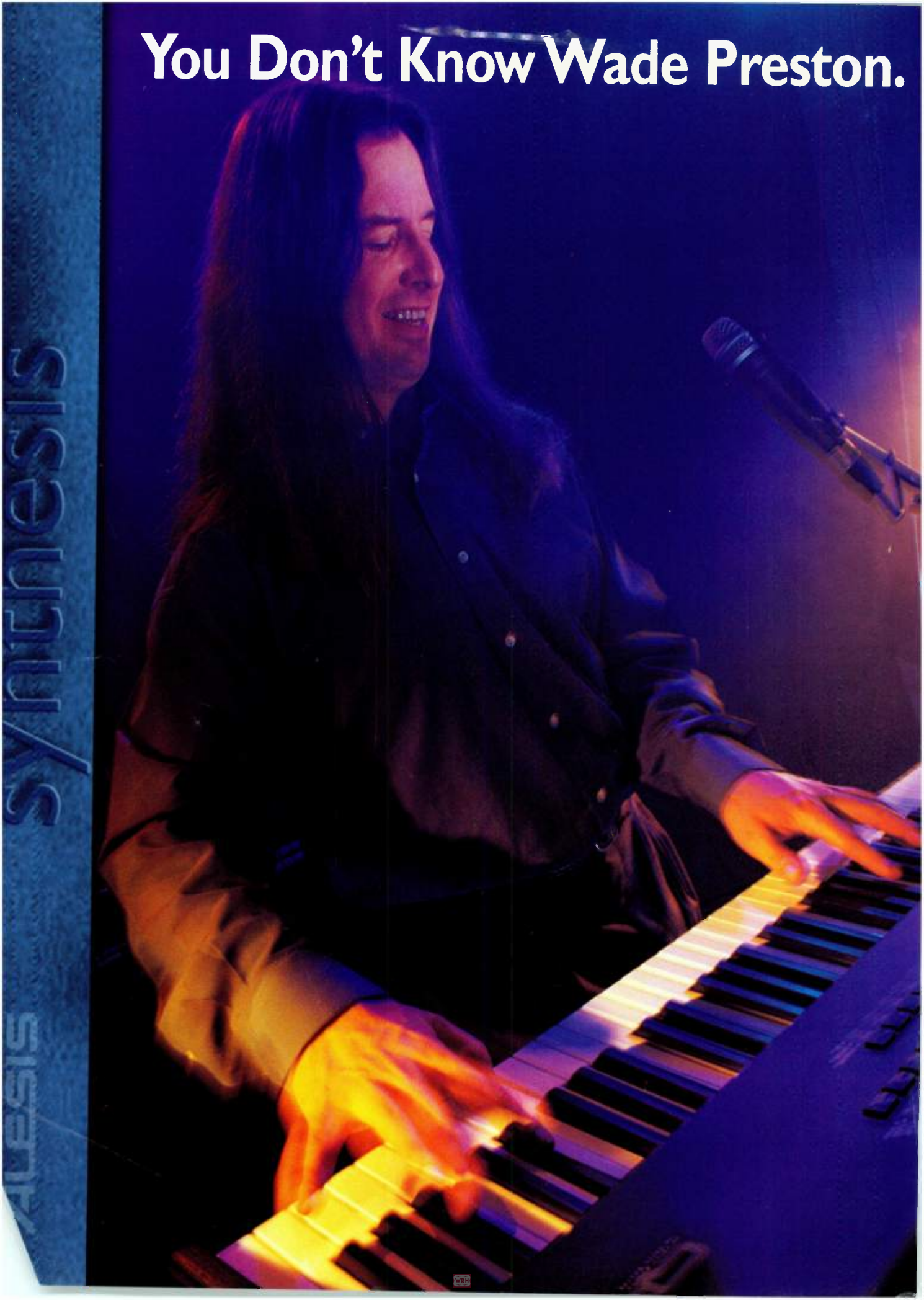

You Don't Know Wade Preston.
ALESIS
synthesis

But He's Working On It.

Wade's self-produced, self-distributed album
No Present Like The Time.
Recorded on ADAT.

He doesn't have a day job. This is it. Night after night. Six hour sets. Usually without a break. From beach bars packed with joyously drunken fans to the martini crowd at Jimmy's in Beverly Hills.

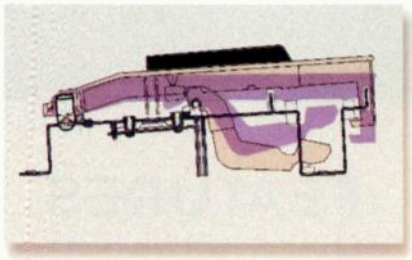
He's got heavy hands. Beethoven meets Jerry Lee. But his QS8 not only stands up to the beating, it sings.

There's been music for commercials, film scores, as well as backup for recording sessions. He even did a tour with a national act. But the clubs still feel like home.

He had his band going, but the bass player went back to New York. So did the drummer. Added an Alesis sequencer and SR-16™ Drum Machine. The gigs continue: private parties, outside, in parks, backyards and party yachts. Eventually builds up enough work to hire a new band to play with him.

The labels think he's a marketing risk. Too eclectic. So he records his own CD on ADAT™. Sells it at clubs. One copy at a time. Already made back the recording costs. He's in the black.

"Alesis deserves a lot of credit. The products are within my price range and they sound great. Had the stuff not hung in there with excellent reliability, I wouldn't have been able to keep going for so long. And hey, maybe it's not the big time. But I'm thriving as a full-time musician on my own, and that's what really counts."



Lesser keyboards haven't been able to handle Wade's boogie-woogie left hand rhythms and blistering leads. But the QS8's robust, fully-weighted, piano-action keypad feels great and holds up under the heaviest hands.

In addition to being one of the best-sounding, feature-packed keyboards available today, the QS8 is lighter and smaller than nearly any other 88-key weighted synth. Even with its metal chassis and oak endpieces, you won't need a roadie to get it to your gig.

Working musicians have to adapt to their surroundings. Wade might play a bar mitzvah on Saturday and an arena on Sunday, so his keyboard has to handle any job he takes on. With thousands of onboard sounds and open-ended expandability, the QS8 can roll with the changes, making it perfect for everyone from studio cats to lounge lizards.

Get to know the QS8. At your Alesis Dealer now.

QS8™
64 VOICE 88 KEY EXPANDABLE MASTER SYNTHESIZER

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I N S I

FEATURES

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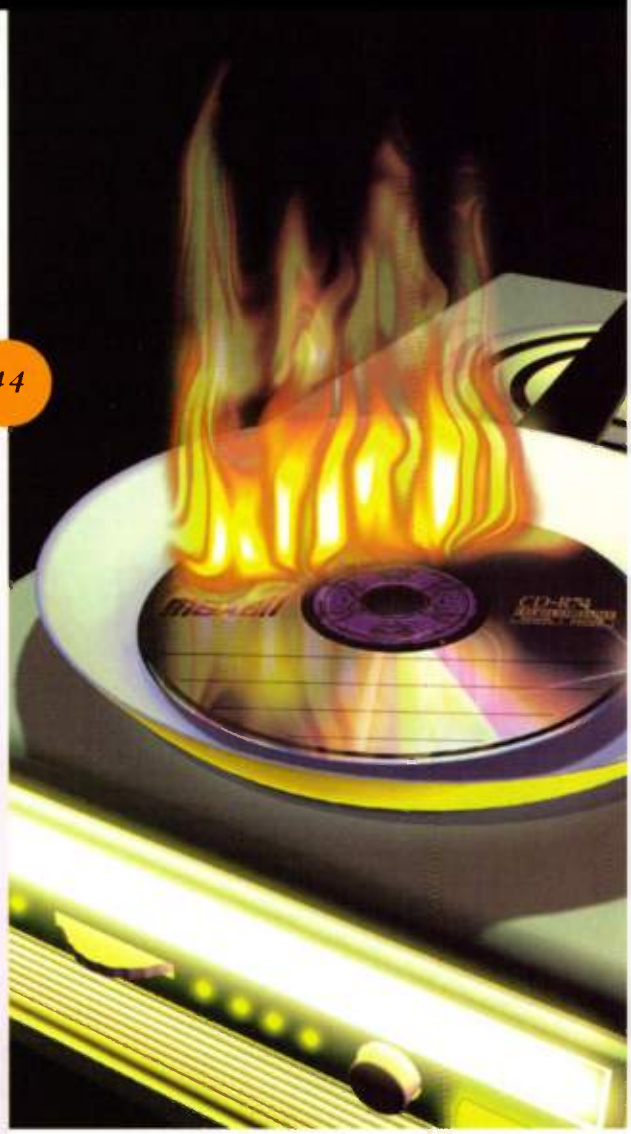

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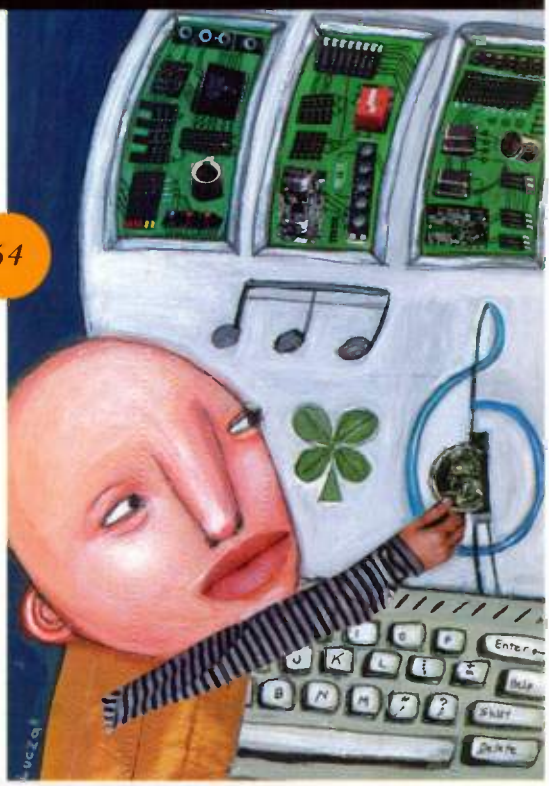

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Cover: Digital imaging by Peter Neumann.

Solving the Plug-in Dilemma

Sometimes weeds are simply flowers grown out of control.

ANTHONY PIDGEON

Audio DSP plug-in formats are getting to be like a field of dandelions: attractive, beneficial if you know how to use them, but propagating entirely out of control. This is especially true on the Mac platform.

The Mac music-software community has failed, due mostly to competitive rivalries, to create a standard real-time DSP plug-in format that runs native on the Power Mac without special hardware. At first, having a real-time plug-in format was a competitive advantage, but now almost every developer is doing it a different way, and we have too much of a good thing.

On the Windows side, DirectX is a workable real-time solution. But the technology has limitations, and we still have the Steinberg, Syntrillium, and IQS plug-in formats.

I am reminded of the chaos that surrounded synthesizer interfacing before MIDI. Establishing the MIDI spec led directly to the explosive growth of personal studios and the commensurate growth in equipment and software sales. As with MIDI, developer unity can help the entire music-software industry grow.

Clearly we need a standardized, real-time architecture that embodies the best of the existing formats. Ideally, it should also be cross-platform.

The big four who have the technological, political, and financial power to accomplish this are Microsoft, Adobe, Digidesign, and Apple. But Microsoft shows no signs of releasing an improved, cross-platform DirectX, and Adobe doesn't appear motivated to reinvent its Premiere plug-in architecture. A real-time, improved version of the Premiere architecture is being independently developed, but without Adobe's active backing, broad acceptance is unlikely.

Digidesign intends to provide a Mac solution by further developing AudioSuite. But the pro-oriented company wants to develop, in essence, the native equivalent of TDM sans hardware, which could take a while. Furthermore, the extent of Digidesign's influence over its development partners is questionable—several important host programs don't support AudioSuite, for example—and the company has no real influence on Windows developers.

With its strong links to Macintosh music-software developers, Apple has the best chance of establishing a Mac standard based on QuickTime 3.0 and Sound Manager. Apple's technology is cross-platform, but the company lacks ties with Windows developers, so Windows support will be a tough sell.

The good news is that Apple has finally decided to act. Its engineers have met with developers and have compiled a wish list for a Sound Manager–based, real-time plug-in architecture. At the 1998 Winter NAMM show (two weeks from this writing), Apple will host a meeting to move the issue forward and to address the problem of establishing a cross-platform universal multiport audio-card driver. Development begins in earnest immediately after QuickTime 3.0 ships in February.

It is time for software developers to put aside their rivalries and actively support Apple's efforts. Users and developers alike need to make sure that Apple clearly understands the needs of Mac- and Windows-based musicians. We at **EM** are willing to offer our good offices as a neutral party to assist in this effort.

Electronic Musician®

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tel. (310) 207-8222; fax (310) 207-4082
Subscriptions, Customer Service, Back Issues
PO Box 41525, Nashville, TN 37204
tel. (800) 843-4086 or (615) 377-3322; fax (615) 377-0525;

Intertec Publishing Corp.
9800 Metcalf Ave., Overland Park, KS 66212

President and Chief Executive Officer
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Senior Vice President Cameron Bishop

Electronic Musician (ISSN: 0884-4720) is published monthly by Intertec Publishing Corp., Inc., 6400 Hollis St., #12, Emeryville, CA 94608. ©1998. This is Volume 14, Number 3, March 1998. One year (12 issues) subscription is $36; outside the U.S. is $65. Periodical postage paid at Oakland, CA, and additional mailing offices.

POSTMASTER: Send address changes to Electronic Musician, PO Box 41525, Nashville, TN 37204. Editeur Responsable (Belgique): Christian Desmet, Vuurgatstraat 92, 3090 Overijse, Belgique. Canadian GST #129597951. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 0478741.

Also publishers of *Mix*® magazine.
Printed in the USA.

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have you seen?

From the moment you get a musical idea...until you've finished the final mix...the new ZR-76 has everything you need to write your next hit. The 76 weighted-action keys are perfectly matched to the 1200 incredible sounds inside. In fact, the included 16 meg Wave Expansion Board, *The Perfect Piano*™ by William Coakley, sounds and feels so good, you may find yourself tickling the ivories into the wee hours of the night.

If you perform your music live, the ZR-76 has you covered, too. The "Favorites" buttons under the display give you instant access to the sounds you use most. An easy-to-use sequencer, built-in drum machine and a 24-bit effects processor completes the package.

The new ZR-76 is a keyboard that you would expect from ENSONIQ ...refined and balanced, great-sounding and easy to use... all at a great price.

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Perfect Piano – *The ZR-76 comes with our new EXP-4 ROM Expander installed. This 16 meg expander features William Coakley's acclaimed "The Perfect Piano™", along with two practically perfect electric pianos.*

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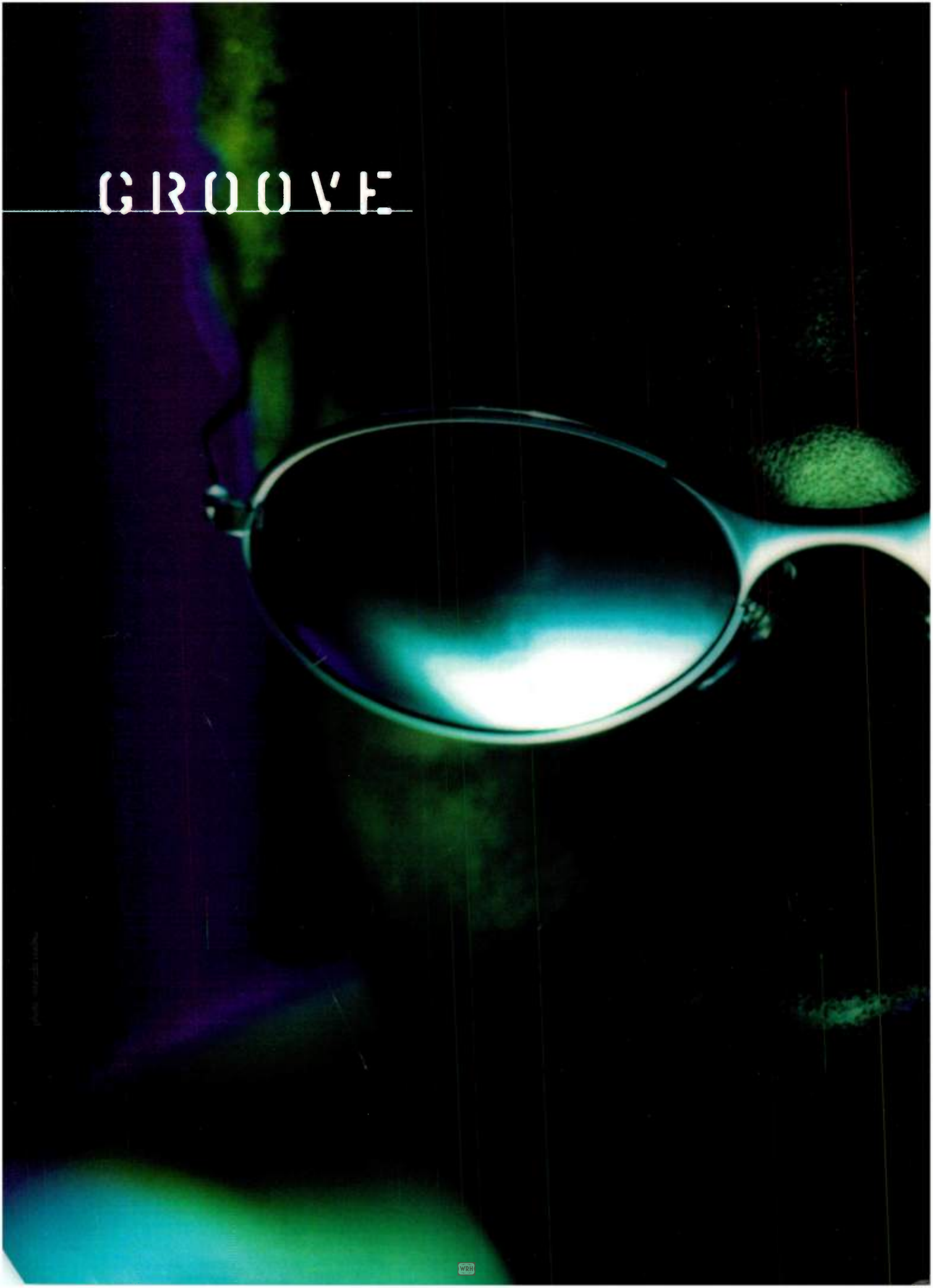
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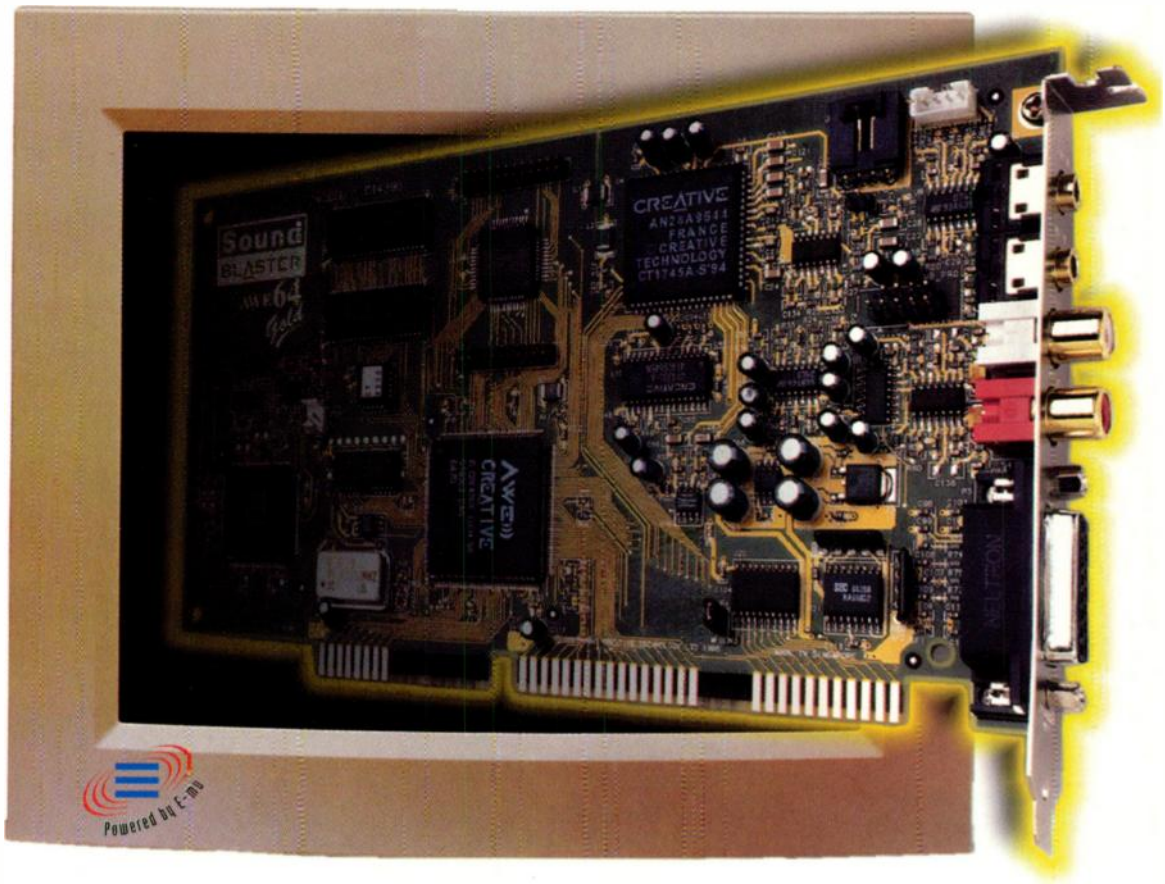

Now E-mu's legendary sounds and sampling technology can be in your PC! With Creation Studio, your PC becomes a powerful desktop home studio complete with a digital recorder, a MIDI sequencer, an audio editor, and an 8 MB sampler!

Its a synth, a sampler and a MIDI instrument

The heart of the Creation Studio is the award winning Creative Labs Sound Blaster™ AWE64 Gold card—Editor's choice for sound card in both PC Magazine and Electronic Musician. The AWE Gold card features the EMU8000 sound engine for superior wave-table synthesis, real-time effects and MIDI playback. Full duplex support, 8 MB of onboard RAM (expandable to 28 MB), 16 bit/44k output, digital output (S/PDIF), Plug & Play installation and a free MIDI cable combine to give this card quality features for a budget studio.

The Creation Studio comes with over 30 banks of pro-quality, downloadable E-mu SoundFont® presets, based on the same sounds used in E-mu's professional synthesizers. You can add new sounds from our expanding SoundFont library and can even sample sounds to create your own banks!

The software bundle makes a complete studio

The E-mu Creation Studio comes with full versions of Cakewalk Express SE v5, Sonic Foundry SoundForge 3.0XP, SoundTrek JAMMER Hit Sessions, and Creative Lab's Vienna SoundFont Studio™. Software valued at more than $300!

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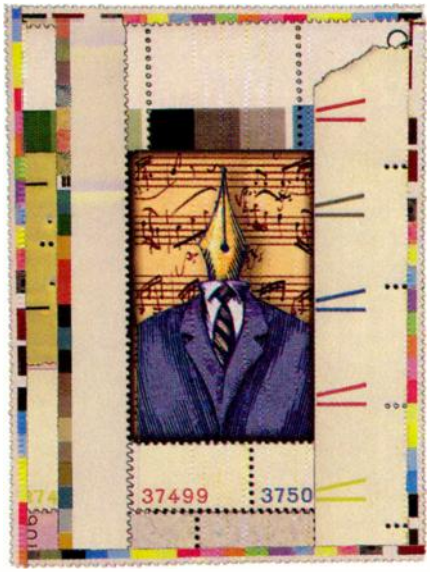
LETTERS



RAZZLE-DAZZLE

Improving my favorite mag, are you? Well, it looks great, and I like the new additions. The magazine just feels more comfortable to read now, as well. What are you guys up to anyway? Is it some sort of mind control or subliminal imagery placed within the new graphics or what?

Thank you for taking these steps in the right direction, and keep up the great work!

Brian McDonald
no address given

A TIMELY REVIEW

What beautiful timing on behalf of **EM**! I am referring to your review of PG Music's recently released *Band-in-a-Box* 7.0 software (December 1997). As a trumpet player, I have been trying to generate some jazzy MIDI sequences to use for my performances during contemporary church services. But as you can imagine, without being a keyboardist, meeting this goal has been an extreme challenge, even with my desktop–music publishing setup.

Armed with a Roland XP-10 keyboard connected to my Pentium-based computer, I read your review of *Band-in-a-Box* and was encouraged. I took the plunge and bought the program. The installation was easy and quick, the program took little time to learn, the data/chord entry was a breeze, and within an hour of installation I had created a simple worship chorus in the jazz style I had been longing to hear.

I found your review of this product fair and just, especially regarding the automatic soloing feature, which is helpful and fun. Thanks **EM**! Your timing didn't miss a beat.

Ken Lang
Zion Trumpet Ministries
North East, MD

NOT JUST ANOTHER TOY

In Steve Oppenheimer's "Toy Story" (December 1997), he mentions the different musical toys one could buy in a toy store. We have a toy store here in McAllen, Texas, but they don't have these kinds of instruments. Where can I purchase the toy instruments you mention?

Wanda Wiegers
McAllen, TX

Wanda—I've been agreeably surprised by the enthusiasm "Toy Story" generated! We found some of the coolest toys (including the kalimba, ocarina, and Schoenhut toy piano, which appears to be an overwhelming favorite) at HearthSong. The company offers a mail-order catalog (tel. 800/533-4397), which probably is your best bet.

Most of the other toys were found by serendipity at local stores, though we did notice a few of them at chains such as Toys R Us, as well. From where you are, along the Big River (believe it or not, I remember McAllen from my road-warrior days), you might have to drive a few hours to Corpus Christi or Laredo to find them. You should also try the Back to Basics Toys catalog (tel. 800/356-5360 or 302/323-9578; fax 800/759-8477).—Steve O.

TECHNOLOGICAL TO-DO

I am writing to make a number of corrections to the article by Scott Wilkinson titled "Tech Page: Reconfigurable Computing," which appeared in the November 1997 **EM**. In the first paragraph of the article, Wilkinson states, "Traditionally, two types of ICs have been used in [music-technology] systems: general-purpose microprocessors, such as the Pentium and PowerPC, and application-specific ICs (ASICs)." This statement fails to mention the DSP (digital signal processing) IC technology that continues to play a decisive role in the industry, including the design of leading-edge synthesis products.

Wilkinson doesn't appear to have much of a grasp of application-specific IC technology or what it represents. From the perspective of the design engineer, the ASIC manufacturer provides a library of module functions, a number of which can be combined together on a common silicon substrate. These functions include standard microprocessors as well as logic, memory, DSP, and a host of specialized operating blocks.

He also states that "a new type of processor called a field-programmable gate array (FPGA) is being developed in electronics labs around the world." This is complete nonsense on two fronts. First, the FPGA is not a processor; it is a field-programmable array of gates that can be electrically interconnected in various ways to provide specific functions, such as arithmetic, counter, datapath, state-machine, random-logic, or glue-logic functions. An external processor can configure an FPGA to perform specific processing functions.

Secondly, FPGAs have been around for years. For example, I have a Cypress Semiconductor data book that lists no less than seven different FPGAs, and this book is almost five years old.

Finally, the ability to perform a hardware change has virtually no application, particularly when the proper functioning of a given product, such as a digital music workstation, is dependent upon having a host of hardware functions available at all times without interruption. With a fixed, high-speed, DSP hardware core, virtually all forms of music/sound synthesis and audio effects can be realized

BOB DAHM

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1-Step™ backup software protects as much as 2 gigs (compressed†)

Access time

15.5ms read/17.5ms write

Average seek time

10ms read/12ms write

Maximum sustained transfer rate

6.62MB/sec. max

†Assuming 2:1 compression ratio. Actual compression will vary with file and hardware configuration.

††Performance will vary when using 1GB cartridges.

"How I fit 1 speeding downtown bus, a crippled lunar lander, and 5 car-tossing tornados into a 4 INCH SQUARE."

STEPHEN HUNTER FLICK

Sound Designer

Creative Cafe

Stephen Hunter Flick is a communicator. As the two-time Academy Award-winning sound effects specialist whose work includes films like *Speed*, *Apollo 13*, and *Twister*, Stephen works with major studios (20th Century Fox, Universal, Sony Pictures to name a few) creating sounds that aren't just heard, but felt. From compiling over 2,000 sound files to create a massive tornado to transporting or even cutting straight to digital picture, Stephen's work takes space. Big space. Space like the high capacity Jaz® drive. Incredibly, he used 41 Jaz drives at once on *Twister*, demonstrating its usefulness as an industry standard.

Stephen's work is larger than life, but thanks to his Jaz drive and handy Jaz disks, it fits neatly into his pocket.

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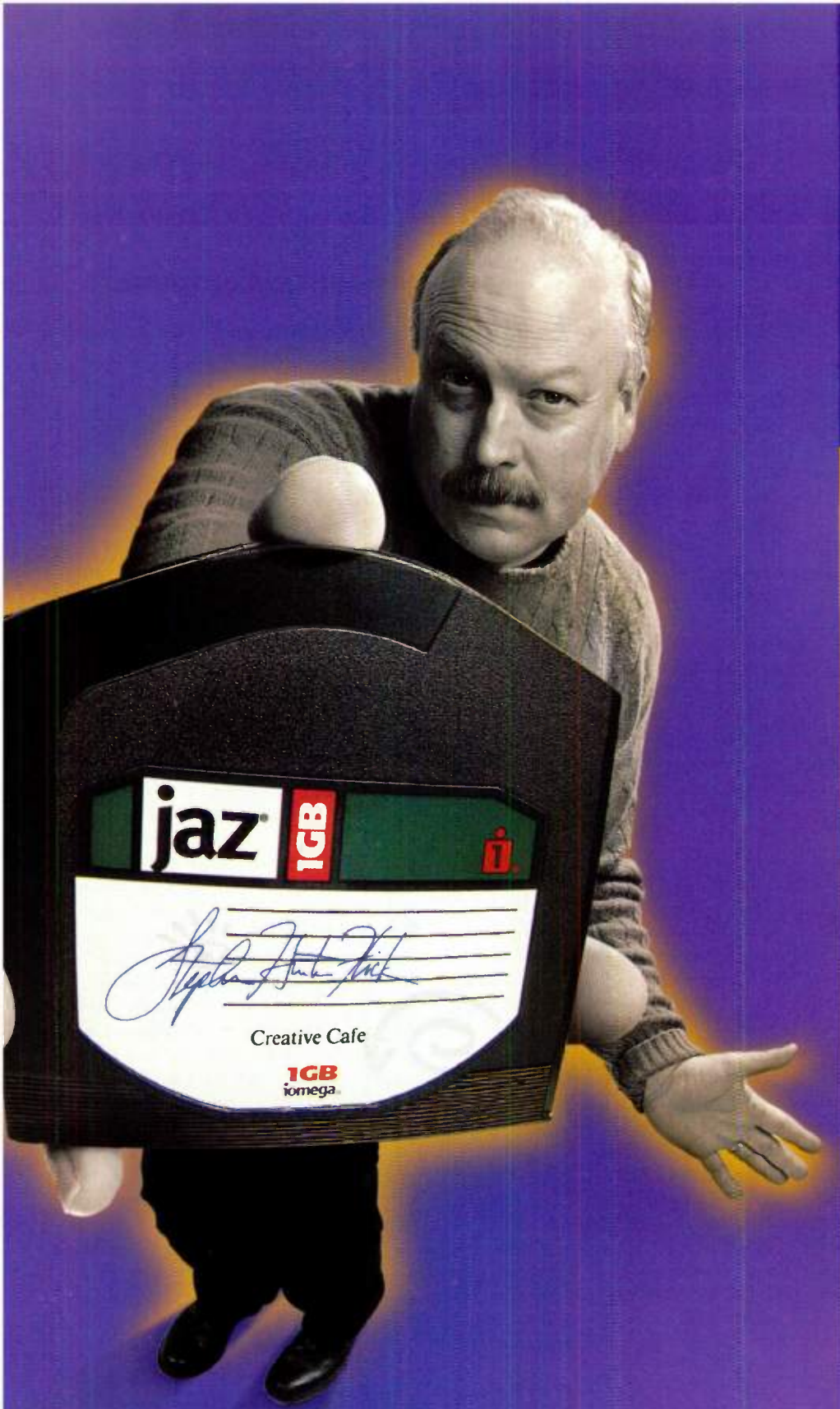

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Each cartridge has
two monster gigabytes of capacity

2GB is read/write compatible with 1GB††

1-Step™ backup software can protect
up to 4 gigs (compressed†)

Access time

15.5ms read/17.5ms write

Average seek time

10ms read/12ms write

Maximum sustained transfer rate

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EM ONLINE

Screenshots of waveform displays may help you to visualize some things, but when you read about sounds, you want to really hear what it's all about. Now you can. Just browse your way over to this month's section of the **EM** Web site, www.emusician.com. There you will find audio files to download that illustrate the points made in the magazine. This month, we have examples from our sampling feature, "Wild Things," and from the Korg Z1 review.

While you're online, don't forget to stop by our "Perspectives" column and its discussion group, where you can give us and other readers the benefit of your opinions and experiences.

through changes in software. Therefore, the final question from a hardware standpoint is the number of instructions that can be processed per second, thus determining the outer boundary of what can be realized through the integration of appropriate and presumably well-designed, efficient software to realize a given task.

Tim J. Lawrence
President
Delta Music Research
Toronto, ON, Canada

Tim—After receiving your letter, I communicated at length with Lee Ferguson, product-development director at Metalithic Systems, Inc., who helped provide the following responses. First, you state that I failed to mention DSPs along with general-purpose microprocessors and ASICs, but microprocessors and DSP chips are both based on the stored-program operational paradigm and are therefore very similar. Your comment that DSP chips play an important role in our industry is well taken, but I maintain that DSPs are a special case of microprocessors. Of course, DSP core functions can be incorporated into ASICs, as well.

As far as ASIC technology is concerned, once the design engineer determines what functions are to be included in the chip, these functions are fixed and cannot be changed without designing and manufacturing a new chip. The beauty of FPGAs is that their function can be changed on the fly, unlike ASICs.

You are correct that an FPGA is not a processor inherently. However, these chips can be configured to perform processing functions, as you also point out.

You are also correct that FPGAs have been around for a while. Perhaps I should have explicitly stated that I was referring to a new breed of dynamically reconfigurable FPGAs that are optimized for computationally intensive operations, such as DSP. This type of FPGA can be partially modified in real time while the rest of the circuit continues to operate undisturbed. Furthermore, the tools and techniques to exploit this new type of FPGA are new and not generally available on the market yet. Companies using these devices are developing their own tools and techniques, which they consider to be trade secrets (for example, Metalithic Systems).

Regarding your assertion that "the ability to perform a hardware change has virtually no application," I couldn't disagree more. According to Ferguson, many skilled hardware and software engineers are not familiar with the techniques of dynamic FPGA reconfiguration or, more importantly, the "paradigm shift in thinking" required to successfully utilize these devices in products. The statement that a digital music workstation must have all hardware functions available at all times is not true and displays two-dimensional thinking (the hardware and the software). We are used to changing the software dynamically, but now the hardware can change, as well. This represents a third dimension: the hardware inside the FPGA is virtual and exists in time and space.

In a digital audio workstation, there are many tasks that are not *performed simultaneously (e.g., record, mix, effects processing, editing, mastering). These tasks are optimized, and different configurations are loaded into the FPGAs from the host computer based on those tasks.*

In addition, I/O operations account for a sizeable portion of any data-processing system. With FPGAs, the I/O operations can be placed in closer association with the datapath functions (multiply/accumulate operations), resulting in higher system performance for a given class of tasks. As the nature of the task changes, the optimal I/O datapath relationship changes, as well. DSPs and ASICs can't change their I/O-channel-to-CPU architecture, but reconfigurable FPGA-based systems can. Using a RISC processor or DSP chip with FPGAs can provide a virtual hardware system that can be dynamically optimized through reconfiguration. Not only is this an elegant and efficient solution, it is cost effective, as well. This new dimension in system design offers the potential for many new and exciting products, which is the whole point of the "Tech Page" column.—Scott W.

NEW USES FOR OLD GEAR

In my high-tech duo, I use a Roland XP-50 as sequencer and main keyboard, along with a Casio PG300 guitar controller. I don't really need a second "keyboard" in the rig, but I wanted to be able to trigger sound effects and other little extra parts separate from the sequenced music in the act. My Korg DDD5 drum machine has been a fave of mine for years: you can program your own intros, main patterns, and endings for any type of generic drum part you want. The sounds aren't that great (unless the 12-bit thing works for your muse), but it's MIDI controlled. It's also Velocity sensitive, so it can be used to trigger drum sounds from, say, my Alesis D4, Alesis QSR, or the Ensoniq EPS-M rackmount sampler, another machine that works for a variety of applications.

Now, I haven't used the Korg for some time; instead, I sequence my own drums from pads and store them on disk for each song. What I had forgotten is that the Korg, or any other drum machine, can be used as a portable minikeypad to trigger drums from a sampler or other sound source. And because each pad can be assigned to any MIDI channel, you can use it to control a variety of sound modules. It seems to be the answer to the "I don't want or need to carry another keyboard just for this particular application" issue. I've always had a saying: if it has a MIDI plug on it, it will find a use no matter how old it gets.

This magazine made me rethink my system just when I was starting to get a little complacent about the way I make my music.

Steve Nelson
steveyray@tomah.com

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

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And while everyone can lay claim to the fact that they've got 88 keys, only the privileged can tout **64-note polyphony**, 12 exquisite AWM2 voices, a 16MB wave memory, and 24 performance memories each with 2 MIDI channel transmission. Still fewer can say that they have a panel lock mode to keep you from accidentally changing the program number.

And no one but Yamaha can claim to have it all for $2395.

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WHAT'S NEW

By the EM Staff

JLCOOPER MCS²

JLCooper's Media Control Station² ($299.95) provides convenient transport controls and a jog/shuttle wheel for working with Macintosh software-based editing systems. According to JLCooper, it works with all major audio, video, and multimedia software. Used with Media 100 video-editing systems, the MCS² allows you to shuttle through the Clip window with

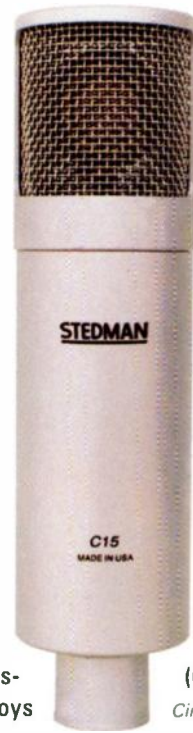
frame accuracy. It has Fast-Forward, Rewind, Stop, Play, and Record buttons as well as Shift and Option buttons, providing a total of twenty button combinations. Software is included that lets you customize and remap the controls. The unit has dual ADB ports so you can use it in a chain with a keyboard, mouse, etc. It measures 8.5 x 3.25 x 1.5 inches and features all-metal construction.

Also available are the MCS² MIDI with MIDI Machine Control, MCS² RS-232 for DOS and Windows (includes software drivers), and MCS² 9-Pin for VTR control ($299.95 each). JLCooper Electronics; tel. (310) 322-9990; fax (310) 335-0110; Web www.jlcooper.com.

Circle #401 on Reader Service Card

STEDMAN C15

Stedman Corporation, maker of the popular N-90 dynamic microphone, has stepped into the world of midpriced condensers with its latest transducer offering. Designed for studio use, Stedman's new C15 ($599) is a large-diaphragm, cardioid-pattern condenser microphone intended for use on vocals, acoustic instruments, and percussion.



The C15 provides a studio-grade frequency response of 25 Hz to 19 kHz and can handle SPL levels up to 132 dB. According to the manufacturer, the microphone's off-axis rejection makes it well suited for applications where room acoustics are not ideal. The C15 employs a lightweight, gold-sputtered, Mylar diaphragm and low-noise electronics, housed inside a solid aluminum body. The microphone weighs a total of 8.5 oz.

The microphone comes packaged in its own foam-lined hard-shell case, complete with a dual-knob, adjustable adapter clip. In the accessories department, C15 owners can opt to purchase a suspension shock-mount (SMC-2; $49.50) and a washable pop filter (WS-2; $7.40). The C15 is available in matched pairs and comes with a standard 2-year warranty on parts and labor. Stedman Corporation; tel. (616) 629-5930; fax (616) 629-4149.

Circle #402 on Reader Service Card

CALISTAN WAVE SAFE PRO

From dirty, abused, old, or defective media to power surges, system crashes, and computer viruses, threats to the integrity of your digital audio files abound. Corrupt files can result in a loss of fidelity, or your software may simply refuse to recognize them. *Wave Safe Pro* (Windows; $199) from Calistan Solutions monitors the integrity of WAV files and salvages corrupt files.

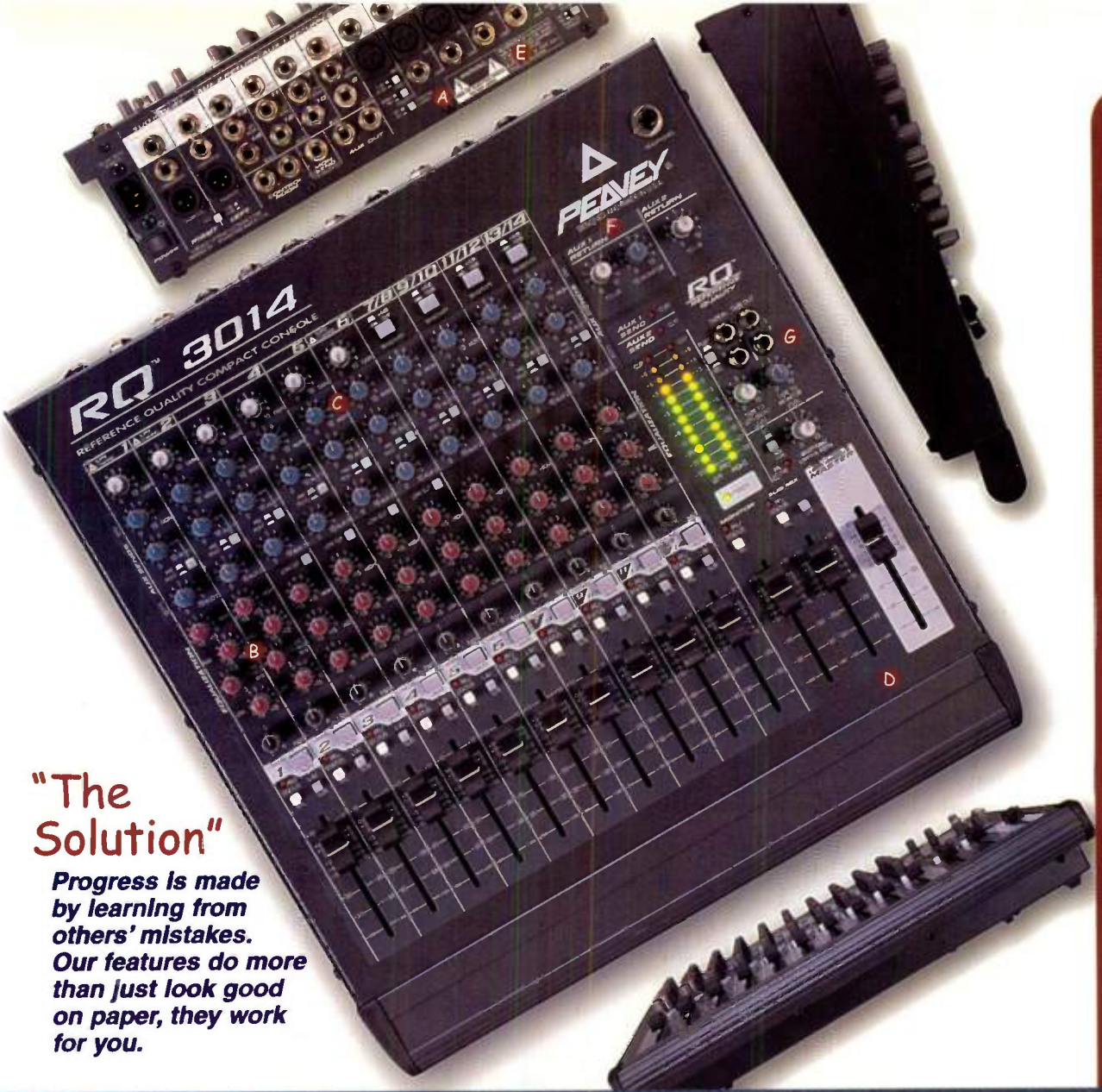
The program works by storing detailed information about your sound files in a central database. You can then use the program to verify the integrity of files. For example, if you restore a file from a backup, you can check to make sure that the restored file is valid.

If a file does become corrupted, *Wave Safe Pro* will salvage it using the information in its database and a set of fixing algorithms. It will even rescue sound data from damaged media (such as scratched CD-Rs) that Windows deems unreadable. Of course, some data may still be lost. You can print out several types of reports showing file status and salvage results.

Wave Safe Pro is compatible with hard-disk utilities, such as those from Microsoft or Norton. A shareware version is available from the company's Web site that is functional but lacks some features, such as the pro version's performance optimizer and the ability to read directly from CD-R/RW.

The program is available in 16- and 32-bit versions. It requires a PC with an 80486 or better processor and Windows 3.1, 95, or NT. Calistan Solutions, Ltd.; tel. and fax 44-0-171-691-7823; e-mail sales@calistan.demon.co.uk; Web www.calistan.demon.co.uk.

Circle #403 on Reader Service Card



RQ™ 3014 Reference Quality Compact Console

"The Solution"

Progress is made by learning from others' mistakes. Our features do more than just look good on paper, they work for you.

A **Problem:** Phantom power makes some wireless mics sound squirrely, but your other mics need phantom power.
Solution: Separate 48V Phantom power switches for Channel 1 *and* Channels 2-6 (smart).

B **Problem:** You can't get your instrument to sound "just right" with fixed EQ.
Solution: 3-band ***mid sweep*** EQ on first 2 channels. "Who says all channels have to be the same?"

C **Problem:** The drummer needs his own monitor mix.
Solution: ***3 Aux sends.*** You can never have too many auxes — #1 dedicated Pre, #2 switched Pre/Post, #3 dedicated Post.

D **Problem:** You want to sub mix your vocals through a processor, and still be able to use the mutes.
Solution: We give you PFL, Mutes *and* a Sub bus that doesn't get trashed when you use your mutes. This extra bus has its own fader for use as an alternate stereo mix, rear surround, or Sub out. A L/R assign switch allows use as a group master. An insert jack lets you process then remix into L/R (we do it right).

E **Problem:** Your drum mics are picking up sounds out of phase and thinning out the bass.
Solution: ***"Super Channels"*** offer Pad and Polarity switches on Channels 1 and 6 (neat).

F **Problem:** You want to send effects return to Main and Monitor without burning extra inputs.
Solution: Aux 1 return has sends to ***both*** Main ***and*** Monitor.

G **Problem:** You want to use a pre-recorded track, ***and*** hear it in your monitor
Solution: Tape input with send to Main and send to Monitor

The RQ 3014 will exceed your expectations and the competition's performance.

All this and a noise floor so quiet you can hear gnats burping. Note: we haven't confirmed that it was indeed a burp, but the mic preamps and discreet summing amps are extremely quiet.

▶ FOSTEX DP-8

Digital audio brought flexibility to the personal studio: don't you feel more limber after bending over to repatch your digital equipment a dozen times? The new DP-8 digital patch bay ($359) from Fostex makes it easy to patch gear with ADAT Lightpipe or S/PDIF I/O. It has six optical I/O pairs, which accommodate Lightpipe or S/PDIF signals, and two coax S/PDIF I/O pairs. Each input has a control that assigns it to an output. For quick patching, one optical I/O pair is on the front panel.

The DP-8 accepts signals with sampling frequencies up to 48 kHz and resolutions up to 24 bits. It also cleans up degraded signals. Fostex Corporation of America; tel. (562) 921-1112; fax (562) 802-1964; e-mail info@fostex.com; Web www.fostex.com.

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▼ ALESIS ADAT-LX20 AND XT20

The 20-bit ADATs are here! In addition to the M20, which we previewed in the June 1997 "What's New" (it was called the "Meridian" at that time), Alesis is offering two lower-priced models, the ADAT-LX20 ($2,299; shown) and the ADAT-XT20 ($2,999). Both machines record eight tracks of 20-bit digital audio (at 44.1 or 48 kHz) on S-VHS tapes. The new machines can be cascaded with original ADATs and ADAT-XTs and are compatible with tapes recorded on the original machines as well as with Alesis's BRC.

The LX20 offers controls similar to those on the original ADAT, with five locate points and no onboard editing or selectable meter peak/hold controls. Its chassis is a conventional steel-cased housing, and it provides only unbalanced RCA analog I/O for -10 dBV signals.

The XT20 replaces the ADAT-XT and features similar controls, such as onboard digital editing with Tape Offset, Track Copy, and Track Delay; ten locate points; and meter-ballistics controls. It has a die-cast, solid aluminum chassis with an isolated internal power supply. Connections are on unbalanced RCA jacks (-10 dBV) or balanced 56-pin connector (+4 dBu).

Alesis rates the LX20's dynamic range at 97 dB (A weighted) and its THD+N at <0.009%, whereas the XT20's dynamic range is rated at 102 dB and its THD+N at <0.003%. Frequency response is rated at 20 Hz to 20 kHz (+0/-0.5 dB). Alesis Corporation; tel. (800) 525-3747 or (310) 255-3400; fax (310) 255-3401; e-mail alecorp@alesis1.usa.com; Web www.alesis.com.

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▶ SPIRIT FOLIO FX16

Spirit's new Folio FX16 ($1,199.95) is a 4-bus, 16-channel multipurpose mixer with built-in Lexicon digital effects. The console's sixteen mic/line inputs (on balanced XLR and impedance-balanced ¼-inch jacks) have Spirit's UltraMic preamps, which provide 60 dB gain range and +22 dBu headroom. Global 48V phantom power is available.

Each channel has a 3-band British EQ. The high and low bands are fixed at 12 kHz and 80 Hz, respectively, and the mid-band sweeps from 250 Hz to 6 kHz. A custom pot for the sweepable mid provides fine control across selected frequencies. There's also an 18 dB/octave highpass filter at 100 Hz.

The onboard effects processor delivers sixteen reverb, chorus, and delay programs, including dual effects. The chosen effect is globally available from a dedicated effects send on each channel. Each program has two editable parameters, and settings can be stored.

In addition to the effects send for the onboard processor, there are one prefader and two postfader aux sends. Each channel also features solo in place, prefader listen, and pre/postfader (switchable) direct out.

The Folio FX16 uses 100 mm faders throughout. In addition to the stereo mix outs, the FX16 has a mono-sum output and two subgroup outs. There are four stereo returns with level-control pots. The 10-segment, tricolor meters can be set to monitor mix, subgroups, or individual channel PFL.

The mixer uses custom pots and PCB surface-mount technology. With an optional kit (approximately $50), you can mount it in ten rackspaces. A rotating pod puts the connections behind the rack.

Spirit rates the FX16's THD at <0.009% (input to main outs, +20 dB output). Noise is rated at -80 dBu (aux or main outs; measured RMS, 22 Hz to 22 kHz). Spirit by Soundcraft; tel. (800) 255-4363 or (916) 630-3960; fax (916) 630-3950; Web www.spiritbysoundcraft.com.

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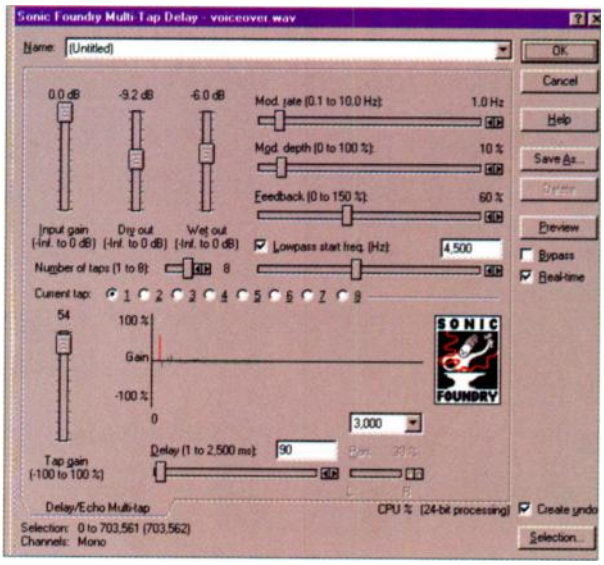
▼ SONIC FOUNDRY XFX

Sonic Foundry has released a series of effects plug-ins in DirectX format. The XFX 1 and XFX 2 Plug-In Packs ($249 each) contain native versions for Windows NT (with Pentium or Alpha chips) and Windows 95. All of these plug-ins offer real-time preview.

The XFX 1 Plug-in Pack includes *Reverb, Pitch Shift, Multi-Tap Delay, Time Compression/Expansion, Simple Delay,* and *Chorus* plug-ins. *Reverb* offers nineteen types, with multiple early-reflection modes and high- and lowpass EQ. You can set decay and predelay times and adjust dry, reverb, and early-reflection levels.

The *Time Compression* and *Pitch Shift* plug-ins use multiple algorithms tuned to specific types of materials. The former lets you effectively compress or stretch by 20 percent, with a maximum compression of 50 percent and expansion of 500 percent. The latter lets you pitch shift up to ±50 semitones, with precision down to cents (hundredths of a semitone).



You can set up to eight taps in the *Multi-Tap Delay,* with variable amplitude, pan, and delay time (up to 2.5s). Using the *Simple Delay,* you can adjust delay times between 1 ms and 5s, with delay feedback decay times up to 20s. The *Chorus* plug-in offers control of modulation depth, frequency, and feedback and includes a lowpass filter and phase reversal for the chorus.

The XFX 2 Plug-In Pack has six plug-ins. *Noise Gate* offers thresholds between -∞ and 0 dB, with control of attack and release times. The *Graphic Dynamics* plug-in provides compression, limiting, and expansion with graphic control for each and automatic gain compensation. *Multi-Band Dynamics* gives you dynamics control on up to four simultaneous frequency bands with individual bypass controls.

XFX 2's *Paragraphic EQ* features four parametric bands plus variable low- and high-shelving filters and extensive presets. *Parametric EQ* has band-notch, bandpass, low-shelf, and high-shelf filters. Finally, *Graphic EQ* offers fixed 10- and 20-band pages, or you can draw filter curves in a graphic frequency-envelope page.

These DirectX plug-ins require a Pentium or better PC (Pentium Pro recommended for real-time previewing), Windows 95 or NT 4.0 or later, 16 MB RAM, a sound card, and a CD-ROM drive. Sonic Foundry; tel. (800) 577-6642 or (608) 256-3133; fax (608) 256-7300; e-mail sales@sonicfoundry.com; Web www.sonicfoundry.com.

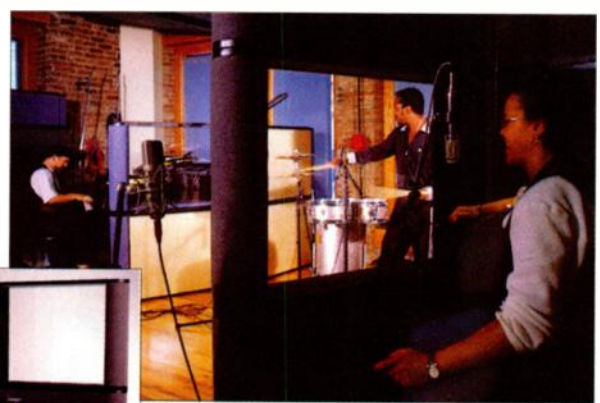
Circle #407 on Reader Service Card

▼ TAYTRIX STACKIT GOBOS

Acoustical control is a critical parameter in studio recording, yet it is often given short shrift, especially in the personal-studio environment. The Taytrix StackIt gobo system ($285 to $395 per gobo, depending on size and style) employs a modular, stackable design that provides a versatile solution to instrument bleed during live, multiple-instrument recording. The unique design makes the system quickly adaptable to setups for drums, vocals, partition walls, amp enclosures, and other sound-separation applications.

StackIt gobos are available in two sizes, three styles, and a variety of colors, including blue, forest green, slate, russet, and rose weave. The full-size model is 46 inches long, 32 inches high, and 8 inches thick. The half size is the same length and thickness but only sixteen inches high. The three styles are absorption, Plexiglas, and combination.

The absorption gobos ($285 and $380, half and full size) use multiple layers of fabric insulation to provide maximum control at high and midrange frequencies. The Plexiglas gobos ($315 and $415) employ double layers of ¼-inch clear Plexiglas to provide see-through capability as well as sound separation. The combination gobos ($295 and $395) feature natural maple on one side for low-frequency absorption and high/midrange-frequency deflection and fabric insulation on the other side for a higher degree of sound absorption.



StackIt gobos are lightweight (24 to 36 lbs. each) and feature rounded edges to allow for virtually any angle of setup. The tops and bottoms interlock and are joined by a clip ($6 each, two provided with each gobo) for added stability. Taytrix; tel. (210) 222-2826; fax (201) 222-5457; e-mail info@taytrix.com; Web www.taytrix.com.

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– Teddy Riley

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Now, you're probably thinking we had to pay Teddy to say all this. But the truth is, he's been using Pro Tools on every project since Michael Jackson's *Dangerous* — simply because it's the best tool for the job. Based on the number of hits he's cranked out, his career and life have been nothing short of remarkable. Or, as Teddy would say..."*complete.*"

For more information about Pro Tools and Third-Party development products, call **1.800.333.2137 ext. 324** for a free Pro Tools video, or to schedule a free demo.

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TEDDY RILEY, PRODUCER | ARTIST
Lil' Man Records Future Recording Studios, VA

circle #517 on reader service card

▼ DIGITECH STUDIO S100

If a crunched budget is cramping your studio style, relief is in sight with DigiTech Studio's S100 ($199.95), a dual-engine multi-effects processor in a single-rackspace box. The S100 provides a full menu of effects, including stereo reverbs, multitap delays, chorus, flange, tremolo, pitch shifting, detuner, and parametric EQ. Ninety-nine factory programs are provided, and up to 99 user-defined programs can be saved.

The S100's two independent processors can be arranged in seven different configurations, including series, parallel, and stereo. The unit's interface includes a data wheel, LED screen, and dedicated function buttons. The rear panel provides an input-level control, ¼-inch unbalanced inputs, ¼-inch balanced outputs, ¼-inch footswitch jack, a MIDI In port, and a jack for the wall-wart power supply.

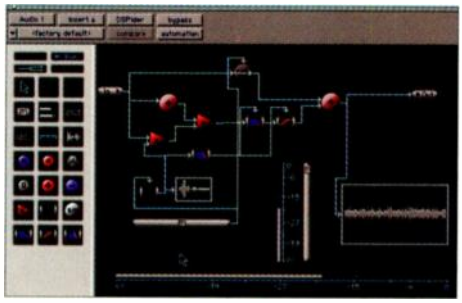
The S100 features 20-bit A/D and D/A conversion and utilizes a 46.875 kHz sampling rate. Frequency response is rated at 20 Hz to 20 kHz, S/N ratio >96 dB (A weighted), and THD at less than 0.008% (1 kHz). DigiTech Studio/Harman Music Group; tel. (801) 566-8800; fax (801) 566-7005; e-mail customer@digitech.com; Web www.digitech.com.

Circle #409 on Reader Service Card

▶ DUY DSPIDER

DUY's *DSPider* ($799) provides Pro Tools users with a powerful software synth and effects processor. The TDM plug-in consists of 40 modules, from simple operators such as add, shift, and so on, to complex processors such as envelope followers and pitch trackers. You get digitally controlled oscillators and filters, delays, waveform shapers, noise generators, ramp generators, and more.

The graphic interface allows you to link modules together onscreen and uses tools such as sliders, numeric readouts, and plasma meters. Predefined patches are provided (around 40 are currently available). The plug-in has far more features than we can describe here. Cameo International (distributor); tel. (888) 33-CAMEO or (408) 399-0008; fax (408) 399-0036; e-mail info@duy.es; Web www.duy.es.



Circle #410 on Reader Service Card

▼ SONIC DESKTOP SMARTSOUND

For low-hassle soundtrack creation, check out Sonic Desktop Software's *SmartSound for Multimedia* (Mac v. 1.61 /Win v. 1.5; $249, upgrade from v. 1.0 for $35). For instance, if you want to show a client approximately what you have in mind for a piece you will later create from scratch, you can use *SmartSound*'s library of production-music clips to assemble a quick demo.

The software's Maestro section guides you through the process of selecting appropriate music. You specify the audio's purpose (opening, background, transition, etc.), length (to the tenth-second; looping audio can also be created), and style. Based on these parameters, the Maestro suggests source files from accompanying *Audio Palette* CDs and then creates a soundtrack by combining elements from the Audio Palette. You can also add your own tracks by importing files in a wide variety of formats.

Soundtracks can be edited in the Smart Blocks editor, which displays phrases as blocks that you can drag and drop. You can hear a phrase by double-clicking it. *SmartSound* gives you hints as to which phrases fit together well. Effects such as reverb, delay, and chorus are also included.

The Mac version can display QuickTime movie thumbnails on a timeline; you can export the movie with the soundtrack attached.

A completed soundtrack can be output in a variety of formats, including WAV, AIFF, AU, QuickTime and RealAudio; the Mac version exports SDII files, as well. *SmartSound* can handle 44.1 kHz, 16-bit audio, although the basic package includes only 22 kHz phrases. A 44.1 kHz version is available for $298.

Audio Palette 1 (included) provides sound effects and music in rock, pop, jazz, classical, big-band, country, and ethnic styles. Three other Audio Palettes are currently available: *Scoring Essentials, Maximum Action,* and *Narration Backdrops* ($69 each for 22 kHz versions; $129 each for 44.1 kHz versions).

SmartSound for Windows requires an 80386 or better processor, 4 MB RAM, Windows 95 or NT 4.0, an 8- or 16-bit sound card, and a 2x CD-ROM drive. The Mac version requires a 68020 or better processor, 4 MB RAM, System 7 or later, Sound Manager 3.0, and a CD-ROM drive. Sonic Desktop Software; tel. (818) 718-9999; fax (818) 718-9990; e-mail info@sonicdesktop.com; Web www.smartsound.com.

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circle #502 on reader service card

SOUND ADVICE ▲ ▲ ▲ ▲

▲ DISCOVERY FIRM

Asian instruments playing traditional and modern phrases are the subject of Discovery Firm's *Oriental Groove* audio CD ($59.95). The company's Japanese production team recorded Japanese, Chinese, and Indian instruments, including shakuhachi and other traditional Japanese wooden flutes; koto (with arpeggiated and tremolo phrases); shamisen; water gongs and other metallic, melodic gongs; taiko; sitar; tambura; and tabla.

The ten grooves range in tempo from 116 to 136 bpm. Each is given as an ensemble followed by as many as fourteen phrases with different instrument combinations (or single instruments). A few single hits are thrown in, too. Phrases are up to 44 seconds long, and the total time of the disc is over 43 minutes. Discovery Firm; tel. (888) 544-3476 or (310) 781-1333; fax (310) 781-1330; e-mail dis@discoveryfirm.com; Web www.discoveryfirm.com.

Circle #412 on Reader Service Card

PRO-REC

Four new collections of patches for the Korg Trinity are now available from Pro-Rec. *Dance, Techno/Rave, Filmscape,* and *New Age* cost $44.90 each (three for $89.80; all four for $119). Each disk contains 128 programs and 128 combinations based on the Trinity's internal samples.

Dance features digital and analog-style synthesizer hits, leads, pads, basses, and percussive sounds. The *Techno/Rave* volume contains fat and bright techno and dance stabs, hits, and leads; fat and smooth basses; techno drums; and assorted effects sounds. On the *Filmscape* disk you'll find huge, expanding atmospheric sounds; swirling atmospheres; wild pads; fat film attacks; developing sounds; and special effects. The *New Age* collection has light and muted synth sounds; smooth and swirling pads; simple atmospherics; sweeping, developing soft sounds; and various textured, musical sounds.

Each collection comes on a floppy disk, or you can purchase them electronically and download them from the company's Web site (which also offers complete patch listings and demos). Pro-Rec; tel. (212) 675-5606; fax/demos (212) 627-3148; e-mail prorec@aol.com; Web users.aol.com/prorec.

Circle #413 on Reader Service Card

▶ IK MULTIMEDIA PRODUCTION

The latest product from IK Multimedia vastly expands the concept behind the company's *Axé* loop library and groove-construction software (reviewed on p. 174 of this issue). *GrooveMaker + Dancity* (Win; $69) is a 2-CD-ROM set that includes the huge *Dancity* library of techno and dance loops and *GrooveMaker* software for combining these loops into grooves and even entire songs.

The 504 loop samples are stored as 16-bit audio files with 44.1 and 22.05 kHz sample rates. Tempi for these 8-bar phrases range from 98 to 180 bpm The loops include bass, bass drum, effects, percussion, vocals, and synth sounds in techno, house, progressive, Eurodance, jungle, trash, and other styles.

Using the *GrooveMaker* software, you can layer up to 80 loops onto eight stereo tracks, with control of volume and pan for each loop. You can shift tempos by ±20 percent. The software plays the groove in real time as you swap loops in and out. A randomization feature mixes in loops according to user-programmable parameters. Combinations can be saved to disk or stored as snapshots for later assembly into songs. In addition, you can add your own samples and generate more sounds with the included software's Virtual Synth Arpeggiator, which has 99 sounds and more than 30 patterns.

With the GrooveSequencer feature, you assemble marked grooves into songs that you can save to disk as audio files (mixing the eight tracks or recording them separately). There's also a Virtual DJ that assembles random mixes. The software requires a 75 MHz Pentium with 16 MB RAM and Windows 95. A Mac version is under development. Ilio Entertainments (distributor); tel. (800) 747-4546 or (818) 707-7222; fax (818) 707-8552; e-mail ilioinfo@ilio.com; Web www.ilio.com.

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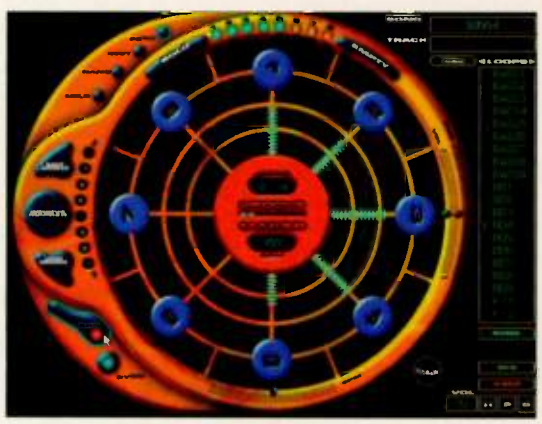
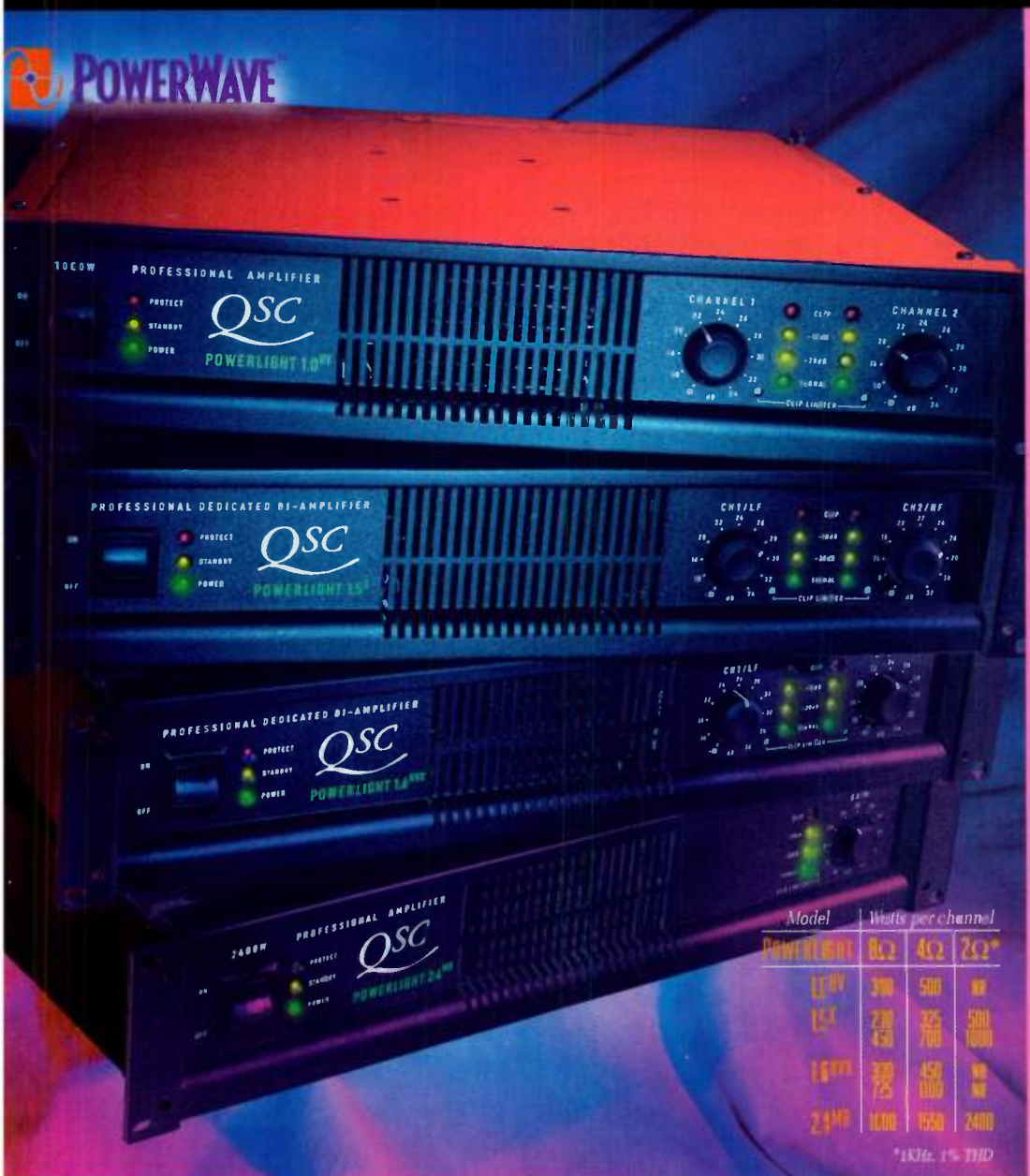


PERFECT POWER.



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circle #568 on reader service card

▶ POWER TECHNOLOGY DSP • FX VIRTUAL

Until now, Power Technology's innovative effects plug-ins have required the company's proprietary hardware. Now there is a software-only version: DSP•FX Virtual Pack ($499). This suite of DirectX plug-ins uses the same 32-bit, floating-point algorithms and graphic interfaces employed by the hardware-based versions. It is also compatible with the proprietary plug-in format used by Innovative Quality Software's *SAW Plus 32*.

The initial release of DSP•FX Virtual Pack includes eight effects plug-ins: *Reverb, Stereo Pitch Shift, Analog Tape Flanger, Multi-element Chorus, Multitap Delay, Parametric EQ, Auto Pan,* and *Auto Tremolo.* (See the review in the January 1997 **EM** for more on these plug-ins.) The company plans to release additional effects in the future.

DSP•FX Virtual Pack also comes with a standalone application that allows you to process WAV files directly (i.e., without using a DirectX-compatible host program). Because all of the algorithms and interfaces are the same, presets can be exchanged freely between the DSP•FX Virtual Pack and hardware-based DSP•FX systems.

According to the manufacturer, the program should run on any PC using Windows 95 or Windows NT. Power Technology; tel. (415) 467-7886; fax (415) 467-7386; e-mail dspfx@dspfx.com; Web www.dspfx.com.

Circle #415 on Reader Service Card

▶ SAMSON Q2 AND Q3

Samson Technologies has added two new dynamic microphones to its "Q family" of stage mics: the Q2 instrument/vocal mic ($174; shown at right) and the Q3 instrument mic ($224). Both mics feature the same transformerless design, aluminum humbucking voice coil, neodymium element enclosed in a multi-axis, shock-mount chassis; gold-plated XLR connector; and special "Euro-Adapter" that allows the mic to be mounted onto European mic stands. Both mics also provide a switchable pad (-10 dB) and high-pass filter (75 Hz @ 12 dB/octave).

The Q2 is a hand-held mic with a cardioid polar pattern. The smaller Q3 has a hypercardioid polar pattern and 90-degree rotatable mic mount to allow positioning on drums, guitar amps, and so on. Frequency response is rated 50 Hz to 15 kHz, sensitivity at -71 dB, and maximum sound-pressure level at 137 dB for both mics. Samson Technologies Corporation; tel. (516) 364-2244; fax (516) 364-3888; e-mail sales@samsontech.com; Web www.samsontech.com.

Circle #416 on Reader Service Card

▼ DRAWMER MX40

Drawmer's latest offering in its affordable MX line (which includes the MX30 compressor reviewed on page 164) is the MX40 Punch Gate ($599), a 1U rack-mount, 4-channel, "tunable" noise gate that is especially suitable for gating drums and percussion. The MX40 is the first Drawmer product to use the company's new "Peak Punch" circuitry. The switch-operated Peak Punch provides 8 dB of broadband expansion per channel to "accelerate" the leading edge of gated signals, resulting in increased dynamic punch.

Each channel on the MX40 has three rotary controls: Trigger Frequency, Threshold, and Release. Trigger frequency, with continuous settings from 50 Hz to 8 kHz, is a filter that allows "frequency conscious" gating. It provides switches for external key (configures the gate to open from an external trigger source), filter in/out, and key listen (provides monitoring of the trigger signal seen by the gate). When no external trigger source is connected, all gates can be triggered by channel 1.

Threshold settings range from -60 to +20 dBu and release times from 25 ms to 4s. A Range button provides switchable attenuation levels (-20 or -90 dB). Each channel also provides a "traffic light" LED display (red for closed, green for open, and amber for attack/release status) and Bypass button. In addition, two Slave Link switches enable the control of channel 2 from channel 1 and channel 4 from channel 3.

The MX40's rear panel provides balanced XLR I/O and ¼-inch key-input jacks for each channel. The unit has an internal power supply (switchable 115/230V) and detachable IEC cord. Frequency response is rated at 10 Hz to 22 kHz and THD at 0.024% (@ 0 dB). Transamerica Audio Group (distributor); tel. (805) 241-4443; fax (805) 241-7839; e-mail transamag@aol.com; Web www.proaudio.co.uk/drawmer.htm.

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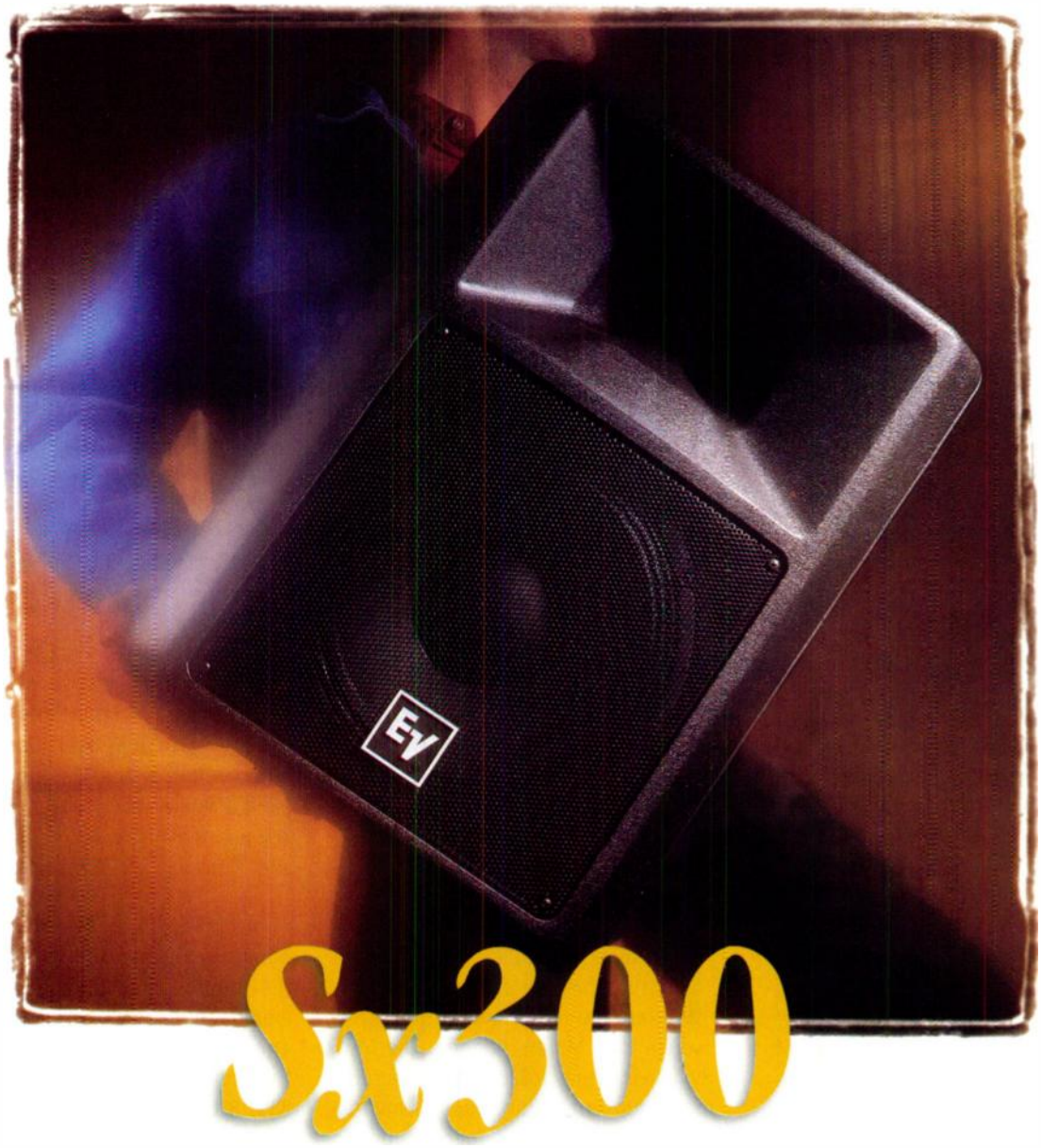

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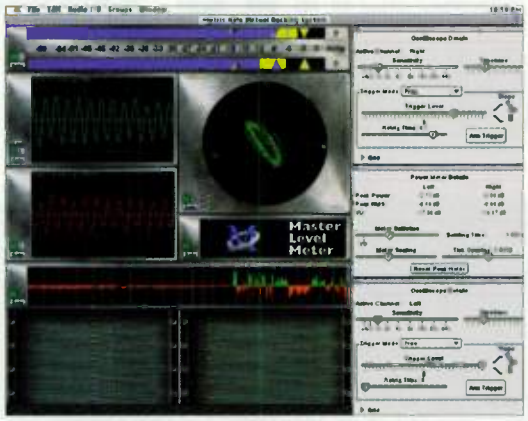
circle #524 on reader service card

KEY CHANGES

Thanks to an agreement between Roland and AirWorks, the latter's *S/Link* for Macintosh will allow users to save Roland VS-880 sound files to a variety of file formats, including Pro Tools sessions. AirWorks' *AutoConform* will let users load source material into the VS-880 and will supply full audio sync... Spatializer Audio Labs has released its *PT3D* 3-D audio-mixing plug-in in AudioSuite format ($199)...Digidesign released D-fx ($249), a bundle of AudioSuite plug-ins *(D-Verb, Chorus, Flanger, Multi-Tap Delay,* and *Ping-Pong Delay)*...Symbolic Sound is shipping a PCMCIA card that interfaces with the Kyma system's Capybara card cage, allowing Kyma to be used with a Mac or PC laptop computer...Web surfers will now be able to purchase and download sheet music from the Sheet Music Direct Web site (www.sheetmusicdirect.com), a joint venture of Hal Leonard and Music Sales U.K. The cost of a single song is $3.95...Digigram released a driver that allows its PCX cards to work with software that complies with Microsoft's WAVE standard. The driver can be downloaded at no charge from the company's Web site: www.digigram.com...Users of Emagic *Logic Audio* 3.0 with the TDM Extension can now download, free of charge, a 24-bit updater that supports Digidesign's Pro Tools 24 system. Emagic is also shipping its Soundscape Extension for *Logic Audio* for Windows 95 ($149), which allows *Logic Audio users* to work with Soundscape's SSHDR hard-disk recorders...Neumann's U 87Ai, U 89i, TLM 170R, and TLM 193 can be purchased as consecutively numbered stereo pairs, housed in a custom aluminum case. The case can be purchased separately.

—Rick Weldon



▲ METRIC HALO MLM-100

Comprehensive level metering is now available in an affordable software package for the Macintosh. The Metric Halo *MLM-100 Master Level Meter* ($99.95) provides high-resolution, high-speed metering of a stereo pair of audio signals in real time, a Lissajous phase scope, a power-balance meter, and two full-featured oscilloscopes.

The *MLM-100* uses Metric Halo's *SpectraFoo* analysis technology to update its instrumentation displays up to 84 times per second. The system's digital meter can show RMS and peak level simultaneously and provides average readings with adjustable ballistics; a numerical readout of consecutive, full-scale samples; and numerical peak holds accurate to 0.01 dB.

Peaking waveforms are captured by the dual-channel oscilloscope, which provides adjustable time base, sensitivity, and calibrated graticule as well as level, slope, clip, and polarity-check triggering modes. The Lissajous phase scope offers both oscilloscope and vectorscope modes, and the left/right power balance meter provides eighteen seconds of stereo soundstage and panning information.

The *Master Level Meters 100* system will run on any Power Macintosh and is compatible with Mac OS 7.5.3 to 8.0. The software can accept analog or digital input using a Lucid Technology PCI24 audio card, a Digidesign Audiomedia III card, or a Korg SoundLink 1212 I/O card. A plug-in module for Digidesign Pro Tools systems is also available. In addition, the Metric Halo TDM system even allows you to monitor the effect of other DSP plug-ins while you are changing parameters.

Bandwidth is DC to 22.05 or DC to 24 kHz, depending on sample rate. Bit depth is 16 or 24 bit. Metric Halo Labs, Inc.; tel. (914) 298-0451; fax (914) 298-4089; e-mail in-foo@metric-halo.com; Web www.mhlabs.com.

Circle #418 on Reader Service Card

▼ MIDDLE ATLANTIC MPS SYSTEM

Those of us who are constantly restructuring our studios will appreciate the new modular connector system from Middle Atlantic. The MPS System (starting at $38.50) offers a rack-mounting frame that supports custom prepunched modules, accommodating virtually any connector.

Twenty-three MPS modules are offered in all, supporting XLR, Switchcraft, Neutrik, Cannon DL, Elco, 50-pin data port, and other connectors. Each MPS frame occupies two spaces in a standard rack and accepts five MPS modules, which are punched for two, three, or four connectors of the same type.

The MPS modules and frames are constructed from 16-gauge steel, and they sport a black powder finish. The manufacturer also offers blank modules and vented modules. Middle Atlantic Products; tel. (201) 839-1011; fax (201) 839-1976. ❁

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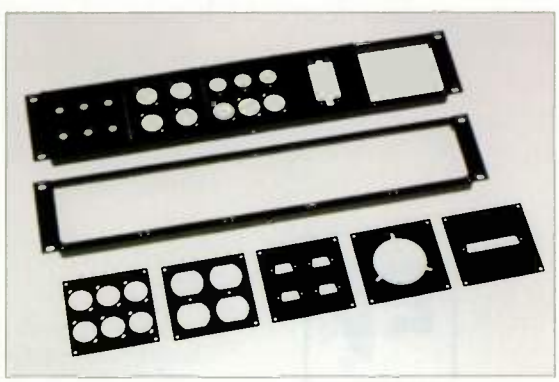

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circle #593 on reader service card

TECH PAGE

CD—The Next Generation

Better audio quality and CD compatibility.

By Scott Wilkinson

Without a doubt, the compact disc has become the most popular audio-distribution medium in history; nearly 500 million CD players and more than 10 billion CDs have been sold since the format's inception some fifteen years ago. Nevertheless, there are those who complain about the limitations of the CD's 16-bit resolution and 44.1 kHz sampling rate, claiming that these specs are simply not good enough for truly high-fidelity sound.

As a result, a number of companies are working on the next generation of digital audio media. One of these proposals is based on the new DVD format; the most commonly discussed audio specs are 96 kHz and 24 bits. However, this approach is not compatible with current CD players.

To address this problem, Philips and Sony are working a new format, Super Audio Compact Disc (SACD). Fully compatible with current CD players, the disc includes two layers (see **Fig. 1**). The inner layer contains standard CD information encoded in the normal manner, and the outer layer contains new, high-density (HD) information.

If you put an SACD in a standard CD player, the laser light (which has a wavelength of 780 nm) passes through the outer, HD layer and reflects from the inner, standard layer. But an SACD player uses a laser with a wavelength of 650 nm, which is reflected by the outer layer. The shorter wavelength allows for smaller pits, so more data can be encoded in this layer.

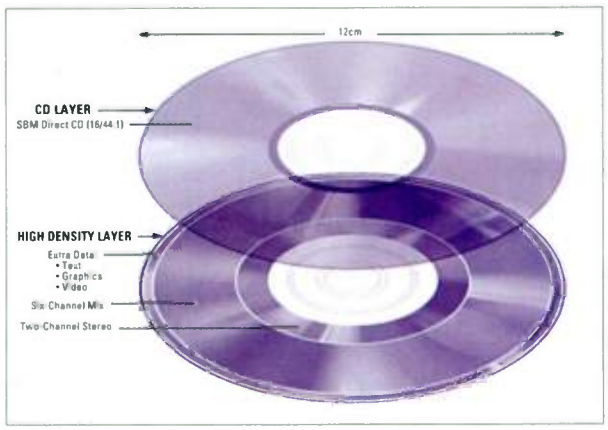
The HD layer can hold up to 4.7 GB of data. This data can include a complete program of stereo material (up to 74 minutes) and another complete program of 6-channel material. It can also include extra data, such as text, graphics, and video.

The new HD format is encoded using a process called Direct Stream Digital (DSD). Unlike the multibit CD or DVD approach, DSD is a 1-bit system with a sampling rate of 2.8224 MHz. DSD represents the instantaneous amplitude of the incoming analog waveform by the *density* of 1s and 0s in an ever-changing stream rather than by the values of multibit words: a stream of mostly 1s represents a high instantaneous amplitude, while a stream of mostly 0s represents a low amplitude. Therefore, it is sometimes called Pulse Density Modulation (PDM).

Using fifth-order noise-shaping filters (which move the noise energy of the bitstream up above the range of human hearing), DSD supports a frequency response up to 100 kHz and a dynamic range of 120 dB throughout the audible spectrum. By contrast, a standard CD has a frequency response up to 20 kHz and a dynamic range of less than 96 dB.

Data compression is critical for storing two complete programs—stereo and 6-channel—plus extra text and graphic information in the HD layer. Instead of using a lossy technique, such as MPEG, ATRAC, or Dolby AC-3, Sony and Philips developed a lossless coding algorithm called Direct Stream Transfer (DST). This algorithm reduces the bit rate by 50 percent without losing any data.

To convert DSD signals to standard CD format, a process called Super Bit Mapping (SBM) Direct is used; this is an outgrowth of Sony's original SBM. SBM Direct uses a finite impulse response (FIR) digital filter/noise shaper to convert DSD to standard 16-bit, 44.1 kHz PCM while retaining much of the enhanced audio quality of the original DSD signal. In addition, the system is capable of converting DSD to almost any sample rate and bit resolution. This gives the Sony/Philips system as much flexibility as anyone might want in a digital audio delivery medium.



COURTESY SONY/PHILIPS

FIG. 1: The Sony/Philips Super Audio CD includes two layers, one for standard CD information and one for high-density DSD information.

Keith Emerson
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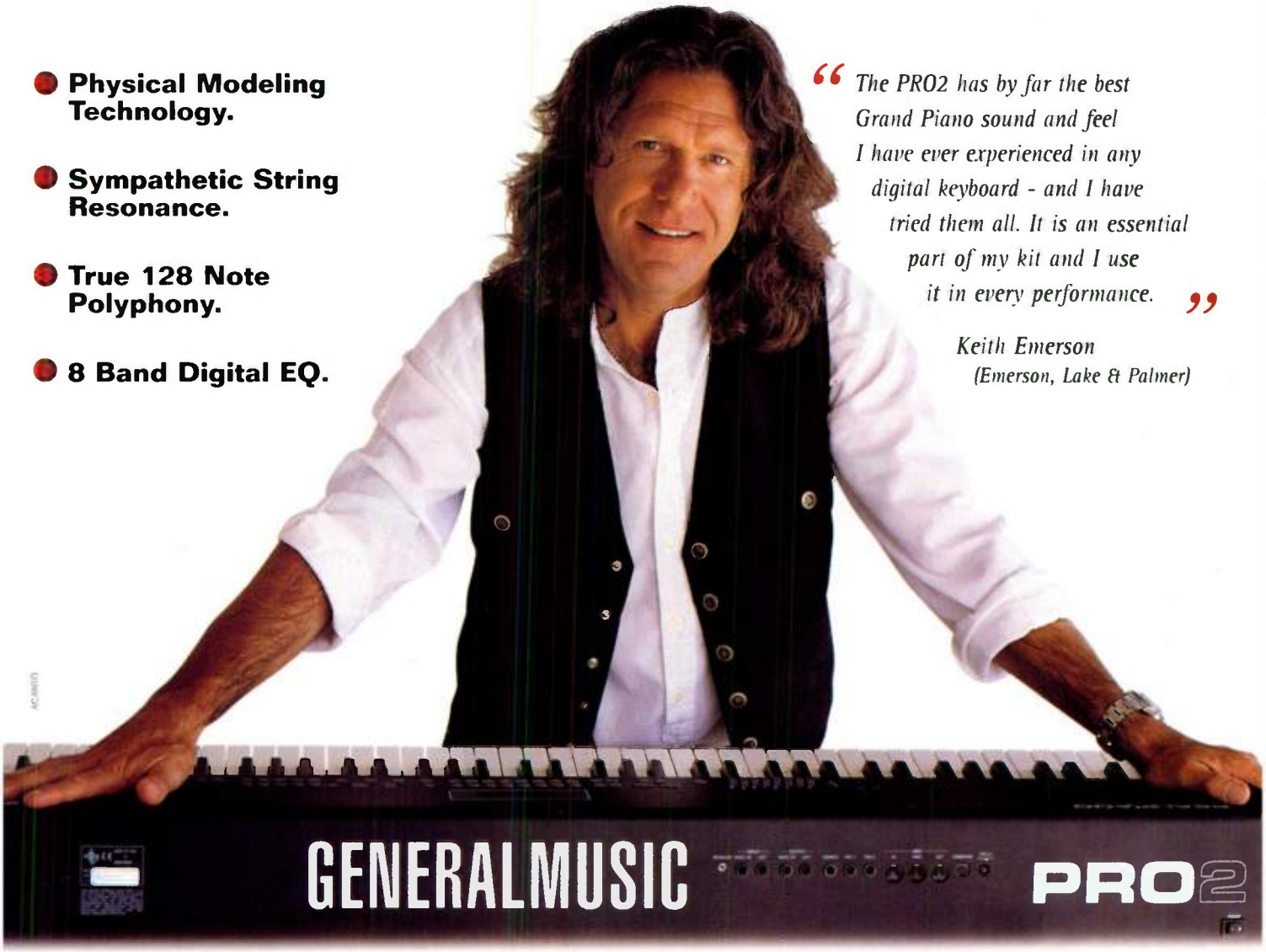

"The PRO2 has by far the best Grand Piano sound and feel I have ever experienced in any digital keyboard - and I have tried them all. It is an essential part of my kit and I use it in every performance."

Keith Emerson
(Emerson, Lake & Palmer)

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The Realpiano PRO series starts at a suggested $1,865 retail price (PRO1) and is also available in a module version, the PRO Expander (pictured above).

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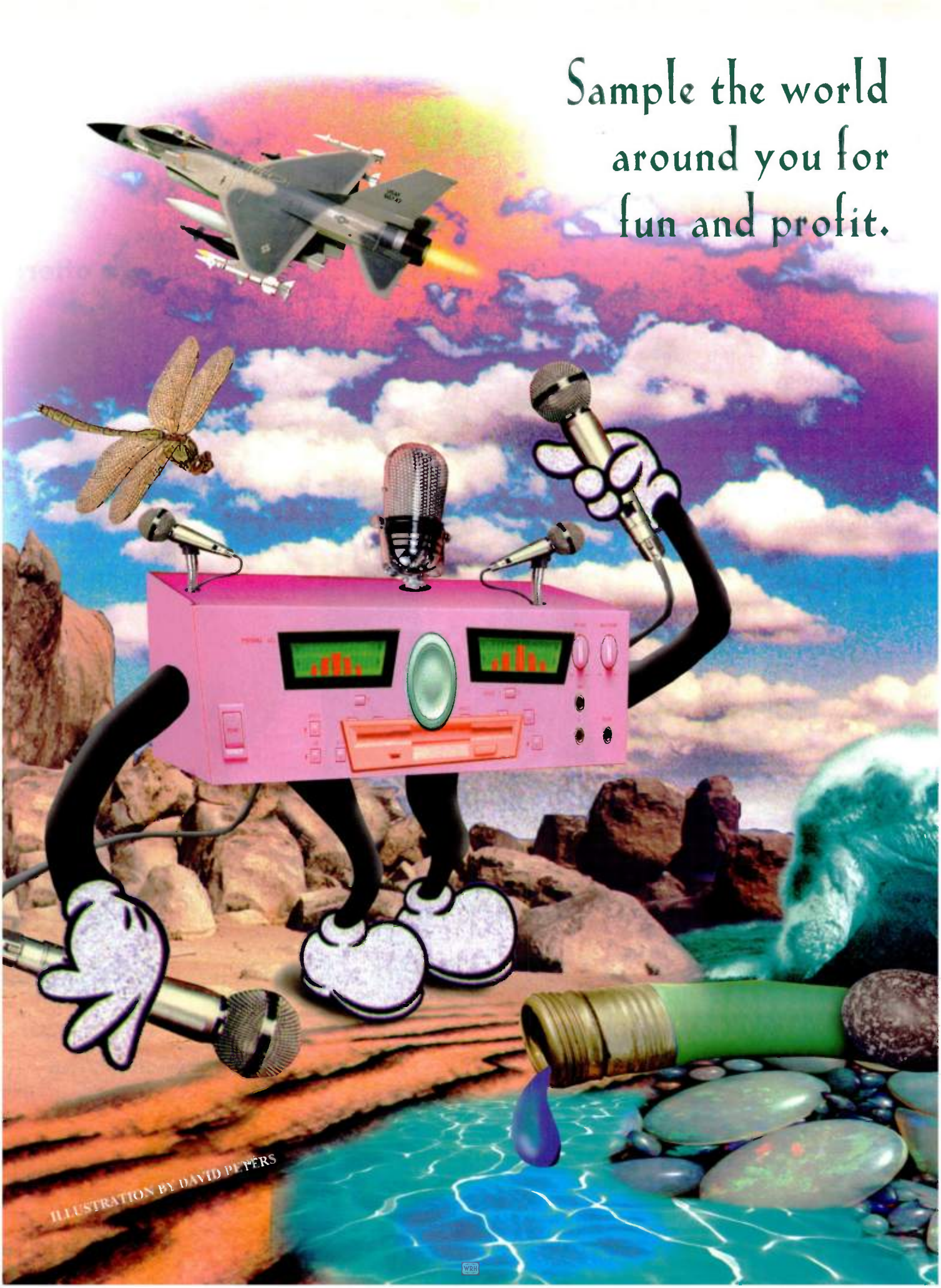
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ILLUSTRATION BY DAVID PETERS

Wild Things

By Jim Miller

After I bought my first sampler in 1985—a Sequential Circuits Prophet 2000—I began recording sound effects like any novice sampling fanatic: I broke glass, slammed doors, encouraged my dog to bark, and abused all sorts of kitchen appliances. I must have filled hundreds of floppy disks with these sounds. Once I established a network of musicians who play acoustic instruments, however, I started sampling them and marketing the resultant libraries of sounds, after which I rarely recorded effects.

Then, in the spring of 1997, I received a commission to do some sampling for a large entertainment company. Among the required samples were a number of natural sound effects, such as crickets, rain, thunder, and ocean waves, as well as a selection of man-made sounds. During this project, I was reminded that creating great effects samples can actually be as challenging—and just as much fun—as producing the best samples of acoustic instruments.

I divide sound effects into three categories. The first category includes natural sounds: waterfalls, waves, fire, animal noises, and the like. The second category includes easily identifiable man-made sounds: car horns, helicopters, jets taking off, etc.

The third and perhaps most interesting category includes man-made sounds that are designed to sound like something else, such as making ordinary household objects into a drum kit or crushing certain harmless fruits and vegetables to simulate a variety of grisly events for horror films. This category represents the most creative sound designing.

For our purposes here, I will focus exclusively on stereo samples. (You can check out some examples on **EM**'s Web site, www.emusician.com.) So load up your sampler with some additional RAM and let's get started.

AU NATURAL

Some of the most interesting and relaxing sounds occur naturally all around us. Unfortunately, most of us are forced to spend a lot of time indoors making a living, so we don't get as many opportunities to experience these sonic environments as we probably should. Studies have shown that even recordings of these sounds can lower blood pressure and pulse rates.

Countless records, tapes, and CDs include the sounds of moving water, singing birds, or buzzing insects on a soft summer evening. But many of these recordings were made years ago under less-than-ideal conditions and without the best equipment. Today, we have DAT recorders we can carry into the field and sophisticated stereo microphones specifically designed to capture ambient environments.

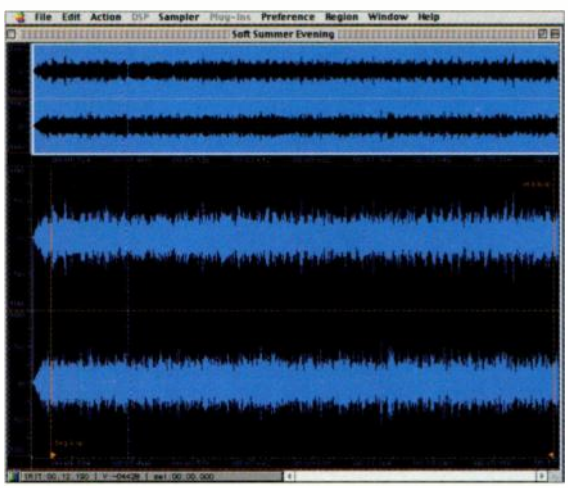

FIG. 1: On warm afternoons in Florida, the trees buzz with cicadas. You can easily loop such sounds in a variety of places and usually without crossfading; in this case, I looped almost the entire 17-second sample. I did not normalize because this often introduces unusual aliasing in samples with such complex high-frequency information.

I like to use a Crown SASS-P stereo microphone ($625) for this kind of work because it is specifically designed to produce a wide, accurate stereo image. In addition, you don't have to fool around with *x-y* patterns or worry about phasing problems. It's also rugged enough to withstand just about any abuse, and power is supplied by two 9V batteries. Another excellent performer for the money is Audio Technica's compact Model 822 stereo mic ($399), which is powered by AA batteries. AT also offers the slightly more expensive Model 825 for $525, which can run on batteries or phantom power.

FIG. 2: I used DUY's *DaD Valve* plug-in to add some warm, tube-type saturation to a gunshot sample. In this case, I used the "E. Snare" preset, which is the least linear of the group and produced the most heavily saturated sound.

THINGS THAT GO BUMP

The first part of my commission took me deep into the north Florida wilds to capture the sound of night creatures such as frogs, toads, crickets, cicadas, and certain nocturnal birds. Fortunately for me, there are a number of relatively undisturbed wetlands and mesic hammocks within minutes of my home. I ventured forth on a night that followed a late afternoon thunderstorm, so I knew there would be plenty of activity.

Despite the fact that I have spent a lot of time outdoors over the years, it's still a bit disconcerting to drive into a relatively remote area, turn off all the lights, and stand in near-total darkness armed only with a DAT recorder, stereo mic, and headphones. On this particular night, there was only a tiny sliver of moon in the sky; with almost no visual information, my hearing seemed much more acute.

Once I plugged the mic into my Sony TCD-D7 portable DAT recorder and slipped on a set of AKG K 240M headphones, I was astounded by the amount of sonic data that was present. The sound of all those nocturnal creatures was almost deafening. With only the dim blue backlight of the DAT's LCD to give me comfort, I found it very easy to understand why early humans imagined terrifying monsters. However, the only thing to actually attack me that night was a squadron of hungry mosquitoes.

Over the next few days, I filled several DAT tapes with night sounds in a number of different locations as well as early-morning bird songs in a hardwood forest and several afternoon thunderstorms. At this point, I should note that it's very important to document specific sonic events in a journal of some sort because three hours of audio becomes all but unmanageable without some reference points. During the field trips, I scribbled the times (from the DAT's LCD) of what I thought were the best sections into a small notebook; later, I transferred this information to the DAT insert sleeves. This gave me a good starting point when taking all these recordings into the studio.

CATCHING SOME WAVES

To capture waves breaking on the shore and the sound of seagulls and terns, I drove out to scenic St. George Island on the Gulf Coast in the wee hours of the morning. For this type of recording, you must be out early, before all the automobile traffic, power boats, and Jet Skis create too much sonic pollution. As

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a hedge against future needs, I recorded ten minutes of cars and trucks rocketing past me on the island's causeway later that morning.

A special problem in recording ocean waves is that the better the wave action, the bigger the winds. Even with the Crown's windscreen in place, the rumble created by the wind blowing from the ocean directly at the mic was a problem. Fortunately, I anticipated this and brought along the front grille from one of my Tannoy studio monitors. Placing this in front of the windscreen brought the wind noise down to manageable levels. You might lose some high-frequency information when using such a setup (more in a moment). In addition, take care to minimize sound diffraction from the wooden frame, which can create a noticeable phasing effect if held in the wrong position. Start with the grille centered on the mic at a fairly close distance and slowly move it around while listening on headphones until the sound is the best.

Another hazard is sand, which gets everywhere. Placing the DAT recorder in a plastic bag is usually enough to keep it free of potentially destructive grains of sand, even a few of which will destroy the heads on your DAT. I prefer the kind of bag that your average newspaper is delivered in because it's thin enough to let you easily operate all the recorder's controls right through the bag. This is also helpful for keeping corrosive salt spray off of delicate equipment.

When recording on location, I carry everything I think I might need in a big, aluminum camera case. These are relatively inexpensive and all but indestructible. They generally have a nice, wide shoulder strap for trudging through the swamp or across the sand dunes and can be purchased at most bigger camera stores.

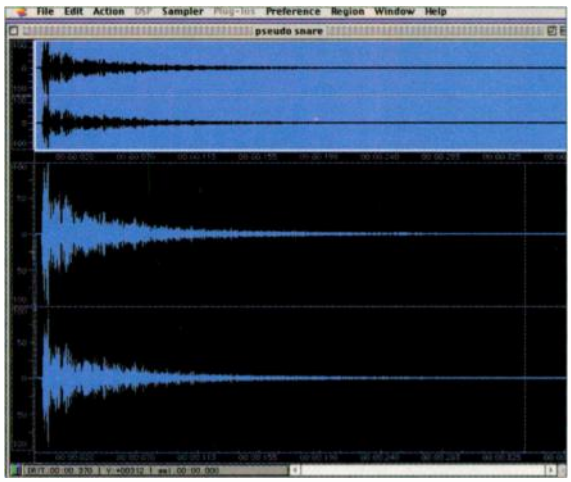

FIG. 4: This is a "pseudosnare" sample created by hitting a heavy drum stick on a stiff cardboard box.

BACK IN THE STUDIO

By referring to my notes, I was able to go right to the sections I thought might contain the best sounds. The samples were ultimately destined to be used on a Kurzweil K2500, but I started by transferring the audio to my Power Mac 7500 using my Audiomedia III card with BIAS's *Peak* software. Editing sounds on the Mac's 17-inch monitor is infinitely preferable to using the K2500's relatively limited LCD. *Peak* is designed to transfer samples to and from the K2500 via SMDI, so it's a simple matter to send the finished sounds from the computer to the keyboard.

For my night-creatures sounds, I sampled four or five sections of the most interesting audio from each location (see **Fig. 1**). Each of these samples was two to four seconds long. Fortunately, you do not need to do any crossfade looping; just set up your initial loop points and then move them around until you find two spots that form a seamless loop. This is a breeze when you can see the audio data on the monitor screen.

Next, I assigned each sample to adjacent white notes on the K2500. I put a general chatter of bugs and frogs on C4, while D4, E4, etc. each got a "standout" animal, say an owl hooting or a bullfrog's sonorous croaking. This assignment requires very little sample RAM (under 4 MB in most cases). Had I sampled one continuous stream of audio, I would have quickly run out of RAM with no room for my standout croaks, hoots, and calls.

To play a convincing night-animal symphony, remember that the individual animal samples also include the background buzz, so don't hold the background key while playing one of the specific animal keys. For this application, you need to create an amplitude envelope for each sample. The attack rate should be one to two seconds, the sustain level should be 100 percent, and the release rate should be two to three seconds. This prevents abrupt changes in amplitude or timbre as you play different keys. For the most convincing effect, hold down the "background" key, let go of that key as you press the next one, and so on. You'll get the hang of it after a few minutes of practice.

I followed more or less the same procedure for my ocean-wave samples, but I used a longer section for my basic track (about nine seconds) with several other 4- or 5-second samples of slightly different waves rolling in or some seabirds calling in the distance. Playing these sounds like a composition, you can create the illusion of total randomness that is actually found in nature.

Because there was a bit of remaining rumble from wind noise, I used Waves' *Q10* parametric equalizer plug-in to apply a steep cutoff at about 100 Hz. A small amount of wind noise was still

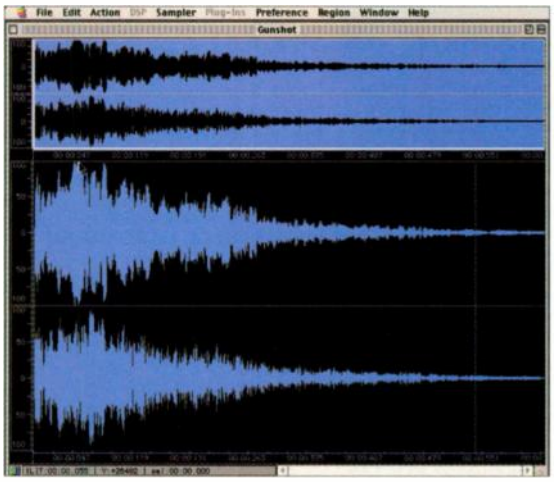

FIG. 3: In the final gunshot sample, notice that I allowed the *Valve* plug-in to just slightly clip the sample (indicated by the arrow cursor), which added even more punch to the finished sound.

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audible (particularly when listening on headphones), but I felt this was quite acceptable; after all, you'd expect some wind noise at the beach. I didn't want to remove any more low-frequency information because this would compromise the nice lows as the waves hit the beach.

As mentioned earlier, I had used two layers of wind protection and lost some of the highs as a result, so I wanted to restore the high-end fizziness that comes at the end of each wave as it's rolling back out. I tried *Q10*, which did an acceptable job, but a better solution turned out to be DUY's *Shape* plug-in, which provides frequency-dependent waveshaping. This plug-in let me put a nice, glossy top end on the samples without adding any audible hiss or other sonic artifacts.

To optimize all the samples, I had used Waves' *L1 Ultramaximizer* plug-in. However, simply normalizing your sounds in an audio-editing program or right in the sampler works just fine in most cases.

There are tons of natural sounds out there just waiting to be sampled. Of course, your biggest challenge is recording them without pollution by man-made noises. The zoo is absolutely great, particularly in the morning. (Most animals like to nap in the afternoon, much like this author.) However, human animals can quickly spoil your fun. I've been forced to ask my fellow zoo-goers to hold it down for a few minutes while I get some recordings. (Hint: It helps if you tell them you are doing a research project or something similar. This tends to get you lots more cooperation than simply telling everyone to please shut up.)

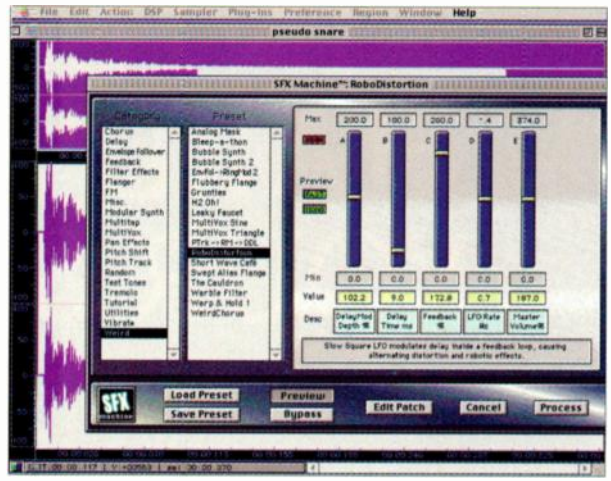

FIG. 6: Using BIAS's *SFX Machine* plug-in, I could easily mutate my pseudosnare into something else entirely. In this case, it became a pitched, techno-type percussion sound.

Even if you don't end up with world-class recordings, it's still a rewarding experience to get out into the natural world and hear what our planet's music sounds like. After all, it's been playing for millions of years, so I think it's probably pretty good by now.

MAN-MADE SOUNDS

In addition to natural sounds, my project called for a multitude of man-made sounds, such as lawnmowers, chainsaws, cars honking, jets taking off, and other cacophonous reminders that humanity is the king of high-decibel sound production. Jet takeoffs required the longest samples, extending 45 seconds after editing. I found a good spot near the end of the runway and recorded two jets passing overhead, following them with the mic. In this case, the mic's L/R axis was perpendicular to the flight path. Then, I recorded several more with the mic pointed straight up and its L/R axis parallel to the flight path. Keep your mic and headphone levels down and use a microphone that can withstand high SPLs. You might need to make several recordings before getting the levels just right. Above all, protect your ears!

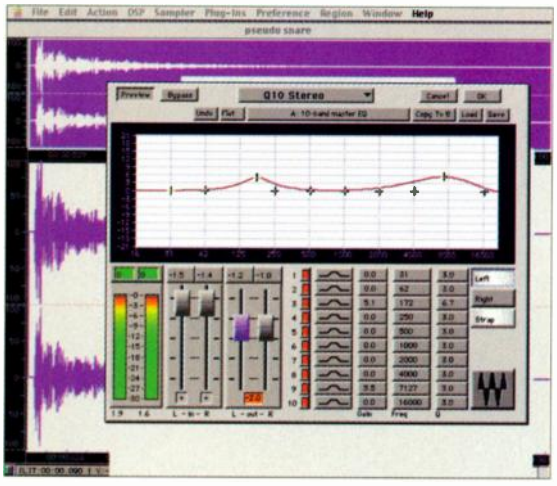

FIG. 5: The pseudosnare sample needed a little creative equalization to add body and crispness. I used Waves' *Q10* plug-in from within BIAS's *Peak* software to boost the highs and lows by about 6 dB.

Car horns are rather interesting (provided you're hearing a sample rather than the real thing coming from behind you in traffic). Some are pitched at a specific note, which means you can play a melody with a single sample (within a range of two octaves or so). In addition, try applying some LFO vibrato with the mod wheel, which produces a very cool effect. Other horns have weird overtones that make them great fuel for further experimentation, which I'll get to shortly.

To get the maximum impact from many of these samples, particularly the more percussive sounds, I like to use DUY's *DaD Valve* plug-in (see **Fig. 2**). *Valve* lets you simulate the type of warm saturation that occurs when using tube-based equipment. This adds rich harmonic distortion to your sounds without harsh, digital clipping, giving samples a lot of "roundness" or body. In fact, certain sounds (e.g., door slams and gunshots) are most effective with a small amount of clipping in the sample, which serves to enhance the overall impact (see **Fig. 3**).

Speaking of gunshots, I strongly advise contacting your local police. They are usually happy to arrange for you to stop by the pistol range and get some recordings. Once again, protect your ears and select a mic that can take *high* SPLs; a .44 magnum can be deafening.

Once you start recording these easily obtainable sounds, it quickly gets addictive. You'll find yourself carrying your portable recording rig everywhere: sporting events, bowling night, first dates. (Well, maybe that's not the best idea, but you get the picture.) Your biggest challenge is getting good, clean recordings without other noises messing

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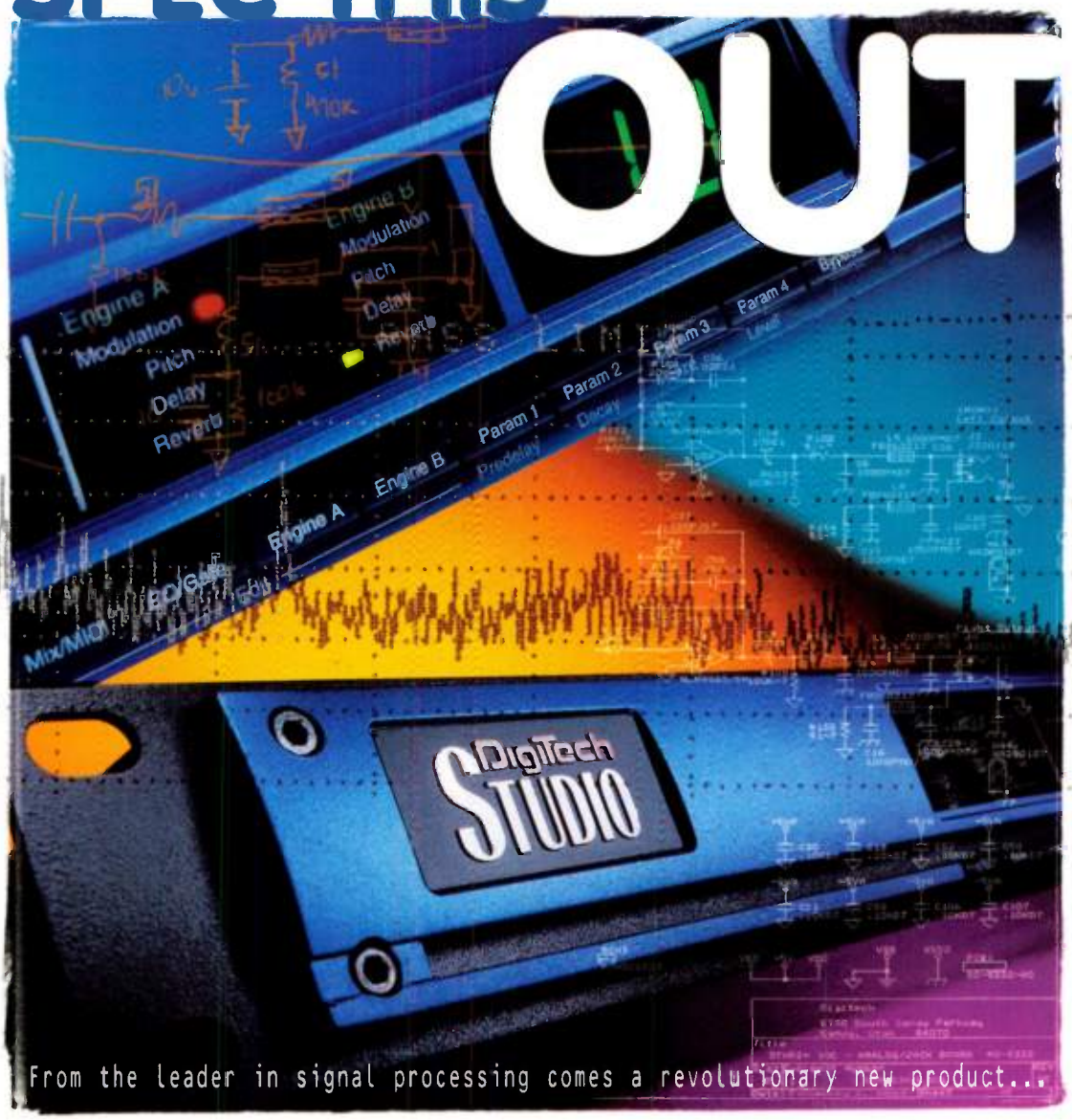

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them up. It seems as though cars without mufflers always drive by at the critical moment no matter what you're recording.

THE REAL FUN BEGINS

One of the most creative uses for effects samples is producing sounds that don't exist in reality. For example, all the sounds made by the dinosaurs in *Jurassic Park* and *Lost World* started as various natural or man-made sounds. These sounds were then massaged, mangled, and otherwise mutated to reproduce a convincing set of voices for the movies' nonhuman stars. The same was true for the otherworldly sounds produced by the creatures in the *Alien* series.

Tish Eastman, who is currently a media designer for Disney Imagineering, has always been an inspiration to me. She never stops listening for weird and unusual sounds to record and turn into something else. Several years ago, she and I were moving a bulky metal desk in a large storage area. As it slid across the concrete, it made the most horrendous screeching sound. I just said "oww," but Eastman promptly grabbed a portable DAT and recorded it. By now, I'm sure that desk has been turned into any number of dinosaur roars and other monstrous creature sounds.

Now that I've been recording effects for a while, I can no longer hear a sound without thinking to myself, "What could I make out of that?" For example, the nasty alarm clock that woke me up at 3:30 in the morning for my drive to the beach has turned out to produce the most foul of futuristic noises. Thanks to some awesome pitch shifting courtesy of Mark of the Unicorn's *Digital Performer* software, followed by a healthy dose of Waves' *Q10* equalization and *TrueVerb* processing, it's unrecognizable as a $19.95 Radio Shack alarm.

> Car horns are rather interesting, provided you're hearing a sample rather than the real thing coming from behind you in traffic.

The beauty of today's sound-processing software is that we can do in seconds what used to take sound designers in the analog era many hours, even days, to accomplish. Take a chainsaw sample, mix it with some distorted guitar feedback, stir in a bit of a pitch-shifted male voice, season with a dash of aluminum foil being torn in half, and you have all the makings of a sonic nightmare. What's more, thanks to modern looping techniques, we can make this terrifying timbre go on and on for as long as we wish.

For those less inclined to produce frightful sounds, I recently built a one-of-a-kind drum kit using just a variety of cardboard boxes (for the snare, kick, and toms; see **Fig. 4**) and my voice (for the cymbals, shakers, and such). Liberal equalization was necessary, using Waves' *Q10* (see **Fig. 5**), in addition to some flanging and pitch shifting, which was performed in BIAS's *SFX Machine* plug-in (see **Fig. 6**). Finally, I used the DUY *Shape* plug-in to give my pseudodrums some additional presence and punch (see **Fig. 7**).

Another experiment that should yield some interesting sounds is to set up your gear and record things being dropped into a bathtub full of water. Use your hand or some pots and pans to create waves and splashes. Then, pitch shift them, and add flanging or comb-filter effects. Note that most bathrooms are excellent recording environments for sound-design projects because they tend to produce lots of early reflections that can lead to many strange effects when pitch shifted up or down. A small metal trash can that is rolled over a bathroom's tile floor can produce an almost limitless number of special effects.

I discussed car horns earlier, but I must remind you that these things can be an excellent starting point for some great sound-design work. Some older foreign cars have two horns that are tuned to interesting intervals. (You can actually find some that work at auto graveyards.) Try pitch shifting these, adding them to the original sound, and using your plug-ins or outboard gear for additional mutation. Weird, cool, or just plain stupid—you decide.

GIVE IT A TRY

Music is sound and vice versa. Who's qualified to determine exactly where one ends and the other begins? Not me. I'm too busy making real and unreal sonic landscapes for fun and profit as well as teaching you how to do the same. If I've done my job, you probably can't wait to get out there and record some effects of your own, natural or otherwise. It's fun, it's harmless, and a career as a sound designer for movies or TV just might be on your horizon. But you won't know until you try, right?

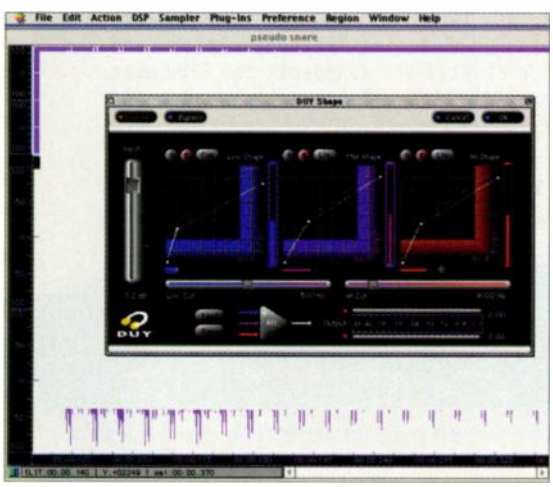

FIG. 7: To polish my new, pitched "techno snare," I used DUY's *Shape* plug-in to give it more of a metallic quality and just a bit more punchiness.

Jim Miller *is a freelance sound designer and occasional session guitar player whose samples have appeared in sound libraries and instruments from Alesis, Korg, Roland, Kurzweil, and Sweetwater Sound.*

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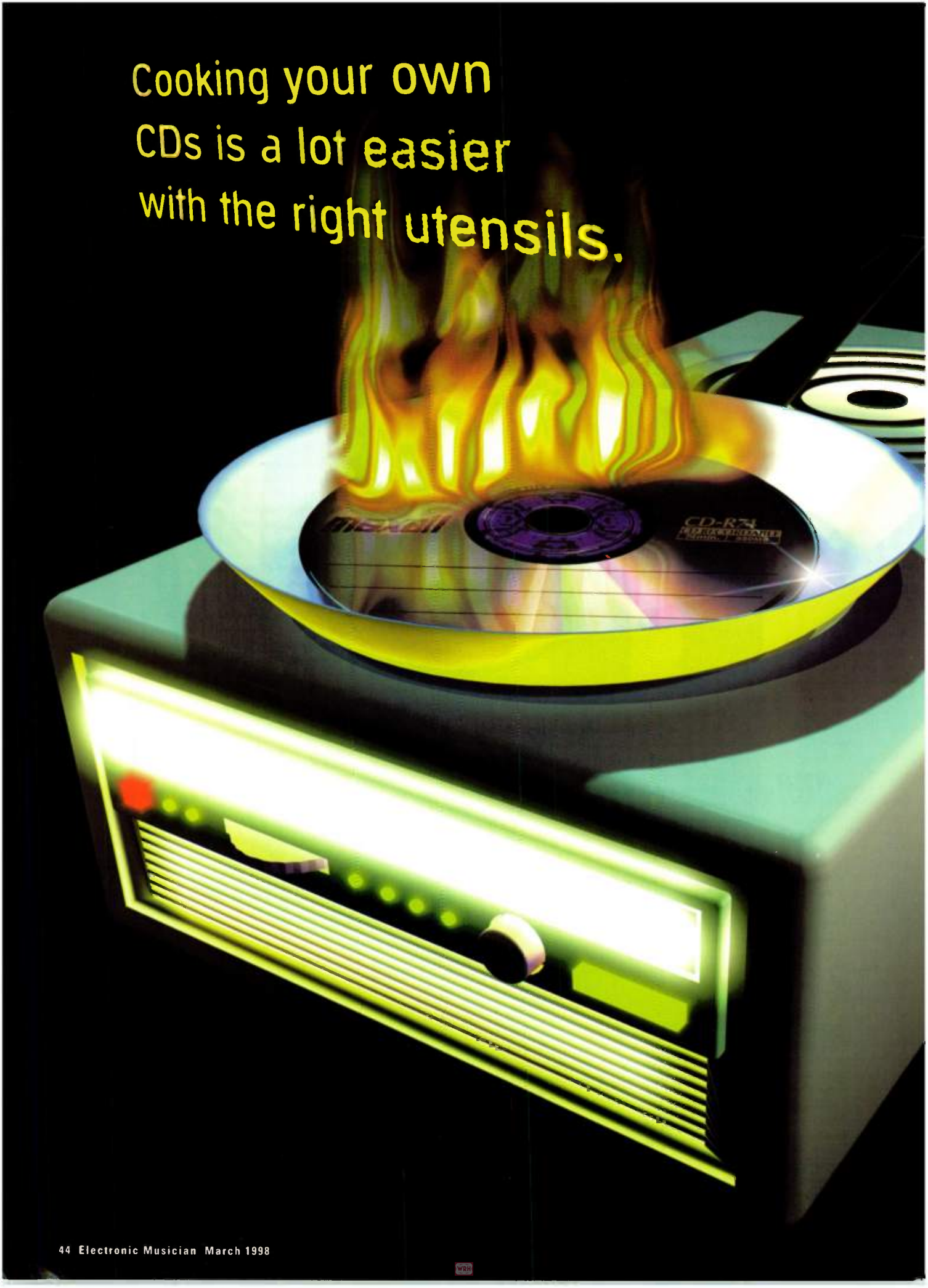
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The CD-R Software Cook-Off

BY RUDY TRUBITT AND DENNIS MILLER

With prices of CD recorders dropping well below $500, many desktop musicians are seeing the value of having a recorder for delivering music projects or "one off" demos on CD. Recent advances in recording hardware, including rewriteable models and EIDE-based products on the PC, also make CD recorders suitable for more tasks and platforms than ever before. But although many recorders offer similar options—indeed most recorder mechanisms are made by only a half-dozen major manufacturers—the range of recording software is extensive and is a major consideration for the desktop musician.

We've looked at a number of programs for both the PC and the Mac, and we'll present an overview of each program and offer commentary on how well it does its job. We'll cover the high-end programs available for both platforms as well as a number of slightly lower-end, but still useful, Windows offerings. For an overview of all the programs, see the sidebar "CD-R Software Specs."

LIGHTING THE FIRE

Burning CDs is one of the most demanding tasks you can ask of your computer, yet most modern systems are up to the task. Fast, SCSI-based computers typically have no trouble getting data to the CD burner, and well-tuned EIDE systems should also be suitable in most cases. Because CD burners need an uninterrupted flow of data, it's important that your system not perform any maintenance or other routine tasks while sending data to the drive. By turning off "auto-notification" in Windows 95, closing all background programs, and keeping your drives well optimized, you can give your system a helpful boost. (You'll find other information about CD recording basics in the sidebar "Making Your First CD.")

What often chokes the system, however, is the real-time processing that's required during CD burning. Many of the programs covered here can do fades, crossfades, EQ, and real-time mixing as the data is sent to the burner. If that overtaxes your system, fear not. You can typically "prebuild" on your hard drive an image of the entire CD that contains all the processing and editing. This is an excellent solution for slower systems, but keep in mind that it does require an amount of free hard-drive space equal to the size of your entire project.

Beyond those considerations, your only other main concern is whether a program supports your specific CD-R hardware and, of course, whether it supports disc-at-once writing, which is required if you want to send your CD-R out as a master to a commercial CD replicator. The list of supported drives for many of these programs changed even while we were writing this roundup, so unless you're buying a bundle that includes software and hardware, be sure to check the manufacturer's Web page to ensure that your burner is on its list. You might also find a list of recommended software at the hardware maker's site.

ILLUSTRATION BY PETER NEUMANN

MAC CAN COOK

In the world of Macintosh audio CD-burning software, Digidesign's *MasterList CD* 1.4 (*MLCD*) and Adaptec's *Jam* 2.1 stand out in the crowd. Both let you create discs suitable for replication with variable track gaps (including gapless transitions between tracks) and optional control of track levels and crossfades between tracks. Note that *Jam* was previously sold under the name *CD-DA*. *CD-DA* and *Toast*, another CD-burning program, were purchased by Adaptec, who wisely renamed *Jam* to eliminate the confusion with their *Toast* package.

The current version of *MLCD* requires a Digidesign card (Pro Tools III PCI, Pro Tools Project PCI, Audiomedia III, Pro Tools III NuBus, Pro Tools Project NuBus, Audiomedia II, Sound Tools II, Pro Tools 442, or ProMaster 20). The next version of *MLCD* will run on Power Macs without additional hardware. *Jam* runs on both 68040 and Power Macs without any extra hardware requirements, but 680X0 machines may have trouble keeping up when previewing crossfades or changing levels. We tested both programs on a Macintosh Quadra 950 with a 4-channel Pro Tools 442 system, running system 7.5.5 with a Yamaha CDE 100II 4× CD-R.

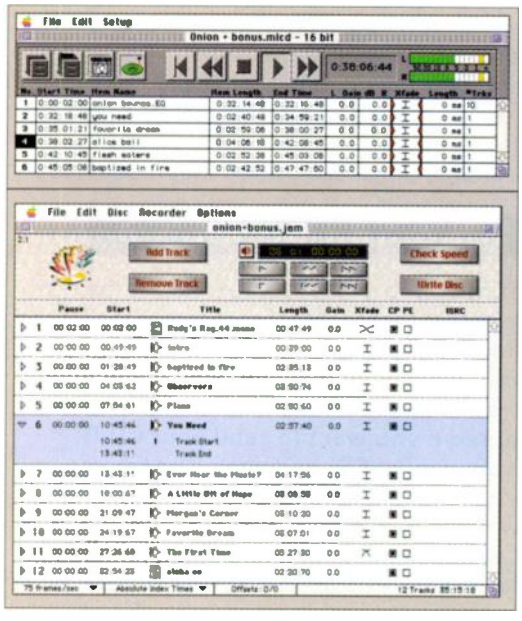

FIG. 1: *MLCD* (top) and *Jam* (bottom) have similar interfaces at first glance. Note the level meters of *MLCD* and the "virtual CD player" display of *Jam*.

ROUND 1: DISC SETUP

The first step in our recipe for creating a new CD is to select the 44.1 kHz audio for each track. This could consist of individual songs, each in its own sound file, or predefined regions or playlists contained in a Sound Designer II file. Using region or playlist definitions is helpful when dealing with live shows, where multiple songs could be contained in a single sound file. Both programs also read AIFF files, and *Jam* can also read Windows WAV files. *MLCD* can read 24-bit files for convenience and will dither these down to 16 bits on the final CD. However, you can't mix 16- and 24-bit files in the same session.

Both programs provide an empty window into which tracks are placed. A line of text appears for each track, showing its number, name, duration, optional level adjustment, and other tidbits of information (see **Fig. 1**). *MLCD* provides the bare minimum for getting your tracks loaded: an expanded File Open dialog box (see **Fig. 2**). It takes three mouse clicks to select a file and two more to choose a region or playlist. For a 10-song CD, that's 30 to 50 mouse clicks before you even begin to check gaps, levels, or crossfades. Most annoyingly, selecting each track makes the whole dialog box go away, so you have to repeat this entire process over and over. However, you can drag and drop sound files onto the *MLCD* application icon, which will open a new MasterList containing those files. This is helpful if you know in advance which files you're going to need, but it is not as convenient as dragging files into an existing document.

Jam supports drag-and-drop, so you can just drag one or more sound files from the Finder, and you're ready to work. Even better, if you hold the Command key while dragging, you get the helpful Add Sound Items dialog. This shows the regions and playlists contained in each file. You can select the items you want, click OK, and they are added to your CD-R document.

Both programs let you drag individual tracks to a new position. *Jam* also allows moving multiple tracks but strangely

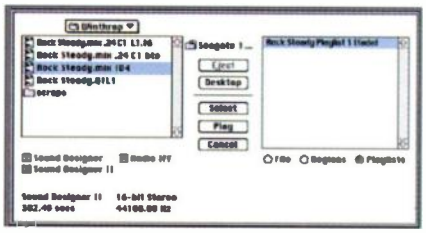

FIG. 2: *MasterList CD* uses a cumbersome dialog box to add tracks to your CD.

doesn't allow undoing track moves. Still, *Jam* gets you through the CD setup phase much more easily than *MLCD*. However, *MLCD* gets a little extra credit for being able to place multiple sound files into a single track. That can be helpful when creating audio sound-effects CDs.

ROUND 2: TRACK CONTROL

Once the tracks are in the correct sequence, you'll want to hear the transitions between songs to set a musically appropriate pause. Both *Jam* and *MLCD* allow complete control over gaps between tracks, with a user-definable default gap that is applied to newly added tracks. *Jam* also lets you globally change all track gaps on the disc to a new value. When *Jam* plays your disc, a "virtual" CD transport display shows time remaining, track ID, and Index counts as well as the countdown before each track starts. That's a nice touch.

MLCD lets you hear a single transition by setting a preroll time, selecting a track, and hitting Play. To hear the next transition, you'll need to stop and manually advance to the next track. With a single command, *Jam* will automatically preview your entire disc or the gap between a pair of tracks. Note that *Jam* allows other programs to grab CPU cycles during playback. This can result in occasional preview glitches, although it doesn't impact disc burning. *Jam*'s Play Disc command locks out all other activity during playback, which is useful if you want to make an uninterrupted DAT or cassette copy of the *Jam* document.

Besides auditioning transitions, it's important to jump to different places in each tune to compare apparent levels between tracks. *MLCD* lets you set and recall up to 99 auto-locate points per document via your keyboard's numeric keypad. However, locate points cannot be viewed or named, so it's not likely that many people will use more than a handful. Selecting a new auto-locate point or new track in *MLCD*

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stops playback. *Jam* lets you jump to the start of any new track without stopping playback, although you can't jump to the middle of a song without manually fast-forwarding or rewinding. Neither provides a waveform overview, which would help you visually navigate to loud and soft sections of the disc.

Both programs support nondestructive, RAM-based crossfades between tracks with an interface lifted from *Sound Designer II*'s playlist editor. (We did find a crossfade-related bug in *MLCD* that shifted the start time of individual tracks that were all part of one larger file.) Both programs have enough crossfade curve shapes to implement most transitions; unusual crossfades may need to be done destructively in an external audio editor. Previewing crossfades in real time with *Jam* on 680X0 Macs can be problematic, although they are burned correctly to disc. Nevertheless, both programs provide the tools to manipulate the track-to-track transitions on your final disc.

ROUND 3: LEVEL CONTROL

When mastering a disc for replication, it's often useful to use a plug-in such as Waves' *L1* to match up track levels and for any EQ or other signal processing. That way, when you're ready to burn CDs, you've already got the tracks level-balanced. However, for quick demo CDs, it is convenient to make adjustments directly in the CD-burning program. This changes the level on the material burned to the CD but doesn't affect your original sound files. Both programs support independent left/right level control of individual tracks, with ranges of +12 dB to -96 dB in 0.1 dB steps.

Any program that supplies gain should also provide peak metering. Here, *MLCD* shines with high-resolution meters and the ability to search for the loudest peak in a selected track or the whole disc. With these tools, you can confidently use *MLCD*'s gain sliders without fear of introducing unintended distortion. *Jam* lacks these critical features. That's a significant oversight.

More serious, the shipping version of *Jam* 2.1 includes a nasty-sounding bug. Instead of clipping when a gain adjustment or a crossfade happens to push the signal above digital zero, *Jam* lets the audio "roll over." This snaps peaks to the opposite side of the waveform and generates unbelievably bad distortion (see **Fig. 3**). Most of us avoid clipping like the plague, but the truth is, if you analyze many commercial CD releases (especially electronica, alternative, and heavy metal), you'll find lots of flattened "overs." If you choose to, *MLCD* can boost tracks into this kind of distortion, which, in moderation, adds a hard, pumped-up sizzle to the sound. *Jam* sounds awful the instant it distorts.

Changing the levels of entire tracks or crossfading between pieces loses a small amount of resolution from the original sound. By adding dither noise

CD-R SOFTWARE SPECS

	Disc-at-once	Waveform view	Audio extraction	Write image file	Random access entire track list	Cross-fade tracks	Sub-indexing support	Drag-and-drop file loading	Track gap adjust	Level metering	Data writing (backup)	Cost
Adaptec *Easy CD Creator* (Win)	yes	no	yes	yes	no	no	no	yes	no	no	yes	$99
Adaptec *Jam* (Mac)	yes	no	yes (using included utility)	yes	no	yes	yes	yes	yes	no	no	$399
CeQuadrat *just!audio* (Win)	no	no	yes	yes	no	no	no	yes	no	yes	no	$79
CeQuadrat *WinOnCD* (Win)	yes	yes	yes	yes	no	no	yes	yes	yes	no	yes	$299
Digidesign *MasterList CD* (Mac)	yes	no	no	yes	yes	yes	yes	yes	yes	yes	no	$495
Elektroson *Gear Audio* (Win)	yes	no	yes	yes	no	no	no	yes	yes (global only)	no	no	$99
SEK'D *Red Roaster 24* (Win)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	$399
Sonic Foundry *CD Architect* (Win)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	$395
Steinberg *WaveLab* (Win)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes (main waveform view only)	no	$399
Tracer Technology *DART Pro 32* (Win)	yes	yes	yes	no	no	no	no	no	yes	no	no	$399

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to a signal when processing you can preserve more low-level detail. *MLCD* uses the dither scheme from Pro Tools; *Jam* doesn't dither at all. When making small changes, the differences are pretty subtle. However, if you put heavily attenuated signals under the sonic microscope (48 dB of gain cut and boost), a dithered signal sounds like music with a ton of hiss, while undithered material sounds heavily distorted and gated. From a practical standpoint, *Jam*'s lack of dither when using nondestructive, playlist-based fades or applying level changes to tracks with wide dynamic range is a concern. If you're not gain-scaling or crossfading, both programs produce identical-sounding discs.

Round 3 goes decisively to *MasterList CD*. Its metering is excellent, and in two narrow but significant cases, it can make better-sounding discs than *Jam*.

ROUND 4: OUTPUT OPTIONS

All the features in the world won't do you much good if your CD-R software doesn't support your CD-R drive. *MLCD* 1.4 supports 23 burners. In contrast, *Jam* supports 66 (including CD changers), and given Adaptec's resources and market focus, you can expect *Jam* to continue to support more drives sooner than *MLCD*. Digidesign does support DDP tape drives, a data-only computer tape backup standard accepted by some CD replicators. (We did not test this feature.) Note that some CD-R drives have oddities in their firmware that prevent them from creating optimal audio discs. If you are shopping for a CD burner, it's imperative to check with Adaptec or Digidesign for a list of supported and recommended drives. (If a drive does not support disc-at-once mode for audio CDs, don't buy it!)

Both programs can burn discs "on the fly," meaning that the data is read directly from your source sound files as the CD is being written. However, *Jam* is capable of on-the-fly recording at 4× speeds, but *MasterList CD* can only perform this at 2×. In order to make CDs at 4× with *MLCD*, you'll have to spend extra time to create an image file, which is a single file containing all the tracks, crossfades, and level changes. Better have a lot of free hard-disk space available! Note that 680X0 Mac *Jam* users may also need to create an image file if any level changes are used. *Jam*'s image file is actually an editable SDII stereo file that uses regions and markers to denote tracks and gaps. *MLCD*'s image files are user-inaccessible.

Besides the actual disc output, both programs can export a verbose text track sheet containing subcode information, suitable for giving to your replicator. It would be useful if both vendors included a pared-down version of this information, suitable for giving to a graphic artist for liner notes. In the meantime, you can use a text-processing macro to strip out the unnecessary information automatically.

Round 4 goes to *Jam*, thanks to its superior list of supported drives and faster on-the-fly burn times.

EXTRA INGREDIENTS: BUNDLED SOFTWARE

MLCD ships by itself, whereas *Jam* comes with two useful pieces of software. The first, *Toast Audio Extractor* 1.0, is a nicely implemented utility to copy tracks (or selected portions thereof) from an audio CD to disk. These can be downsampled on the fly or saved in their full 16-bit, 44.1 kHz resolution. Also included with *Jam* is the "lite" version of *Peak*, the stereo editor from BIAS. *Peak LE* lacks some of the features of full-strength *Peak*, but it's a great bonus. One limitation is that, while *Peak* can create Sound Designer regions readable by *Jam*, *Peak* has its own playlist format that *Jam* doesn't understand. Hopefully this problem will be remedied in a future revision of *Jam*.

When saving a file, *Peak* requires free space equal to the size of the file being edited. This saves your bacon if there's a one-in-a-thousand power failure or system crash midsave, but unfortunately, it also means *Peak* can require 600 MB or more of free space on your drive just to edit and save region definitions. Still, *Peak* and *Peak LE* have a number of unique and valuable features and are clearly the heir apparent to the languishing *Sound Designer II*. Be sure to get version 1.62 (or later) from BIAS's Web site. It has much more responsive waveform selection than version 1.6.

BEGIN LEAD-OUT...

By the time you read this, Digidesign should be shipping *MLCD* version 2.0. More of a maintenance release than a major upgrade, *MLCD* 2.0 won't require Digidesign hardware when running on Power Macs. (The 2.0 installer will actually install 1.41 on 680X0 Macs, so Digidesign hardware will still be required.) PPC users may enjoy faster burn times. According to Digidesign, 4× burns should be possible without an image file, although that still won't be possible on NuBus Power Macintoshes. *MLCD* 2.0 will also add more dither noise-shaping options, but unfortunately, it won't address any of the cumbersome user-interface issues. It also won't support any new CD burners, although new drives will be added to a subsequent release.

What about the future? That's a tough call, because neither program is particularly critical to its company's success. Digidesign is obviously committed to the audio market, but their focus is Pro Tools, Pro Tools, Pro Tools. We'd expect CD-burning functionality to show up in Digidesign's flagship product sooner than any major updates to stand-alone *MLCD*. In other words, buy *MLCD* based on what it is today, not on what you hope it might be someday. *Jam* is the company's sole "prosumer" audio product and although it probably won't wither on the vine, it's clear that important audio features will be left to third parties, such as BIAS and other plug-in vendors.

Enough crystal-balling! What should I buy? If you make lots of demo discs (especially with large numbers of

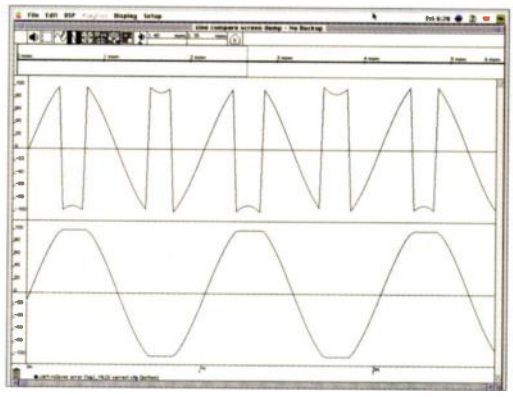

FIG. 3: Digital distortion do's and don'ts: Here, a sine wave is boosted 1 dB over digital 0. The lower trace *(MasterList CD)* shows flattened peaks, which is correct. *Jam* (upper trace) exhibits rollover, where positive "overs" show up on the negative side of the waveform.

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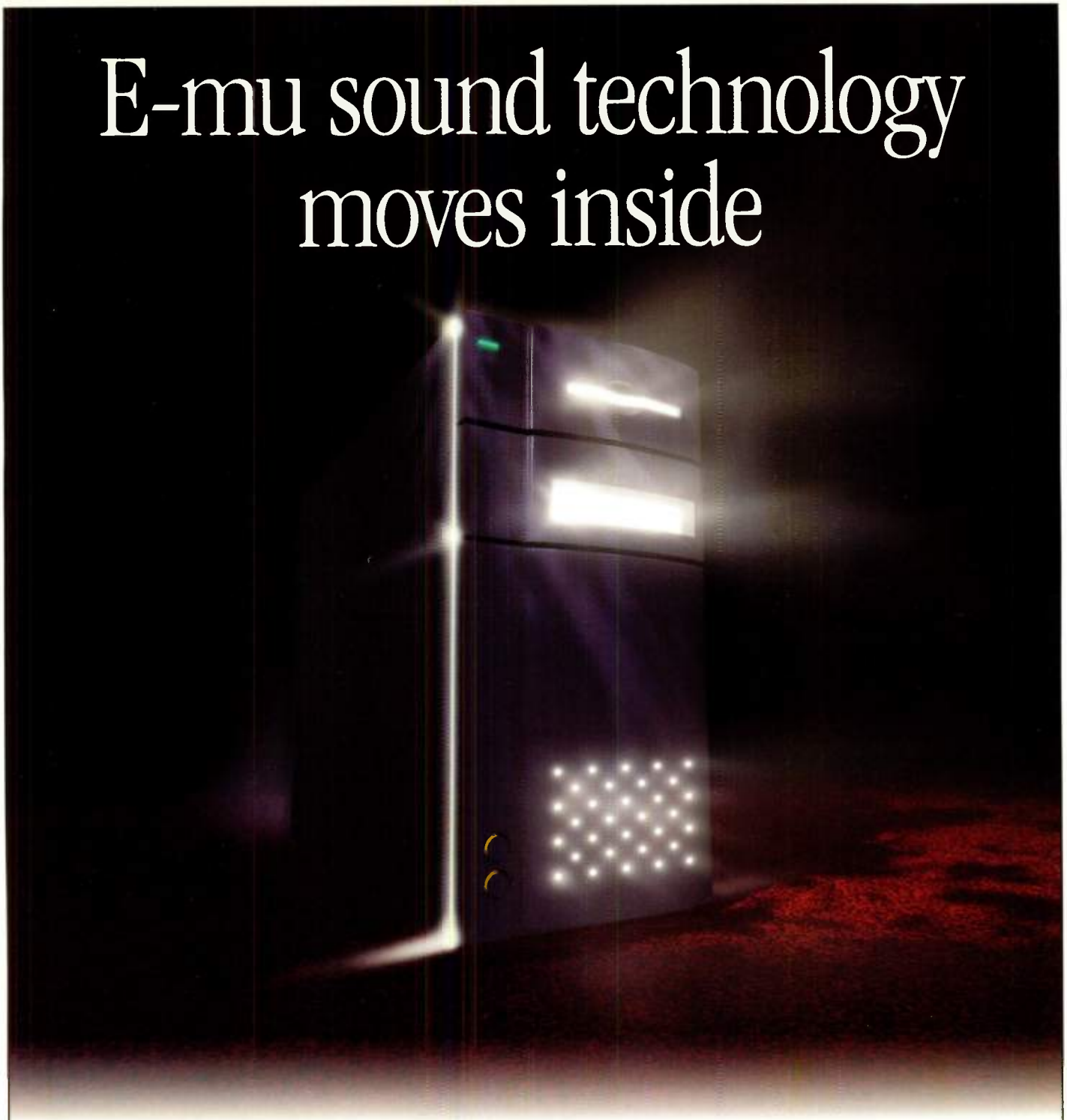

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tracks), get *Jam*. *Jam*'s ease-of-use advantages are substantial, and its extensive CD-burner support vastly increases your hardware options. Furthermore, only *Jam* can create an audio CD without "fixing" the disc (i.e., closing the session), which is critical if you want to create Enhanced CDs. However, *Jam*'s distortion bug and, to a lesser extent, its lack of dithering (both will be addressed in future releases) are major concerns. Until the "over" bug is fixed and metering added, it's not totally safe to use *Jam*'s level changing features. *MasterList CD*, while clumsy at times, is a better choice if you have a 680X0 Mac because the required Digidesign DSP hardware ensures proper previewing of crossfades and level changes. In addition, *MLCD*'s dithering and metering mark it as the more professional product, especially if you plan to use level controls on critical projects.

WINDOWS CD-R SOFTWARE

On the PC, there are several categories of recording software. At the high end are *CD Architect* by Sonic Foundry and *Red Roaster 24* from SEK'D. These two audio-only programs provide all the features of the Mac applications and then some. They should fill even the most demanding musician's needs. The second group, which includes CeQuadrat *WinOnCD* and Adaptec's *Easy CD Creator*, integrates data-writing features with audio. As expected, the audio features are not as robust as the pro audio programs. Yet for many tasks, these programs are quite suitable.

Another group of stand-alone programs includes two consumer-level audio-only programs, *just!audio* from CeQuadrat and *Gear Audio* from Elektroson. Targeted at users who want to create compilations of their favorite CDs or transfer LPs to disc, these two programs can handle simple situations where minimal editing is needed. Built-in processing options and ease of use add considerably to their value.

The last solution is offered by a group of digital audio editors that include CD-burning capability. In this group, SEK'D's *Samplitude Studio* and Steinberg's *WaveLab* are software-based editors. MTU's *MicroEditor*, Creamware's *tripleDAT*, and Spectral's *Prisma* include burning options within their hardware-based systems. A third software editor, *DART Pro 32*, offers state-of-the-art noise reduction and includes CD burning as a nonintegrated, add-on feature.

THE TOP TIER

CD Architect. Upon its release last summer, Sonic Foundry's *CD Architect* rocketed to the top of the high-end CD-recorder software field. This powerful program is available both as a plug-in to the company's *Sound Forge* 4.0a and later and as a stand-alone application. The stand-alone version is bundled with *Sound Forge XP*, providing a very respectable set of editing tools.

We tested *Architect* as a plug-in and found that, for the most part, it integrated nicely with the main editing program. You can define regions in *Sound Forge* and convert them into CD tracks in just a few steps, though surprisingly, there's no command in *Architect* to simply import the current audio file from *Sound Forge*.

Using *CD Architect*'s Audio Pool/Add feature, you convert audio files on your hard drive directly into indexed CD tracks. (The tracks are simply pointers to the actual audio and do not take up additional space on your hard drive.) Once they are loaded, a waveform view of the tracks appears at the top of your screen, and you can easily drag tracks forward or backward to adjust the gaps between them (see **Fig. 4**). You can also change a Track's entry in the text-based PQ List to edit its start or end time.

There are many editing options you can perform in real time, such as drawing fades and changing a track's overall amplitude. Although the manual cautions that edits you make while a file is playing could interrupt playback momentarily, there was no lag whatsoever while using the Volume tool to adjust levels. The program responded as smoothly as if you were moving an outboard fader or mixer slider. Of course the response time will vary depending on the system in use. (All PC testing was done on a Pentium II 266 under both Windows 95 and NT. The drive used was an external Ricoh 6200 CD-RW.)

As you drag entire tracks onto others, the program automatically creates the crossfade of your choosing (linear or equal power) and displays it on the screen. This type of visual feedback is very common in the program and is a real aid to the editing process.

CD Architect contains several features that at first seem a bit esoteric but, on closer examination, can actually be quite useful. For example, the Unmute time for emulation mode lets you simulate the length of time a CD player might take to unmute after jumping from one track to another. (Car CD players are especially prone to long unmute times.) By using this setting, you could discover that you're losing some audio at the beginning of a track while the player unmutes. You could then fix the problem by moving the Track start point farther from the beginning of the audio before doing your final burn.

PADUS *DISCJUGGLER*

Though *DiscJuggler* doesn't quite fit the mold of the other programs, we've decided to mention it for the simple reason that it has a lot of features that none of the other software offers. The program is aimed at users who need to do small batches of CDs and has extensive tools for duplication. For example, *DiscJuggler* is the only program that can write to multiple drives at the same time, even taking the output of programs that use an ASPI shell, such as *Easy CD Creator*, and redirecting it to multiple devices. It offers a bit-level verification option to ensure that data copied to or from CD is accurate, and it supports nearly every major autoloader on the market.

DiscJuggler can copy an audio CD from a CD-ROM drive directly to a CD recorder without any intervention from the user. It shows you a running status of all the functions it's performing, which makes it easy to debug if a session goes bad. The program doesn't have the ability to transfer audio files directly from your hard disk to a CD-R, which is clearly a major limitation, but the next release (available around the time you read this) will offer that option. A version that supports one CD writer at a time is $79. Versions that support multiple drives (including autoloaders) cost $199 and up. A free version that is limited to 1x recording is available at the company's Web site (www.padus.com).

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CD Architect has numerous Preference settings that make it highly customizable, and its interface puts most major commands within easy reach. It is a powerful and intuitive program and proved quite capable, no matter how complex the job we threw at it.

Red Roaster 24. *Red Roaster 24* from SEK'D combines *Samplitude Master*, for editing audio and defining a CD Table of Contents (TOC), with *Point CDaudio*, for actually burning the disc. Though earlier versions of the program had often been characterized as difficult to use, this new release is very friendly, especially if you happen to be one of the growing number of *Samplitude* users. *Red Roaster 24* is the only standalone PC CD-mastering software that supports 24-bit audio files, and its real-time redithering options ensure that the 24-bit signal will be optimally reproduced by 16-bit hardware. (*WaveLab* also works with 24-bit data, though it is at heart a stereo-wave editor that also sports CD-burning capabilities.) It is also the only program that lets you work with two stereo tracks in a CD project.

As with SEK'D's flagship program, *Samplitude Studio*, *Samplitude Master* uses a Virtual Project (VIP) window to assemble and edit material for your CDs (see **Fig. 5**). Audio segments used in a Virtual Project are called Objects and are simply pointers to actual physical files on your drive. You can record audio into the program at any of the sample rates your hardware supports. If you need to digitally transfer material that was not recorded at 44.1 kHz, *Samplitude*'s real-time sample-rate conversion feature will fit the bill perfectly.

Preexisting audio files can be loaded from disk and automatically appended to the end of your Virtual Project, and you can also copy tracks from an audio CD directly into the program. Like *CD Architect*, *Samplitude Master* provides a massive number of processing options, including denoise (which is available as a plug-in for *Sound Forge*), parametric EQ, and a compressor/expander. There's also a powerful crossfade editor that allows you to design numerous types of curves for your fades, and because you can load files onto two stereo tracks, your fade outs and fade ins can start at different times. Unlike *CD Architect*, however, the program doesn't ship with presets for any of the audio-processing functions.

After you've tweaked all the Objects in a project, it's easy to set up your CD track list. Position the individual Objects by dragging them with your mouse or assigning their start times in the Move Object window, and then use the Set Indices on Object Ends command to assign track indices. The program automatically assigns a 2-second gap between tracks, but you can easily change that before writing the TOC. Fades, crossfades, and other edits are processed in real time as the program burns the CD, though if you prefer, a new image file can be created on your drive that contains all the edits. (Projects that use two stereo tracks will be mixed to disk before burning begins.)

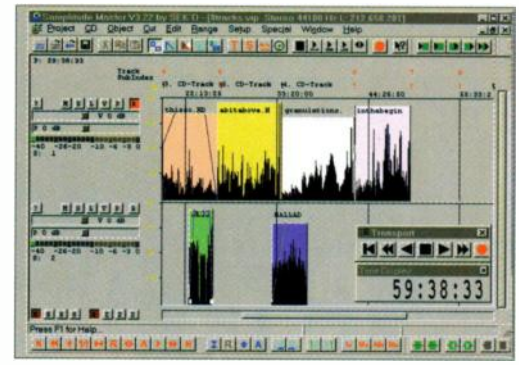

FIG. 5: *Red Roaster*'s sound-file editor uses links to your audio data that it calls Objects. Objects can be converted to tracks automatically. Stop points can be set by hand.

After you've written your TOC file, you run *CDaudio* and define ISRC settings, toggle copy-protection, and enable preemphasis if needed. You can name tracks and, of course, run a simulation of the CD burning (also available in *CD Architect*), but there's no way to change track gaps or start times from this screen. Instead, you'll have to reload the TOC in *Samplitude*, make any revisions there, and then save the edited version. (This step will be eliminated in the forthcoming version of *Samplitude*. See the sidebar "2496 Calling.")

Red Roaster is also available in a 16-bit version. Though it doesn't have all the processing features of its big brother, either version should be a valuable addition to your audio arsenal.

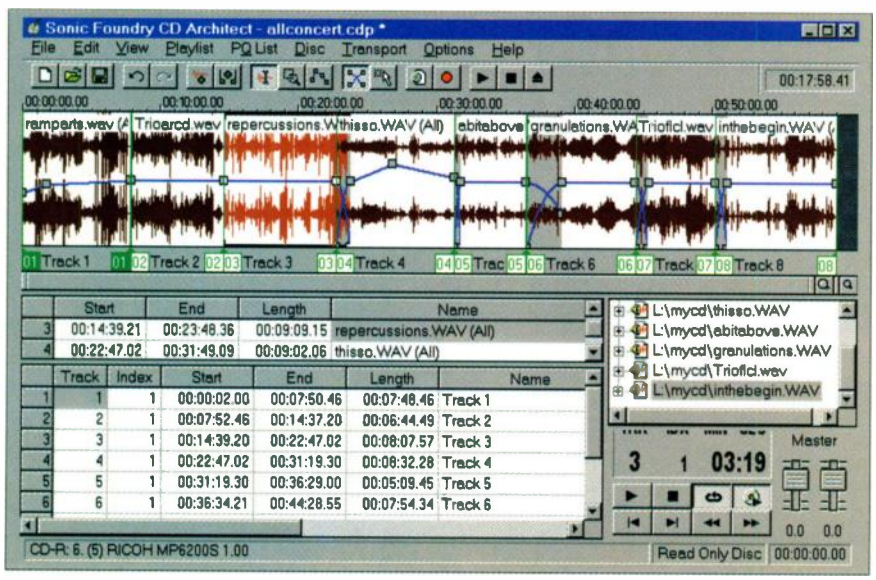

FIG. 4: *CD Architect* displays a waveform view of your entire CD project. Individual tracks can be dragged to new start times.

MIXED AUDIO AND DATA PROGRAMS

WinOnCD. Though there's a clear gap between the two high-end audio applications and the rest of the pack, many of the other programs can be very useful for less-demanding desktop musicians. CeQuadrat's *WinOnCD*, for example, has numerous audio features, including the ability to view waveforms of your tracks and shell (hot link) to an external program for recording audio. Its drag-and-drop interface makes adding files to a project easy, and support for subindices is only one of several professional options for building CDs.

WinOnCD uses four main work areas for creating a project. The Tracks view is where you'll select the audio tracks for your CD (see **Fig. 6**). Right-clicking on a file name in this view gives you access to parameters such as track name and allows you to enable a non-customizable Declicking feature. In the Editor window, you can toggle a display of your waveform, set track start and end points, and perform volume fades. It's easy to move track and subindices around, and though you can't simply drag your audio data to a new start point, you can insert silence at the beginning or end of your file if you want to add additional space between tracks.

The final two work areas are the Artwork view, used for creating simple booklet and inlay-card designs, and the Disc view, where you set CD-recording parameters. *WinOnCD* supports both disc- and track-at-once modes and simulated CD recording. It gives you the option to burn on the fly or create an image file.

WinOnCD provides many little extras that really speed up working. For example, because it supports so many types of CD formats, you can have the program limit your view in a directory to files that match the type of project you're creating. For audio formats, the program displays sample rate, bit depth, and total duration for every audio file in your source directory. To save screen redraw time, you can view audio files as simple horizontal bars rather than actual waveforms. The program can also detect silences at the start or end of a file and will automatically highlight them for easy editing.

WinOnCD's manual practically dares you to run other applications while burning a CD, so of course we had to take the challenge. We used *Sound Forge* to loop a segment of audio and even patched it through a DirectX reverb effect while the music played. Sure enough, *WinOnCD* met the challenge and burned a perfect, 14-track CD while *Sound Forge* was playing and processing the audio.

To be fair, we attempted to duplicate these results with *CD Architect* and *Red Roaster*. Though *Sound Forge* couldn't access the PC's audio card while *Red Roaster* was burning the CD, we opened and closed dozens of programs, looped a MIDI file while altering numerous parameters, and generally gave the system a massive workout. Both *Red Roaster* and *CD Architect* met the challenge, as well. What a long way we've come from the point where one CD-software maker used to recommend, "Don't even breathe while the data is flowing to the burner!"

Easy CD Creator Deluxe. Adaptec is one of the key players in the mainstream CD-recording market, and its *Easy CD Creator Deluxe* is well suited to many tasks. *Easy CD Creator Deluxe* includes a wave editor for recording and editing files, a Wizard feature that walks you through the process of creating a new project, and a simple drag-and-drop approach to building playlists. However, though it supports disc-at-once mode, there's no way to alter the space between tracks except for adding silence to the file in the included editor.

Creating a new project in *Easy CD Creator* can be nearly automatic if you use the program's Wizard feature. Once you've chosen "audio CD" as your project type, *Easy CD Creator* will guide you through all the steps you'll need. First, it opens an Explorer-style window for

picking files, and then it prompts you for names for your CD and the artist. Next, the Wizard allows you to determine if the CD will be closed or left open for additional tracks (only available with track-at-once writing) and choose whether you want to simulate the actual burn or move right ahead with the job at hand.

Of course, the "hands off" approach limits you to the default settings that *Easy CD Creator* applies. Although these are only suitable for creating "generic" audio CDs, where the track gaps are all the same and there are no subindices, the Wizard definitely makes setting up and burning a CD nearly foolproof.

The *Easy CD Creator Deluxe* package includes another set of programs that can be used to create video and picture (pcd) discs. There's also a standalone audio editor, a CD copier, and a program called *CD Spin Doctor* that is optimized for making CDs from LPs and cassettes. Though we didn't test these options, the all-in-one approach of the package means you'll have the proper resources for many different tasks. In addition, an extensive set of tools for designing CD inlay cards and covers gives *CD Creator* a distinct advantage over many of the other programs in its class.

CONSUMER-LEVEL DEDICATED AUDIO PROGRAMS

Gear Audio. *Gear Audio* is one of two "low end" programs aimed at the consumer market. Yet both *Gear Audio* and *just!audio* (described shortly) are capable programs for musicians who don't need high-end capabilities. They also offer an excellent way to get into the CD-recording world for very little money.

Of the two programs, *Gear Audio* has the more robust audio feature set. You can set a global track pause length or set gap lengths for tracks individually. A Scan feature allows you to hear the first few seconds of a track, including the gap, which is useful for confirming that all your timings are in order. Though you can't edit audio directly in the program, there's an option to shell out to an external editor, make your changes, and then return to the program and find your edited version already loaded.

Gear Audio thoughtfully displays a total elapsed time for your CD and alerts you if you try to add a file that would exceed the limit. It allows you to make copies of the audio files you're using in your project or simply establish a "link" to the existing files on your disk. The copy option is handy in case you do edits on your files but wish to keep the originals on hand, as well.

As with many of the other programs in this roundup, you can run a test before performing the actual burning, but there's no way to write an image file to disk. Still, *Gear Audio* offers quite a few useful features for its very reasonable $99 price tag.

Just!audio. CeQuadrat's *just!audio* can't match *Gear Audio*'s range of features, but it easily has the most unique interface of any of the programs. A colorful and animated main screen provides access to the major work areas of the program, and though the audio functions

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are minimal, enough options are available to make the program worth a look.

Just!audio offers a drag-and-drop interface for adding files to a project list. You can grab files from a Windows Explorer window or directly off an audio CD. The program will automatically detect silence at the beginning or end of a file and delete it. A Max Volume option is also available for normalizing a file.

Because *just!audio* is aimed at users who are dubbing their LP collections to CD, you'll also find a DeClick feature on its main screen. However, like many other options, the DeClick feature is not customizable, so it won't be of much use to the serious musician. Though you can run a test burn, the program does not support disc-at-once mode, which means you cannot send your CDs to a mastering house for duplication. (There are also technical reasons why track-at-once mode is not as efficient a way to burn audio CDs.)

A CD-cover and booklet designer offer a number of useful tools for creating original artwork, and it's easy to add your own bitmaps or to format text. The key words here are "user friendly," and *just!audio* slips in just above the level of cuteness that would probably discourage us from recommending the program. Not wanting to appear grouchy, we must confess we enjoyed working with the program, though you'll probably find it useful only if you're just starting out in the CD-R business.

INTEGRATED AUDIO EDITORS AND CD SOFTWARE

WaveLab. In addition to the specialized audio and mixed-purpose software mentioned above, a number of sample-editing programs, both software- and hardware-based, offer CD-burning features. Steinberg's *WaveLab* 1.6, for example, is very capable of burning CDs and offers numerous features to make the job manageable.

To begin the process, load a file using the File/Open menu or drag one into the program directly from an Explorer window. Then, append as many additional files as you want by opening them in their own windows and drag-copying them to the end of your first file. (An Append New File command would be helpful at this stage!) To set Track indices, start playback and press the Control and Insert keys to open the Marker menu. If you've set the Marker type for Track Start, you can simply press OK and *WaveLab* will drop an index number at the cursor location. With one hand on the keyboard and the other on your mouse, you can move through a file of any length and build a complex track list from the file in a single pass.

Track markers that you drop can be sequentially numbered automatically, or you can edit them and add your own names. The markers can be moved and are saved to disk with the file, but there's no way to quickly delete all markers if you decide you need to start from scratch.

After you've saved the indexed file to disk, you reload it into a CD Program. This feature is integrated directly into *WaveLab;* no need to jump out and launch another program. In the CD Program screen, *WaveLab* displays every Track you've indexed as a separate entry in the list (see **Fig. 7**). You can also add new, unindexed audio files and have *WaveLab* convert them into Tracks automatically or drag selections, even an entire file, directly from the *WaveLab* Wave window into the CD Program.

Clicking next to a Track name allows you to view start, end, and pause times,

MAKING YOUR FIRST CD

Okay, you've finished mixing an album's worth of songs, and you want to burn them onto your first CD. Where do you begin? First, you'll need to transfer your finished mixes from DAT to your computer's hard drive. Use a sound card with a digital audio input so you don't have to suffer an unnecessary analog-to-digital conversion by using your computer's analog line inputs. If you're working with an analog master (cassette or open reel), you could use the line ins on your computer, or better yet, invest in an outboard A/D converter and a sound card with digital I/O.

Transfer each song into its own sound file (WAV format for Windows, AIFF or SDII for Mac). The exception is a recording of a live show where you want to preserve applause and ambience between songs. In this case, load the entire performance into a single sound file.

Next, from your CD-burning program, select the songs and place them in your desired running order. For the live disc, you'll need to place markers or regions in the multi-song sound file to indicate the start point of each song. If you don't, you'll get a CD with a single track containing the entire show. This will play correctly, but you won't be able to skip from song to song.

Once you have the tracks in sequence, listen to the transitions between songs. Better CD-R programs, including several mentioned here, let you vary the silent pauses or "gaps" between tracks individually. For instance, when a song ends with a fade out, a shorter-than-usual gap before the next track often works best. And of course, a live CD won't have any gaps between tracks. In some cases, you may actually want to fade one track out while the next one is starting. This sort of segue can be created using crossfades. That's an important feature found in the best CD-R software programs.

Now, it's time to listen again! Do all the songs sound equally loud? This isn't simply a matter of normalizing each track so they all have the same maximum peak level. Instead, use your ears to balance levels. You may also want to experiment with EQ or compression to help all the tracks sound like they belong together. Some CD-R programs can change levels as the disc is burned. In other cases, you'll need to make the adjustments using an external audio editor. Boosting track volumes is much safer when your CD-R software has level meters.

Once everything sounds just right, you're ready to burn your CD. The speed at which this can happen (1x, 2x, 4x, or higher) depends on your CD-recorder hardware. But your software also comes into play. Discs with crossfades, real-time level changes, and other processing might not burn successfully at the maximum speed supported by your hardware. That's why most programs give you the option of creating an *image file*, a single data file containing the entire CD, including fades, edits, and level changes. This file could be over 650 MB, but it should allow you to burn successive identical discs at the maximum speed supported by your CD recorder.

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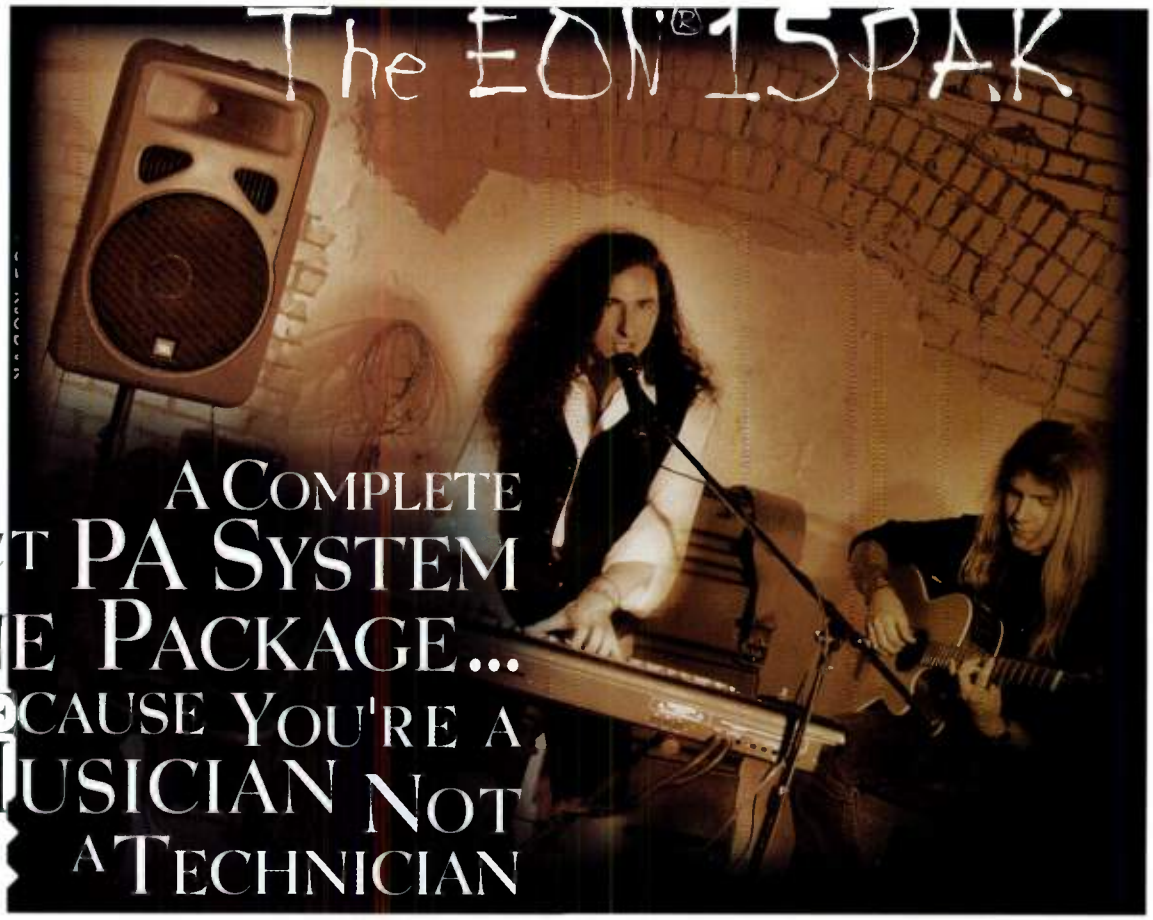

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and it's easy to adjust the pause length in the CD Program screen. (To adjust Track start and end times or subindices, however, you must reopen the audio file and move the markers accordingly.) You can click on Track start or end settings and the program will begin to play audio at that spot. Entire Tracks can be dragged and dropped into new locations if you need to rearrange the list. When all is in order, you can choose to test write the whole CD or a single track or begin to burn the disc.

We were unable to capture audio from a Ricoh 6200 CD-RW using *WaveLab*, though all the other programs worked fine. (A fix for this problem is available on Steinberg's Web site.) Steinberg suggested that having all the other software drivers on the system could be giving *WaveLab* problems. The program's Help menu also comes up short on advanced topics. For example, the Help menu tells you that if you don't know what the Advanced settings mean, you should leave them alone or consult the Red Book spec. It certainly could be more helpful in supporting the features the program offers. But *WaveLab* easily provides the most integrated CD burning of all the audio applications examined, and if you get hold of the program, you have much of what you need to burn pro-level CDs, and you have an excellent editor to boot.

DART Pro 32. Tracer Technology's *DART Pro 32* offers a huge range of audio processing options intended primarily for restoration tasks. If you happen to need a program for transferring LPs and cassettes to CD, you can't do better than this one.

DART Pro 32's basic toolkit is very comprehensive and includes a multiband graphic EQ; scale, maximize, and mute settings; log or linear adjustable fades; and sample- and bit-rate conversion. As with most audio editors, you can view your files as waveforms and edit them using common copy and paste functions. Many of the program's features, for example the Soundtree option, are oriented towards the specific restoration functions the program features. The Soundtree feature allows you to view a "history" or "family tree" containing all the different versions of a file you've used the restoration tools on.

The real power of the program, however, is in the DeClick and DeNoise options. Here you can fine-tune the numerous settings offered by the various preset options or build your own restoration filters using any combination of the existing processing features. The Filter Builder allows you to chain functions, preview the effect, and then save the chain as a preset. This very versatile feature is beyond the scope of the current roundup, but it is among the most sophisticated sound-processing routines we've seen.

When your files are tweaked and you're ready to burn, switch to the *WaveMan* application to build your track list. *WaveMan* will automatically convert files to Red Book–ready format and will also allow you to adjust track gap lengths. Although you can play the entire track list and loop or sample just the start of each track, you can't see a waveform view of the files for visually editing or rearranging tracks. As with most of the other programs, you can run a simulation before burning. Unfortunately, there's no option to create an image file.

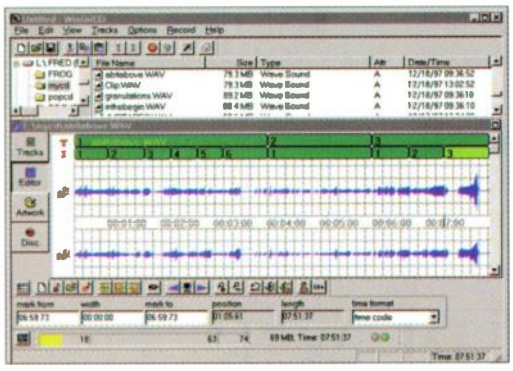

FIG. 6: *WinOnCD*'s Track view displays each channel of your stereo file and allows you to move track start times and subindices. Files are added to the track list by dragging them from the destinations shown at the top of the screen.

The others. As CD burning becomes more commonplace, you should expect to find it appearing in more audio editors. MTU's *MicroEditor* and Creamware's *tripleDAT*, two hardware-based systems, have had CD burning capabilities for some time. Spectral's AudioEngine and Prisma workstations both support CD recording, as well. SEK'D's flagship software *Samplitude Studio* has even more editing capabilities than the version *(Samplitude Master)* that comes with *Red Roaster 24*. (See the complete review of *Samplitude Studio* in the January 1998 issue of **EM**.) Most significantly, you can mix unlimited tracks of audio to an image file before burning and use a 4-bus, real-time mixer to control numerous parameters of your music. Many new processing features are also available, and the *CDaudio* program can be called directly from within the *Samplitude* main screen.

2496 CALLING

We had the opportunity to preview an early beta version of a new program from SEK'D that raises the bar more than a few notches for multitrack editing and CD burning. The new program, *Samplitude 2496*, will allow you to mix multiple tracks of audio on the fly while burning to disk. Depending on your system resources, you'll also be able to perform real-time panning and level changes and apply and tweak effects while burning a CD. Of course, if things get too complicated, you'll have the option to create an image file first. As you play back multiple tracks and make your changes, you will also be able to record a new, mixed file onto your hard drive. This will give you, in effect, a real-time mixdown mode. (All in software, of course!)

Samplitude 2496 will also provide support for sampling rates up to 96 kHz and process and store files with 24-bit, floating-point precision. Compatibility with DirectX plug-ins will make using third-party effects simple, and new internal effects, such as a multiband compressor and an enhanced mixer, will be included. Finally, you won't need to call *CDaudio* to burn a CD; that capability will be offered directly within the program. As the music world marches steadily toward higher bit resolutions and sample rates, *Samplitude 2496* will be waiting at the gate.

THE FINAL CUT

As you've seen, Windows CD-R software comes in all shapes and sizes. The two high-end programs, *CD Architect* and *Red Roaster*, are both excellent for serious professional applications. With numerous audio-editing capabilities for tweaking your files before burning the

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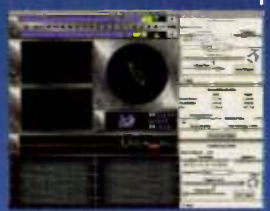

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disc and intuitive, easy-to-use interfaces, you'll be more than satisfied with either program.

In the other categories, you'll find programs that can do the job adequately, although they won't give you all of the options that audio professionals often need. We particularly liked working with *WinOnCD*, especially because it supported so many types of CD burning. Furthermore, it had better audio options than *Easy CD Creator*, the other program in its class. To be fair, though, it's considerably more expensive than its competition.

If you're on a tight budget, *Gear Audio* makes the most sense, because it lets you set track pause lengths—one

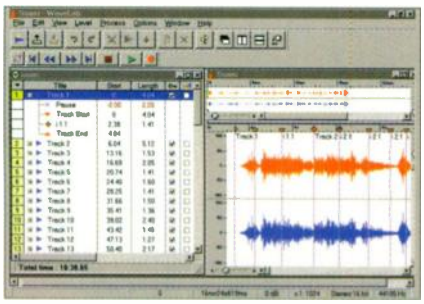

FIG. 7: *WaveLab* uses a CD Program dialog to show the tracks in your project. This feature is part of the main program interface.

of the most important options any program should provide. You'll have to do without an audio editor or even a waveform view, however. If you happen to be a *WaveLab* user, then by all means upgrade to version 1.6 and take advantage of the CD-burning capabilities integrated within this program. You may find that it is an all-in-one solution for your work.

Whichever application you choose, rest assured that you'll never have to worry how your music sounds when it gets to its destination. A CD is clearly the best way to get your music out the door, so stoke up that fire and start burning!

Rudy Trubitt's *most recent book,* Live Sound for Musicians, *is now available from Hal Leonard Publishing. Visit Rudy at www.well.com/user/trubitt. Associate Editor* **Dennis Miller** *lives in the suburbs of Boston.*


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Playing the SLOTS

five windows audio cards contend for digital dominance.

by zack price

As you've probably noticed, the number and variety of audio cards available for Windows computers has swollen dramatically in the last year or two. Whether your PC has ISA slots, PCI slots, or both, you'll find a wide variety of cards with which to fill them.

There appears to be especially great demand for cards with stereo digital I/O. Few desktop recordists can resist the lure of being able to transfer audio to and from the computer using their favorite high-quality converters or, better yet, completely in the digital domain. I've looked at a number of the new-generation cards, including several that can handle 20- and 24-bit data. You'll be surprised at how many capabilities these cards offer.

The Chosen Few

The cards I examined have much in common. All provide stereo digital I/O (using the AES/EBU or S/PDIF format), and all but one offer at least one set of analog monitor outputs. None of the cards reviewed include onboard synthesizers (a group of sound cards with synths was covered in the January issue of EM), nor will you find cards that use 8-channel Alesis optical I/O. These cards are a special case and will be discussed in a future article. Beyond that, there were no other restrictions.

The five cards meeting our requirements are the AdB Multi!Wav Digital PRO24, Digital Audio Labs Digital Only CardD, SEK'D PRODIF 24, Zefiro Acoustics ZA2, and Antex Studio Card AV Pro. Of these, all but the Antex fall within the $400 to $500 range, and although the Antex is several times the price of the others, its expanded functionality and versatility justify its higher price.

The DAL Digital Only CardD is the only card that does not have analog monitoring outs, and the Antex is the only card that has multichannel analog outputs, offering two stereo pairs of analog I/O. The AdB Multi!Wav PRO24 can also output four discrete channels: its two digital and two analog outputs are simultaneously available. The Antex is also the only PCI card examined here (see the sidebar "Bus Stop").

Two Is Company

A card with digital I/O can serve many purposes. The most obvious purpose for stereo digital I/O is to digitally transfer audio from a DAT recorder or CD deck into a computer for further stereo editing and mixing to DAT. However, an increasing number of studios and artists use digital mixers or outboard 20-bit and 24-bit A/D converter boxes to mix directly to the computer and then burn CD-R submasters.

Moreover, stereo digital I/O cards are also extremely cost-effective for users of multitrack hard-disk recording programs or digital audio sequencers. If you record only one or two audio tracks at a time, there's no need for more than two inputs. All that's needed is a front-end device like a DAT deck or stand-alone A/D converter to record directly to digital.

Also, hard-disk recording programs and digital audio sequencers can provide the virtual equivalents of outboard mixers and effects-processing devices, especially when supplemented with DSP plug-ins. Inasmuch as a mixer's ultimate job is to balance and output all signals to a stereo mix, a software-based virtual mixer needs only a stereo physical output at the end of the audio chain during playback.

Zefiro Acoustics ZA2

Strength in Numbers

On the other hand, the 2-channel approach can only go so far. For one thing, it won't give you the ability to record multiple tracks at once. Two inputs won't cut it if you want to record a band, a group of backup vocalists, an acoustic drum set, even a pair of guitarists/vocalists who want to perform live in the studio.

Two outputs might not be enough, either. For example, your ability to apply signal processing within the computer is limited by your CPU's ability to crunch numbers. Even if you add a special DSP processing card, such as Power Technologies' DSP•FX, you are not going to be able to simultaneously apply real-time EQ to every channel and add a long list of effects to the extent you can with one of the new breed of digital mixers or with an analog mixer and a few racks of outboard gear. Furthermore, you probably already have some nice outboard processors; why not use them? If you have multiple channels of analog I/O along with digital I/O, you can not only get more instruments in, you have the ability to set up effects loops for your outboard gear.

The Antex card includes 4-channel analog I/O, which is a good start for traditional multitrack recording. But if you want more extensive multichannel I/O, none of the cards examined in this article are for you.

The Going Rate

All five cards I examined record and play back 16-bit audio at the standard DAT sample rates of 32, 44.1, and 48 kHz. The Studio Card AV Pro and ZA2 can also handle other sampling rates (see table, "The Card Table"), which is nice because you never know when it may be necessary to do so. Of course, there's no point in paying extra for sampling rates you don't need; as with other features, you should consider which are vital to your work.

The Multi!Wav Digital PRO24 and PRODIF 24 provide the ability to transfer digital audio data at up to 24-bit

Digital Audio Labs Digital Only CardD

resolution. As of this writing, the ZA2 can record digitally at 20 bits but offers only 16-bit digital playback. However, according to Zefiro, the card will soon—perhaps even by the time you read this—be capable of 24-bit digital transfers.

That doesn't mean that the Digital Only CardD and Studio Card AV Pro are hopelessly out of date—at least, not yet. The standard for DAT decks and CDs is still 16-bit resolution, and that is all you need for many projects at this point. However, there are several good reasons to use higher bit resolutions or even to use higher bit-rate converters when recording to a 16-bit medium. Take a look at the sidebar "Is This Bit Necessary?" before deciding you don't need a high-resolution card.

I/O Silver

An important variable is the types of digital I/O connections offered by the five cards. The DAL Digital Only CardD has only S/PDIF electrical connections on standard RCA jacks. The Antex Studio Card AV Pro has only AES/EBU digital I/O on XLR connectors, as demanded by the specification. But as you'll see, the Antex card is not your average digital I/O card.

In contrast, the ZA2, Multi!Wav Digital PRO24, and PRODIF 24 cards all have AES/EBU I/O and two types of S/PDIF I/O: on electrical connectors and on Toslink optical connectors. However, their implementations differ. The ZA2's S/PDIF electrical ports use standard RCA connectors, and its AES/EBU ports use standard XLR connectors. The other two cards employ nonspecification ¼-inch TRS jacks, which are software-switchable between S/PDIF and AES/EBU formats. This

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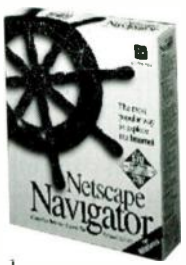

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was apparently done in order to save space on the backplate; after all, the manufacturers had to squeeze in a pair of electrical and optical digital jacks, an analog output jack, and, in the case of the Multi!Wav Digital PRO24, a BNC jack for word-clock I/O. Note that none of these cards can transmit or receive more than one format at a time.

The Multi!Wav Digital PRODIF 24, PRO24, Studio Card AV Pro, and ZA2 cards control all digital I/O configurations in software. Simply call up the control and choose between AES/EBU and S/PDIF electrical or optical for the desired digital input and output. The coolest-looking controller software is the Multi!Wav Digital PRO24's *Driver Link* program (see **Fig. 1**).

The ZA2 software is the easiest to use, however, because you can configure the card to follow the digital inputs and outputs you've set in your digital audio program's preferences. And it is a system-tray application, so you can simply call up the ZA2's control menu from the Windows 95 taskbar.

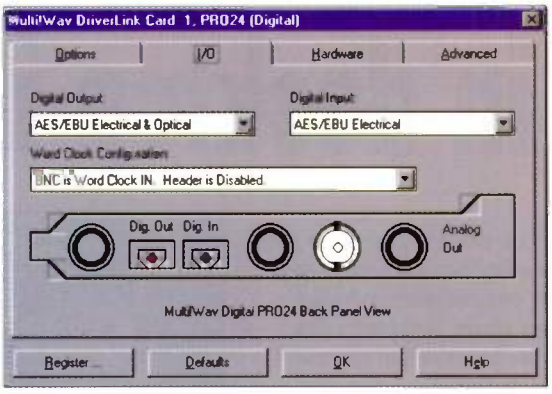

FIG. 1: Many cards use software to control the type of digital I/O. This is the digital I/O control window of AdB's *Driver Link* software for the Multi!Wav Digital PRO24.

More Is More

Although the Antex Studio Card AV Pro is the only card with multichannel analog outs, it offers only 16-bit AES/EBU digital I/O. However, if you see desktop video production as a natural extension of desktop music production, then the Studio Card AV Pro is your ticket to that expanded universe. Internally, the card has a header for adding a DSP-based audio effects processor (currently under development) as well as the connections to clock lock to a variety of video-capture cards. Externally, it has a variety of sync I/O connections (including word clock, VITC, LTC, and composite video).

The Antex card also has the ability to generate time code (LTC, VITC, and MTC), and its MIDI interface (the only one in this roundup) works as a true interface and not just as a means for generating or receiving MIDI Time Code. Simply put, this card lets you do it all and control it all. And yes, the audio quality is excellent!

Those Little Extras

Three cards are bundled with special versions of software from third-party companies. The Multi!Wav Digital PRO24 includes a special version of Steinberg's *WaveLab*, and the ZA2 comes with Sonic Foundry's entry-level *Sound Forge XP*. These bundled programs

The Card Table

	AdB Multi!Wav Digital PRO24	Antex Studio Card AV Pro	Digital Audio Labs Digital Only CardD	SEK'D PRODIF 24	Zefiro Acoustics ZA2
Card Type	ISA	PCI	ISA	ISA	ISA
Price	$499	$1,595	$395	$399	$495
Analog I/O	0/2 (¼" TRS)*	4/4 (¼" XLR balanced)	0/0	0/2 (¼" TRS unbalanced)	0/2 (RCA)
Optical S/PDIF I/O	2/2	0/0	0/0	2/2	2/2
Electrical S/PDIF I/O	2/2 (¼" TRS)**	0/0	2/2 (RCA)	2/2 (¼" TRS)**	2/2 (RCA)
AES/EBU I/O	2/2 (¼" TRS)**	2/2 (XLR)	0/0	2/2 (¼" TRS)**	2/2 (XLR)
Max. Digital Transfer (bits)	24	16	16	24	20 in/16 out
Sampling Rates (kHz)	32, 44.1, 48	8–50	32, 44.1, 48	32, 44.1, 48	5–60
DACs	24-bit	18-bit	n/a	18-bit	16-bit
ADCs	n/a	16-bit	n/a	n/a	n/a
Sync Types	word clock	word clock, 256x word clock, VITC, LTC, MTC, composite video	n/a	n/a	word clock (optional)
Additional Features	n/a	MIDI, header for audio-effects card, clock lock to video-capture cards	n/a	n/a	n/a

* Simultaneously available with digital output for four discrete outs

** One set of ¼" TRS ports, switchable S/PDIF and AES/EBU

MS1402 • MS1202

Fade out slowly or twist the night away. Whether you choose the MS1202-VLZ® (rotary pots) or the MS1402-VLZ® (60mm faders), you'll own the best.

Superb mic preamps with our renowned discrete, large-emitter geometry design. Headroom to handle screaming vocalists or miked kick drums. Yet audiophile definition and ultra-low (–129.5dBm E.I.N.) noise help capture the tiniest nuances.

Low Cut Filter on mic channels lets you use Low EQ on voices without boosting harmful stage rumble, mic thumps, wind noise, and P-pops. Unlike the 6dB or 12dB/oct. "filters" on some compact mixers, our sharp 18dB/oct. design doesn't sacrifice audible bass above 75HZ.

	MS1202	MS1402
Mic preamps	4	6
Mono inputs	4	6
Stereo inputs	4	4
–10/+4 switch[1]	no	yes
Total channel inputs	12	14
Aux sends	2	2
Stereo aux returns	2	2
Channel inserts	4	6
Equalization	3-band	3-band
True low-cut filter	yes	yes
Channel controls	sealed rotary	60mm faders
Master control(s)	ganged rotary	separate L/R faders
Ctrl Rm matrix	yes	yes
In-place solo	PFL	AFL/PFL
Metering	12-LED	12-LED
Stereo outputs	both XLR &1/4"	
Tape ins/outs	RCA	RCA
ALT 3-4 bus	yes	yes

Musical 3-band EQ with wide, natural midrange bandwidth centered at 2.5kHz.

Constant loudness pan control. When you pan a channel to the extreme left or right, the apparent sound level stays the same[2] as in the middle — a critical requirement for accurate stereo mixes... and a Mackie Designs exclusive.

Trim control with –10dB "virtual pad" and ultra-wide 70dB total input level gain range to handle any live or studio situation[3].

Beefy headphone amp.

Aux 1 Master with 10dB of extra gain above Unity.

EFX to MONITOR switch lets you feed Aux Return 1's reverb or other effects back into Aux Send 1 and control the amount via Aux Return 2. A Mackie exclusive feature.

Two aux sends per channel w/extra gain past Unity.

Separate tape inputs & outputs.

Check around. You'll discover that even though there are about a gazillion makes and models of ultra-compact mixers, just two tend to show up in the racks and project studios of serious pros. The MS1202-VLZ and MS1402-VLZ tour on stage with top stars, submix into mega consoles, and even record sound for major motion pictures. Why settle for a toy when the real thing is comparably priced?

Solid steel chassis.

Rude Solo Light.

Inserts on mic channels (unbalanced).

Two stereo Aux Returns, with up to 20dB of gain available.

Control Room/Phones switching matrix and separate level control. Select any combination of tape, main mix, or ALT 3-4 and route them to the Control Room/Phones output OR back into the main mix. Consider the possibilities: easy assign to control room monitors, multitrack recorders, submixes, separate monitor mixes, broadcast, or 2-track tape feeds. A Mackie Designs exclusive.

Built-in power supply instead of a wimpy, outlet-eating wall wart.

ALT 3-4. Mute a channel and the output is routed to a separate stereo bus. ALT 3-4 has its own outputs or can be "folded" into the Control Room/Phones bus OR main mix.

Stereo in-place solo (1402) retains channel's correct position in the stereo mix. A soloed channel's operating level appears on the main LED display. Solo is PFL (pre fader) on the MS1202-VLZ, and globally switchable to AFL (after fader) on the MS1402-VLZ.

Control Room outputs so you don't have tie up your headphone outs to drive a pair of our nifty new HR824 active near-field monitors.

XLR main outputs with switchable mic/line level.

Above right: The MS1402 Control Room section. MS1202-VLZ is similar except without Phantom LEDs, Level Set LEDs and global AFL/PFL solo switch.

Below: A few of the 400+ folks who work at Mackie Designs in Woodinville, WA, 20 miles north of Seattle.

1) On stereo channels.
2) This would make a great album title for the '90s.
3) Except possibly drummers who drink triple espressos.

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circle #550 on reader service card

admirably fulfill their twin purposes of providing users with the means to get up and running immediately while offering such limited features that new users are dying to get their hands on the full version of the program.

Most of the cards also include little utility programs that are helpful to varying degrees; only the Digital Only CardI) was noticeably lacking in this department. Of the included mixer applets, for example, the Studio Card AV Pro's 4-bus mixer (see **Fig. 2**), which can mix up to eight stereo tracks and route them to any of four physical outs, is the most sophisticated.

Another common utility is some sort of audio-metering application. The PRODIF 24's meters are part of its overall control panel (see **Fig. 3**), but the meter bridges for most sound cards are standalone applications. In my opinion, these mixer and level-meter applications have limited usefulness. For one thing, I use the audio meters and mixer controls that are part of my digital audio programs. That's where the work is being done, and I don't need these utilities adding an extra layer of complexity to my work. Second, they're not that great for diagnostics anyway. Most of the time, you can't know if a sound card is working properly until you get it into a program environment. As a result, these utilities don't really do much to resolve potential problems.

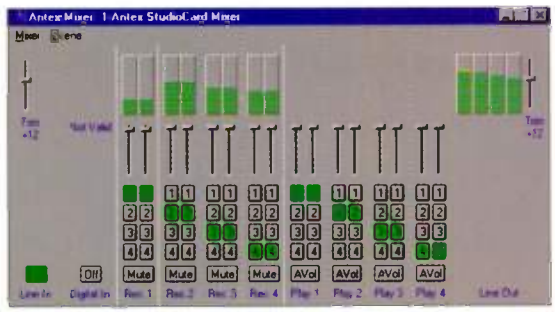

FIG. 2: Many sound cards come with mixer control panels, such as this one for the Antex Studio Card AV Pro. Although this panel has many features, most mixer panels are redundant because volume levels are controlled from within the digital audio application.

However, a couple of cards come with utility programs that are pretty useful. The ZA2 has a test-tone generator that you can use for card testing and audio calibration of the different devices in your digital audio setup. The MultiWav Digital PRO24 includes a test-tone generator that has even more options. Using

IS THIS BIT NECESSARY?

People sometimes ask me whether they ought to get a 20- or 24-bit digital audio card. They cite all the reasons they've been told why they should (it sounds better than cards with 16-bit audio resolution, it's the format of the future, etc.). Though the debate continues regarding how substantial the qualitative advantages of high bit rates are, there are practical considerations to take into account before going to 24-bit audio.

First, determine if such capability is necessary for the work you do. For example, the bulk of my work involves editing and mastering material that was recorded onto 16-bit DAT tapes. Because I digitally transfer audio material from DAT tapes into the computer, it's pointless for me to record at 20- or 24-bit resolution because all I'd get is zero values for those unused bits. I'd also end up generating a sound file that's 1.5 to 2 times larger than it needs to be.

However, if you are doing a large amount of signal processing or editing on those files, the extra zeros can provide some "digital headroom." Many types of processing operations degrade the signal-to-noise ratio of your material; compressors and filters are among the worst offenders.

If you're doing mixdowns right into your computer using a 24-bit A/D converter box or a digital mixer with 20-bit digital outputs, then a high bit-rate digital-transfer card is an absolute necessity. Besides, buying a digital audio card with higher bit resolution often costs no more than lower bit-rate cards, and in some cases it may even cost less. It will still digitally transfer 16-bit audio just fine and will generate no useless data bits as long as you use matching bit resolutions (e.g., recording 16-bit DAT data to a 16-bit audio file).

You can also assume that 24-bit cards have better A/D converters overall, because from an engineering standpoint, they must be quieter. And the 24-bit cards I examined cost pretty much the same as the 16-bit cards.

If you decide to buy a 20-bit or 24-bit card, you should also evaluate every component of your digital audio setup to make sure the entire system can work at its best. If you are concerned with recording analog signals to the computer, of course, the bit resolution of your A/D converters is of primary concern, as are the capabilities of your digital audio editing program. As of this writing, Steinberg's WaveLab and Samplitude from SEK'D are the only stereo editing programs for Windows that work with 20- and 24-bit digital audio data.

However, more such programs are likely to appear in the very near future. Twenty-bit and 24-bit multitrack hard-disk recording systems have already appeared in high-end pro circles, and it won't be long before the technology filters down to the budget-conscious personal studio. In fact, AdB has already announced a new card, the MultiWav PRO Analog 24, which will offer balanced 24-bit analog I/O and list for under $500.

In addition, as noted elsewhere, higher-resolution delivery media (such as audio DVD) will appear sooner or later, so consider whether being ready for that eventuality is worth the extra disk space required to store 20- and 24-bit files.

That said, as of this writing, your digital audio data's final destination is still either a CD-R that you burn yourself or a DAT submaster that will be turned into a CD by a professional replicator. The CD medium's sampling rate is 44.1 kHz at 16-bit resolution, so you will still have to resample and dither down those 24-bit files to fit this final format.

the *BitWav* utility, you can generate different test tones (including sine, sawtooth, noise, and even silence) of any length and in any resolution from 16-bit, 11 kHz mono to 24-bit, 48 kHz stereo.

One Card at a Time

Among my minimum requirements for a stereo sound card is the inclusion of a stereo analog output so you can monitor signals during recording and playback. All of the cards but the Digital Only CardD have that option. Although it is possible to monitor the Digital Only CardD's input from the analog outputs of a DAT deck, it's not possible for most DAT users to simultaneously monitor the Digital Only CardD's digital output. In other words, you can either monitor the card's input or output using a DAT deck, but you can't do both (unless, of course, you like the feedback the deck will produce). I consider the absence of an analog output a serious drawback of this card.

Though it is possible to use a second sound card for analog monitoring, that's an inelegant solution for several reasons. First, the quality of the analog output depends on the quality of the card itself. I wouldn't want to do edits and signal processing based on what I heard through a cheap multimedia card. And if you are going to spend the money on a quality audio card, you would do better to get Digital Audio Labs' combination of the CardD Plus and its digital companion, the I/O CardD.

Unfortunately, that brings up another reason two cards are an inelegant solution: two cards take up two slots. That's one too many for some users, especially when you can record and monitor with just one card. At one time, it made sense to get two audio cards in order to have four inputs and outputs, but if that's your aim nowadays, you are better off going with a multichannel I/O card.

With ISA cards, there are some additional problems to keep in mind if you intend to add a second or third card to your system. The ISA-based cards mentioned here offer multichannel capabilities by using two of the computer's 16-bit DMA channels for full-duplex (simultaneous record and play) operation. Because computers usually have only three 16-bit DMA channels available, and a single ISA-based card requires two of them for full-duplex operation, a second card would have only one DMA channel to work with. That means it could only work as a half-duplex card: it would be able to record or play but not do both simultaneously. If a third card were added, then all cards would become half-duplex. It's better to stick with PCI cards if you feel this is an important consideration. Mark up a point for PCI.

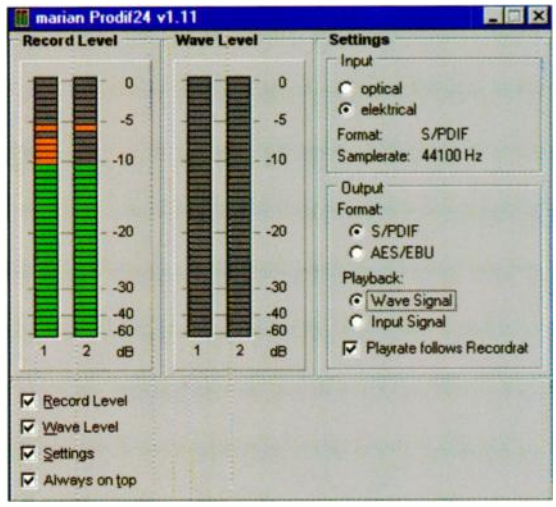

FIG. 3: Sound cards often contain level meters, such as this one for the SEK'D PRODIF 24. As in the case of mixer panels, these level meters are redundant because nearly all digital audio applications contain this function.

BUS STOP

Four of the cards in this survey (Digital Only CardD, Multi!Wav Digital PRO24, PRODIF 24, and ZA2) were designed for use with a computer's ISA bus. Given that the PCI bus is faster (it has a 32-bit data path as opposed to ISA's 16-bit data path), one may wonder why these cards weren't designed to take advantage of that. There are several reasons why these and other cards are still designed for the ISA bus.

Two of the cards (Digital Only CardD and ZA2) were designed and marketed before the PCI bus was in widespread use on Windows PCs. The Multi!Wav Digital PRO24 is an evolutionary step up from its predecessor, the Multi!Wav PRO18, which was also designed and marketed before the PCI bus became commonplace. The design of these three cards is a reflection of the time when they were created. Only the PRODIF 24 is of current design.

In addition, just because PCI slots are available on more computers now doesn't mean that the ISA bus is useless. In fact, you'll still find that many new Windows computers contain as many ISA slots as they do PCI slots. (The usual configuration is three of each).

Those PCI slots tend to get used up rather quickly, however, with one slot used by the display adapter card, and often a second taken by a hard-disk controller card. This is especially true for SCSI-based systems. That leaves one precious PCI slot free, while there are probably two or three unused ISA slots available. And if you're saving that last PCI slot for special-purpose hardware (such as a video-capture card), you'll have no choice but to use an ISA-based audio card.

Furthermore, there are still many Windows users who own computers without PCI slots. These older systems are fully capable of high-quality stereo or multitrack recording and editing. If you own one of these older systems, you obviously need an ISA-based digital audio card. However, keep in mind that there are some general advantages to the PCI cards: for example, they require fewer of your computer's resources, and they provide a real performance boost for true multichannel audio output (as opposed to multiple tracks mixed down to stereo outs).

ALESIS signal processing

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As a new sports car beckons you to the open road, the Wedge's totally unique desktop design makes creating great reverb a breeze. It's the first reverb that's fun to drive.

Just push the Wedge's edit button and start adjusting your reverb with the four edit sliders. It's easy to get creative with the Wedge's powerful parameters like decay, frequency damping, swirl, early reflection room shape, width, density and diffusion.

For as long as effects processors have been bolted into racks, customizing your reverb sound has been about as much fun as setting the time on a digital watch. But the Alesis Wedge™ offers an ingenious new angle to the way you approach reverb and ambient effects.

Unlike racked effects, the Wedge is a dedicated Desktop Master Reverb, cleverly designed to be used on or near a mixing console where you do your most critical listening... in the sweet spot of your mix. And with four edit sliders to access several effects parameters at once, you'll find yourself tweaking aspects of your sound you would never dream of editing in a rackmount box. Result: more inspiration for recording and mixing, and less limitation on your creativity.

There's more to the Wedge than its great design, like all-new algorithms that represent the finest, most detailed, best-sounding reverb you've ever heard, especially in an affordable processor. Don't limit yourself to the rack; instead, think differently and try out a new slant on reverb. The Wedge. At your Alesis Dealer now.

Instead of using a snare drum to set up your reverb, the Wedge offers the innovative Impulse Audition™ feature, which sends a full bandwidth audio signal to help you get flawless reverb for every application.

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ALESIS

circle #505 on reader service card

It's the Sound!

Regardless of the type of material I'm working with, the most important issue for me is the quality of the source material and what I have to do to make it sound good. I've worked from cassette mixes, made vinyl transfers, and resuscitated lifeless mixes. This calls for a sound card with analog outputs good enough to let you hear just how flawed the original material is.

All of the cards except the Digital Only CardD (which has no analog monitoring capabilities) are quite capable in this regard. There are, however, significant differences. The Multi!Wav PRO24 uses 24-bit D-to-A converters, the PRODIF uses 18-bit DACs, and ZA2 has 16-bit DACs. Assuming quality converters, higher bit resolution should result in lower noise and greater dynamic range.

Although I did not conduct bench tests, the manufacturers' published specifications indicate that the higher-bit cards have considerably better dynamic range. However, all of the converters in the cards I tested are of very good quality and are fine for all but the highest-end professional monitoring applications.

The Multi!Wav and PRODIF analog outputs ran about 2 dB hotter than the ZA2, which could potentially give you a little better signal-to-noise ratio in your monitor system but probably not enough to matter. One major advantage of the Antex card is its balanced analog ins and outs. I typically prefer using balanced equipment because balanced connections tend to reject noise.

May We Recommend...

When writing a face-off, the ultimate question, stated or implied, is "What would you buy?" Because individual needs must be taken into account, it's likely that there will be more than one winner. However, I often find that there are certain needs that tend to cluster together. It's easy to profile users according to the constellations of needs they share. It's not a perfect science, but it seems the best way to approach this.

Your basic stereo. The Multi!Wav Digital PRO24, PRODIF, and ZA2 cards all represent good solutions for those needing a stereo digital sound card that works with 16-bit digital audio data. You should keep in mind that the higher bit-rate cards can record at lower bit rates, as well.

That said, the ZA2 is a good solution for those needing a stereo digital sound card that works with 16-bit and 20-bit digital audio data. It is the only one of all the cards covered that has separate and standard connections for all three types of digital inputs and outputs. For some people, this is very handy because you can easily shift the output around to different devices in your studio. The ZA2 includes useful software utilities that are easy to access in a working environment.

Just a little bit higher. Users who have decided to jump to 24-bit audio will need to look at the Multi!Wav Digital PRO24 and PRODIF 24 cards. The Multi!Wav Digital PRO24 and PRODIF 24 are similar in some respects, but different in many others. Both have the same electrical and optical digital I/O configuration, for example, but the Multi!Wav Digital PRO24 provides 24-bit, stereo analog converters, and the PRODIF 24 uses 18-bit.

The Multi!Wav Digital PRO24 card also includes a BNC connector for reversible word-clock functions, which means that you can use its *Driver Link* software to set the word-clock jack to either receive a signal or output it. And the analog and digital outs on the Multi!Wav Digital PRO24 can be used simultaneously, giving you four discrete outs. Of course, these features increase the price of the Multi!Wav Digital PRO24 by $100 over the cost of the PRODIF 24. If you're working with video or are synchronizing audio equipment with a device such as Mark of the Unicorn's MIDI Timepiece, this is money well spent.

Windows on the future. Another factor that may influence your decision is whether or not you need Windows NT 4.0 drivers. Some people use Windows NT instead of Windows 95 because they get markedly better system performance from their computers when running digital audio editors and multitrack hard-disk recording programs. The Multi!Wav Digital PRO24 is the only 24-bit card with NT drivers. The ZA2 (16-bit output/20-bit input), Digital Only CardD (16-bit I/O), and Studio Card AV Pro (16-bit I/O) also support NT. (SEK'D has just announced the PRODIF 32 card, which fully supports Windows NT.)

Multichannel options. If what you need is S/PDIF digital I/O and two analog I/O ports for multitrack work and effects loops, the Antex Studio Card AV Pro is your only option. At $1,595, the card is overpriced for just doing digital audio work, especially considering that it can only transfer 16-bit digital audio. But if desktop video production is in your future or you consider yourself to be a "multimedia" musician, the Antex card suddenly becomes a much more reasonable purchase. Its ability to accept an audio-effects daughtercard, clock lock to a video capture card, and sync to word clock, VITC, and LTC makes it the desktop videographer's choice.

Zack Price *owns and operates Tin Ear Productions, a digital audio editing service. Please direct any inquiries to tinearpro@aol.com.*

In The Kitsch-en

with The Moog Cookbook

PHOTO: VICKI BERNDT

Roger Manning and Brian Kehew take off their oven mitts and share some of their best recipes.

With an approach that is part homage and part parody, synthesizer duo The Moog Cookbook makes mincemeat of the genres "modern rock" and "classic rock." The duo, Roger Manning (aka Meco Eno) and Brian Kehew (aka Uli Nomi), serve up compelling "sonic freak-outs" that stick a knife in the toaster of so-called popular music.

On their self-titled debut album, for example, they reworked Soundgarden's "Black Hole Sun" into a kitschy bossa nova and Nirvana's grunge anthem "Smells Like Teen Spirit" into a cartoon blip fest that they say both "celebrated and denigrated its original pompousness."

Manning and Kehew infuse their work with a love of vintage synths (you know, the kind that change pitch depending on the weather), a good sense of humor, and a true respect for the pioneering efforts of artists such as Wendy Carlos, Keith Emerson, and Neil Young.

"Our first album," reports Manning, "was used at the Berklee College of Music as an example of what not to do with a synthesizer. We said amen to that!" Kehew seconds that emotion: "We really are doing things you shouldn't do with synthesizers. But we're trying to break new ground."

COMEDY OR TRIBUTE?

What may confuse some listeners at first is the duo's odd balance between cutting satire and real appreciation for well-known music. Press photos of the pair donning silver space suits (even before the Intel Pentium dancers hit the airwaves) didn't help them to be taken seriously. So what is it that they do, parodies or genuine tributes?

"A bit of both," confesses Kehew. "We love it and we laugh at it! We were kind of upset that some of the best synthesis was being done by pompous progressive rock or 'experimental' hippie bands. We thought it was equally sad that the current 'cutting edge' crop of techno and electronica bands couldn't play very well and didn't know how to write good songs."

By Paul Myers

The Moog Cookbook's latest album, *Ye Olde Space Bande* (Reckless Records), finds our analog duo in a '70s classic rock mood. "We'll make fun of somebody like Keith Emerson," says Manning, "even though he's one of the greatest rock keyboard players. It's about poking fun at music but at the same time paying homage to a lot of arrangers, synthesizer orchestrators, and performers that have shaped our lives as musicians."

As Spinal Tap once said, there's a fine line between clever and stupid, and it's a line that some listeners are reluctant to explore at all. "A lot of people don't get it," concedes Manning. "People are sometimes afraid to tell me that the record made them laugh, but first and foremost we make comedy albums. Brian and I go about achieving a laugh somewhat differently than, say, Weird Al Yankovic does. We want you to sit back, relax, and enjoy the sonic freak-out."

VICKI BERNDT

The Moog Cookbook has invented a new brand of song parody by subverting popular songs into electronic freak-outs using analog synths. Their most recent album, *Ye Olde Space Bande*, was recorded at Audities Studios in Los Angeles using Alesis ADATs and a Quad Eight Pacifica console. The digital multitracks were employed to precisely capture the analog synths' low-frequency dynamics.

WRITING THE COOKBOOK

At the time they met, Manning was the keyboard player in the now-defunct band Jellyfish, a group that made their mark daring to produce Beatle-esque melodies smack in the middle of the Seattle grunge boom. One day he found himself scouring L.A. in search of funky used synthesizer gear. Meanwhile, Kehew, a Los Angeles–based recording engineer and producer whose client list includes the Muffs, Redd Kross, Matthew Sweet, Michael Penn, and Korla Pandit, had long been a collector of both vintage and progressive synths. So it was inevitable that, during his hunt, Manning would end up at Kehew's door.

"I was selling one of my many Optigans," remembers Kehew, "and Roger came by to look at it. One thing led to another, and we ended up 'comparing notes' and going off to look through keyboard stores all day."

Taking their name from an actual cookbook written by Shirleigh (the former Mrs.) Moog, The Moog Cookbook was born.

THE RECIPE

Like all good chefs, Manning and Kehew choose their ingredients carefully. As for the menu, the two have very stringent guidelines about the songs they select. Manning stresses that because their work is mainly instrumental, strong melodic content is a key factor.

"One of the hardest songs we've done," recalls Manning, "is 'Whole Lotta Love' by Led Zeppelin. The original version is pretty much a blues scat with no real melody per se. Copping something like a Beatles tune is very easy because they wrote such lyrical melodies. But with Zeppelin, you're working from somebody's improvisational blues riffs, which is much more difficult."

"For our purposes," adds Kehew, "it's a lot funnier if the songs don't have a recognizable keyboard part already. That gives us the opportunity to develop a concept for the whole tune. We like to start out by finding a specific style, such as disco, progressive rock, boogie, and so on, that gets us laughing, and then we build up certain sounds and musical ideas off of the melody. We try to throw in really odd things like a recognizable bass line that fits under another chord progression or something minor that used to be major. Often, we can spice up a really simple song if we have our thinking caps on that day."

Manning recalls one such example: their cover of Van Halen's "Ain't Talkin' 'bout Love," featuring "lead vocals" that were derived from samples of Michael Penn. "We just started messing with it, and the next thing we knew, we had this kind of computerized, robotic, Laurie Anderson version of the song," he explains.

Kehew says that contrast is a big part of both of their albums. "It's easy to turn a song into a joke by making it really wimpy and light, like a Brazilian 'Black Hole Sun,'" he admits. "But we try to get some variety on our albums by doing heavy songs like 'Rockin' in the Free World' and 'Whole Lotta Love,' *plus* some light songs and some weird electronic pop songs. Those are the difficult ones."

COOKING THE MEAL

Once the material has been selected, the duo starts the creative process. The team usually goes about this just like a traditional rock band would, from the ground up, starting with the drums.

Although The Moog Cookbook relies heavily on drum machines to produce a variety of wacky techno sounds, Kehew says that they often use real drums and real-time performance to

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give their rhythm sections the "boogaloo" treatment. "It's an old '70s term for groovy, rocking, funky arrangements with busy rhythmic parts. Our version of 'Whole Lotta Love' and a piece of 'Hotel California' were both done this way," he explains. "We try not to use MIDI or computer sequencing too much. Really grooving tracks do *not* have perfect timing. Many people quantize tracks simply because they can't play their instruments well. I like to think that we can play decently, maybe not as good as Wendy Carlos or Billy Preston but pretty good for '90s keyboard players. Live performance really makes a difference. Just work on it until you can play it right!"

Overall, Manning and Kehew work together well, and the process moves along rather efficiently. "If the ideas are working out," relates Manning, "we can literally slam something out in a few hours because we start to sort of 'Zen out' with the arrangement—as long as all the gear is cooperating!"

And just how often does their vintage gear decide to cooperate? Manning and Kehew admit that, when working with old synths, high maintenance comes with the territory. "You just deal with it," shrugs Manning. "Any gear from before 1980, and even some of the early '80s stuff, has its share of problems. The thing we hate, of course, is that with early synths there's no way to save sounds or tones that we've slaved over for hours. Sequential Circuits made a pretty amazing programmer, the model 700, that we have hooked up to the Minimoog, but it just saves parameters, not oscillator settings."

"The other drawback about classic synths," adds Kehew, "is repairing them. We bought most of our keyboards used, and some of them were really dirty and needed a lot of attention."

Certain kinds of malfunctions and glitches, however, help create some of The Moog Cookbook's favorite sounds. A dirty key contact, for example, can cause voltage surges on the triggering mechanism, resulting in wild, gurgling glissando glitches. "Having a tape rolling constantly always works to our advantage," admits Kehew. "We love those spontaneous mistakes that the equipment gives us, and we pray that they happen at a cool moment."

Given their penchant for analog authenticity, it may seem odd that The Moog Cookbook chooses to record those "cool moments" exclusively on a digital multitrack, the Alesis ADAT. When asked why, Kehew doesn't miss a beat: "Cheap, cheap tape that's easy to move as we travel. For analog synths, it's a good way to capture them without losing the punch of their dynamics. Digital tape represents low frequencies flatter than analog tape does, which helps us maintain the big low end that comes off of old beatboxes and bass synths."

SIX-VERSE FEAST

Ye Olde Space Bande was recorded at Kehew's own facility, Audities Studios in L.A. To get the cleanest signal path possible, mic preamps were routed directly into the ADATs, bypassing the console. For the mix, a Quad Eight Pacifica board (without automation) was employed. The 2-track DAT was later edited on a hard-disk workstation.

The only exception to this simplicity would be the recording of one of the most memorable moments on *Ye Olde Space Bande:* the Cookbook's epic rendering of the Eagles' "Hotel California." With a complex automated mix and offset edits, Manning reckons that it was both the most adventurous and the most time-consuming track the duo has recorded.

"We loved the idea of doing an Eagles song," recalls Manning. "Just from a production point of view, Brian and I were huge fans of 'Hotel California' when it came out in 1976. But when we sat down to talk about the arrangement, it dawned on us that the tune is about seven minutes long and has six verses that are musically all the same!"

Faced with this repetition dilemma, the pair came up with the solution of casting each verse in a different style. "We'd spend weeks working on the sections separately and then edit them together," remembers Manning. "The whole point was to play off of clichés. The song is a sonic journey through music—complete with a full-blown psychotic circus-clown chorus!"

Manning recalls, "The drums came from a Wurlitzer Sideman, which is basically a giant box with different tape loops of real drummers. We also used the Chamberlin Rhythm Mate, another old piece with various rhythm loops.

"The first verse is our spoof on Yanni and the disastrous sonic landscape that New Age keyboards have contributed

A FEW OF THEIR FAVORITE THINGS

Keeping up the quest for new out-of-this-world sounds can require quite a bit of ingenuity and a lot of obscure gear. The Moog Cookbook employs a vast collection of interesting keyboards and unique processing boxes.

"The Baldwin Fun Machine is one of our favorites," relates Brian Kehew. "Heart used one first back in 1982, and we think it's a great box. The Eventoff Sonica is another great piece that provides a surge oscillator mounted inside a hippie-like, gourd-shaped wooden casing! Aesthetics are always a big thing for us."

What else is in their arsenal? "The Electro Harmonix Minisynth offers a really unique tone, complete with a touch-plate keyboard that rarely works. The Hohner Pianet N offers a great crunchy Beatles/Zombies tone," says Kehew. "The Steiner Master's Touch is an absolutely brilliant combination of a CV breath controller, a touchpad, some triggers, and several filters that can be used on almost everything."

He adds, "The Roland GR-700 guitar synth and the Korg X11 guitar synth both have trouble tracking properly, so when you put a nice melody in, you get a goofy one out. We like this feature, but most people don't!"

"On the effects side," Kehew concludes, "we use the Maestro Echoplex for traditional 'space age' sounds. The Sound Workshops spring reverb is also a must for that 'old synth' feel. It's all about spicing things up."

GEAR SHOPPING ADVICE

Roger Manning and Brian Kehew have acquired much of their gear through diligence, good timing, and a lot of luck. Manning points out that, as recently as five years ago, vintage gear in decent condition was much easier to find than it is now. Sometimes their diligence in gear acquisition borders on pestering. "When Roger and I find an amazing, rare keyboard, we'll spend several years slowly bothering the owners until they decide to get rid of it," admits Kehew. He adds that anyone seeking vintage equipment would be well advised to understand the market and the going rates for particular instruments.

"Advertise for the gear; make it come to you instead of trying to look in every nook and cranny," he explains. "Let everyone know you want one. I came across two hard-to-find instruments this month by asking a handful of people. Also, buy what nobody else wants right now. You can get a Polymoog for $150, a Minimoog for $300, and Clavinets and Wurlitzer electric pianos for $50. I have a room full of neat keyboards totaling less than $1,000!"

Kehew also says to be very cautious of buying an old piece of gear that needs a lot of repair work: "Keep in touch with keyboard-repair people throughout the country; they are a great resource. Before committing yourself to a purchase, talk to one of these folks and find out about the piece you're considering: Is it difficult to fix? Is it worth fixing up? Is it likely to break again? Unlike a vintage guitar, a typical analog synth has hundreds of parts, and it's hard to check them all in a quick test. In almost all cases, it's better to pay more for something that works great than to save a bundle thinking you'll 'fix it up.'"

to," he continues. "We pulled out the Roland D-50, which has some wonderful PCM sounds, in addition to a lot of disgusting New Age patches like the 'Shakuhachi Flute.' For the next verse, we used the Yamaha FB01, which provided that Rhodes-like DX7 sound that people break out in hives over! It's only a matter of time, but some band will make a whole album using that sound, and you won't be able to find an FB01 because they'll be in such high demand!"

"The third verse features the Oberheim Cyclone, a genius piece of gear that has been totally overlooked because it came out in the late '80s, when sequencing and keyboard music was somewhat out of fashion. But it really is an amazing arpeggio sequencer," Manning continues. "Next we wanted to do

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a cheeseball country verse, so we whipped out a Chamberlin for the pedal-steel guitar track. The funny thing is that, in order play a keyboard like a pedal steel, you have to be able to bend the pitch the same way you would on the traditional instrument. So, we wound up riding the pitch control on the Chamberlin, bending it in real time. It was difficult to do but yielded great results."

For the "space boogie funk craze" verse (*their* term), the pair pulled out the Baldwin Fun Machine, which provided them with left-hand autochord patches and quirky drum sounds. "I like it a lot better than most late '70s and early '80s products," admits Manning. "It actually has a handful of synthesizer features that allow you to take traditional organ sounds and totally screw them up. You can get lots of thin, funky little sounds out of it. We also threw in a tuba track, which I played on a Steiner Synthacon, another very obscure keyboard."

Thanks to Dave Kean (owner of the Mellotron Archives and Kehew's former partner at Audities Studios), the two had access to one of the earliest Moogs ever made, the 3C. They employed the Moog 3C exclusively in "Hotel California" for the *Switched On Bach*–style verse, arranged by Kehew in homage to the pioneering work of Wendy Carlos.

"The intent was to take a verse and do something referential to early synthesizer recordings," explains Manning. "With a machine like the Moog 3C, the sky's the limit. Brian is a much faster programmer than I am, and I was very happy to let him do the *Switched On* verse by himself. He did a lot of comping between tracks. He'd record one take of a melodic passage and then do the whole section again on another track with a different melody. This way, when he put them together, we had a little diversity in the section."

For the signature guitar solo coda in "Hotel California," the pair chose a genre that they dubbed "Cheeseball Ska." Even though real guitars and guitar synthesizers do show up on the album (Wayne Kramer swings a Roland GR-700 on "Whole Lotta Love", and Lyle Workman mans a Roland GR-300 on "Rock And Roll All Night"), the trademark Eagles' solos were emulated on synths. Some synths, however, were routed through a variety of classic guitar pedals.

FUN KITCHEN APPLIANCES

For a band so devoted to vintage synths, Manning and Kehew have a wide variety of guitar pedals. Two of their favorites are from Electro Harmonix. "The Talking Pedal is sort of a wah pedal, but it sweeps frequencies that are the equivalent of vowel tones," says Manning. He also goes gaga for an obscure Electro Harmonix box called the Soul Kiss. "It's basically an envelope filter," he explains, "but you're in total control of it. It has a wire coming out with a little nodule on the end. Whatever comes in contact with this little pod—such as your hand, mouth, or ear—will provide the filter shaping and pitch shifting. I really have no idea how it works."

In addition to some Mutron and Maestro effects, the Cookbook also employs a variety of "cheap Japanese fuzz boxes and phase shifters," which they use in combination to achieve some wonderfully weird sounds. But it is still the keyboard synthesizer itself that puts these space-suited twins on the musical map.

Kehew says, "I love the Minimoog and the ARP 2600. None of today's

OUR FAVORITE PATCHES

Overtone Lead Patch

We used this patch throughout the new album, most notably in the second solo of Lynyrd Skynyrd's "Sweet Home Alabama." This is a simple patch that will create a dirty, buzzing lead tone that can rise into a higher pitch, resembling feedback.

First, set the filter to a middle/lower range and the resonance to 50 percent. Apply a little bit of modulation from the envelope generator to make the filter swell up and down. Put just oscillator B (transposed one octave up and slightly detuned) into the sample/hold mixer, and use a little of it to control the filter. Finally, step on the expression (control voltage) pedal to set the balance between the upper and lower tones. Experiment with various levels to get the best results.

Random Tone Pad

This is a beautiful effect that's barely audible under the bridge in "Ain't Talkin' 'bout Love." It's a stereo pad that pulses with subtle tone shifts on the beat.

First, patch a choral pad synth (a Korg Polyphonic Ensemble in our case) into the low-pass filter of an ARP 2600. Use a click track from the tape deck to trigger the sample/hold circuit, which controls the filter. At each click, the filter will jump to a new setting, making the chord pad randomly brighter and darker. Record this to tape as the left channel. Then repeat the process with a new random pattern going to the right channel. When played back, it creates a nice shifting tone that moves in stereo.

Dee-Da Patch

This is one of our favorites. It's a classic old sound from the '60s *Switched On Bach* era. It hasn't been used much since then, so we thought it would be cool to resurrect it. It's a simple sound but one that many keyboards can't reproduce. This works great on a modular synth, a Moog Sonic Six, a Yamaha CS15, or an ARP Odyssey. For some reason, the Minimoog modulation wheel stops just short of the octave needed to do this right.

It's basically a single-oscillator lead tone, with an octave trill, created by modulationg the oscillator with a square-wave LFO. The low and high frequencies of the square wave must be exactly one octave apart, and the LFO speed should be set somewhere between two and ten times per second. For variation, try changing the LFO trill speed with an envelope filter or a random sample/hold or key-range select.

—Brian Kehew

synths can match their tones. We both have older Minimoogs, but in general they *all* sound good. Each one of them has a different tone. I'm partial to polysynths with really good touch response—keyboard feel has a lot to do with getting a good track. The Rhodes Chroma, although hard to program, is also a great machine. The Prophet T8 is easy to program and runs rings around the Prophet V. And while the Synergy is limited, it's the warmest digital synth that I've heard. It responds well to dynamics, and its sounds are unique and distinctive. It's a wonderful instrument."

Kehew continues, "We also like the Moog Sonic Six. I can't recall anyone else ever using one on a record! It has better routing options than a Minimoog in addition to its two wild low-frequency oscillators, not to mention that it has possibly the coolest panel design I've seen on a keyboard. We based the artwork of our first album on the Sonic Six front panel and even included the original advertising brochure in there for fun!"

"We love spontaneous mistakes from the equipment and pray that they happen at a cool moment."
—Brian Kehew

And fun is, after all, what The Moog Cookbook are all about. Manning sums up the band's musical philosophy as anything goes, tempered with traditionalism.

"I believe you have to understand history, or you're doomed to repeat it. There's so much to learn from the past thirty years of music. It's important to continue to push the envelope but not lose sight of important songwriting and arranging techniques."

Paul Myers *is a Toronto-born guitarist, singer-songwriter, producer, and freelance journalist currently living with his wife and cat in beautiful San Francisco.*

DESKTOP MUSICIAN

Tuning Up Windows for Audio

What Microsoft forgot to tell you about its audio tools.

By David Roach

Microsoft's Windows NT 4.0 and Windows 95 have quite a lot in common, including similar audio subsystems and a nearly identical look and feel. Both operating systems come with an assortment of audio-related tools, though their use is not always obvious and Microsoft offers precious little documentation to enlighten the end user. To help get you up and running, this article will examine a number of the audio utilities on your system. Because the current consumer-grade audio cards are now reasonably quiet and useful for serious music production and it's even possible to install multiple sound cards in the same computer, it's worth knowing how to use Windows' audio tools to maximize your results.

If your computer is handy while you're reading this column, you'll probably get the most benefit by performing each step as it's explained. With few exceptions, all of the topics covered here should be available to you if you're using either Windows 95 or NT 4.0.

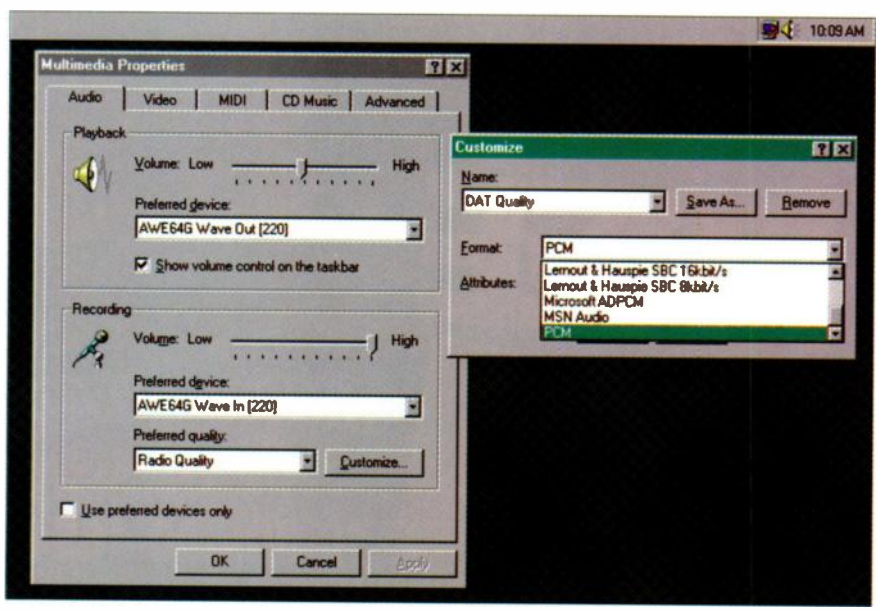


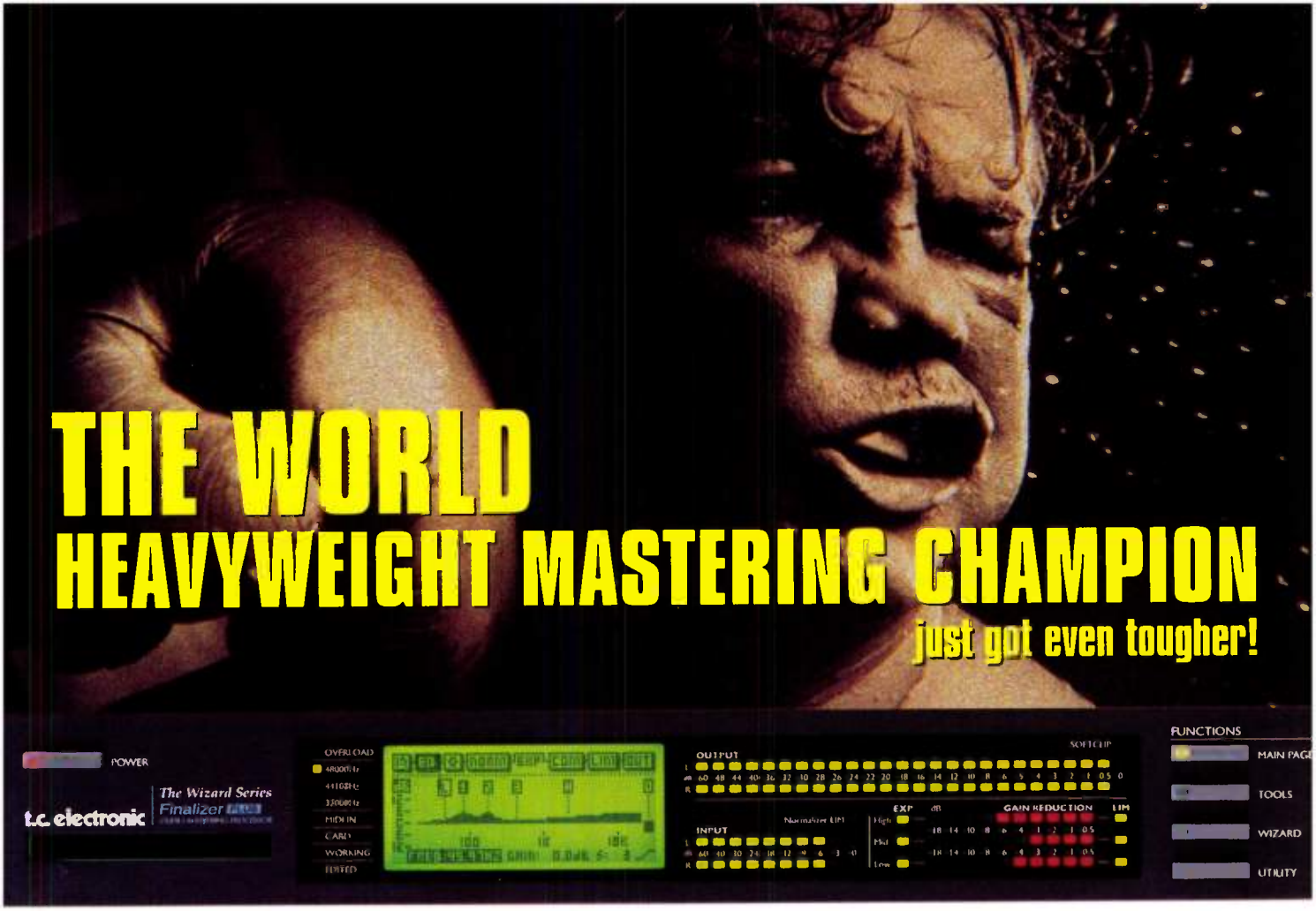
FIG. 1: Use the Customize dialog box to set the default recording quality. The drop-down list shows the various compression types. Notice the yellow speaker icon in the taskbar.

CONTROLLING THE MEDIA

We'll begin with the Multimedia option in your system's Control Panel. Double-click on the Multimedia icon and you'll see five tabs, labeled Audio, Video, MIDI, CD Music, and Advanced (Win 95) or Devices (NT).

The Audio tab enables you to set which sound card the system will use with its audio utilities. This is typically the only place you can specify a sound card or recording format for use with the different audio utilities.

If you have two sound cards in your system, you're probably aware that you can route audio in a multitrack program to either card. But when using Windows' own audio utilities, things can get a bit confusing. For example, look in the Audio tab and you'll see the option to set one of your cards as the "Preferred device." If the preferred



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device is in use when an audio utility wants to play a sound (such as a system beep), then Windows automatically chooses the next sound card in the list. (Of course, you won't hear anything unless each card is connected to a separate set of speakers or mixer channel!) That might be unacceptable in some situations, so to keep it from occurring, simply check "Use preferred devices only" at the bottom of the Audio window. Then if a sound can't be played by the preferred sound card, it is simply ignored rather than being sent to the second card and possibly ruining your session with extraneous sounds.

THE LITTLE YELLOW SPEAKER

If there's one thing you should do as a result of reading this column, it's enable the "Show volume control on the taskbar" check box in the Playback section of the Audio settings. This places a little yellow speaker icon next to the clock in the taskbar.

Clicking on the speaker icon with the mouse opens the preferred sound card's master Volume control and Mute check box. This slider controls the overall volume for the preferred sound card and won't affect any other sound cards in your system. Double-clicking the yellow speaker icon opens the Volume Control tool. We'll explore that in much more detail a little later.

Right-clicking on the yellow speaker displays a menu with the following choices: Volume Controls, which opens the Volume Control tool, and Adjust Audio Properties, which displays a copy of the Audio tab window without the rest of the Multimedia control panel. This can be handy if you want to quickly change any Audio default settings while working with your system audio tools.

The Audio Properties screen is also the place to set the default sound card for recording and to specify the default audio-recording format. You can create your own personal set of recording formats by clicking on the Customize button and naming a new format. Each recording format is a combination of a compression scheme (or lack thereof), a sample rate, a bit depth, and a number of channels (mono or stereo).

The Microsoft Compression Manager allows many different audio compression schemes to be installed, often without your knowledge (see **Fig. 1**). Most of these are only useful for low-bandwidth speech transmission. They sound pretty bad when used for music. You should select PCM, 44.1 kHz, 16-bit stereo for high-quality recording. Keep in mind that this will gobble up disk space at about 10 MB per minute.

WHERE'S MIDI MAPPER?

In Windows 3.1, the control panel that handled MIDI assignments was called MIDI Mapper. In Windows 95, it's simply called the control panel "MIDI," and you'll find it alongside the Audio tab in the Multimedia control panel.

MIDI Mapper hasn't really gone away, though. It appears in the list of MIDI output ports that can be chosen from a sequencer. Even though the words "MIDI Mapper" don't appear anywhere on it, the MIDI tab in the Multimedia control panel is used to control what is played when you select MIDI Mapper as a MIDI output device from inside your sequencer. The system audio tools, such as Media Player, always route their MIDI output to the MIDI Mapper.

If you select the Multimedia control panel's lower section, Custom Configuration, you can indeed map the channels of a MIDI signal to multiple devices. The Configure button opens the MIDI Configuration dialog box. It allows you to route, for example, MIDI channels 1 through 4 to one device, channels 5 through 9 to another device, and channel 10 to your favorite drum machine (see **Fig. 2**).

But what if your drum machine doesn't use the standard note assignments for General MIDI? In Windows 3.1 there were additional screens in the MIDI Mapper to accommodate this situation. They are gone in Windows 95, but if you have enough perseverance, there's a way to get around this obstacle. For some reason, Microsoft has decided that this kind of manipulation should be exclusively the domain of software programmers, so they created a demo utility called Instrument Definition File (IDF) Edit. It allows you to edit the IDF files that are produced behind the scenes when you create a custom MIDI configuration.

IDF Edit comes as part of the Win32 Software Development Kit, which Microsoft sells to developers as part of a $500 subscription. That makes the price a bit steep for most musicians. Fortunately, you can also download the Development Kit for free by going to premium.microsoft.com/msdn/library/devprods/vc++/vcsamples/f14/d19/s1b374.htm. Because this is in the Microsoft Premium Content area, you'll have to fill out a multipage questionnaire about which language you develop in and what kind of computer you have. Once you've filled everything out, you can download the software.

This package includes all the source code to build the IDF Edit program, but the only file that most musicians will care about is IDFEDT32.EXE. Once you've got it on your computer, double-click IDFEDT32.EXE to run the IDF editor, which will allow you to modify an existing IDF file. Although none are included with the download, you can find one on your hard drive called "general.idf" in the windows\config directory (see **Fig. 3**).

With IDF Edit you can reassign patch and drum-key numbers, mute channels, and specify which channels are for percussion. You can also create multiple IDF files and use them with different configurations. Keep in mind, however, that MIDI Mapper only works on a single MIDI port (16 channels) at a time, and only one instance of MIDI Mapper can be run at any one time.

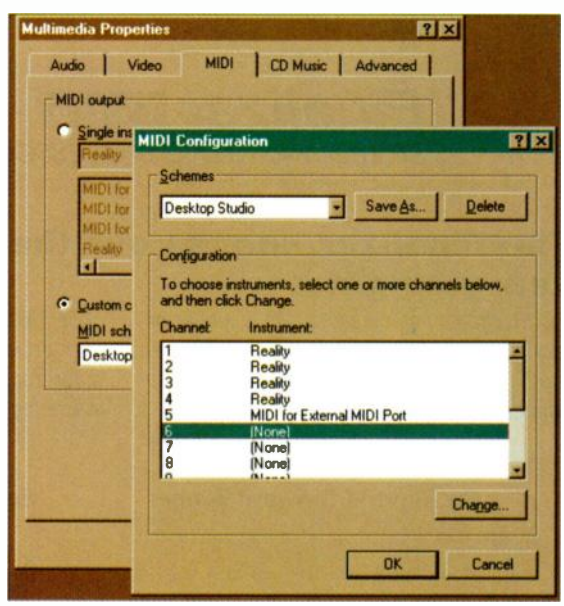

FIG. 2: The MIDI Configuration dialog box enables you to configure MIDI Mapper.

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DEALING IN VOLUME

Now that you know how to tweak your MIDI setup, let's get back to controlling the invisible analog mixer in your sound card. As mentioned earlier, the Volume Control tool is actually very powerful. Unfortunately, its usefulness is hampered by Microsoft's minimal documentation. Double-click on the yellow speaker icon that you set up earlier in the taskbar to open the Volume Control Mixer window. In the Options menu, select Properties. You'll then see a scrolling list showing the mixer channels that can be displayed.

Scroll down and make sure that all the boxes are checked, and then click OK. Now you'll see more sliders in the Volume Control window, some of which may be important to you. Next, uncheck any items that you know aren't in use. For example, if you don't have a CD player installed, there's no reason to display the CD slider. Be sure to mute it before you hide it to minimize noise in the mixer.

Now reopen the Properties dialog box, select Adjust volume for Recording, and click OK. You'll see a mixer panel showing all of your recording sources. Double-click on the yellow speaker icon yet again and you'll see the Volume Control mixer for playback in addition to the Recording Control mixer.

Close the Record mixer, move the Volume Control panel to one side of your screen, and double-click on the yellow speaker once more. You'll see another instance of the playback mixer. Arrange the screen so you can see both playback mixers. As you move a fader on one, you should see the corresponding control move on the other mixer.

Next, single-click the yellow speaker, and adjust the single Volume control that appears. You should see the master Volume faders of both playback mixers tracking your moves. Finally, go back to the Audio tab of the Multimedia control panel, and adjust the two volume controls you see there. Adjusting the Playback Volume control typically affects the Wave fader only. Adjusting the Recording Volume typically affects the line-input fader in the recording mixer.

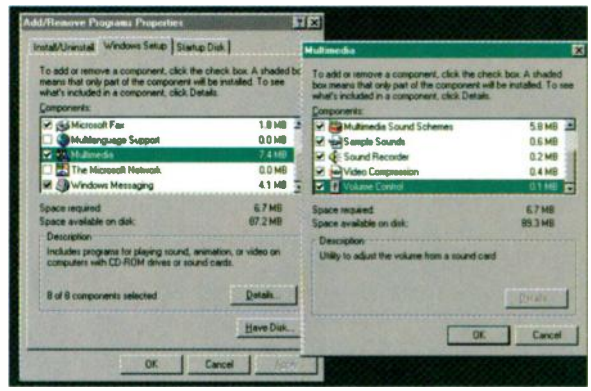

FIG. 4: Use the Add/Remove Programs control panel to install system audio tools that are missing.

Remember to mute any playback or recording channel that's not in use to prevent noise buildup. This can be especially critical on older sound cards or portable computers where the line and mic inputs can be quite noisy.

If you have multiple sound cards installed, go into the Properties dialog box of one of the playback mixers, and select a different mixer device from the list. Now you have a playback mixer displayed for each sound card. You can create as many mixer windows as you wish, each with a different view.

Now go to the Options menu in your Playback mixer, and select Advanced Controls from the Options menu. If you have any features on your sound card that aren't directly supported by the Volume Control tool, then buttons labeled Advanced should appear below those mixer channels. All kinds of sound card–specific features might appear here, such as microphone AGC (automatic gain control), treble and bass controls, reverb mute, and 3-D stereo effects.

Many sound cards are packaged with a custom volume control tool. (Something Microsoft does not have a monopoly on!) Typically, this tool will support the specific features of your sound card without resorting to the use of "advanced" buttons. Although you can't click on the yellow speaker icon in the taskbar to launch them, in most cases these utilities coexist nicely with Windows' own Volume Control tool.

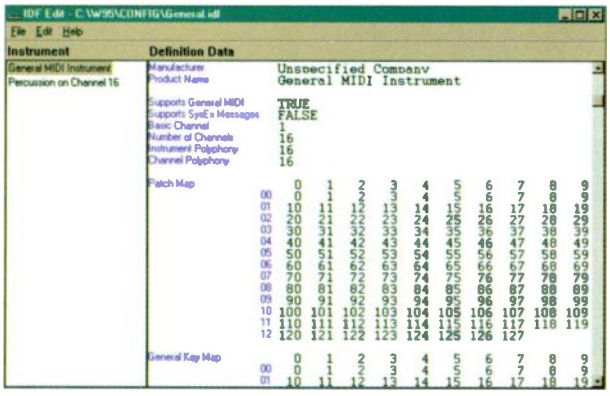

FIG. 3: The IDF Edit application allows you to edit Patch Map and Key Map settings.

SOUND RECORDER

The lowly Sound Recorder application has been around since Microsoft introduced the multimedia add-ons in Windows 3.0. Most professionals snicker at Sound Recorder, but it has its uses. For example, right-click on a WAV file in the Windows Explorer or in a File Open dialog box and a pop-up menu appears with a Play option at the top.

The Play command allows you to audition a WAV file *before* opening it. If Sound Recorder is not installed, however, you'll see Open at the top of the list instead. That usually opens the WAV file with Media Player. (You can also double-click on a WAV icon to open it directly in Sound Recorder if it's installed.)

Sound Recorder is handy for making quick recordings. If your default digital audio recording format is 44.1 kHz, 16-bit, stereo PCM, then recordings that you make with Sound Recorder will be just as good as those made with other, more powerful audio-editing applications. The built-in effects, however, are not pro quality.

MEDIA PLAYER

Media Player is a playback-only application that is used whenever no other application is available to play a multimedia file. When Windows is installed, Media Player is associated with all the various media types. Most sound editing and sequencing applications allow you to override this association when they're installed. So if you double-click on a MIDI file, for instance, your most recently installed sequencer is usually launched instead of the Media Player.

You can change these associations yourself in Windows Explorer. Select

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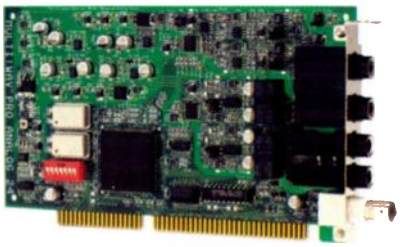

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Options in the View menu and then select the File Types tab. Next, select the file type that you want to make an association for, and click the Edit button. When the Edit File Type screen opens, you'll find a row of buttons near the bottom of the screen. Again, select the Edit button, and use the Browse button to find the application that you want to associate the file type with. A shortcut for this process is to highlight the file you want to associate in an Explorer window and right-click on it while holding down the Shift key. When you see the menu pop up, select Open With. Choose the program you want from the list, or browse to it using the Other option, and then check the box marked "Always use this program" to complete the association.

▼

The Volume Control tool is actually very powerful.

ADD/REMOVE PROGRAMS

Depending on the options that were selected when Windows was installed, some of the tools described in this column may not have been installed in your computer. You can install or uninstall them by opening the Add/Remove Programs option in the Control Panel.

Double-click on the Add/Remove Programs icon, and select the Windows Setup tab. Scroll down the list to Multimedia, and double-click on it. Click on the Details button and you can see all the utilities Windows provides. Choose the ones you wish, but be careful; if you uncheck something that's already installed, it will be uninstalled when you click OK (see **Fig. 4**).

MORE TO COME

Around the middle of 1998, Microsoft should release Windows 98, which will include a completely new, mostly digital audio subsystem, and numerous elements of your audio configuration will change yet again. Unfortunately, many aspects of this new subsystem are intended for delivering, not creating, digital media. As a result, several areas of the new audio subsystem will likely produce greater triggering delays than Windows 95, which could have an impact on real-time applications such as sequencers. This means software manufacturers will have to resort to the same time-consuming, guerilla programming tactics that they have used in the past to get around these particular limitations.

Windows NT 5.0 will probably arrive in late 1998 or early 1999, and it will also have the new audio subsystem. The good news is that the new Windows 98 driver model is supposed to work on both Windows 98 and NT 5.0. That should accelerate the drive to NT by MIDI hardware and software manufacturers. The bad news is that we'll all have to learn a whole new way of doing things. Let's hope that Microsoft does a better job of documenting its audio features next time around.

David Roach *develops professional software-based synthesizers for Seer Systems, Inc. In a previous life, his left hand was a reggae bass player, while his right hand played New Orleans second-line piano.*

RECORDING MUSICIAN

Organizing Your Studio

Don't let "gear pandemonium" spoil the audio task at hand.

By Brian Knave

It used to be that tidiness was considered a virtue. But thanks to slacker style and the aesthetics of grunge, the slovenly have acquired sex appeal. On the cultural front at least, unkempt is cool—and fastidious a bore. Rather than celebrate the shipshape, we eye the too tidy suspiciously, whispering epithets like "neat freak" and "anal retentive."

That's fine, of course, if you're only sniggering about how meticulously someone folds clothes or labels spice jars. But in the recording studio, tidiness is still a virtue. In fact, if you expect to turn out quality mixes in a timely fashion, a tidy, well-organized work space is practically a prerequisite.

DMITRY PANICH

Of course, good housekeeping skills don't come easily to everyone. I recently did some tracks in a personal studio where the mixer (a 24-channel, 8-bus model) was balanced precariously on a narrow shelf, *sideways* to the monitors, and held in place with bungee cords. Moreover, the monitors were wall mounted at a height of nearly seven feet and aimed straight out into the room. Elsewhere, chaos ensued. You could hardly move without knocking something over, and the whole mess was connected by spaghetti lumps of unlabeled cables.

Although I would hope that that studio bore scant resemblance to the average **EM** reader's, I've put together some tips for studio organization—just in case. As we'll see, good studio organization is more than just ergonomics and tidy cabling; it ultimately affects productivity *and* sonic quality.

THREE IDEALS

Let three ideals guide you as you organize your studio: efficiency, comfort, and optimal sound. To increase efficiency, arrange gear logically, which is to say, in accordance with its function. Comfort means having things set up to best accommodate freedom of bodily movement (thus ease of operation) as

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well as your own style of working. That way, the creative ideas can flow unimpeded by equipment concerns.

At the same time, it's important to arrange things to minimize noise in the system. Obviously, of the three ideals, this is the most important; fortunately, it is easiest to come by when everything, including you, has its designated place.

SWEET SPOT SETUP

Start with the mix area. The chair you sit in while tracking and mixing should be positioned at a comfortable height, centered in front of the mixer (or computer screen) and directly between the audio monitors so that your head and the monitors form an equilateral triangle (see **Fig. 1**). That is, if the monitors are three feet apart, the best monitoring position is three feet back from each and directly between (assuming that you employ close-field monitors).

Also, make sure the monitors are aimed on a horizontal plane with your ears. Ideally, this should be a level plane, to minimize reflections from the console, floor, and/or ceiling. If the monitors have to be mounted slightly higher than your head, tilt them so they point to ear level.

IMMEDIATE PERIPHERY

Position your most-used gear on either side of (or above or below) the mixer and mix area. That might mean putting your keyboard controller on one side of the mixer, your drum controller on the other, and your MDMs below. If you mix with a computer-based hard-disk recording system, try to position your computer monitor and keyboard between the audio monitors so you don't have to turn your head while working onscreen. If your system combines computer-based recording with an MDM and outboard mixer, you may have to decide whether it's more important to listen while facing the computer monitor or the mixer.

Whatever your needs, think symmetry and ease of operation. Efficiency is the goal, so be logical based on your system's components and your method of working. Well-designed studio furniture can be a real boon to good organization because it helps eliminate clutter, and it minimizes problematic reflections and resonances (see **Fig. 2**).

BIRDS OF A FEATHER

Group and rack outboard gear by type. Where you put each group is a matter of preference but should reflect your working style. For example, I group my dynamics processors in one rack and my effects processors in another. Either group can be accessed from the mix position, allowing me to hear the effect of the processes as I tweak. As for sound modules and MIDI gear (interface, sync box, merger, etc.), I group them between my drum and keyboard controllers for convenient access.

If you use the computer and MIDI to edit and automate your synths and effects, you can put these devices at a remote location and reserve the area near the mixing station for non-MIDI devices. If you use synths and samplers that have disk drives or fans, you can stash this noisy gear, along with your power amps, CPU, and drives, in a separate room or machine closet. (A machine closet is basically a soundproof, ventilated closet for storing noisy gear. For more information, see "Getting Away From it All" in the February 1997 **EM**.) If you must have power amps in the control room, be sure to position them well away from other gear to reduce noise and heat transference.

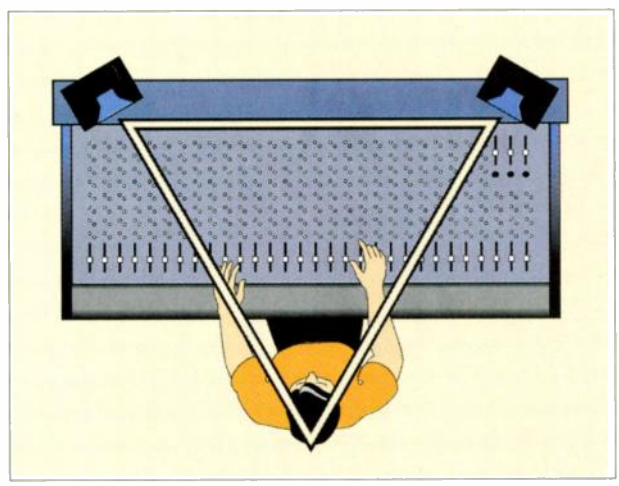

FIG. 1: To monitor accurately with close-field monitors, position the speakers so as to form an equilateral triangle in which your head is one corner of the triangle.

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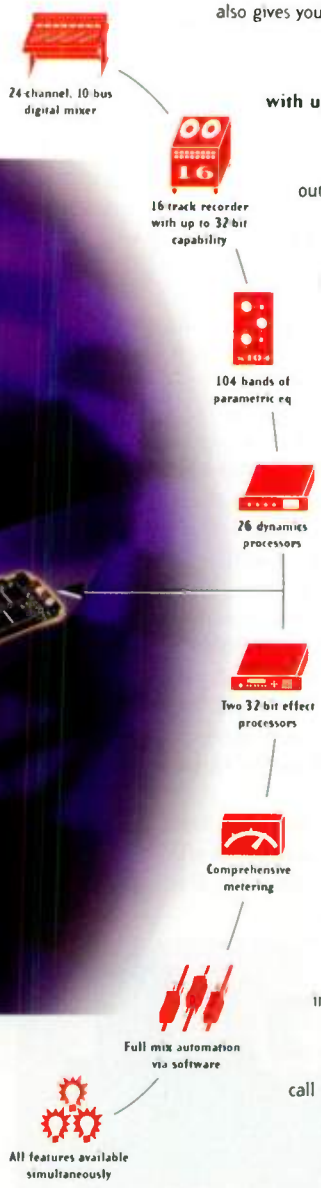

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For the recordist who also performs, a ready-to-go "gig rack" can save time, effort, and money. For example, a keyboardist's gig rack might include sound modules, a line mixer, and a MIDI interface. Install a patch bay and electrical strip in the rear of the rack and configure everything so you can quickly patch the racked gear into your live or studio setup. This violates the "birds of a feather" rule, but it provides efficiency of a different sort.

DOCK OF THE BAY

Audio patch bays are a primary ingredient of studio efficiency and also increase routing flexibility. However, it's difficult to make general recommendations because there are many different ways of setting them up. The usual approach is to group all the patch bays together into a central bay near the mixing station so you can patch individual pieces in and out as required for each situation.

You also can put a bay in the rear of each rack so that you don't have to reach into racks to access individual jacks. Then, using snakes, connect these bays to the central group of patch bays. However, this increases the number of connectors and cables in the signal path. (For more information about patch bays, see "Recording Musician: The Patch Bay" in the May 1992 **EM**, "Square One: Patch Me Through!" in the September 1995 issue, and "Recording Musician: Patch-Bay Profiles" in the June 1996 issue.)

Obviously, MIDI patch bays are also extremely useful, if not essential, in studios that use MIDI gear extensively. Use colored MIDI cables or label same-colored ones to help keep track of routing.

TIDY CABLING

Three types of cables inhabit most studios: audio cables (mic, line, and patch cords), digital cables (AES/EBU, MIDI, computer serial, etc.), and power cables. The main rule is to keep audio and power cables separated because power cables can induce hum into audio cables. Problems are much more likely if the cables' shielding is inadequate.

Although less critical than with audio cables, it's nevertheless wise to keep digital cables away from heavy-duty AC power sources to avoid the outside possibility that the bitstream could be affected by the power cables' magnetic fields. It's usually not terribly critical to keep digital cables away from audio cables, but it's still a good idea where possible; if nothing else, it makes troubleshooting easier.

For groups of cables, use snakes or bundle your own with tape, cable stays, twist ties, or whatever. Snakeskin, made by American Recorder Technologies, provides an especially elegant way to bundle cables.

Power cables, too, can be bundled where appropriate. On the back of a rack, try running all the power cables down one side and audio cables down the other. If you must cross the two, do so perpendicularly (like a cross) rather than parallel, because this will help minimize induced noise. For obvious reasons, take special care to keep monitor cables away from power cables.

Another helpful hint: when running power cables from a rack to a power conditioner or outlet strip, insert the cables in order (sequentially) so that top to bottom of the rack goes left to right (or vice versa) on the strip. Then, make a schematic of the strip showing which piece of gear is plugged into which outlet. Knowing at a glance where each piece of gear is plugged in greatly streamlines troubleshooting, removal, and installation.

Wall-wart AC adapters present a particular challenge to tidy cabling. One solution is to plug all wall warts into an electrical strip especially designed to accommodate them. (The outlets are positioned perpendicular to the length of the strip and provide extra space between.) These are available from many computer and hardware stores. Another approach is to plug each wall wart into a very short extension cable, effectively converting the adapter into a "lump in the line" type.

Don't forget to secure your cables to floor or walls. Duct tape is a favorite method for anchoring cables, but if you have to run cables along walls or across an area where there will be foot traffic, you may want to use cable bridges. These can often be obtained from vendors of computer-network cable as well as from professional audio dealers.

MIC CABLES

To increase efficiency, patch mic cables from mic preamps (console or outboard), run them to the most-used areas of the studio, and leave them set up. Use different colors of colored tape to mark each end of each cable. That way, you can tell with a glance where each mic signal is coming from.

A tidier, though more costly, solution is to use a snake terminating in a junction box. Then simply number each cable for quick reference. The

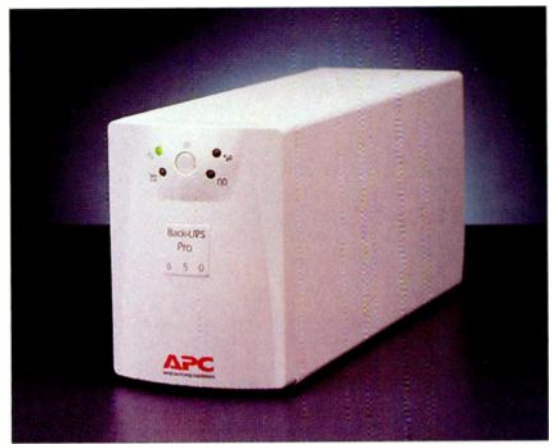


FIG. 3: An uninterruptible power supply is advisable for computer-based hard-disk recording systems. The APC Back-UPS Pro 650 provides voltage regulation, full-time surge protection, EMI/RFI filtering, and eighteen minutes of backup power.

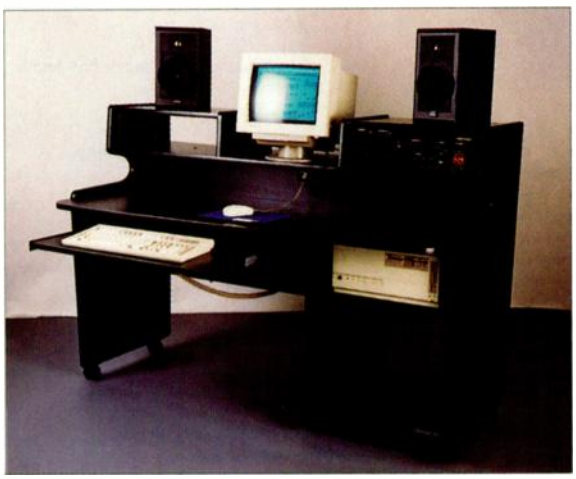
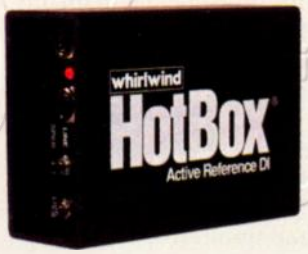


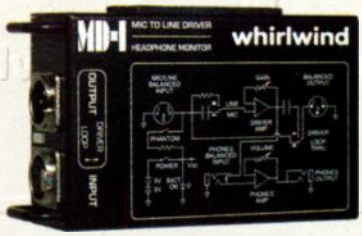
FIG. 2: Well-designed studio furniture can greatly simplify studio organization. Pictured is the ProStation Jr. by Omnirax.

For manufacturer information, please see Contact Sheet, p. 163.

THE GOOD STUFF.



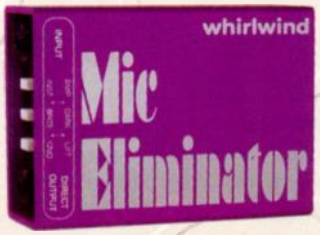
Professionals rely on industry-standard tools from Whirlwind to protect each performance and recording from the frustrating failures and poor sonic results of second-rate components. Built to provide consistent superb results through years of tough use, these products are what sound specialists buy when they can buy what they want — *the good stuff.*



The Hot Box™ is Whirlwind's top-of-the-line DI for sending your pure guitar sound direct to the mixer. The ultra-high input impedance, super-wide bandwidth and vanishingly low noise mean you won't find better sonic performance anywhere.

The Director® is a premium quality DI box with an input select for instrument or amp/preamp, a ground lift switch, and a filter to roll off amp noise.

The IMP® 2 brings a high-quality DI to musicians on a budget. Rugged, good sounding, with a ground-lift switch.



The Mic Eliminator® is a specialty DI that takes your direct guitar, amp, or preamp signal, and adds the clean sound of a classic SM57 + Jensen 12" mic + speaker setup for that famous "miked" sound without the mic.

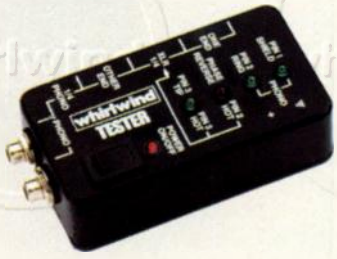
The Selector® switches one instrument to two inputs or two instruments to one input using a patented totally silent Whirlwind switching circuit.

The MD-1™ is a battery powered studio-quality mic preamp with a transformer isolated line driver output and a built-in headphone monitor. The heavy steel box, 18V phantom power and transformer isolation make it a favorite with sports broadcasters.

The MicPower® is a convenient portable phantom power supply that operates from two standard 9V batteries to power condenser mics.

High Performance PM Tubes® are manufactured for Whirlwind using the latest techniques and specialty metals. If you own a tube amp or effects device, listen to the difference these tubes will make.

The Qbox® is an all-in-one battery powered audio line tester. It includes a built-in mic, speaker, tone generator, headphone amp, and voltage detect LEDs for verifying phantom or intercom power.



The Tester is the industry's favorite continuity tester, detecting shorts, opens, or cross-wiring on cables with virtually any combination of XLR, 1/4", and RCA phono connectors.

whirlwind™

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junction box can be wall mounted in the recording room or, in a one-room studio, simply positioned on the floor.

To further increase setup speed, I leave a mic cable attached to each mic stand even when not in use. These, too, are color coded, so when I'm setting up for a session, I simply match the colors of the mic-stand cables to those taped on the floor.

LABELING FRENZY

Audio patch bays should be labeled on the front panel. If writing on the patch bay itself (in those absurdly small white boxes), use pencil so you can erase and relabel at a later time. An easier and tidier solution is to use patch-bay designation strips. These are available from most cable manufacturers as well as from Black Audio Devices.

Label each end of all cables. One way is to wrap white tape around the connector and write the name or number of the box (or an abbreviation) on the tape with a felt-tip marker. You should also label media of all sorts. The more clearly everything in your studio is identified, the more smoothly all of your sessions will go.

POWER ISSUES

Clean power is fundamental to quality music production, and so is proper power distribution. Don't just daisy-chain a dozen common power strips off of one outlet, or you will invite overloads and possibly fires. To the extent possible, you should use power-distribution systems, including line regulators and uninterruptible power supplies, which are available from such companies as Furman Sound, Juice Goose, Tripp-Lite, and American Power Conversion (see **Fig. 3**). (For further information on studio power and grounding, see "On Solid Ground," parts 1 and 2, in the September and October 1992 issues of **EM**.)

KEEP TRACK

Keeping records is critical to efficiency in the studio and can be done via hard copy, computer files, or both. Hard-copy track sheets can be photocopied from the back of many mixer and recorder manuals (including Mackie 8•Bus and Alesis ADAT XT manuals) or can be drawn up based on individual needs. My selection of track sheets includes some drawn with circles representing EQ, pan, and aux knobs so I can jot down settings and routing configurations used during important sessions.

In addition to track sheets, keep records of patch-bay designations, gear purchases, and customer accounts. (For more information on studio record keeping, see "Recording Musician: Hard Copy" in the November 1995 **EM**.)

NEAT-FREAKS, UNITE!

A friend watching me track and mix recently remarked that I seemed awfully "anal" about the process. Rather than be offended, I took the remark as a compliment. The dishes may pile up in my sink, the clutter may obscure my desk, and months may pass before I finally break down and vacuum the carpet. But when it comes to recording, I'm a fussbudget of the first order.

And why shouldn't I be? After all, it's the music that's at stake—and what could be more important than that?

Assistant Editor **Brian Knave** *has been accused of far worse than being a neat-freak.*

DOWNLOAD IT NOW !!!

WWW.PGMUSIC.COM

You can order & download PowerTracks Pro Audio, Band-in-a-Box & many other PG Music products immediately at http://www.pgmusic.com

Now with Digital Audio

PowerTracks Pro Audio 4.0™

INTEGRATED DIGITAL AUDIO & MIDI SEQUENCER FOR WINDOWS

$29 New Version. Cool Features. Same Low Price!

"Solid sequencing at an unbelievable price" **Electronic Musician**

POWERTRACKS PRO AUDIO 4.0 is a professional, fully featured digital audio & MIDI workstation, packed with features for musicians, students & songwriters. With seamlessly integrated digital audio/MIDI recording, & built-in music notation, PowerTracks turns a typical soundcard equipped Windows PC into a music production powerhouse!

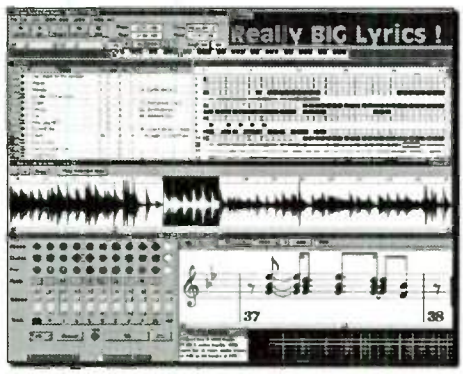
48 Track Digital Audio Recording Studio with Real-time effects & audio plug-ins!

You can record up to 48 tracks of CD quality audio (vocals, guitar, etc) or MIDI using your soundcard & microphone.

- Real or punch-in record.
- Choose either 22K or 44K (CD) 16 bit sampling rates.
- Audio effects included: panning, volume, reverb, chorus, delay, EQ, gain & more!
- Edit audio in Wave window using cut, copy, paste, merge, de-glitch, etc.
- Import/export Wave files.
- Supports audio plug-ins from PG Music, 3rd parties, or program your own!
- We include sample source code for audio plug-ins that you can use as a template for your own.

Professional MIDI Sequencing

- Real/step/punch record, sound-on-sound
- MIDI file support (Type 0 & 1)
- sync (SMPTE, MIDI time code, MIDI)
- edit (quantize, cut, copy, paste, undo, data filters, transpose)
- multi-port support
- up to 960 ppq timebase
- sys-ex editor-librarian
- patch names, banks & much more.



Deluxe Windows interface

Multiple Windows: notation, audio, tracks, bars, staff roll, event, meter, tempo, guitar fretboard, piano keyboard, Big Lyrics & more.

Programmable

Programmers can extend the audio or MIDI features of PowerTracks using the language of their choice (C, Visual Basic, Delphi) using EXE or DLL files. Customize PowerTracks to your needs, or purchase 3rd party add-ons.

Music notation & printout

- Enter, edit, display music in standard music notation.
- Chord symbols, lyrics & Karaoke style 'Big Lyrics window.'
- Intelligent/automatic features such as: correct beaming, tying of notes, minimize rests option, "Jazz" eighth notes option (this automatically allows jazz swing eighth notes & triplets to be notated properly – jazz musicians love our notation!)
- Notation scroll-ahead. Intelligent accidentals.
- Reads in any MIDI file & display any track as notation!

Exciting Features not found in other sequencers

- On-screen piano keyboard & guitar fretboard shows notes as they are played. Notes highlight on notation as played.
- Enter/print out chord symbols in notation. Reads in chord symbols from Band-in-a-Box MIDI files.
- Comprehensive support for guitar (on-screen guitar, fretboard, tab display & printout, display & MIDI track on guitar fretboard)
- Karaoke Style Lyrics window.
- Automatic drum tracks (100 drum styles included).
- Built-in Roland Sound Canvas Editor.
- Juke box playback. Play a set of songs, either by simply specifying a "wildcard" like c:\songs*.* or specify a specific set of songs. Option for random or sequential playback.

☺ CD-ROM video training included!

"**PowerGuide**" CD-ROM included with comprehensive on-line video tutorials outlining program installation, driver setup, playback/recording tutorials, working with audio effects, programming & much more!

MULTITRACKS™ Play along CD-ROMS available!

- Jazz MultiTracks™ CD-ROM
- Blues MultiTracks™ CD-ROM
- Rock MultiTracks™ CD-ROM
- And more!

We've recorded top studio musicians in Multi-Track Digital Audio .WAV file format. These are full songs (4-5 minutes), with each instrument (bass, drums, piano & guitar) recorded in audio on a separate track. Play the files directly from the CD using PowerTracks, or load them into PowerTracks for further editing. Each CD comes with 10-20 songs, each 4-5 minutes – over one hour of music! These are great for listening, practicing, or to use as bed tracks for further production.

Customers love PowerTracks!

"Killer Software"
"Intuitive and powerful"
"I love the notation"
"Other packages just don't compare"
"Incredible features and easy to use"
"Totally unbelievable – I love it"

30 day unconditional money back guarantee!

POWERTRACKS PRICES

PowerTracks Pro Audio 4.0 ..... $29
Contains PowerTracks Pro Audio & CD-ROM video training

Upgrade to PowerTracks Pro Audio 4.0 ..... $19
(from any previous version of PowerTracks)

ADD-ON MULTITRACKS AUDIO CD-ROMS

Jazz MultiTracks CD-ROM $19
Blues MultiTracks CD-ROM $19
Rock MultiTracks CD-ROM $19

Special! PowerTracks PowerPAK $49
The PowerPAK is PowerTracks Pro Audio, CD-ROM video training plus all 3 MultiTracks CD-ROMs. 5 CD-ROMs included.

Upgrade to PowerTracks PowerPAK $39
(from any previous version of PowerTracks)

SYSTEM REQUIREMENTS: Windows 95, 98, NT or 3.1. 8mb RAM. Digital Audio features require fast 486 or Pentium, any Windows compatible 16 bit soundcard (e.g. SoundBlaster 16, AWE32, AWE64, Ensoniq, Yamaha, etc.), and 20 mb free hard drive space. MIDI and other features require 386, MIDI interface or sound card, CD-ROM drive and printer (optional).

WINDOWS 95 NT & 3.1 FRIENDLY

PG MUSIC INC. *Maker of PowerTracks, The Pianist series & Band-in-a-Box*
266 Elmwood Avenue Suite 111 Buffalo NY 14222
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BAND-IN-A-BOX™

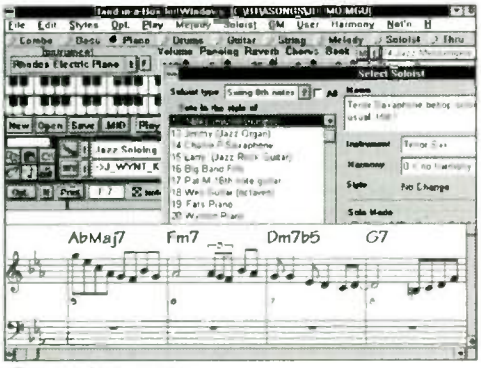
VERSION 7.0 FOR WINDOWS & MACINTOSH

Intelligent software for IBM (Windows/DOS) & Macintosh*

(NOTE: ATARI Band-in-a-Box available only in Ver. 5)*

Version 7 for Windows & Macintosh is here. Automatic Accompaniment has arrived!

Type in the chords to any song, using standard chord symbols like C or Fm7b5, choose the style you'd like and Band-in-a-Box does the rest... Automatically generating professional quality five instrument accompaniment of bass, drums, piano, guitar & strings in a wide variety of styles.



Windows version shown above

100 STYLES INCLUDED WITH PRO VERSION. *Jazz Swing • Bossa • Country • Ethnic • Blues Shuffle Blues Straight • Waltz • Pop Ballad • Reggae • Shuffle Rock • Light Rock • Medium Rock Heavy Rock • Miami Sound • Milly Pop • Funk • Jazz Waltz • Rhumba • Cha Cha • Bouncy 12/8 Irish • Pop Ballad 12/8 • Country (triplet) • and 75 more!*

BUILT-IN SEQUENCER ALLOWS YOU TO RECORD OR EDIT MELODIES.

BUILT-IN STYLEMAKER™. *You can create your own 5 instrument styles using the* ***StyleMaker*** *section of the program.*

SUPPORT FOR OVER 70 SYNTHS BUILT-IN. *Drum & patch maps included for over 70 popular synths. General MIDI, Roland GS & SoundBlaster soundcard support included.*

STANDARD MUSIC NOTATION *and leadsheet printout of chords, melody and lyrics. Enter your songs in standard notation & print out a standard lead sheet of chords, melody and lyrics.*

AUTOMATIC HARMONIZATION. *You can select from over 100 harmonies to harmonize the melody track, or harmonize what you play along in real time. Play along in "SuperSax" harmony, or harmonize the melody with "Shearing Quintet". Create your own harmonies or edit our harmonies.*

NEW! Additional features in Version 7.0

Band-in-a-Box 7.0 for Windows & Macintosh breaks new ground with over 60 new features!

Band-in-a-Box 7.0 is here! This major upgrade includes over 60 new features. We've added a an amazing new feature called "Automatic Soloing". Choose the type of soloist you'd like (from 100 available) and the program creates and plays a solo in that style, along to any song! Or create your own soloists. This is hot! These solos are of the highest professional quality, rivaling solos played by great musicians! And there's lots more in 7.0 – improved notation, step time/notation edit of StyleMaker patterns, scroll ahead option for notation, improved synth support, over 60 new features in all!

OUR CUSTOMERS LOVE VERSION 7.0! ***"Wow! The soloing sounds amazing... how can it do that?" "I love the notation improvements." "Another winner – thanks!" "You guys have added everything I wanted."***

NEW! Add-ons for Band-in-a-Box Version 7.0! Jazz, Rock & Bluegrass Soloist Disk Sets

- **Soloist Disk Set #2: "Killer" Jazz Swing Soloing $29**
- **Soloist Disk Set #3: Specialty Jazz Soloing $29**
- **Soloist Disk Set #4: Rock Soloing $29**
- **Soloist Disk Set #5: Bluegrass Soloing $29**
- **Bluegrass MIDI-FakeBook (50 songs) $29**

An exciting aspect of the Soloist feature in Band-in-a-Box Ver. 7 is that the program is able to increase its musical intelligence by analyzing new solos it is exposed to. It learns by "ear" and constantly gets better and better! Then the Soloist can incorporate the soloing we expose it to into its own playing. We've now created brand new soloist KnowledgeBases with dramatically enhanced results. We've created stunning new soloists in the jazz, rock and Bluegrass styles, and are offering them as new Soloist Disk Sets for Band-in-a-Box 7. The packages include **bonus styles** (some also include demo songs) to augment your BB with your favorite types of music.

SOLOIST PAK ALL 4 Soloist Disks + Bluegrass MIDI-FakeBook on disks or CD-ROM $99

Bluegrass MIDI-FakeBook 50 Bluegrass standards with chords & melodies performed on MIDI guitar by Bluegrass virtuoso **Marty Cutler**.

NOTE: Soloist Disk Set #1 is included with Band-in-a-Box 7.0 and upgrade, so is not offered as an add-on.

BAND-IN-A-BOX PRICES

NEW CUSTOMERS (IBM/Macintosh/Atari*)

Band-In-A-Box Pro *(first time purchase)* $88
Version 7, Styles Disks 1-3, Harmonies Disk 1 + Soloists Disk 1

ULTRAPAK *(first time purchase. Also available on CD-ROM)* $189
The UltraPAK includes Pro version 7, Styles Disks 1-8, Harmonies Disk 1 + Soloists Disk 1 (ATARI available only in Version 5)*

ADD-ONS

Styles Disk #4 ..... $29
Styles Disk #5 ..... $29
Styles Disk #6 ..... $29
Styles Disk #7 ..... $29
Styles Disk #8 *(included with Version 7 upgrade)* $29
MIDI-FakeBook *(100 songs on disk)* $29
Bluegrass MIDI-FakeBook (50 Bluegrass standards on disk $29
Soloist Disk Set #2 - "Killer" Jazz Swing Soloing $29
Soloist Disk Set #3 - Specialty Jazz Soloing $29
Soloist Disk Set #4 - Rock Soloing $29
Soloist Disk Set #5 - Bluegrass Soloing $29
Soloist Pak - All 4 Soloist Disk Sets + Bluegrass MIDI-FakeBook $99
NOTE: Soloist Pak available on disks or CD-ROM. Soloist Disk Set #1 included with Version 7 upgrade.

UPGRADES

Regular Upgrade to Version 7 *(for Windows & Macintosh)* $49
Includes Styles Disk 8 + Soloists Disk 1. Upgrade from Version 6

Complete Upgrade to ULTRAPAK *(also available on CD-ROM)* $89
Includes Styles 1-8 (these are all the Styles Disks we have made for Band-in-a-Box!)

MEMORY REQUIREMENTS: DOS (640K), Windows (8 mb), Macintosh (8 mb), Atari (1040)

HELP! *I Forgot to send in the Registration Card, but I want to upgrade now!! No problem. Since the upgrade checks for any previous version of Band-in-a-Box, you can order the upgrade even if you forgot to register! Or register & order online at http://www.pgmusic.com*

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Mac OS

WINDOWS 95 3.1 & 3.11 FRIENDLY

Hot new software programs created by PG Music!

NEW! The Pianist Vols. 4&5 · The Modern Jazz Pianist · The Latin Pianist · The Irish Pianist · PowerTracks Pro Audio 4.0 · The Blues Pianist · The Bluegrass Band

THE PIANIST SERIES

WINDOWS • MACINTOSH ATARI • DISKLAVIER

Each program contains piano music performed by world-class pianists, **PLUS** memos, trivia questions, biographies, Guess the Song games & more. They are ideal for learning to play piano, or for background music while you use other programs. Windows versions also display & print standard music notation & chord symbols for pieces. They are available for WINDOWS, MAC & ATARI, & are also available in Yamaha Disklavier & Roland SoundBrush format.

NEW! The Modern Jazz Pianist™ $49

Top Modern Jazz Pianists play over 50 tunes in Modern Jazz styles! Jazz/studio pianists Renee Rosnes, Miles Black, Ron Johnston and Brad Turner play over 50 tunes in a wide variety of Modern Jazz Piano Styles. Emulating styles made famous by Herbie Hancock, Fred Hersch, Cedar Walton, Mulgrew Miller and more. Full of info on the masters of Modern Jazz Piano! Includes player program to see/study the music using notation and on-screen piano.

NEW! The Latin Pianist™ $49

Over 50 "Latin" and "Salsa" piano and trio pieces by famed Latin pianist Rebeca Mauleon-Santana (editor of Hal Leonard Music's Latin Real Book). Including authentic Latin/Salsa piano songs and styles including Conga, Cumbia, Merengue, Son, Mambo, Cha-cha-cha, Guaracha, Samba, Partido Alto, and more. Includes player program, song memos, descriptions/analysis of styles and real-time piano score.

NEW! The Irish Pianist™ $49

Great Piano Performances of over 50 old and new Irish piano styles by top Irish pianist, Pat Crowley. Including traditional styles like jigs, reels etc. and newer styles popularized in "RiverDance." Includes pictures of Ireland, song memos, biographies and information on Irish music. Over 3 hours of music.

Nearly 900 of the world's most popular classical piano pieces, performed by world-class concert pianists! per volume **$49**

Moonlight Sonata, Sonata Pathétique, Minute Waltz, Claire de lune, Mephisto Waltz, Hungarian Rhapsody, Fantasie Impromptu, Military Polonaise... 900 in all!!!

PLUS... Music Trivia Game, "Guess the Song", program notes, biographies, music dictionary (on disk) & more!

OUR CUSTOMERS LOVE THE PIANIST...
"Incredible... amazing... terrific... masterful... fabulous... love it... my favorite program!"

NEW! The Pianist Volume 4

We've added 200 fabulous selections to The Pianist program. Along with the companion volumes, there are nearly 900 of the world's classical masterpieces available in The Pianist series! More music by your favorite composers includes Haydn, Mozart, Liszt, Debussy, Fauré, Schumann & Schubert. Now listen to the complete Mozart Piano Sonatas, Chopin Etudes, Preludes, Ballades & Scherzi, Schumann Carnaval & Album for the Young (complete), Debussy Preludes (complete) & much more! **INCLUDES** ALL NEW Program Notes!

NEW! The Pianist Vol. 5 • Beethoven Sonatas

For the first time, **ALL 32 Beethoven Piano Sonatas** are available in NEW "must have" MIDI performances for The Pianist program. The greatest sonatas ever composed for the piano, have been performed by world-class pianists for your study & enjoyment. **INCLUDES** program notes about the sonatas!

Volume 1 (215 selections) • Volume 2 (200 selections) • Volume 3 (170 selections) Volume 4 (200 selections) • Volume 5 (complete Beethoven Piano Sonatas)
Each volume $49 • Volumes 1-3, $99 • Volumes 1-5, $149

The Jazz Pianist™ $49

This program makes it "too easy" to learn to be a great jazz PIANO player!

Top jazz/studio pianists play 60 jazz standards in a wide variety of styles.

Hear the music with CD-quality through your sound card or MIDI system. Most pieces have bass/drums as well as piano so you get a full sounding jazz trio for the tunes! Jazz Trivia game & Guess the Song game, program notes, biographies & music dictionary (all on disk).

The Jazz Pianist Volume 2

Volume II upgrade - $49 (requires The Jazz Pianist) • first time purchase: Volume 1 & 2 - $98
60 more fabulous jazz standards for Volume 2, complete with new program notes and biographies!

The Ragtime Pianist™ $49

Over 90 ragtime & early jazz piano standards, played on MIDI keyboard by top Ragtime Pianists... and featuring world-renowned Ragtime performer JOHN ARPIN!

Hear virtuoso performances of every Joplin rag in this program, as well as many other rags, CakeWalks, waltzes & other Ragtime Era tunes by Eubie Blake, Joseph Lamb, Daniels and, of course, Scott Joplin.

The New Orleans Pianist™ $49

Over 60 "New Orleans Style" piano music standards, played on MIDI keyboard by top New Orleans pianists Henry Butler, Jon Cleary, Tom McDermott, Joel Simpson & David Torkanowsky playing a wide variety of New Orleans, R & B, Blues & Ragtime piano music.

The Gospel Pianist™ $49

Over 50 Gospel style piano pieces played on MIDI keyboard by top Gospel pianists Louise Rose, Davell Crawford, Henry Butler, Sam Berfect, Derrick Bethune, Joel Simpson & Jon Cleary. The "Gospel Piano" style underlies much of the blues, jazz & popular music played today.

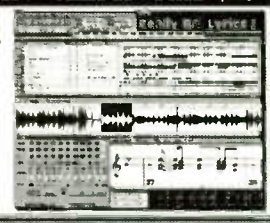
The Christmas Pianist™ $49

This software includes great piano performances of over 50 all-time favorite Christmas songs and carols – ideal for listening or singalong! On-screen lyrics, notation & piano keyboard, piano notation printout, background playback, Music Trivia & Guess the Song games & more!

PowerTracks Pro Audio 4.0™

INTEGRATED DIGITAL AUDIO & MIDI SEQUENCER FOR WINDOWS

New version! Cool Features. Same Low Price $29



PowerTracks Pro Audio 4.0 is a professional, fully featured digital and MIDI workstation, packed with features for musicians, students and songwriters. With seamlessly integrated digital audio/MIDI recording, and built-in music notation, PowerTracks turns a typical soundcard equipped Windows PC into a music production powerhouse! Comes with CD-ROM based video training. **MultiTracks CD-ROMs!** Jazz, Blues & Rock MultiTracks Play along CD-ROMs available, each with over one hour of multi-track digital audio music on CD-ROM for play along or use in PowerTracks.
Pricing: PowerTracks Pro Audio $29; Upgrade $19; PowerPAK (program & all 3 MultiTracks CD-ROMs) $49; Upgrade to PowerPAK $39

NEW! The Blues Pianist™ $49

Volume 1 (50 pieces - older styles) $49 • Volume 2 (50 pieces - newer styles) $49

Each volume contains over 50 great down-home blues piano stylings by top professionals! Playing in a wide variety of blues piano styles – Boogie Woogie, Slow/fast boogies, jazz blues, New Orleans style, Chicago blues & more. These are the styles made famous by Pete Johnson, Albert Ammons, Jelly Roll Morton, etc. Hours of listening pleasure! Full of info & trivia on the great masters of piano blues. Slow them down & learn the licks! The perfect gift for any blues lover.

The New Age Pianist™ $49

Over 70 "New Age" & "New Age-Jazz" style piano pieces, played on MIDI keyboard by top performers.

A beautiful collection of solo piano compositions which draw their inspiration from the natural world. Full range of "New Age" piano techniques are presented: "ambient" performances in the style of George Winston & "New Age-Jazz" performances in styles of Chick Corea/Keith Jarrett. Includes song memos, biographies & information on important New Age musicians. Includes photo album of stirring nature scenes & real time piano score *(notation in Windows version only)*. Over 3 hours of music!

The Children's Pianist™ $49

Over 70 of the best-loved children's songs for listening & singalong!

Lyrics to all songs displayed on screen in large type. Chords, lyrics & music notation. On-screen lessons explain the techniques of piano accompaniment. Examples of alberti bass, embellishments, syncopation, stride style & many more techniques! Over 4 hours of music! Includes words & music for 70 songs: London Bridge, Camptown Racetrack, Home on the Range, My Bonnie Lies Over the Ocean, and many more!

The Bluegrass Band™ $49

Virtuoso live performances of 50 Bluegrass standards!

These MIDI files are great! As you listen to the tunes, you can single out any of the instruments using the on-screen fretboard display, tablature or notation. **PLUS** Lots of Bluegrass pictures, bios, & trivia (all on disk) & much more. Our most "feel good all over" program so far. Includes: Wildwood Flower, Sally Goodin, Cripple Creek, Fire on the Mountain, Pigtown Fling, Red Haired Boy, Jesse James & many more!

NEW! The Jazz Soloist™ Vol. 3 $49

Vol. 1 (50 pieces) $49 • Vol. 2 (50 pieces) $49 • Vol. 3 (60 pieces) $49

The Jazz Soloist is a music program with professional jazz quartet arrangements. Each song features a great jazz solo played by top jazz musicians, as well as piano comping, bass & drums. Vol. 3 of the Soloist series features Latin, Blues, & Jazz Waltz stylings. Includes Jazz Soloist program with MIDI files, & also files in Band-in-a-Box format. Sight-reading was NEVER so much fun before the Jazz Soloist series!
(NOTE: Mac users get on-screen-notation only when running the files in Band-in-a-Box. Volumes work together or as standalone programs.)

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The Miracle of Digital Tape

Digital tape decks bring pro-quality recording to the masses.

By Scott Wilkinson

Not long ago, digital tape decks were the exclusive purview of high-end commercial studios. Now, however, they are available to just about any home studio at very reasonable prices. Digital decks come in three basic varieties: open reel, DAT, and modular digital multitrack (MDM). (A few years ago, Philips introduced a fourth variety of digital machine, the Digital Compact Cassette deck, which used the cassette format and could even play regular analog cassettes. Although its technology was good, DCC never caught on with the public.) Open-reel digital machines are very expensive and are used only in commercial facilities; DATs and MDMs are becoming quite common in personal studios, so these are the formats I will discuss here.

STEPHEN RAMIREZ

The fundamental principle used to record and play digital audio is the same as it is for analog decks: tape coated with magnetically sensitive particles is drawn past magnetic heads, which align and sense the orientation of the particles. However, the particles are aligned in only two directions, which represent 0 and 1. When an audio signal enters the deck's analog input, it is converted into a digital signal, which is nothing more than a string of 0s and 1s. (The particles on an analog tape are aligned in many different directions to correspond to the rising and falling analog waveform; see "Square One: Merrily We Analog" in the February 1998 **EM**.) In addition, the digital data is stored in packets rather than in a continuous stream, as with analog tape.

Like their analog counterparts, digital decks typically include analog line-level inputs and outputs. However, they also have digital inputs and outputs, which can include AES/EBU, S/PDIF, ADAT Optical, and/or TDIF (see "Square One: Caveat Connector" in the November 1996 **EM**). Other differences include the maximum recording level: analog decks let you record slightly above 0 VU with no objectionable

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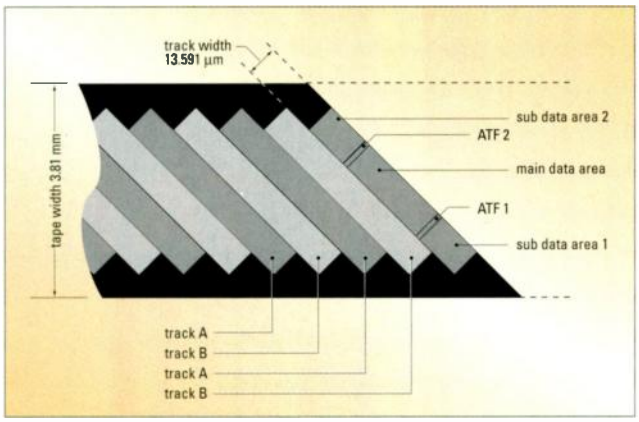

FIG. 1: The rotary heads in a helical recording system rotate at an angle to the direction of tape travel. As a result, the tape tracks are diagonal to the surface of the tape.

distortion, but digital decks start clipping the signal above this level. Some digital decks set the 0 VU point a few decibels below clipping so you can record above 0 VU.

HEAD TO HEAD

DAT and MDM decks use a type of head mechanism that was first developed for VCRs. This is called a *rotating head* because it rotates as the transport pulls the tape past it. In addition, its rotational direction is oriented at an angle to the direction of tape travel. As a result, the actual tracks on the tape are diagonal to the length of the tape (see **Fig. 1**). If you were to curl the tape into a long, lengthwise tube, the diagonal tracks would form a helix (a cylindrical spiral), so this mechanism is called a *helical recording system.*

In most helical recording systems, the actual head gaps are located on the surface of a rotating cylinder, and there is no separate erase head; the record head overwrites any previously recorded information. In 2-head designs (e.g., DAT decks), the record and repro heads (which are often called write and read heads in this case) are generally located 180 degrees apart (see **Fig. 2**); in 4-head designs (e.g., ADAT), there are two write heads 180 degrees apart and two read heads at right angles to the line connecting the write heads.

Because the heads rotate, they cannot write or read a continuous stream of data on the tape. As a result, the incoming data is stored in a temporary RAM buffer until the write head is in the proper position to record the data on the tape. Similarly, data from the read head is stored in the buffer and sent to the output at the correct time. This also allows the system time to perform various error-correction chores.

Unlike those on analog decks, the heads of a digital machine are not easily accessible for cleaning. You can get special "cleaning tapes" that look just like normal recording tape, but the "tape" is actually a head-cleaning material. To use a cleaning tape, simply insert it into the machine and hit Play. However, you should use a particular tape only once for five to ten seconds and not rewind it; reusing the tape can redeposit dirt on the heads. Unfortunately, these cleaning tapes are not generally adequate for machines that see heavy studio use. However, unless you are a video technician, do not attempt to manually clean rotating heads yourself; let a professional do this.

Interestingly, track width and tape speed don't necessarily have any effect on audio quality (although track width does affect tracking accuracy by allowing a margin for error when the heads drift out of alignment). What matters is the manner in which the analog signal is converted into digital and stored on the tape in addition to the type of error correction used. Digital decks do not need to be calibrated for different types of tape, but they do need periodic adjustments, such as alignment of the transport, tape path, and back tension.

THAT DARN DAT

DAT is strictly a stereo medium; virtually all DAT machines record both channels at once. It is "half-track" in the sense that you can record in one direction only; you can't turn the tape over and record on the other side. In addition, the tape is not divided into lengthwise tracks because DAT machines use a helical recording system. Like analog cassettes, DAT tapes are enclosed within a plastic shell, and they are identified by the amount of recording time they offer (e.g., a D60 DAT offers 60 minutes of continuous record time).

DAT decks are available in professional and consumer versions (although consumer models are quickly fading away). Consumer models typically can record *analog* signals only at 48 kHz, which must be sample-rate converted to 44.1 kHz if the material is intended for CD distribution. (Consumer DATs can record and play *digital* audio at 44.1 kHz.) Both varieties currently record with 16-bit resolution.

Consumer decks also include the Serial Copy Management System (SCMS, pronounced "scums"), which prevents digital copies beyond the second generation; i.e., you can make a copy of the original recording, but you can't make a copy of the copy. This was mandated for consumer DAT decks to fight piracy. Professional DAT decks (see **Fig. 3**) can record analog audio at 44.1 or 48 kHz and in some cases 96 kHz, and they have no SCMS or offer defeatable SCMS.

Because the track width is so narrow, there are bound to be dropouts, so an extensive error-correction system is used. In this system, multiple copies of the data are interleaved or stored in nonsequential packets; if a dropout occurs in a packet, the deck can reconstruct the data using one of the redundant copies.

In addition to the digital audio data itself, DAT decks record a variety of ancillary, or *subcode,* data in the helical scan. Embedding subcode data in the helical scan is part of a system called

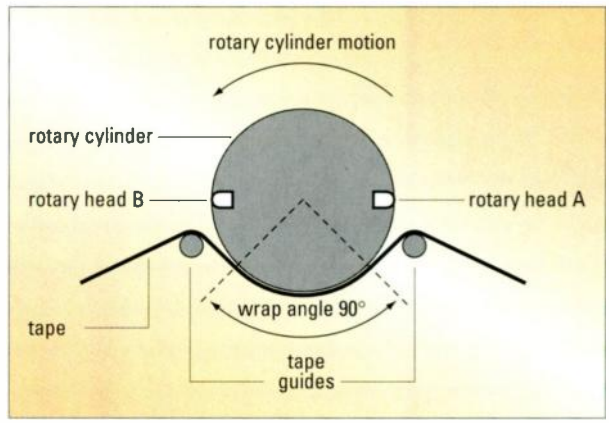

FIG. 2: The heads on a rotary head are 180 degrees apart, and the tape is wrapped partly around the head assembly.

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Auto Track Finding (ATF), which helps steer the heads to the correct helical track.

The subcode data includes Start IDs (which number the beginnings of selections on the tape) and timing information, such as elapsed and remaining time for the entire tape and each selection. This lets you quickly cue the tape to the desired location and display cumulative or selection-specific elapsed and remaining time. Subcode data can even be added or changed after the audio has been recorded, which lets you renumber the selections on tape.

MDM MADNESS

Modular digital multitracks (MDMs) have brought digital multitrack tape recording to the masses in a big way. As of this writing, all MDMs can record eight tracks of digital audio; most record at sampling rates of 44.1 or 48 kHz with 16-bit resolution.

The first MDM was the Alesis ADAT, which was soon followed by the TASCAM DA-88. Since then, several manufacturers have produced compatible MDMs under license from Alesis or TASCAM; ADAT-compatible MDMs are made by Fostex and Panasonic, and DA-88–compatible MDMs are made by Sony. Alesis and TASCAM have also updated their original MDMs. TASCAM's line now includes the DA-88, DA-38, and DA-98. Alesis offers the ADAT XT, which records 16-bit audio with 18-bit converters, and the M20, which records at 20-bit resolution but still plays original-format ADAT tapes. Alesis is expected to announce more new machines at the 1998 Winter NAMM show (see **Fig. 4**). This month's "What's New" column has the details. In addition, Studer has announced the V-Eight, a version of the M20 with additional, high-end features, such as an industrial-strength tape transport.

The ADAT uses a modified VHS transport and standard S-VHS videocassettes. The tape speed is 3¾ ips, which provides 40 minutes of record time on a T-120 videocassette. TASCAM selected the Hi-8 (8 mm) format for the DA-88 and its siblings. In this case, the tape speed is only slightly faster than a standard Hi-8 videotape transport, so you get about 108 minutes of record time on a "120-minute" tape. In both cases, the tape must be

TAPE FORMULATIONS

The materials and construction of recording tape vary for different formats (analog open reel, cassette, DAT, S-VHS, Hi-8), but the basic principles are the same. Recording tape of any type consists of a polyester-based film coated with a magnetic material on one side and an inert back coat on the other side (see **Fig. A**). The back coat is a carbon-based material that helps the tape wind and unwind without slipping, reduces print-through, and minimizes static-electricity buildup. Digital tape also includes a top coat over the magnetic coat to produce an extremely smooth surface.

The magnetic coat actually includes several ingredients. The magnetic particles themselves are typically some form of iron oxide; tapes that use iron oxide are known as *ferric*, which means iron. *Chrome* tapes originally used particles of chromium dioxide, but this terms now refers to any magnetic material that exhibits certain characteristics; these days, it usually means iron oxide with cobalt. *Metal* tapes use particles of pure iron or an alloy of iron and nickel or cobalt.

The magnetic particles are mixed with a binder that adheres to the base film, a dispersive agent that keeps the particles evenly distributed, and other materials designed to lubricate and combat problems such as static-electricity buildup and chemical breakdown. Taken together, the magnetic coat is called the *tape formulation*.

All types of magnetic particles exhibit some resistance to being aligned by an external magnetic field (such as from an erase or record head); this resistance is called *coercivity*, and it's measured in units of *oersteds* after Danish physicist and chemist Hans Christian Oersted. The coercivity value determines the magnetic field strength required to align the particles effectively. Once the particles are aligned, you want them to stay aligned; the degree to which the particles remain aligned is called *retentivity*.

FIG. A: Recording tape includes at least three layers (four for digital tape).

If you apply a strong enough magnetic field, virtually all the particles will be firmly aligned; this is called *saturation*. Applying an even stronger field forces the particles out of alignment, which results in distortion. This saturation distortion builds up slowly as the strength of the magnetic field is increased. Tape manufacturers typically measure the level of the distortion's third harmonic (known as *third harmonic distortion*, or THD, not to be confused with total harmonic distortion, which is also abbreviated THD) in relation to the total output. Values above 3 percent are considered unacceptable. The level at which this occurs with a 1 kHz test tone is said to be the tape's *maximum output level* (MOL).

In cassettes, the type of magnetic particles used and the equalization setting (which is unfortunately called the *bias* of the tape, even though it has nothing to do with the high-frequency bias signal) are identified by a Type designation. Type I cassettes are ferric with a "normal bias" of 120 µs, and Type II cassettes use a chrome formulation and "high bias" of 70 µs. Type IV tapes use metal particles and high bias. (Type III tapes use a ferrichrome formulation, but this type of cassette is now obsolete.) DAT, S-VHS, and Hi-8 tapes use a metal-particle formulation.

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FIG. 4: The new Alesis ADAT-XT20 MDM records with 20-bit resolution but is still compatible with standard, 16-bit ADAT tapes.

sync signals, it also carries word clock for the digital audio; see "Square One: Digging into Digital Audio" in the February 1996 **EM**.)

A GREAT LOCATION

All tape decks include some sort of tape counter that indicates the passage of tape through the machine. On DATs and MDMs, the counter typically indicates the passage of time in minutes and seconds. It can also indicate elapsed and remaining time on the tape thanks to the subcode data (or the control track in the ADAT).

Each point on the tape can be identified by the value of the counter as that point passes the heads. Some decks let you store one or more counter values and shuttle to them automatically at the touch of a button. This is great for locating different sections of a song or different songs on the tape. Most decks also have a *return to zero* (RTZ) button that shuttles the tape to the point at which the counter reads zero.

To achieve even greater control over the tape, you can use an *autolocator*. This external device can store many tape locations in its memory and shuttle the tape between them. Alesis makes two autolocators for the ADAT: the LRC (Little Remote Control) is included with each ADAT and provides limited control for one machine, and the BRC (Big Remote Control) provides expanded control for one or more synchronized machines. The TASCAM equivalent is the RC-848.

Several manufacturers make autolocators for a variety of tape decks. For example, JLCooper Electronics makes the CuePoint, which can be used with MDMs or any device that responds to MIDI Machine Control. You can install an optional ADAT card that connects directly with the ADAT 9-pin sync interface, and it can generate SMPTE and MIDI Time Code from the ADAT sync codes.

FRUIT PUNCH

All types of multitracks let you punch in and out. In this process, you engage the Record function for one or more tracks as the tape is playing. This lets you replace a section of the track with new material. For example, suppose you flubbed one phrase in an otherwise brilliant track. Rewind the tape to a point before the flub and start playing. When you get to a point just before the flub, hit the Record button and record the phrase again; this is called *punching in*. After the new phrase is finished, disengage the record function to retain the previously recorded material after that point; this is called *punching out*.

Normally, it's best if there is a section of silence before the flubbed phrase begins and after it ends. The shorter these silent sections are, the "tighter" the punch (i.e., the more accurately you must engage and disengage the record function to avoid erasing the material you want to keep).

In case your hands are full (for example, with an instrument), most multitracks let you punch in and out with a footswitch connected to a special connector on the back panel. Many newer machines also provide an auto-punch feature that lets you program punch-in and out times from the tape counter; this can also be done with most autolocators.

MDMs and DATs have brought digital tape recording to home studios everywhere. This has democratized the process of recording music with professional quality, so that anyone with even a modest budget can produce an album for commercial release. All that remains is the inspiration to infuse your music with the life it needs to be a success.

EM *Contributing Editor* **Scott Wilkinson** *records his mixes on a DAT machine.*

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KORG

Z1

Korg has unleashed a synth that sounds like no other.

By Geary Yelton

The synth world is in a state of flux. For almost a decade, wavetable synthesizers have been the norm. Perhaps the most promising competitor to the wavetable standard is physical-modeling synthesis. Instead of using sampled sounds, modeling attempts to reproduce traditional instrumentals by digitally mimicking their physical characteristics.

Simply put, the Korg Z1 is the state of the art in physical modeling on a keyboard instrument. In addition to modeling drawbar organ, electric piano, brass, woodwinds, and plucked- and bowed-string instruments, the Z1 features seven other methods of generating sound. These include emulating traditional analog synthesizers, comb-filter modulation, a combination of phase modulation and waveshaping called "variable phase modulation" (VPM), resonance oscillation, ring modulation, frequency modulation, and sync modulation. Lump them all together and you have a synthesis technique Korg refers to as MOSS, short for Multi Oscillator Synthesis System.

In most respects, the Z1 is a direct descendent of the Korg Prophecy, a monophonic physical-modeling synthesizer that is also available as a section of the Trinity Plus keyboard workstation. Some of its fans have even called the Z1 the polyphonic Prophecy. The Prophecy evolved from Korg's OASys (Open Architecture Synthesis System) development platform. Like the Prophecy, the Z1 generates sounds from scratch, making it a true synthesizer in every sense of the word. However, the Z1 is a second-generation product and has better modeling algorithms than the Prophecy.

Korg's state-of-the-art Z1 synthesizer models a variety of acoustic and electric instruments and digitally emulates numerous analog synthesis techniques to produce dazzling sounds. You can use a different synthesis method for each of its six multitimbral parts.

THE SOFTWARE ALTERNATIVE

An excellent Macintosh-based editing program is available for free from Korg. The *Z1 SoundEditor* makes modifying parameters infinitely easier than editing from the front panel. It also makes you appreciate just how deep this instrument is. For the moment, however, Windows users are out of luck.

The main window shows programs, MultiSets, and arpeggio patterns separately as well as global and MIDI parameters. When you double-click on the program portion of the window, you open a list of all the programs in both banks. Double-click on a program's name, and its primary parameters are graphically displayed (see **Fig. A**). Double-click on any parameter category to display all its parameters in greater detail. Sliders and numerical readouts are provided, as are graphs showing things like pitch slope and envelopes. An onscreen keyboard lets you play the Z1 from the computer, and an onscreen *x-y* pad gives you expressive control. All of the Z1's front-panel knobs are duplicated.

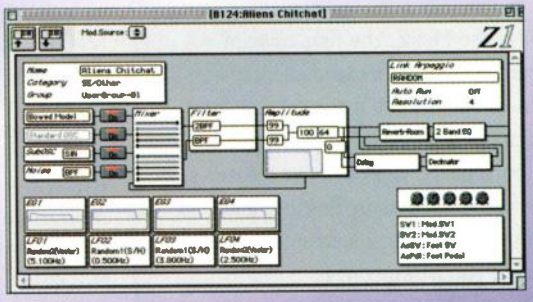

FIG. A: If you double-click on a program's name in *Z1 SoundEditor*, the primary parameters are displayed. To get into greater detail, double-click on any parameter category. Graphic envelope generators, knobs, and sliders simplify programming.

At the time the Prophecy appeared, making a polyphonic instrument that incorporated physical modeling was too costly to be practical. It still isn't cheap: a stock, 12-note polyphonic Z1 goes for $2,600. For $500 extra, you can add the DSPB-Z1 6-voice expansion board, giving you a total of eighteen voices. (You can also buy an already expanded Z1EX for $3,100.) True, twelve voices is far fewer than expected on a polyphonic wavetable instrument, but it helps to think of the Z1 as a dozen Korg Prophecies.

ON Z SURFACE

At the moment, there are a dozen keyboards in my studio, and the metallic-gray plastic body and sleek styling of the Z1 makes it arguably the coolest looking of them all. The first thing you may notice about the Z1 is its abundance of knobs, even more than some synths from the analog era. There are 23 knobs, 59 switches, a volume slider, pitch-bend and modulation wheels, and an *x-y* pad that resembles the touch pad featured on some laptop computers in place of a mouse or trackball. Most of these switches are dedicated to a single function; only fifteen of them serve double duty.

The 61-note keyboard has a light, unweighted action. The three MIDI ports, stereo outputs, two pedal jacks, and two footswitch jacks on the back are well labeled on the front panel, so you don't have to crawl behind your keyboard stand to see where to plug things in, a detail that's always appreciated. Also on the back are a dedicated display contrast knob (great idea!) and a port for inserting a PCMCIA flash card for memory expansion. The headphone jack is located on the front left corner, where it belongs.

The bright, yellow-green LCD is large enough to display a generous amount of information as both text and graphics. The five knobs located just below the display are assignable and can be pressed like buttons. In Play mode, pressing a knob shows you what parameter it controls, and turning it changes the value of that parameter. In Edit mode, pressing a knob scrolls the cursor through a row of editable parameters.

Like the Prophecy, the Z1 sports numerous input devices for musical expression. Instead of the Prophecy's ribbon controller, there's something much, much better: the *x-y* pad. This stiff plastic rectangle is divided into four quarters by tactile dots on its surface, Braille-style. I can't say enough about how expressive this thing is. Tap it with your fingers to articulate timbre in distinct rhythm, or rub it to produce sweeping changes to two parameters simultaneously. Use your fingertip to hone in on a particular filter frequency, modulation depth, or any other parameter, and then hit the *x-y* Hold switch to stay there.

The pitch-bend and modulation wheels are smaller and wider than most and feel quite responsive. Also in the left-hand controller section are two assignable switches and another for turning portamento on and off. The assignable switches can be used to turn effects on and off, shift octaves, or turn polyphony on and off. Perhaps more interesting, they can be used as modulation sources to control any of the numerous parameters in the synth's voice architecture.

On the left side of the control panel, next to the volume slider, there's a group of knobs for controlling filter and envelope settings in real time. There's definitely a lot to be said for controlling basic synthesis functions with dedicated knobs on the front panel. These knobs make all the difference if you're looking to get your hands dirty shaping sound. Thrill as we take you back to those wondrous days of yesteryear when such parameters were forged on the fly!

ADSR generators dedicated to filter and amplitude envelopes are at your fingertips. Two separate multimode filters each have dedicated knobs for cutoff, resonance, and envelope depth. A switch lets you instantly choose either or both filters. Four more switches let you turn on and off the two oscillators, sub-oscillator (explained shortly), and noise generator at will. All these knobs and switches give you much more immediate and expressive control over performance parameters than we've come to expect from digital instruments.

Z PROGRAMS & MULTISETS

The Z1's internal memory holds 256 individual programs divided into two banks. In addition, there are 32 MultiSets stored internally, also divided into two banks. MultiSets are patches containing as many as six programs, each

with its own keyboard zone, MIDI channel, and dynamic level. Not only is the Z1 6-part multitimbral but each of the two oscillators in a voice can use a different type of synthesis, so in theory, the instrument is able to produce sounds with twelve kinds of synthesis simultaneously. In practice, as we'll see, many physical models require the entire voice, so you end up with fewer simultaneous synthesis methods. But let's not get nit-picky here: whether you use six synth types at once, or twelve, or something in between, this is one heck of a flexible synthesizer.

A 4 MB flash card can add a whopping sixteen banks of 128 programs each, with sixteen MultiSets per bank. A switch selects between banks, and the numeric keypad takes you directly to the program or MultiSet within the selected bank. Unfortunately, when you switch from one program to another, there's always a noticeable delay before the new program sounds. When switching MultiSets, the delay is just over a second long. This is understandable; after all, the Z1 is doing an incredible amount of number crunching in order to handle multiple synthesis technologies, a wealth of parameters, and effects. The Z1 isn't one of those old-fashioned wavetable synths, after all! Nevertheless, for a user, the delay is a drag.

Like only a few other instruments, the Z1 has programs organized into categories so you can step through related sounds. This is useful when you know what type of sound you need and you're searching for the best one. If you're looking for the right sound effect, for instance, you'll discover that the internal programs offer a dozen from which to choose. There are eighteen categories, each with a graphical icon in the corner of the display. Brass sounds, for example, are represented by a trumpet icon.

MAKING WAVES

MOSS (not to be confused with MASS, Kurzweil's Multimedia Audio Sample-playback System) allows you to select from thirteen oscillator types. The two primary kinds of synthesis are acoustic-instrument modeling and analog-synth emulation. However, the Z1 can do *so* much more!

The Z1's three kinds of modulation-based synthesis and standard oscillators featuring basic analog-type waveforms have been with us since the early days of synthesized music. Variable phase modulation (VPM) evolved from the method used by the old Casio CZ-101 and its brethren to generate sound—but with a twist. Comb filtering is a process that's been used in classic electronic music for many years. Generating sounds with resonant filters is another technique that's been around for decades, though again the Z1 gives it a new twist.

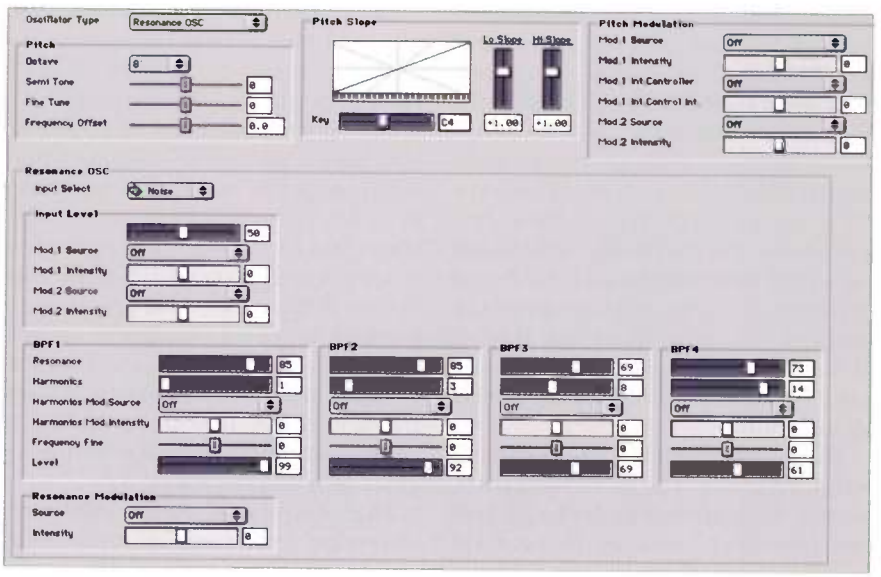

FIG. 1: The Z1's unusual resonance oscillator (shown here in Korg's free *Z1 SoundEditor* software for Mac) has four bandpass filters with independent center frequencies and resonance. In the example, the noise generator is used as the input, but you can use the other oscillator or the suboscillator, as well. Note the numerous places you can apply modulation.

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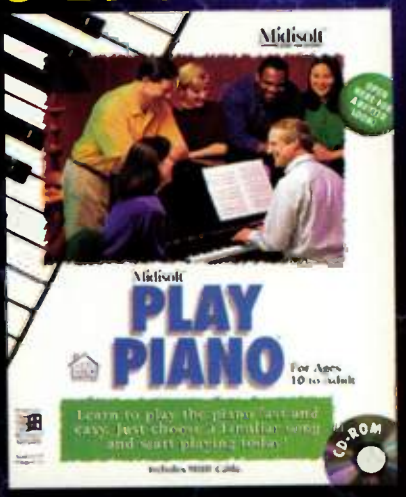

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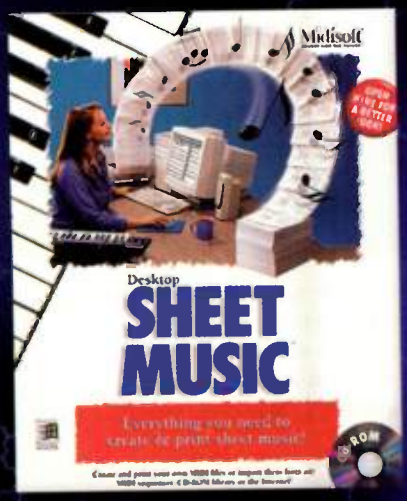

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WRH

As with the Prophecy, there are two oscillators and a suboscillator per voice. The suboscillator in most synthesizers produces a basic waveform one or two octaves below the main oscillators. The Z1's suboscillator also gives you a choice of matching the fundamental or playing an octave higher, so "sub" oscillator is actually a misnomer. It can also be tuned in semitones to any pitch, and its pitch can be modulated independently of the main oscillators. The noise generator has its own resonant, multimode filter, which can be modulated by two sources simultaneously.

Most types of synthesis can be independently assigned to each oscillator. Except for organ and electric piano, though, the physical models are so demanding that they use up the entire voice. That means you can't have a single voice that models both plucked and bowed strings at the same time, for instance. You can, however, use a physical modeling oscillator to modulate other types of oscillators, unleashing a new world of creative possibilities.

Each standard oscillator provides sawtooth and pulse waves, which can be mixed with triangle and sine waves. Both the width of the pulse wave and the slope of the triangle wave can be modulated. The phase of the triangle and sine waves can also be shifted in relation to the sawtooth or pulse wave. In addition, there's a waveshaping section that lets you modulate level, shape, and balance independently from a selection of 47 modulation sources.

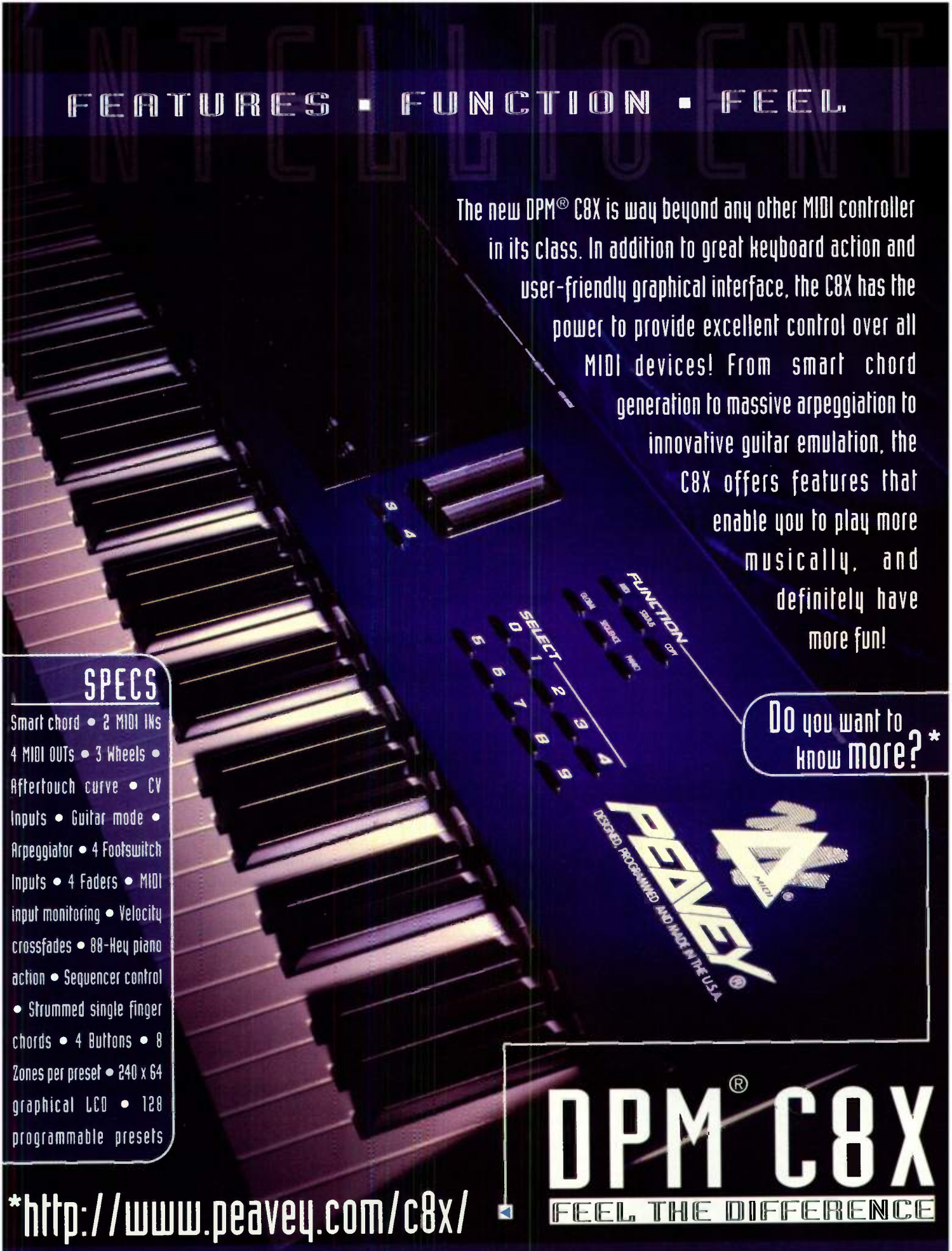
The comb-filter oscillator produces sound by feeding back a filter whose input can be the other oscillator, the suboscillator, or the noise generator. Comb-filter oscillation is recommended primarily for unpitched sounds, such as percussion and sound effects. A greater level of feedback produces greater resonance, which results in a more pitched tone. The amount of feedback can be controlled by a modulation source.

Z1 Specifications

Synthesis Methods	MOSS: physical modeling, analog-synth emulation, comb-filter modulation, variable phase modulation, resonance oscillation, ring modulation, frequency modulation, sync modulation
Polyphony	12 notes (expandable to 18)
Multitimbral Parts	6
Preset Programs	256 (in RAM)
MultiSets (multitimbral setups)	32 (in RAM)
Number of Effects Processors	2
Effects Types	15
Keyboard	61 notes, Velocity and Pressure sensitive
Display	64 x 240-dot LCD
Card Slot	PCMCIA format (ATA or linear, 256 KB to 4 MB capacity)
Arpeggiator Patterns	5 preset, 15 user
Controllers	Pitch-bend and mod wheels, *x-y* pad, modulation switch 1 and 2, *x-y* hold switch, portamento switch, knobs 1–5, filter knobs (Cutoff, Resonance, EG Intensity), filter EG knobs (ADSR), amp EG knobs (ADSR), arpeggiator control knobs (Gate, Velocity, Resolution, Speed)
Audio Connections	(2) unbalanced ¼" audio outs; stereo headphone out
Control Ports	Damper pedal; assignable switch; volume pedal; assignable pedal; MIDI In, Out, and Thru
Dimensions	4.7" (H) x 42.9" (W) x 13.7" (D)
Weight	30.6 lbs.

For manufacturer information, please see Contact Sheet, p. 163.

FEATURES • FUNCTION • FEEL



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the instrument's bell. You can select an instrument type to simulate the bore lengths and shapes of different brass instruments. In addition, you can specify whether pitch will jump or change smoothly when pitch bend is applied. Smooth bends are best for trombone. As with the bowed string, all these variable parameters contribute a lot to realism in the hands of a skillful player.

Finally, there's the reed model, most often used for synthesizing woodwind instruments. The instrument type specifies the shape and length of the bore, offering eighteen choices ranging from Bassoon to Harmonica. Reed parameters include wave shape and wave-shape modulation characteristics. Pressure simulates the force of the player's breath and is controlled by an envelope generator and two other modulation sources. Breath noise is emulated by the noise generator. This model also has been used quite creatively in such synthy programs as "TREX vs. Helicopter" and "Deep Forest X/Y."

Most of the factory programs that use the reed model are saxophones. One of them, Blue Sax, is perhaps the best synthesized saxophone I've ever heard. The *x-y* pad gives you control over its brightness and growl. A few of the other saxes sound awfully electronic, but perhaps that's intentional.

Z EFFECTS

The Z1 features two separate effects processors with fifteen kinds of effects that are saved as part of each program or MultiSet. In addition, a master effects section lets you choose from delay, hall reverb, or room reverb. All effects are smooth and flexible. Any modulation source can determine effects depth for real-time control. Four effects require enough processing power that they can't be assigned to both processors simultaneously: Talking Modulator, multitap delay, ensemble, and rotary speaker.

Most of the effects types are pretty standard, but two are a little unusual. The Talking Modulator is used to produce vowel sounds in the manner of a vocoder or talk box. You can step through five different vowel sounds with a modulation source, or you can leave it fixed at a particular vowel. The *x-y* controller is especially useful for modulating vowel sounds: you can slide your finger from one part of the pad to another to shift from an *a* to an *o* sound, for example.

The other new effect, called the Decimator, basically degrades the quality of sound by lowering its sampling frequency and bit resolution. The sampling frequency can be specified from 1 to 24 kHz and can be modulated by a control source. The lowest sampling frequency produces an effect that sounds like heavy ring modulation. Resolution can range from 4 to 24 bits. At its lowest settings, it produces a pronounced distortion effect. The Decimator offers a wider range of sound modification than I expected.

One of the more standard effects is overdrive, which includes a 4-band parametric equalizer. There are two rotary-speaker effects, one simulating the rotation of both the high-frequency rotor and low-frequency speaker and the other simulating the high-frequency rotor only. The mono delay has a maximum delay time of 680 milliseconds, as does the stereo multitap delay. The ensemble effect spreads three choruses across the stereo field.

All effects have a generous number of editable parameters (as many as twenty) that can be modulated with control sources. For example, the ensemble parameters are speed, speed-modulation source and intensity, depth, depth-modulation source and intensity, effect balance, balance-modulation source and intensity, LFO depth, LFO depth–modulation source and intensity, and shimmer (the amount of modulation that is applied to the LFO).

Z MOTHER OF ARPEGGIATORS

I had great fun with the Z1's sophisticated arpeggiator. Though some arpeggiators have a greater storage capacity, this one is extremely flexible. Three knobs and a dozen switches are dedicated to the arpeggiator section of the front panel. You get five preset patterns and fifteen user-defined patterns of up to 36 steps apiece. There's one catch, however: the 36 steps can't contain more than ten pitches per step.

If a memory card is inserted, you can select from another fifteen user patterns. Arpeggiator settings can be saved as part of a program or a MultiSet. In fact, arpeggios are an integral part of many of the Z1's factory programs. Because MIDI note data is transmitted from the Z1's arpeggiator and the arpeggiator syncs to MIDI Clock, patterns can be recorded into a sequencer in sync with previously recorded tracks.

An Octave switch extends the range of an arpeggio from one to four octaves. If it's set for two octaves and you play a triad, those three notes will play in the original octave and then an octave higher before starting over. A Latch switch continues the pattern after you release the keys. If you play a chord with Latch turned on, you can step through all the different patterns by just pressing their switches. If Key Sync is turned on, the pattern starts over when you release the keys and press them again.

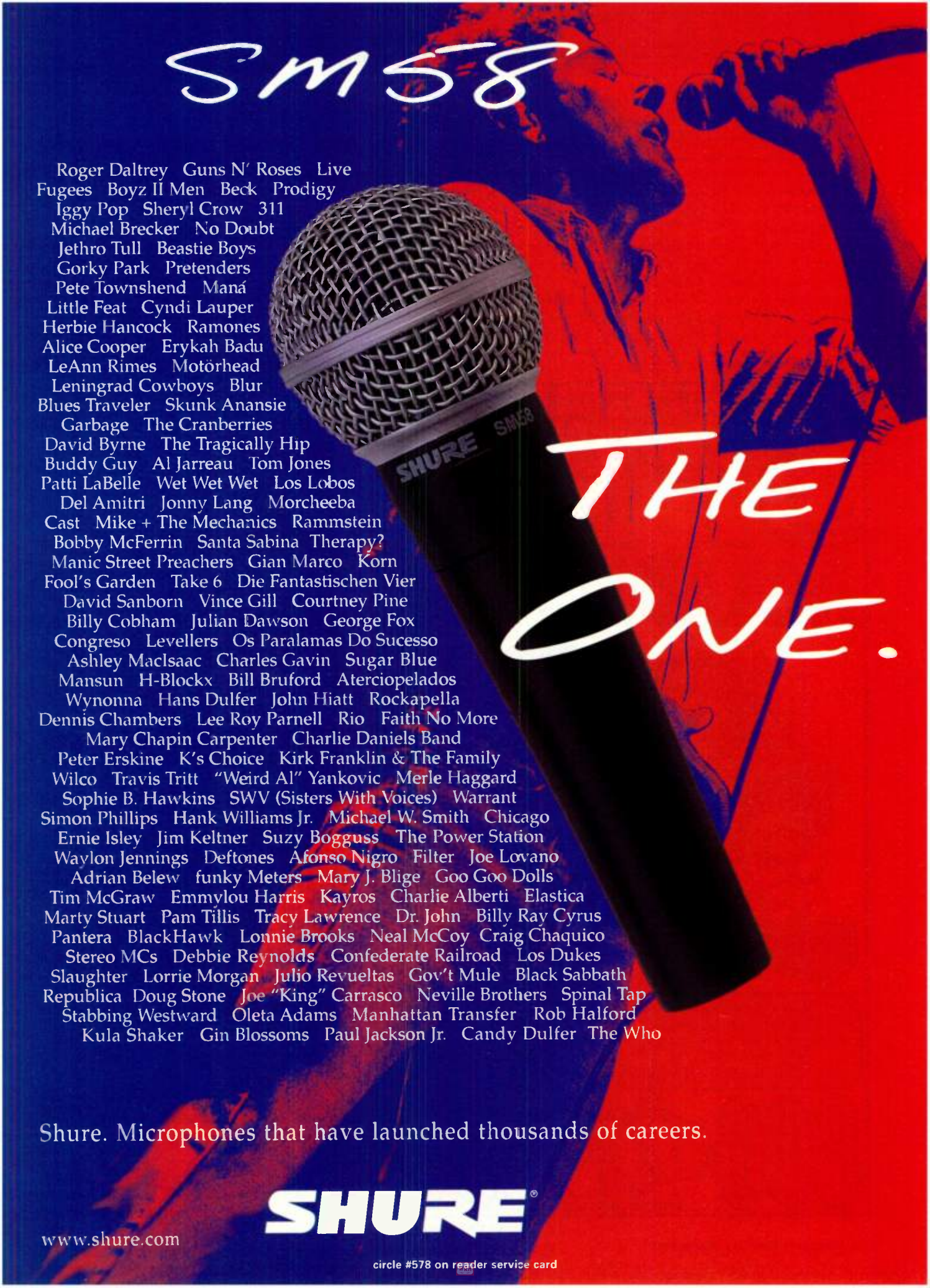
Notes can be sorted from low to high or high to low, or they can play in the order the keys are pressed. All notes are hard quantized, but you can specify a degree of swing to make the rhythm more interesting. Even with the preset patterns, Velocity can be changed on the fly by turning a knob, and the Gate knob controls how staccato or legato each note plays. Neither Velocity nor note duration responds to MIDI Pressure. Note resolution, ranging from sixteenth-note triplets to quarter notes, can also be changed on the fly.

Most synthesizer arpeggiators simply step through a pattern when you hold down a chord. On the Z1, if you first press the Keyboard switch, you can play the keyboard normally, and the notes you play are added to the pattern. That is, if you play a chord, you'll hear the whole chord the moment you play it, and its notes will be arpeggiated.

You can play parts totally independent of the pattern only if you first define the arpeggiator's key range and then play another part in a different area of the keyboard.

In Arpeggio mode, you can edit the user patterns and specify other arpeggio parameters. Unfortunately, the process for programming a pattern is less than intuitive. Instead of pressing a key to specify the pitch of each step, you twist a knob. Patterns are created in the PAT Step Param page, which shows a row of sliders resembling a drum-machine pattern display. The gate of each note in a pattern—how staccato or legato it plays—can be specified for each individual step. A single step can play more than one pitch, and you can specify longer notes by following a legato note with a rest.

With some advance planning, you can play a single note and trigger not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Del Amitri Jonny Lang Morcheeba
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Bobby McFerrin Santa Sabina Therapy?
Manic Street Preachers Gian Marco Korn
Fool's Garden Take 6 Die Fantastischen Vier
David Sanborn Vince Gill Courtney Pine
Billy Cobham Julian Dawson George Fox
Congreso Levellers Os Paralamas Do Sucesso
Ashley MacIsaac Charles Gavin Sugar Blue
Mansun H-Blockx Bill Bruford Aterciopelados
Wynonna Hans Dulfer John Hiatt Rockapella
Dennis Chambers Lee Roy Parnell Rio Faith No More
Mary Chapin Carpenter Charlie Daniels Band
Peter Erskine K's Choice Kirk Franklin & The Family
Wilco Travis Tritt "Weird Al" Yankovic Merle Haggard
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just an arpeggio but a short sequence. This feature has some interesting compositional possibilities. You can program a different 32-note sequence for each user pattern today and give a spontaneous performance at tonight's rave by simply pressing the Pattern Selection buttons.

You have to hear this arpeggiator to fully appreciate its sublime coolness. Playing with it reminds me of the days when my only synth was a 2-voice Oberheim with an 8-step analog sequencer. Each step could be altered in real time so that, every time it played, that step played a different note. Whole songs revolved around that capability. The technique of modulating repeating patterns in real time was made popular in the 1970s by synth ensembles such as Tangerine Dream. Now, using the Z1's arpeggiator, you can re-create that technique and discover many new ones that go way, way beyond.

Z WRAP-UP

If you're looking for the latest sound, you'll find it in the Korg Z1. In terms of pure synthesizing power, no other hardware synth comes close. Its real-time controllers give it a depth of expression you just won't find on other synthesizers.

As with the Korg Prophecy, the Z1's main strengths are emulating analog synths and creating entirely new timbres. If you're looking for realistic emulation of traditional instruments, you will have to learn to control the minute details that give instruments their individual characters. To sound like a real cello player, for instance, you must master the parameters that control the virtual bow. Fortunately, everything you need to do this is provided. The Z1 gives you infinitely greater control over the nuances that define expressive sound than sample-playback instruments could ever provide.

The two banks of internal factory sounds, ranging from analog-synth sounds to acoustic timbres to completely new sound effects, demonstrate the Z1's versatility. Two new banks are already available from Korg as of this writing, but unless you want to replace the original sounds, you need a RAM card to store them.

The Z1 is a positive step toward realizing the potential of physical modeling, but the instrument emulations aren't reason enough to rush right out and buy one. Though you can control the nuances of modeled instruments in fine detail, the sounds are more electronic than organic. On the other hand, the Z1 absolutely shines at making electronic sounds. Whether you want one, then, may depend on your musical style. Personally, I want one! It's ADAT friendly, too: you can add an ADAT Optical output (the DI-TRI digital I/F board) for only $130.

Unless your style runs toward pure electronica, the Z1 probably isn't an ideal choice for your only synthesizer, but it's flexible enough to make a great second keyboard. The Z1 is sure to find its way into television commercials and European dance clubs. Unfortunately, reading this article can't show you what it sounds like. For that, you'll have to get your hands on one. (Actually, you can hear the Z1 by visiting the "This Month in EM " section of **EM**'s Web site at www.emusician.com.)

Geary Yelton *has been playing with synthesizers for a quarter of a century and has been reviewing them for* **EM** *for half that long.*

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SONICWORX ARTIST (MAC)

This amazing sound-design tool is like no other.

By Peter Freeman

Although many digital audio editors are available for Mac and PC, few offer truly unique and powerful sample-altering tools. Prosoniq's *SonicWorx Artist,* however, is an interesting and extraordinary program that can be fairly described as unique.

There are two programs in the *SonicWorx* series. Although similar in layout and design, *SonicWorx Artist* and *SonicWorx Studio* are intended for fundamentally different applications. The former, which I'll focus on here, is intended for use in sound design; the latter (discussed in the sidebar, "SonicWorx Studio") is intended primarily for post-production. However, you can use the *SonicWorx* plug-ins in either environment, so if you have one program, you have an extra incentive to buy the other.

WHAT YOU NEED

SonicWorx Artist is a "fat" application: it contains both 680X0 and native PPC code. However, the program requires a floating-point unit (FPU), which precludes the use of certain 680X0 Mac models (such as the Performa 475) unless they have been upgraded with an FPU card. Even then, the processing speed on 680X0 Macs can be on the order of one-twentieth the speed on a PPC. Furthermore, certain *SonicWorx* plug-ins are PPC-only.

Clearly, you'll need a Power Mac to get the most out of *SonicWorx.* On the other hand, all sample-editing and DSP functions of the program are disk-based, so there is no file-size limit.

WHAT'S HAPPENING

The program works by applying user-selected DSP algorithms to preexisting sound files. Many algorithms use neural-network processing to perform intelligent, multipass analyses on sound files in order to recognize and extrapolate specific aspects of the sound that Prosoniq refers to as "performance" and timbral features. The program supports AIFF-C (uncompressed only), SDII, and unformatted "raw" files. It will read single- or multichannel, 8- to 24-bit audio files at sampling rates from 8 to 50 kHz. The program itself is actually only an operating framework; all the DSP functions are handled by plug-ins, which are included with the program.

The two main windows are the Wave Editor and Parameter Editor. The Wave Editor is a stereo sample editor with three main areas: the waveform display, the waveform overview, and the function bar (see **Fig. 1**). The waveform display sports a familiar design that is similar to that of Digidesign's *Sound Designer* and Passport's *Alchemy* in both appearance and functionality. The main difference is the presence of "inA" and "inB" markers, which are edit in and out points used to define the areas of a sound file that will be processed by the current algorithm.

The overview display works a bit differently than the displays in the other programs I mentioned. Instead of clicking on the display to play the current sound file from a specific point, you can select an area and zoom in on that region in the main waveform display, which is a nice shortcut. There are also zoom in/out key commands, as one would expect.

The Parameter Editor is where most of the real action takes place. Here you find the parameters of the currently selected DSP algorithm, assigned to blue and red sliders (see **Fig. 2**). The blue sliders are classified as Easy parameters, meaning that they usually have a great influence on the resulting sound. The red (Expert) parameters are for fine-tuning, but I did not find them to be critical for getting good results in most cases.

The Parameter Editor always reflects the current DSP algorithm, eliminating the need to have separate windows open for each plug-in used. I liked the design of this window, primarily because of the color-coded parameters and its clean layout, which makes it easy to read quickly.

GETTING STARTED

To get started working with the program, open an existing *Artist* file (which contains stored plug-in parameter settings and pointers to related sound files on disk, if any) or create a new one; then choose a sound file to work with. The program's Waveform Editor will display a graphic representation of the selected sample; both channels are shown if it is a stereo file.

Here is the point at which the *SonicWorx* programs differ from most other programs. *Artist* and *Studio* employ a user-definable, 2-channel input/output routing scheme to configure the signal flow through each of the various effects algorithms. The algorithms make use of the two inputs, called A and B, in different ways. For example, the Vocoder algorithm uses the two inputs separately, one for the carrier and the other for the modulator.

This routing is done in a 2-part process. Having chosen a plug-in, you select a portion of the current sound file in the Waveform Editor. Then you assign its destination using the routing flip menu at the top of the Waveform Editor window (see **Fig. 3**). This seems odd and can be confusing, at least initially, because no other programs function this way. However, Prosoniq anticipated that users might not want to think about the specifics of routing and has provided a check box

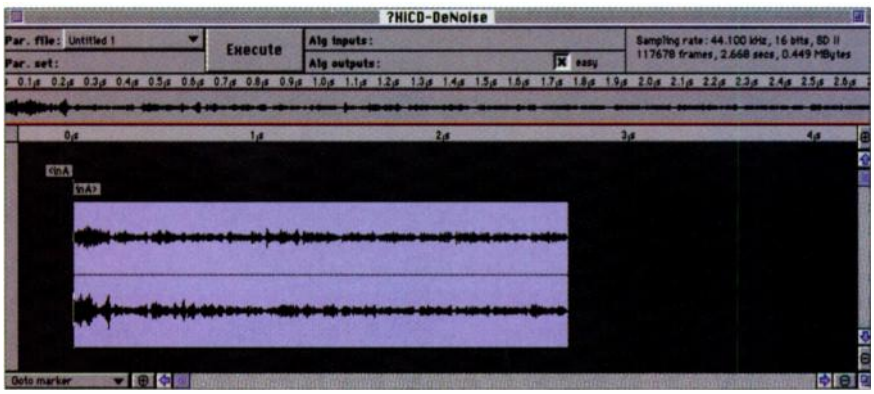

FIG. 1: A stereo sample in *Artist*'s Sample Editor window. Note the function bar at top.

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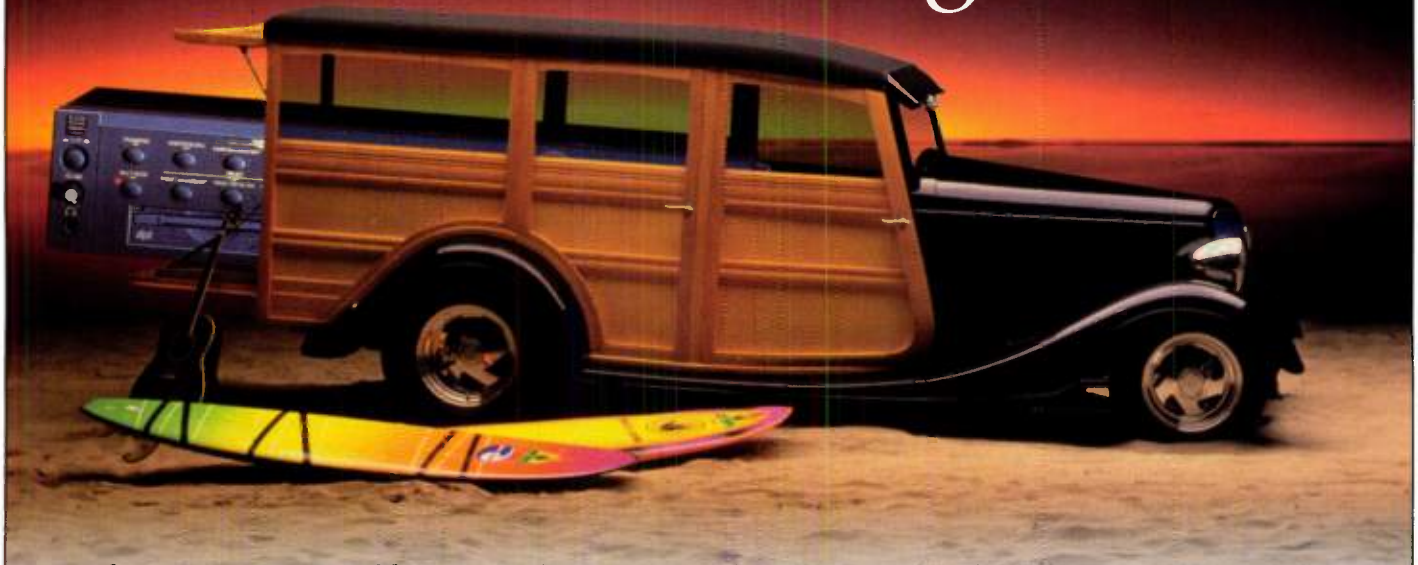

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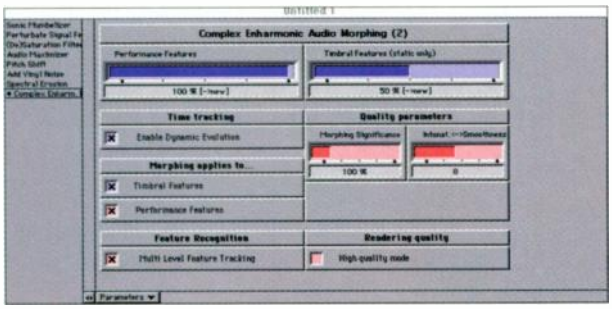

FIG. 2: The Parameter Editor shows the parameters of the currently selected DSP algorithm. Blue sliders control Easy parameters, which usually have a great influence on the resulting sound. Red sliders control Expert parameters, which are for fine-tuning.

labeled "Easy" as a workaround. This check box automatically routes *SonicWorx*'s inputs and outputs appropriately for the currently selected plug-in and sound file. Of course, user input is required in some situations, such as choosing which portions of particular sound files are to be used by the program's morphing algorithms. In general, though, the Easy check box was just that; an easy way to get going with the current algorithm.

THE PLUG-INS

Having chosen the sound files to be processed, it's on to the *SonicWorx* algorithms. These appear in the Algorithms menu and are grouped into nine categories for easier access: Utility Algorithms, Mathematic Operations, Envelope & Dynamics, Frequency Domain Filters, Spatial & Phase DSP, Timebase & Pitch Correction, Special EFX/Sound Design, and Audio Rendering Levels I and II.

Space limitations prevent an in-depth discussion of each of *SonicWorx Artist*'s plug-ins, so I will try to give an overview of the various algorithm categories and focus on the ones that are the most unusual and powerful.

UTILITY ALGORITHMS

The Utility Algorithms area provides a range of tools for signal adjustment, including DC Offset Removal, Fades, Phase Invert, Normalize, Pitch Transpose, Reverse, Sample-Rate Conversion, and Swap Channels (flip the channels of a stereo file so that right becomes left and vice versa).

Most noteworthy here is the presence of exponential fade-in/out, exponential fade with offset, and ramp up/down algorithms, which produce different types of fade curves. In case you are wondering about the inclusion of a pitch-transpose algorithm under the Utility heading, you should note that this is simply a straight pitch shift without time compression, so the length of the sound file being transposed will vary accordingly. True time-independent pitch shifting is handled by the Pitch Shift algorithm, which I'll cover later. Time compression/expansion without pitch alteration is done by the Audio Time Compress/Expand plug-in, also covered later.

MATHEMATIC OPERATIONS

Next in the algorithm groups we have Mathematic Operations, which are just as utilitarian in many respects as the Utility algorithms but perform different functions. Under this heading are Absolute Sample Value, Add Channels, Center Clipping, Multiply Channels, Scale Volume, Sign Conversion, Square Root Distortion, Subtract Channels, Transform & Divide, and Transform & Multiply.

Among these algorithms, I particularly liked the Center Clipping and Square Root Distortion. Center Clipping is good at making rhythmic material sound like it's being played through a broken system, and Square Root Distortion gives a "digital sounding" but somewhat smooth fuzz effect.

ENVELOPE AND DYNAMICS

The Envelope and Dynamics plug-ins offer various forms of amplitude-envelope modification. They are Apply Envelope (impose the envelope of one sound file onto another), Invert Envelope (same as Apply Envelope except the envelope is inverted, so that high values become low and vice versa), and Remove Natural Envelope, which completely strips away amplitude changes in a sound file, (an effect similar to extreme compression).

My favorites here are the first two, which allow wonderful rhythmic/tonal effects to be created by combining purely rhythmic material with harmonically and texturally interesting material. These effects are like much more sophisticated versions of the tried-and-true technique of gating a sustaining texture with a drum or rhythm track.

FREQUENCY DOMAIN FILTERS

With the Frequency Domain Filters plug-ins, we begin to get into some of *SonicWorx*'s more exotic and unique processing algorithms. In this category, we have a (De)-Saturation filter, Vocoder (band-reversed), Harmonic Contour EQ, Moving Contour EQ, Van-der-Pol filter, Vocal Refresh, Vocoders 1 and 2, and Wavelet Signal Reduction.

My favorites are the Vocoders, EQs and Wavelet Signal Reduction. The band-reversed Vocoder gets its name from the fact that its internal analysis/synthesis filter banks are routed in reverse order to a conventional vocoder: low-frequency input components affect high-frequency output components. This algorithm produces some very interesting sounds. The Vocoder 1 and 2 plug-ins are designed for processing percussive and sustaining sounds, respectively.

According to the engineers at Prosoniq, these algorithms are a digital simulation of an 18-band, high-quality, EMS hardware vocoder. Not being familiar with that particular brand, I can't comment on how closely they simulated it, but I like the sound of all three algorithms very much. This is not a real-time program, so you must pick the carrier and modulator sound files, do the processing, and listen to the results, which is not the way vocoders are normally used. However, these algorithms are powerful and worth experimenting with.

The Harmonic Contour EQ (like many *SonicWorx* plug-ins) is unlike any other effects algorithm I've used. It adapts to the input signal and allows you to make changes in the formants of a sound. It features three special-effect options: Add Irregularities, Add Dirt, and Nicotine Voice. Superficially, the results it produces can sound reminiscent of using multiple phase-shifters

System Requirements

Mac with 68040 CPU or 680X0/FPU (no software FPU), 8 MB RAM, System 7.1 or higher, Sound Manager 3.0 or higher. Power Mac strongly recommended; some plug-ins will not run on 680X0 machines.

For manufacturer information, please see Contact Sheet, p. 163.

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simultaneously. However, the effects produced by this plug-in are difficult to describe; the term "EQ" is a bit misleading here. Using the plug-in on the same audio material several times in a row also yields unusual and interesting effects. In general, it is good for dirtying up sounds as well as for subtle timbral modifications.

The Wavelet Signal Reduction algorithm uses arcane processes to deconstruct sound files. Particularly effective in rhythmic material, this plug-in can turn drum loops into gurgling, muffled, and generally funky shadows of their former selves. I had lots of fun with this one, especially when using it in small degrees.

SPATIAL & PHASE DSP

The Spatial & Phase DSP plug-ins are called APEM De-Reverberation and Virtual Room. These remove (yes, remove) and add reverb to sound files, respectively.

Right off the bat, the notion of being able to actually remove ambience from a sound is novel, and I was skeptical. Remarkably, the program does manage to perform this function to an impressive degree.

The plug-in has sliders for controlling the percentage of reverb removed and the high-frequency phase correction. There are two basic modes of operation here: one gives you the original sound with the chosen percentage of reverb subtracted from it, and the other gives you only the removed (reverberant) portion of the sound (see **Fig. 4**). Also, using the High Quality/Less Reduction check box lets you attempt to preserve the highest fidelity, at the expense of the reverb-removal process.

For the purposes of testing, I used a single-bar drum loop (the famous and overused "When the Levee Breaks" beat, which I chose because its sound is so familiar) and applied the De-Reverberation plug-in to it. What I ended up with sounded a bit like gated ambience: the individual drums were quite distinct, and a substantial amount of space had been created in the sample. Overall, the process worked, making the drum ambience "smaller." There was noticeable timbral alteration after using this plug-in, which took the form of an extra "crunchiness" in the case of this drum loop.

However, during the course of experimenting with different settings (using extreme amounts of reverb

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1 2 3 4 5

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CONS: Plug-in architecture is proprietary. Manual is not detailed enough. Copy-protection dongle conflicts with dongles for some other programs.

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removal without the High Quality button enabled), I occasionally produced results in which the timing of the loop had been altered and the original feel had been lost. This problem is fixable, of course, by using a program like Steinberg's *ReCycle*, but it is nonetheless an undesirable artifact. Still, for the most part this plug-in does what it says it does, and that is remarkable.

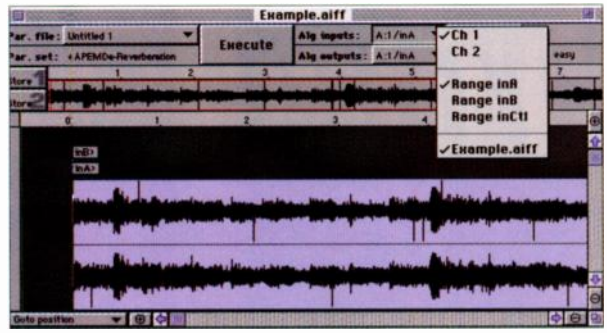

FIG. 3: In *SonicWorx Artist*, you route sounds between plug-ins by selecting a portion of the sound in the Waveform Editor and assigning its destination using the routing flip menu at the top of the Waveform Editor window.

The Virtual Room plug-in complements the De-Reverberation algorithm, offering Ambience, Room, Wide Room, and Hall presets. Control is provided over wet/dry mix, reverb decay time, cold/warm character, and diffuse/reflective character.

Although one might question the need for such a (non-real-time) algorithm in this age of inexpensive, high-quality hardware reverbs, I liked the sound of the reverb very much. Would I use it in place of my Lexicon PCM 80? No, but that doesn't mean I wouldn't use it.

I experimented with adding reverb to various types of sound files, from voices to percussion and guitars. Overall, they tended to be musical and transparent sounding. I definitely liked the results.

TIME BASE/PITCH CONVERSION

Three time-base and pitch conversion plug-ins are included with *SonicWorx Artist:* Pitch Designer, Pitch Shift, and Audio Time Compress/Expand. The somewhat confusingly named Pitch Designer is especially interesting. Although it won't let you actually redraw the pitch content of a sample (as the name might imply), this plug-in is capable of a wide range of effects, depending upon the settings of its few parameters.

According to Prosoniq, Pitch Designer dynamically (over time) shifts different frequency components of a sample independently by different amounts. In practice, I found that I was able to produce effects ranging from filter-like sweeps and static resonances to drastic EQ-like effects and quasi-ambient effects that faded in and out over the duration of the sound. At first, it was almost impossible for me to predict what setting would produce specific results, but after I played with Pitch Designer's parameters, I began to learn how to control it.

This is a potent plug-in, and the only way to really understand it is to experiment with it. I was surprised at the extent of its capabilities and particularly liked it on drums and other rhythmic material.

The Pitch Shift plug-in produces conventional pitch-change effects and can shift as much as an octave up or down. The original tempo of the source material is maintained. Four quality levels are available (Poor, Better, Good, and Excellent), and a Timbrewizard check box attempts to preserve the original timbral quality of the source after shifting.

I found the quality of the pitch shift at the Excellent setting to be good, though the plug-in seemed to have some trouble with harmonically complex sounds, such as multi-instrument synthesizer samples. (Admittedly, I'm a bit spoiled in this department by the Eventide DSP4000, which, at $4,000, is in a different league.) The pitch-shifting algorithm is useful, but this is not the task for which I'd usually turn to *Artist*. These days, you can find plenty of dedicated, real-time hardware devices that do this better.

Finally in this category is the Audio Time Compression/Expansion plug-in, which uses the same TIDE time-scaling algorithm as the Pitch Shifter. There are only two parameter sliders here—New Sample Length and Tracking Strength—in addition to the same four quality buttons found in the Pitch Shift plug-in.

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I was a bit puzzled by the behavior of this plug-in when performing time expansion. With a 1-bar drum loop set to 200 percent time expansion (so that the processed audio is twice the length of the original), *Artist* slowed down the sample's tempo appropriately and quite well, but it didn't change the length of the sound file. This meant that the 1-bar pattern was cut off before its natural end.

With other programs of this type, such as Steinberg's *Time Bandit,* the actual file length is altered to conform to the chosen amount of compression or expansion. According to Prosoniq, *Artist* works as it does because the program supports "raw" audio files, and in those cases it knows nothing about the file header's contents. Thus, changing the length could destroy part of the file. This means that manual file length adjustment is necessary if you want the processed file to be the right length. This is apparently going to be done automatically in an upcoming version.

In terms of quality, this plug-in was good but not spectacular. I define "spectacular" in this case as "the processed sound file was free of perceptible artifacts and had very defined pitch and unaffected timing." To my ears, the two programs that come closest to achieving this to date have been Steinberg's *Time Bandit* and Opcode's *Studio Vision Pro* 3.0. I didn't feel that *Artist* completely equaled these two programs in this particular area.

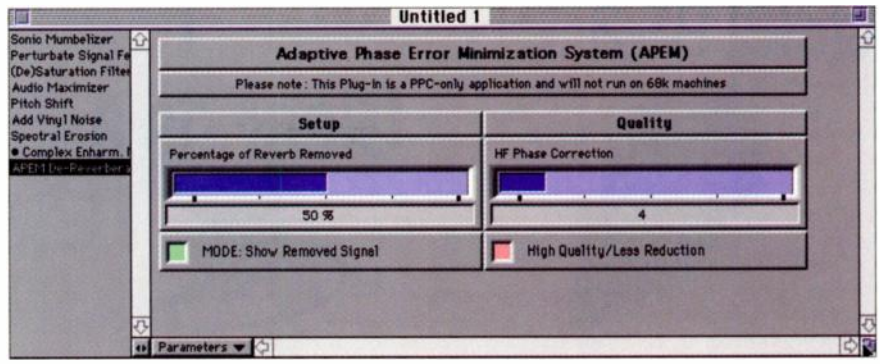

FIG. 4: The Adaptive Phase Error Minimalization plug-in actually removes reverb from a sound file. The Mode button lets you select between the sound without reverb and the removed (reverberant) portion of the sound. The High Quality/Less Reduction check box tries to preserve top fidelity by doing less reverb removal.

SPECIAL EFX/SOUND DESIGN

This is where the fun starts. These plug-ins are squarely in the effects category, and are capable of interesting (and often humorous) results. They include Add Vinyl Noise, Bit Reduction, Drum Loop Jungleizer, Wavelet Alienize, Ring Modulator, Sonic Disperse, Sonic Crowder, Sonic Electrify, Sonic Mumbelizer, Sonic Threshold, Spectral Erosion, Transwave Cycle, Telephone Line Simulator, Tubulator, and Wow & Flutter.

If these sound weird, it's because they are. Favorites here were the Drum Loop Jungleizer, Sonic Mumbelizer, Sonic Threshold, and the Telephone Line Simulator. The Drum Loop Jungleizer is hard to describe, unless you're familiar with the more "industrial" parts of the jungle/drum 'n' bass world. Essentially, it alters the harmonic content of the individual drum hits in a loop, adding complexity and generally making things funkier.

There are no parameters for this plug-in; it's a take-it-or-leave-it proposition. It's extremely specialized and not everyone's cup of tea, but I like it. It's a great tool for getting new life out of old loops, changing their timbral quality while leaving the feel and music intact.

In sillier territory, we have the Sonic Mumbelizer. This algorithm has six amusing presets; SF Voice, Adult Robot, Hi Speed Bodily Rotation, Centrifugal Power, Motoric Confusion, and Complete Nonsense. These might be somewhat self-explanatory, but here are my impressions. In general, these presets slice and dice a sound file and/or add strange, resonant overtones. Motoric Confusion, Centrifugal Power, and Complete Nonsense do more of the former, sounding a bit like the Time Scrambling preset on Eventide's old SP2016 or Stutter on the H3000. SF Voice and Adult Robot are more resonant sounding. I got some interesting and subtle results on drum loops with SF Voice, so by no means does this plug-in have to be restricted to voice processing. Good stuff.

Sonic Threshold is another hard-to-describe plug-in. Essentially, it adds a shimmery cloud of overtones that varies in intensity with the amplitude changes of the source sound. Often, these overtones can completely replace components with sharp attacks in a sample.

Two parameters, Threshold and Threshold Randomization, control the intensity of this effect. What I found particularly interesting here is the huge range of effects variations that are possible through careful adjustment of these two parameters. With drum loops, it is possible to turn the lowest-level sounds in the loop (hi-hats, for instance) into unrecognizable, soft metallic blips, while leaving the more prominent kick and snare hits quite natural sounding. This unusual effect essentially allows "new" loops to be created from old ones.

Though certainly not a new effect, the Telephone Line Simulator goes further than any device I've seen toward achieving this sound convincingly. Ten different effect presets are offered, along with an ISDN Quality button, which was pretty amusing. The ten presets' self-explanatory names are worth listing: Clean Line 1 & 2, Analog Classic Phone, Telephone Interview, Graveyard Phone, This Is Your Captain Speaking, Outer Space, Oversea, Digital Connection out of Range, and Anonymous Call from Phobos III. I quite liked this on individual instrument parts (particularly drums) as well as on vocals.

AUDIO RENDERING LEVEL I

According to the *SonicWorx Artist* manual, this plug-in category contains plug-ins that are completely based on neural-network processing. The category contains Cellular Morph, Upward Expansion, and Downward Expansion.

The Cellular Morph algorithm analyzes two sound files and creates a morphing transition between them. Don't let this description fool you, however; this algorithm isn't designed to simply do a conventional morph between two sounds. Rather, it uses the process of morphing as part of its method of transmuting two sounds into a third, completely new timbre. Parameters

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provided are Cell Size (the length of the extracted audio segments used to create the morph), Movement Speed (length of the final morphed sound), Morphing Zone (the length of the morph transition), Cells<->Plane (the separation between the single segments used to create the morph), and Inverse Segmentation (see Fig. 5). This is a stereo algorithm, so it can produce interesting stereo "atmospheres"—depending, of course, on the source sounds.

I found it hard to predict the results of using any two sound files. However, I did enjoy myself in the process of experimenting with it. It's possible to obtain interesting and unusual sounds using almost any two source sounds. I tried combinations of drums and voice, guitar and synth samples, percussion and speech, and others, and in all cases I got surprisingly interesting results.

The Upward and Downward Expansion plug-ins transpose the timbral

SONICWORX STUDIO

Prosoniq's *SonicWorx Studio* ($995), which requires a Power Mac, allows you to use all the capabilities of *Artist* by sharing the *Artist* plug-ins folder and provides additional plug-ins and real-time DSP processing features that are intended for use in post-production (mastering). The program also includes a useful and powerful multiple undo/redo feature.

The first of *Studio*'s plug-ins is called the Rubberband Equalizer, a graphical EQ that allows you to draw EQ curves with a breakpoint/graph interface. This EQ offers 12 dB of boost and 48 dB of cut from 0 to 21.6 kHz. I liked the precision and clarity of its sound and found it to be capable of enough subtlety to be useful even on a stereo mixdown. My only complaint is with the interface; Option-clicking inserts a breakpoint on the graph, which is fine. However, to delete the breakpoint, you must drag it off to the left or right and release the mouse. This is just silly.

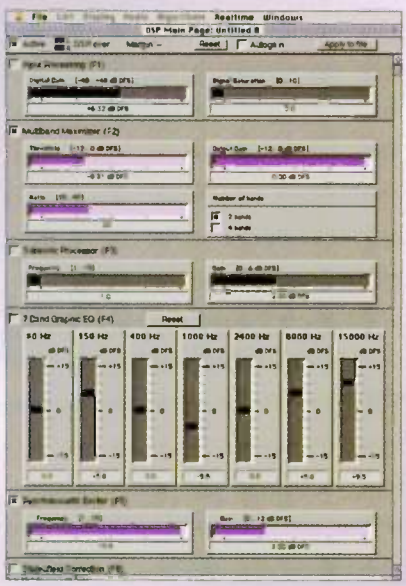

FIG. A: *SonicWorx Studio*'s DSP Main Page provides real-time processing and analysis functions for use on finished mixes or real-time input.

In the Pitch Shift/Time Compression/Expansion department, *Studio* offers Mixdown Pitch Scale I and II and Mixdown Time Scale I and II. Version I of each plug-in is general purpose; version II is intended for percussive sounds in particular. I wasn't floored by the quality of the time and pitch manipulation offered by these plug-ins. My comments from the Audio Time Compression/Expansion plug-in in *Artist* apply equally here.

The Post Production/Mastering category contains a number of specialized plug-ins, the most unusual being the Neural Drum Processor and De-Noise/De-Crackle algorithms. In addition to these, the Natural Pitch Transpose algorithm from *Artist* is included, as is an Audio Refresh plug-in.

The Neural Drum Processor plug-ins attempt to give you control over the relative balance between drums and sustained sounds/instruments in a finished mix. Needless to say, this is a very ambitious undertaking and has never been successfully achieved, to my knowledge. Two variations of this algorithm are provided: version II is less memory intensive, for users with less RAM.

I tested the algorithms with a number of long samples of records. Results varied, but I was surprised at how well these plug-ins deliver. I was able to noticeably, though not drastically, boost and cut the apparent level of the drum kit in most cases. Predictably, you pay a significant sonic price in the form of artifacts when attempting noticeable changes in a mix. As a result, I can't really recommend these plug-ins for modifying a finished mix. However, for applications such as sampling, they could prove valuable.

Audio Refresh is a multiband spectral enhancer designed to "refresh" audio recordings by synthesizing additional harmonics. Control over the Refresh Intensity is provided, as are four Frequency Linearization settings in case the Refresh processing adversely effects the frequency balance of the material. It's important to apply this type of processing in moderation; there's often a high "hype" factor to the resulting sound if used to excess.

The Hybrid Neural Denoising System plug-in does broadband noise reduction. Results depend to an extent on the material being processed. I was able to remove various types of noise from a collection of samples but encountered audible changes in high-end content and phase.

The Strict De-Click/De-Crackle algorithm is much more effective and transparent in its operation. I successfully used it to remove vinyl-record surface noise and miscellaneous clicks and pops from various samples.

DSP Main Page

SonicWorx Studio's DSP Main Page (see Fig. A) offers a number of real-time processing and analysis functions for use on finished mixes or real-time input. The first stage converts sound files to 64-bit representations to prevent clipping and allow for the additional information added by the various DSP modules.

The Multiband Compressor/Maximizer can function as either a 2- or 4-band compressor with threshold, ratio, and output gain controls. I wasn't wild about this module. I found it unsubtle, and the inability to select the frequencies of the bands was frustrating.

The Subsonic Processor is intended to enhance the low end of a

(sidebar continued on p. 136)

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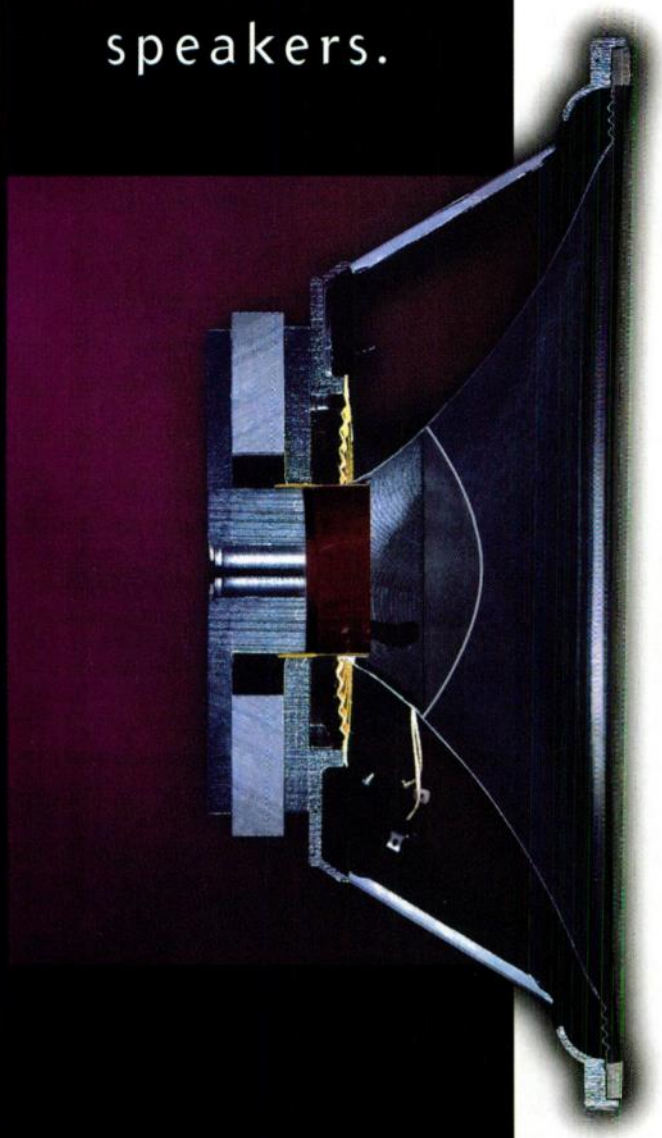

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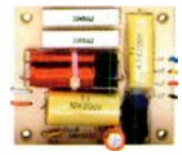

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features of a sound file up or down without affecting the basic tuning or length. The more harmonic content is present in the source sound, the more pitch movement will occur. This dependence on the characteristics of the source sound differentiates these plug-ins from conventional pitch shifter/transposers. For example, a drum loop might hardly yield any movement, whereas a sine wave could be tuned to another pitch.

One interesting application I discovered for this plug-in is applying it to one channel of a long, stereo ambient sample with fairly stable harmonic character. The result is that one channel is timbrally altered and transposed by an

(continued from p. 134)

mix by synthesizing subharmonic partials. It's pretty easily controlled, yielding a result not unlike careful low-end equalizing. I can see it being helpful for squeezing a bit more "oomph" out of a mix after the fact.

The 7-Band Graphic EQ provides fixed 60, 150, 400, 100, 2,400, 6,000, and 15,0000 Hz bands, with 15 dB of cut or boost. For mastering applications, seven fixed bands aren't enough, but this feature is a useful shaping tool nonetheless. If a more flexible equalizer is required, use the Rubberband EQ.

The Psychoacoustic Exciter is capable of enhancing a dull-sounding mix and works particularly well with the Subsonic Processor to help extend the upper and lower frequency ranges of finished mixes. Small amounts are key here; too much of this effect gets ugly really fast.

Stereofield Correction gives control over pan balance and stereo width. It's a simple but important corrective tool, though if your mix has problems on this basic level, I'd consider remixing. The Stereo Width control has a fairly small useful range; values outside this range introduce obvious phase problems.

The Phase Alignment module realigns the frequency components of a signal for use in vinyl mastering. Not doing any of this type of work at the moment, I didn't have the opportunity to put this to the test.

The Output Processing section is primarily a digital headroom control in the form of a single slider. It's also where the program converts from its internal 64-bit resolution back to 16-bit. A High-Precision Dithering button is provided, along with a 0.2 dB U-matic Headroom button. The latter ensures that the final output of *Studio* will have a small margin of headroom for the purposes of CD mastering; compressed full-level signals can sometimes cause problems with the U-matic machines often used in the CD-mastering process.

Real-Time Displays

SonicWorx Studio has three real-time displays for analysis of sampled or live audio: the Analyzer window, Stereo Correlation Display, and Level Meter. Each provides control over peak-hold time, and all are presented in easy-to-read, high-contrast colors. Because of a quirk in the display engine in version 1.0, the displays require a few seconds to "catch up" when used with samples on disk; very short samples are a problem because it's possible for the sound to be over before the displays have caught up. (This has been fixed in version 1.1.) A good phase-correlation display is usually the domain of expensive mixing consoles, so its inclusion here is a nice bonus.

The spectral analyzer displays 31 bands between 25 Hz and 20.1 kHz and is essential for a program of this type. This display helps tremendously with many areas of *Studio*, particularly EQ and compression, as you can immediately see (as well as hear) the results of your tweaks.

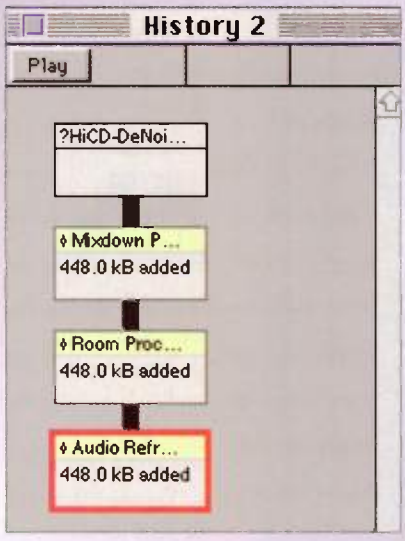

FIG. B: *Studio*'s History window provides a tree-style representation, in chronological order, of all processing applied to each sample in the current session.

History

One of my favorite aspects of *Studio* is the History window (see **Fig. B**), which provides a graphical tree-style representation, in chronological order, of all the processing you've applied to each sample in the current *Studio* session. Each stage of processing is represented by a titled icon which can be used to revert the sound file back to that stage simply by double-clicking on it. This makes it easy to see and hear what you've done, the order in which you did it, and the original sound. A separate, independent History window is created and maintained for each sound file you work with during a *Studio* session, which is very useful. I wish all similar programs had this feature.

Sum and Difference

As with *SonicWorx Artist, Studio* seems best for sound design. This is not to discount its mastering and post-production applications, but to be a top contender in this area, more control and flexibility is necessary, especially in the DSP Main Page. For example, this page is currently set up such that all the DSP modules are connected in a predetermined, "hard-wired" chain which can't be altered in any way. To be a truly flexible, configurable mastering tool, these modules should be able to be arranged in any desired manner.

But as a sound-design and multipurpose processing program, like *Artist, SonicWorx Studio* is amazing. Mac-based sound designers who don't have it are missing out on a very important tool.

SOUND ADVICE.

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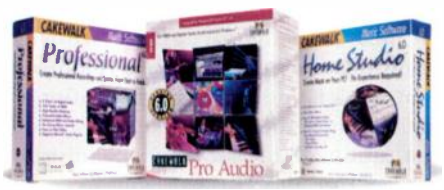

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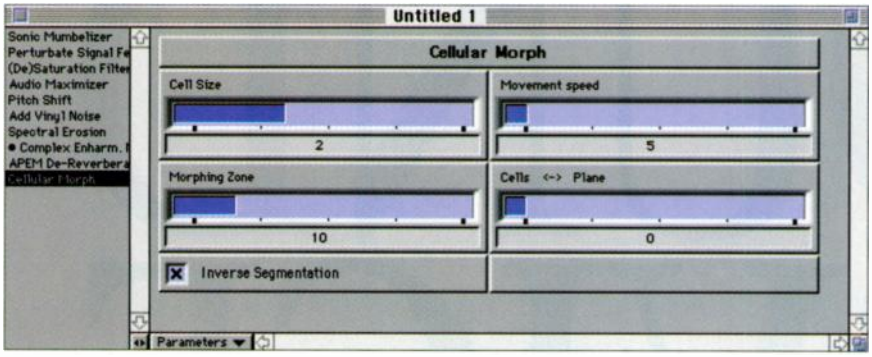

FIG. 5: The Cellular Morph algorithm analyzes two sound files and creates a morphing transition between them to create a new sound. Cell Size controls the length of the source audio segments, Movement Speed sets the length of the new sound, Morphing Zone determines the length of the morph transition, and Cells<->Plane sets the separation between the source segments.

amount controlled by the Tuning Adjust slider (the plug-in's only parameter), while the other channel is left untouched. The contrast between the two channels was interesting in a number of cases. In general, this plug-in seems best suited for the creation of sustained textures and soundscapes.

AUDIO RENDERING LEVEL II

This category contains *Artist*'s most sophisticated plug-ins, apparently based entirely on neural-network processing.

The included algorithms are Atmosphere Designer, Apply Features, Timbral Sound Morphing, Structural Sound Morphing, and Complex Enharmonic Morphing 1 and 2. According to Prosoniq, the Timbral and Structural Morphing plug-ins are intended for use with single-instrument samples. The two Complex Morphing plug-ins are for use with complex, multi-instrument signals.

Right from the start, these plug-ins caught my attention. Atmosphere Designer yielded stunningly unexpected sounds nearly every time, with a wide variety of sound sources. It can transform just about anything into a weird and ethereal sci-fi soundscape. Four parameters are provided: New Sample Length/Tempo, Atmosphere Diffusion, and Atmosphere Depth. Coolness in the extreme.

Apply Features is another great plug-in. It is designed to impose the timbral characteristics of one sound onto another. With a slider for Performance Features (which determines the extent to which the amplitude envelope of the source sound will be imposed on the second sound), two sliders for Rendering Tolerance and Intonation<> Smoothness, and four preset effect-depth choices, many different effects are possible through the use of various types of source and target samples. I found this plug-in a bit unwieldy at first; I made a number of attempts that produced rather ugly, unsubtle sounds before I got a handle on how to tweak the parameters effectively. In the end, cool sounds abounded.

I found that obtaining successful results when working with the various morphing plug-ins was mainly a function of what types of sounds I was morphing coupled with lots of parameter-tweaking experiments. These plug-ins don't provide a simple, clean, straightforward morph between two sounds in all cases. Instead, they seemed to use the two source sounds as starting points to create new timbres with some characteristics of each source. I wouldn't entirely rule out the possibility of using them to do straight morphs, but if this is all you are interested in, you might be disappointed.

It may be that my findings with the morphing plug-ins are simply due to the fact that the *Artist* manual offers no help on tweaking parameters effectively to suit various situations. The manual is the only part of the *SonicWorx* package that I found disappointing.

DISAPPOINTMENTS

Although clearly written, the *SonicWorx Artist* manual simply doesn't go into enough depth regarding the use of the plug-ins. Algorithms and parameters are briefly explained, but examples of how to apply the various plug-ins are sorely lacking. In addition, the plug-in routing scheme (which has considerable confusion potential) could have been described in more detail and with more examples. Only after a few e-mail messages back and forth with Prosoniq did I begin to fully understand how to handle the routings. Software as complex and unique as this deserves a manual to match.

Another headache is that *SonicWorx Artist* and *Studio* each require their own ADB hardware key (dongle). This can be problematic if you're running other dongle-protected applications such as Emagic's *Logic Audio* at the same time. I experienced crashes with *Artist* and sometimes with *Studio* when I ran either of them after using *Logic Audio* and quitting it. According to Prosoniq, this is remedied by running *Artist* when you first boot your machine and then quitting and running the other programs (if you need to). This did greatly reduce the number of crashes, to the point where they *almost* disappeared entirely. I should emphasize here that these crashes happened as a direct result of the dongle, not because of the programs themselves. I realize that dongles are a necessary evil, but frankly I'm sick of this sort of thing, especially because I frequently need to use the dongle-protected *Time Bandit, Logic Audio,* and *Artist/Studio* simultaneously. Ugh!

POWER TOOLS

There's not enough space here to cover all the functions, details, and subtleties of *SonicWorx Artist.* Prosoniq has broken new ground here; *Artist* and *Studio* are amazing programs whose sophistication and power are reminiscent of high-end, esoteric applications such as those developed by academic institutions like CCRMA (at Stanford University) and IRCAM. The exceptional thought, imagination, and technical expertise at work here is obvious within minutes of using the software. Developers Stephan Sprenger and Frederic Schilling are to be congratulated for their hard work.

I found *Artist* to be invaluable for processing and sound design. Clearly, this is a special program for people who love working (playing?) with sound and exploring new possibilities.

Peter Freeman *is a freelance bassist, synthesist, and composer living in New York City. He has worked with such artists as John Cale, Jon Hassell, Chris Spedding, Nile Rodgers, Shawn Colvin, L. Shankar, Sussan Deihim, Richard Horowitz, and Seal.*

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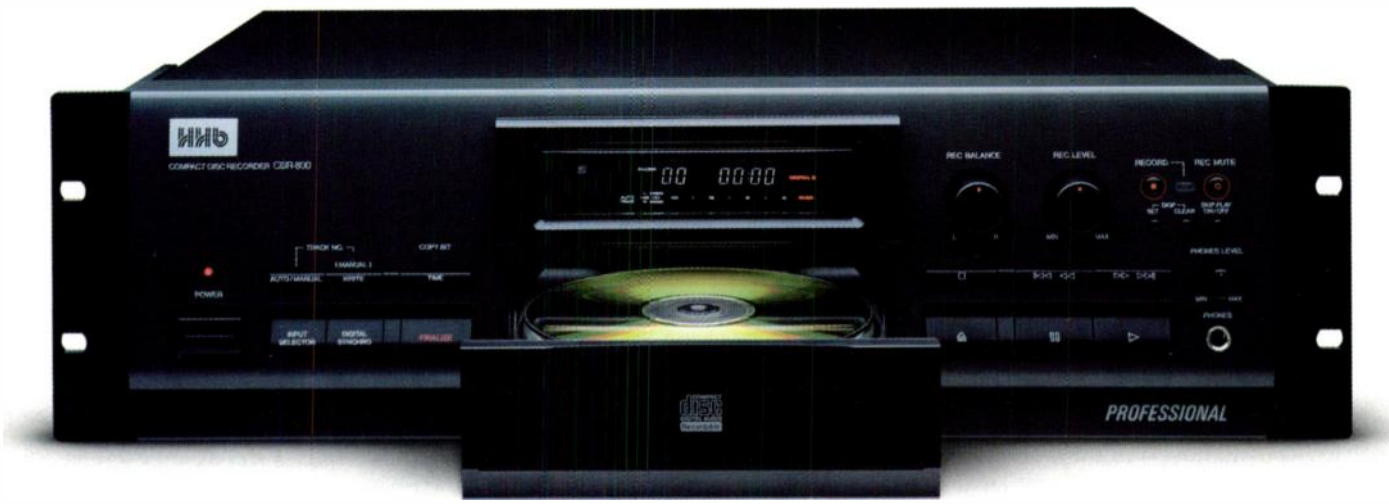

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MARK OF THE UNICORN

MIDI TIMEPIECE AV

Centralized sync and a MIDI patch bay, too!

By Erik Hawkins

In recent years, the typical MIDI project studio has grown to encompass much more than just an assortment of MIDI instruments and a personal computer. To keep pace, MIDI interfaces have also evolved, and a growing number of products now offer multiport and patch-bay functions.

But sophisticated synchronization capabilities (the kind often demanded by digital audio, video, and multimedia production systems) have traditionally been viewed as the domain of big-ticket studios—until now. Mark of the Unicorn (MOTU) has reached another rung on the evolutionary ladder with its MIDI Timepiece AV, an 8-in/8-out MIDI interface that includes patch-bay capabilities and a bevy of powerful and extremely useful synchronization functions.

With a price tag of less than $600, the MIDI Timepiece AV (MTP AV) brings to the personal studio a number of coveted features such as ADAT sync, video sync, master word-clock output, SMPTE/MTC read/write capability (with jam synching and freewheeling), and 128-channel MIDI capacity. All of this comes in a single-rackspace device that will operate with either a Mac or a PC and can network with other MIDI Timepieces.

The MIDI Timepiece AV comes with individual manuals for Macintosh and PC users. Mark of the Unicorn also supplies the appropriate interface cables and installation disks for each of these platforms. The installation disks include the MTP *Console* (front-end software for the MTP AV), FreeMIDI (MOTU's system extension for configuring your MIDI setup), and several example setup files.

FRONT AND BACK

The MIDI Timepiece AV closely resembles MOTU's earlier MIDI Timepiece II, sporting a black front panel and the familiar unicorn logo. In fact, you can connect a MIDI Timepiece II and a MIDI Timepiece AV together to expand your system. The MTP AV will run on either 115 or 220 VAC; a recessed switch on the side allows you to change the voltage setting.

The front panel of the MIDI Timepiece AV is nicely laid out. Almost all of the MTP AV's functions can be accessed from its front panel. Starting from the left, you'll find two MIDI jacks (these are MIDI In and Out ports number 8), a ¼-inch footpedal jack, a Mac/PC selector, two rows of LEDs indicating MIDI status and time-code activity, a 2-line backlit LCD (which provides, among other things, a continuous readout of SMPTE time), four knobs and two buttons for scrolling through pages and adjusting parameters, a dedicated panic button, and a power switch.

On the rear of the unit there are seven MIDI In and seven MIDI Out jacks, BNC connectors for Video Sync In and Word Clock Out, ¼-inch SMPTE In and Out jacks, an ADAT Sync Out port, a PC parallel port, a Mac serial port, and another footpedal jack. There is also a bidirectional network port located next to the Mac serial port, which can be used for "daisy chaining" multiple MTPs. The port accepts an RS422 cable—the same one that is used to connect the MTP AV to a Mac. Power is supplied through an IEC type 2 removable cable.

SETTING UP

I tested the unit with a Macintosh, but if you want to have both a Mac and a PC hooked up to the MTP AV simultaneously, the Mac/PC selector allows you to quickly switch between platforms without unplugging anything. What's more, if you connect a Mac to the network port and a PC to the parallel port, the MTP AV can actually exchange MIDI data with both computers simultaneously.

The MIDI Timepiece AV can also be operated without a computer. This makes it ideal in situations where you either don't have a computer at your disposal or you just don't feel like turning one on. (Sometimes I like playing my keyboard without having computer fans roaring away.)

At first, I tried using the MTP AV without a computer to see how easy it would be. Basic MIDI patching is fairly straightforward, and I managed to accomplish that much without even looking at the manual. More advanced programming, however, (MIDI muting, programming knobs to send controller data, changing SMPTE start times, etc.) becomes tedious using only the front-panel LCD. The amount of information presented in the 2-line window simply can't compete with what's offered on a computer screen.

Using the MTP *Console* software is easy and intuitive. I tested version 2.0, which requires FreeMIDI (you don't need FreeMIDI on a PC) and Mac OS 7.0 or higher. If you're familiar with older versions of this software, you'll feel right at home. If you've previously used a MIDI Timepiece, MIDI Timepiece II, or MIDI Express and you have your old settings saved, you can transfer those settings directly to the MTP AV. If you've never used FreeMIDI, however, be prepared to spend some time setting things up, especially if you have a complex MIDI system.

If you use software that requires Opcode's OMS system extension, MOTU provides OMS Emulator, which allows you to use FreeMIDI in place of OMS. The program is designed to fool Opcode's software into thinking FreeMIDI is in fact OMS. I tried it using *Vision* 3.0 but didn't have any luck—*Vision* wasn't fooled. I got better results just using OMS directly with the MTP AV. MOTU later informed me that FreeMIDI only emulates OMS Version 1 right now and that OMS Version 2

For manufacturer information, please see Contact Sheet, p. 163.

The MIDI Timepiece AV combines sophisticated MIDI interface/patch-bay features with an array of useful audio/video synchronization capabilities.

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- interactive knowledgebase for music education in primary schools (Music Teachers National Association);
- Sound & Music design for 30' animation (Wallace & Gromit, BBC);
- Della Reese's 'Gospel Retrospect' for symphony orchestra and choir (Lett Entertainment).

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emulation is still being developed. (I was using OMS 2.0.1.) MOTU also pointed out that FreeMIDI 1.33 or later (available by download from MOTU's Web site) provides OMS emulation as a Preferences option in FreeMIDI's setup software (rather than as an additional system extension).

IN CONTROL

The constraints of practicality prevented me from testing the MTP AV with all of the currently available MIDI sequencers. I did, however, test the unit with MOTU's *Digital Performer* 2.1 and Opcode's *Studio Vision* 3.0. My partner tested the MTP AV on a PC with Emagic's *Logic* 2.6.6 and *Cakewalk* 6.0. In all cases, the MTP AV worked fine.

Perhaps not surprisingly, the MIDI Timepiece AV works even better with MOTU's own software. *Digital Performer* can take full advantage of the MTP AV's ADAT Sync Out. The program provides a dedicated window that allows you to operate the transport controls and to record-enable tracks. I was able to do this with ADATs and with an E-mu Darwin. (The Darwin had an ADAT sync card installed and was not connected via MIDI to the MTP AV.) *Performer* can automatically detect ADATs connected to the MTP AV and set up the appropriate controls for the user. You can even power up your ADAT after booting up the MTP AV, and the ADAT will show up in *Performer*'s MIDI Machine Control (MMC) window after a few seconds.

Technically speaking, any software sequencer can send MMC messages through the MTP AV, and the MTP AV can translate those messages into ADAT commands. However, while most sequencers will transmit transport commands successfully, not all sequencers will transmit record-enable commands very well. According to MOTU, this is because the MIDI Timepiece AV requires certain nonstandard commands for these actions, and only *Performer* generates these. I managed to get *Vision* and *Logic* to send record-enable messages to the Darwin via MIDI, but I could not do so using the ADAT Sync Out port exclusively (i.e., no MIDI was connected, only the ADAT port). MOTU states that, currently, any OMS Version 1–compatible program can send record-enable commands to the ADAT via FreeMIDI's OMS emulation. (The ADAT appears as another device in the Studio Setup.) OMS Version 2 emulation, when available, will further expand compatibility, allowing any program to record-enable ADAT tracks.

PATCHES, SETUPS, MODIFIERS

The MIDI Timepiece AV is organized into eight basic programs called "Base Setups." Each Base Setup contains a user-definable set of parameters, which can include things such as SMPTE frame rates, pedal assignments, cable routing, and MIDI channel maps. Any change made from the front panel or the software is automatically added to the currently selected Base Setup.

If you wish to temporarily change a Base Setup without having that change written to memory, you use what's called a Modifier. A Modifier can be a single command (such as "mute patch changes on cable 8") or a set of commands (for example, "turn on pedal B, send MTC to cable 5, and assign Continuous Controller 7 to front-panel knob D").

The idea is that by calling up a Modifier (or several Modifiers) you can

MIDI Timepiece AV Specifications

Size	1U rack-mount
MIDI Ports	8 In/8 Out
MIDI Channels	128
Setups/Patches	8 Base Setups/127 Patches
Sync Types	SMPTE In/Out, MTC, Video Sync In, Word Clock Out, Digidesign Superclock Out, ADAT Sync Out
Other Inputs	2 footpedal inputs
Other Features	Front-panel LCD, assignable knobs, MMC support, can operate without a computer, can be networked with other MTPs.

quickly change a Base Setup by simply turning the Modifier on or off. Unlike Base Setups, which come already programmed in the MTP AV, there are no Modifiers in the unit until you create them. You can have up to 127 Modifiers, with each Modifier containing as many commands as you'd like; I've used as many as twenty. (The maximum number is limited by the MTP AV's internal memory, but I never ran out of space.)

Base Setups and Modifiers can be recalled from the unit's front panel or with *Console*. They can also be recalled via MIDI patch changes. To use MIDI patch changes, however, you must first create a Patch which contains a Base Setup and/or up to four Modifiers. The MTP AV can store 127 Patches, and Base Setups, Patches, and Modifiers can all be individually named.

Although Modifiers are a bit confusing at first (why not just have 127 programs?), they ultimately do make a lot of sense. You'll probably only need a couple of Base Setups (e.g., one for the home studio and one for live performing), so you'll want to keep those Base Setups unchanged most of the time. There will be times, however, when you need to temporarily turn on a controller or mute a conflicting SysEx message, for example. Modifiers provide the flexibility to make changes during a session or on a particular song without altering your regular Base Setup.

KNOBS AND PEDALS

The MIDI Timepiece AV has an impressive array of knob and pedal functions. The unit's front panel sports four infinitely turning, detented knobs. Normally, these knobs are used for scrolling through pages and adjusting parameters. However, they can also be used to send MIDI Note On/Off, Pitch Bend, Continuous Controllers, Mono/Poly Pressure, Program Change, and System Exclusive messages. In addition, a minimum and maximum value, a value per step, and a default value can be set for each knob. This is a very cool feature because it turns the MTP AV into a 4-knob control surface. Techno-heads who like assigning filter sweeps and modulators to knobs will especially appreciate this.

As mentioned previously, the unit also has two pedal jacks—one on the front panel and one in the rear. Both

jacks will accept momentary or latching foot switches (with either positive or negative polarity) as well as expression pedals from Korg and Roland. If you're using an expression pedal, you can also use *Console* to draw a custom curve (to provide a nonlinear response) for each pedal.

The front jack will also accept an Alesis LRC, another excellent feature. By converting the LRC's commands into MMC, the MIDI Timepiece AV turns the LRC into a control surface for your software sequencer. (Remember to slave your sequencer to MMC.)

The rear jack can also act as a click-to-MIDI input. Its threshold and decay times can be programmed, and the incoming click can be converted to a note, controller, or hex message. This is a useful feature for creating tempo maps or layering recorded sounds (such as a snare or a kick drum) with MIDI sounds. Unfortunately, the input does not recognize dynamic information, so it falls short of real trigger inputs like those found on the Alesis D4.

SYNC OR SWIM

For starters, let's review some basic terminology. There are two forms of SMPTE time code: LTC and VITC. LTC (Longitudinal Time Code), which is transmitted as an audio signal, describes locations in terms of hours, minutes, seconds, and frames. VITC (Vertical Interval Time Code) is the video counterpart of LTC and uses the same format for identifying locations. Musicians most commonly work with LTC, which is often referred to simply as SMPTE. The MIDI Timepiece AV can read and write LTC; it does not read or write VITC. (For a more thorough tutorial on time code, check out "That Synching Feeling" in the October 1996 issue of **EM**.)

The MIDI Timepiece AV can handle all three components of synchronization: time base, address, and transport control. As a time-base source, the MTP AV provides a stable, centralized time reference to which all the devices in a studio are synchronized. In other words, all of the devices measure the passage of time equally because they are all locked to a single reference source. The MTP AV can act as the time base itself, or it can distribute a centralized time base from another source.

"Address" refers to cue position and playback location. The MTP AV can receive an address from a master source (which may be a computer or a SMPTE time-code tone) and then send that address information to every device in the studio (e.g., every device should cue to 04:00:00:00, which equals bar 1 of your sequence and 05.00 on the ADAT). Alternatively, the MTP AV itself can act as a central address source for all devices.

The MIDI Timepiece AV locks to any incoming video signal (or "blackburst" house sync) through the Video Sync In jack and can lock the ADAT and your computer to the video's time base via proprietary ADAT sync and MTC, respectively. In addition, the MTP AV can lock your music to a video time base while deriving the actual address information from a separate SMPTE time-code source (connected to the SMPTE In jack).

▼

I was able to read and regenerate SMPTE, MTC, and ADAT sync simultaneously.

"Transport control" refers to such actions as play, stop, fast-forward, rewind, and record. As an MMC device, the MIDI Timepiece AV will respond to and distribute MMC messages to ADATs (connected to its ADAT Sync Out port) and other MMC devices (connected to its MIDI Outs).

The MTP AV works great as both a centralized "clock" and a synchronization tool. While it doesn't do everything (no TASCAM DA-88 sync or VITC), its bang for the buck simply can't be beat. It works great with ADATs and any other devices that accept ADAT sync, such as E-mu's Darwin hard-disk recorder (with the appropriate expansion card).

Digidesign users will be pleased to know that Mark of the Unicorn specifically designed the MTP AV to work with Pro Tools systems, including support for Digidesign's proprietary Superclock format. MOTU pointed out that it has done extensive testing of its audio phase-lock engine to optimize the MTP AV's performance with Pro Tools. As a result, Pro Tools users now have an affordable solution for synchronizing their systems to the outside world.

I was very impressed with the incredibly tight lock that I heard when I took a MIDI track (from *Performer*), recorded it to an ADAT, and listened back to both the ADAT track and the MIDI track simultaneously. The lock was tighter than anything I've been able to get using the Alesis BRC as the ADAT-sync-to-MTC converter. In fact, it was tighter than any sync involving MTC that I've ever heard, and I'm a real stickler when it comes to synching things. It's got to be nearly phase locked to impress me.

I was also able to read and regenerate SMPTE, MTC, and ADAT sync simultaneously, which allowed me to do all sorts of neat things. Using an external SMPTE tone on a video tape as my master, I drove three ADATs, a Darwin, a SMPTE-reading digital editor (*SoftSplice* from Digital Expressions), and a software sequencer (both *Performer* and *Vision*). And to get all of these components synchronized, I simply plugged the output of the video deck into the MTP AV's Video Sync In jack. The MIDI Timepiece AV definitely syncs *and* swims.

MARK OF THE UNICORN
MIDI Timepiece AV
MIDI interface/patch bay/synchronizer
$595

FEATURES ■■■■
EASE OF USE ■■■■▮
DOCUMENTATION ■■■■
VALUE ■■■■■▮
1 2 3 4 5

PROS: Versatile synchronization capabilities, supports MMC. Works with or without a computer. Programmable knobs and footpedal inputs. Well-written documentation. Works with Macs and PCs. Network connection allows expansion of system.
CONS: Does not support TASCAM DA-88 sync or VITC. No serial throughput switch.
CIRCLE #439 ON READER SERVICE CARD

I SYNC I'M IN LOVE

Before I unabashedly praise this product, let me get a couple of minor complaints off my chest. First, I wish the network output functioned as a throughput so I could send printer or modem information through the MIDI Timepiece AV as needed. Currently, I've just been unplugging and replugging cables. A serial switcher box is the only way to eliminate this problem. (MOTU recommends the Port Juggler by Momentum, Inc.; tel. 425/893-8100; fax 425/893-8200; e-mail sales@momenuminc.net; Web www.momentuminc.net) To be fair, though, I should point out that the MTP AV requires only one serial port connection for access to all of its features. So, people who have only a printer and an MTP AV are in good shape. Those of us with a printer, an external modem, and an MTP AV, however, are left to juggle three devices on two ports.

Second, the MTP *Console*'s transport controls are overly simple and limited to working with FreeMIDI applications. I discovered that *ClockWorks* (the software console that comes with MOTU's Digital Timepiece) is a bit more comprehensive and works with the MIDI Timepiece AV. But I still prefer Opcode's *AV Controls* (which comes with OMS) because it lets you name location points and create custom MMC devices without opening a sequencer. Neither of these gripes is terribly serious, although it would be nice if MOTU addressed them in the future.

Now for some praise. It's rare that I encounter a product that solves so many studio problems at once without bankrupting me, and the MIDI Timepiece fits this bill perfectly. Its ability to read and write SMPTE, generate ADAT sync, transmit MMC and MTC, and simultaneously resolve to video has solved 90 percent of my synchronization woes. The well-written manual, the user-friendly software, and the fact that the unit's front panel can double as a control surface are frosting on the cake. MOTU's years of making MIDI interfaces have really paid off—the MIDI Timepiece AV is great. I'm putting one in my studio.

Erik Hawkins *is an independent producer in Los Angeles County and the San Francisco Bay Area.* *He would like to give special thanks to David Earl for his assistance with this article.*

GENERALMUSIC

SK76

Powerful MIDI workstation meets auto-accompaniment keyboard.

By Julian Colbeck

The line between pro and home keyboards has been fading for some time. Until now, this has mostly been due to home keyboards gaining more professional sounds. But Generalmusic's SK76 and its partner, the SK88—the two models are identical in all aspects except that the SK88 has an 88-key, weighted-action keyboard—are part of a new breed of instruments that virtually obliterate the distinction. You could call them "workstations with accompaniments" or "home keyboards with pro synth editing."

These instruments are direct descendants of Generalmusic's popular SX3 Multimedia Workstation (reviewed in the July 1995 **EM**). I tested the SK76, which features a 76-key, semiweighted action sensitive to Velocity and Channel Pressure.

If you're into features, as I am, playing with the SK76 is an exciting prospect. A sample-based, subtractive synth, the 64-voice polyphonic SK76 has 8 MB of waveform ROM, which translates into some 600 ROM sounds. To supplement this, you can load your own sounds into the stock 2 MB of sample RAM, which is expandable to 32 MB. You get a 32-track sequencer, in-depth sound editing, mic/line inputs so you can sing along or accompany your sequenced parts on guitar, and a slew of handy features for creating and manipulating accompaniments. There is a jukebox song facility, and lyrics or scores can be shown on the display.

The operating system is in flash memory, so it is easily updated; in fact, if you have a Windows PC, you can download it as a zipped archive from the company's Web site. If you buy the optional interface kit ($249), you can also add a 500 MB, 2.5-inch hard drive, which is especially wise if you are going to add sample RAM.

I think the addition of accompaniments on an otherwise pro instrument is perfectly valid in these days of solo acts, songwriting studios, and multimedia. Being able to access samples from other manufacturers' libraries (or WAV files) is almost becoming *de rigeur*. This level of one-stop shopping has a definite appeal. But enough generalization; let's delve into this instrument.

THE HOME FRONT

The front panel is a little hokey, festooned as it is with glow-in-the-dark buttons and letter symbols printed beneath the keys. Some of these items actually relate to file naming, but it gives an uncomfortably amateurish first impression. Presumably, this is part of the SK76's home-keyboard heritage.

The screen is vast and is flanked by nice-looking rubber buttons, each of which is split in two. I stress the word "looking"; frankly, these buttons are too small and fiddly to operate. They also are almost the only pieces of panel hardware not illuminated, and they need to be lighted quite as much as any of the others. The design people obviously won this battle.

The soft keys around the screen might be a triumph of style over content, but overall, the SK76 looks smart and is functionally laid out. Each part of the instrument is given its own area: the sound groups, the sequencer, the style groups, and the mixer. Performance-oriented features are strategically placed toward the front of the panel. These include Variation buttons for styles, a Tempo control (a not particularly free-flowing wheel that is also used for general data access), Stop/Start, Transpose, and four Performance pads for triggering any sample or loop in real time.

Each section of the Generalmusic orchestra—drums, bass, the accompaniment parts, and the mic/line input—is controlled by its own volume slider on the mixing panel. To the left of the keyboard action is a pair of rubbery pitch and mod wheels like those on Generalmusic's S2 synth (reviewed in the November 1992 **EM**). The pitch wheel is spring-loaded; the mod wheel is not. Above the wheels, in a recessed alcove, is a floppy-disk drive.

A PLETHORA OF PORTS

The unit's two headphone jacks are front-mounted. Yeah! You won't twist your headphone wires around the unit. At the back panel are two sets of MIDI In, Out, and Thru ports which provide 32-part multitimbral operation. Also on the rear are the three inputs for assignable pedals. A direct computer interface is provided, but you need the optional Multimedia Kit ($42) to get the drivers for Mac, Windows 3.1 and Windows 95 and the 9-pin/25-pin serial adapter.

In addition to the main left and right audio outputs, there are two supplemental outputs, two mic/line inputs, and both RGB and S-VHS video outputs. This is a good haul and is very much geared towards education, multimedia, and karaoke.

INSIDE THE SOUNDS

Any instrument that offers this wide a range of features has the potential to be a little confusing. The fundamentals of the voice architecture are relatively straightforward, though. The basic patches are called Sounds, and

A descendant of the popular SX3 interactive keyboard, Generalmusic's SK76 keyboard workstation delivers an impressive variety of features.

For manufacturer information, please see Contact Sheet, p.163.

circle #532 on reader service card

you have a large library of them in ROM. There are sixteen groups of sixteen banks, each of which contains anywhere from three to eight Sounds. You also get 1,448 (!) RAM locations for storing sounds you have tweaked or edited.

Primarily intended for editing drum kits, SoundPatch mode is much more potent than I initially suspected. A SoundPatch is a Velocity-switchable combination of Sounds. In this mode, you can place any Sound or individual sample on any key, at any pitch, and assign effects to it, control the pan position, and so on. Each key also has its own assignable Velocity switch. In short, SoundPatch is a straightforward way to assemble custom drum kits.

▼ The processor will drive you absolutely crazy with sensual timbres.

Styles are the automatic backings, comprising drums, bass, and other accompaniment parts. Generalmusic has supplied 96 preset Styles, and you can modify and save 32 of your own. Each Style is made up of eight tracks, each of which has four variation patterns. Do the math, and you'll see that the SK76 provides a total of almost 3,000 patterns.

Performances are collections of Styles and Sounds or SoundPatches, along with effects and MIDI settings. Once you get the Performances organized to your liking, Performance mode is a valuable mode in which to remain.

The organization of these various Sound and Performance features is not bad, but it's not great. If you want to make a deep study of the instrument, I'm sure you can argue its logic. In the real world, meanwhile, you spend an awful lot of time wondering why you can't do this with that, access this from here, or hear this when that is on.

THE AUDITION

With many home keyboards, I find auditioning sounds rather tiresome because the screen has an annoying habit of leaping back to the main page nanoseconds after you have made a choice from the sound group. Help is at hand with the SK76's Display Hold button, but Generalmusic would have been wiser to keep the already heavy button-pressing aspect of this instrument down to a minimum. When you move to a new page on a professional computer/instrument, you expect to stay there until you *want* to move elsewhere. You should not have to press a button in order to remain where you are. In this instance, the SK76 is closer to a pro keyboard than are most home keyboards, but it is not quite fully professional.

The other tiresome aspect of auditioning is the precision and strength you need to activate the soft keys beside the screen. I found these buttons to be stiff and awkward to activate cleanly. Can you spin through sounds using the data wheel? Not that I found.

Out of the box there are some 600 sounds to choose from, which are grouped according to instrument type and are fully GM compatible. The sound groups comprise Piano, Chromatic Percussion, Organ, Guitar, Bass, Strings, Ensemble, Brass, Reed, Pipe, Syn Lead, Syn Pad, Syn SFX, Ethnic, Percussive, and SFX. Individual Sounds are presented eight at a time onscreen. You hit the corresponding soft button to make your choice.

Leaving aside for a moment how the sounds are created and what you can do with them, here is a small sample of the sort of range and standard you can expect.

One of my favorites is a lovely, rich, breathy soft sax. This is a classic. I also like the true, hollow clarinet, which exhibits a very good tone.

I found some solid sounds amongst the keyboard patches. I appreciated the edgy Clavinet; it is especially good with some radical feedback flanging added. You get a nice range of pianos: nothing to rival the Generalmusic RealPiano 2, but all types are covered, from acoustic to electronic to electric to digital. I found no real standouts, though. The accordion is much as I'd expect from the Galanti family (owners of Generalmusic), who made their name, fame, and fortune in accordions back in Italy.

Less thrilling are the electric guitars, which are the Strat-type "clean guitars" we've heard a million times. Not very many samples are employed here, and the tone is not very consistent. It's

difficult to re-create pedal-steel guitar parts on a keyboard, but the SK76's "Pedal Steel" patch is curiously tinny. I find it hard to imagine this patch being convincing no matter how the part was generated.

Sounds can be layered, or two sounds can be assigned to a left/right split (with easily alterable split point). Thanks to the unit's 32-part multitimbral operation, you can create up to 32 layers and splits. As with other such instruments, of course, this reduces the polyphony; fortunately you have plenty of voices (64) to play with.

SONIC CREATION

Sometimes you just want to brighten up a bass sound. The Quick Edit route offered on the SK76 takes place in Edit Perf Sound/SoundPatch, where you can do things like modify a simple envelope; alter the filter cutoff of the lowpass, highpass, or bandpass filter; tweak a resonance parameter; and alter LFO speed, depth, and delay. What you are altering here is the Performance Track—a layer of parameters that are applied to the sound—not the basic sound itself. For instance, if you brighten up your bass patch in this manner and then later switch to a new bass Sound altogether, your new Sound will inherit those earlier modifications.

Other times, you want to put in serious hours nudging filters. In-depth editing takes place at the Edit Sound level. Here, you are changing the Sound itself, and if you want to keep these edits, you'll need to resave your patch in RAM.

The SK76 is essentially a subtractive-synthesis instrument with sounds based upon samples stored in ROM. But instead of the usual signal flow (a single wave to a filter to an amplifier, plus envelope and LFO), Generalmusic offers five basic algorithms, each presenting a different tally of oscillators, filter configuration, and number of envelope generators. Your choices are single algorithm with one oscillator; dual algorithm with two oscillators in parallel; dual algorithm with independent EGs per oscillator and with filters in series; dual algorithm with independent EGs per oscillator, summed with a balance control, and with the filters in parallel; and dual algorithm with independent EGs per oscillator, summed with balance control, and with the filters in series. Obviously, this offers a lot of programming flexibility.

A Sound can use up to three layers, with each layer capable of using one or two oscillators. You can use a different algorithm for each layer. Once you've chosen an algorithm, your work begins in earnest, with a choice of some 263 waveforms (to which you can add your own waveforms).

These waveforms can be retuned and scaled and can be set to play forward, backward, and in Alternate mode, which provides looped playback that alternates between forward and reverse. You can also tweak the volume, keyboard tracking, and Velocity sensitivity.

The resonant filters can be 2- or 4-pole and come in five types: lowpass, bandpass, highpass, parametric boost, and parametric cut. The filters respond to Velocity and keyboard tracking and have dedicated, 10-stage Key On and Key Off EGs (meaning you can trigger envelope stages when you strike a key and when you release a key).

Six-stage envelopes are provided not only for the filter cutoff, amplifier, and pitch but also for pan and oscillator balance. Here, you'll find the large-format display very helpful: you can not only see but draw the envelope shapes. The LFO can sync to MIDI Clock and offers a choice of six waveforms with rate, delay, mod amount, and sync controls.

If you use a computer-based sequencer, you'll be glad to know that Performances, drum kits, and global parameters can be controlled via SysEx, allowing you to automate many of the unit's operations.

FOR WHOM IS IT MADE?

I've already noted that I like having lots of features, so it would seem that the SK76's generous selection of features is well and good—or is it? On a pro synth whose sole purpose is sound design, a large basket of editing parameters makes complete sense. But the SK76 is not this sort of dedicated sound-design synth. The thrust of this instrument is as much Styles as sounds, and Styles are generally the purview of the home-accompaniment keyboard player. Even with the helpful screens, how much time is the average home-accompaniment keyboard user going to spend slaving over a hot 10-stage pitch envelope? Once in a blue moon, or never. Take your pick.

Conversely, the average sound designer is going to wince at the very sight of built-in accompaniments. And you are paying for both types of features, even if you only need one or the other.

There is some cross-fertilization here, as has been proved by the Korg i series and the like, but the line is a fine one. So although the SK76 could wind up attracting both types of user, it could easily attract neither.

A SAMPLE OF SAMPLING

Generalmusic has opened the SK76 to the world of sample libraries by allowing us to load in samples in Akai, Kurzweil, Sound Designer I (but not SDII), Sample Vision, AIFF, and WAV formats as well as Generalmusic WX, WK, and S-series sounds.

The loading and/or conversion process is relatively painless, although, as with most such sample imports, it is necessarily limited by the differences in sampler and SK voice architectures. The ability to load samples means that if you are less than satisfied with the onboard selection, you can, to some extent, add your own. The unit comes with 2 MB of sample RAM, which you can upgrade to 32 MB using standard 30-pin SIMMs. That is easily enough memory to load most commercially available samples.

This aspect of the SK76 should be graciously received, and I would feel a little churlish complaining that you can't sample directly into the SK76. That, of course, would raise the price of the unit another notch, and the home-keyboard types who would do much original sampling tend to be the hip-hop and rave crowds, which Generalmusic has not really addressed in this synth anyway.

However, the SK76 does not support SCSI, so in this era of CD-ROM sample libraries, the only ways the SK76 can access outside samples are the painfully slow MIDI Sample Dump Standard or fast-disappearing floppy-disk libraries. If you have a sampler already, of course, you can save samples to floppy yourself. Otherwise, adding sample RAM to the SK76 might not be so attractive as it first seems. It also is worth noting that sample editing is limited to normalizing, setting overall gain, truncating, and simple looping.

If one looks at the SK76 from the pro sound-design side, these limitations considerably reduce the instrument's appeal. I can't see E-mu E4s and Kurzweil K2000s appearing in the classifieds as a result of the SK76.

STYLE COUNCIL

Italian companies have become masters of accompaniment Style production over the past ten years. None do it much better than Generalmusic, which has a permanent staff of musicians playing instruments from keyboards to MIDI guitars in order produce lifelike grooves over which you can play or compose.

There are 96 Styles built into the keyboard, presented in Style Groups: 8-beat, 16-beat, Rock, Funk, Dance 1 & 2, Jazz, US Trad 1 & 2, and Latin 1 & 2. The unit also offers four user Style locations. Each Style has four variations and a range of intros, endings, and fills.

Basic operation is admirably simple: select a Style from a Group and hit the red Start button. Instantly, a virtual band will spring into life and will, as a default, take its lead harmonically from anything you play anywhere on the keyboard.

Sometimes this can be magic. You find a groove that you like, tweak the tempo, and start playing a few of your favorite chords, and the band sits in, tossing out a selection of cool bass lines, licks, and accompaniment frills. It is possible to trip the players up and

SK76 Specifications

Keyboard Action	76-key, semiweighted, Velocity and Pressure sensitive
Polyphony	64 notes
Multitimbral Parts	32
Waveform ROM/# of Multisamples	8 MB/263
Sounds (presets/user locations)	600/1,448
Performances	64
Sequencer Tracks/Events/Songs	32/250,000/16
Sequencer Resolution	192 ppqn
Styles (presets/programmable)	96/32
Effects Processors	4
Controllers	2 wheels, 10 sliders, 4 pads
Pedals	3 programmable
Disk Drive	3.5" HD/DD
Audio Inputs	(2) ¼" mic/line
Audio Outputs	(4) ¼" line; (2) stereo headphone
Data Ports	serial port, 2 sets MIDI In/Out/Thru, Video Out (RGB/S-VHS)
Display	320 x 240-pixel graphic LCD
Dimensions	49.8" (L) x 4.9" (H) x 14.6" (D)
Weight	47.6 lbs.

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ELECTRONIC MUSICIAN 1998 EDITORS' CHOICE

"I suggest that you do a reality check and write a check for Reality. You'll be getting one of the hottest, most exciting new programs to appear on the PC in some time."
—Dennis Miller, Electronic Musician Magazine

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—Martin Walker, Sound On Sound Magazine

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"If you're searching for fresh sounds, you'll appreciate the new types of synthesis and the wealth of modulation routings in the PCM/Analog (and let's not forget FM) algorithm. The ability to capture Reality's output to a WAV file is the vital link for all sorts of creative projects... [Reality] goes deep into the forest of synthesis..."
—Jim Aikin, Keyboard Magazine

"If you want to be a REAL professional synthesist, Reality is the best guide for the past, present and future."
—Keyboard Magazine Japan

"Wow! I installed Reality and played with it all day. Incredible. Powerful. Incredibly powerful!"
—Dr. Richard Boulanger
Professor of Music Synthesis, Berklee College of Music

"...the electronic music community is in for a huge treat..."
—Daevid Vincent, Boot Magazine

"Reality represents an important step in the evolution of synthesis."
—Adam Schabtach, Recording Magazine

"I'd like to say that I was really blown away. This thing does some GREAT sounds right out of the box. I was immediately impressed with the depth and complexity of some of the presets."
—Grant Ozolins, Blown-Away Customer

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*[illegible] Musician's October '97 review awarded Reality the highest rating for any synthesizer [illegible] since the inception of their 5 point rating system in June 1991.

produce drivel, and some of the arrangements do occasionally take on somewhat of a Martian hue. But in the main, the standard of programming is top class and great fun.

Standouts include the Funk grooves, which only a dedicated professional programmer is going to be able to top, and some of the Latin rhythms, which are complex and highly groovy. There's nothing terribly modern—no trip hop, for instance—but fashion hounds can always set about programming such Styles for themselves.

Chord recognition is one of the big issues with Style keyboards. The SK76 even displays the chord you are playing as you play it, which, apart from anything else, is a very handy way to learn what the heck that favorite chord of yours really is.

Sure, you can fool it if you try. You can even fool it if you only sort of try. If you play a first-inversion A triad and then drop the root note to a G, which gives you A7 (voiced 7/3/5), the SK76 will call it C♯ diminished. That's understandable and correct. But it does this even if you play A an octave below in the bass, which is disconcerting. Still, there are many odd chords that the instrument does interpret correctly, and in the main, I think it does a good job in this department.

GROOVY SEQUENCER

The 32-track sequencer can store up to 250,000 notes and operates in either a Quick Record (yes, please!) or regular Record mode. This is a very sensible solution: sometimes you just want to dash down an idea, and sometimes you want to flesh out an idea with all musterable care and attention.

Although I wouldn't want to trade in my copy of Steinberg's *Cubase VST* for this sequencer, there are numerous attractions to having sequencing and sounds under one roof. You can scroll through tracks, making sound changes, transposing, quantizing (including groove quantizing), and even making event-by-event edits in Microscope Edit. The unit can load sequences in the background during playback and can read and write Standard MIDI File Types 0, 1, and 1 + Lyrics.

You can also add chord symbols and even lyrics. With an optional Video/Audio Interface kit ($295), you can send a whole combination of words and music out to a big-screen TV. Yes, folks, karaoke is completely possible using just the SK76.

You can also take a Style to pieces and reassemble it in Sequence mode while you play live. I liked being able to remix a Style using the eight faders. I especially liked being able to record real-time remixes and make real-time tempo adjustments, sound substitutions, and the like into the 32-track sequencer. This is a superb songwriting tool and highly addictive.

THE ICING

The SK76's digital effects processors can be assigned to two channels, A and B, which are independent effects buses. This allows you to add separate effects to the accompaniment and to a sound you're playing live. Each channel has two processors, one for reverb and another for delay/modulation effects.

In the reverb camp are some 24 types, ranging from clubs to halls, each with maneuverable reverb time, predelay, and HF decay parameters. While not state of the art, this is a long way from the days when you only had one global effects processor built into a keyboard. The quality is quite respectable—nothing too pingy—though I wouldn't put your dedicated pro reverb processor out to grass just yet.

The 32 delay and modulation (time-based) effects range from stereo and multitap delays through a bunch of

GENERALMUSIC
SK76 keyboard workstation
$2,695.00

FEATURES ■■■■
EASE OF USE ■■■■
QUALITY OF SOUNDS ■■■
VALUE ■■■■
1 2 3 4 5

PROS: Excellent sequencer. Ability to import samples. Flexible synth-voice architecture. Impressive accompaniment Styles. Multiple effects processors. Video output. Large display.

CONS: Preset sounds are bland. No SCSI for sample import. Serial interface is PC only. Soft-key buttons small and difficult to use.

CIRCLE #440 ON READER SERVICE CARD

swimming choruses and ensembles, pitch shifting, rotary-speaker simulation, and distortion. Control is provided mainly over speed and depth, with each effect type offering you its own particular spin.

Again, the quality is respectable for the context, and big-screen editing makes the overall comprehension and detailed tweaking of effects a relatively painless experience. Full marks to Generalmusic for adding the Effects Off bypass button, too.

AT DAY'S END

Without a doubt, the SK76 is a well-made, carefully designed instrument. There are plenty of eye- and ear-catching features, such as quality Styles, good digital effects processing, and helpful screens for sound editing. The sequencer is especially feature laden. The user interface is generally quite good, although some of the panel hardware leaves something to be desired, physically and functionally.

Taken as a home keyboard for the one-person band, karaoke accompanist, or one-keyboard studio, the SK76 almost seems overendowed (other than lacking an amp and speakers). It has numerous improvements over the SX3, including expandable sample RAM, ability to import non-native samples, twice the number of sequencer tracks, the ability to accept an optional hard drive, the ability to use layered sounds with Styles, and the ability to use the Styles to make a linear sequence. It also has more Styles and variations than the SX3. So if you are a fan of the earlier Generalmusic instrument, you will love the new one.

Admittedly, I am not blown away by the sounds. Although the SK76 has some decent piano voices, that brilliant soft sax, and some strong drum kits, the sounds have a certain world-weariness to them. We may not have heard it all before but, well, we've heard a good deal of it.

On the other hand, the synthesis architecture and filters offer lots of opportunities to create your own sounds, though they offer nothing new or distinctive. Is the SK76 the most powerful synth in its class? No, but it *is* deeper than your average subtractive wavetable synth at the next lower price class. On the other hand is the fact that you can import your own samples, which is especially useful if you install the full 32 MB of RAM. The only problem here, and it is significant, is that you are limited to SDS or floppy.

Generalmusic is an exciting company, bursting with good ideas. However, it seems to me that the company has tried to cram too many ideas for too many different types of users into one instrument. It's really hard to say that the SK76 is an ideal choice for all of these potential users. That doesn't mean that Generalmusic blew it, though. If you are a one-person band or are building your first personal studio and also play live, and you are looking for one keyboard to make the central focus, the SK76 or its 88-key sibling, the SK88, would be a fine choice.

Julian Colbeck *is busy trying to wind down his career as a pro keyboard player even though a clutch of rereleased albums he recorded with the band Charlie in the late '70s is proving worryingly popular at the moment.*

OPCODE

STUDIO VISION PRO 3.5 (MAC)

The first digital audio sequencer is still one of the best.

By Ed Uribe

When Opcode introduced *Studio Vision* in 1990, the program was hailed as revolutionary, offering the first combined digital audio recording and sequencing software. Since then, the software has undergone many changes, the most impressive being 1995's version 3.0 upgrade (reviewed in the April 1996 **EM**), which introduced Opcode's Audio-to-MIDI technology and support for DSP plug-ins.

Version 3.5 runs in native code on the Power Mac and delivers improved system performance. Without sacrificing quality for quantity, *Studio Vision Pro* 3.5 adds support for Adobe Premiere plug-ins, upgraded Sound Manager support, and improved busing for Digidesign TDM plug-ins. Formant-based pitch shifting has been added as well as enhanced integration with the Apple QuickTime format.

DELUXE VISIONS

Opcode delivers *Studio Vision Pro* 3.5 in a Deluxe version on CD-ROM that also contains *Galaxy* 2.1, OMS 2.3.1, and numerous other goodies. Along with the core programs, you also get two DSP plug-ins from Waves (*EZVerb* and *AudioTrack*) and two that are algorithms extracted from Arboretum's *Hyperprism* (*Low Pass EQ* and *Echo*). You also get several limited-time (but fully functional) demo versions of other Waves and Arboretum products and several *Vision* files, MIDI drum patterns from Beatboy, and digital audio files from Protolab and Belief Systems. There are new tutorial files, a tour to help you configure OMS, demo QuickTime movies of *Studio Vision* features, and a wealth of documentation. With the already tight integration that Opcode's OMS provides, improved system performance, and new processing features, you'll find yourself sitting in front of quite a control station.

The educational additions are especially useful for novice to intermediate users. The tutorials and introductory files allow you to get working right away, which is one of the best ways to learn any software package.

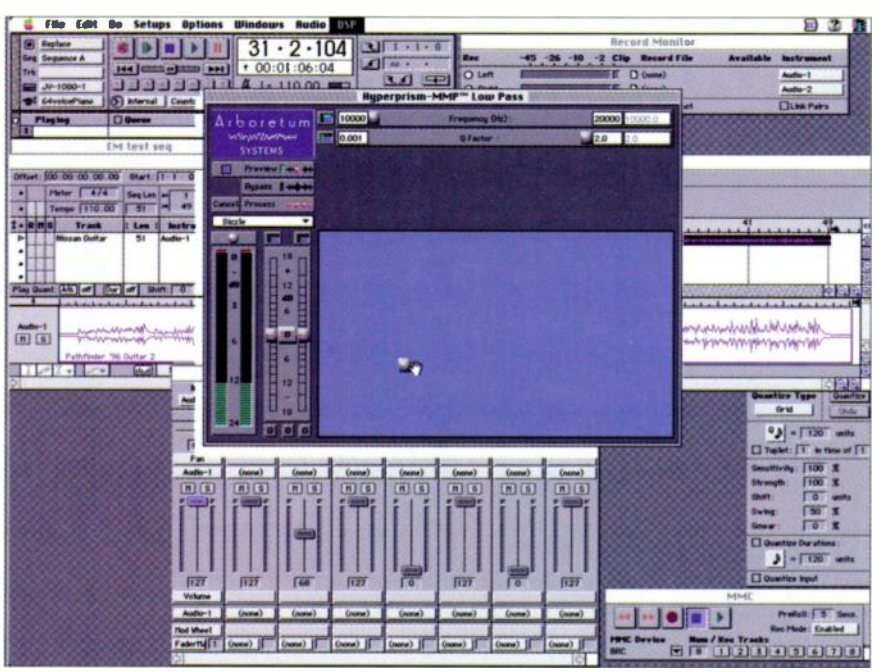

FIG. 1: All Adobe Premiere plug-ins are called up from the Premiere Plug-Ins folder submenu of the DSP Menu. Here, a lowpass filter in Arboretum's *Hyperprism-MMP* is about to be applied to a guitar track.

For those who rely on the program for digital audio recording, the DSP plug-ins are a major bonus. They round out the package, allowing you to fully experience the power of digital audio recording, processing, mixing, and editing, without making financial investments or commitments to any additional software.

The software and all supporting files (including the Digidesign Audio Engine, or DAE, which is required for use with Digidesign hardware) is easily installed from the single CD-ROM, saving you the trouble of dealing with several floppy discs. Hopefully this is the wave of the future for music software.

THE SPEED OF SOUND

With this version, *Studio Vision Pro* is now entirely Power Mac native. This does not affect sequencer playback, but the speed of audio processing and editing functions has increased dramatically. You'll also see a marked improvement in the screen redraw time, especially when viewing simultaneous MIDI and digital audio tracks. Several other processing functions are also much faster than they were in previous versions.

For example, pitch shifting a 2-minute audio guitar track up a major second (with processing selected for "highest quality") took only 4.5 minutes on a Quadra 950, three minutes with a Power Mac 7200/120, and one minute on a Power Computing Power Tower Pro 180.

DOUBLE (TRACK) VISION

Improvements in Sound Manager support and in synchronization and OMS timing (dubbed "SmartSync" technology) allow more audio tracks to be recorded and provide improved sync between MIDI and audio events when working without any external hardware. Opcode's literature states that version 3.5 doubles the amount of tracks, and the company promises up to twenty tracks on the fastest Power Macs.

Studio Vision Pro 3.5 certainly handles multiple audio and MIDI tracks well and feels stable when doing so. However, the reality is that there is no guarantee how many tracks are available with the program using Sound Manager—there are too many variables. It is possible to get sixteen to twenty tracks on a very fast computer (a 200 MHz 604e or better) with lots of RAM and a big, fast,

For manufacturer information, please see Contact Sheet, p. 163.

eas·y (ēz´i), *adj.*

1. not difficult; that which can be done with ease.
2. free from trouble & anxiety

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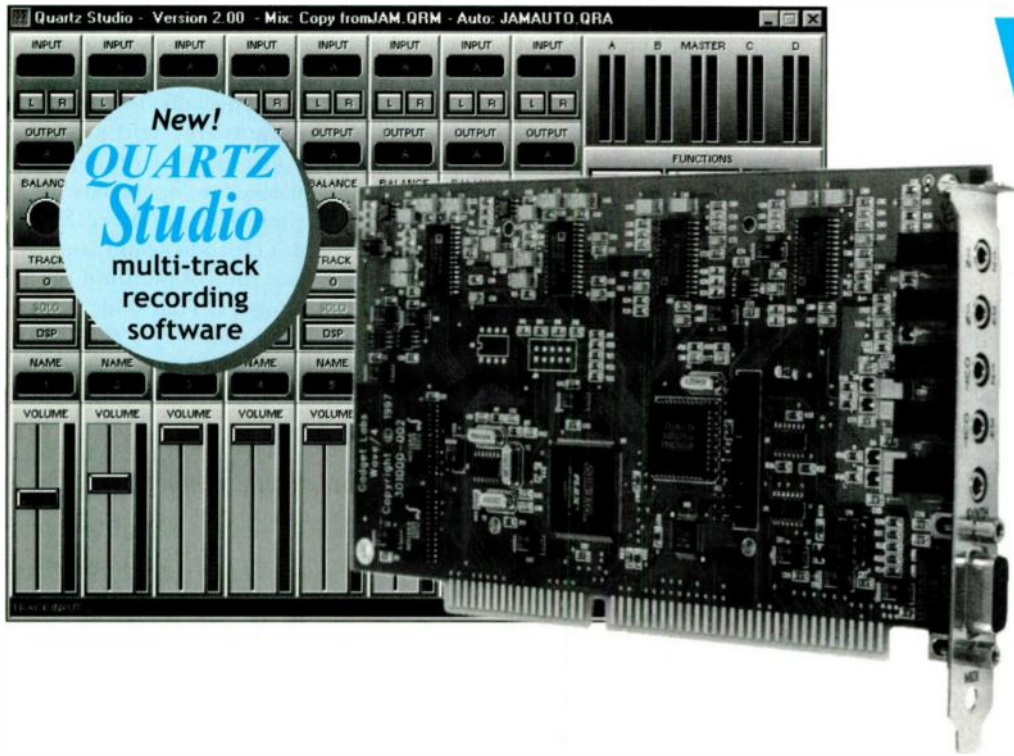

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empty, optimized, and properly formatted drive. But depending on the computer you're using, the size of your hard drive, and how much DSP is engaged, the number of potential tracks can drop substantially. This is a fact of life in hard-disk recording. Opcode does, however, provide tips and information, both with the program and through its Web site, on optimizing your system and recording more efficiently.

If you're serious about recording digital audio on your Mac, you should consider adding an audio card such as Digidesign's Audiomedia. Hard-disk recording using only Sound Manager on a Power PC is a viable option for some applications, and you can produce quality tracks that are acceptable for the Web, presentation backgrounds, demos, QuickTime movies, and other multimedia projects. But if you're looking to produce music CDs, an additional investment may be necessary. My favorite use for Sound Manager is travel: a PowerBook loaded with *Studio Vision* and a small MIDI keyboard is about the best portable studio you can take on the road.

PLUG IN TO YOUR VISION

For people using *Studio Vision Pro* with Digidesign's Pro Tools, there is extensive new PCI/TDM support. When used with a Pro Tools PCI system, *Studio Vision Pro* 3.5 accommodates up to 64 audio instruments with 64 inputs and outputs, four aux sends and sixteen stereo buses per channel, and 48-channel simultaneous playback. (In version 3.0, you had TDM inserts but not sends and buses.) Sample Cell audio (or any audio routed through Sample Cell) can also be bused to any TDM device. TDM busing is conveniently available from the Audio Instruments window or directly from the Mixer window, which provides the feel of a conventional mixing console.

Version 3.5 adds support for the Adobe Premiere plug-in format (see **Fig. 1**), significantly expanding the audio processing and editing power of the program. Premiere is not a real-time architecture, but many Premiere plug-ins offer real-time previews of a part of a file. This means you can monitor a limited section of audio as you work on it, but you still have to stop and let the computer crunch numbers before you hear the whole thing.

Some people will criticize Opcode for not developing their own native real-time plug-in architecture. Digidesign's TDM architecture operates in real-time, of course, and it is supported by *Studio Vision Pro* in superior fashion. But you have to spend a significant amount of money to get a Pro Tools system with TDM. Those who cannot afford TDM and want to run real-time DSP plug-ins using Sound Manager will have to settle for real-time previews in Premiere plug-ins that support this feature.

FIG. 2: This QuickTime movie and its audio track, which has been extracted for editing, are locked together. As you scrub audio or enter SMPTE values in the control window, the movie chases to the exact audio location.

On the other hand, so many Mac DSP plug-in architectures have been developed already that the situation is getting confusing, especially if you use several host programs and want to be able to use your plug-ins in all of them. In contrast, Windows developers have a common real-time format: DirectX. This problem isn't Opcode's fault, and solving it will take the cooperation of all the Mac developers. That said, the fact remains that Steinberg's *Cubase VST* and MOTU's *Digital Performer* have real-time native plug-ins; *Studio Vision Pro* does not.

Although the DSP plug-ins worked like a charm overall, I experienced a consistent problem with Waves *C1*. When I tried to use the plug-in, I was prompted "could not initialize plug-in,"

THE BIG FOUR-O

Following close on the heels of *Studio Vision Pro* 3.5, Opcode announced its plans to release yet another major upgrade to the program. Version 4.0, set to debut at the 1998 Winter NAMM convention in Los Angeles, promises to deliver functional system and interface enhancements for both the sequencing and audio portions of the program.

One of the more impressive changes promised with version 4.0 is the addition of a Drum Grid Editing window. Also new on the sequencing side are nondestructive groove quantizing during playback and nested looping functions.

The new version will also provide 24-bit audio support for Digidesign's Pro Tools 24 and will include several audio crossfade patterns (very cool for comping tracks and doing odd sound design) and stereo DSP audio editing.

Opcode promises MIDI- and audio-event muting directly from the Track Overview window, saving you the hassle of opening multiple windows. The Strip Chart will be resizable, allowing you the freedom to view only the information you need to.

Aesthetically, version 4.0 will include a redesigned display featuring more color, 3-D graphics, and new dialog boxes. In addition, the software will provide a number of user-configurable options for setting up the interface to meet your particular needs.

On top of all this, the company promises more than 100 other new features and enhancements that they won't tell us about. I guess we'll have to wait and see.

—Jeff Casey

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System Requirements

Mac IIci or better; System 7.0.1 or later; 16 MB of RAM; 680X0 machines require current Digidesign I/O hardware or the Yamaha CBX-D5/D3

followed by a system crash. I can't be sure that a memory-allocation problem was the cause, but Opcode states in a "Read Me" file that certain plug-ins continue to allocate RAM for themselves every time they are called up. If you continue to call them up during a session, your system might crash. The suggested fix is to allocate more RAM to *Studio Vision Pro* and not repeatedly call up a particular plug-in. But it's not inconceivable that you would call up a certain plug-in several times during a session, so in my estimation, this should be addressed by Waves.

CAUSE AND EFFECT

Opcode has included some very cool new formant-preserving pitch-shifting features, giving you the ability to work with polyphonic and multitimbral audio. These processes enable you to shift pitches while retaining timbral characteristics or shift timbres without pitches. In essence, you can practically change the gender of a vocal line.

I tried pitch shifting guitar and trumpet tracks. The results were virtually flawless and quite impressive: the pitch shift was accurate and without coloration. Small interval transpositions yielded the best results; you're pushing it trying to shift anything more than a fifth.

The new Formant Preservation algorithm is also accessible for doing MIDI-to-Audio and Audio-to-MIDI transfers. I went both ways with some trumpet tracks, and the conversions were right on the money. It didn't handle the acoustic guitar tracks very well, but considering the complex patches I used, I expected as much. This feature really shines with single-note passages.

Time compression/expansion tests were also flawless: I was able to speed up and slow down almost every track. I've done extensive work with the Akai S3000 and Roland S760 samplers, and although you can achieve the same results with those units, *Studio Vision* makes it much easier. Let's say you have two tracks at 96 bpm and you want to change them to 104 bpm. You simply type in "104," and you're done. Anyone who has ever been told by a producer, "This section would sound so much nicer if it were just a little faster," will really appreciate this feature.

MULTIMEDIA VISIONS

Studio Vision Pro's QuickTime support affords you a conducive environment for doing multimedia production. Versatile options allow you to extract audio from your QuickTime movie (see **Fig. 2**); sequence, edit, and process it; and then lay it back into the video. You can also work online: *Studio Vision* delivers an impressive QuickTime sync. As you edit or scrub the audio, the QuickTime movie follows frame by frame. You can also save MIDI and audio sequences as QuickTime movies, which is an excellent way to deliver Web audio productions.

▼

You'll find yourself sitting in front of quite a control station.

Opcode's software allows you to import and export in WAV, AIFF, and SDII formats and to import audio directly from CD—great for the sampling and remix folks. The program also provides bit-resolution and sample-rate conversion functions and allows you to export multiple audio events. In conjunction with the plug-in support, *Studio Vision Pro* can produce audio and music for delivery in virtually every format currently in use.

ENVISION THE MIX

The program's mixing consoles have been improved in a number of ways that give you added flexibility. For instance, you can resize and scroll the Mixer windows just like standard Macintosh windows.

The most impressive new mixer feature allows you to group faders and move them in three different ways: Absolute Fading allows all grouped faders to move the same amount; Proportional Fading lets them move proportionally, reaching their minimum or maximum levels simultaneously; and Snap Fading allows the faders snap to a specified value simultaneously.

This is very slick automation that you typically see only in higher-end conventional consoles. The beauty of this feature is that you can now group a number of faders onscreen and assign one hardware MIDI fader to control that group. You can continue to assign successive groups and manually control a 24-channel mix from a controller such as the JLCooper Fadermaster Pro—without ever changing banks.

PERIPHERAL VISION

Several new intuitive features have been added in version 3.5 that make working with the program even more enjoyable. For example, if an instrument has been soloed in a window that is not currently visible, a Solo indicator is displayed on the control bar. By clicking on the indicator, you can automatically bring up the window where the MIDI or Audio instrument was left soloed, rescuing you from a dreaded playback misery: silence.

Another very hip new feature displays MIDI and Audio tracks in any view—not just in the Track view—segmented or broken at your song markers rather than in predefined phrases that the program chooses. This is a tremendous visual aid that makes the software feel

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PROS: Improved system performance and interface enhancements. Superior Pro Tools TDM support. Innovative Audio-to-MIDI/MIDI-to-Audio processing. Strong QuickTime implementation.

CONS: No native (non-TDM) real-time plug-in architecture. Weak notation capabilities.

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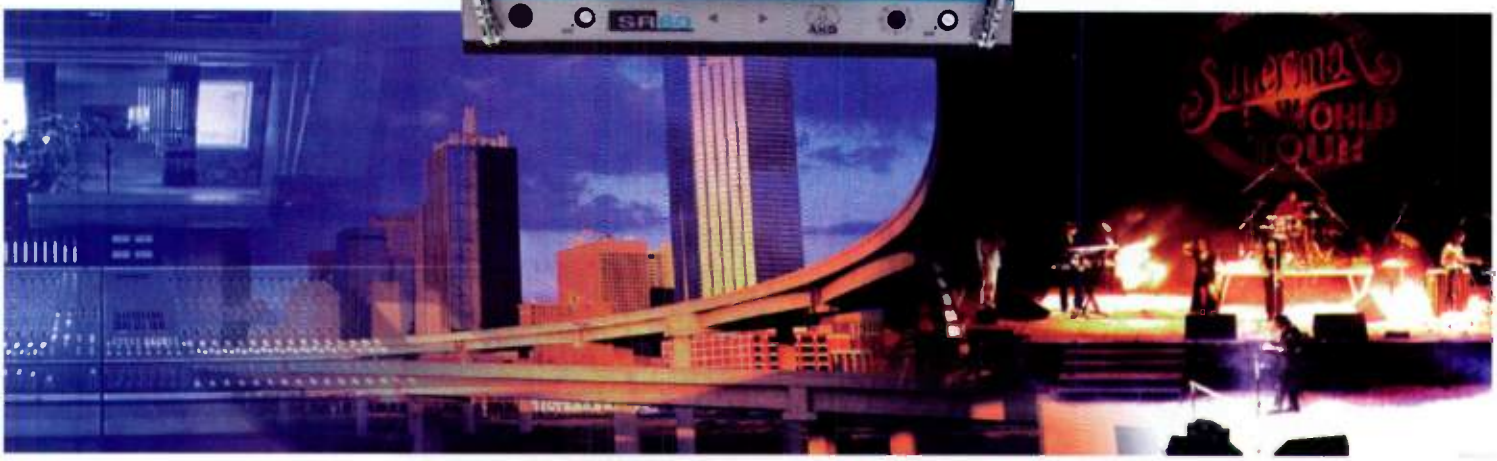

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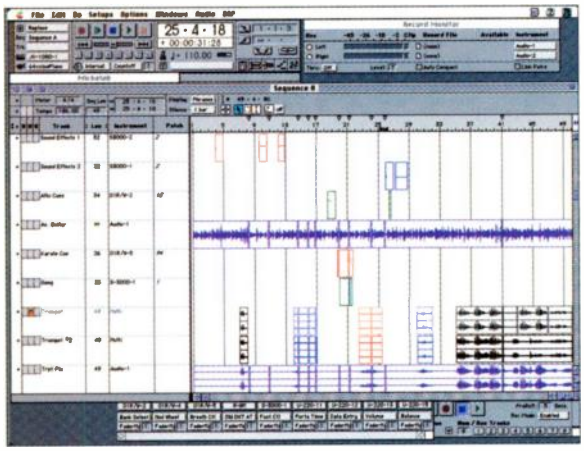

FIG. 3: The vertical zoom feature allows easy multitrack manipulation and editing without forcing you to take a trip to the Graphic Editing window.

more musical. Controller data has also become easier to view: it is shown in bold on the menu, providing a quick visual cue to any relevant data associated with that particular track. *Studio Vision Pro* version 3.5 also allows you to define your own keystrokes for most menu commands, as opposed to using the factory presets.

Although the Track Overview window has always allowed horizontal zooming, your ability to see fine detail in each track was limited. The new vertical zoom (see **Fig. 3**) provides a much more precise tool to view both audio and MIDI tracks, saving you countless trips to the Graphic Editing window.

Finally, the Select All command now works in conjunction with the View Filter and only highlights what you have defined in that filter. In the past, the Select All feature would select *everything*—even if the window was purposely hidden.

REALIZING YOUR VISION

I've been working with this program for a long time and have completed a number of projects with it, often under crazy deadlines. Any shortcomings that I've found in previous versions have certainly been addressed in version 3.5. All too often, companies release what they call "full version upgrades" that don't even come close to having the number of new features that Opcode is offering with *Studio Vision Pro* 3.5. I can't wait to see version 4.0 (see sidebar, "The Big Four-O").

In the music world, the lines between the player, arranger, composer, engineer, sound designer, programmer, and editor have become increasingly difficult to define. Today, it's not uncommon to have one person doing all of these jobs. Just as these individual artists are having to adapt and integrate tasks that were once clearly separated, so must the resources that the industry develops for them. With *Studio Vision Pro* 3.5, Opcode has successfully provided additional tools—for an already comprehensive program—that meet the needs of the ever-changing industry.

Ed Uribe *is a drummer, percussionist, composer, author, educator, clinician, and multimedia artist living in New Jersey. He'd like to thank his friend Steve Wilkes for hooking him up with* **EM**.

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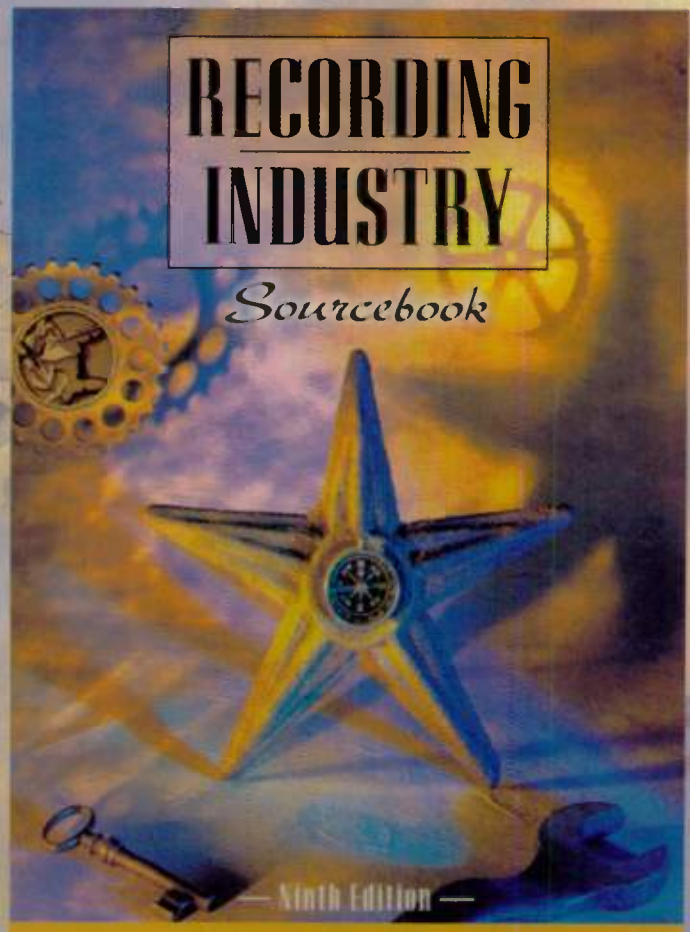

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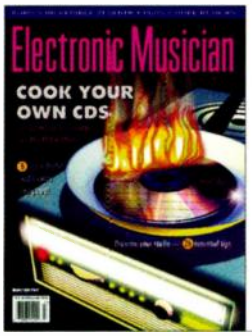

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Wild Things

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DRAWMER

MX30

Truly professional dynamics processing is now truly affordable.

By Brian Knave

Anyone keeping up with pro audio gear for the last few years has no doubt noted the trend: each year manufacturers of inexpensive gear manage to make their stuff sound better. Meanwhile, to stay competitive, makers of premium gear either lower their prices or come out with budget boxes that sound nearly as good as their high-ticket items. How much longer this trend can last is hard to say. But one thing's for certain: it has ushered in a heyday for home recordists.

The latest great news—at least in dynamics processing—is the introduction of the Drawmer MX30 Dual Gated/Compressor/Limiter. Drawmer has been a major player in dynamics processing for years and in the world of audio engineering has achieved nearly legendary status with its 1960 Vacuum Tube Compressor Amplifier. (The designation 1960 is the model number, not the year.) At over $2,300, though, the 1960 has not exactly been a small-studio mainstay.

With the MX30, however, Drawmer is positioning itself well within reach of the personal studio. At $449, this unit delivers what almost every manufacturer boasts about its products: professional quality at an affordable price. In the case of the MX30, this is made possible by the use of proprietary circuitry employed in the more expensive Drawmer dynamics processors and by using printed, rather than hand-wired, circuit boards. The result is the finest dual-channel gate/compressor/limiter I've heard for under $500.

LAY OF THE BOX

The MX30 has a classy look and a logical, easy-to-grok user interface. The face plate is a light gold color with black silkscreened sections, black knobs, white switches, and cool-looking graphics. Functionally, the front panel is divided into identical halves (one side for each channel) with a Link switch between the two. When it is engaged, the Link function configures the unit in stereo mode with the left-hand channel acting as the master for both channels. The Bypass buttons, however, remain independent in Link mode.

Each half of the front panel is further divided into gate, compressor, and output/limiter sections. The gate section provides a knob for setting the gate level (from Off to +20 dB), a Release switch, and red and green LEDs that indicate gate activity. The Release switch provides fast and slow gate-release times: fast with the switch out and slow with it in. A yellow LED labeled Slow remains lit while the Release button is depressed.

The MX30's gates employ proprietary "Programme Adaptive" circuits that vary the gate ratios depending on the dynamics of the signals being processed. The onset of gating is progressive, which means that lower-level signals are subjected to a lower ratio of gating (like an expander) whereas residual noise during pauses gets a higher expansion ratio and is, therefore, attenuated more.

Each compressor section has a knob for setting threshold and another for ratio. A horizontal, 9-segment bar-graph meter monitors gain reduction (0 to 30 dB). The MX30 employs a combination of soft-knee and standard, ratio-style compression. The transition from unity gain to gain reduction at the selected ratio is progressive: the unit applies soft-knee compression to signals exceeding the threshold by up to 10 dB and conventional compression once the soft-knee region is exceeded.

The lowest compression ratio the MX30 offers is 1.2:1, which means that some degree of compression is always active unless the channel is in Bypass mode. Another curiosity is the orientation of the threshold control (a British thing, no doubt): the MX30's lowest threshold setting (-40 dB) is positioned at hard right and the highest (+20 dB) at hard left—the opposite of what you find on most American-made compressors. This somewhat counterintuitive design (which also afflicts the gate control) may take some getting used to, but it's nothing to get bent out of shape over.

The MX30's output section provides a make-up Gain control; Peak Limiter control (0 to +16 dB) with red LED indicator; a switchable, 8-segment LED bar-graph meter for monitoring input and output levels; and a Bypass switch with red LED indicator. The meter reads output levels during normal signal processing and input levels when the Bypass switch is engaged.

The MX30's Peak Limiters feature a gain-reduction circuit that kicks in when the output signal is high enough to cause the limiter to operate for more than 20 milliseconds—a useful feature for live-sound applications.

The MX30's rear panel provides balanced XLR and unbalanced ¼-inch connectors. The unit has an internal power supply and a standard, detachable IEC power cord.

NUTS AND BOLTS

For me, vocals, electric bass, and stereo drum overheads are primary tests for a compressor, so I started there. Happily, the MX30 loves vocals. Whether you need to mildly tighten up dynamics or really squash a voice silly, this box delivers the goods. I especially liked having the gate first in the processing chain, to keep unwanted low-level sounds from even entering the compressor section.

For manufacturer information, please see Contact Sheet, p. 163.

The Drawmer MX30 Dual Gated/Compressor/Limiter provides an abundance of pro-quality dynamics control in an easy-to-use, inexpensive package. The sound is clean, quiet, and transparent.

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The MX30's gates are first rate—smooth, sensitive, accurate—and the easiest to use I've come across. On vocals, I set a slow release, found the right setting, and got lovely, expanderlike results in seconds. In addition to single vocal tracks, I also got great results processing harmony background vocals in stereo Link mode.

Although I generally prefer tube compressors on electric bass for the coloration and "fattening" they can add, I was impressed by the MX30's handling of bass signals. Many inexpensive compressors I've used are capable of compressing bass but not without losing some of the low-end punch and warmth as well as high-end brightness. But the MX30 compresses bass transparently, with no appreciable tonal loss. My favorite ratio settings were between 2:1 and 5:1, but even extreme settings—up to 10:1—sounded good.

DRAWMER
MX30 gated/compressor/limiter
$449

FEATURES ■■■■
EASE OF USE ■■■■■
AUDIO QUALITY ■■■■■
VALUE ■■■■■
1 2 3 4 5

PROS: Clean, transparent sound. Premium dynamics control. Great design. Easy to use. Affordable.
CONS: Counterintuitive. Threshold control works the opposite of most familiar compressors.
CIRCLE #442 ON READER SERVICE CARD

THOSE DANGED DRUMS

Stereo drum overheads are an important application for dual-channel compressors, especially in small studios that may not be able to spare more than three or four tracks for a complete drum kit. In such situations, the overheads have to represent practically the whole drum sound. Therefore, it's important that the compressor be able to bring up the low-level stuff, smooth out the overall sound, and quell any extreme overshoots, all without coloring or mangling the sound.

The MX30 proved up to the task. All it took was stereo linking the channels and applying a small dose of compression. I used the MX30 on overheads while mixing a be-bop style drum kit—complete with boomy kick, overtone-rich toms, sizzle cymbals, and lots of brushwork—and was very pleased with the results. With a 2:1 compression ratio, the MX30 beautifully enhanced the sound. It brought out the metallic sonority of the cymbals, making them sound more present and harmonically complex, while tightening up the overall kit sound in the mix. The brushwork, too, sounded luscious.

On a straight rock mix, I used the MX30 on kick and snare (dual mono mode) and also got excellent results.

MX 30 Specs

Inputs	(2) +4 dBu balanced XLR and (2) -10 dBV unbalanced ¼"
Outputs	(2) +4 dBu balanced XLR and (2) -10 dBV unbalanced ¼"
Maximum Input Level	+21 dBu
Maximum Output Level	+20 dBu
Frequency Response	<10 Hz–36 kHz (-1 dB)
Distortion	<0.02% (1 kHz @ +4 dBu, unity gain)
Noise (RMS)	-101 dB (22 Hz–22 kHz, unity gain, gate off)
Crosstalk	<100 dB @ 1 kHz
Compressor Threshold Range	+20 to -40 dBu
Compressor Ratio Range	1.2:1 to ∞:1
Gate Threshold Range	+20 dBu to Off
Peak Limiter Range	0 to +16 dBu
Dimensions	1U rack-mount x 7" D
Weight	5.5 lbs.

A 3:1 compression ratio tightened up both drums, resulting in a consistently punchy sound. I especially liked being able to employ a moderate amount of gating (using a fast release) to isolate and further define the sounds before adding reverb. Also, the peak limiter proved useful as a creative tool. For example, I crunched down on a snare drum with the limiter, and it lent a distinctive bite to the track. This sounded especially cool on sidestick hits.

The MX30 saved my butt on a techno mix with stereo tracks of electronic drums. The problem was, someone had evidently recorded the kick drum too hot coming out of the sound module, which had distorted the synth's outputs. The client who brought in the tape to be mixed hadn't noticed the distortion on his home speakers, but on my reference monitors the noise was readily apparent. It consisted of a buzzy high sound that sat right on top of the kick hits and sustained annoyingly beyond each thump.

Short of going to a better-equipped studio and dumping the tracks into a DAW for some slick digital editing, I couldn't get rid of the distortion without spoiling the drum sound. But by using the MX30's gate set with a fast release, I was able to contour the end of the note, cutting off the sustained portion of the buzz and effectively integrating the distortion into the sound of the kick drum. In other words, I made the distortion sound as if it was supposed to be there.

PLEASANT SURPRISES

I also tried the MX30 in some less common settings and was surprised by the good results. On miked acoustic bass, for example, I was able to reduce boom and simultaneously fatten the low end and bring up the low-level finger sounds on the strings. Very impressive. And on stereo electric-keyboard tracks, used sparingly, the MX30 nicely increased the sustain and helped clarify the chords.

For a real stretch, I tried the MX30 compressors on an acoustic nylon-string guitar that was played finger-style and miked with a stereo pair of condensers. This is not a particularly recommended application, but to my surprise, when used sparingly, the MX30 definitely improved the sound. Using the lowest ratio setting (1.2:1), I was able to fatten up the low end and enhance note articulation without losing the performance dynamics inherent to finger-style playing and without adding mud or boom.

Although I'm not fond of VCA-based compressors for processing complete stereo mixes, the MX30 easily proved its mettle even when loosed on this difficult application. Depending on the mix, I employed a ratio between 1.5:1 and 2.5:1. The results were quite usable.

▼ The MX30 has a classy look and a logical, easy-to-grok interface.

IT'S A KEEPER

I have nothing but praise for the MX30. Drawmer is to be commended for bringing its wealth of dynamics processing expertise into the realm of the personal studio. The unit's sound is exceptionally clean, quiet, and transparent (which is just the kind of "sound" you would expect from a good, solid-state, VCA-based design), yet this dynamics processor is capable of squashing signals as much as anyone could want. All of the controls work as specified, and the unit is as simple to operate as they come. Considering that it doesn't offer any "extras," such as dedicated attack and release controls, the MX30 is surprisingly versatile.

Over the course of two months, I used the MX30 on practically every session in my studio, and it performed beautifully in each application. I used it on mono and stereo source signals while tracking and mixing, and I tested it on a whole array of instruments, all with great results. In fact, I never came across a source sound on which the MX30 wasn't able to work its magic. To put it quite simply, this is a premium box; I wish I had a whole stack of them. ●

CESIUM SOUND

FLEX PROCESSOR 1.3 (MAC)

Flex your MIDI muscles and express yourself.

By David Kaplowitz

One of the primary complaints about electronic music is its alleged lack of expressive capabilities. In reality, however, the majority of the MIDI specification defines messages that represent expressive gestures. These messages include Pitch Bend, Aftertouch (two kinds), and most of the 120 Control Changes (Modulation, Breath Controller, Volume, etc.), all of which can be used to expressively control various synthesis parameters in real time.

Still, these messages are limited in their potential. For one thing, they follow a linear path from their minimum to their maximum value. In some cases, this path can be modified by various response curves that are found in some synthesizers, but these curves are not consistently implemented in all instruments. This is unfortunate because response curves are critical to realizing the potential of the expressive MIDI messages.

One solution to this problem is to process expressive MIDI messages through an external device that applies meaningful response curves to them regardless of the controller that generates the messages and the sound module that responds to them. This is the direction taken by Nick Longo of Cesium Sound in *Flex Processor*, a standalone application for the Macintosh platform developed in Opcode's *Max* MIDI-processing software.

However, *Flex Processor* goes way beyond static controller curves. It generates variable curves that interactively respond to the way you manipulate the physical controller. This produces a much more interesting and expressive result than the simple controller curves found in many synths.

BACKGROUND

Longo realized that music technology reflects human perception in several important ways. For example, stereo speakers reflect the fact that we have two ears. However, there is no reflection of the activity of our muscles as we play a musical instrument, which is vital to musical expression.

Muscle activity is rarely constant or linear, which is readily apparent when you try to lift objects of different weights. In addition, muscles always operate in pairs. First, one muscle pulls in one direction while another muscle controls its motion by pulling in the opposite direction. Then, the roles are reversed as the gesture is completed. This system of opposing cyclic forces closely resembles the simple harmonic motion of a sonic sine wave, which is the basis for all sound.

Using these ideas, Longo created a "gesture synthesizer" that is analogous to a music synthesizer. The time it takes to complete a gesture corresponds to the period of a sound wave, the depth of a gesture corresponds to the amplitude of a sound wave, and the shape of the gesture corresponds to the waveform of a sound wave.

WHAT IT IS

The result of these ruminations is *Flex Processor*, which uses a modular architecture to generate controller messages that simulate the interaction of human muscles with musical instruments. The software provides nine different Gesture Synthesis modules that can be combined to operate simultaneously or sequentially. These modules can be triggered by a wide variety of MIDI messages, and the output of one module can be used to modulate another module. Their primary output is Pitch Bend, although they can also output other controller messages. The Pitch Bend messages are used to play licks or riffs that are difficult or impossible to play using a standard pitch-bend wheel or other techniques.

The output of each module follows a curve determined by its parameter settings and the manner in which you move the controller that activates it. When a module is triggered by a continuous message, such as Modulation, the output follows the curve at a rate that depends on the position, velocity, and acceleration of the controller's motion. In addition, the output is bidirectional; moving the mod wheel forward can produce a different output than moving it backward, although the forward and backward curves are typically mirror images of each other to simulate the effect of muscles moving back and forth.

Although *Flex Processor* is designed primarily for use with continuous controllers, the modules can also be triggered by Note On and Off messages. In this case, the incoming Note On triggers a "forward" gesture that occurs at a constant, programmed rate until the module receives a corresponding Note Off, at which time the "reverse" gesture occurs at an independently programmed rate. Playing one of the trigger keys is equivalent to moving a continuous controller at the programmed rate, providing a ramp up or down input. In this case, a range of

FIG. 1: *Flex Processor*'s Main window lets you configure and combine Gesture Synthesis modules in various ways. Notice that the Table Pair module in location 2 is being modulated with the output from the module assigned to location 6.

For manufacturer information, please see Contact Sheet, p. 163.

keys on your keyboard controller (typically located at the low end of the keyboard) are designated as triggers and are not available to play notes in the normal manner. All keys in the specified range produce the same result; there is no change in the output when you play different keys in the range.

To use the program, you play notes with your right hand while triggering and controlling licks or gestures with your left hand. The software then synthesizes Pitch Bend data that adds notes and/or expressive pitch-based effects to the notes that you play on the keyboard.

Keep in mind that *Flex Processor* does not produce sounds. It is a "gesture synthesizer" that produces musical performance gestures and riffs. For example, you can use the program to perform guitar licks and effects, such as blues bends, vibrato, hammer-ons, slides, and screams. Furthermore, the program isn't limited to simulating natural gestures, you can create some completely unnatural effects, as well. In fact, some of these effects turned out to be my favorites.

▼

The program isn't limited to simulating natural gestures.

FORM AND FUNCTION

Flex Processor's Main window lets you combine up to eight modules (see **Fig. 1**). The outputs of the modules assigned to these locations are summed so that gestures can be combined sequentially or simultaneously while holding down a single note. The parameter settings in the Main window define a Preset, which can be saved. (The program comes with many Presets to help you get started.)

At the top of the Main window are several pop-up menus that let you select the source of the initial controller messages, the destination of the program's output, the MIDI channel on which the program's output is sent, and whether or not Note On/Off messages are passed through the software, which is useful for processing an existing sequencer track. Unfortunately, this MIDI routing information is not stored with a Preset. Instead, the information

is stored in a Global file, so each time you launch the program, it loads the routing you defined the last time you used it.

The software works with Opcode's OMS or Apple's MIDI Manager, and its output can be directed to a sequencer program as well as a sound module. When using *Flex Processor* with a sequencer and OMS via Inter-Application Communications (IAC), set *Flex Processor*'s MIDI In parameter to your keyboard controller and the MIDI Out parameter to one of the IAC channels. In your sequencer, disable the keyboard controller as an input device, enable IAC as the input device, and set the sound source for the desired track. Generally, Thru should be on in both *Flex Processor* and your sequencer.

If you use a non-OMS sequencer, such as *Performer*, you must use Apple's MIDI Manager to handle the routing. MIDI Manager has some problems with Mac OS 8 and also doesn't work with OMS 2.0 or later. If you use MIDI Manager with FreeMIDI (for Mark of the Unicorn applications), you must use the FreeMIDI MIDI Manager Driver instead of the Apple MIDI Manager Driver. Likewise, if you use OMS with MIDI Manager, you should use the OMS MIDI Driver.

You can assign one of the nine available Gesture Synthesis modules to each of the eight locations in the Main window. The output of each module can be enabled or disabled, and the outputs from all enabled modules are added together before being sent to the computer's MIDI Out or to other software.

The Operator field lets you select one of several common MIDI controllers as the input to the specified module, and the +/- field determines the direction of the output with respect to the direction of the input controller. Pitch Bend up and down are available separately in the Operator field. The Ctlr# field lets you select any MIDI controller by number. Oddly, the Ctlr# and Operator fields override each other depending on which one was last set, which seems rather redundant and potentially confusing.

The Parameters button opens a window that displays the parameters for the specified Gesture Synthesis module (see **Fig. 2**). Finally, the Interval field lets you specify the pitch range of the module's output. You should set your sound module to a global pitch-bend range of plus or minus twelve semitones for the Interval selector to be accurate.

In addition to several common controllers, the Operator field also lets you select the output of the module assigned to another location in the Main window as a controller input. This is called a Preout because the selected module's output is taken before its Interval parameter defines its range. If you try to assign a module to control itself, that module won't function.

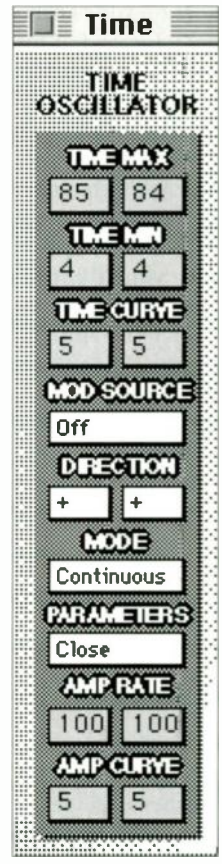

FIG. 2: Each Gesture Synthesis module—such as the Time Oscillator shown here—has its own dedicated window for setting the parameters.

At the bottom of the Main window, the Triggers button opens a window that lets you define as many as six key ranges on the master controller (see **Fig. 3**). The keys within each range are used to trigger the Gesture Synthesis module assigned to the location ("Channel") in the Main window selected in the Send To field. In addition, the Triggers window lets you specify the rate at which the input signal is fed to the module for both Note On and Note Off events. Finally, the Trigger Mode can be independently set for Note On and Note Off: Restart causes the signal to start at the beginning, and Continuous picks up where the other signal left off.

The Sub Outputs button in the Main window lets you select MIDI messages other than Pitch Bend to output from each module. The Multi Outs button lets you send Pitch Bend and other controller data to multiple channels of a multitimbral device. This allows for a variety of effects, such as 2-note

bends in which each of the notes bends differently.

THE MODULES

The parameters for each module are typically arranged in two columns that correspond to the forward and reverse directions of the gesture. In many cases, the settings are the same for forward and reverse, but you can create different outputs for each direction. For example, you can program a gesture to ramp up slowly in response to Pitch Bend Up and then return to the nominal pitch much more quickly when you release the pitch wheel.

The Time Oscillator module "simulates the way muscles are activated by internal nerve impulses." It was designed for creating "languid motions" for effects such as slow guitar bends and pedal-steel slides. This module lets you define the minimum and maximum output rates, which are modulated by another controller (see **Fig. 2**). For example, you can use the pitch wheel to bend a note up and down at a variable rate defined by the maximum and minimum rate settings. Then you can select a modulation source that lets you vary the rate of bend in real time with another controller, such as the mod wheel or a continuous footpedal.

The Flex Filter simulates muscles working "at or near full activation," which makes it useful for more aggressive guitar bends. Both the Time Oscillator and Flex Filter also work well as inputs to other modules. They let you define a curve for both the forward and reverse motions of a bend. The Time Oscillator module, however, offers greater flexibility for defining the types of curves, because it has two rate parameters for each direction instead of one.

The Table Pair and Table Player modules are similar in that they use lookup tables to define the shape of a gesture in both the forward and reverse directions. A collection of 198 tables

System Requirements

68020 or better CPU; System 7 or higher; 4 MB RAM (at least 8 MB and a 68030 CPU if used with a sequencer); MIDI Manager or OMS 2.0 or higher with IAC; MIDI keyboard, alternate MIDI controller, or control surface.

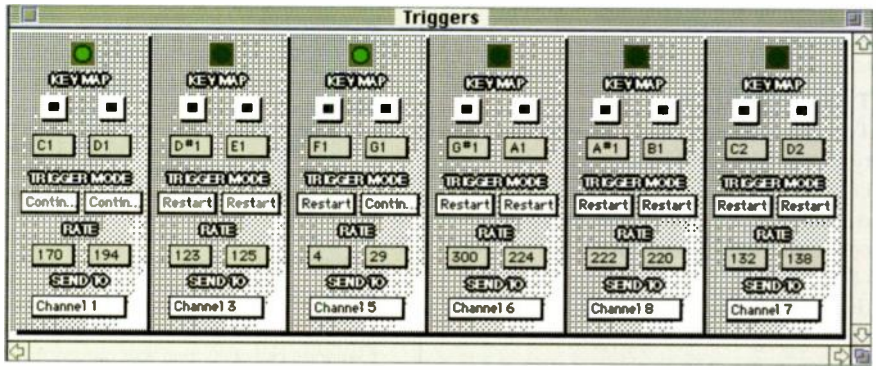

FIG. 3: Keymaps are specified in the Triggers window to define keys for triggering gestures.

is included with the program: trills, glissandos, bends, licks, and many more. In addition, you can edit the tables graphically and save them as user tables (see **Fig. 4**). As with most parameters in *Flex Processor*, you can edit the forward and reverse directions independently.

Tables let you create interesting licks, which can then be used with other modules. For example, you can play a lick while bending a note by combining Table modules with other modules. The tables are also the easiest way to simulate guitar hammer-on effects.

The Window Shaper module also uses lookup tables, but you can select a portion of the table curve and change its values using a modulation source. You can select a shape and position, both of which can be modulated as you play the gesture. The manual does a good job of graphically illustrating how the shape and position parameters affect the selected portion of the table. Within the program, however, there is no way to accurately predict results without some trial and error.

The table-based gesture modules are my favorite part of the program. They let you create some truly unusual gestures. Although they're not a substitute for live guitar playing, they can breathe more life and movement into your music. When used with other modules, the effects are amazing.

The Interval Amplifier changes a musical interval by a specified amount, which you can also modulate from another source. The Variable Delay works somewhat like a digital delay unit to change the parameters of another module after it is activated by moving a controller. The Variable Delay works well with long gestures that require flexible timing, such as long country steel-guitar slides or fiddle-style portamento.

The Hyperbolic Shaper and Radial Shaper modules produce subtle effects by letting you vary other modules in real time. For example, you can use

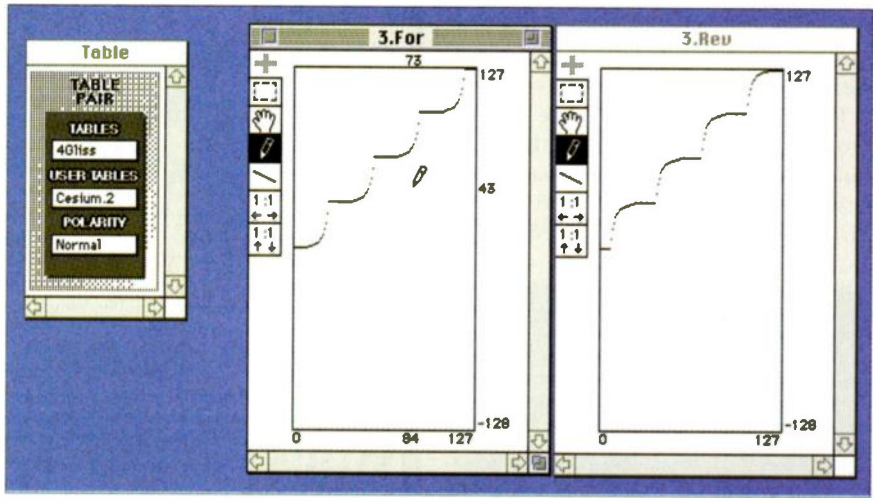

FIG. 4: These windows show the forward and reverse directions for a table-based glissando. Many tables are provided, but you can also draw your own curves and save them.

the Time Oscillator as a pitch-bend source and then route it through one of the Shaper modules to control modulation with a footpedal. The main difference between the Shaper modules and the others is that you're not "automating" the gesture; instead, you're playing the modulation in real time.

MANUAL DEXTERITY

The documentation is very thorough; perhaps a bit too thorough at times. It does a reasonable job of explaining how the ideas for the software came about, how they are implemented, and how to get the most out of the program. However, the language is sometimes obtuse and confusing, and there are many spelling errors. In addition, there are no screen shots, although there are several technical diagrams that illustrate the operation of certain modules.

The documentation is only provided in electronic form as a separate application; you'll need about 90 sheets of paper to print it out. I found it convenient to have the manual open in the background while using the program. Under these conditions, the lack of screen shots is not too much of a problem. Still, without them, it's hard to use a printed copy of the manual when you're away from the computer.

QUIRKS AND GLITCHES

Although storing Presets is straightforward, it would be nice if MIDI routing information was stored with each Preset. In addition, if you store a Preset with the same name as a Preset that already exists, the name appears twice in the Preset pop-up menu. If you quit and reopen the program, the two names then show up as a single Preset.

There are also some memory problems, which are mentioned in the manual. For example, if you load a lot of Presets, the program's available RAM fills up. When it gets full, the program alerts you and then stops working. This can be remedied simply by allocating about 3.5 MB to the application.

The user interface is sometimes more confusing than necessary. For example, the program doesn't use a consistent unit of measurement. I would prefer to see time units expressed in milliseconds. Using the program involves a lot of trial and error and a consistent time reference would help.

Furthermore, the way things are grouped in some of the windows makes it unclear as to how the different elements relate to one another. Even more annoying, when you click on a numerical parameter nothing highlights to let you know it's ready for entry from the keyboard.

CESIUM SOUND
Flex Processor 1.3 MIDI processor (Mac)
$189

FEATURES ■■■■■
EASE OF USE ■■■
DOCUMENTATION ■■■■
VALUE ■■■■
1 2 3 4 5

PROS: A powerful and versatile tool for manipulating MIDI pitch data in ways that could not otherwise be performed.
CONS: The user interface is sometimes awkward to use, and the program lacks clarity in several areas.
CIRCLE #443 ON READER SERVICE CARD

NEW EXPRESSIONS

Flex Processor represents a new way of approaching expression from keyboards. The user interface is often less than elegant, but many of my earlier complaints should be corrected or at least smoothed out in future updates. Perhaps one should think of this as a prototype application that is available commercially now. In many ways, it does have the look and feel of first-generation software. Nevertheless, *Flex Processor*'s power, versatility, and potential usefulness can't be denied.

Even if you forget about the science that's gone into it or the program's stated intention of simulating physical gestures, it is still a wonderful tool for experimentation and for giving your MIDI tracks a totally different bent.

David Kaplowitz *is a San Francisco–based composer-sound designer and co-owner of Found Sound, a multifaceted recording facility. He can be reached by e-mail: dave@foundsound.com.*

IK MULTIMEDIA

AXÉ (MAC/WIN)

The rhythms of Brazil are just a few mouse clicks away.

By Neil Leonard III

In recent years, such U.S. musicians as Paul Simon, Mickey Hart, Miles Davis, Pat Metheny, Chick Corea, and McCoy Tyner have expanded their ensembles to include Brazilian percussionists. The results of these collaborations have often been stunning and at times have even helped redefine jazz and pop music in the U.S.

The *Axé* CD-ROM from IK Multimedia Production gives desktop musicians access to some of the same rhythms and instrument sounds used in these collaborations. It contains 817 samples, including 673 loops and 144 single-strike percussion samples, all played by master Brazilian percussionist Jorge "Carecao" Neves.

The disc can be used with a Macintosh or Windows computer and comes with a great interface for auditioning sample loops and combining them to form grooves. The software worked smoothly on a Power Mac 7600/132. Audio playback was not always smooth on a Quadra 650, even with 22.05 kHz files, but I was able to save files with no problems. I tested the Windows 95 version on a Gateway 2000 200 MHz Pentium II with 32 MB of RAM, a DVD player, and an Ensoniq SoundscapeVIVO 90 sound card. The software performed as expected at all times, even when playing eight sample loops simultaneously.

GETTING LOOPED

Evaluating sample loops from a CD-ROM is usually a time-intensive process: in many cases, each sample must be loaded entirely into RAM, one at a time. You might have to delete samples from RAM to create space for more. Hearing individual samples in combination requires more work. Actually creating a usable loop by combining individual loops turns into a small sound-design project that might require you to dig deep into the functions of your sampler. You could find yourself paging through menu after menu performing hundreds of button presses to make it all happen.

The *Axé* CD-ROM includes a cross-platform application that takes most of the pain out of auditioning and combining sample loops. There are, of course, sample editors that let you audition AIFF or WAV sounds from disk, but *Axé* is designed expressly to accomplish this with the provided sounds and has useful looping features and various other bells and whistles that make the process quick and easy.

Launching the *Axé* software brings up a main menu with four buttons, labeled Instruments, GrooveMaker, Info, and Credits. The Instruments button calls up an interface that looks as if it could be a gadget from William Gibson's sci-fi classic *Neuromancer*. Clicking on one of the thirteen instrument names produces a picture of the instrument or a QuickTime movie, along with a brief description of how it is played.

The Info screen gives just enough information to help you get started. However, it does not mention basic details, such as where to find the single-strike samples, nor does it explain central features of the Auto GrooveMaker screen.

MANUAL GROOVEMAKING

The *GrooveMaker* software has two screens: one for Manual mode and one for Auto mode. In Manual mode (see **Fig. 1**), you can audition any single loop or create a groove comprising up to eight loops. On the right-hand side of the screen is a column that lists all of the instrument categories: afoxe, agogo, apito, berimbau, cuica, congas, ganza, metal recoreco, pandeiro, repenique, samba, sino, surdo, tamborim, tanta, vibraslap, vocals, and wood recoreco.

Clicking on the name of one category calls up a second list of up to 33 samples, numbered and sorted by tempo in beats per minute. For example, clicking on the Conga button displays a list of samples with tempos from 60 to 120 bpm. Clicking on a sample number causes the sample to begin playing.

IK Multimedia's *Axé* provides not only a great collection of Brazilian percussion loops but also a user-friendly interface for auditioning them.

For manufacturer information, please see Contact Sheet, p. 163.

FIG. 1: The Manual GrooveMaker screen plays up to eight sample loops simultaneously. The controls may look a little strange, but they're not hard to use.

The center of the screen has eight buttons arranged in a circle, one for each audio channel. In order to create a groove, you click on the number of an audio channel and then select a sample from the column on the right. This process can be repeated until all eight channels are playing simultaneously. You can change the computer's speaker volume from this screen and mute individual channels, but you cannot adjust the volume of sound channels individually. Samples stream from the CD-ROM for the first iteration and then play from RAM as they loop. As you choose individual samples, the groove might lose sync for a few repetitions; the "Groove" icon in the center of the circle flashes when the samples are synchronized again.

Once you have found the loops you want, you press the Save button. Saving a groove created with in the Manual GrooveMaker screen will cause the computer to create a folder called MGROOVE1 and copy each of the individual loops that make up your groove into that folder. The program will create AIFF files on a Mac and WAV files on a Windows computer. You can then modify this groove to create variations or press Empty to start over. Subsequent saves will create folders called MGROOVE2, MGROOVE3, and so on.

AUTOMATIC GROOVES

The Auto GrooveMaker screen looks like a high-tech gadget decorated with foliage and two boom-box speakers at the bottom. Pressing the Groove icon at the top of the screen causes the software to begin playing variations on a groove of its own design, changed randomly every several iterations. Successive presses create new grooves.

The sample-loop collection is comprehensive.

You control the Auto GrooveMaker by using three arc-shaped sliders labeled Colour, Group, and Beat. The Colour slider has five positions (Dark, Mild, Bright, and two in-between settings). Moving this slider to Dark creates a groove that consists of low-pitched drums. The Mild setting creates grooves that tend to use mid-pitched instruments such as samba snares and conga drums. The bright setting favors such samples as agogo bells and the high-pitched apito drum. The Group slider controls the number of loops used simultaneously. The Beat slider appears to have five notches but can only be set to three of them (Cool 120 bpm, Random, or Rave 140 bpm).

The screen has a button to add a "solo" part—an instrument that contrasts with those used for the groove. Another button locks *GrooveMaker* into the current pattern and eliminates periodic random selection of sample loops. As you listen to the loop combinations, you can also store loop settings temporarily in one of sixteen placeholders for later use in the session. The Save function in the Auto GrooveMaker works much like its counterpart in the Manual screen; however, it labels the folders it creates AGROOVE1, etc.

SOUNDS ABOUND

The sample-loop collection is comprehensive. Ten of the eighteen instrument categories have more than twenty loops to choose from. The overall quality of the loops is very high, both in terms of their sound quality and the loop timing. You get an amazing variety of samples. For example, there are 33 agogo patterns recorded at 120 bpm. These patterns would work well in many non-Brazilian styles, including jazz and funk.

The berimbau makes some of the most beautiful sounds in Brazilian music. The instrument has a single string and looks like an archer's bow with a resonating gourd on one end. The player strikes the metal string with a stick while holding a shaker and moving the open end of the gourd on or off the stomach to get a wah-wah effect. You get an excellent variety of patterns featuring this combination of metallic attack and shaker and wah-wah sounds. Of the 33 berimbau samples, 21 were recorded at 120 bpm.

The variety of cuica sounds is somewhat disappointing. This instrument is a drum with a stick sewn into the head. The stick is rubbed with a wet cloth to create a wide range of vocal-like effects. There are only ten 120 bpm samples here. Five of these samples seem like vocal emulations of the real thing and are far less compelling than the ones that are clearly authentic.

In contrast, the 33 pandeiro samples provide an excellent variety. This instrument looks like a tambourine fitted with a head and is struck with both palm and fingers. It sounds a bit like a high-pitched, extremely resonant conga and a tambourine being hit simultaneously. Speaking of congas, there are 29 conga grooves at 120 bpm and four grooves at other tempi. Given the widespread use of this instrument, a wider variety of loops at different tempi would be useful.

Samba rhythms are well represented, with 33 loops of rhythms played by one or more drums, including some wonderful snare-drum patterns. These are mostly recorded at 140 bpm.

The surdo is a deep, tom-tom-like drum that is struck with a mallet in one hand and muted with the other hand. All 33 surdo patterns are recorded at 100 bpm, which limits the use of this drum within *GrooveMaker* because there are few other 100 bpm grooves.

System Requirements

Mac: Power Mac required for 44.1 kHz playback (68040 Centris or Quadra provides 22.050 kHz playback and saves 44.1 kHz files); 16 MB RAM; System 7.5.1 or later; 2x CD-ROM drive.

PC: 80486 DX2/66 or better processor; 16 MB RAM; Windows 3.11 or 95; 2x CD-ROM drive; 16-bit sound card.

Singing is clearly not Neves's forte. The vocal samples that emulate drum patterns work; others are as trite as a simple shout of "okay!"

COMPLAINTS

A major issue in creating grooves with this disc is finding loops that have complementary feels and timbres. For example, there are four afoxe (cabasa) patterns at 120 bpm. While they share the same tempo, they have three slightly different feels. When I juxtaposed each one separately against the same agogo pattern, the unique feels were even more pronounced. In this case, the combinations worked; however, this is not always the case. So although the disc advertises millions of combinations, you might find the number of useful combinations to be fewer than one thousand.

In addition, you must exit the interface to hear the single-strike samples. The folder for 44.1 kHz samples has a Shot subfolder that contains the single hits organized into subfolders by instrument. These samples include silences at the end so that they fill a full beat at 120 bpm. There are nine or more variations on agogo, berimbau, congas, repenique, surdo, vocal, and wood recoreco. Many sampled percussion kits have fewer than a handful of samples for complex instruments like these, which makes this disc especially good for building your own percussion keyboard maps. Unfortunately, the interface does not provide a way to preview the 144 single-strike samples, although it seems that adding a single-strike preview feature would be easy.

▼

The berimbau makes some of the most beautiful sounds in Brazilian music.

POLYRHYTHM SECTION

If you have a need for Brazilian percussion sounds or just want to explore some new and irresistible rhythms, this CD-ROM is for you. The disc is reasonably priced, contains many useful loops, and provides an expedient way to audition them. With the exception of the single-shot files, which do not appear anywhere in the interface, all sounds are easy to access and archive as copies in new directories, grouped with related files.

If you want the samples but not the software, you can get an audio-CD version of *Axé* ($99) that has the 673 loops, 131 instrument sounds, and nine groove examples. However, the software is well worth having, and you save no money with the audio version (which is curious).

The *GrooveMaker* represents a breakthrough for sample CD-ROMs and will hopefully serve as a model for other sample collections in the future. The program makes it easy to experiment with juxtaposing different rhythms and helps you create custom grooves with very little effort.

This CD-ROM is an essential tool for musicians working with samples in Brazilian or world music. I highly recommend it if you want to spice up your music with enchanting polyrhythms.

IK MULTIMEDIA
Axé percussion-loop CD-ROM
$99

FEATURES ■■■■
EASE OF USE ■■■■■
QUALITY OF SOUNDS ■■■■
VALUE ■■■■
1 2 3 4 5

PROS: Wide variety of high-quality loops. User-friendly interface for auditioning loops singly and together.
CONS: Weak vocal samples. Single hits are not accessible from software interface. Playback uneven on Quadra 650.
CIRCLE #444 ON READER SERVICE CARD

Neil Leonard III *is a composer and performer who teaches in the Music Synthesis department at Berklee College of Music. He recently performed a concert of his interactive pieces at the Alternativa Festival in Moscow. He frequently composes music for film, video, and multimedia.*

D U Y

SHAPE, TAPE, AND VALVE (MAC)

A newcomer offers three unique DSP plug-ins.

By Peter Freeman

Users of digital audio recording and editing programs are well aware of how important it is to have a range of powerful and good-sounding DSP plug-ins with which to process audio tracks. Although many manufacturers offer well-written, quality plug-ins, only recently have we begun to see a new crop of more adventurous and innovative products that go well beyond the familiar delay, reverb, EQ, and dynamics processing.

Seemingly out of nowhere, Spanish newcomer DUY has arrived on the scene with a suite of refreshing new DSP plug-ins. *DUY Shape* provides frequency-dependent wave shaping, *DaD Valve* offers tube simulation, and *DaD Tape* delivers analog-tape simulation.

DUY Shape and *DaD Valve* are available in Digidesign TDM, AudioSuite, and Sound Designer II; Adobe Premiere; and Steinberg VST formats. *DaD Tape* is available for TDM only. Recently, DUY released two more plug-ins—*DUY Max* and *DaD Wide*—but these shipped too late for me to check them out. These two, as well as *DUY Shape* and *DaD Valve,* have now been ported to the MOTU Audio System (which works with *Digital Performer* 2.1) and are available as a bundle but not individually.

I tested the plug-ins on a Pro Tools TDM system. In this format, the plug-ins configure themselves automatically and can operate in either mono or stereo.

THINGS ARE SHAPING UP

DUY Shape is the most complex of the three DUY plug-ins I tested. The program employs an algorithm invented by DUY called FDWS (Frequency Dependent Wave Shaping) to perform spectral/dynamic modifications on sound. The technology allows you to define three separate frequency bands (low, mid, and high) and then process the amplitude within those definitions based on their individual input and output ratios. For example, you can choose to boost all low-frequency energy that resides below a certain volume threshold while simultaneously cutting all high-end frequencies that fall above a specific dynamic level.

How is this different from normal frequency-dependent compression? The answer is that the processing takes place instantaneously rather than over a controllable time period as with a compressor (employing attack and release rates). The result is unique sounding and powerful, if used properly.

At first glance, *DUY Shape* is simultaneously inviting and a bit perplexing (see **Fig. 1**). Its user interface consists of three different colored breakpoint *x-y* graphs representing low-, mid-, and high-frequency input/output ratios. The input signal corresponds to the horizontal axis while output is represented by the vertical axis.

The graphs are presented in an attractive and futuristic style, which I soon discovered is a DUY hallmark. All three graphs have their own input- and output-level meters, which lie next to their appropriate axis. There are only three sliders on the interface: controls for the master input level, low-cut filter, and high-cut filter. Interestingly, DUY has avoided adding a separate midfrequency slider by structuring *Shape* so that the midrange filter's frequency is determined by the position of the Low Cut and High Cut sliders. In other words, the midrange boundaries are defined by the area above the Low Cut frequency and below the High Cut. As a result, the low-cut and high-cut filters can span from 0 Hz to 1 kHz and 1 kHz to 22 kHz, respectively.

Each frequency graph has its own set of preset curve buttons: Linear, Expansion, and Curve Select. The Linear mode simply resets any current curve back to zero, providing a linear response with no cut or boost. The Expansion button expands the current curve so that it produces the maximum possible energy from the incoming signal. The Curve Select button, on the other hand, offers a choice of eight different types of algorithms: Lin, Cos, Log e, Log 2, Log 4, Log 5, Log 10, and Log m—each of which has specific uses.

I found it particularly useful that you can solo any of the three filters. This is handy not just to monitor the effect of a particular filter but also in creating specialized effects by isolating a particular bandwidth (e.g. telephone EQ using a midrange solo).

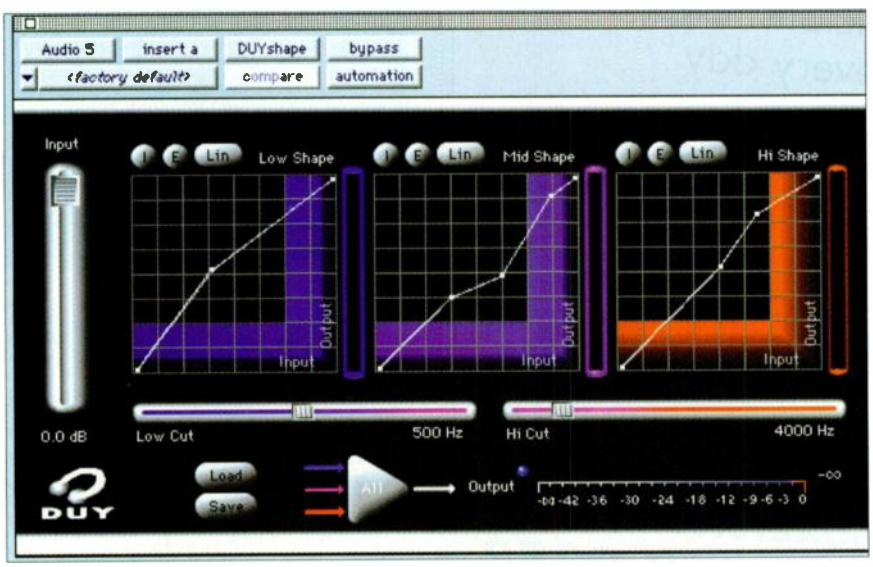

FIG. 1: DUY *Shape*'s graphic interface does not use conventional analog controls and can be somewhat confusing.

GETTING IN SHAPE

Processing with *Shape* involves creating breakpoints in the three graphs using the mouse. In order to understand how to do this effectively, one must look at the three Shaper graphs as being input/output level maps for different parts of the frequency spectrum. Creating a breakpoint tells *Shape* that you want all energy in the current frequency band residing at dynamic level *x* to be output by *Shape* at

dynamic level *y*. For example, if low-frequency signals come in at -10 dB, you can map them to -4 dB at *Shape*'s output. This is aided by a nice feature that displays the current *x* and *y* coordinates near the cursor whenever you drag the mouse in one of the Shaper windows.

In general, I did not find this process to be very intuitive. Extended experimentation is the only real way to obtain satisfactory results. In all honesty, initially I found *Shape* to be barely comprehensible, mainly due to its graphic interface. Although I did come to understand it better after some time, I totally disagree with DUY's method of controlling *Shape*'s parameters. They would have done better to provide conventional knobs and sliders as a front end, offering a more intuitive and clear way of accessing the plug-in's power.

Shape can be powerful and effective if you are willing to put in the time to understand the interface. If, on the other hand, you expect to get immediate and clear control over the software, you may be disappointed.

IT'S TUBULAR!

The *DaD Valve* plug-in attempts to emulate the sonic characteristics of vacuum tubes, which can produce a variety of tones. The software was written based on the mathematical model of an actual tube circuit. According to DUY, many important aspects of real tube circuitry were taken into account when creating this model, including noise, temperature, frequency response, and impedance. Interestingly, the model is designed such that its various internal parameters "interfere" with each other to create a realistic simulation of a tube circuit.

DaD Valve has few controls and sports DUY's appealing and inviting graphic design (see **Fig. 2**). The plug-in features two separate processing stages or models: Dynamic and Spectral. Pressing the Dynamic or Spectral Model buttons brings up a matrix of 40 different presets, individually designed for particular types of program material. The presets offer processing for a number of specific instruments (guitar, kick drum, viola, choir, etc.) as well as for the stereo bus. Combinations of the two Model presets produce a variety of tube tones.

There are two sliders on the interface: Input Level and Pusher Level. The Input slider (predictably) controls the amount of input level fed to the virtual "tube" circuit, and the Pusher sets the operating level of the dynamic section in the Valve model, almost like an Overdrive control.

System Requirements

Macintosh capable of running host program that supports any of the following formats: Digidesign TDM (Pro Tools 3.1 or higher), AudioSuite, or Sound Designer II; Adobe Premiere; Steinberg VST; MOTU Audio System. Allocate at least 1 MB extra RAM to DAE or host program.

Two other buttons, Lobe Flip and Link, make up the rest of the *DaD Valve* interface. Lobe Flip behaves like a phase-reversal feature, inverting the polarity of the dynamic model in the plug-in. The Link function serves as a section bypass, allowing you to listen to the effect of one model without the influence of the other.

Using *Valve* is very simple: set your input level, choose a Dynamic and Spectral Model preset, and play the track or audio source you want to process. You can then adjust the Pusher and Input sliders to achieve the desired effect. The Dynamic and Spectral presets can be changed on the fly, so it's easy to quickly experiment with different settings.

I can say without reservation that I loved the sound of *DaD Valve*. It genuinely seemed to add warmth, manifested as increased "weight," roundness, and richness in the processed signal. Through experimentation, I was able to get great-sounding results processing a number of sources, the most impressive being bass and guitar. Instruments that were recorded through a direct box seemed to benefit the most from *DUY Valve*; bypassing the effect momentarily clinched it for me.

(continued on p. 184)

DUY S.A.
DUY Shape
TDM $699; SDII $439; Premiere $149;
VST/AudioSuite $439
DaD Valve
TDM $799; SDII $469; Premiere $199;
VST/AudioSuite $469
DaD Tape
TDM $499
MOTU Bundle $699 (includes DUY Shape, DaD Valve, DaD Wide, Max DUY)

FEATURES ■■■▮
EASE OF USE ■■■
AUDIO QUALITY ■■■■
VALUE ■■■▮
1 2 3 4 5

PROS: Attractive graphic interface. *Shape* allows *simultaneous* processing of three separate frequency bands. *Valve* has impressively accurate tube emulation. *Tape* and *Valve* add excellent warmth, especially good for guitar and bass tracks.

CONS: Unintuitive *DUY Shape* interface leads to difficult learning process. Nasty digital distortion in one *DaD Tape* preset. Pricing structure is confusing.

CIRCLE #445 ON READER SERVICE CARD

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MICROPHONES

AKG

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E-300
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A multi-patterned side address mic that combines vintage capsule design with advanced head-amp electronics, the E-300 has an unusually wide frequency response of 10Hz to 20kHz & an exceptional dynamic range of 137 dB. It also features extremely low self noise of 11dB. Ideal for even the most critical studio applications.

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audio-technica.

AT4050/CM5
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The AT4050 multi-pattern condenser expands upon the AT4033 to set the standard for studio performance mics.
- 2 capacitor elements.
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- Vapor-deposits of pure gold on specially-contoured large diaphragms are aged through 5 steps to ensure optimum characteristics over years of use.
- Transformerless circuitry results in exceptional transient response and clean output even under extremely high SPL conditions.

AZDEN

UHF Performance Series

Breaking new ground, Azden's new UHF receiver and microphone transmitters offer superb performance and features at prices far below anything you've ever seen.

411UDR UHF Receiver
- Crystal-controlled, PLL synthesized UHF receiver with 63 user-selectable channels in the 794-806 MHz band. Up to 9 systems may be used simultaneously. Features both 1/4-inch and XLR output jacks, volume adjustment, and can be rack mounted.

41HT Handheld Microphone Transmitter
- Newly-designed handheld with supercardioid uni-directional mic element and 63 user-selectable channels. Uses 2 AA alkaline batteries or Azden ni-cads with the AMC-2A Charging Station.

41BT Bodypack Transmitter
- 63 user-selectable channels, input level control, standby switch, locking mini-plug connector and metal clip. Ideal for use with lavalier and headset microphones or as an instrument transmitter.

AMC Ni-cad Battery Charging Station
- Turns the 41HT into the only rechargeable UHF microphone available. (Uses Azden AN-1A nicad batteries only). Fully charged, the 41HT will run for 4 hours. Charging time is approximately 12 hours.

SENNHEISER

ME66/K6P
Short Shotgun Microphone

This road ready mic system is perfect for camera mount and other short gun applications. It's professional sound quality and affordable price combined with the flexibility of a modular setup make it a hard choice to beat.

MIXING BOARDS

MACKIE.

SR24x4 • SR32x4
Sound Reinforcement Consoles

These consolses do for live sound what the acclaimed 8-bus series has done for studio recording. Both professional grade mixing consoles, the SR32-4 and SR24-4 were built to deliver the same kind of useful features found on "bigger boards" while standing up to 24-hr-a-day use.
- Fast, accurate, easy level setting via "solo".
- 4 submix buses.
- 3 band EQ w/ sweepable mids.
- 6 Aux sends.
- Globally switchable AFL/PFL.
- Mackies "VLZ" technology for low noise.
- Tape return to main mix, mono out w/level control.

The new MS-1202, 1402, 1604 & SR Series all include VLZ (Very Low Impedance) circuitry at critical signal path points. Developed for Mackie's acclaimed 8•Bus console series, VLZ effectively reduces thermal noise and minimizes crosstalk by raising current and decreasing resistance.

TASCAM M-1600
16 & 24 Channel 8-bus Consoles

Great for modular Digital Multitrack setups and hard disk recording, the M-1600 is part of Tascam's next generation series of recording consoles. It features multiple options for inputs and outputs and uses the same, easy to install D-sub connectors as Tascam's more expensive consoles, all in "a compact design.

- XLR Mic inputs w/phantom power on 8 channels.
- Signal present/overload indicators on each channel.
- Balanced & Unbalanced tape returns & Balanced Group/Direct outputs using D-sub connectors.
- TRS Balanced Line Inputs on all channels.
- 3-band EQ with sweepable mids.
- 5 Aux sends (1 stereo)

4 assingable aux returns.
Perfect for use with DA-88 and ADAT setups.

MINIDISC MULTITRACKS

TASCAM 564 Digital Portastudio

The Tascam 564 Digital Portastudio combines the flexibility and superior sound quality of digital recording with the simplicity and versitility of a portable multitrack. Using MiniDisc technology, the 564 has many powerful recording and editing features never before found in a portable 4-track machine.

JUST IN

FEATURES–
- Self-contained digital recorder/mixer.
- Uses low-cost, removable MiniDiscs.
- 2 AUX sends / 2 Stereo returns.
- 4 XLR mic inputs.
- Channel inserts on inputs 1 & 2.
- 5 takes per track, 20 patterns, 20 indexes per song.
- Random access and instant locate.
- Non-destructive editing features with undo capability include: bounce forward, cut, copy, move.
- Full-range EQ with mid-range sweep.
- S/PDIF digital output for archiving.
- MIDI clock and MTC.

SONY MDM-X4 MD Multi-Track Recorder

MD recorders are here! Offering up to 37 minutes of high-quality 4-track digital recording, the MDM-X4 is truely the next generation of personal multi-tracks. With a built-in mixer, exclusive Track Edit system, and a Jog/Shuttle wheel for sophisticated editing with ease, the MDM-X4 will encourage you to flex your creativity.

FEATURES–
- Records on high quality, removable MD data discs.
- 3.5-gen. ATRAC CSI for wide dynamic range.
- 10 Input / 4Bus mixer.
- 2 AUX sends, 3-band EQ. • 11-point locator.
- Random access memory for quick playback and record from anywhere on the disk.
- Editing features include Undo, Redo, & Section/Song editing for flying material between different tracks.

STUDIO MONITORS

ALESIS

NEW PRODUCT

Point Seven
DESIGNED FOR MULTI-MEDIA!

- Shielded reference monitor.
- Front ported venting system for great bass response.
- 50 watts RMS–100 watts peak @ 4Ω.
- 85Hz–27kHz, ±3dB.
- 2kHz crossover for accurate phase and a wide "sweet spot" for mixing.
- Accurate flat sound reproduction.
- Great for studio and multi-media applications.

TANNOY

PBM 6.5II
Studio Reference Monitors

The PBM 6.5 II is the industry standard for studio reference monitors. They provide true dynamic capability and real world accuracy.

- 6.5" low frequency driver and 3/4" tweeter.
- Fully radiused and ported cabinet design reduces resonance and diffraction while providing deep linear extended bass.

SONY

NEW PRODUCT

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Powered Studio Reference Monitors

The new SMS-1P monitors are perfect for post production environments. They feature 2 types of inputs with independent volume adjustment, 15 watts of power, bass/treble control and shielding for use near computer monitors.

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The 4206 & 4208 studio reference monitors are 6" and 8" respectively. Both offer exceptional sonic performance, setting the standard for today's multi-purpose studio environments.

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PORTABLE DAT RECORDERS

TASCAM DA-P1

- Rotary 2 head design, 2 direct drive motors.
- XLR mic/ line inputs (w/phantom power)
- Analog and S/PDIF (RCA) digital I/O
- 32/44.1/48kHz sample rates & SCMS-free recording.
- Built in MIC limiter and 20dB pad.
- TRS jack w/ level control for monitoring.
- Includes shoulder belt, AC adapter, & battery.

HHB PDR1000/PDR1000TC

- 4 head Direct Drive transport
- XLR mic & line analog ins, 2 RCA line outs. Digital I/O includes S/PDIF (RCA) and AES/EBU (XLR)
- L/R channel mic input attenuation selector (0dB/-30dB)
- 48V phantom power, limiter & internal speaker
- Illuminated LCD display shows clock and counter, peak level metering, margin display, battery status, ID number, tape source status and machine status.
- Nickel Metal Hydride battery powers the PDR1000 for 2 hours. AC Adapter/charger included.

PDR1000TC Additional Features–

- All standard SMPTE/EBU time codes are supported, including 24, 25, 29.97, 29.97DF, & 30 fps.
- External sync to video, field sync and word sync.

- **MS1000 Master Sync module** ensures drift will be no more than 1 frame in 10 hrs.
- **HM1000 Headphone Matrix** provides a rotary switch for selection of Stereo, Mono Left, Mono Sum, & M/S (mid-side) Stereo modes.

JUST IN

SONY TCD-D8

This is the least expensive portable DAT machine available. It features 48kHz, 16-bit sampling, automatic and manual recording level, a long play mode for 4 hours of recording on a 120 minute tape, & an anti-shock mechanism. It includes a carrying case, a DT-13CLA cleaning cassette and an AC-E60HG AC acaptor.

KEYBOARDS & SOUND MODULES

Roland A-90EX Master Keyboard Controller

The A-90EX is an 88-note, weighted master controller with one of the best keyboard actions currently on the market. It offers incredibly realistic piano sounds, powerful controller capabilities and 'virtual' programmable buttons which can be configured to operate your software and other devices. The A-90EX combines the majestic sound of a concert grand, the expressive action of a fine acoustic keyboard and the comprehensive MIDI functions of a master controller—all in a portable stage unit.

Roland JV-2080 64-Voice Synthesizer Module

Roland resets the standard with the incredibly expandable JV-2080 64-Voice Synthesizer Module. This amazingly powerful package offers unprecedented expandability, digital signal processing, and remarkable operational ease, all housed in a 2-unit rack-mount design.

FEATURES

- 64-Voice polyphony / 16-part multitimbral capability
- 8 slots for SR-JV80 series expansion boards.
- 3 independant effects sets plus incependant reverb/delay and chorus.
- 6 outputs, Main Stereo and 4 assingable.
- **NEW** patch finder and Phrase Preview functions for easy access to the huge selection of patches.
- Large backlit graphic display
- Compatable with the JV-1080, XP-50, and XP-80.

Roland JP-8000 Analog Modeling Synthesizer

Analog is back- FOR REAL! This synth delivers a killer array of real-time control, Roland's revolutionary new analog modeling technology, and FAT, FAT SOUNDS! The assingable ribbon controller, 4 octave keyboard, built in arpeggiator w/ external sync capability, and RPS function will make this little gem a must have for DJs and re-mixers as well as that funk musician looking for some new inspiration.

NEW PRODUCT

FEATURES–

- 8 note polyphonic, 49-key velocity sensitive keyboard.
- Newly developed DSP oscillator
- "Motion Control" recalls parameter changes in realtime
- Single, Dual, & Split mode, assingable 'on-the-fly'.
- 128 user/ 128 preset patches, 64 user/64 preset performances.
- Tone control, 12 chorus, & 5 delay effects. *Play of soul.*

PORTABLE HARD DISK RECORDING

Roland VS-880 V2

This new version of the popular VS880 incorporates powerful additional software functions that allow you to get the most out of this baby's incredible creative potential.

FEATURES–

- Auto Mixing Fuction records and plays back your mix in realtime
- Easy recording with an inserted effect in "INPUT-TRACK" mode.*
- Process the master output with a specific inserted effect such as total compression.*
- Scene change by MIDI program change message.
- Simultaneous playback of 6 tracks in MASTER MODE recording.
- Digital output with copy protection.
- 10 additional effect algorithms (30 total) including Voice Transformer, Mic Simulator, 19-band Vocoder, Hum Cancelor, Lo-Fi Sound Processor, Space Chorus, Reverb 2, 4-band Parametric EQ, 10-band Graphic EQ, and Vocal Canceller.
- 100 additional preset effects patches.
- Use MIDI program & control change messages to edit and change effects.
- In total, over 20 powerful and convenient features in editing/sync sections have been added. Some require the optional effects expansion board

Fostex DMT-8 VL

The latest in the Fostex HD recording family, the DMT-8 VL truely brings the familiarity of the personal multi-track to the digital domain.

FEATURES–

- 18 bit A/D, 20 bit D/A conversion.
- Built in 8 channel mixer, Ch 1&2 feature mic & line level.
- 2 band EQ and 2 AUX sends per channel
- Cut/Copy/Move/Paste within single or multiple tracks.
- Built-in MIDI Sync., 6 memory locations.
- Dual function Jog/Shuttle wheel provides digital "scrub" from tape or buffer without pitch change. 1/2X to 16X.
- Divide the drive into 5 seperate 'virtual reels', each with it's own timing information.
- **NO COMPRESSION!**

NEW PRODUCT

MIDI

OPCODE Studio 5 LX Macintosh MIDI Interface

The Studio 5 LX is arguably the most advanced MIDI interface on the market today. It incorporates a MIDI patchbay, MIDI processor, and SMPTE synchronizer with it's interface functions, all in a 2 rack space unit.

- 15 Independant MIDI ins and outs.
- SMPTE reads and writes all formats– 24, 25/29.97/29.97DF/and 30.
- Network multiple units, 240 MIDI channels each.
- 128 patches, unlimited virtual instrument controls.
- 2 assignable footswitch inputs, 1 controller input.
- 8X speed when used with OMS.
- Internal power supply.

Studio 3 & 4 MIDI Interfaces, and Vision 3.5 sequencing software also available.

JUST IN

Mark of the Unicorn MIDI Time Piece AV

8x8 Mac/PC MIDI Interface

The MTP AV takes the world renowned MTP II and adds syncronization that you really need like video genlock, ADAT sync, and word clock sync, even Digidesign superclock!

- Same unit works on both Mac & PC platforms.
- 8x8 MIDI merge matrix, 128 MIDI channels.
- Fully programmable from the front panel.
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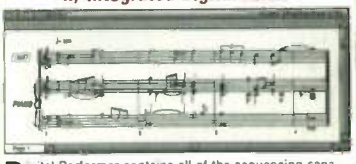
- Fast 1x mode for hogh-speed MIDI data transfer.

Pocket Express Mac/PC MIDI Interface

With the pocket express you get a 2 in, 4 out, 32-channel interface that supports both Mac and PC. It also features a computer bypass button that allows you to use it ***EVEN WHEN THE COMPUTER IS TURNED OFF.***

Digital Performer Macintosh MIDI Sequencer w/ Integrated Digital Audio



Digital Performer contains all of the sequencing capabilities of Performer V.5 and adds Digital Audio to the picture. Apply effects such as Groove Quantize, shift, velocity scaling and more- ***All in REALTIME.***

- MIDI Machine Conrol, Quicktime Video playback.
- Sample rate conversion.
- Spectral effects, pitch correction.
- Real-time editing and effects processing.
- Complete Notation.

FIG. 2: *DaD Valve* offers analog tube simulation and provides over 40 suggested instrument presets.

The effects of the individual presets vary greatly, so experimentation is the key to finding the best combinations for specific tracks and instruments. Across the board however, *Valve* added a really nice character, even when creating deliberate distortion with the Pusher.

I would have no qualms using *Valve* on many elements in a session; this is a great plug-in. It's quite musical and is capable of producing a large palette of coloration, from extreme subtlety to obvious saturation.

TAPE'S RUNNING

DaD Tape is designed to emulate the characteristics of five different types of analog tape machines. In addition, it affords you the options of choosing from three tape speeds (7.5, 15, or 30 ips) and three types of noise reduction (Type 1, Type 2, and Noiseless).

The five "brands" of tape recorders modeled in *DaD Tape* are: a modern 2-track, ¼-inch machine; a popular 2-inch, 24-track from the 1970s; a solid-state 2-track machine from the 1960s; a vintage tube machine; and a cheap, ½-inch multitrack.

The plug-in's user interface is simple (see **Fig. 3**). Three pull-down menus provide selection of tape-machine types, tape speed, and NR options. Two input-level VU meters are also included. A Compare button allows you to A/B two different settings, and a Bypass feature is provided. Using *DaD Tape* is just as easy as using *DaD Valve*: adjust the input level with the Input slider, select your menu options, and you're off and running.

Hearing the subtle differences between the individual presets can be difficult. In general, I liked all of the tape-machine presets with the exception of the "cheap ½-inch multitrack," which I found to be (ironically) too cheap sounding. Granted, the preset is designed to sound low cost, but it also produced unpleasant digital distortion characteristics if pushed too hard. The other emulations did good yet subtle things to the source materials, which included bass, guitar, vocals, drums, and full mixes. They added perceptible warmth and "fatness" to the sound, especially the "Modern ¼-inch 2-track" and "Vintage 2-inch 24-track" presets.

As one would expect, 15 and 7.5 ips tape speeds produced two different degrees of high-frequency roll-off. The noise reduction presets also colored the high end, though not to such an obvious degree. Unsurprisingly, for the majority of sources I processed I enjoyed the 2-inch 24-track setting, with 30 ips and Noiseless selected. Like *DaD Valve*, *DaD Tape* really shined with guitar and bass recordings, although the plug-in did add noticeable warmth to several drum tracks, as well. Though the plug-in's effect was subtle overall, a quick toggle of the Bypass button was all that was needed to immediately hear the positive results clearly.

This is another very good program. While not as critical for day-to-day production as a parametric EQ, *DaD Tape* adds a nice layer of pleasant warmth, which is a definite advantage in the digital world.

HOT SPANISH SPICES

I love these plug-ins. *DUY Shape*, although hampered by its unintuitive front end, is capable of powerful tonal modification. *DaD Valve* and *DaD Tape* offer more subtle processing that can add surprising life and musicality to tracks. Once I conquered the learning curve, I decided that I never wanted to be without them in my arsenal.

Speaking of the learning curve, the three plug-ins come packaged in standard CD jewelboxes, with the instruction manuals enclosed as inserts. In the case of *DaD Valve* and *DaD Tape*, not much tutorial is required, so the concise manuals are not a hindrance. However, the complexity of *DUY Shape* warrants a more thorough instruction manual than is currently provided. Detailed examples and tutorials should be included, not just cursory coverage of the various controls.

One last thing before we leave the topic of things that require a better explanation: the pricing structure is also pretty unintuitive, with each plug-in priced differently in each format. Also, except for the Premiere plug-ins, which are eminently affordable, these are expensive plug-ins. TDM users are accustomed to paying such prices, but the prices for VST and AudioSuite seem a bit exorbitant. The MOTU bundle is reasonably priced, though, considering you get five plug-ins. DUY would do well to reexamine its pricing structure.

I was struck by the superb visual design and aesthetic quality of these plug-ins. They are a pleasure to look at, a fact that is *not* so unimportant when you're staring at a screen for hours on end. I hope that other developers take their cue from DUY in this area. It will make digital audio editing a nicer job if they do.

FIG. 3: The *DaD Tape* interface allows you to select from several tape machine types, tape speeds, and noise-reduction modes.

In general, the new plug-ins from DUY are musical, powerful, and useful. If you have a Macintosh digital audio editor that supports one of its many supported formats, these programs should be near the top of your want list.

Peter Freeman *is a freelance bassist, synthesist, and composer living in New York City. He has worked with such artists as John Cale, Jon Hassell, Chris Spedding, Nile Rodgers, Shawn Colvin, L. Shankar, Sussan Deihim, Richard Horowitz, and Seal.*

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FINAL MIX

Look Both Ways before Crossing

The left brain's connected to the right side, harboring a ghetto of logic and analysis, whereas the right brain's connected to the left side and emanates creative, nonlinear thought. And still them bones manage to walk around. The inside of the human brainpan is at once a mixed up, muddled up, shook up world and an unparallelled miracle of cognition.

Last month, the Left Brain Glee Club of Greater Flogbury held forth in this space, trumpeting the desirability of thinking decisions through in a thorough manner. And rightly so, rightly so.

But the truth of the matter is that many decisions don't *need* to be thought about in depth to arrive at the best conclusion. Sometimes something just *feels* right and the alternative doesn't.

Take groove. (Hey, I'm a drummer.) I'm sure there have been some fascinating and enlightening treatises written on the rhythmic idiosyncrasies to which we apply that term, and lots of good quantization tips toward that end have appeared in these very pages. But when it comes down to picking one take of a song recorded live on three successive evenings to use on an album—given that the performance and technical details are equal (even though often they are not)—the decision is likely to be based on which of the three takes just *feeeeeeeeeeeeels* right. In short, these types of decisions come down to a thing that is describable but indefinable—and instantly recognizable.

I once played in a band that had a bass chair that seemed to rotate at a good clip. I watched half a dozen bassists fly off it and out of the band in the course of couple of years. After a while, it got to the point where I would sense that single moment—an expression playing across the bassist's face or a comment from his direction—that left me with the complete certainty that the bass player was on his way to leaving the band. I'd think, "He's gone now. It's just a matter of time." I could be less certain whether it would be days or months. Either way, that fleeting moment of recognition servec as a trigger to start organizing song charts, taping rehearsals, and performing other such rituals prepratory to the search for and transition to a new bassist.

That ol' third-eye awareness easily turns into sonic dowsing. You nonchalantly put a microphone on a stand and then, just as matter-of-factly, place it in the best possible position.

Is that the result of experience? Of course it is: experience as assimilated into intuition. Intuition and instinct incorporate experience, just as they incorporate emotion. But there, as Hamlet said, is the rub. We've all had the experience of making impulsive decisions, based on emotion, which proved not to have been the best way to go.

Given that both are such powerful and compelling influences, how, oh how, are we to differentiate between the Great Wise Truth revealed by intuition in its finest glory from the Risky Raging Rollercoaster of unadulterated emotion?

Just as that dark conundrum closes around us, the fog suddenly lifts, and we find ourselves back at the Zen Carnival, riding the friendly Yin/Yang Carousel: a person needs to draw on *both* sides of the brain, in congress with each other, just as Captain Kirk needed to reunite his good but wimpy half with his nasty and evil half in order to be fully who he was.

Lead with your gut, which is your right brain. (Biology is confusing.) Size up a situation with a "first take," and then call over to Greater Flogbury, and let the Left Brain Glee Club have a whack at it.

There's the ticket. Don't think about it. Then think about it. Then do it.

Contributing Editor **Larry the O** *inhaled last week and has scheduled an exhale for next Thursday evening.*

ILLUSTRATION BY STEVE CURL

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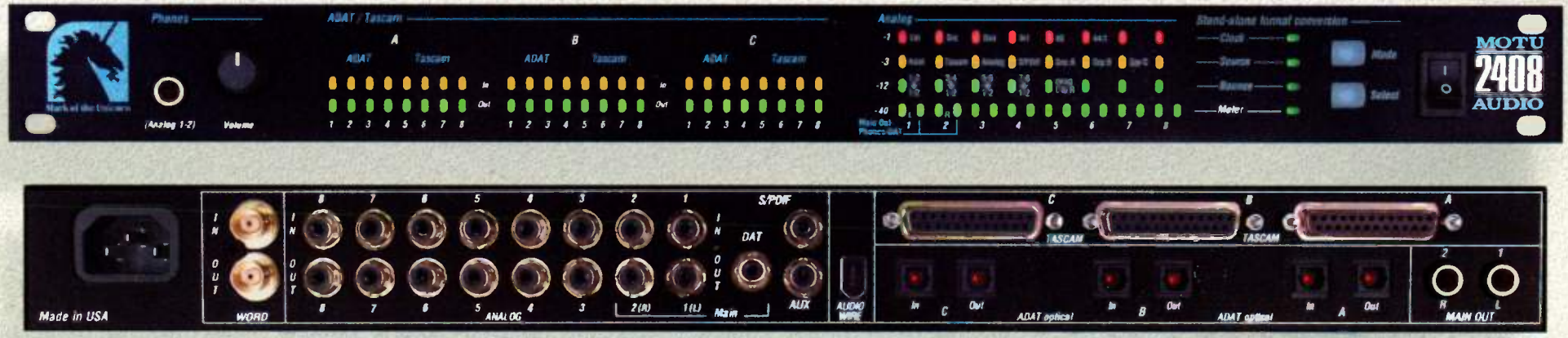

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