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September 1998

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HR824 ACTIVE NEAR FIELD

UNFLINCHING ACCURACY.
We've claimed it. Reviewers and power users are confirming it: the HR824 is the most accurate 8-inch 2-way near field monitor you can buy. It lets you hear exactly what was recorded — from microphones right through to your mixdown deck. You'll suddenly discern fine nuances of sonic texture, dynamics, equalization and stereo perspective that were sonically invisible before. As one owner put it, *"I am correcting a lot of mixes I have made in the past."*

HR824

According to *Mix* magazine's recent field test of the HR824...

"Frequency response was the flattest we have measured so far... *there can be no question... they speak the truth."*

"The HR824s performed admirably, allowing us to distinguish very fine shades of tonal color and to establish subtle timbral and harmonic relationships between sounds. When the mixes were played on other monitors, including some that cost more than twice as much, they translated very well. The overall imaging was extraordinarily clear and detailed."

Because the HR824 is active, we can precisely match each transducer's actual output. During final assembly, each HR824 is carefully hand-trimmed to ±1.5 dB, 39 Hz 20kHz. As proof, each monitor comes with its own serialized, guaranteed frequency response printout.

EXTREMELY WIDE SWEET SPOT.
Instead of a traditional, narrow "sweet spot" directly between the monitors, you'll discover that the HR824s have a wide, "sweet zone." They maintain a wide, coherent, stereo panorama that lets you move from side to side — and share what you hear with others.

Again, *Mix* magazine...

"[HR824s] also have a wide off-axis listening range, due to the high-frequency dispersion of the waveguide...*the mids and highs were tightly focused, and the stereo image well defined."*

EXTENDED LOW FREQUENCY RESPONSE (sub woofer is built in*). The HR824 has the lowest frequency response of any 8-inch near-field monitor. It really IS capable of flat, accurate, articulated response below 39 Hz and usable response to 30Hz — low frequency accuracy that simply can't be achieved with passive speakers. Bass notes start and stop instantly, without overhang, distortion or "tubbiness."

***Mix* further states...**

"The HR824s handled the ultra-low bass remarkably well... *Mackie asserts that the HR824s are smooth from 39 to 20k Hz (±1.5 dB), and our tests corroborated the claim. This is no mean feat for monitors this size, and at this price."*

BRING ON THE HR824s. HOLD THE ICEBERGS.
Simon Franglen and his cohorts worked on the blockbuster hit Titanic at Castle Oaks Studio in Calabasas, CA. The studio was equipped with expensive studio monitors (one each for left, center and right) and a matched sub woofer. When Simon received three Mackie HR824s, he immediately did a series of rigorous listening tests against the old monitors. The unanimous decision: replace the studio's previous near field monitors with the HR824s.

"The difference was extremely pronounced," explains Simon. *"Three HR824s gave us better bass response than the larger monitors with a sub woofer. The HR824s were louder, had more dynamic response, and the imaging throughout the room [was incredible]."* Simon says the HR824's sweet spot is much larger, which made listening to things easier, *"when you were off to the side of the room."* *"Apart from very expensive speakers,"* says Simon, *"I've not come across any other speakers that sound as good. They absolutely tell me what I'm putting on tape."*

One person who's taken Mackie to heart is British-born synth player/producer SIMON FRANGLEN. You may not know his name, but you most certainly know his work. Simon Franglen's curriculum vitae includes work with Grammy winners Eric Clapton, Madonna, and Celine Dion (including the single from the blockbuster movie *Titanic*), rockers Yes and Crash Test Dummies, and legendary performers such as Michael Jackson and Barbra Streisand. Simon's done work in the movies, too, including Titanic, The Client, Dances With Wolves, Mission Impossible, Seven, and Contact. He's won seven Clio Awards for his work in television commercials—his clients have included Nike and Lee Jeans. His talents as a session synth player and programmer, as well as producer, are well-known throughout the entertainment world. With such credits, you'd think the guy was using incredibly esoteric, expensive gear. How else could he get such award-winning results? Well, Simon will be the first to say: you don't have to spend wads of money to get tough, quality sound gear. Not with Mackie.

*A large honeycomb composite piston mounted on the back of the cabinet couples with the front woofer, acting as a subwoofer.

AC power and input connectors (1/4" & XLR) extend directly from the bottom of the amplifier down, allowing the cabinet to fit flush against any surface.

MONITOR—WELL WORTH DISCOVERING.

How much is unflinching accuracy worth to you?
As we talk to more and more professional engineers who have converted to Mackie HR824s, one thing is becoming especially apparent — our near field monitors can uncover nuances that other speakers miss. In fact, one Very Prestigious Major Los Angeles Studio Complex has now installed HR824s in its Quality Control Department — because our monitors can uncover miniscule audio flaws that were undiscovered during the tracking and mixdown process on "big studio monitors." When you value the quality of your creative product, HR824s should be in your studio, too.

HUMBERTO GATICA, TRIPLE GRAMMY AWARD-WINNING ENGINEER/ PRODUCER

Being at least nominally humble we thought it would take years for mixing/producing legends like Humberto Gatica to publicly admit — much less proudly proclaim — to prefer our HR824 near field monitors.

We're delighted the esteemed Mr. Gatica proved us wrong. After being turned on to HR824s by Simon Franglen, Humberto now uses them at his private facility and has carrying cases for a second pair so he can get the same accuracy in studios that haven't yet become HR824 converts. Talk about a traveling ad!

Humberto's stellar ear for mixing has served him well as a producer: Grammy awards and nominations for engineering [Chicago, Michael Jackson, Streisand] led the way to a Grammy for producing Celine Dion's "Falling Into You" and mixing/producing her 18X platinum album "Let's Talk About Love."

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Mix Magazine quotes from Mix Magazine Field Test by Barry Cleveland, April 1998. Reprinted by permission. And this isn't the only glowing review we've gotten. Check out the February 1998 issue of Recording Magazine, beginning on page 30; the April issue of Pro Audio Review, page 16; and the October 1997 issue of Audio Media, page 46.

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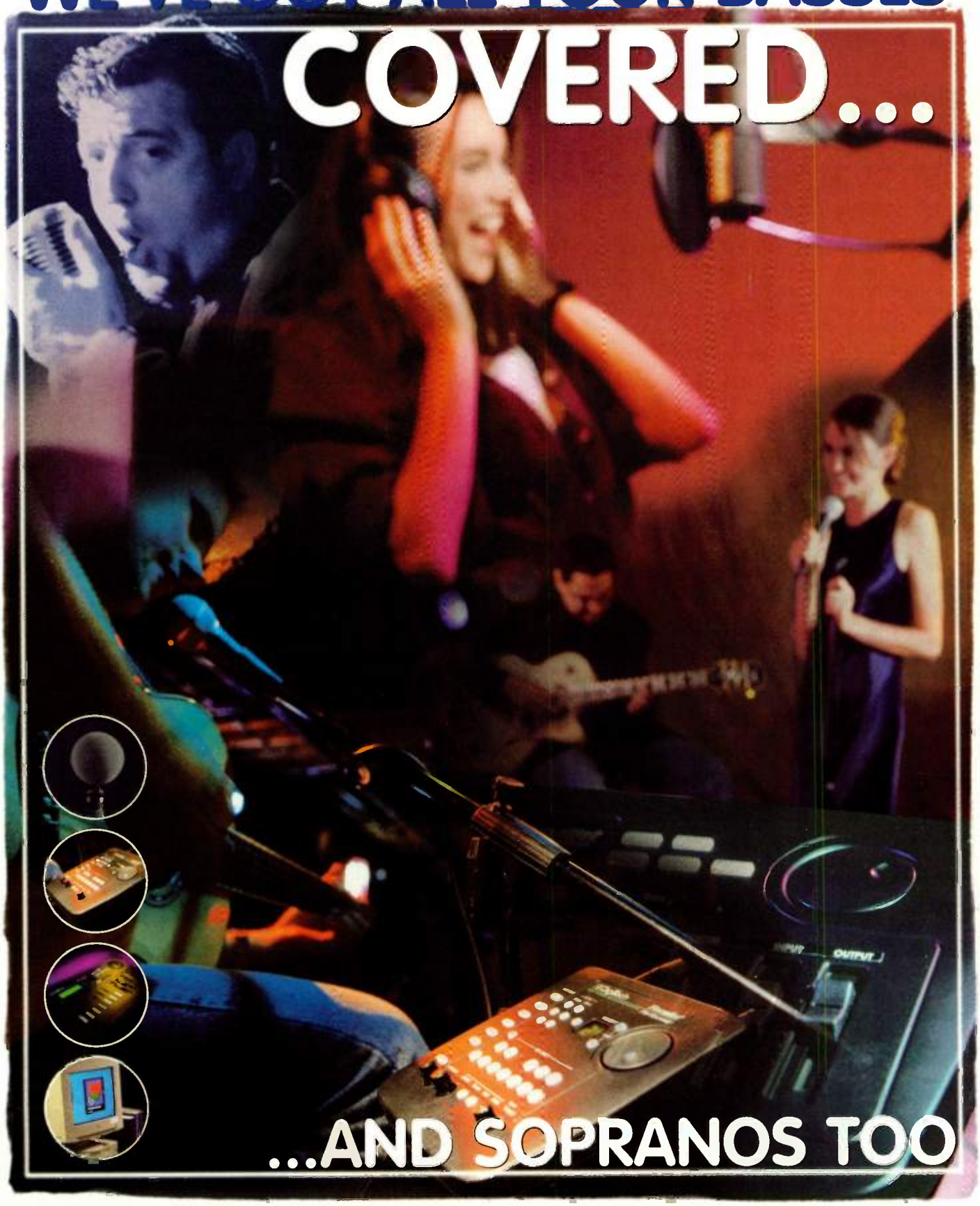

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FEATURES

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Tape-replay keyboards such as Mellotrons and Chamberlins were hallmarks of the 1960s psychedelic sound. Fast-forward to the '90s, where a new crop of artists are putting their own spin on these instruments. Find out how to get in on the action.
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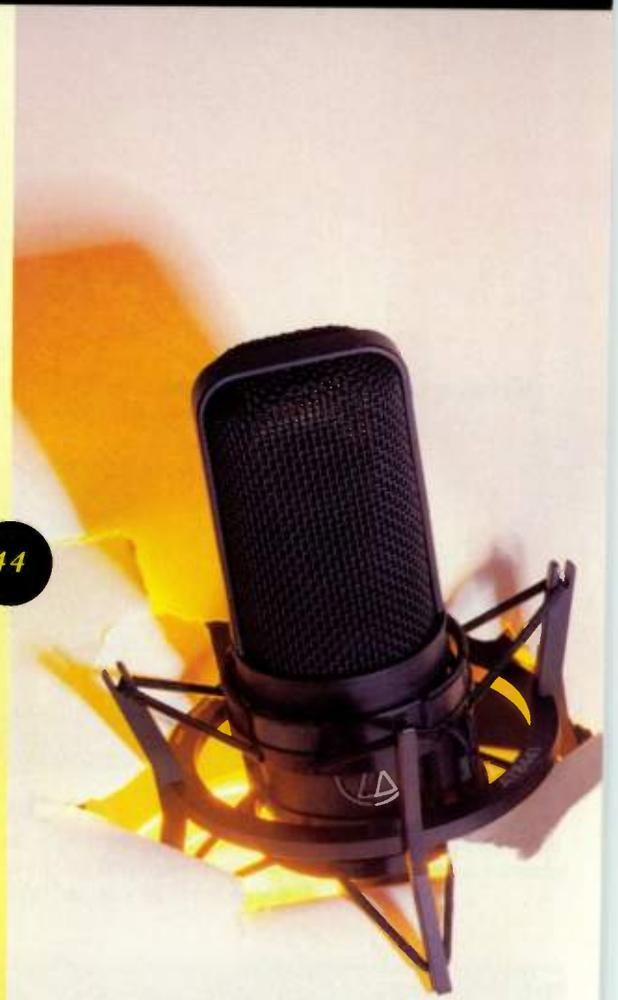

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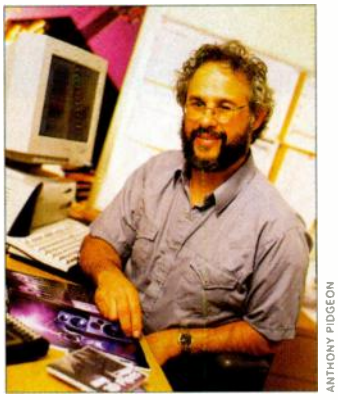
Cover: Photo by Barry Muniz.

A Bit Much

When is digital audio quality "good enough" in the real world?



ANTHONY PIDGEON

A friend who works in our Emeryville, California, enclave recently recorded a single in Nashville. A former resident of Music City, he used his connections to employ the services of some virtuoso players. When he dropped a few names, my jaw dropped. My jaw dropped farther when I heard that one famous player declined the gig on the sole grounds that the tracks would be recorded to ADAT! Apparently, this musical wizard believes that acoustic stringed instruments should be tracked only to analog tape.

This artist may be a bright fellow, but in turning down a session on these grounds, he is thinking like a neo-Luddite. Using analog tape is not the only way to get a warm, natural sound when recording acoustic instruments. Many producers and engineers who record digitally simply add analog warmth with a tube processor; in fact, I happen to know that the engineer for this record did so.

You could argue that the first round of ADATs, for all its success, had room for sonic improvement. Alesis apparently agreed: it issued the improved ADAT-XT, which recorded 16-bit audio via 18-bit converters, and now is shipping a new generation of machines that record 20-bit audio to tape (see the review of the ADAT LX20 and XT20 on p. 138). These improved machines can capture the sound of our neo-Luddite's instrument far more faithfully than can an analog deck.

Thanks to the development of DVD, the Next Big Thing is said to be 24-bit, 96 kHz digital audio. Indeed, the better "wide and fast" converters I've heard sound awesome! Several 24-bit products are available now, though not all support 96 kHz sampling; for example, Ensoniq's PARIS hard-disk recorder (reviewed on p. 122) supports 24-bit, 48 kHz recording.

But wait a minute! Whenever you increase the bit resolution and sampling rate, there are tradeoffs, such as increased file size and computer-memory requirements and potential throughput bottlenecks. Furthermore, DVD also supports 20-bit, 48 kHz audio, which sounds excellent and has more moderate file sizes. So 20/48 might be a smarter choice than 24/96 for many purposes.

Even as 96 kHz converters hit the market, 192 kHz recording is on the horizon. Several **EM** and *Mix* editors recently attended an informal demo by converter manufacturer dCS, comparing 24-bit recordings captured at 44.1, 48, 96, and 192 kHz. We agreed that, compared to 96 kHz recordings, the 192 kHz recordings were airier, more natural-sounding, and exhibited superior imaging. There are good technical reasons for this, which is another story. But we were listening to 24/192 playback; it's fair to wonder whether consumers will notice the difference, even with 24/96 DVD and an audiophile home-theater system. Furthermore, we're talking about files that are three times the size of 16-bit, 48 kHz files! If you mix multichannel surround at 24/96 or higher, the files will be absolutely gigantic.

Given these tradeoffs, what constitutes "good enough"? With 20-bit, 48 kHz technology, which is commonly available, our virtuoso neo-Luddite and his ilk can hear their instruments with unprecedented sound quality—if they open their ears and minds. At the same time, before we give in to unfettered 24/96 technolust, let's examine the practical considerations a bit more.

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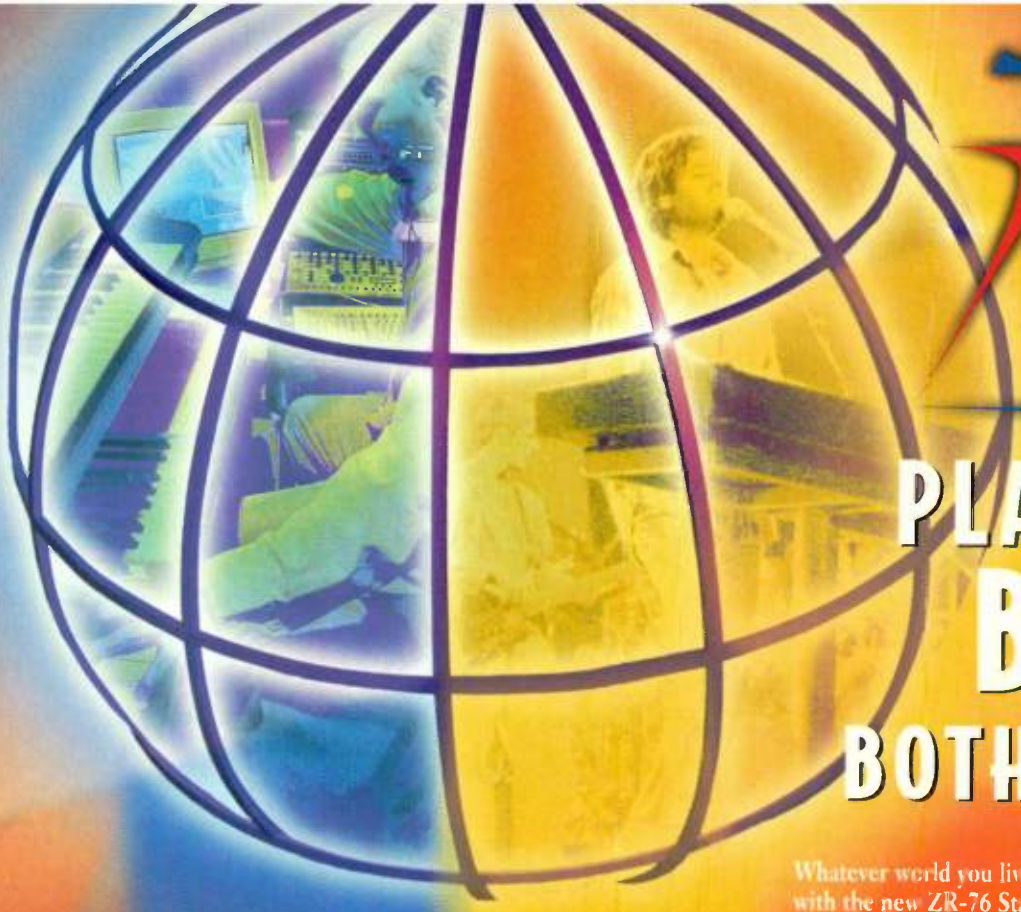

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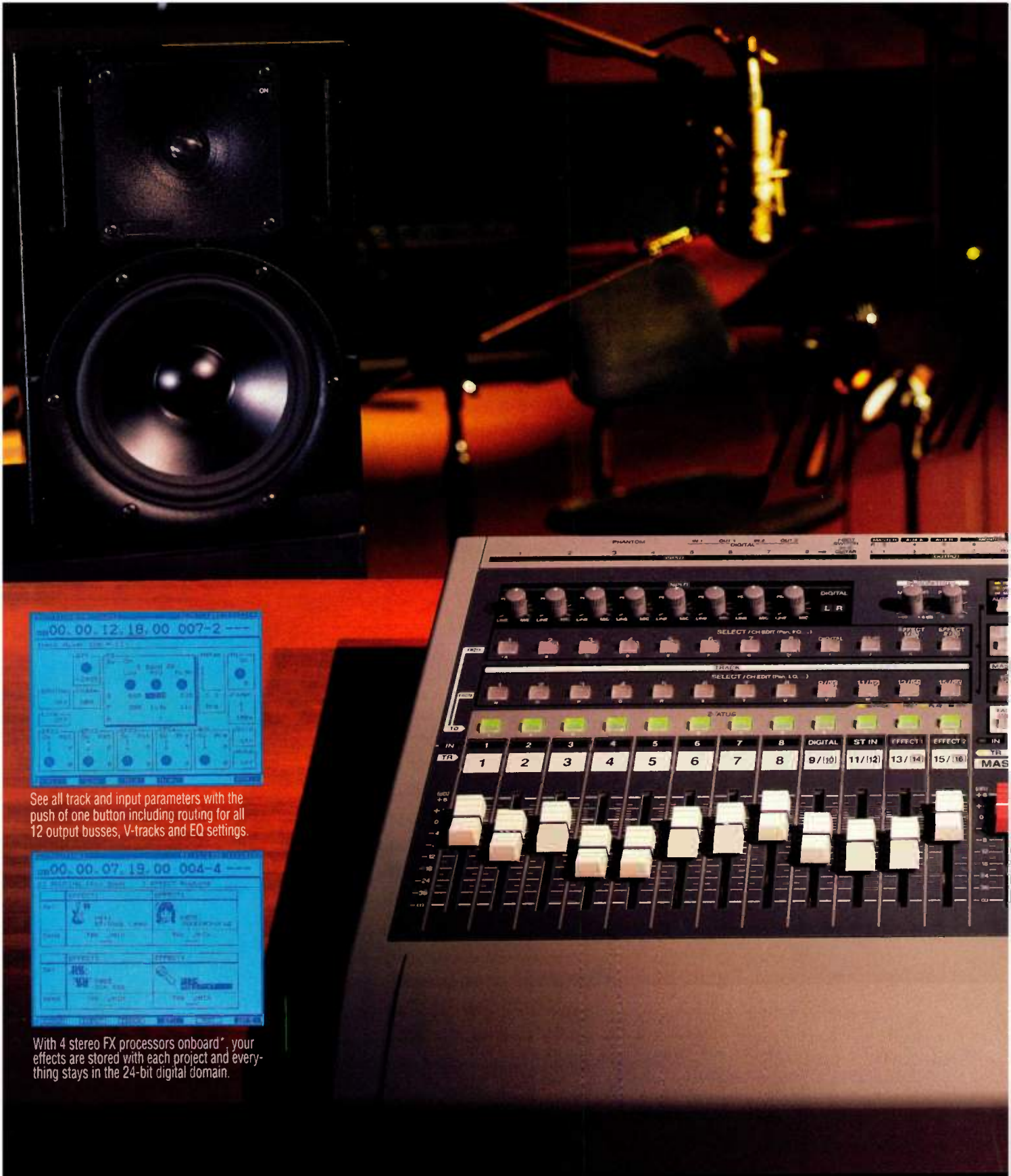

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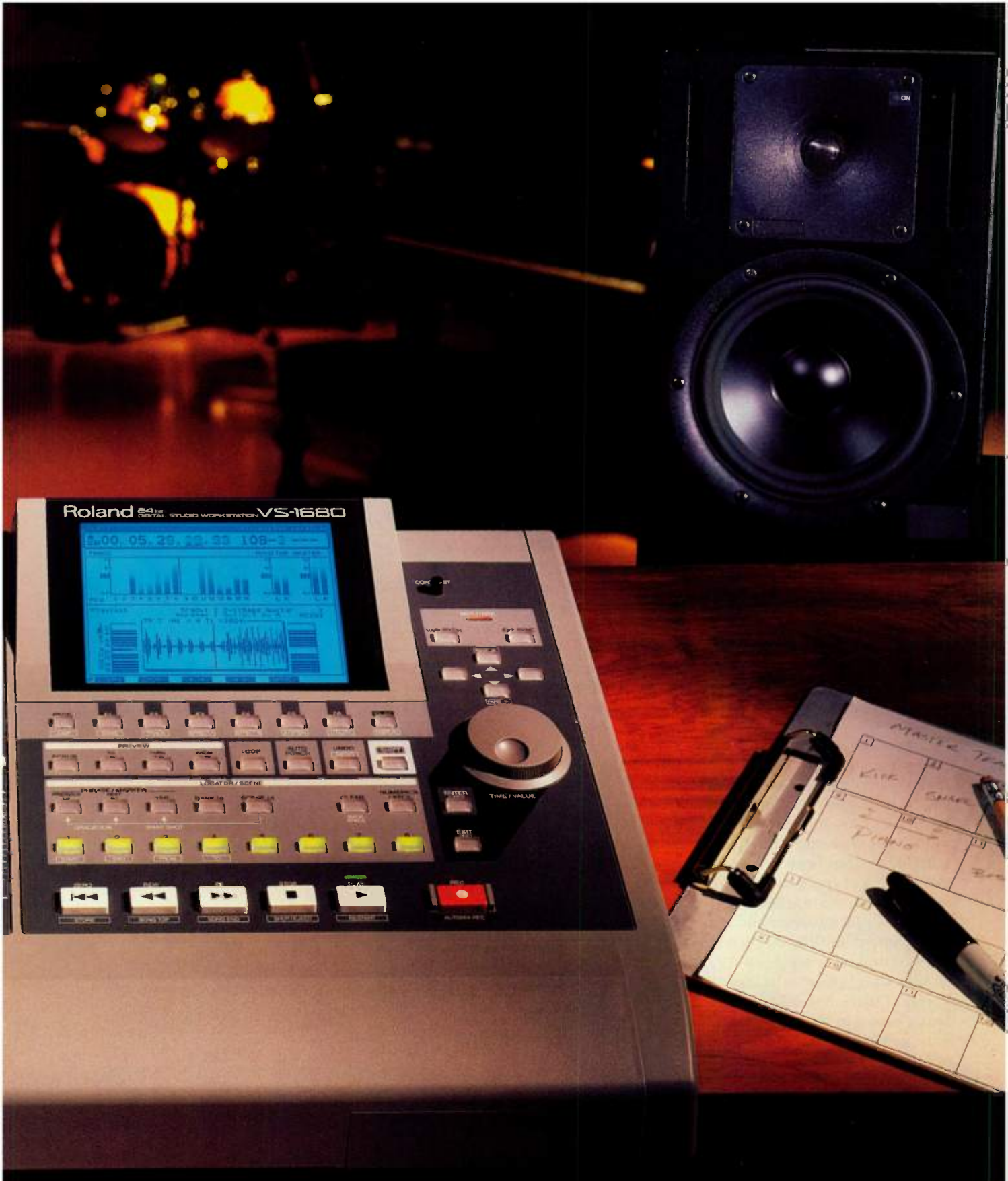

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OSTENSIBLE OS OPTION

I am a software engineer by trade and really love playing, recording, and programming electronic music. I've begun to wonder why Mac and Windows are the only environments people seem to talk about.

Being a software developer, I find Linux to be a much more pleasant and comfortable environment to work in. (Call me crazy, but many developers will tell you the same thing.) In recent years, Linux has become popular for many different applications (including multimedia), mainly because it is a more powerful environment, both for development and for user-level tasks. NASA is using it to replace its Cray machines, Corel plans to release WordPerfect Office Suite for Linux, and Linux is used in my workplace for software development and operations—not to mention the thousands of Linux users and developers worldwide.

Now don't get me wrong; Linux isn't for everyone, but for high-powered audio and video applications, why not? The people that did the special effects for the movie *Titanic* thought highly enough of Linux to use it for much of their special-effects processing. The great thing about Linux is that it's scalable—it runs on anything from your old '386 to the speediest DEC Alpha workhorses. And it's cheap.

Until now, Unix wasn't an important OS for multimedia applications, primarily because it was so expensive. Only those with the deepest pockets, such as movie makers and professional studios, could afford the power of Unix or the staff to manage such systems. But now, Linux on a PC makes a Unix clone more affordable than Windows and Mac systems.

So I now challenge *Electronic Musician* to help Linux forge its way in the vast frontiers of audio, video, multimedia, and personal/project studios. Who knows where it will take us?

Geoff Hardy
ghardy@biztravel.com

Geoff—Keep in mind that the consumer computing market drives music-software development. The total user base for Windows and Macintosh is huge, so even though music software sells to only a relatively small percentage of that user base (compared to sales of database applications and graphics programs), software developers have solid, viable markets for their products.

Developing for a fringe (from the consumer viewpoint) OS is not likely to be profitable, and it seems unlikely that Linux will make it in the consumer world. (Sonorus will soon have Linux drivers for its Studi/o digital audio card. However, Sonorus expects the card to be used with Linux for medical and other scientific purposes, not for music production.)

As I see it, in a year or two, Windows NT and Mac OS X (a next-generation Mac OS with Rhapsody under the hood, due for release later next year) will become the modern operating systems of choice for the high end of the consumer market, with Windows 98 and Mac OS 8.x dominating the lower end of the market. Therefore, Windows and Mac will continue to be the platforms for music-software development.—Steve O.

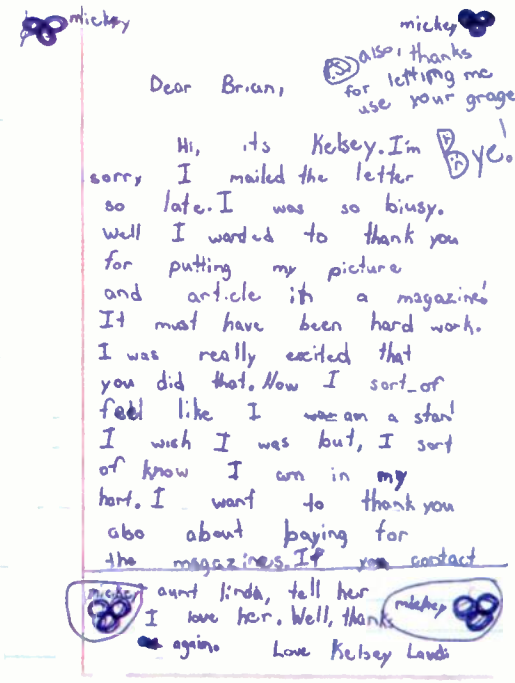
STOP IN MIDI STREAM

I am a musician and computer aficionado, and I love MIDI, but I don't think any MIDI composition is complete until it is brought into the realm of digital audio. I read with horror your article promoting "streaming MIDI" (one in a long list of computer oxymorons)!

First of all, no one wants to land on a site that plays background music. I hate this because I'm usually already listening to a CD, MPEG 3, or even streaming audio; if not, then I am enjoying the silence! So, all you Web developers, if you must include music, put a button on your site that says, "Here's the background music if you want it." Do not just force it down our throats!

From the surfer's perspective, it is neither necessary nor helpful to "stream" MIDI because MIDI files download faster than you can blink your eyes. If you're worried about protecting your MIDI compositions, don't put them on the Internet!

You cannot make real music with General MIDI alone, anyway. There is no MIDI music on the Internet that



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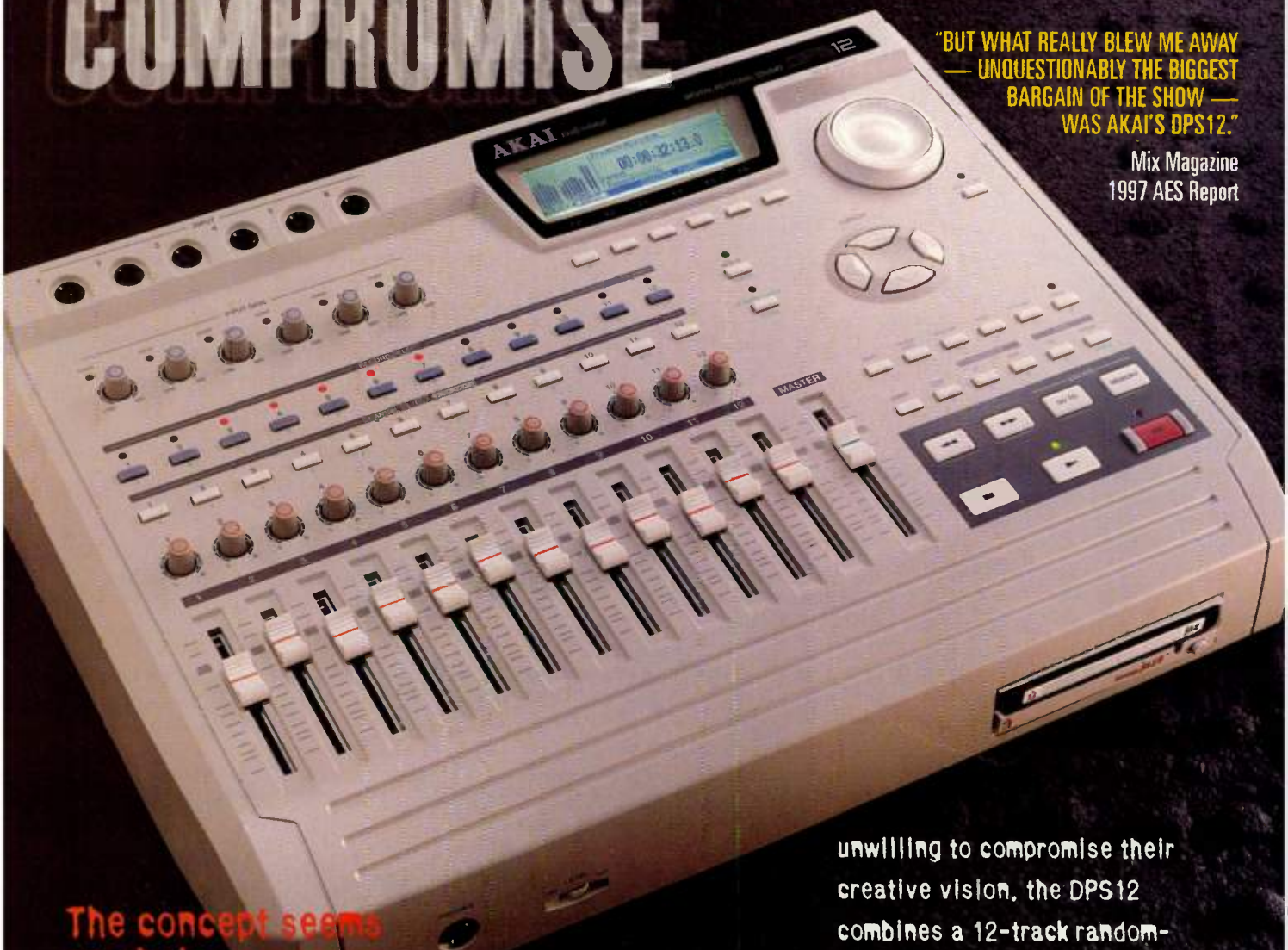
WRH

CREATIVITY WITHOUT COMPROMISE



"BUT WHAT REALLY BLEW ME AWAY — UNQUESTIONABLY THE BIGGEST BARGAIN OF THE SHOW — WAS AKAI'S DPS12."

Mix Magazine
1997 AES Report

The concept seems so obvious. Combine a digital disk recorder and a digital mixer in one convenient box. Eliminate complex interfacing and keep everything in the digital domain. Add optional internal effects. **Creative heaven.** But **up until now,** buying anything that you could afford meant settling for almost enough tracks to record your music. Or a compressed data format that sounded almost as good as CD quality. Or a user interface that you could almost make sense of. **Now, finally,** the concept of integrated digital recording and mixing lives up to its promise with Akai's DPS12 Digital Personal Studio. Designed for those unwilling to compromise their creative vision, the DPS12 combines a 12-track random-access digital recorder (with professional-quality uncompressed 16-bit sound and powerful non-linear editing) and a 20-channel MIDI-automatable digital mixer in one compact, incredibly easy-to-use package. All at a price that is nothing short of spectacular. It's **creativity without compromise.**

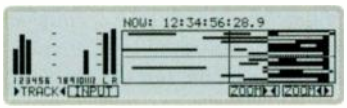
DPS12

Since its founding in 1984, Akai Professional has consistently pushed the boundaries of affordable recording technology. From the original MG1212 12-track recorder/mixer, to the breakthrough A-DAM digital multitrack, to the DR4/8/16 professional disk recorders and the DD family of audio post-production tools, each Akai recording product has established new levels of performance and value.

Now, with the DPS12, Akai builds on this experience to bring professional-quality digital recording and mixing to the personal and project studio at a price that's truly unexpected. (Not to prolong the suspense, it's **$1499** msrp.)

More Is Better

At the heart of the DPS12 is a powerful random-access disk recorder capable of simultaneously playing 12 (that's **twelve**) tracks of uncompressed 16-bit linear audio from convenient removable JAZ cartridges or SCSI hard disks. More tracks for more recording flexibility. More control of individual parts. Less need for track bouncing.



And speaking of more tracks, the DPS12 also lets you record a whopping 250 virtual tracks. At mixdown, you can assign any virtual track to any of the twelve physical tracks for playback. This gives you the freedom to compare multiple takes, experiment with alternative arrangements, even combine parts of different virtual tracks on a single track.

At the front end, the DPS12 lets you record on up to 8 tracks simultaneously through six high-quality balanced analog inputs and a S/PDIF stereo digital input at sampling rates of 48kHz, 44.1kHz or 32kHz.

The Wait Is Over

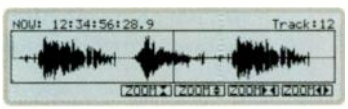
Since the DPS12 is a random-access recorder, waiting for tape to wind is a thing of the past. The DPS12's locating functions let you move instantly to any of 12 quick-locate points and 100 stack memory points. The stack points can even be named, so you can identify locations by the part of the song (FIRST VERSE, CHORUS, etc.) or even by specific lyrics.

An optional internal JAZ drive allows quick access to all your work.

Easy Editing

Ever wonder how people managed to write anything before word processors? Well, after experiencing non-linear editing on the DPS12, you'll wonder the same thing about audio. Insert, Delete, Erase, Copy or Move sections of single- or multi-track audio from anywhere to anywhere within your project. This is stuff you just can't do with tape.

The DPS12's high-quality jogging and graphic waveform display let you zero in on your precise edit points.



Then call up an edit screen (complete with a graphic representation of your selected operation) and Do It.

Next, use the special Play To and Play From keys to confirm that seamless edit. Changed your mind? 256 levels of Undo are only a button press away.

Mix Master

The DPS12's digital mixer is a model of flexibility.

During mixdown, for example, the inputs can be used as an additional 8-channel Thru Mix, perfect for adding tracks from sequenced MIDI modules to the 12 recorded tracks for a true 20-channel mixdown. Two AUX sends and digital EQ are also included.

Found the perfect mix? Mix setups can be saved as snapshots and recalled at any time. And since all of the DPS12's faders and panpots generate MIDI controller data, you can record your mix moves into an external MIDI sequencer (like our MPC2000, for example) and play them back in sync with the DPS12 for a fully automated mixdown.

Effects Inside

If you want the added convenience of integrated internal effects (not to mention keeping your mix entirely in the digital domain), add the EB2M multi-effect processor board. The EB2M gives you two independent studio-quality effects processors with a wide variety of programmable effect types.

It Wants To Be Your Friend

It's one thing to give you all the tools you need to do the job, but it's another thing entirely to make them useable. Here, the DPS12 really shines. It is, quite simply, **really** easy to use.

At the heart of its friendliness is its informative graphic display. Backlit and easy to read, it always gives you a clear picture of what's going on with your DPS12. Frankly, it's all so simple that most of you may never have to take the manual out of the box.

Check It Out

There's a lot more to the DPS12 than we could fit in this ad, so head down to your local Akai Professional dealer for some quality hands-on time with a DPS12. And don't forget, that's

$1499.00 msrp.

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AKAI professional

Akai Musical Instrument Corporation
4710 Mercantile Drive, Fort Worth, Texas 76137
[phone] 817 831 9203 [fax] 817 222 1490 www.akai.com/akaipro

CLARA ROCKMORE, 1911-1998

Clara Rockmore, a classically trained violinist who is widely acknowledged as the world's greatest theremin virtuosa, died on May 10, 1998. She was 88 years old.

Rockmore was born in Vilnius, Lithuania, in 1911. At the age of four, Rockmore began studying violin at the St. Petersburg Conservatory, the youngest student ever admitted to that institution. As a teenager, she concertized throughout Europe with her older sister, the renowned pianist Nadia Reisenberg.

Rockmore and Reisenberg came to New York in the late 1920s, at about the time Professor Leon Theremin introduced the theremin, his gesture-controlled, electronic musical instrument, to the New York musical community. Rockmore met Dr. Theremin, saw his invention, and decided to study it as a serious musical instrument. Rockmore became Theremin's adviser and close friend, providing musical advice that helped him improve the playability of his invention. Rockmore developed a body of theremin techniques that enabled her to perform classical music with remarkable virtuosity and musicality.

Beginning in the early 1930s, Clara Rockmore concertized widely on the theremin, both in recitals with Nadia Reisenberg and with major symphony orchestras. She frequently shared the program with her good friend, the operatic singer Paul Robeson. Her performances became standards to which other thereminists aspired.

Rockmore went into semiretirement in the 1950s. In 1969, she and Reisenberg came to a synthesizer concert in New York City where my associates and I were performing. We became good friends.

A few years later, we recorded Clara Rockmore and Nadia Reisenberg's performances. The recording was first released on vinyl and is now available on CD (*The Art of the Theremin;* Delos D/CD 1014). We also had the opportunity to videotape the two women in Rockmore's home in midtown Manhattan. The documentary video *Clara Rockmore: The Greatest Theremin Virtuosa* was recently produced from this footage. (The CD and the video are both available from Big Briar; tel. 800/948-1990 or 828/251-0090; e-mail info@bigbriar.com; Web www.bigbriar.com.)

Clara Rockmore's final public performance was about a decade ago, at the memorial service for her sister, Nadia Reisenberg. Cinematographer Steven Martin filmed this occasion, including part of it in his wonderful documentary on the life of Leon Theremin: *Theremin: An Electronic Odyssey* (distributed by Orion Pictures).

The theremin is currently enjoying renewed popularity, due in no small part to the music of today's thereminists, who have learned much from Clara Rockmore. She was one of the very first gigging musicians to devote her professional life to mastering and performing on an electronic musical instrument. But more than that, Clara Rockmore was a consummate musician and artist. Her musical accomplishments remain an inspiration to all musicians, but especially to aspiring thereminists.

—Dr. Robert Moog

sounds like real music. If you've composed a piece of music in General MIDI, it isn't finished yet. GM files use a very limited sound palette and quickly begin to sound exactly the same. They may be useful in computer games, but that's about it so far.

Lastly, MIDI has a limited future on the Internet. Remember MOD files? As soon as we're able to stream CD-quality audio, we'll be hearing CD-quality audio as background music to annoying Web pages—which brings me back to my first point!

Geoffrey Newcomb
newcombg3@aol.com

IN LEAGUE WITH LAYLA

Regarding Dennis Miller's equipment recommendations for a $16,000 audio recording studio with computer in the July 1998 **EM**: Why did you spend the dollars for the SEK'D *Samplitude 2496* audio editor, when the Layla unit will not utilize frequencies higher than 48 kHz? Would not one of SEK'D's lower-priced editors have sufficed (or the full version of Syntrillium's *Cool Edit Pro*)?

Dr. Jerry Kenison Hart
kenisonhart@juno.com

Jerry—Samplitude 2496 *offers a number of new features that distinguish it from* Samplitude Studio *and make it the perfect complement to the Layla card. First, it can record and store data with a resolution of 16, 20, or 24 bits, which alone, to me, is worth the price of admission. It also has a 4-band compressor, a real-time dehisser, real-time CD burning, and perhaps most important, DirectX support. Add to that a new object editor and "live" Mixer mode (the ability to send audio data into the program for real-time processing), and you have an excellent upgrade. I also prefer the new context-sensitive menus that appear under the right mouse button, though I imagine they will show up in* Samplitude Studio *soon.—Dennis M.*

ERROR LOG

July 1998, "Build a Personal Studio on Any Budget," p. 62: Mark of the Unicorn's MOTU Audio System real-time plug-in architecture has, in fact, been implemented in *Performer* ($495) as well as *Digital Performer.*

July 1998, "Build a Personal Studio on Any Budget," p. 76: The Lexicon MPX-1 multi-effects processor offers S/PDIF digital I/O.

July 1998, EM Ultimate Personal Studio Giveaway, pp. 162-163; also **August 1998,** pp. 130-131: The prices for the Furman HDS-6 distributed amplification system and three HR-6 personal headphone mixing stations are $395 and $88 each, respectively.

WE WELCOME YOUR FEEDBACK.

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

THE TECHNOLOGY THAT MADE WAVES FOR TITANIC CAN MAKE .WAVS IN YOUR PC

For more than 25 years, E-mu Systems has been one of the most respected names in the music industry. Our sampling and synthesis technology is found in post-production and project studios worldwide. You'll hear the results in many major Hollywood films including *Titanic, Independence Day* and *Hunt for Red October.**

E-mu's sampler products set the standard for excellence in sound. Now you can put E-mu technology in your computer with the E-mu Audio Production Studio (APS)—the first sound card designed as an instrument, not a game card. And, like an iceberg, there's more to APS than meets the eye. APS is a PCI audio system that gives you **sampling**, 64-voice wave-table **synthesis**, multi-track **hard-disk recording**, and **real-time effects** in an easy-to-use, plug-and-play, music-making package.

APS allows you to create professional audio for sound design and multimedia content using your computer's RAM so you don't need to buy additional, proprietary memory.

APS lets you integrate up to 32MB of SoundFont® samples while playing stereo digital audio from your hard drive. SoundFonts are the most widely-used downloadable sample format. Thousands are available from E-mu, third party developers or on the Internet. You can even create your own with the Audio Production Studio.

E-Card—the heart of APS

The E-Card allows full duplex, 16-bit CD-quality streaming audio that can be augmented with programmable hardware-based real-time effects including reverb, chorus, echo/delay, compression and parametric EQ.

E-Drive—convenient drive bay access

APS includes E-Drive, an audio access panel that installs in the drive bay of your PC. It has switchable mic/line inputs, studio-quality preamps, balanced 1/4" connectors and switchable microphone types (with internally-selectable 12V phantom power). There's also an extra S/PDIF I/O and headphone output with volume control. E-mu's E-Control software for Windows® 95 lets you easily manage all of your mixing and routing tasks.

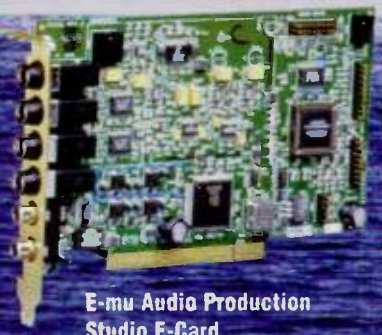
Professional Features and Capabilities

- 64-voice wave table synth/sampler
- Professional balanced input/output connectors
- Supports 32 internal MIDI channels and 16 external channels
- Records stereo audio at eight common sample rates
- Powerful DSP engine for mixing, routing, and real-time effects processing
- Complete with software from E-mu Systems, Sonic Foundry, Cakewalk and compatible with most other audio/MIDI software and hardware

APS is the future of digital audio. So whether you use APS as a standalone digital audio system or as an addition to your existing studio, APS's professional features will add new flexibility and fidelity to your creations—**all for less than $700.**

To find out more about how the E-mu Audio Production Studio is just the tip of the iceberg, see E-mu's desktop music site at www.emu.com, or visit your local dealer.

E-mu Audio Production Studio E-Drive



E-mu Audio Production Studio E-Card

E-Control software for APS

E-MU SYSTEMS

P.O. Box 660015, Scotts Valley, CA. USA. 95067-0015
Tel. 408.438.1921 • http://www.emu.com
London Sales Office: Pinewood Studios, Pinewood Road, Iver, Buckinghamshire, SLO ONH England • Tel: +44 1753 630808

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WHAT'S NEW

By The EM Staff

▲ RACKCRAFT DESKTOP STUDIO RACK

The Desktop Studio Rack ($299.95) from Rackcraft makes it easy to organize the common components of a personal studio in a neat package that fits on a desk or table. The system is made of scratch-resistant, black melamine composite board with T-mold edging to protect desktop surfaces.

The Rack features a 12-space rack rail pair that holds a rack-mountable mixer in a horizontal position. A vinyl wrist rest is provided. Directly above the mixer area is a recessed, 2-space rack rail pair for a monitor amp or patch bays. The 6-space rack above that is designed to hold an MDM or hard-disk recorder. Of course, any rack-mountable equipment can be placed in these compartments.

The top of the rack is a convenient place for a tabletop unit, such as a cassette or DAT recorder. Shelves for near-field reference monitors extend from the sides of the unit, elevating the monitors to a good listening level and freeing up space on the desktop. Rackcraft; tel. (913) 262-3949; fax (913) 262-2513; e-mail rackcraft@aol.com.

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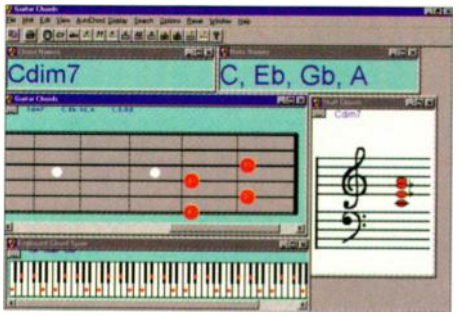
▶ KLYNAS NOTESMART



Musicians who wish to quickly see their work in simple notation should take a look at Klynas Engineering's *NoteSmart* (Win 95 and NT; $39.95). The program can display incoming MIDI chords and notes in real time as standard notation, on a guitar-fretboard display, or on a keyboard-style display. In addition, it can simply name each chord or note as you play. Users can view multiple windows simultaneously.

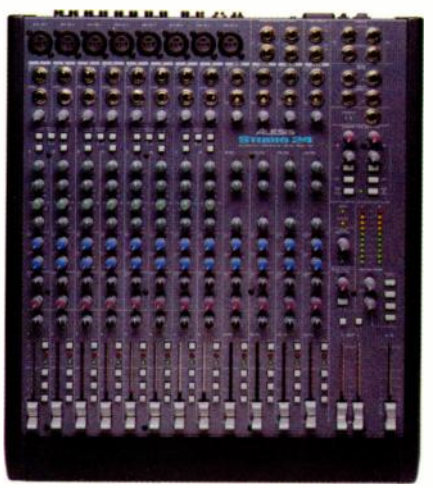
NoteSmart has a built-in guitar-chord library with over 36,000 chord possibilities and many suggested finger positions. The program can display virtually every possible combination of notes within a 4-fret range, making up several hundred chord types. *NoteSmart* has a chord editor that lets users customize the fingering for any chord, and chords can be displayed from either a viewer's or player's perspective.

There is also a keyboard chord library with over 3,300 chords. You can search the libraries to find chord voicings or play a chord on any MIDI instrument to find its name. When playing a chord, you can choose from three complexity levels of automatic chord recognition. When you enter a chord name in Span mode, *NoteSmart* displays every possible note, on a keyboard or guitar's fretboard, that can be used to generate that chord.

NoteSmart can monitor up to sixteen MIDI channels. Each channel has an adjustable pitch range. The program requires a Pentium PC running Windows 95 or NT and 16 MB RAM. Klynas Engineering; tel. (805) 938-9988; fax (805) 938-0988; e-mail info@klynas.com; Web www.klynas.com.

Circle #402 on Reader Service Card

▶ ALESIS STUDIO 24



The Alesis Studio 24 ($799) is an in-line recording console designed for easy and efficient 8-track recording. It provides eight mono input channels, four stereo input channels, and two subgroups.

Each mono channel features an XLR input, trim control (>60 dB of mic/line gain), switchable direct output, ¼-inch line-level input, ¼-inch insert, and four aux sends (two prefader, two postfader). The mono channels also have pan, solo, mute, and 60 mm fader for the main signal path and rotary pan and volume controls for tape-monitor signals. The board's eight mic preamps include globally switchable phantom power. The EQ section for the mono channels offers low and high shelving bands at 80 Hz and 12 kHz, as well as semiparametric mids sweepable from 120 Hz to 13 kHz, all with ±15 dB boost/cut.

Stereo channels have high and low shelving EQ and a fixed midrange at 2.5 kHz. They lack insert points but otherwise provide the same features as the mono channels.

The master section provides group and main outputs (both with ¼-inch inserts), a ¼-inch headphone jack, two stereo effects returns, and dual, 10-segment LED ladders for monitoring input signals. Frequency response is rated 20 Hz to 50 kHz (±0.5 dB), S/N ratio at 90 dB, and dynamic range at 108 dB. Alesis Corporation; tel. (800) 5-ALESIS or (310) 255-3400; fax (310) 255-3401; e-mail alecorp@alesis1.usa.com; Web www.alesis.com.

Circle #403 on Reader Service Card

ROLAND SP-808

Today's DJs have developed sophisticated tastes in equipment, which is a big departure from the days when the only necessary apparatus was two turntables and a microphone. But what has not changed is the need for a complete, compact device that can rock the house. Roland's SP-808 Groove Sampler ($1,695) is designed to meet the needs of DJs, recordists, and remix artists alike, with its ability to sample, edit, sync, and loop sounds; add effects; and mix the tracks.

The SP-808's phrase-sampling bank has sixteen assignable sample pads. Sample length is based on available memory. With the maximum available memory of 100 MB, the maximum available sample length would be just over 23 minutes of 44.1 kHz, stereo audio. The built-in 100 MB Iomega Zip drive records audio and stores up to 1,024 samples (64 banks). Once a sample has been recorded, the SP-808 can calculate and display that phrase's tempo, and there are onboard time compression and expansion functions.

The unit also can record four 20-bit, stereo audio tracks at 44.1 or 32 kHz and has four assignable faders for mixing stereo material. Each stereo track has 3-band, parametric EQ. You can record from the onboard sampler or via a ¼-inch, unbalanced mic input or L/R RCA jacks. You get 99 preset and 99 user-programmable effects onboard, including basic effects such as reverb, delay, chorus, and distortion. In addition, there are esoteric effects for "dirtying up" the sound, such as "Lo-Fi Processor," "Radio Tuning," "Band Isolator," and "Phonograph."

There is also a Step Modulator, a retro-style sequencer that controls the onboard synth and effects. Thanks to a licensing agreement with Interactive Light, Roland has included a dual Dimension Beam infrared controller for further real-time control of tempo, effects, channel mute, filters, and more.

Both RCA and unbalanced, ¼-inch connectors are provided for line-level input and output. An optional expansion board adds optical and coaxial S/PDIF digital I/O and six additional RCA outputs. MIDI In and Out/Thru connectors and a 25-pin D-sub SCSI connector are also included. Frequency response for 44.1 kHz audio is rated at 10 Hz to 21 kHz (+0/-3 dB) and S/N is 92 dB. Roland Corporation U.S.; tel. (213) 685-5141; fax (213) 722-0911; Web www.rolandus.com.

Circle #404 on Reader Service Card

GRAHAM-PATTEN SOUNDPALS

Graham-Patten's SoundPals are modular building blocks for digital audio processing. The latest additions to the SoundPals family are the ADAT-1, ADAT-2, ADAT-3, and ADAT-4, which convert analog or AES/EBU digital signals to 8-channel, ADAT optical format.

The ADAT-1 ($1,499) converts eight analog inputs (on ¼-inch, TRS connectors) to a single, 8-channel ADAT output, using 20-bit A/D converters. There is a level trim for each channel. It's available in two models: one samples at 44.1 kHz and the other at 48 kHz. The ADAT-2 ($1,499) is the ADAT-1 in reverse: it's a 20-bit D/A converter with an 8-channel ADAT input, which the unit separates into eight analog outputs. Both converters can sync to word clock or to an AES3-ID signal.

The ADAT-3 converts four AES/EBU stereo pairs (on balanced or coax cables) to an 8-channel, ADAT optical output. The unit can sync to word clock or to one of the AES/EBU inputs. When the unit is synched to AES/EBU, its reference I/O connector can be used to output word clock. A 9-pin, D-sub jack connects to a remote control that allows individual muting of each input pair and selects an AES/EBU input as the master sync source.

There are six versions of this Sound Pal unit, which are differentiated by the number of onboard sample-rate converters (0, 2, or 4) and by whether the AES/EBU inputs are on balanced XLR ("A" models) or coaxial BNC connectors ("B" models). For example, the ADAT-3/A0 and ADAT-3/B0 ($899 each) have no sample-rate converters; the A0 has XLR inputs, while the B0 has BNC inputs. The ADAT-3/A2 and ADAT-3/B2 ($1,099) have two sample-rate converters; the A2 has XLR inputs and the B2 has BNCs. Finally, the ADAT-3/A4 and ADAT-3/B4 ($1,299) have four sample-rate converters and XLRs or BNCs.

The ADAT-4 SoundPal ($899) is the inverse of the ADAT-3, converting 8-channel ADAT to four AES/EBU output pairs. There are two models, one with balanced XLR outputs and the other with BNC outputs. The sync connector can output an AES3-ID or word-clock signal, so you can sync other SoundPals to the ADAT datastream.

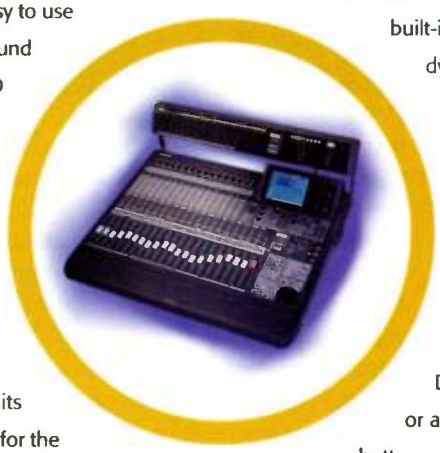
All SoundPals require an external 6 VDC power supply, which is not included. Graham-Patten offers the RT-2 rack-mounted

frame ($399), which includes a power supply and holds three SoundPals in one rackspace. Graham-Patten Systems; tel. (530) 273-8412; fax (530) 273-7458; e-mail info@gpsys.com; Web www.gpsys.com.

Circle #405 on Reader Service Card

Advanced Digital Mixer

Panasonic is taking digital further today with the DA7 digital mixer, an entirely new standard in quality, flexibility, affordability, ease-of use and value. 24-bit converters, 32 inputs, 8 buses, 32-bit processing, moving faders, instantaneous recall of all settings, surround sound mixing...nothing this fully featured has been this easy to use or affordable... and it's available NOW! Incredible sound quality, Internal 32-bit processing and 24-bit A/D and D/A converters give this mixer sound worthy of consoles costing several times its price.



Easy-to-use. The DA7 is one powerful mixer. If you know how to run a traditional mixer, you already know how to run a DA7, since it has a smart, user-friendly design. To access any of the 32 channels, just press its select button and all parameters for the channel-EQ settings, bus and aux assignments, and dynamics and delay settings come up on the large backlit LCD screen. To access individual parameters, just touch the appropriate knob in the console's master section. This automatically calls up the sub-menu on the LCD screen and zooms in on the appropriate function. No more digging through menus or getting lost in functions; just adjust EQ, Pan/Assign, Dynamics/Delay, or Aux... and you're there.

The power to control. The EQ section offers 4 true overlapping parametric bands active on every channel (with the top and bottom bands switchable to low or high peak/shelving, or low pass, or high pass filters). Each Aux return also provides two bands of fully parametric EQ. The dynamics section offers variable attack/release times and levels for threshold and ratio on each channel, and delay is adjustable up to a maximum of 300ms. 50 Memories each are provided for EQ, Dynamics and individual channel settings. In addition to full dynamic moving fader automation of 32,000 events, there are 50 "snapshot" or "scene" memories. Plus, a Macintosh and windows software package (that greatly expands the capabilities of the DA7), will soon be available.

Surround sound at your command. You'll be mixing surround soon. The DA7 is equipped to mix 5.1 channel today. The DA7 has 3 built-in panning modes, and all modes provide full dynamic control of panning, and can be copied, stored, and transferred to any other channel. An optional MIDI joystick gives you yet a fourth method of surround control.

MIDI and more. The DA7 features 4 up/down/left/right cursor keys that can be switched to output MIDI Machine Control commands to MDMs, sequencers, or workstations. Data entry is done through the large parameter dial or an alphanumeric keypad. There's also an undo/redo button, a solo-mode set, and a built-in Talkback mic.

Take on the world. The rear panel sports 16 analog mic/line inputs (8 XLR with individual software-switched phantom power, and 8 with TRS); 16 channel inserts (pre-A/D); and 6 auxiliary send/return jacks (1,2 use S/PDIF; the rest use +4dB 1/4inch connectors). Along with the 2 digital and 4 analog Aux returns, the DA7 has 38 total inputs. Digital I/O, provided via XLR connectors switchable between AES/EBU and S/PDIF, offer the master out signals and they can be assigned to inputs 15 and 16.

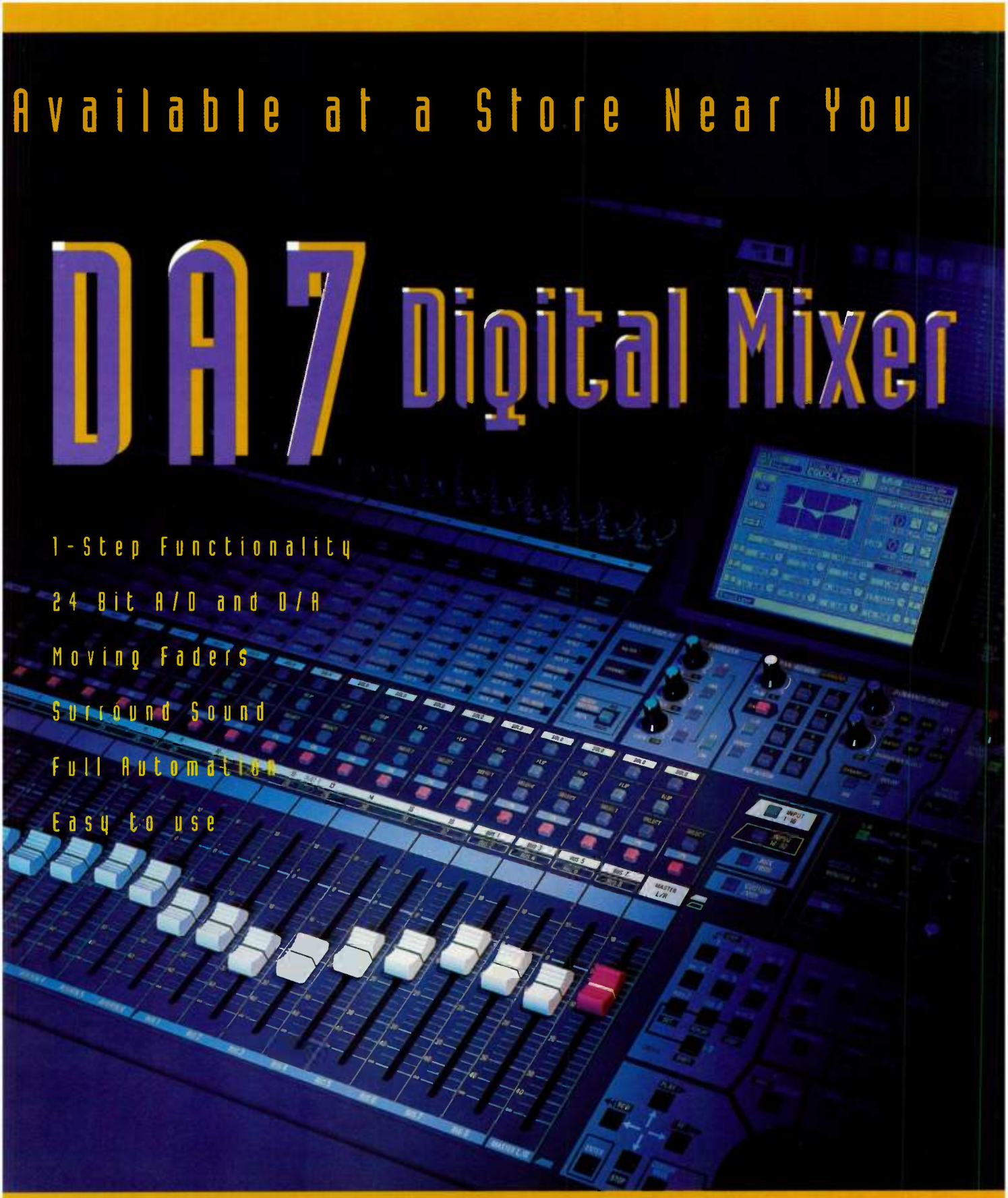
The DA7 rear panel also offers MIDI In and Out, word clock I/Os, both a 9-pin RS-422/485 serial port and PC port for Mac or Windows with software support for both, a 1/4 inch footswitch jack for controlling Talkback on/off or automatic punch in/out, and a D-15 subconnector for the optional meter bridge. So, take your digital mixing further today by going to the nearest Panasonic dealer and auditioning the DA7 for yourself!

PANASONIC PRO AUDIO
TAKING DIGITAL FURTHER

For more information call:
1-800-777-1146 or visit our website at
www.panasonic.com/proaudio

Available at a Store Near You

DA7 Digital Mixer



1-Step Functionality

24 Bit A/D and D/A

Moving Faders

Surround Sound

Full Automation

Easy to use

Taking Digital Further

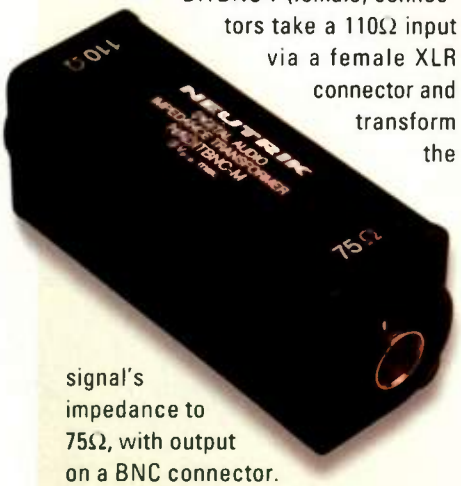
Panasonic

Broadcast & Digital Systems Company

MAKING CONNECTIONS ▲ ▲ ▲ ▲

▼ NEUTRIK

Neutrik is shipping its new NADITBNC-F and NADITBNC-M AES/EBU adapters ($23 each). The NADITBNC-F (female) connectors take a 110Ω input via a female XLR connector and transform the signal's impedance to 75Ω, with output on a BNC connector. The NADITBNC-M (male) takes a 75Ω signal on a BNC and transforms it to 110Ω on a male XLR connector.



According to Neutrik, the NADITBNC-F and NADITBNC-M use unbalanced, coaxial lines that allow for longer cable runs than can be accomplished with twisted pairs, which can attenuate frequencies necessary for the transmission of digital audio signals. Neutrik USA; tel. (732) 901-9488; fax (732) 901-9608; e-mail neutrikusa@aol.com; Web www.neutrikusa.com.

Circle #406 on Reader Service Card

▼ SUNDHOLM ACOUSTICS

The quality of your recordings depends on the clarity of the signals transmitted by your cabling. That's why Sundholm Acoustics has designed its Studio A series of premium interconnect cables ($30 to $86). The wires in these cables are made of high-conductivity, oxygen-free copper, plated with silver to enhance sonic clarity.

All wires in the Studio A cables are insulated with Teflon, which, according to Sundholm, is more elastic and less absorptive than PVC, making it less prone to bleed a signal. These cables exhibit low DC resistance and low parallel capacitance. Sleeving made of polyester braid is designed to improve durability and cosmetic appeal.

Balanced and unbalanced configurations, as well as speaker cables, are available in various lengths with high-quality connectors, gold-plated contacts, and silver solder throughout. Sundholm Acoustics; tel. (503) 794-2661; fax (503) 786-1550; e-mail love@teleport.com.

Circle #407 on Reader Service Card

▶ WHIRLWIND

The new Insert Snakes from Whirlwind are suitable for use with mixing consoles that have a single ¼-inch, TRS insert per channel. The snakes are available in 4-channel ($229.29 and up) and 8-channel versions ($399.95 and up), in various lengths.

Whirlwind snakes feature a braided-monofilament protective sleeving that reinforces the shielded pairs and prevents tangling. Each pair is labeled and color coded. You get ¼-inch, TRS plugs on one end and have the option of ¼-inch, TS plugs; XLR; or TT connectors on the other end. Whirlwind; tel. (800) 733-9473 or (716) 663-8820; fax (716) 865-8930; e-mail sales@whirlwindusa.com; Web www.whirlwindusa.com.

Circle #408 on Reader Service Card

▲ MUSIC INTERFACE TECHNOLOGIES

Induced noise is an inherent problem in cables. When you're playing in small clubs, it's not much of an issue, but when you're recording in the studio, any extra noise immediately becomes apparent. That's why Music Interface Technologies developed an unusual approach to improving the signal delivery of its guitar cables. The Ripcord uses the company's proprietary technology to clean up the signal going from your guitar to your amp.

These cables include a network of passive components designed to increase the efficiency of the signal transfer and actually remove unwanted noise that can mask certain frequencies. The components are housed in two 2-inch-long, ABS plastic boxes, one at each end of the cord.

Ripcords are available in 10-foot ($100), 15-foot ($115), and 20-foot ($130) lengths. Music Interface Technologies; tel. (530) 888-0394; fax (530) 888-0783; e-mail mitcable@aol.com; Web www.mitcables.com.

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The world's most dazzling workstation and the wildly acclaimed Z1 synth have just joined forces. The new V3 gives you Trinity's PCM and Z1's sound modeling architectures in one keyboard. Plus, new combinations and an additional 64 programs. The Z1 board is also available as an option for current Trinity owners.

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circle #510 on reader service card

▼ SIBELIUS FOR WINDOWS

Sibelius's *Sibelius 7* notation software was written for the Acorn computer, a platform that is available in Britain but rarely found in the United States. In order to reach a broader market, the company has released *Sibelius for Windows* ($695), and a Mac version is expected in early 1999.

Created by two composers, *Sibelius* was programmed with a musician's needs in mind. The program features a "virtual manuscript paper" interface without onscreen clutter. Rather than having numerous views and myriad features, the notation program is intended to be easy to use, with intuitive recording and playback. *Sibelius* boasts extremely fast screen redraw, with the ability to reformat even a lengthy score in 0.1 seconds. Page layout is said to be of professional publishing quality, and scores may be exported to your Web site.

You can input your music to *Sibelius* by using your mouse and computer keyboard, by loading in a MIDI file, or by playing through your MIDI keyboard in real time. *Sibelius* follows your playing without the need for a Tap Tempo feature. The included *Optical Music* plug-in lets you scan printed music, which *Sibelius* will convert into its format.

Sibelius is sensitive to all standard expressive markings and terms, with room for user-defined expressions to be added. Playback includes assignable GM instruments, automatic stereo panning of ensemble arrangements, and advanced "humanizing" algorithms.

Sibelius for Windows requires at least an 80486; Windows 95, 98, or NT; and 8 MB RAM. Sibelius Software; tel. (888) 474-2354 or (310) 559-9996; fax (310) 559-9997; e-mail infoUSA@sibelius.com; Web www.sibelius.com.

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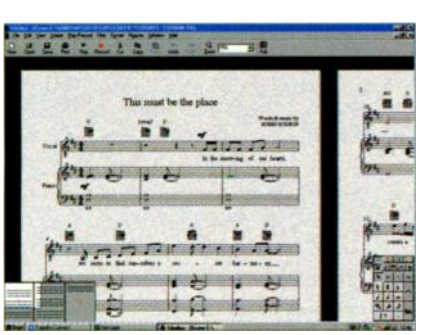
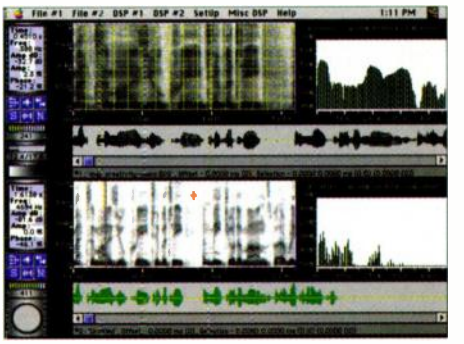


▶ PEABODY SOUNDVIEW



Peabody Digital Soundworks' new *SoundView* (Mac; $149.99) provides tools for spectral analysis and spectral manipulation of sound files. Supported sound-file formats include Sound Designer, PARIS, WAV, and SoundEdit 16. The program supports sample rates up to 48 kHz.

The spectral analysis has a maximum time resolution of 1 ms and maximum frequency resolution of 10.8 Hz. You can identify a sound's fundamental pitch, extract and analyze vocal formants, correlate any two waveforms, and find the difference between any two spectra.

SoundView lets you normalize a waveform or spectrum and apply one sound's formant to another sound; you can, for example, impose the formant of a voice onto a flute sound. You can even interpolate the formants of two sounds over time so one morphs into another.

Resynthesis capabilities include phase vocoding, with up to 1,024 analysis bands; pitch shifting without changing the sound's length; and time expansion/compression without pitch shifting.

SoundView can currently be downloaded from Peabody's Web site. Later this year, the software will also be available on floppy disks, bundled with a hard-copy manual ($174.99). The program uses Apple Sound Manager and requires a Power Mac, Mac OS 7.5 or later, and at least 16 MB RAM (32 MB recommended). Peabody Digital Soundworks; tel. (877) 215-3724; fax (410) 783-8592; e-mail sales@peabody-digital.com; Web www.peabody-digital.com.

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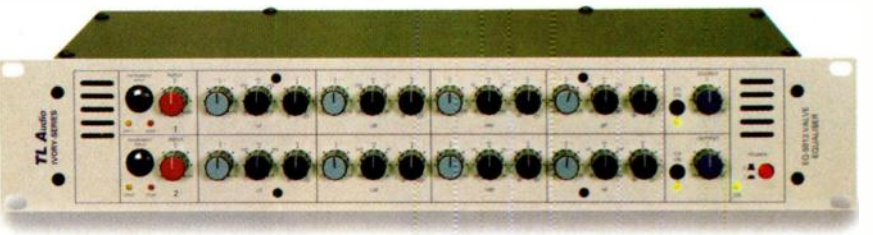

▲ TL AUDIO 5013 AND 5021

Among the tube-driven processors in TL Audio's new Ivory series are the 5013 2-channel, 4-band parametric EQ ($699; shown) and the 5021 2-channel compressor ($699). Both 2U rack-mount units feature front-panel instrument jacks and rear-panel, line-level I/O on both balanced, XLR and unbalanced, ¼-inch jacks. They can operate at -10 dBV or +4 dBu and use internal power supplies.

Each channel of the 5013 parametric EQ has input and output level controls (-20 to +20 dB) and a bypass switch. The center-frequency ranges for the four bands are 30 Hz to 1 kHz, 100 Hz to 3 kHz, 1 to 12 kHz, and 3 to 20 kHz. Each band offers up to 15 dB cut/boost and a Q range from 0.5 to 5.

The 5021 compressor's two channels have identical controls and can be stereo linked. Each channel has pots for input and output gain (-20 to 20 dB), threshold (-20 to 20 dB), ratio (1.5:1 to 30:1), and makeup gain (0 to 20 dB). Program-dependent attack and release times are individually switchable between fast and slow. Each channel also has an expander/gate with threshold pot (-20 dB to off). VU meters can display output level or gain reduction. You also get bypass switches and a sidechain for each channel.

TL Audio rates the units' frequency response at 10 Hz to 40 kHz (+0, -1 dB), noise at -80 dBu (22 Hz to 22 kHz), and dynamic range at 106 dB (line input @ 0 dB gain). Sascom Marketing Group (distributor); tel. (905) 469-8080; fax (905) 469-1129; e-mail sales@sascom.com; Web www.sascom.com.

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SOUND ADVICE ▲ ▲ ▲ ▲

▲ BIG FISH

Big Fish Audio presents *BreakBeat* ($99.95), an audio CD produced by e-Lab, who also produced the *X-Static Goldmine* series of sample discs. The disc contains over 74 minutes of all-new material that re-creates the sound and style of beats originally available only on limited-edition 12-inch singles and other breakbeat records. *BreakBeat* features over 400 loops, and many of its 16-bar patterns exhibit variations from bar to bar. The hits from each loop are added as individual samples, letting users customize their own grooves.

Also available from Big Fish Audio is the audio CD *Strictly House* ($99.95), which features more than 500 house loops, individual drum samples, and other musical elements. Such styles as Deep House, Garage, Speed Garage, Commercial House, and Ruff House are included. Tempos range from 120 to 130 bpm. Big Fish Audio; tel. (800) 717-FISH or (818) 768-6115; fax (818) 768-4117; e-mail sales@bigfishaudio.com; Web www.bigfishaudio.com.

Circle #413 on Reader Service Card

▶ BEATBOY

New from Beatboy is the 2-floppy-disk set *Hip-Hop* and *House/Techno* ($39.95), the first in the company's new Studio Series line of products. These collections of Standard MIDI Files were created by Billy Messinetti (producer of sample CDs featuring Rod Morgenstein, Richie Garcia, Ramon Yslas, and others), who played Clavia ddrum and Alternate Mode drumKAT electronic drum kits into a sequencer.

The first volume, *Hip-Hop*, contains over 500 MIDI drum and percussion loops for a total of over 1,600 bars. A variety of loops is included, ranging from aggressive hip-hop kick and snare workouts to R&B-style grooves.

Volume 2, *House/Techno*, contains a variety of grooves from these popular dance-club styles. Over 1,200 bars of instrumental performances are included. These loops cover straight house, disco, and techno beats. Both discs are compatible with General MIDI, Roland GS, and Yamaha XG synths and can be used with either Mac or PC sequencers. Beatboy; tel. (800) 838-BEAT or (717) 685-1338; fax (717) 685-1573; e-mail beatboytec@aol.com; Web www.beatboy.com.

Circle #414 on Reader Service Card

▶ TC WORKS NATIVE ESSENTIALS

TC Works' *TC Native Essentials* ($349) DirectX plug-in package includes reverb, dynamics processing, and equalization. The reverb plug-in gives you three parameters: reverb type, decay time, and mix level. On the right of the screen is a data wheel that adjusts values for the selected parameter; to the left of the parameter buttons a display shows the current values.

Designed for multichannel use, the dynamics processor offers a switch for selecting a soft- or hard-knee dynamics curve. Four knobs in the center of the screen are assigned to attack and release time, threshold, and ratio. LED-like numeric displays above each knob show the current values. An additional numeric display shows gain reduction.

A 3-band parametric EQ rounds out the package. The EQ's band characteristics are independently selectable for each band; for instance, you can create a preset with one parametric band, one notch band, and one shelving band; or three parametric bands; or any other combination. A virtual joystick lets you customize gain and frequency levels.

Each of the three *TC Native Essentials* processors has an LED-like level meter on the left side of its brushed metal–looking "front panel." The software requires at least a Pentium 133 with Windows 95 or NT, 32 MB RAM, and a DirectX-compatible audio application. TC Works; tel. (805) 373-1828; fax (805) 379-2648; e-mail us@tcworks.de; Web www.tcworks.de. ❦

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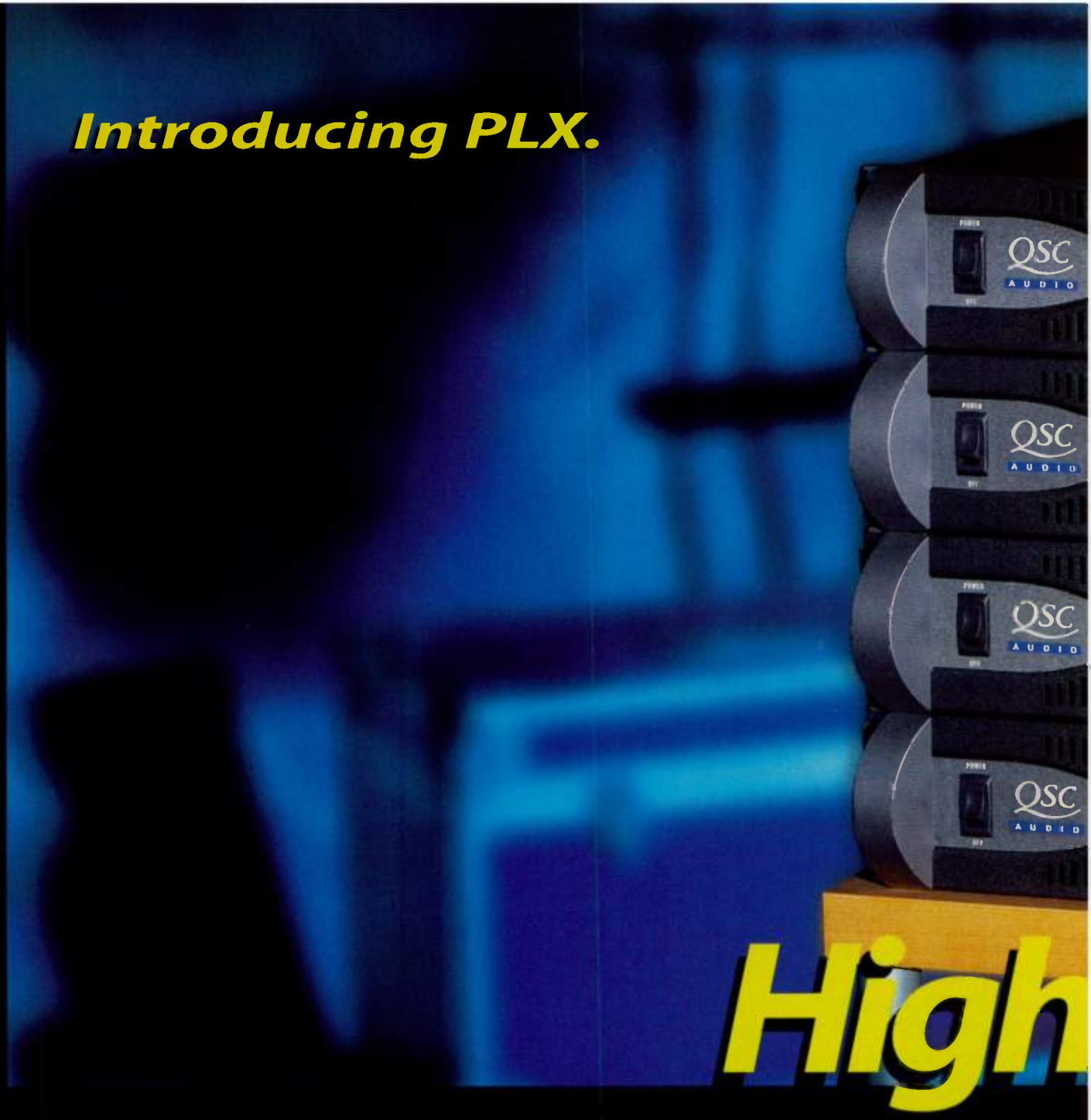
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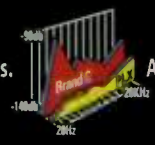
Our exclusive PowerWave™ Technology POWERWAVE used in our PowerLight™ Series for chest pounding bass and crystal clear highs. 

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circle #513 on reader service card

PRO FILE

Music of the Moment

Job is constantly changing its description.

By Rick Weldon

Improvised music comes in endless varieties and degrees of organization. A group of improvisers may decide that a piece will follow certain structures, such as a set of changes followed by a section of experimentation within the given time and key signatures. Other methods can include working from visual cues or themes.

The band Job, made up of Jai Young Kim (E-mu E4K, Roland VK-7, guitar, fretless bass), Matt Lebofsky (drums, Nord Lead, guitar, vocal effects), and Mark Schifferli (double-neck guitar/bass), uses every possible idea to keep the music fresh and the playing invigorating. On its new CD, *Party at Ilan's*, the band captures spontaneous musical moments ranging from repetitious drum beats and barely intelligible dialog to complete sonic mayhem. The album's twelve pieces were compiled from recordings Job made at various live shows and in their studio, Feast or Famine in San Francisco.

Nearly anything goes when it comes to what gets printed to tape. The intriguing scratches and otherworldly hiss on studio recordings such as "40/60" and "Under Snow" were concocted by Schifferli, who created these sounds on his custom guitar/bass using an odd assortment of battery-powered drink mixers, chains, Brillo pads, and motorized sanders. For "Under Snow," he used "a nail file, right on the pickup."

Kim, too, finds myriad ways to keep his synths interesting. "I don't like the envelope sounds of synths in general," he says. "With a bass guitar, say, every note has a different decay characteristic. So when I play, I'll move the volume fader to zero, hit the chord, then fade it in and out manually so I have more control over the transients."

At times, he'll also use a piece of cardstock under two keys to depress a third, giving him both a drone note and two free hands. And if that isn't enough, Kim samples everything from drum 'n' bass sample CDs to foreign-language television news programs (such as the Korean anchorwoman on "Hi I'm Phil Nice to Meet You").

Even among the songs recorded live in concert, they used a wide range of recording techniques. Tracks such as "The Couple Argues at the Next Table" and "It's My Birthday" remain faithful to the band's live sound. These songs were recorded on a Sony DAT deck with a pair of Audio-Technica AT 4033s set up in an *x-y* pattern.

During the mastering stage, Job used their Summit Audio DCL-200 to add a touch of tube warmth to the tracks. Final mastering was done using Astarte's *Toast CD-DA* (which is now Adaptec's *Jam*).

Other pieces that originated from concert tapes, most notably "Clear," underwent more drastic treatment. "This is a standout piece," explains Kim, "as it was completely manipulated and mutilated by Mark Schifferli using Macromedia's *Deck II*, Digidesign's *Sound Designer II*, and his ridiculous array of guitar effects. For me, this track is one of Job's finest recorded moments."

"When we were first starting out," reflects Schifferli, "we played a lot of more rhythmic, straight-ahead stuff, but we realized that that was not our strong point." Kim adds, "We do whatever's necessary to take the music to different places: play multiple instruments at once, step freely through various genres, or even improvise continuously for eight hours. Our sound is always evolving."

For more information, contact Feast or Famine Recordings; (415) 522-1368; e-mail jyk@feastorfamine.com; Web www.feastorfamine.com/job.html.

Job

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ALESIS

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DAYS OF

That old sound of tape-replay keyboards keeps coming back.

Ever since the Beatles introduced the pop music world to the strange, eerie sound of tape-replay keyboards with "Strawberry Fields Forever," the instruments have become part of the vocabulary of music production. Classic rock staples like the Moody Blues' "Nights in White Satin" only helped to reinforce their ghostly, otherworldly appeal.

Mellotrons and Chamberlins, the two most common tape-replay keyboards, were quickly adopted as the instruments of choice for the progressive rock era: a keyboard that played tapes of symphonic instruments (strings, choirs, flutes, etc.) could add a mystical aura to any arrangement. You just weren't a serious player unless you had one of these instruments in your rig. By the end of the '60s, it was hard to find a rock record that *wasn't* embellished with their distinctive sound.

However, improvements in emulation technology and the overuse of Mellotrons and Chamberlins—not to mention their tendency to break down and go out of tune—turned that delightful, discernible sound into a lo-fi cliché by the late 1970s. Players and techs got tired of spending countless hours repairing and maintaining the complex machinery that powered the instruments, and most listeners had heard quite enough psychedelic sound. Consequently, tape-replay keyboards began to collect dust in studios worldwide.

FUTURE PASSED

By Paul Myers

Illustration by Terry Miura

DAYS OF FUTURE PASSED

They languished, that is, until the 1980s, when a handful of influential, modern players such as Mitchell Froom, Patrick Warren, and Jon Brion were drawn back to the archaic and often imperfect sounds that are associated with these instruments. Now, in the 1990s, another crop of young artists including the Wallflowers and Fiona Apple has joined the steadily growing user list that already included Suzanne Vega, Elvis Costello, and Aimee Mann.

HARRY'S BIG IDEA

In 1946, many years before the conception of electronic samplers, Harry Chamberlin an inventor from Upland, California, came up with the visionary notion of using a keyboard to play the sounds of various nonkeyboard instruments. He decided that the best way to accomplish this was to employ a number of small tape heads that could each be triggered by pressing a particular key on the keyboard (see the sidebar, "The Inner Workings"). However, no one had ever before dreamed of building such an instrument, and many of the parts Chamberlin needed simply didn't exist. So, he was forced to build his creation from scratch. But building the unit was only half of the challenge—he also needed to record the samples that would produce his instrument's sound.

Los Angeles–based multi-instrumentalist Jon Brion, who played a Chamberlin on Fiona Apple's breakthrough single, "Criminal," credits the instrument's unique character to the superb care and attention that Harry Chamberlin put into recording the original samples.

"The recordings are exceptional, and I don't think they could be recaptured with the same warmth using today's equipment," notes Brion. "Harry miked his instruments with a Neumann U 47 in a room with great acoustics, and he recorded them directly into a mono Ampex tape machine. Those old Ampex machines had beautiful mic preamps with fantastic, utilitarian designs. He also didn't use any EQ or compression, so the samples are very clean."

Brion also points out that the caliber of studio musicians in the late 1940s was generally much higher than it is today. "Chamberlin used solid session players, like those from the Lawrence Welk Orchestra," he explains. "This really influenced certain Chamberlin sounds, especially the saxophones, which were recorded in a 1920s big-band style, using heavy vibrato. So, you've got this incredible chain of great gear, great players, and great vision on Harry's part that all went into his finished product."

In the mid-1960s, after the Chamberlin had gained a good deal of popularity, an English company called Streetly Electronics began manufacturing their own tape-replay keyboard, the Mellotron. Together with the Chamberlin, this instrument would define a generation of music.

ONCE MORE, WITH FEELING

Musician and producer Mitchell Froom, who has played keys with Elvis Costello, Crowded House, and Suzanne Vega, has probably done more than any other modern player to repopularize tape-replay keyboards. Upon acquiring his first Chamberlin M1, Froom was shocked by its powerful sound. "It cuts through anything," he notes. "The M1 is like a guitar: it's got a lot of harmonic distortion and juice, for lack of a better word."

Froom says the subtle imperfections of the machinery give the Chamberlin a certain humanizing character that is so often missing in many of today's high-tech keyboards. "There's no personality with a lot of modern gear, and keyboard tracks simply disappear in a mix. I try not to use those kinds of instruments. I'd rather use an instrument that has emotion."

In the mid-1980s, the Chamberlin's funky and sometimes erratic personality was also a selling point for Brion, who started using it as a reaction to what he considered to be a limited creative palette. "Everyone was using Yamaha DX7s and Roland D-50s, and everything sounded very homogenous," recalls Brion. "And yet, here were these unique-sounding instruments that were essentially being ignored!

"Twelve years ago, at a studio in Connecticut," he explains, "I discovered a Mellotron that contained tapes of cellos, violins, and flutes. I wound up playing it through a guitar amp, getting all sorts of feedback and just having a really great musical experience. I think there's something emotional about tape-replay keyboards. It's something about the rickety nature of their sounds and the fact that there *is* room for human expression. It's also about playing a little part of history. When I'm touching the keyboard, I feel like I'm actually controlling an orchestra in 1935."

Patrick Warren also fell in love with the Chamberlin the first time he used

DAVID KEAN/COURTESY OF THE MELLOTRON ARCHIVES

With the addition of the M1 remote, a Chamberlin M1 (seen here sitting on top of the remote) could play four simultaneous tracks and access sixteen sounds from one keyboard.

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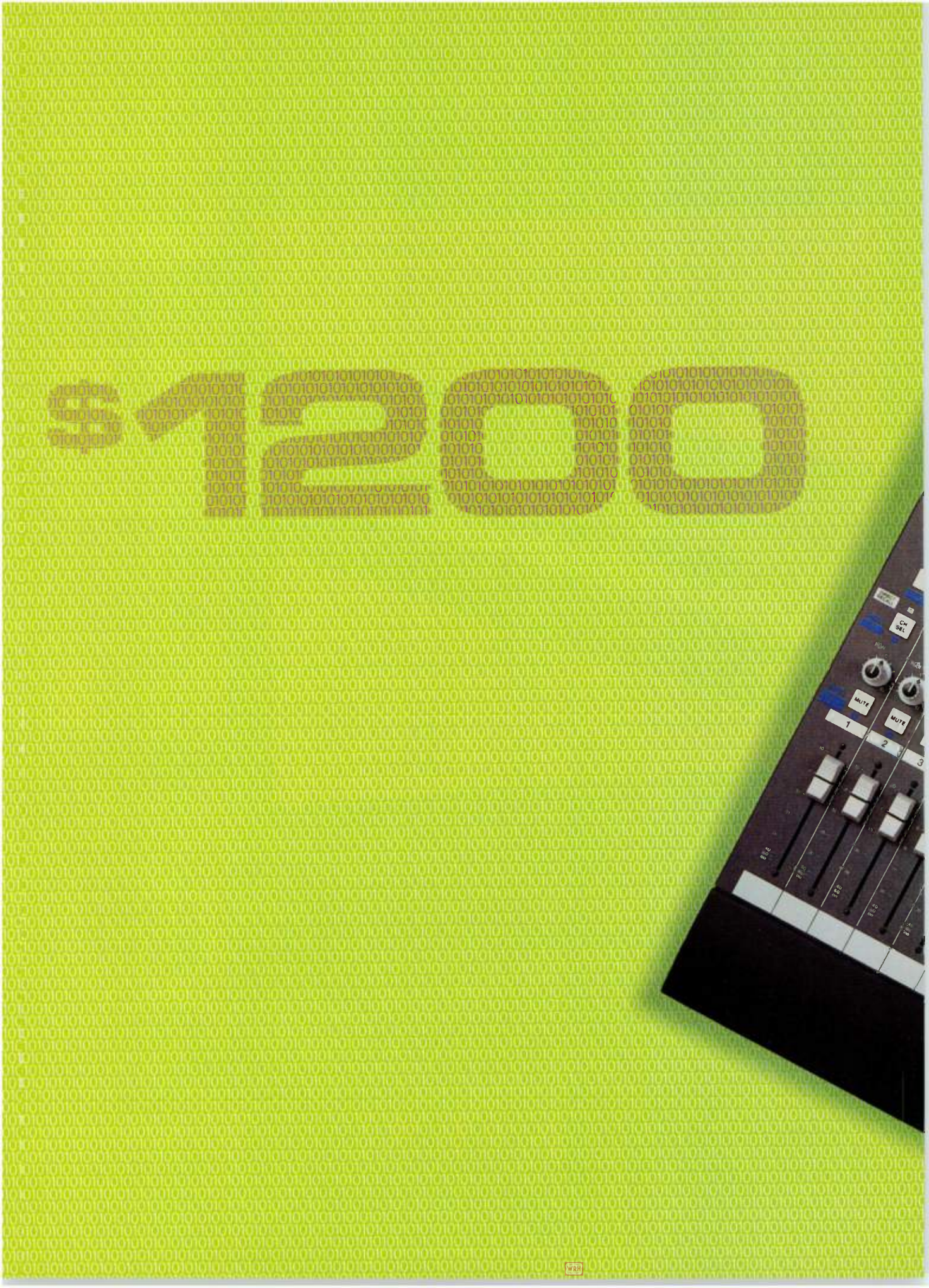
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one. Warren had been playing with Michael Penn in a band called Doll Congress when he spotted Penn's Chamberlin up on a shelf. "At first, Michael wouldn't let me play it," recalls Warren. "He said it was too delicate and too expensive. After about six months, he took it down to use on a song he was writing and finally said to me, 'Okay, you can play it.' I felt instantly akin to it. Within a year, I had bought three of my own."

THE MUSICIAN AS REPAIRMAN

Although Chamberlin and Mellotron diehards would be hard-pressed to stop using the instruments, most agree that a lot of care and maintenance comes with the territory. The units are extremely fragile due to their complex machinery, and the scarcity of replacement parts can be a major problem. In addition, neither Streetly nor Chamberlin are currently manufacturing the instruments. Needless to say, owners spend much of their free time searching for parts and are often very meticulous about how the delicate instruments are handled. Warren relates, "I tell my techs right off the bat, 'You can drop my $20,000 rack off a cliff, but my Chamberlins are irreplaceable—not just in a monetary sense, but in the amount of work that has gone into them.'"

Brian Kehew, a Los Angeles–based musician and engineer, and one half of synthesizer duo the Moog Cookbook, finds Mellotrons to be more reliable than Chamberlins. "Most Chamberlins sound great but work poorly," says Kehew. "The M1 is probably the only reliable keyboard that Chamberlin made. Unfortunately, its basic housing structure is much less durable than a Mellotron's, so it, too, is prone to some maintenance problems. Patrick Warren has made a science of keeping Chamberlins in perfect shape, but I know many other owners who are experts on maintaining them and still have tons of problems."

Warren is indeed an expert on Chamberlin repair. In fact, he's comfortable enough in his abilities that he even takes two on the road with him. While he claims to have no trouble with the vintage instruments, he admits that he has done a lot of work to keep them in shape, including redesigning the original tape-head preamps and fabricating new preamps as backups. He also keeps plenty of spare parts in stock and performs routine alignments daily.

But regardless of how much effort is put into maintaining the machines, Mellotron and Chamberlin owners still face an insurmountable problem: the corruption of the instruments' analog tapes. Basically, every time a note is played, the sonic quality deteriorates. Tom Waits once said that the Chamberlin is "a really beautiful instrument that dies a little every time you play it." Some committed players, like Warren and Froom, have resampled the sounds and replaced the tapes. But, as noted earlier, much of the instrument's

DAVID KEAN/COURTESY OF THE MELLOTRON ARCHIVES

A view from above into the Chamberlin M1.

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What turned the music technology industry on its ear?

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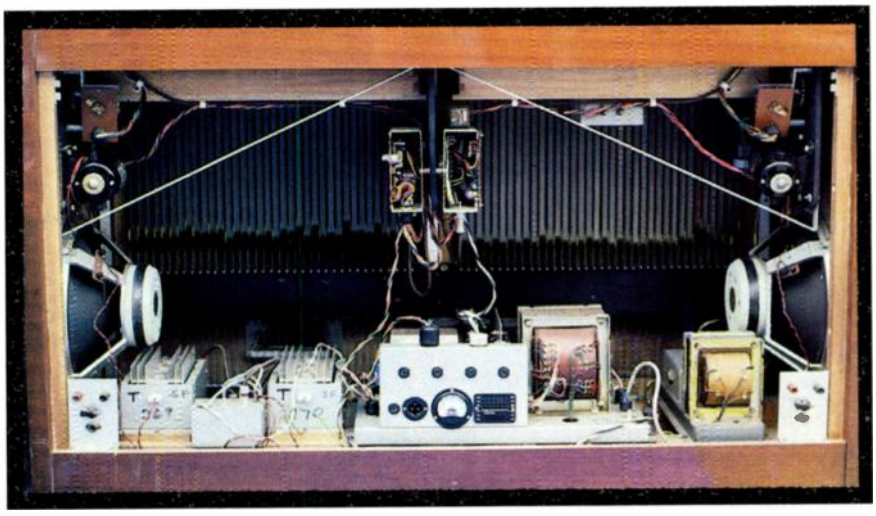

DAVID KEAN/COURTESY OF THE MELLOTRON ARCHIVES

The row of tapes is clearly visible in this view into the back of a Mellotron MK II. Each tape contains only three sounds.

unique character lies in the way the samples were originally recorded.

So is it really worth the aggravation to own a tape-replay keyboard? Brion warns against even thinking about it. "There were only a limited number made in the first place," he explains, "so you'd probably have to pay a small fortune to get an owner to part with one. Then you'd have to find someone qualified to service it, and there aren't many people out there who are. Or, if you service it yourself, you'll spend a good part of your life doing so. It can really get to be a nightmare."

THE MODERN METHOD

So what is the solution? How can you access the unique sounds of these instruments without pouring your time and money into the equivalent of a 30-year old Edsel? Well, like every other sound dilemma nowadays, the answer can be found in a sample CD library. For less than $200, you can now load your sampler with high-quality copies of actual Mellotron and Chamberlin recordings, many of which were recorded by Harry Chamberlin himself.

That CD is called *Michael Pinder Presents: Mellotron*. In 1989, Dave Kean of the Mellotron Archives bought the master tape collection of Mellotron and Chamberlin sounds, then owned by Streetly Electronics. These were complete original recordings—a full seven seconds each of 35 different notes—from machines that were in the best condition. However, when Kean acquired the tapes, they needed a bit of work: some of them had become worn over the years, and others had intrinsic problems from the get-go. "The flute sounds had some major bias pops," remembers Kean. "The boys' choir also had some big problems, and the pipe organ was way out of tune."

To clean up these historic tapes, Kean refurbished a set of old Ampex tape decks with varispeed controls (much like the ones Harry Chamberlin used), which he employed to retune some of the sounds. He also performed a number of analog edits to create new masters. Some digital editing was required, as well. "You can't take bias pops out with a razor blade," Kean laughs, "so we used Sonic Foundry's *Sound Forge* and Digidesign's *Pro Tools* to hack out some of that stuff."

In order to fully capture the character of the original instruments, Kean was adamant that every note be sampled for its full, 7-second length—he didn't want to use any looping. He points out that part of the distinctiveness of a tape-replay keyboard's sound comes from the fact that the player has to re-press each key every seven seconds, requiring a different kind of voicing technique.

Calling himself an "interface evangelist," Kean believes that the player must learn how to interact with the sampler in order to accurately replicate the sound of a true Mellotron or Chamberlin. He asserts, "We need to get away from the concept of a sample being a Polaroid snapshot of a sound, with no unpredictability. We need to re-introduce a little chaos into the static nature of sampling."

IT'S HOW YOU PLAY

Patrick Warren agrees with Kean and suggests that, if you want to emulate a Mellotron or Chamberlin with a sampler, you should avoid using sustain pedals or velocity sensitivity. "You need to finger the keyboard like a harpsichord

For manufacturer information, please see Contact Sheet, p. 195.

THE INNER WORKINGS

Tape-replay keyboards work like digital samplers in that prerecorded sounds are triggered with a keyboard interface. When a key is depressed, a playback head is brought into contact with a linear tape recording that contains the "sample," the tape begins to play and a sound is generated. After the key is released, the tape is quickly pulled back to its starting position by a spring.

Tape-replay keyboards usually have 35 keys, each of which triggers individual sampled notes of a particular instrument. Unlike a digital sample or a tape loop, the tapes in these machines contain complete performances of each note, with full attack and decay phases.

Most units employ ¾-inch–wide tapes that are made up of three separate tracks, which allows tape-replay keyboards to generate up to three different instrument sounds. These sounds are selected from the front panel by a mechanism that moves the heads across the width of the tape. In this way, the sound can easily be changed while playing. It's also possible to set the heads in between tracks to blend sounds. In most of these instruments, the tapes are mounted on easily interchangeable racks.

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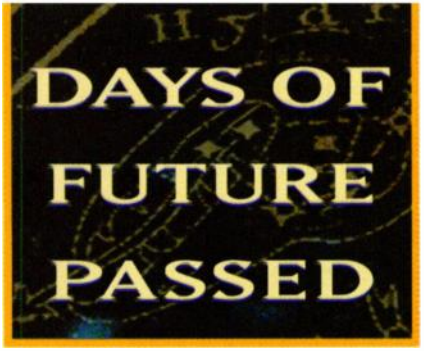


or organ," he says. "When you're moving up the keys, you should be switching fingers on the same key to keep the sustained note going. The Chamberlin requires a special—almost baroque—style of fingering, a return to the days before sustain pedals. You have to really think like that when you're using the samples."

"What's cool about the *Mellotron* CD," notes Mitchell Froom, "is that you're forced to make better music than you normally would with a typical sample library—you can't just drone or sustain through a whole passage, you have to really consider phrasing."

Brion feels the same way. "Tape-replay keyboards are unique instruments," he explains, "and they're played in a different manner than a traditional keyboard. If you learn to play the samples with that same feeling, they can do great things."

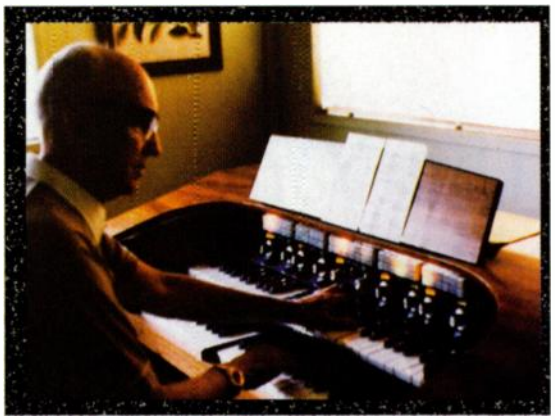
Although the *Mellotron* CD accurately replicates the classic tape-replay sound, Kehew strongly recommends experimenting with the samples in unorthodox ways. "The best part about sampling," he says, "is not just replaying a sound, but using the sampler as a device to *manipulate* that sound. Even though Mellotrons and Chamberlins actually use samples of acoustic instruments, they sound great because they add their own personality to those samples. The way tape-replay keyboards *differ* from the real thing is what creates their unique sound."

Kehew continues, "If you take that thought a step further, getting a digital sample to sound like an authentic Chamberlin is fine, but don't be limited to only replicating that sound. Mellotron and Chamberlin samples should be taken to new places with modern technology—even if they are samples of earlier samples."

Brion agrees. "Anything that merely emulates something else is sort of uncool to start with," he notes. "So don't just use that Mellotron flute sound as is; process it in the sampler or run it through a Leslie cabinet using low-quality mics or something."

THE REAL MCCOY?

Although Patrick Warren is the proud owner of actual Chamberlin master tapes and has created his own samples, he has used the *Mellotron* CD during sessions. "I found so many beautiful sounds on that CD collection that never made it to the Chamberlin library," he says. "For example, there were Chamberlin-recorded Vienna church bells on the CD that I never knew existed. Whether I use the samples or the real thing really depends on the nature of the song." However, he agrees with Kehew that a little ingenuity can go a long way with the samples. "If I were to use the Vienna church bells on a record, I'd probably run them through a Vox AC30 guitar amp to get a more emotional sound—something a little more interesting."



DAVID KEAN/COURTESY OF THE MELLOTRON ARCHIVES

Harry Chamberlin at home on his custom Model 800 Riviera, which contained sounds from his personal collection that were never commercially released. This instrument now resides at the Mellotron Archives.

Froom admits that he used the *Mellotron* CD prominently on the Suzanne Vega album *Nine Objects of Desire*, particularly for the cello and vibe sounds. He also used it extensively to sketch out parts in preproduction. "They really did a good job in producing the CD and were careful not to overtune the notes. The samples sound like the real thing, only without all the nuisances. But I don't waste my time thinking about whether it's better to work with the CD or the real instrument. My engineer and I just put stuff down and whatever works, great. Later, we figure out why it's great."

Brion also figures that, given the hassles of the real instruments, the CD might just be the best way to work. However, he agrees with Warren that it really depends on the nature of the song. "Sometimes," he admits, "if there's a sound that I don't have in my library, or if I'm visiting a studio that doesn't have a Chamberlin, I'll go to The *Mellotron* CD I'm not a purist, I'm a 'soundist': I like anything that emotes, regardless of where it came from. However, if I had to choose between a Chamberlin and the CD, I would use the real thing."

A FASHION STATEMENT

Chamberlins and Mellotrons have become very fashionable over the last several years. Warren was asked to play his Chamberlin on almost every track on the Fiona Apple album *Tidal*. "When the record came out," he recalls, "I was joking that there's more Chamberlin than should be allowed by law! I hope it's not a sign of a trend, because if it gets too trendy it'll kill the fun of the instrument."

In fact, Warren is beginning to realize that, as he popularizes the instrument he loves, he makes it harder to support his own habit. "When I bought my first Chamberlin," he says, "it was in pretty good shape and cost about $1,000. The last one I bought was in really sad condition, but I ended up paying $5,000 for it! I was really irate at the price, but the owner turned around and blamed me. He said, 'You put it on all your records—*you're* the one who drove the price up!'"

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

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ATTACK of the CARDIOIDS!

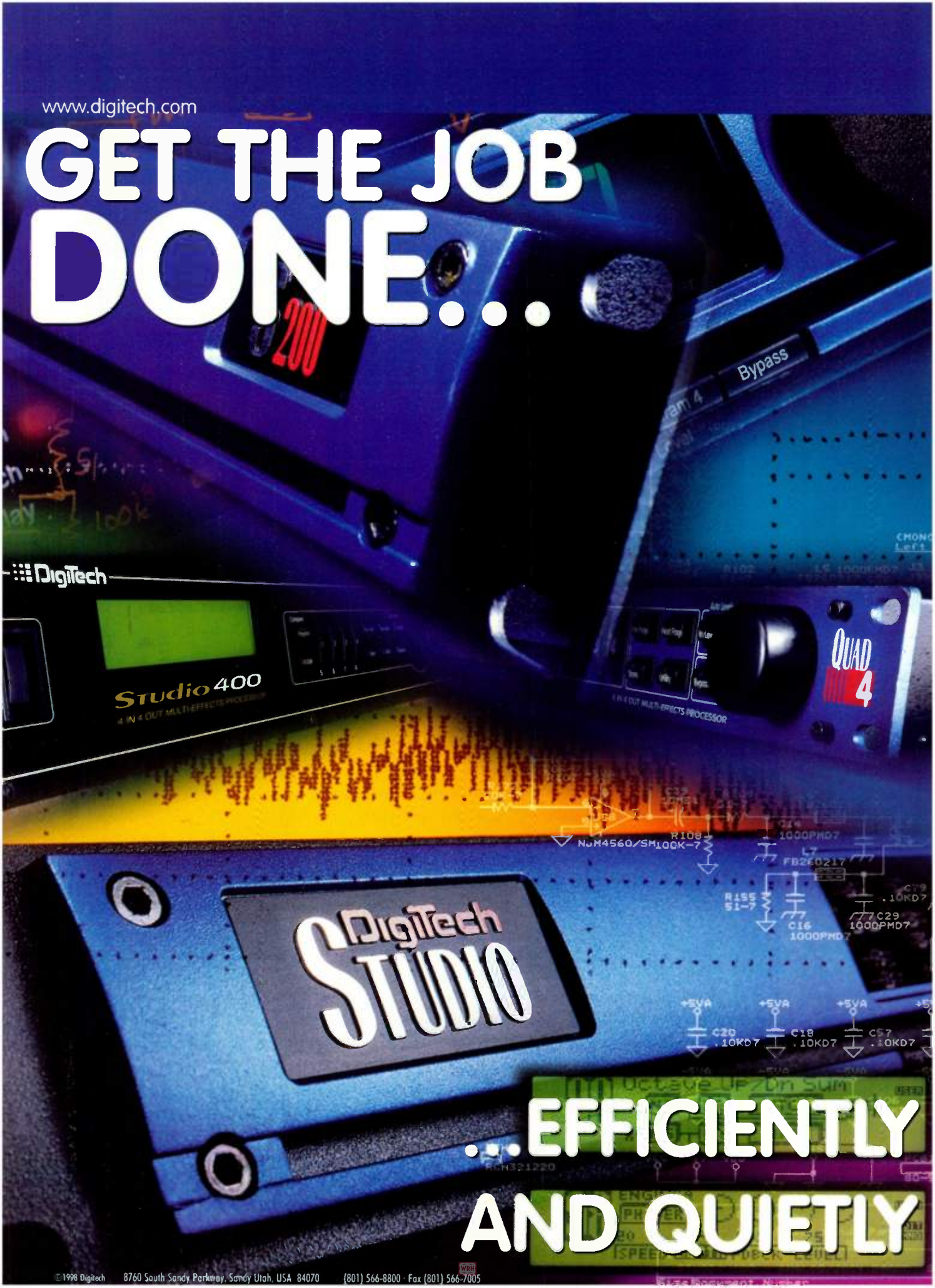
By Brian Knave
with Myles Boisen

EIGHT STUDIO CONDENSER MICS VIE FOR PERSONAL-STUDIO SUPREMACY.

The first condenser microphone to offer multiple, switchable polar patterns was the Neumann U 47 tube mic, released in 1949. Since that time, multiple-pattern, large-diaphragm condenser mics have been a staple of studios worldwide, and fixed-pattern condensers have quietly taken a back seat. The reason, largely, is that commercial-studio owners and engineers preferred the versatility offered by multiple-pattern mics—and could afford to pay for it.

With the proliferation of personal studios, the fixed-pattern studio condenser mic is experiencing a resurgence of favor, largely because the average personal-studio owner cannot afford the luxury of owning a premium, multiple-pattern condenser. In fact, it was only recently that large-diaphragm condenser mics even became affordable enough to compete in the personal-studio market.

PHOTO BY BARRY MUNIZ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When it comes to polar patterns, of course, cardioid is probably the most useful—and certainly the most commonly used—for a variety of recording applications. Not only does it provide excellent rear rejection of sounds (a critical consideration when using multiple mics in a single room or when recording in a 1-room studio equipped with noisy MDMs and hard drives), but it also allows for manipulation of bass response via the proximity effect.

Naturally, because a fixed-pattern mic is cheaper to produce, the manufacturer can offer the product for less money—a fact that figures nicely into the plans of eager personal-studio owners. The upshot is that cardioid-only condenser microphones are suddenly all the rage, and manufacturers are only too happy to provide them.

We did a recent head count and turned up ten solid-state, cardioid-only, large-diaphragm condenser mics for under $1,000—relatively small change in the world of condenser microphones. To help you find your way through this maze of mics, we did a critical comparison test of all ten. Here were the contenders: Audio-Technica AT4033a, Audix CX-101, beyerdynamic MC 834, B. P. M. Studio Technik CR-10, Groove Tubes MD-5sc, Langevin CR-3A, Microtech Gefell MT 711S, Neumann TLM 103, Røde NT1, and Stedman C15.

Unfortunately, though we tested all ten mics, two of them were forced out of the running due to unforeseen problems. The Audix CX-101 turned out to be a prototype rather than a production model and was excluded on those grounds. However, according to Audix, the final version of the CX-101 should be on the market by the time this magazine is in your hands.

The Groove Tubes MD-5sc was also "disqualified" due to internal damage sustained, evidently during shipping. Apparently, the mic was dropped hard, because the electrode that attaches to the diaphragm was loose. The mic still worked, but it performed uncharacteristically badly throughout the testing. By the time the problem was discovered, it was too late to redo the tests.

That leaves us with eight cardioid condenser microphones—still a sizable number to compare. Of the eight, at least half are new mics, and most of the others are only a year or two old. Clearly, the affordable, fixed-pattern condenser mic is an idea whose time has come. Brace yourself for an attack of the cardioids!

CARDIOID WORKOUT

My assistant for the tests was friend and fellow engineer Myles Boisen, who co-owns and operates Guerrilla Recording and the Headless Buddha Mastering Lab in Oakland, California. (Readers may remember Boisen's input on "Tube Mic Tête-à-Tête" in the February 1998 **EM**.) A connoisseur of fine microphones, Boisen has been a recording engineer for over twenty years and is also a recording instructor and an accomplished guitarist.

We did three full days of recording and listening to the microphones, followed by a number of sessions with individual mics and three more days of critical, comparative listening. Although vocals are the primary (and intended) application for these microphones, we also recorded a number of other instruments. This not only helped us to better hear the microphones' sonic characteristics, but it also gave us an idea of their versatility—an important consideration for personal-studio owners who may be able to afford only one good mic. Altogether, we recorded eight source sounds, including vocals (male and female), harmonica (diatonic), acoustic guitar, drum kit (room-miked only), and percussion (shaker, claves, and triangle).

Songwriter/guitarist Mike Lawson, whose debut album, *Lawson and Friends: Ticket to Fly* (Sumertone, 1998), is in stores nationwide, played acoustic guitar, performing a full five minutes of the Bob Dylan classic "It's All Over Now, Baby Blue" on his Gibson J-30C. I laid down all the harmonica, drum, and percussion tracks. The only unusual thing is that I played the clave and triangle tracks from *behind* the mics, to test off-axis rejection and coloration. This is not a standard miking technique, of course, but off-axis rejection and coloration are important factors in a cardioid microphone's response, so I figured the tests were worth the trouble.

Our male vocalist, baritone Johnny Staton, is an active Bay Area singer/songwriter and music director at St. Luke's Methodist Church in Richmond, California. Staton, whose credits include *Let in the Dawn* (Smoothe Records, 1995), a pop/soul CD, sang an extended version (all six verses!) of "Amazing Grace."

For female vocals, I recorded Los Angeles–based singer/songwriter Lygia Ferra, whose debut album, *Strange Peculiar,* is due for release this

BRIAN KNAVE

Five mics were clustered together to capture singer-songwriter Johnny Staton singing "Amazing Grace" for EM's cardioid condenser mic comparison.

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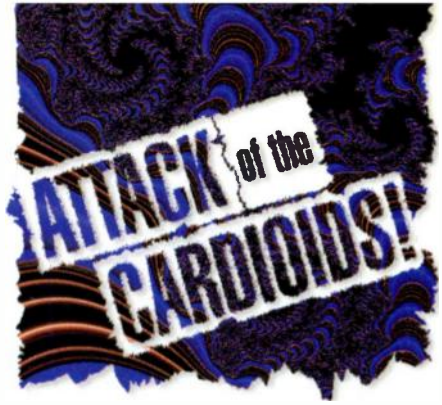

year. At the time of testing, I was helping Ferra track final vocals for the album. Ferra performed one of her own songs, "Out of the Ordinary," as well as an up-tempo rendition of "Dream a Little Dream of Me."

For the drum tracks, I played a slow backbeat with a sixteenth-note ride that progressed from closed hats to crash-cymbal bell and then to ride cymbal. Fills at the end of each section alternated between snare drum, mounted tom, floor tom, and kick drum, an approach that allowed us to isolate and listen critically to each element of the kit. As we expected, the drum set's big range of frequencies and timbres helped reveal each microphone's "sonic predispositions." (The same held true for the acoustic guitar, thanks to its wide range of tones.)

HEART CONDITION

Because these mics are aimed primarily at the personal-studio market, it made sense to test them in real-world, personal-studio conditions. Rather than employ expensive, outboard mic preamps, for example, we used the preamps on my Mackie 8•Bus board. From there, signals were routed to two Alesis ADAT-XTs, with each mic recorded to its own track. No fancy cables were employed, either. However, I did make sure to use the same brand and make of cable for each mic, and I patched the mics to different channels for each session—just in case one or another mic pre performed differently from the rest. Naturally, all signals were recorded sans EQ and effects, and no pads or bass rolloffs were activated on the mics that offered them. Also, levels were carefully matched during both recording and playback.

Ideally, we would have hit all ten mics with the same signal at once so that each mic could capture the same performance. Due to the number of mics involved, though, this proved impractical. So we divided the mics into two groups of five, clustered each group of five mics with the capsules as close together as possible (as you can see in the session photos), and then had the musicians perform their pieces twice through, taking pains to ensure that the performances were as close to identical as possible. This required each musician to play to a click track and then to monitor his or her original performance while recording the second one. Thanks to good musicianship and careful level matching, this approach worked well.

All performances were recorded between two and three feet away from the mic clusters, which allowed enough room for the source sounds to "open up" and helped ensure that each mic was hit with the same signal. Obviously, at this distance, proximity effect is not an issue—what you get instead is the basic, "unaffected" flavor of the mics. Therefore, keep in mind that closer mic positioning would dramatically increase bass response and warm up the sounds noticeably. Moreover, allowances must be made for the fact that our testing method precluded "optimizing" each mic's performance (via positioning). Also, the testing increased the amount of room sound on the tracks to above average.

BRIAN KNAVE

The mic cluster was positioned three feet back and angled slightly downward to record songwriter/guitarist Mike Lawson playing his Gibson J-30C.

ONLY HEARTS CLUB

Before getting into specifics, I want to make clear that these comparison tests, though enjoyable, were often grueling, particularly during the listening stage. There are two reasons for that. One is the large number of mics involved. The ear is quick enough to stray in the first place, so it took intense concentration, lots of backtracking, and frequent breaks to do the job right. It's no simple feat keeping tabs on ten very similar sounds while trying to discern subtle differences among them.

The other reason is that the sonic differences between the "best" and "worst" of the mics were often, in the overall scheme of things, slight. That's not to say that we had a hard time deciding which mics we liked most or least for the various applications. On the contrary, the opinions expressed by the performers and listeners were pretty consistently in accord, and Boisen and I only rarely disagreed in our assessments. But overall, this is a fine bunch of microphones. In the hands of a capable recordist, any of them could capture stellar tracks. Moreover, were you to put any one of these mics up by itself without first hearing the others, it's likely you would be favorably impressed by its sound.

I'm driving this point home because the nature of a hierarchy is inherently problematic, suggesting that the best is magnificent and the worst is crap. But such extremes don't apply in this case. I'll illustrate my point in reference to the Røde NT1, which I reviewed separately earlier this year. On a scale of one to five, I gave the NT1 a four and a

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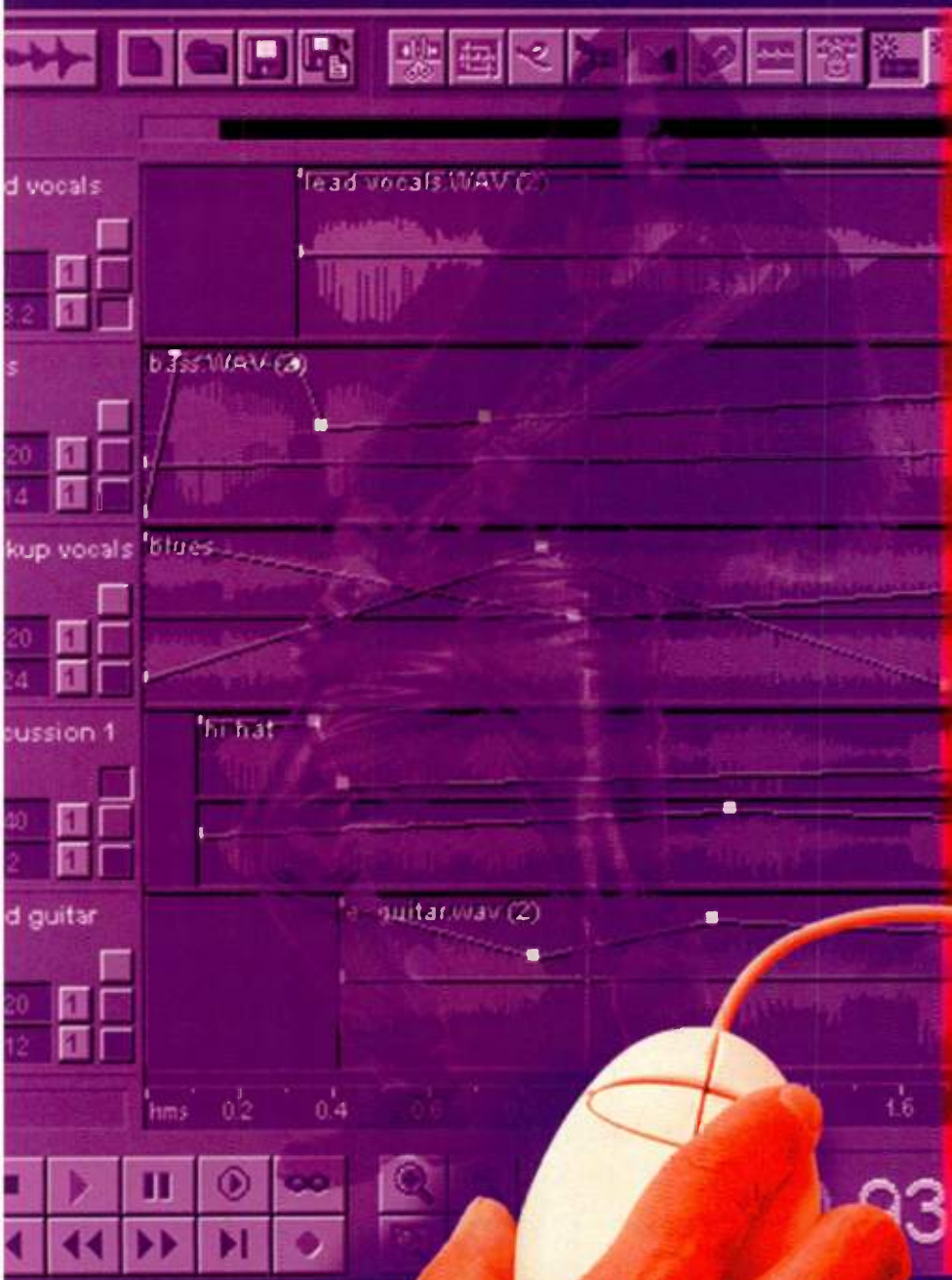

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half for audio quality. For these tests, I might put the NT1 closer to a four and range the audio quality of the other mics somewhere between a four and a five. That's quite a small hierarchy.

I bring this up simply to point out the complexity and relativity (not to mention subjectivity) involved in a critical audio comparison test such as this one. There's no doubt that comparison testing is worthwhile; after all, everything we know in life we know in comparison to something else. But as you consider our assessments of the following microphones, bear in mind that the differences we've attempted to describe were often extremely subtle. Also, consider that we're at the mercy of words—symbols that aren't always up to the task of making minute distinctions.

AUDIO-TECHNICA AT4033A/SC

Audio-Technica's AT4033a/SC is a handsome mic with a black matte finish and the company's distinctive logo in chrome on the front. The mic's XLR connector posts are gold plated.

The AT4033a provides a 10 dB pad and 80 Hz bass rolloff with small switches for both on the back. The switches are recessed to prevent accidental activation but stick out just enough that you can move them with an able fingernail. The AT4033a/SC (which we tested) comes with a sturdy, easy-to-adjust, machined mic clamp that features a rubber insert to hold the mic snugly in place.

For an extra $40, you can get the AT4033a/SM ($725), which comes with a custom shockmount rather than the mic clamp. Either way, the mic comes in a vinyl-covered, foam-lined box for safe storage and transport. Audio-Technica also has a new cardioid condenser for under $1,000, the AT3525 ($399), which we will review separately at a later time.

Vocals. On our male vocalist, the AT4033a exhibited a big, sensuous tone with warm, smooth lows and plenty of presence; the highs, however, were slightly scratchy or buzzy sounding. Evidently, the mic has a rather wide cardioid pattern, as it picked up a bit more room sound than the other mics. This, along with an attenuated-sounding midrange, resulted in a mildly hollow sound. Surprisingly, the high end was somewhat smoother sounding on our female singer, but it was still a bit edgy for my (and Boisen's) tastes.

Harmonica. The AT4033a sounded full and open on harmonica, with a fairly smooth high end. However, there was a disconcertingly "boxy," or hollow, quality to the sound, and at times the signal seemed mildly compressed.

Acoustic guitar. This mic sounded great on Lawson's Gibson J-30C. In fact, the response seemed almost tailor-made—as if the signal had been equalized specifically for solo acoustic guitar. Boisen aptly described the sound as "impressive and airy" with "crisp, detailed, glistening highs, hollow mids, and solid—but not tight—lows." I especially loved hearing the "clicky" articulation of the pick on the strings. The scooped-out low mids definitely made for a clear, non-muddy sound. Overall, the response was very flattering, though clearly hyped.

Drums and percussion. The AT4033a's image of the drum set confirmed the relative looseness of the mic's cardioid pattern—you could really hear the room—as well as the mic's particular frequency affinities. Specifically, the snare drum sounded great (bright yet full, as if already equalized); the kick drum had big, boomy lows but seemed a bit distant; the toms were mildly deficient in tone and depth (though definitely usable); and the cymbals came off okay but with slightly artificial-sounding harmonics.

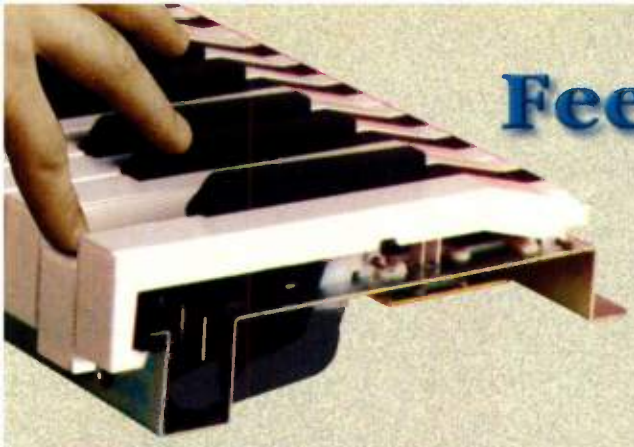
Not surprisingly, the wood shaker sounded crisp with a full, resonant tone (Boisen described it as sounding "produced"). Off-axis coloration was not problematic, and the behind-the-mic clave and triangle tests definitely revealed the AT4033a's big ears. Even from the backside, the attack of the triangle was prominent, and I could easily make out the sound of the click track bleeding from my headphones.

BEYERDYNAMIC MC 834

The all-around smallest microphone of the bunch, beyerdynamic's MC 834 has a matte black finish and a squared-off grille that flares out from the cylindrical body of the mic. The fine mesh of the grille is a bit flimsier than that used on most of the other mics, but it seemed strong enough to handle anything short of a boot crunch. The beyerdynamic logo is silk-screened on the front of the mic in white.

Gear-like rotary switches embedded on the front of the mic are used to change attenuation and bass rolloff. Each switch provides three settings.

Audio-Technica AT4033a/SC



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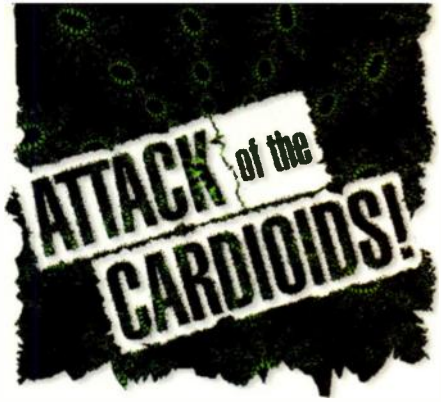

The attenuation switch has settings for 0 dB (no attenuation), -10 dB, and -20 dB. The low-frequency rolloff switch has settings for "LIN" (no rolloff), 80, and 160. Both switches are a bit difficult to turn, requiring a strong thumbnail, pen tip, or other pointed implement.

The MC 834 comes in a black plastic carrying case with a handle. Included in the case is a simple but functional shockmount consisting of a black metal tube with a crisscrossed rubber O-ring on either end. A spare O-ring is provided.

Vocals. On male vocals, the MC 834 had an aggressive, "midrangey" sound with good presence and was, in Boisen's words, "pleasantly airy with natural highs." On female vocals, however, the MC 834 proved bright and glassy sounding, while sometimes exhibiting a slightly "honky" quality. Overall, the mic's prominent mids at around 500 Hz and 1 or 2 kHz somewhat overshadowed its more positive characteristics.

Harmonica. On harmonica, the MC 834's surfeit of highs made for a thin, overly bright sound with a mildly artificial quality. Mids, however, were well detailed.

beyerdynamic MC 834

Acoustic guitar. The mic's enhanced mids nicely complemented the Gibson J-30C we recorded, bringing out a pleasant, woody tone at around 400 Hz. Overall, the sound was full and natural with smooth, unobtrusive highs. "Definitely more natural sounding than the Audio-Technica 4033a," remarked Lawson.

Drums and percussion. The MC 834 captured a big, though slightly boomy, picture of the drums, complete with crisp highs, decent lows, and excellent presence. The snare sound was aggressive and "in your face" and toms and cymbals sounded great. Boisen noted a "vaguely compressed sound that brought all elements to the forefront."

The wood shaker sounded excellent—very crisp and detailed but with sufficient body. In the behind-the-mics tests, the claves came out sounding too midrangey, suggesting that off-axis coloration leans toward enhancing the mic's already enhanced mids.

B. P. M. STUDIO TECHNIK CR-10

Only slightly larger than the beyerdynamic MC 834—but considerably heftier—the B. P. M. Studio Technik CR-10 is a fine-looking mic with a satin brass finish and "CR-10" and "BPM" engraved into the front of the body. The grille is roughly pentagonal and, like the MC 834's, employs a rather flimsy wire mesh. (Unless you're the type who abuses gear, this won't present a problem.) The mic's XLR connector posts are gold plated.

The CR-10 is the best accessorized mic of the lot. It comes in a lockable, foam-lined, aluminum flight case complete with a sturdy shockmount, a 20-foot mic cable, and a foam windscreen. There's even a vinyl zipper pouch for storing the mic inside the flight case.

Vocals. The CR-10 was very bright and crisp on male vocals, yet so lacking in lows as to sound castrated. "Not enough bass," was Staton's terse comment. On female vocals, the sound was more agreeable, with solid mids and smooth, natural-sounding highs. Still, the timid lows, though even-sounding, were not sufficient to do Ferra's voice justice, and sibilance was slightly enhanced.

B. P. M. Studio Technik CR-10

Harmonica. To our surprise, the CR-10's bright finish didn't taint the sound of the harmonica. Rather, the sound was smooth, accurate, and surprisingly pleasant. Generally, I prefer a warmer, darker sound for harmonica, but the openness and accuracy of the CR-10 were impressive, and the resulting sound was eminently usable.

Acoustic guitar. The CR-10 produced a very crisp, clean, and smooth sound with excellent note articulation but insufficient lows and low mids. Boisen felt that the sound was "overly bright and clicky" and "too metallic on the highs," yet conceded that the mic might be just the ticket for enhancing a dull or overly dark-sounding guitar.

Lawson, too, found the CR-10 too bright, but he liked its character. "This is the mic I'd want on guitar for a bluegrass tune," he said, adding that it would "definitely help a flat-picked solo stand out." Most likely, this is a case where proximity effect could be used to advantage: the CR-10 would

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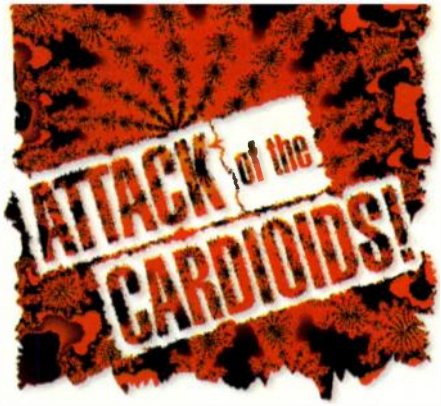

probably capture a better balance of frequencies were it positioned closer to the guitar.

Drums and percussion. The CR-10 captured an accurate picture of the high-end aspects of the drum kit—particularly the cymbals—and exhibited excellent transient response. Due to its bass-lean frequency response, however, the mic wasn't able to account sufficiently for the low-end instruments, such as kick drum and floor tom. Overall, the drum kit sound was crisp and supremely articulate but, in Boisen's words, "bright to the point of being annoying."

Similarly, the highs of the wood shaker were wonderfully crisp and percussive, but the tone was compromised somewhat by the lack of warmth. Off-axis coloration was not problematic, at least for the high sounds: even from behind the mics, the tone of the triangle was clear and true, with attack transients amply preserved. The claves, though, were more attenuated than the triangle, and sounded dull. (The click track leaking through my headphones was only barely audible.)

LANGEVIN CR-3A

The Langevin CR-3A has a Neumann U 67–style body with a satin-brass finish and the Langevin logo engraved on the front. Both a clip and a shockmount are included with the mic. The shockmount is simple yet functional, featuring a "twist lock" that snaps the mic snugly into place.

The CR-3A also provides a 10 dB pad and 100 Hz bass rolloff. The switches, though recessed, are easy enough to move with either a finger or fingernail. The foam-lined case that comes with the CR-3A provides a separate compartment for the mic clip and shockmount. The compartment also contains a foam windscreen.

Vocals. The CR-3A delivered a full, chesty, yet slightly dull tone on Staton. Also, it sounded as if the mic were very close to the source (all mics were exactly the same distance away), yet there wasn't much presence, indicating some attenuation around 5 or 6 kHz. At the same time, the sound was overly bright at around 10 kHz, and again, the low mids (deep chest voice) were very prominent.

On Ferra, the sound lacked warm, midrange tones and, overall, was a bit bright, thin, and sibilant. At the same time, the apparent boost in the low

Langevin CR-3A

mids (around 250 Hz) created a slight masking over the voice (this sounded similar to a proximity boost but obviously wasn't). Also evident was increased room sound, suggesting a wide cardioid pattern.

Harmonica. The tone was thin, bright, and slightly harsh. Also, a bit of harmonic distortion was audible on the high notes.

Acoustic guitar. Again, the CR-3A seemed distinctly closer than the other mics, but the sound—dark, muddled, boomy, slightly muddy, with honking mids—was unflattering to the acoustic guitar. In Lawson's words, it sounded like "an acoustic guitar plugged into a small, inexpensive P.A. system."

Drums and percussion. The CR-3A sounded absolutely huge on drums! Initially, we suspected I had gotten the levels wrong, because the track sounded so much hotter than the rest. But the levels were the same. Also, as we noted before, the CR-3A sounded much closer to the source than the other mics. Somehow, this mic just reached out and grabbed the drums like no other in the bunch, providing a very dimensional, in-your-face sound. Boisen described the CR-3A as being "very up-front and immediate" with "lots of definition. It grabs and defines subtle sounds." However, he warned that the "wide mid boost, though providing lots of personality, could be tubby-sounding and dark on cymbals."

BRIAN KNAVE

Up-and-coming diva Lygia Ferra sings "Out of the Ordinary," an original from her forthcoming album, *Strange Peculiar,* into a cardioid mic cluster.

For manufacturer information, please see Contact Sheet, p 195.

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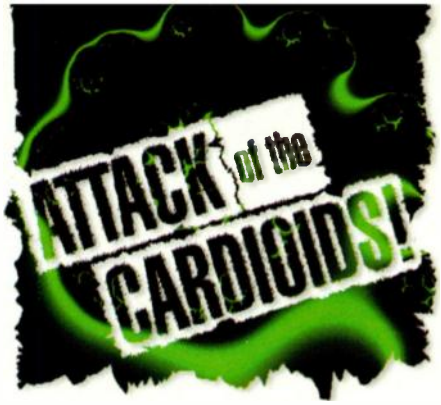


I liked the character imparted to the drums, especially for rock tracks, but the sound was somewhat uncontrolled, and the cymbals were a bit brash sounding.

On wood shaker, the CR-3A sounded crisp and detailed, but the tone wasn't especially likable. The behind-the-mics test captured a big-sounding triangle with an excess of harmonics, yet a very dull-sounding clave. The click track bleed from my headphones was not audible.

MICROTECH GEFELL MT 711S

Structurally, the Microtech Gefell MT 711S is the odd man out in this group of mics, with its long, slender body and small grille. It's a nice-looking mic, though. Finished in matte black, it is clearly a precision-machined instrument, and it feels sturdy and well balanced in your hand.

It is worth noting that the MT 711S employs the legendary M7 capsule developed by Georg Neumann in 1932 and used in the CMV 4a, U 47, U 48, M 49, UM 57, and UM 70 microphones. For a time, before Germany was divided, Neumann and Microtech were the same company, called Georg Neumann & Co./Gefell, "Gefell" being the name of the town. Today, according to Microtech, "the company still produces the M7 capsule the same way it was made in the 1930s."

A small, oval-shaped "window" on the front of the MT 711S provides access to two small switches: one for a 10 dB pad and the other for a 90 Hz low-frequency rolloff. These well-recessed switches can be moved only with a pointed implement.

The mic itself comes in a lovely, foam-lined, hardwood storage case with a natural finish. This box, in turn, is packaged in a larger cardboard box that contains a nylon mic clip, a 20-foot mic cable, and a large foam windscreen. The nylon clip snaps readily onto the mic (it's difficult to slide the thing on) and provides secure and versatile positioning. Microtech Gefell offers another cardioid-only, large-diaphragm condenser mic that fit our criteria for this article: the M 900 ($995), which is optimized as a performance mic but is equally useful in the studio.

Vocals. The MT 711S sounded very smooth, tight, and balanced on both male and female vocals. This mic has a sturdy sound with remarkably smooth, natural highs that never sound harsh. Indeed, despite a hint of nasal sound (a slight boost between 800 Hz and 1 kHz?), the MT 711S exhibited the most realistic balance of frequencies, making it overall the most natural sounding of the ten mics. Its transient response, too, was very true to life. Boisen described the sound as "solid, commanding, and detailed throughout the spectrum." At the same time, next to the other mics—all of which sounded bright in comparison—the MT 711S has an understated, slightly small sound that doesn't immediately make a big impression.

Harmonica. The MT 711S was clearly the best-sounding mic on harmonica. In fact, it's possibly the best-sounding solid-state condenser I've ever used on harmonica—and I've been laying down studio harp tracks for over twenty years. The tone was warm, smooth, full, and accurate, with no ugly bite or grittiness on the highs. This mic definitely handles highs better than the others and has great resolution. Also, Boisen commented favorably on its "firm lows" and "open, spacious, true-to-life sound."

Microtech Gefell MT 711S

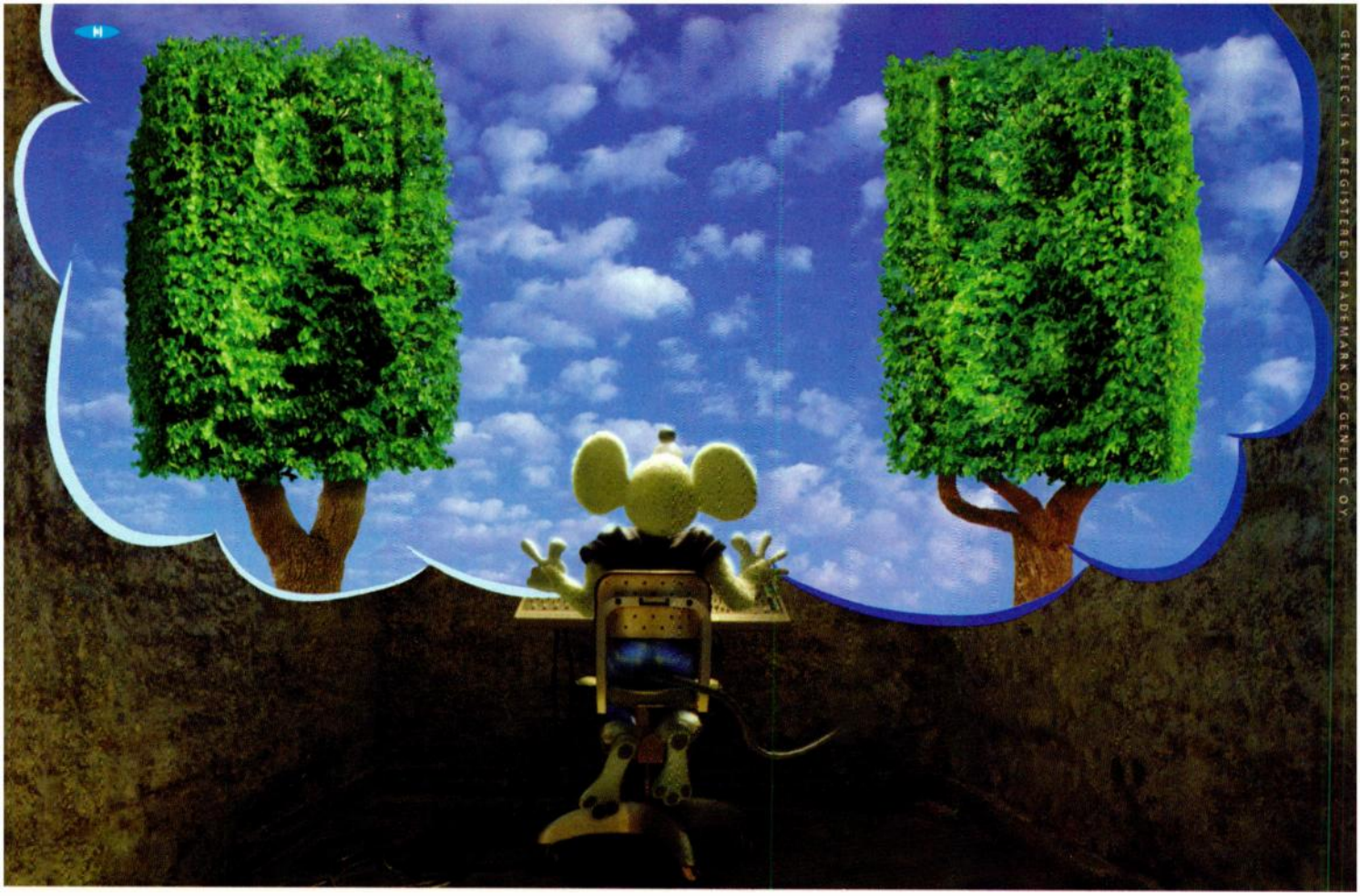
These comparison tests,

though enjoyable, were often grueling, particularly during the listening stage.

Acoustic guitar. The MT 711S delivered a lovely acoustic-guitar sound—warm, tight, dimensional, and beautifully articulated—that was very realistic but could prove too dark for some styles of music (e.g., country and pop rock). Lawson, who liked the sound a lot, described it as "fat" and even "tubey," adding that the MT 711S made his Gibson J-30C (a nicely balanced instrument with resonant lows, rich mids, and high sheen) sound more like his Gibson J-160E (a darker, warmer-sounding guitar). Boisen, too, loved the MT 711S on acoustic guitar, remarking that it captured a "dark, woody" sound with "listenable and sweet highs that I liked better than the Neumann TLM 103's." Furthermore, he noted that the "slightly nasal upper-mid boost...enhanced middle strings and inner voicings...and worked to get inside the guitar and bring the sound forward."

Drums and percussion. Again, the MT 711S captured a natural sound from the drums, but in this case, the slightly "small" character of the mic didn't perfectly complement the application, and the mild mid boost was evident in a slightly inaccurate—but still very nice—snare sound.

Specifically, the snare sounded woody and slightly throaty, with a marginal deficiency of low mids (around 200 Hz). The kick drum was a bit mild on the



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lows and sounded somewhat distant. Toms and cymbals, though, were very accurate and pleasant, if a bit covered sounding in comparison to the other, much brighter mics.

Curiously, the MT 711S got so "inside" the wood shaker that it seemed to capture too much detail, resulting in an unwanted emphasis on the arrhythmic elements of the sound. The tone was warm and rich, but it just didn't suit this application. The behind-the-mics tests captured a pleasant but somewhat dull-sounding triangle. The claves, too, sounded distant and not as resonant as the source (though still nice) and were pitched slightly (less than a half step) down. As for the click track bleed from my headphones, it was inaudible, which suggests good off-axis rejection.

NEUMANN TLM 103

The Neumann TLM 103 is a squat but handsome mic that resembles an old Neumann M 49—or a U 87 that's had its bottom chopped off. The mic has the company's standard satin-brass finish, a red logo plate, and gold-plated XLR connector posts. As with the Microtech Gefell MT 711S, everything about the Neumann TLM 103 reflects fine craftsmanship.

The TLM 103 comes in a gorgeous cherry-finish hardwood case with brass-plated latches (as do all Neumann microphones). A hard nylon mic mount is provided. Once it was attached to the mic, the clip proved solid and easy to position; however, it's not especially easy to attach to the mic, and one can only wonder how long the nylon threads will last.

Neumann makes a shockmount, the EA 103 ($175), specifically for the TLM 103, but it, too, has plastic threads. A sturdier, though more costly, choice is the all-metal EA 193 ($220).

Vocals. The Neumann TLM 103 sounded great on both male and female vocals. The tone was similar to the Microtech Gefell MT 711S's—smooth, full, tight, warm in the mids, and accurate—but with a characteristically bright, Neumann "sheen" on the high end (in this case, a smooth presence boost that extends from about 5 kHz all the way out to 15 kHz). Staton liked the TLM 103 best on his voice, remarking that it captured "a full, rich, natural sound." Boisen, likewise, noted that it was "the only mic to convey [Staton's] resonant

Cardioid Mic Specifications

MICROPHONE	CAPSULE	ELEMENT	FREQUENCY RESPONSE	S/N RATIO	SELF NOISE
Audio-Technica AT4033a/SC	⅝" (16 mm), 2 microns thick	fixed-charge back plate permanently polarized capacitor	30 Hz–20 kHz	77 dB (1 kHz @ 1 Pa)	17 dB (A weighted)
beyerdynamic MC 834	½" on one side, ¾" on the other; gold-vapored condenser	DC polarized	20 Hz–20 kHz	not available	18 dB (A weighted)
B. P. M. Studio Technik CR-10	1" gold-sputtered diaphragm	DC polarized	20 Hz–20 kHz	78 dB (1 kHz @ 1 Pa, A weighted)	18 dB (A weighted)
Langevin CR-3A	1", 6 microns thick	DC polarized	40 Hz–16 kHz	67 dB (1 kHz @ 1 Pa)	not available
Microtech Gefell MT 711S	1.2" gold-sputtered diaphragm w/ M7 capsule	DC polarized	40 Hz–18 kHz	80 dB (1 kHz @ 1 Pa, A weighted)	14 dB (A weighted)
Neumann TLM 103	1.25" gold-sputtered diaphragm	DC polarized	20 Hz–20 kHz	76.5 dB (1 kHz @ 1 Pa)	7 dB (A weighted)
Røde NT1	1" gold-sputtered diaphragm	DC polarized	20 Hz–20 kHz	not available	17 dB (A weighted)
Stedman C15	0.9" gold-sputtered diaphragm	DC polarized	25 Hz–19 kHz	79 dB	16 dB (A weighted)

power." However, he felt that the tone was slightly sibilant and the "forward mids were not always complementary" to Staton's voice.

On Ferra, our female vocalist, the TLM 103 sounded smooth and lush, with warm lows and a pleasant airiness on top. The sibilance was more pronounced, though, and to both Boisen's and my ears, the tone was a bit too bright. Ferra, however, loved the sound and chose this mic over all the others. In fact, she ended up using the TLM 103 (both this one and another that she rented in Los Angeles) to record final vocal tracks for her forthcoming CD.

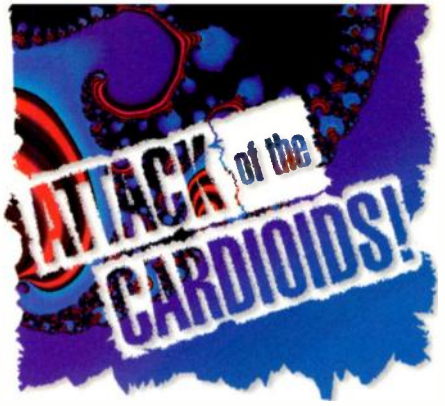
Harmonica. The TLM 103 worked just fine on harmonica, capturing a big, open sound; full, rich lows; and excellent detail and transient handling. The mic's accentuated high end, though, produced a sound that was just a tad too bright and reedy for my tastes.

Acoustic guitar. The TLM 103's tonal disposition was exceptionally complementary to acoustic guitar. The sound was full, smooth, and natural, with great articulation and superb transient response. Moreover, this mic has a special gift for capturing dimensionality; even on a mono track, you could readily hear *into* the guitar.

Lawson, who initially liked the Audio-Technica AT4033a best on acoustic guitar, and then the Microtech Gefell MT

Neumann TLM 103

MAXIMUM SPL	PAD	BASS ROLLOFF	DIMENSIONS	WEIGHT	ACCESSORIES	PRICE
145 dB; 155 dB w/pad	10 dB	80 Hz @ 12 dB/oct.	6.69" (L) x 2.1" (D)	13.4 oz.	mic clamp, soft case	$685
150 dB	10 dB	80 & 160 Hz	6.5" (L) x 1.46" (D)	10.23 oz.	shockmount, spare rubber ring (for shockmount) plastic case	$999
136 dB	none	none	6.78" (L) x 2.07" (D)	14.53 oz.	shockmount, windscreen, XLR cable, aluminum road case	$599
122 dB (0.05% THD @ 1 kHz)	10 dB	100 Hz @ 6 dB/oct.	7.87" (L) x 2.13" (D)	17 oz.	mic clip, shockmount, windscreen, soft-shell case	$800
134 dB (0.5% THD @ 1 kHz)	10 dB	90 Hz	8.54" (L) x 1.65/.83" (D)	10.05 oz.	mic clip, XLR cable, windscreen, hardwood case	$895
138 dB (< 0.5% THD)	none	none	2.36" (L) x 5.2" (D)	17.64 oz.	mic clip, hardwood case	$995
135 dB	none	none	7.25" (L) x 1.86" (D)	11 oz.	mic mount, plastic case	$349
132 dB	none	none	7" (L) x 1.75" (D)	8.5 oz.	mic clip, plastic case	$599

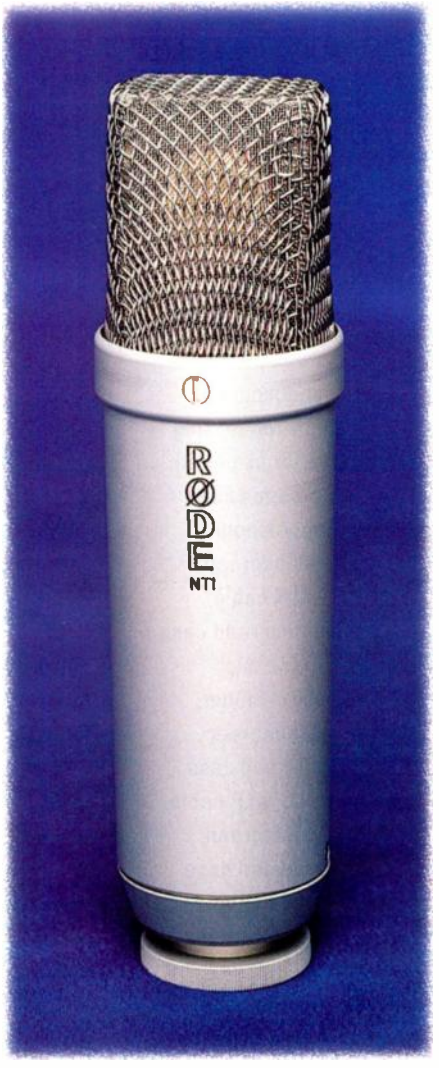


711S, in the end settled on the TLM 103 as his favorite. "It produced the best balance of lows, mids, and highs," he explained, "without seeming to favor one frequency over another." Boisen didn't quite agree, citing "slightly boomy lows" and "some exaggerated mids." However, he loved the mic's "airy, intimate" sound and noted that it exhibited "high resolution, like a great camera."

Drums and percussion. In terms of realism, depth, punch, and all-around great sound, none of the test mics topped the TLM 103 on drums. The sound was full yet contained, perfectly balanced (meaning that the relative levels of the individual source instruments were retained), and remarkably dimensional. Accordingly, the separation of sounds between one drum and the next was excellent.

Specifically, the kick drum was big and full sounding (with a slight, but nice, boost) with tight lows and great detail; the snare sound, though seemingly boosted around 800 Hz, was very nice; the toms were gorgeously represented; and the cymbals were tight, smooth, well controlled, and, surprisingly, not overly bright. (We wondered if the mic's smooth highs indicated a discreet, upper-mid attenuation around 2 kHz.)

The TLM 103 captured big, slushy, exaggerated lows (in the 200 to 400 Hz realm) on the wood shaker, and it was not as tight and percussive as we had expected in this application. In the behind-the-mics test, both the triangle and claves were clearly—and loudly—captured. Harmonics on the triangle were slightly exaggerated, but overall the sounds were pretty faithful to the source. The click track from the headphones was not audible.



Røde NT1

RØDE NT1

The Røde NT1 is a plain-looking, attractive mic with a glossy, light-gray enamel finish on a light-gauge steel body. The Røde NT1 logo is engraved on the front beneath a brass button designating the capsule side, and the mic's XLR connector posts are gold plated.

The NT1 comes in a hard plastic, foam-lined case with a simple but very sturdy mic clip. Adjusting the clip is easy, thanks to a plastic-handled tightening screw. The design of the clip, however, doesn't allow for complete freedom of positioning.

Of the mics we tested, the NT1 is notable for having won the 1998 **EM** Editors' Choice award. That means we thought it was the best of the new microphones that were released between October 1996 and October 1997, when the award winners were selected.

However, we chose the microphones for the present article based solely on their attributes, with no release-date restrictions. In fact, all of the other mics tested for this article were released before or after the eligibility dates for the 1998 Editors' Choice award. Furthermore, several of these mics cost more than twice as much as the NT1. Therefore, in my opinion, the NT1 faced much more formidable competition in this set of tests than it faced in winning the Editors' Choice Award for a single year.

This helps to put my critical comments into perspective. Though it's true that in this present comparison test the NT1 didn't perform as well as some of the other mics, that fact does not reduce the mic's stature. Rather, it underscores the impressive performance of the other mics.

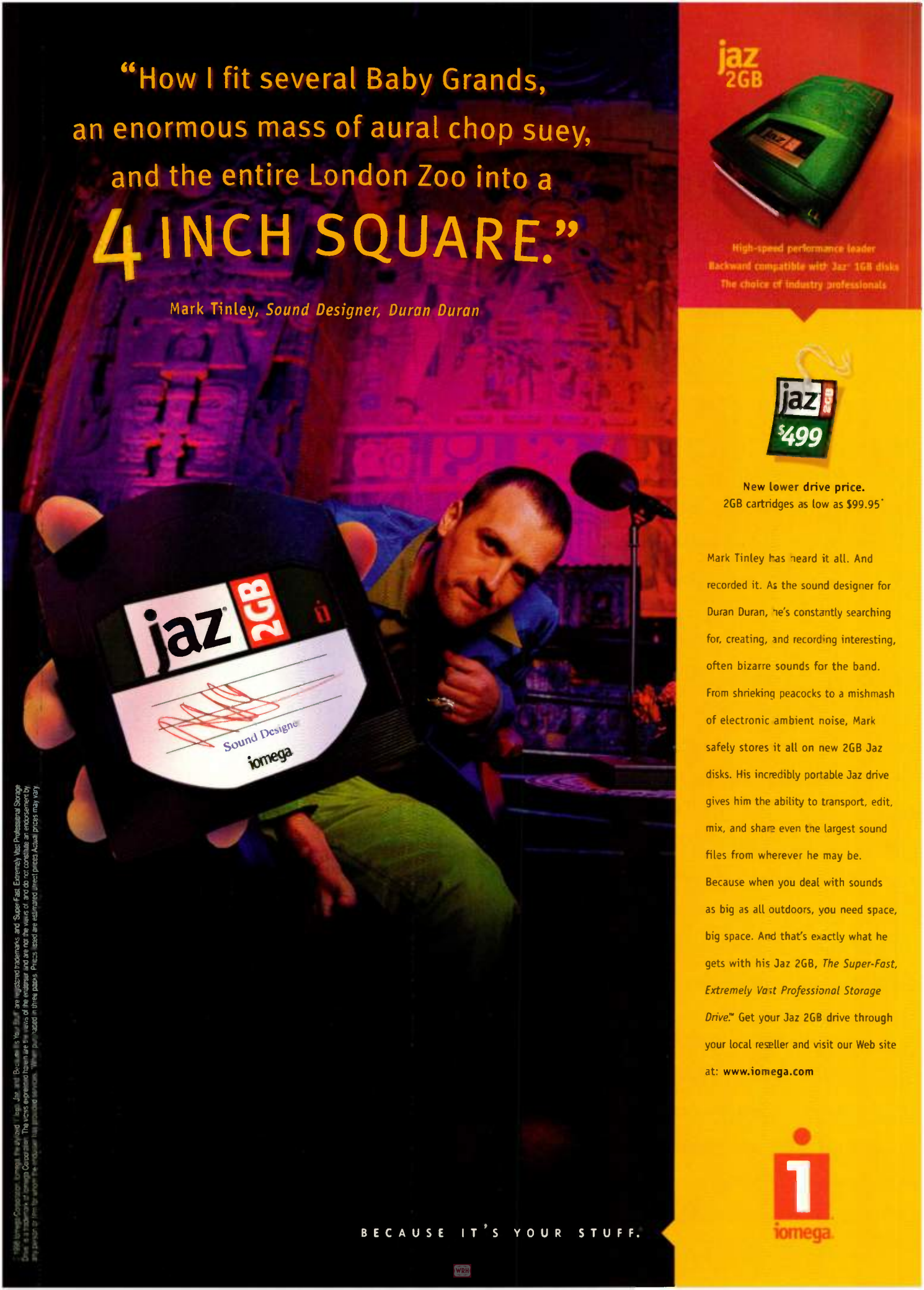
Vocals. On male vocals, the NT1 captured an intimate, nicely articulated sound with good presence but not much dimension. The mids were well represented, but the lows were mildly deficient and the highs sometimes exhibited a slightly "buzzy" quality. On female vocals, the sound was a bit thin and sibilant, with a somewhat compressed quality. Ferra didn't much like the NT1's sound on her voice, and Boisen described the highs as sounding "disembodied."

Harmonica. The NT1 wasn't particularly well suited to harmonica (an instrument that's not easy to record well, by the way). The sound was thin and somewhat harsh. Also, the mic was so sensitive to air movement that it sometimes "popped" up to three feet away from the source sound.

Acoustic guitar. Although I've captured nice-sounding, perfectly usable acoustic-guitar tracks with my own Røde NT1, when compared to the best guitar mics in the bunch, the NT1 fell a bit short. In comparison, the sound was soft and slightly unstable, seeming even to pump and breathe a bit like a compressor. The NT1 also sounded farther from the source than most of the other mics. Bass frequencies were not well accounted for, and the mids sounded a bit uneven. (Most noticeable was a low-mid boost around 250 Hz.)

Drums and percussion. The NT1 is not an especially flattering room mic for drums. Overall, the sound was slightly dull and lacking in air and dimension. Though the toms sounded passable—even big—and the cymbals bright (but usable), the snare had a thin, papery, and mildly hollow sound. Also, the kick drum was a bit distant sounding and deficient in lows.

For manufacturer information, please see Contact Sheet, p 195.


"How I fit several Baby Grands, an enormous mass of aural chop suey, and the entire London Zoo into a 4 INCH SQUARE."
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Mark Tinley has heard it all. And recorded it. As the sound designer for Duran Duran, he's constantly searching for, creating, and recording interesting, often bizarre sounds for the band. From shrieking peacocks to a mishmash of electronic ambient noise, Mark safely stores it all on new 2GB Jaz disks. His incredibly portable Jaz drive gives him the ability to transport, edit, mix, and share even the largest sound files from wherever he may be. Because when you deal with sounds as big as all outdoors, you need space, big space. And that's exactly what he gets with his Jaz 2GB, The Super-Fast, Extremely Vast Professional Storage Drive.™ Get your Jaz 2GB drive through your local reseller and visit our Web site at: www.iomega.com
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On wood shaker, the NT1's particular frequency response made for a thin, slightly metallic sound that was lacking in body. On the behind-the-mics test, the triangle had lots of attack but also sounded thin and overly metallic. Claves, too, sounded thin, with a piercing tone that was slightly higher in pitch than the source. As for the click track bleeding through my headphones, I could only barely make it out.

STEDMAN C15

Slightly smaller than the Røde NT1, the Stedman C15 looks a bit like one of those little camping lanterns lit by a votive candle, but with a capsule inside rather than a candle. Its perfectly cylindrical body has an anodized aluminum finish with the Stedman logo silk-screened in black on the front.

The C15 comes in a hard-plastic, foam-lined carrying case with a handle. Included is a sturdy, finger-friendly, easy-to-position mic clip. The Stedman shockmount, too, is sturdy, effective, and user friendly, but it doesn't come with the mic.

Stedman also has another cardioid condenser for under $1,000, the SC3 ($998). The SC3 provides a 100 Hz bass rolloff and both 9 and 18 dB pads. It also features special "vintage" and "enhanced" modes.

The first C15 we received performed fine until the final day of testing, at which point it began to generate an internal static-like sound that grew louder as the session proceeded. Evidently, the mic had a defective part, and by the end of the day it was fried. Stedman kindly sent a replacement, which performed flawlessly throughout a second round of testing.

Vocals. On both male and female vocals, the C15 produced usable tracks, but it had a slightly unnatural sound that seemed mildly compressed. Also, compared to the best of the bunch, it lacked resonance. On Staton, the sound was thin and mildly hollow in the midrange. On Ferra, the lows were nicely represented, but sibilance was accentuated, and there was a slightly harsh quality around 2 or 3 kHz. At the same time, the mids seemed a tad deficient between 500 Hz and 1 kHz.

Harmonica. The C15 captured a reedy, somewhat removed sound with an occasional touch of harmonic distortion on the high notes. The mids felt fine, but the lows were a bit lean.

Acoustic guitar. The C15 redeemed itself on acoustic guitar, exhibiting a fine balance of frequencies and good transient response, albeit with a mildly "electronic," not-quite-natural sound. Lawson remarked that the C15 tracks sounded as if they were played through "a really top-of-the-line pickup going through a great P.A. system with no EQ dialed in." Boisen described the sound as "immediate and tight" with "crisp, pointy, and very lifelike highs" but "uneven mids." To my ear, the balance of frequencies was similar to the Neumann TLM 103's, but the overall sound was slightly less focused, natural, and dimensional. Overall, though, it was a usable sound that would probably work just fine in a mix.

Drums and percussion. Again, the C15 exhibited good transient response, but the overall sound on drums was a bit harsh and not quite in focus. Also, though the accentuated harmonics on cymbals were appealing in their own way, the sound was somewhat unnatural and, as it turned out, nearly a half-step lower in pitch than the source. Toms were best represented. The kick sound, though, was distant, indistinct, and colored by an uncomplimentary tone that was not present in the drum.

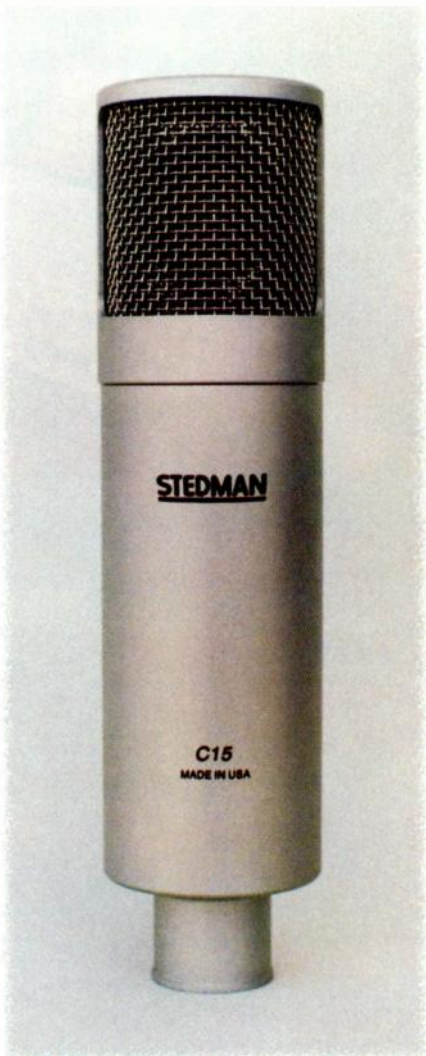
Unfortunately, because the original test mic had crapped out by the time we got to recording shaker, claves, and triangle, there was no time for further testing.

EIGHT OF HEARTS

To sum up, I'll give our overall impressions of the eight microphones, along with the most flattering applications for each mic. Again, keep in mind that many of the distinctions made here are very subtle—sometimes more subtle than words can convey.

Audio-Technica AT 4033a. The immediate hit on the AT4033a was almost always good: this mic is quick to please with a big, bright, open, and articulate sound. The light of close comparison, however, soon revealed the mic's tailored response, a tonal blend that includes crisp, articulate highs; discreetly scooped-out mids; and big, sometimes boomy lows. Best applications were vocals and acoustic guitar, though all tracks were clearly usable.

beyerdynamic MC 834. The MC 834 is generally a very present-sounding, articulate mic with bright yet natural-sounding highs; sufficient lows; and very prominent mids. The mic's aggressive midrange response can be used creatively to bring out certain aspects of an instrument (it sounded great on acoustic guitar), but it can sometimes sound honky. Likewise, the mic's crispy high end may be useful for cutting through a dense mix, but is sometimes overly bright. Best applications were acoustic guitar, male vocals, drums, and percussion.



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B. P. M. Studio Technik CR-10. The CR-10 was the brightest mic of the bunch, yet its highs were surprisingly smooth and natural sounding. Its bright finish and bass-lean response, however, make it not an all-purpose mic, but rather one that could be employed creatively or as a problem solver (e.g., to enhance highs and/or diminish lows on a dull or boomy-sounding acoustic guitar). Best applications were harmonica, percussion, drum overhead, and acoustic guitar. (Note: after our tests were completed, a letter fom PMI Audio, which distributes the CR-10, informed us that recent modifications have improved the mic's bass response.)

Langevin CR-3A. The CR-3A is a big-sounding mic with prominent low mids and a slightly uneven high-end response that was often too bright yet lacked a bit in presence. Curiously, this mic always sounded nearer to the source than the other mics, even though it was positioned at the same distance. Our favorite application for the CR-3A was drums, which sounded huge, though somewhat dark.

Microtech Gefell MT 711S. This is the kind of mic that doesn't hit you over the head with sparkle and pizzazz, but rather sneaks up on you by dint of its versatility and consistent quality. The warmest, sweetest-sounding mic of the bunch, the MT 711S had a modest, decidedly different sound from the other mics and was notable for its accuracy, naturalness, and smooth high end. A premium mic, the MT 711S sounded exceptionally good in all the applications but really shined on vocals, harmonica, and acoustic guitar.

Neumann TLM 103. It didn't take long for the TLM 103 to emerge as our benchmark mic during the comparison tests. This is a premium microphone characterized by an open, articulate, very natural sound; super resolution; big, tight, detailed lows; and a distinctive presence boost that yields a delicious, intimate quality. The TLM 103 performed beautifully in all the applications, but it proved especially well suited to vocals, acoustic guitar, and drums.

Røde NT1. This mic has a bright and open sound but is lacking in low lows and airy highs and, compared to the best of the bunch, sounds slightly compressed and lacking in dimension. Also, the NT1's slightly uneven midrange response sometimes "bites" a bit in the high mids and muddles the sound in the low mids. The best application was male vocals.

Stedman C15. The C15 is a good-sounding mic with excellent transient response, but compared to the better-sounding mics in this test, it tended to sound a bit "canned" and slightly shy of natural. The best application was acoustic guitar.

SEARCHING FOR A HEART OF GOLD

Rating products is always difficult, especially when all of the products are good and the differences between them are subtle. There were, however, a couple of mics that consistently outperformed the others in this comparison test. Top honors go to the Neumann TLM 103 and the Microtech Gefell MT 711S. Though different sounding, they're both outstanding, very versatile microphones. (As for choosing one over the other, that would be a matter of taste.)

After that, the rating gets a bit tricky. Overall, I would say that the beyerdynamic MC 834 deserves third place after the Neumann TLM 103 and Microtech Gefell 711S. However, it's entirely conceivable that some folks would prefer the sound of the Audio-Technica AT4033a; the two mics have quite different responses, so again it's largely a matter of taste. Moreover, the B. P. M. Studio Technik CR-10 is right up there with the beyerdynamic and Audio-Technica mics, except that its exceedingly bright, airy sound makes it a less-versatile microphone (although one that might fare especially well in an analog tape–based studio).

The other three mics have their strong suits, but I won't attempt to rate them qualitatively. However, because value is always a concern for the personal-studio buyer, it's worth noting that most of the leading mics in this test were also the more expensive ones (specifically, the beyerdynamic, Neumann, and Microtech Gefell). From that perspective, the Audio Technica AT4033a becomes considerably more attractive.

In terms of best all-around value, the B. P. M. Studio Technik CR-10 is hard to beat, coming as it does with a flight case, shockmount, mic cable, and windscreen—all for only $550. (And with a purportedly improved low-end response on the newly modified CR-10s, the deal looks even sweeter.) Also, don't overlook the Røde NT1! At $349, it remains the least expensive large-diaphragm condenser mic on the market, and a great-sounding one, at that.

It's also important to note that quality, versatility, and value aren't the only considerations for someone in the market for a new mic. A studio operator with an already well-appointed mic cabinet, for example, may just as likely be looking for a different or unusual sound, or perhaps a mic that does wonders for one particular instrument only. For example, Boisen is now quite interested in the Langevin CR-3A microphone, precisely because of how it sounds as a room mic for drums.

HEARTENING PERSPECTIVES

To put things into perspective, I want to reiterate that each mic we tested for this article sounded very good, if not exceptional, and that our critical comments are therefore made within a quite small hierarchy. On a scale of one to ten, these mics inhabit the upper realms, somewhere between a seven and a half and a nine and a half.

A couple of personal anecdotes may serve to anchor these perspectives in the real world. One is that I personally

own a Røde NT1, and I use it frequenty in my studio to record a variety of instruments. I have also recommended the NT1 to a number of friends and acquaintances, and those who bought it on my recommendation have been very happy with the mic. I've even been thinking of buying a second NT1, to allow for stereo recording.

The second anecdote concerns the Audio-Technica AT4033a, which came in third or fourth in our comparison tests (depending on your tastes). Producer Phil Ramone had a hand in developing the AT4033a, and I happen to know of several other leading engineers and producers who love the mic and use it regularly. Recently, I sat in on a recording session at Studio B in Nashville, and the engineer used three of them: one for lead vocal and two on piano. Needless to say, the tracks sounded great.

Again, these comments are meant to put things into perspective; they do not in any way undermine the "winners." After all, based on what I've learned from these comparisons, I would definitely prefer a new Neumann TLM 103 or Microtech Gefell MT 711S to any of the other mics tested. But whether I can always afford to own what I prefer is another matter entirely. (I assume the same is true for many of our readers, as well.)

HEARTY DISCLAIMER

Though we hope these comparison tests prove helpful, we certainly don't mean to suggest that they represent the last word on the mics compared. Microphones—perhaps more than any other audio components—are intensely application dependent. The same tests conducted with different singers or instruments, for example, would likely yield different results. Different ears, too, might reach different conclusions. After all, quality of sound is ultimately a subjective measure.

Finally, of course, no mic is the answer to every recording need. For these reasons, we encourage you not to simply take our word for it, but rather, to the extent possible, to conduct your own listening tests before deciding on a new mic. You'll be glad you did.

Brian Knave *is an associate editor at* **EM.**
Thanks to Myles Boisen, Mary Cosola, Lygia Ferra, Mike Lawson, and Johnny Staton.

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Sampling STRINGS

BY JIM MILLER

Expert tips for recording the string family.

The violin has been called the marvel of the woodcarver's art. It's a relatively small instrument—a mere fourteen inches long—constructed of spruce and maple with an ebony fingerboard. Yet for more than four centuries, the violin has captivated listeners worldwide with its soaring tone and ability to evoke emotion. Everyone knows what a violin looks like, but exactly how its astonishing tone is produced remains acoustically inexplicable.

Even with today's technology, we cannot produce an instrument whose tonal qualities truly rival those of the great master builders like Stradivari and Giuseppe Guarneri del Gesù. In much the same way, a superb solo violin sample might be considered the touchstone of the sound designer's art. Indeed, a sonically compelling set of samples of any of the solo strings—from violin and viola to cello and double bass—often seems beyond the grasp of even the most dedicated sound designers.

In this article, we'll take an up-close look at string instruments to see exactly why they are so difficult to sample. We'll then discuss ways to work around these problems to ensure that your string samples are the best they can possibly be. For the most part, a solo violin will serve as the primary example, though the techniques we'll be examining will work just as well for any instrument in the string family. Mind you, this article won't deal with string ensembles—that was covered in "All Together Now" in the June 1998 **EM**. Be prepared: hard work lies ahead, but so does a great finished string sample!

Sampling STRINGS

BOWING TECHNIQUES

Unless you are intimately familiar with string performance techniques, I suggest you find a few choice recordings of some exceptional violin performances. A particularly fine example is the 1980 Philips recording of Bach's *Sonatas and Partitas for Solo Violin* as performed by Gidon Kremer, though there are hundreds of wonderful recordings out on CD now.

Regardless of what recording you listen to, you will be astounded by the range, dynamics, and expressiveness of the violin. You'll hear slurred notes, hammered notes, flying staccatos, ricochet bowings, glissandi, double stops, and more. Essentially, the immense variety of timbre and effects that a violin produces occurs through a combination of bow speed and the interruption of that speed by the pressure of the right index finger on the stick. The distance of the bow from the bridge is also a significant factor. It sounds simple, but adequately performing such techniques demands an amazing amount of finesse and dexterity on the part of the performer, not to mention the ability to accurately finger the notes with the left hand—all at the same time!

While you don't need to be an expert on classical bowing technique, it is important to be aware of the many ways a violin can be bowed and how each one affects the instrument's sound. Most of the sampled solo strings in CD-ROM collections are limited to legato bowing, though some may include one or two other performing styles. If more than one performing style is provided, they must be well matched. Otherwise, when you Velocity switch between samples, it's quite apparent that an entirely different set of sounds is being heard, thus screaming at the listener: "This is a sampled string part!"

In the sidebar "Standard Bowing Terms," you'll find definitions of a few principal bowings that you should be aware of. Although these definitions are not strict interpretations of playing style, they should be adequate for the needs of the sound designer. (Classically trained violinists in the crowd, please don't write us nasty letters!) There are many variations on these techniques, and a skilled performer should be able to effortlessly move from one to another.

Ultimately—and I cannot stress this enough—your finished samples will depend upon the skills of your player and, more importantly, upon his or her cooperation and desire to do the job right. Don't even bother with a performer whose heart isn't in the project.

QUALITY CONTROL

Besides working with a skilled player, if you want a really great sample set, you also need to be working with a better-than-average instrument. A well-crafted instrument will produce a more consistent tone, which is important because we will be grabbing only a limited number of representative samples. We must timbre-match our violin sound across the sampler's keyboard, so we want to start with an instrument that has a consistent sound.

The instrument's acoustics are another important factor to consider. Every violin (and every other acoustic instrument, for that matter) radiates its fundamental tone and each set of harmonics from different areas of the body. A lovingly crafted violin is going to have a very nice balance between fundamental notes and overtones, as well as a wood body resonance somewhere between 500 and 600 Hz. While the fundamental is radiated more or less spherically, at frequencies above 2,500 Hz, sound radiation is quite sensitive to direction. If the harmonics are well tuned (as they will be in a well-made violin), you stand a very good chance of placing your mics in one of the instrument's sweet spots.

On the other hand, a lesser-quality instrument might produce a set of harmonics that are not perfectly in tune with the fundamental. If you place your mics in a position that is in-line with one or more of these strong overtones, your samples will end up having a thin, raspy quality. Those of us whose ears have not been trained to pick out these subtle tonal qualities will not recognize them until it's too late, and we may inadvertently place our microphones directly in their paths. What's more, imagine an out-of-tune harmonic that is now transposed up one or two semitones—the sampling world's equivalent of fingernails on a blackboard.

Almost every mediocre violin sample I have heard suffers from the same problem: placing the mics too close to the instrument (see **Fig. 1a**). This typically results in a sample with too much of a particular overtone and an unnatural amount of body resonance. At first, this may seem to give your recording a nice "woody" tone; however, it's going to sound strange when you start to transpose your samples up a semitone or two.

Even more disturbing is the fact that close-miking overemphasizes the scrape of the bow on the strings. I've heard samples where the bow scrape is actually as loud as the note being played. While the scrape is an integral part of the sound of any bowed string instrument—and part of what separates a sampled violin from a synthesized one—it's unnatural for this to be such

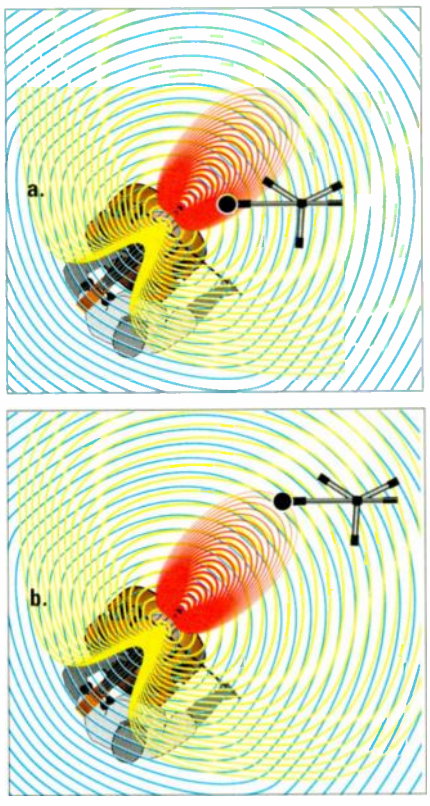

FIG. 1: If the microphone is placed too close to the instrument (a), you might capture too much of a particlur overtone or an unnatural amount of body resonance. In theory, the ideal mic position would be more like that in the bottom illustration (b). However, the actual sweet spot is dependent on a number of factors, including the quality of the instrument and the size of your recording environment.

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Sampling STRINGS

a dominant part of the sound. (Refer back to the sound of the violin on that CD I suggested you purchase.) Add to that the same problem we had with the violin body's resonant peak: a loud bow scrape transposed up and down a semitone or more will not sound natural. However, when our finished violin samples are played over accompaniment, the transposition of a small (and even moderate) amount of bow noise will be quite acceptable.

Unless you're working in a soundproofed studio, you'll also have to factor in the relative noise level of your recording environment. If you're working in a concert hall, it would seem logical that you'd want to have your mics near the best seats in the house: front row center, or about twenty feet from the stage. However, in most instances, that placement is just not practical because all but the very best concert halls have some amount of ambient noise (air conditioning vents, traffic, outside noise, etc.), and in all probability, the mics will need to be moved in. Ambient noise can also a major problem when you're recording at home.

So what can you do? If you place the mics too close, the violin won't sound natural when it's transposed, and if the mics are too far away, you run the risk of capturing some unwanted room noise. My advice is to simply trust your ears. Walk around as your soloist is playing and listen to the various characteristics of the sound. When you have found a spot that pleases your ears, put the mics there, which should be somewhere in the area illustrated in **Figure 1b**. Then listen through a pair of headphones in mono to make absolutely sure no phase cancellation is occurring.

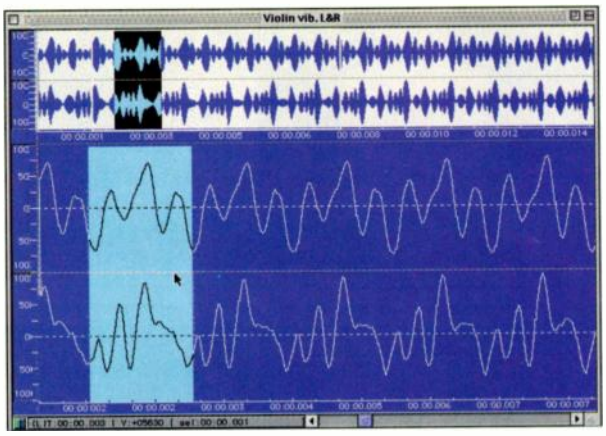

FIG. 2: A stereo violin sample with vibrato. Notice how the left and right channels have a different harmonic content and amplitude. This is what gives a stereo sample more life and a greater feeling of ambience than a simple, mono sample.

Of course, it also goes without saying that you need a pair of exceptional mics to capture the sound of such a fine instrument. I always depend on my AKG 414s, but plenty of great mics are available these days that won't set you back a year's salary (and naturally, quite a few that will). Most importantly, remember to do your recording in stereo, even if you don't think you'll be using stereo samples.

BEGINNING THE SESSION

Depending upon the attitude of the player, the session itself can be either a relaxing part of the project or a surefire migraine starter. If you have your performer's complete cooperation, congratulations! Start by having them play a brief piece that they're comfortable with, so you can get an idea of their playing style (three or four minutes is plenty). This is also a good opportunity for you to check your mic placement and the overall quality of the recording.

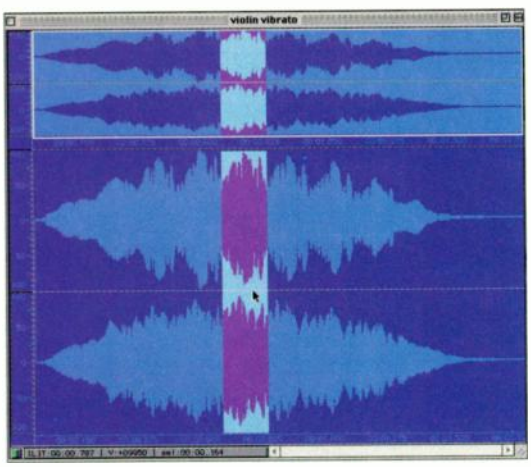

FIG. 3: This screen shot shows a violin sample with natural player vibrato. The highlighted cycle of vibrato illustrates where you would typically begin looping this sound. It's quite easy to see the repeating cycle here, making this sample a breeze to loop.

Next, have your performer demonstrate different bowing techniques based on the descriptions discussed earlier. It's very important for the player to understand that each of the techniques must ultimately blend together to become a finished part of a virtual performance instrument, so radical changes in tone are not appropriate.

In order to ensure you are getting the best material, you will probably have to allow your soloist to "slip their leash" a little. I believe that many sample libraries are far too hung up on consistency and have sacrificed some amount of musicality. In any event, you'll want to record at least two or three takes of every note for each bowing technique. I'd recommend starting with smooth legato bowing, as this will lay the foundation for all further variations. While it isn't necessary to have your performer play every note, on every string, all the way up the fingerboard, it makes sense to have them play at least three or four notes higher on each string so you will can choose the one that sounds best. As an example, when playing the lowest string on the violin (the G string), have the performer play up to the E or F on that string before switching to the next string up (D). On the top string (E), you'll want them to play up as high as possible while still maintaining a good tone.

Next comes another critical decision: vibrato or no vibrato? I've long believed that no modulation source on a keyboard—up to and including a ribbon controller—can produce the richness of real player vibrato, particularly on a bowed string. But you'll have to make that determination for yourself. If you have plenty of time, record both. (Keep in mind that double-bass strings are really too fat to allow vibrato techniques on the lowest notes.)

If you decide to use vibrato, think about how deep you want it to be. Will the final sampled sound be used for solo or ensemble work? For violin parts played over dense accompaniment,

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you're going to want a nice, deep vibrato, whereas ensemble playing can benefit from something a bit more subdued. Again, it's your decision; but when in doubt, record both.

By the time you are done with your first chromatic run up the scales, you will have a better idea of how long your session will ultimately take. If your first pass took 30 minutes, that's good. If it took an hour or more and you're not sure you really got the material you need, rewind your DAT and do a quick (but critical) listen. Don't be afraid to bail on the project if things just aren't sounding right or you're not getting the player's full attention. Better to admit defeat now than to end up with material you'll never use, which is an expensive and frustrating proposition.

If you are getting a good recording but the session is running long, try to reschedule a second session for a later date. From personal experience, I can tell you that anything you record after an hour and a half will very likely be unusable. Imagine yourself in the performer's position: playing mindless scales for hours while someone tells you to make it sound great. Your player is only human, so do your part to help them keep their sanity.

When and if you are ready to move on, continue recording scales of the various bowing techniques. Remember to have the performer do a run playing pizzicato and tremolando. There are actually two types of pizzicato: one in which the right hand plucks the note, and another in which the left hand plucks the note. In the left-hand approach, the finger above the note being played does the plucking (e.g., if the left index finger is holding a D, the middle or ring finger is used for the pluck). Have the player try both, and decide which you like. For the double bass, you'll want the right-handed finger pluck because you can also use this for upright jazz bass parts.

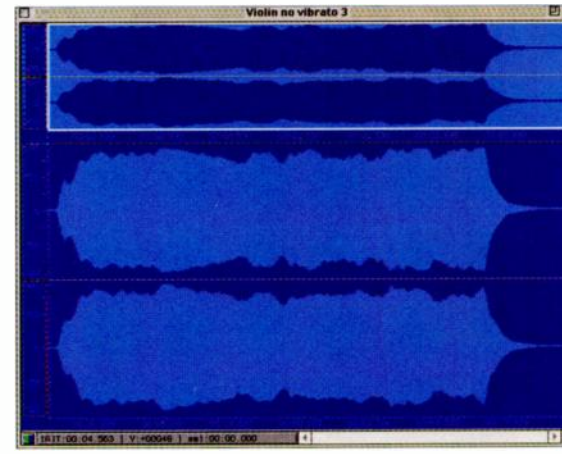

FIG. 4: This violin sample has no vibrato. You can easily see that the amplitude is not consistent across the entire 4-second sample. Looping this particular sample would be difficult.

Tremolando refers to a rapid back and forth bowing of the string, usually used to create tension in a solo part. Though this is more common in ensemble than solo playing, it's worth capturing because it can usually be done fairly quickly.

Finally, no discussion of the violin would be complete without mentioning harmonics. Almost everyone can identify guitar harmonics, but not many are aware that a violin (or other bowed strings) can also produce such unusual sounds. As with guitars, both natural and artificial harmonics are available, but a thorough discussion of these is beyond the scope of this article. If you are interested, have your performer demonstrate some harmonics for you, and then determine whether they are useful for your applications.

BACK IN THE STUDIO

At this point, we'll assume that you have had at least one or two excellent recording sessions and that you have recordings you feel comfortable with. Now comes the most agonizing part of all: weeding through the recording and importing the individual samples into your sampler. Nothing will prepare you for how much work goes into this part of the project, but keep in mind that, as your "virtual violin" begins to come to life, you'll understand why it's worth all the effort.

Let's consider again the issue of stereo and mono samples. Even if you think that you will never need a stereo violin, go ahead and create a few stereo samples, and then create mono versions of the same material. You will almost instantly hear how much more life there is in the stereo version (see **Fig. 2**). Honestly, it's worth the extra RAM and decreased polyphony. After all, RAM is pretty cheap these days, and you'll be playing only one or two sampled notes at a time. Give it a try; you'll be a believer.

A little judicious use of a good equalizer can help at this point. A few notes inevitably end up sounding somewhat brighter or darker than those around them, particularly as the player changes strings. I have also discovered that gradually equalizing out some of the lower

STANDARD BOWING TERMS

legato The most common technique, meaning "played smoothly," with no exaggerated attack. This is the foundation of your sampled violin sound.

détaché Similar to staccato and referring to a short note that has a more pronounced attack.

martelé Also known as a "hammered" stroke, this is produced by the pressure and somewhat fast release of the first finger on the stick of the bow at the beginning of each stroke. It creates a brighter, more pronounced attack.

spiccato A bouncing staccato in which the bow is lifted off the string between notes.

portato A light articulation of each note produced by pressure and release of the first finger without halting the bow.

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frequencies (below 180 Hz) as I move up through the highest notes of the violin's range helps to keep bow scrape to a minimum. For the very top notes, I might cut as much as 9 dB.

As an experiment, you might even try an audio enhancement processor (BBE Sonic Maximizer or Aphex Aural Exciter, for example) to give the samples some additional sparkle. Just make sure you apply these effects discreetly. EQ and enhancement can also be done in the editing stage on your computer (if you're using one) with plug-ins like DUY *Shape*, Waves *Q10*, and many others. I never use compression on my samples, but that's a personal choice; use whatever you believe will give you the best finished product.

Here's another important tip: don't even consider looping your samples at this point. Just choose the best-sounding notes and keep on going. You might want to import more than one sample of a particular note (e.g., a D♯ played on the lowest string and then again on the next string). Digitize more samples than you believe you'll ultimately need. You don't have to decide exactly which ones to keep right now; you should make that decision after you have all your samples safely tucked away on your hard drive. Also, be sure to save your material after importing every note or two, and if possible, make a backup copy. Some samplers (like the Kurzweil K2500) have a "verify" function that makes sure what is written to disk will be readable later. If your sampler has such a feature, use it!

After you have finished your first complete set of multisamples, you can do the final selection process. Build a keymap from the lowest to the highest notes, auditioning samples as you move up the keyboard. You might find that you are comfortable with some samples transposing a semitone up or down, while in other instances, you might need two notes adjacent to each other to adequately fit a specific range. The more samples you use, the more expressive your final sample will be.

LOOP-DE-LOOP

When you finally have a great set of samples, then you can tackle looping. If you recorded with vibrato, your task will be easier because it's pretty easy to see the individual vibrato cycles in a graphic waveform display (see **Fig. 3**). Grab a cycle and loop it, using your ears to pick out the loop points, and use a small amount of equal-power crossfading to smooth out any tiny bumps or clicks.

If you recorded without vibrato, your challenge will be somewhat greater because the timbre at the midpoint of your sample will rarely match the end point (see **Fig. 4**). You might want to try a short linear crossfade of just a few cycles several seconds into the sample, or you might find that a 1- to 2-second equal-power crossfade is needed. There is no rule here that covers all the bases. Just keep in mind that when you use your violin sample in an actual performance (and add manual vibrato), your loops will be almost invisible to the listener. (For more in-depth information on looping techniques, see "In the Loop" in the September 1996 issue of **EM**.)

END LOOP

I wish, for all our sakes, there were some simple techniques that would make producing a stunning set of samples faster and easier. Unfortunately, there aren't any. In fact, by the end of this project—depending on your specific goals and your personal level of perfectionism—you will doubtless have invested dozens of hours, maybe a hundred or more. Don't try to do it in a day or even a week. Creating anything of beauty usually takes a long time, and you just can't rush this kind of project.

But once you have built your virtual violin (or cello, or whatever), all that's left to do is play and enjoy. All of your work is rewarded by having a great set of samples that will be available to you for many years to come.

Jim Miller *is a frequent contributor to* **EM** *and a freelance sound designer whose sounds have appeared in ROM-based instruments and sample libraries from Alesis, Roland, Kurzweil, Sweetwater Sound, and many others.*

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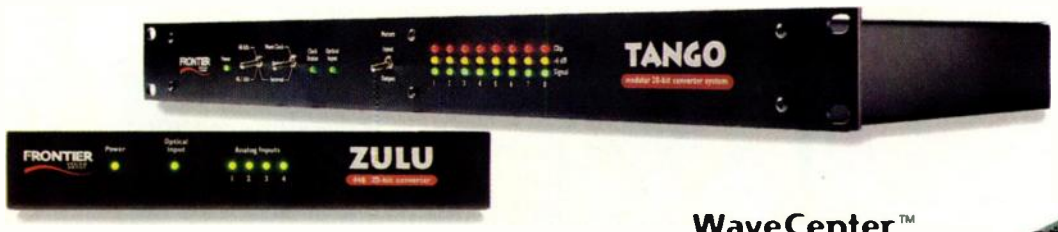

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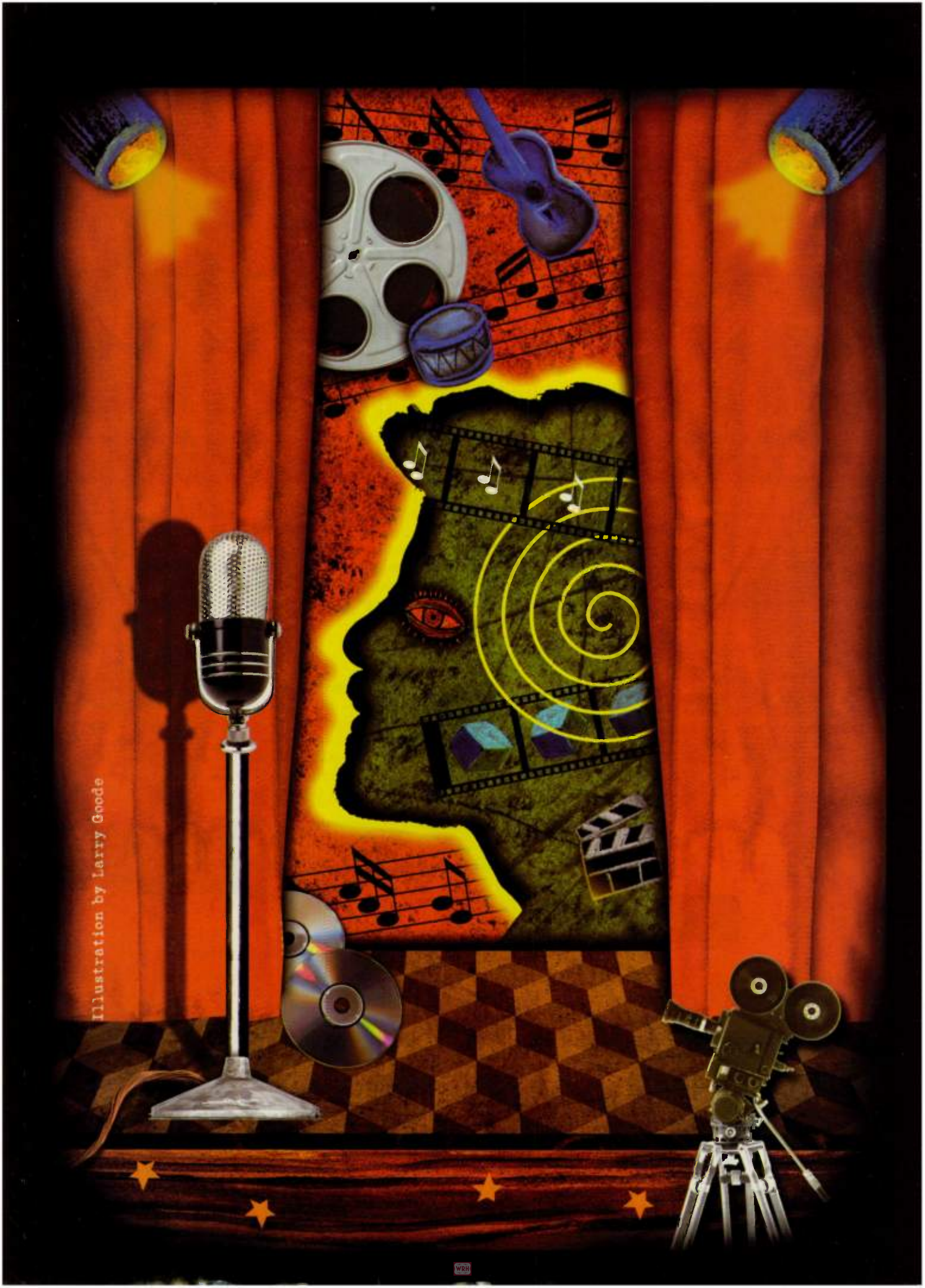
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Know the Score

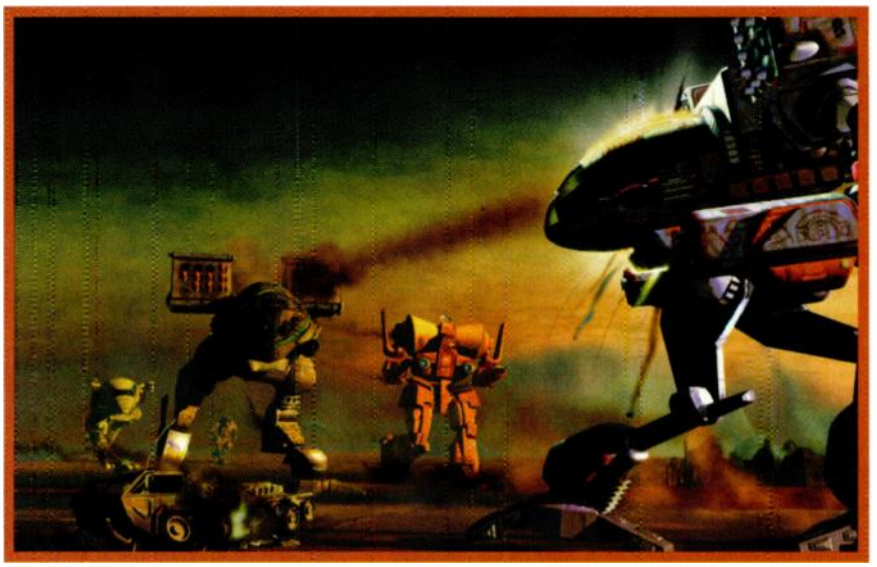
Punctuating pictures with music takes planning and preparation.

Whether you're doing film, TV, video, or CD-ROM production, the skill set required for scoring to picture is much different than what you need for writing songs. Unlike songwriting, the music for film and video is bound to an already established story line, and the composer's job is simply to augment that story and heighten its emotional impact. To do that, you must compose music that tastefully supports the visual and dramatic elements. Certain scenes require great thematic writing, while others are best served with simpler passages or even complete silence. Scoring to picture is a challenging task that will test your musical skills, as well as your restraint and good taste.

Important Contacts

When scoring to picture, you are part of a creative team; the other members of that team can give you support and guidance. Your relationship with these people is critical, and if possible, you should try to collaborate with them from the beginning of the project. Producers are ultimately responsible for the entire project and manage its budget. They know what constitutes a successful picture, so their input is invaluable. Directors control the artistic realization of the production. They shepherd the project from script to final medium, and they have day-to-day control over the production of the picture. Routine collaboration with the director is of the utmost importance; that person can help you interpret the picture's visual imagery. The other important people you'll be sharing your journey with are the sound designers and audio engineers. It's vitally important to keep communication open with them so that all of the audio elements—dialog, music, and sound effects—gel to form a seamless product.

Know the Score



COURTESY FASA INTERACTIVE

FASA Interactive's *Mech Commander* features music that intensifies the action.

Writing in Style

Your initial conversations with the producer and director should point you in the right direction in terms of an appropriate musical style. It is essential that you know what kind of music they have envisioned for the picture, so ask them to make specific references to other pictures that are similar in concept. You're not trying to copy the work of other composers, but you need to get a feel for the style of score that the filmmakers are after.

If you've been given complete creative control over the score, you must ask yourself some deeper questions. For example, is the plot dependent on a specific time in history? Music from a certain era can give your audience an instant connection. What era do you think of when you hear a minuet, a big band, a waltz, or a rock 'n' roll twist? If the score needs to convey the feeling of a specific period, you'll be expected to write in that style.

If the story is focused more on the characters and their situations, the score might be more effective if it is written in a traditional orchestral style. John Williams could have written the *Star Wars* score for many different pictures—it is timeless. You think of *Star Wars* when you hear the music because it helped to tell that particular story. An orchestral or traditional approach can make the score powerful and emotional without tying it to a specific time or place. Rather, it reflects the emotions you feel as the story unfolds.

Instrumental Decisions

Musical style also plays an important role in your choice of instruments, although you needn't be overly restrictive. Remember, an orchestral score can use a synthesizer, and a heavy metal band can use an English horn! Sometimes, using atypical instruments can add interest and novelty to a score or bring out emotional impact that the main instrumentation lacks. Nonetheless, you must be consistent with the mood that you are trying to create.

Sound effects can also be integrated into your score, provided that they are consistent with the story. A well-placed sound effect can add spice and emotional impact to a passage. (What would Tchaikovsky's *1812 Overture* be without the cannon?) But be careful not to create conflicts with the film's sound effects. It's important to collaborate with the audio editors if your score will include nonmusical sounds.

Read the Script

Before you write any music, it's a good idea to sit down and carefully read through the script. You may have already done this before you decided to take on the project. This time, really get a feel for the story, and try to immerse yourself in the world that you are helping to create.

As you read, take notes on how different scenes make you feel and where the mood of the story changes. These are important transitional points that will help you set up a framework for your score. Sometimes, you'll need a subtle crossfade to shift from one mood to another. At other times, a separate transition piece may be required. Occasionally, the mood might need to shift 180 degrees in a single frame. Remember, too, that music does not usually accompany a picture all the way through. Movies average about 20 minutes of score for every 60 minutes of film. Shorter pictures usually have a greater percentage of music, but even TV spots can benefit from "holes" in the score.

Your notes don't have to be encyclopedic. In fact, simple, 1-word comments or even symbols are enough. All you are trying to do is to understand the flow of the project. Avoid getting bogged down with details that will distract your emotional focus or even steer your music in the wrong direction.

Rough and Ready

Now that you have conceptualized the music, it's time to find out how the director and actors have interpreted the story. If the script was well written to begin with, the actual filmed version shouldn't deviate drastically from it. But even the best scripts are subject to interpretation, and change is inevitable during the production process.

Try to view the film or video in rough-cut form to get a sense of the look and feel of the project. This is when you will start to think about actually writing the music. Before you even touch an instrument, you need to create some pieces of the score in your head. Doing this allows you to instantly change things and to experiment with new ideas without worrying about other issues. Remember, it's much better to use your time carefully planning your score than to end up redoing it several times later.

When you watch the film, make note of potential cue points, using words or symbols, the way you did when you read through the script. If you have a video with time code, you can use specific SMPTE frame numbers as references. You should keep in mind, however,

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Identical in design to SAWPlus32, but less resource intensive. SAW32 offers simultaneous playback of up to 16 mono or stereo tracks and supports up to six stereo sound cards. If you want all the features but don't need all the tracks, SAW32 is for you.

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Know the Score

that, if you're viewing a rough-cut version, many of the cue points may change by the time the project reaches the final edit stage.

Getting Technical

Up until this point, you haven't really had to deal with equipment or the hassles that can accompany it. But now you're ready to start working out specific parts, and you're going to need to do that in the studio. Whether you're working in a project studio by yourself or in a commercial facility with a staff of engineers, you will ultimately be responsible for the final product, so you should have a decent grasp of the technology that goes into it.

The first thing that you'll need to do is sync your multitrack to the video deck. Make sure that you are locked to picture at the correct frame rate. (Your technical contact can tell you the SMPTE rate and whether it is in drop or nondrop format.) Once you have a lock, you will use it throughout the project. (For more on SMPTE time code, see "That Synching Feeling" in the October 1996 issue of **EM**.)

COURTESY FASA INTERACTIVE

What element in the score lets you know that something's blowing up? Sound effects!

Be familiar with the technical audio aspects of the final release format. For example, VHS tape can play back mono, stereo, or hi-fi stereo audio. Broadcast media can employ mono, stereo, or surround sound. Some media have specific limitations to consider, such as broadcast audio, which is often heavily compressed before it's transmitted. These variables will change your mix (and maybe the music itself), so take the time to talk with your technical contact to avoid any potential problems with bandwidth, EQ, levels, etc. Also, consider the type of medium for delivering your final mix. Do the film's sound mixers want your score on DAT with time code, 24-track analog tape, Pro Tools 24 files, or some other format?

Preliminary Cues

Your studio should be off-limits to drop-in visitors (including friends and family). This is your workplace, and you need an environment where you can focus on the score without being

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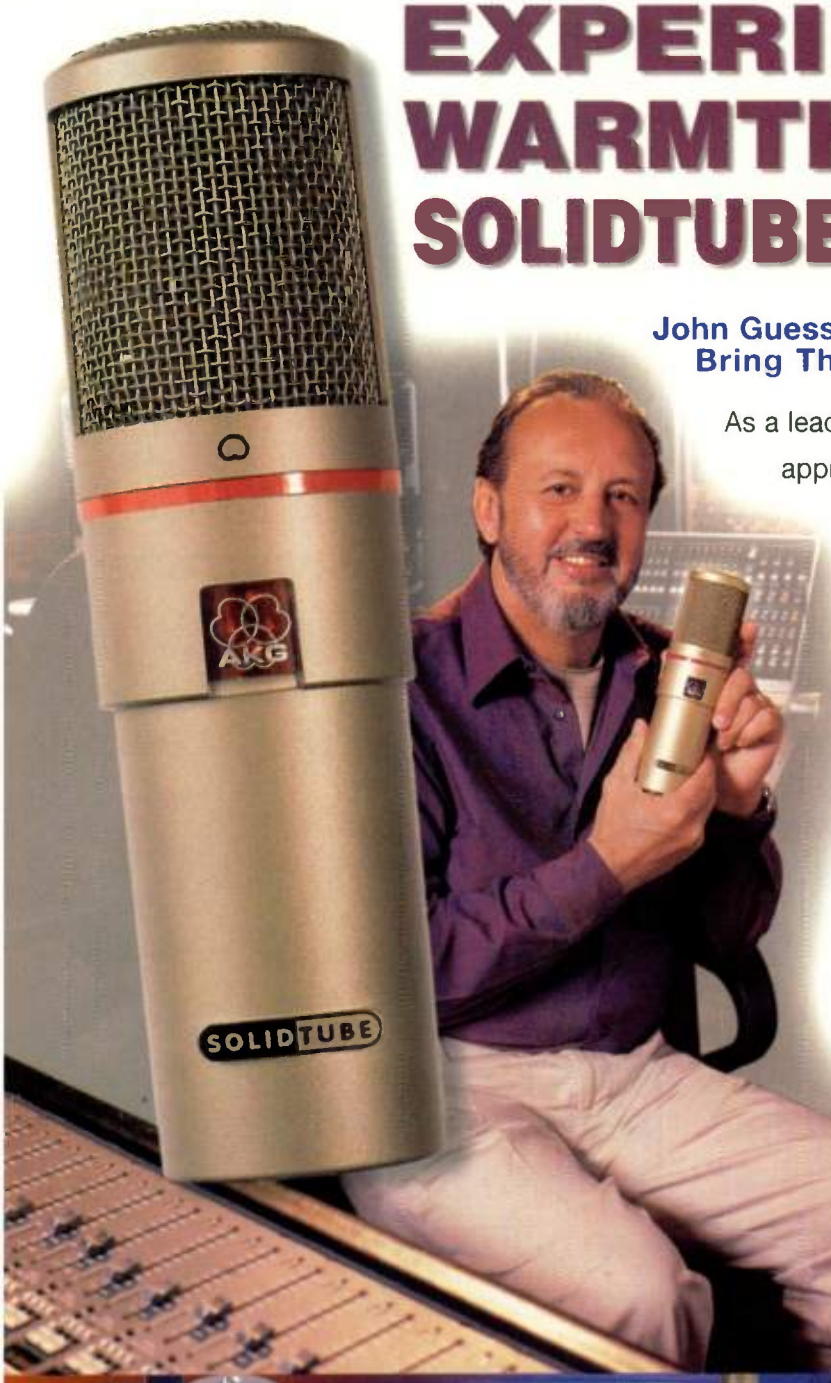

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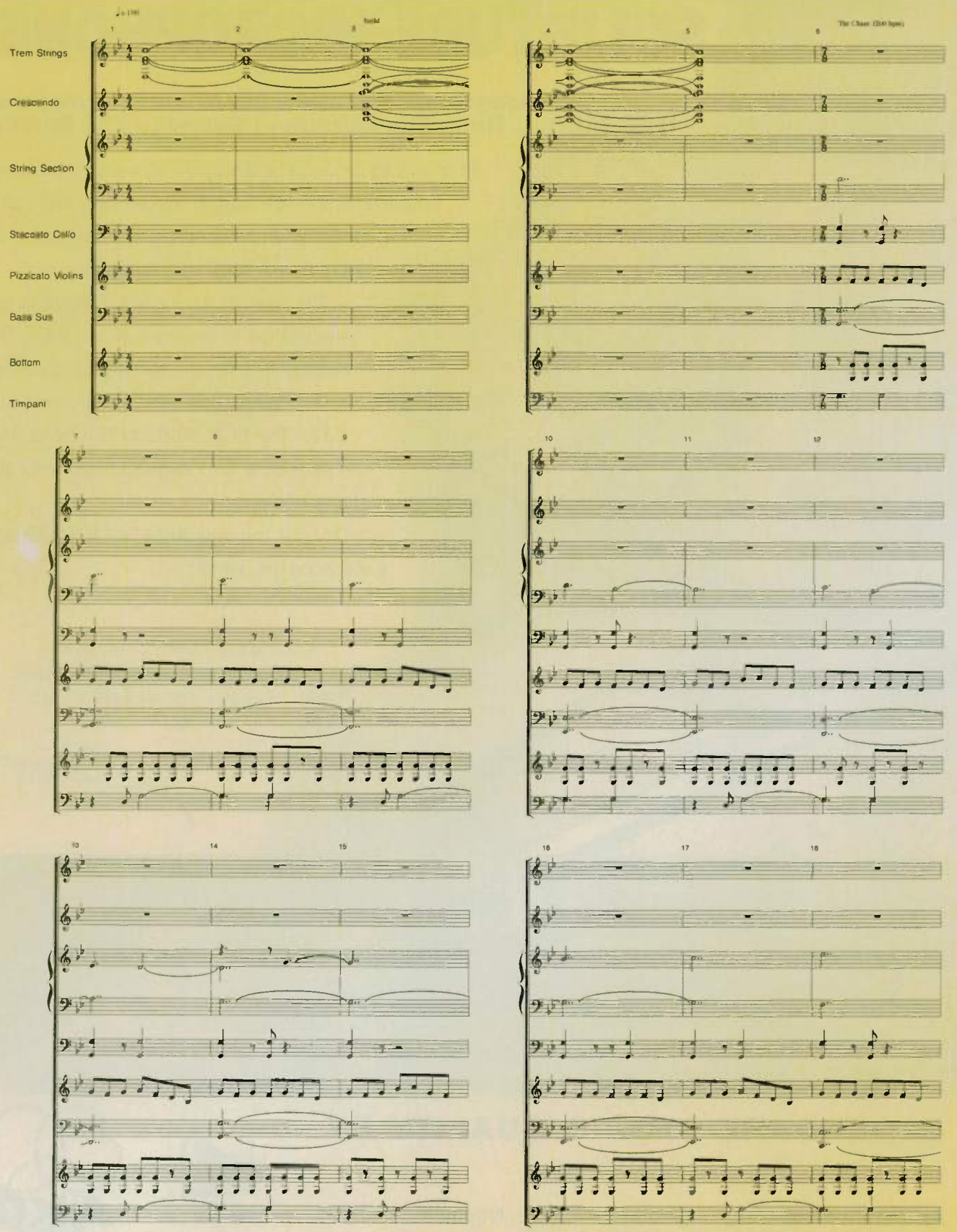
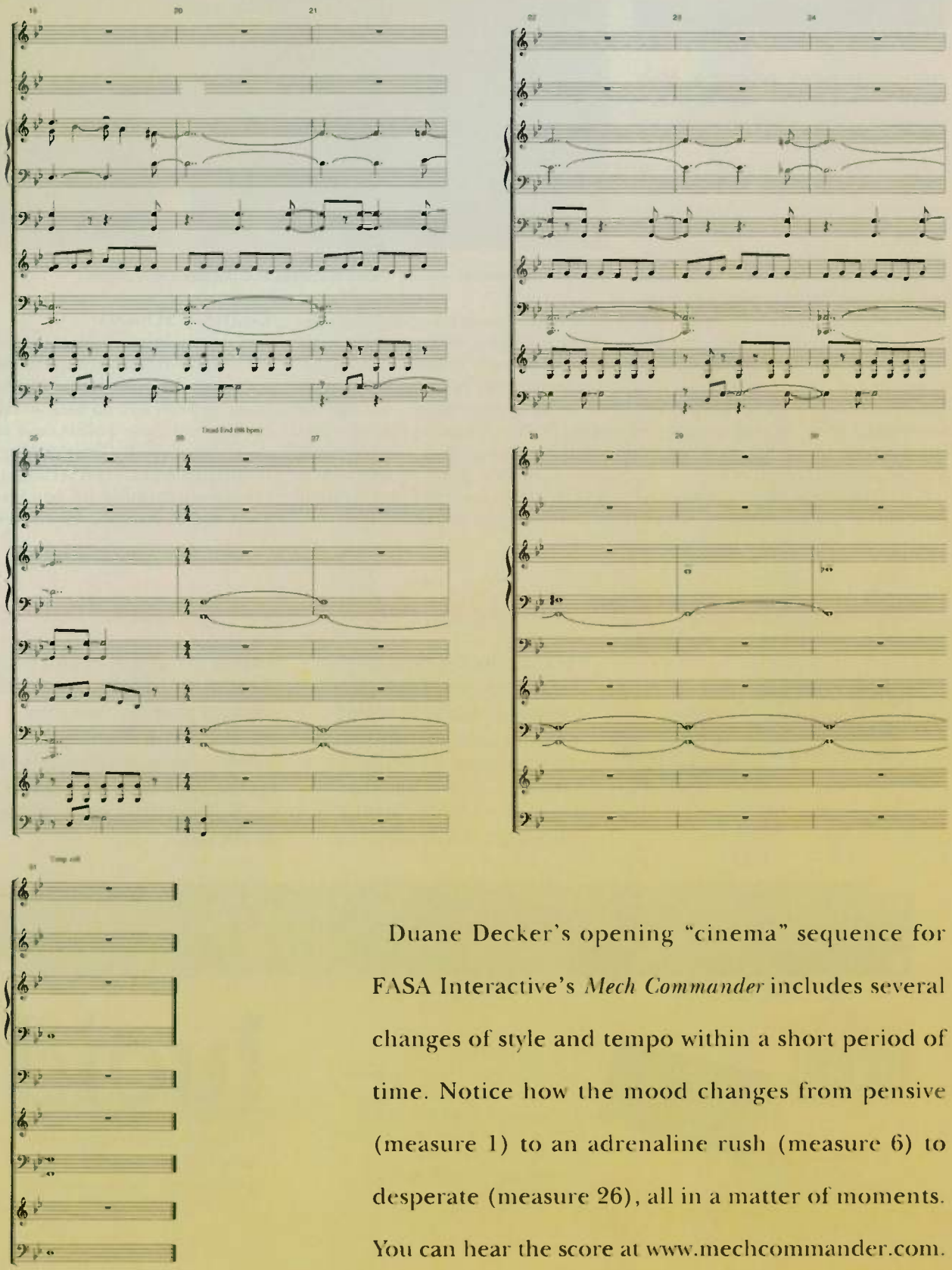
MECH COMMANDER



Opening Sequence

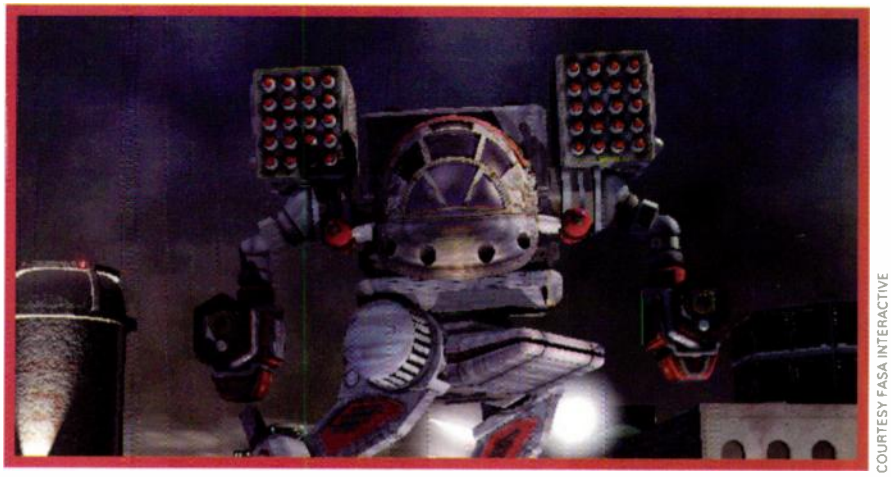


Duane Decker's opening "cinema" sequence for FASA Interactive's *Mech Commander* includes several changes of style and tempo within a short period of time. Notice how the mood changes from pensive (measure 1) to an adrenaline rush (measure 6) to desperate (measure 26), all in a matter of moments. You can hear the score at www.mechcommander.com.

distracted by people popping in. Make yourself comfortable—a few beverages and snacks aren't a bad idea—and get down to business.

Start out by improvising: pick up whichever instrument you are most comfortable playing, and play whatever comes to mind while you're watching the picture. It doesn't matter what your performance sounds like, because at this stage your goal is simply to establish a tempo and a feel. The notes that you took while reviewing the script and rough cut, as well as your preconceived thoughts on the score, will act as a basic framework during this process. Sometimes, even an impromptu jam can generate ideas that you wouldn't have otherwise thought of

Record *everything*. Make sure you have plenty of free tracks available so you can go through lots of takes. Although you will be solidifying ideas later, you might happen across a wonderful "mistake" that fits perfectly into the score. To gain a broader perspective on how well the music fits the picture, try playing a pass, without stopping, from one big transition to another. You'll be able to hear how the music flows and whether it will work the way you had envisioned.



COURTESY FASA INTERACTIVE

If you have a big robot walking toward you, make sure the music tells you so.

Getting Serious

Once you've made it all the way through the video and are satisfied with the musical structure that's been outlined, you can now go back and define tempo maps, cue points, and transitions. You can also start making firm decisions about certain sections of the score—what music do you want to keep, and what do you want to rewrite?

Make your computer audio come clean.

The computer that energizes your project studio is a terrible place for analog audio signals. It doesn't matter which high powered sound card you choose, it's still locked inside a noisy, RF-plagued box. By using the ADA1000 external rack mount A/D & D/A converter, you instantly gain at least an extra 10dB of fidelity. 20 bit conversion in both directions produces clean, crisp audio for all your recording, mastering, and archival projects. **The Lucid ADA1000. Improve your sound without taking your budget to the cleaners.**

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Know the Score

Once you have a clear road map in place, start composing in earnest.

The ideas generated in the previous stage will enable you to define, arrange, and refine your score. The instrumentation that you have chosen will provide the necessary consistency and continuity for telling a unified story. Your own technique and style will guide you through to the finished product.

It's a good idea to develop your demos thoroughly before playing them for your contacts. You don't have to produce a finished master, but keep in mind that directors and producers probably don't have your level of musical expertise. Because of that, they often won't hear the same things that you hear in the early stages of development. Offering them a good-quality version of the cues gives them a clear image of your musical intentions and makes you look more professional. They will now be able to give you the feedback that you need to complete the project to their satisfaction.

Building a Roller Coaster

As a part of the creative team, you are expected to help create an emotional roller coaster for your audience. In the "Mech Commander Opening Sequence" (see p. 84), you see an example of how the mood and pace of a story can change dramatically. In these three simplified cues from the opening of the interactive CD-ROM game *Mech Commander,* the mood changes from pensive (measure 1) to an adrenaline rush (measure 6) to desperate (measure 26), all in a matter of moments. This structure heightens the impact of the story line, but does not overshadow the story itself.

Don't forget to leave room for sound effects. Sometimes sound effects can be a much more effective accent to the story than music. Let's say the villain gets his just rewards by being blown up in a huge, fiery explosion. The sound of the fireball and its aftermath fills the sonic landscape. As the sound effects subside and our hero realizes that he has defeated the villain despite tremendous odds, the music slowly swells into a triumphant, thematic refrain, which makes the audience feel good.

In terms of storytelling, you must let the audience feel the full impact and emotional release of the well-deserved explosion. By waiting a few seconds to start the music, you leave the audience wondering if it is really over. Your musical swell then reinforces the fact that the conflict is resolved, and the hero has indeed succeeded. You have created the desired push-and-pull emotional effect.

Final Edit

Expect changes in timing and edits until the very end. The editing and postproduction phase allows the director to fine-tune his or her work, and inevitably, the refining will continue up until the last minute. Subsequently, you will be expected to make the necessary musical changes. Sometimes the changes only require a small edit. At other times, however, you will be expected to rewrite and redo entire parts. Nevertheless, always adopt a cool, professional attitude. The changes are often a good thing and are intended to perfect the final product.

Good audio engineers make every effort to mix dialog, sound effects, and music so they can always be heard. There may be times when your music gets pushed to the back of the mix. After all, the music is there to support the story on the screen—not the other way around. If you have done your job well, even the music that gets buried in the background will add an essential element to the overall project.

Unlike making records or performing live, scoring to picture does not always draw public attention. In fact, it is often barely noticed. You may receive little in the way of direct acclaim for a job well done. You will, however, be a part of the creative team that enables audiences to experience and be moved by a story as it unfolds onscreen. If you enjoy the power and passion of music, you'll surely find that touching people on a gut level offers its own brand of personal satisfaction with many unique rewards.

Duane Decker *is composer/sound designer at FASA Interactive in Chicago. His work is heard on radio, TV, video, CD-ROM, and in virtual- and location-based theme parks. You can contact him via e-mail at ddecker @fasainteractive.com.*

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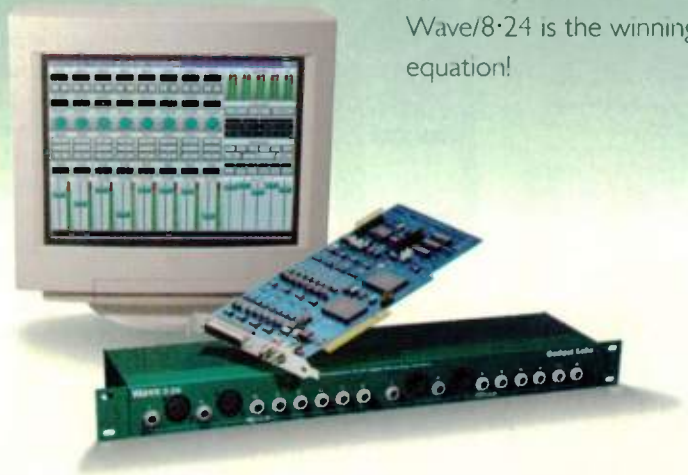

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DESKTOP MUSICIAN

What's Cooking at IRCAM?

Take a look at some hot new dishes from the IRCAM kitchen.

By Thomas Wells

France's prestigious IRCAM (Institut de Recherché et Coordination Acoustique/Musique) was founded in Paris in 1970 on a mandate from then-president Georges Pompidou. He commissioned the noted composer/conductor Pierre Boulez to establish a center for music research in conjunction with a future National Center for Contemporary Art. The history of IRCAM is so rich and its scope is so vast that I can only mention a few of the myriad points of interest before turning to the main focus of this article: IRCAM software.

Visitors to the IRCAM lobby are provided with computers that describe the institute's facilities and activities.

DAVID M. RUBIN

The development of music workstations has been a recurring theme in the research at IRCAM. The first technical project undertaken there was the 4A digital sound processor in 1974. Those were the days when "affordable" processors were Digital Equipment Corporation PDP 11/xx machines that ranged from $20,000 to more than $100,000, with audio converters either built in-house or available from a handful of suppliers for over $20,000.

The features that designer Giuseppe Di Giugno built into these 4-series machines boggle the mind, and their real-time signal processing capabilities are still enviable. Out of the need to write control software for the 4X machine, Miller Puckette devised what was to become *MAX*, one of the most widely used music applications in the world. Its development continues with the recent release of *MSP*, by David Zicarelli. *MSP* is a set of extensions to Opcode's *MAX* 3.5 programming environment that does real-time synthesis and signal processing on a Power Macintosh. (Both a free run-time version and a full commercial version of the program can be downloaded from the Web site of Cycling '74, *MSP*'s distributor.)

IRCAM has been extremely productive and successful mainly because of its dedication to a strong artistic vision and its ability to bring together talented people from all parts of the world. The institute's influence, however, extends

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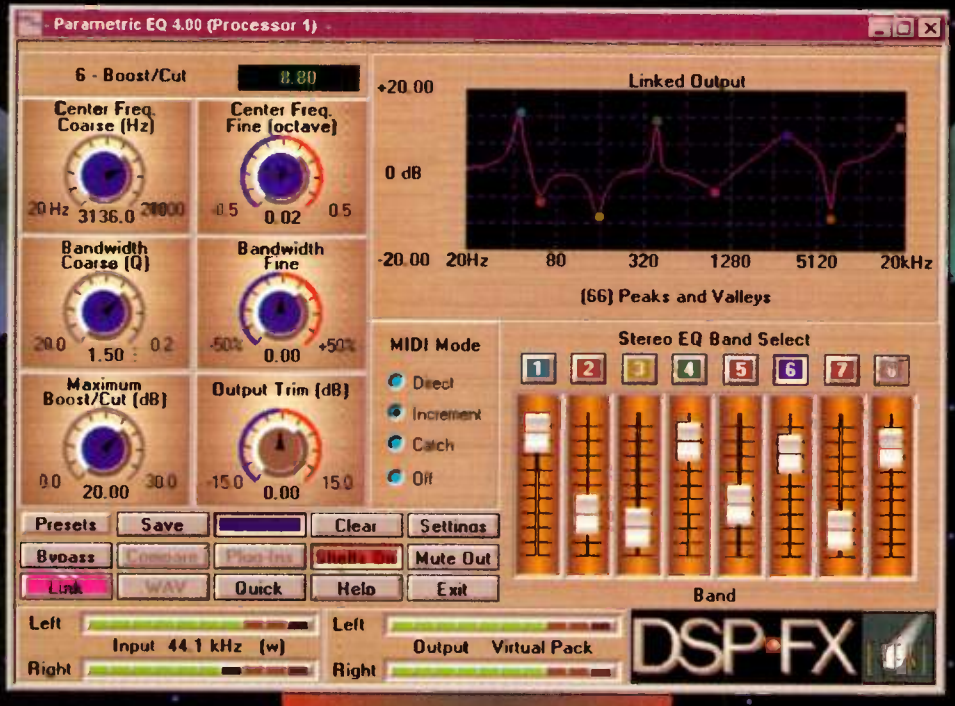

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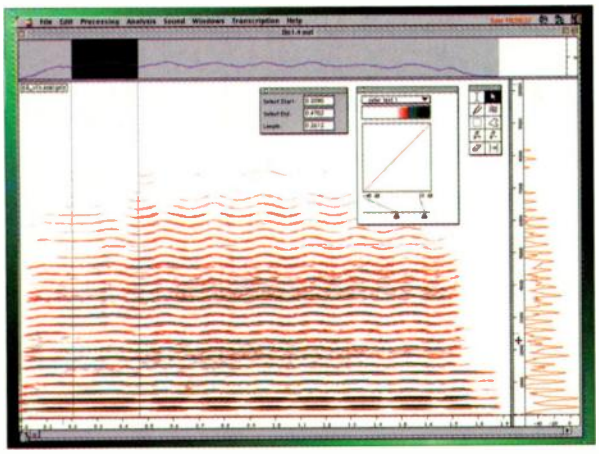

FIG. 1: In this *Audiosculpt* window, the sound of a violin is shown with the Tool and Color palettes and the Inspector window.

far beyond the academic audience of computer music specialists, theorists, and musicologists. Through active dissemination of ideas, compositions, and software, IRCAM has had a profound effect on the whole spectrum of computer music making, as well as composition and performance practice. Its Web site (www.ircam.fr), audio CDs, conferences, and concerts have reached wide audiences of listeners and computer music practitioners.

From project studios to academic and commercial installations, you can now find IRCAM software throughout the world. For the most part, this software is Power Mac–specific, although applications have also been developed for SGI, DEC Alpha and MIPS, and NeXT platforms. The software falls into three thematic groups: Computer-Aided Composition, Analysis/Synthesis, and Real-Time. Access to the software requires a membership in the Forum IRCAM. An annual Personal Membership costs Fr 1750 (approximately $289) for one group, Fr 2850 (approximately $470) for two groups, or Fr 3800 (approximately $627) for all three groups per year. Institutional memberships are also available. There is a 20 percent discount on renewal of membership.

Forum IRCAM membership provides a great number of services, including an annual IRCAM software CD distribution that includes a large collection of computer-music freeware, shareware, and demo programs. You'll also get telephone and e-mail technical support, a biannual technology report that is a gold mine of reprints of important articles, and the opportunity to attend Forum Workshops in Paris. Web services include a password to download the newest versions of IRCAM software from the Web site, access to the experimental Studio-on-Line sound database with signal-processing functions for remote processing of members' sound files (under development), and access to the ForumNet Web site for member communication and information exchange. Finally, membership provides various discounts on IRCAM CDs and books.

Now let us take a closer look at two programs that illustrate some of the exciting new areas that are being developed through the IRCAM Analysis/Synthesis Group.

AUDIOSCULPT

Audiosculpt is an extremely useful and versatile program for sound analysis, signal processing, and spectral editing. Its interface allows the user to "sculpt" sound through graphic interaction with a sonogram analysis. For those not familiar with this type of display, a sonogram shows elapsed time from left to right, frequency from top to bottom, and intensity of spectral components as intensity of the display (i.e., the colors on the display become more intense). Sonograms have been used for sound analysis, especially in speech and hearing research, since the 1930s. You may have heard *Audiosculpt* at work recently in the movie *Farinelli* about the virtuoso castrato singer of the same name. A team from IRCAM synthesized a considerable amount of very believable castrato singing using, among other software, the IRCAM *Super Phase Vocoder* that is the heart of *Audiosculpt*.

A typical *Audiosculpt* screen appears in **Figure 1.** It shows the sound of a violin (with vibrato) playing the D above middle C. The time-function pane runs along the top, with the sonogram display beneath. The narrow rectangle at the far right is the short-spectrum pane, which shows the spectrum of the sound at a time specified by a mouse click in the sonogram pane. You can also see the floating Tool palette, the Color palette, and the Inspector window, which indicates the start, end, and length of a selected segment. The harmonic partials of the violin sound can be clearly seen as a series of parallel dark traces, with sinusoidal modulations in frequency indicating vibrato.

The floating Tool palette gives the user a set of operators for inspecting and modifying the sonogram. Aside from the usual Selection and Pointer tools, there is a Harmonic Measure tool. From any point where you click the mouse, the Harmonic Measure tool shows the first eighteen harmonic partials of that frequency as a stack of short, horizontal ticks. Move the mouse up and down, and the ticks expand and contract like an accordion. It's very useful in determining harmonic makeup of a signal.

The tuning fork–shaped Sine Play tool plays a sine tone with frequency and amplitude corresponding to any point you click on in the sonogram. This fun tool is very useful in measuring and evaluating spectra and is especially useful in teaching situations.

Other tools enable you to define regions for filtering by drawing shapes on the sonogram. In addition, the Pen Plus (Pass Pen) and Pen Minus tools allow you to draw freely on the sonogram to mark regions that will be either passed or eliminated. A Fade tool

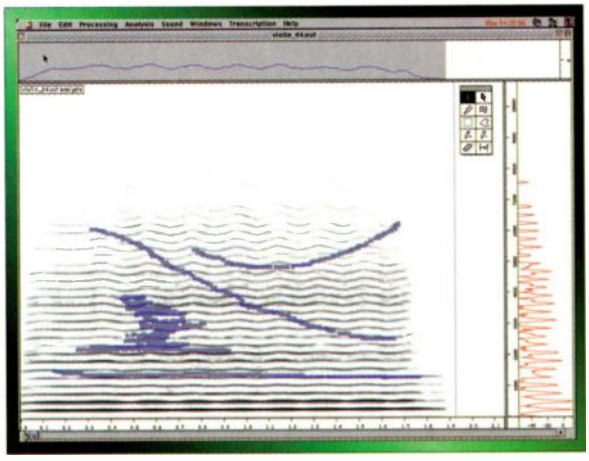

FIG. 2: This is the same window as shown in Figure 1, but filtering regions have been drawn on the sonogram with the Pass Pen.

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is also available for making different frequencies fade in or out at different times.

Finally, the Color palette controls the mapping of harmonic intensity to graphic intensity in the sonogram. It's rather like a contrast control. For example, you can use the Color palette to display only a few of the strongest partials on the sonogram.

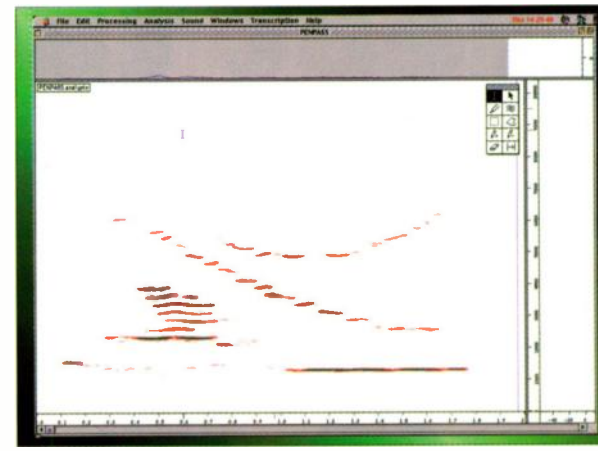


FIG. 3: This *Audiosculpt* window shows the results of the sonogram filtering in Figure 2.

In **Figure 2**, you can see the sonogram of **Figure 1** after the Pass Pen tool has been used to indicate which areas of the sonogram we wish to retain. Processing is fast: on my Power Mac 7600/132 with 112 MB of RAM, the filtering operation took ten seconds. The resulting sonogram is shown in **Figure 3**. The before-and-after sound files that accompany these figures were saved as RealAudio 5 files, which are available for you to audition at www.sss.arts.ohio-state.edu/DesktopMus. You can also download the same files at **EM**'s Web site (www.emusician.com).

What else can *Audiosculpt* do? A lot. For instance, the program offers three kinds of cross synthesis using factory settings from menu items or with fine control over the program's settings using a command-line interface. A complete discussion of the formidable cross-synthesis capabilities of *Audiosculpt* is well beyond the scope of this article. You can learn more about this the subject from Mario Mary's excellent 76-page *Cross Synthesis Handbook* available from the IRCAM Forum. I have included three examples demonstrating *Audiosculpt*'s three cross-synthesis methods, using a suspended-cymbal sound file and the violin sound file from **Figure 1**. They're offered as RealAudio 5 files at the previously mentioned URLs.

Audiosculpt also performs flawless time compression and expansion, either fixed or dynamic. In fact, my first encounter with the *Super Phase Vocoder* program (for which *Audiosculpt* is a front end) came in 1992 when I downloaded a beta version from the IRCAM ftp site. I was soon using it to compress a colleague's 11-minute chamber orchestra piece for a CD recording. When I used other phase vocoders and commercial software for compression, I was getting unacceptable artifacts and glitches, so I decided to give the *Super Phase Vocoder* a try. With some help from the IRCAM personnel, we arrived at an amazingly clean result. This turned out to be the first such use of the program on such a long and complex sound file.

For that project, I worked on a DEC-Station 5000/200 Unix machine, but now everything can be done faster and far more easily with *Audiosculpt* on a Power Mac. That was six years ago, and even though good time expansion/compression is now taken for granted, much of today's software still does not offer the same level of fine control that is needed when problems arise with difficult program material.

There are some other useful features of *Audiosculpt* that I will just mention in passing. These include a "freeze" function that synthesizes a new sound by extending a slice from a small section of a source sound, excellent sample-rate conversion, and a host of other analysis methods. Among the latter are Fundamental Estimation, Masking Effects, and a very nice Realtime Analysis feature.

MODALYS

Modalys is a physical-modeling synthesis application for the Macintosh that provides the user with a workshop full of tools for assembling virtual instruments from the ordinary to the fantastic. Instruments can range from a simple plucked string to much more imaginative constructions such as a metal plate excited with a sound file of flute key clicks. Or how about a

The compressor that forgives, but never forgets...

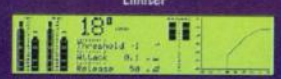
Gate

Start with the gate. Set parameters for threshold, ratio, attack, hold, release, and output gain. See the effect of your settings on the graphical display, as well as on the gain reduction and audio level meters, they all interact in real time with your manipulation of the parameters. Start with a threshold setting of about -60dB to clean off the noise in between the vocal takes. You can save your final gate settings as a "gate preset" building block and recall it into any other setup you do.

Compressor

Then move to the compressor. The effects of the gate settings are still visible on the graphic display, so let that help you determine where to set your compressor threshold. The parameters you change here will also effect the curve on the graphical display in real time. Move through all the regular parameters, like threshold, ratio, attack, release, and output gain. For vocals use a threshold of about -25dB, a ratio of about 3:1 or 4:1, and a slow attack and fast release for the most natural sounding effect. Your compressor settings can also be saved off as a building block to be called up into any other preset.

Limiter

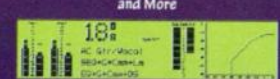


On to the limiter. Changes you make to the limiter settings are also seen on the graphical display. Adjust the level up or down to suit your needs. The flat-top line of the display moves up and down as you adjust the level. You can also set the speed at which the the limiter lets go of the signal as it goes below the threshold. This is truly smooth limiting, with patented dbx FlatPlus™ algorithms, so rest assured that where ever you set your threshold level, your tape will not distort, and your signal will not get butchered as it goes across the threshold. And like the other parts of the processor, your limiter settings can be named and saved for later recall.

De-esser

De-essing works the same way: see the effects of your settings displayed on the graph. Parameters here are the common ones: threshold in frequency, 800Hz to 8kHz, and amount in percent. Other available processing includes EQ - both hi-pass and shelving, for special-effect types of processing. When you are editing any of the building blocks its icon is visible on the display, and the parameters are shown on the graph, so it's always easy to know where you are. Parameters are easy to see in this page driven operating system. When it's so complex as this, it's nice to know somebody was thinking when it was put together.

and More



You can also work in stereo, or set up a completely different and independent processing chain for the other channel. Also, notice that the audio meters are capable of showing both peak and average levels for input and output. Optional digital outputs with the TYPE IV™ Conversion System with TSE™ (Tape Saturation Emulation) provides up to 24-bit outputs in either AES/EBU or S/PDIF formats with the trademark digital processing of TYPE IV™. The DDP also has full MIDI/Automation capability, with separate midi in and thru jacks. Entire processing setups may also be saved into one of 50 user defined presets, or use one of the 50 factory setups.

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7-foot–diameter bowed gong made of molybdenum? The program is based on the work of Jean-Marie Adrien, whose dissertation on modal synthesis laid out the physical-modeling algorithms used by *Modalys*. To quote from the *Modalys* introduction, modal synthesis is "a musical application of modal theory, which arises from the aircraft and bridge-building industry, where precise simulation of vibrating structures submitted to external forces is needed."

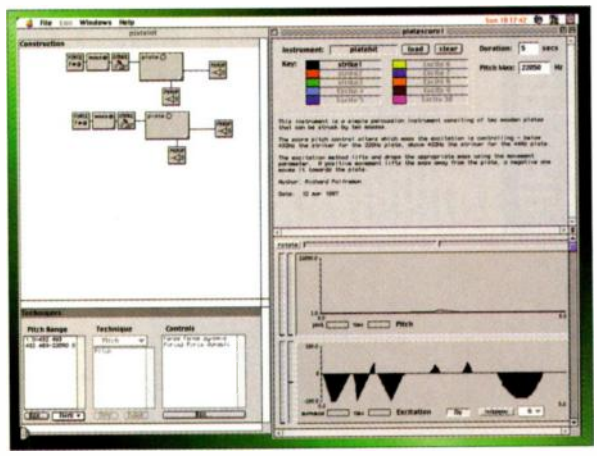

FIG. 4: The *Modalyser* Construction and Score windows provide a graphic interface for working with *Modalys*.

As a side note, Seer Systems' *Reality* software for the PC offers a modal synthesis algorithm based on research at Stanford's CCRMA on Coupled-Mode Synthesis (a bank of resonant filters driven by an impulse).

Modalys first appeared under the name *Mosaic* in the late 1980s, and when the first Macintosh version was released in the early 1990s, the user interface involved writing programs in SCHEME, a dialect of Lisp, and evaluating (running) them. Thanks to R. P. Polfreman of the University of Herefordshire, U.K., there is now a graphic front end to *Modalys* called *Modalyser*. (A beta version is included on the IRCAM CD.) *Modalyser* produces *Modalys*-readable code and makes the business of producing sounds with and learning to use this powerful application less unwieldy for the nonprogrammer.

As with *Audiosculpt*, the *Modalys* package from IRCAM comes with a full set of documentation, including a reference manual, a tutorial, and plenty of coded examples with the sound files they produce. The *Modalys* "workshop" provides the user with a number of objects, connections, accesses, and controllers. An *object* is essentially a simulated vibrating body that serves as *Modalys*'s basic sound-producing element. A *connection* defines a relationship between objects. For example, one object might strike, push, bow, or be glued to another object. An *access* specifies a physical location on a *Modalys* object, so that it can interact with other objects. *Controllers* specify user-defined, time-varying information to the synthesis algorithm. *Modalys* can also import data from MIDI files for control of various parameters and performance gestures.

The *Modalyser* Construction and Score windows are shown in **Figure 4** for an instrument consisting of two wooden plates struck by two masses.

As you might expect with such a computation-intensive application, *Modalys* is no speeding bullet. For example, a 2-second, plucked-string sound took 23 seconds to compute and then write as a 16-bit AIFF file (the only format currently supported) on my Power Mac 7600.

I suspect the primary use of *Modalys* for most sound designers will be in the creation of sounds or sequences of sounds that can then be mixed and edited in digital audio workstations. MIDI control certainly provides the user of *Modalys* with abundant opportunities for inputting musical control gestures. There is no real-time jamming with this program, however (at least not yet). But the sounds *Modalys* can produce are fantastically rich and natural. As John Cage once said, "The problem is not to imitate nature, but to imitate nature in her manner of operation."

If you wish to go beyond this simple introduction to IRCAM and two of its analysis/synthesis applications, a visit to the IRCAM Web site can provide you with further information on this Mecca of new music and sound synthesis. Have a look around and take advantage of the riches you'll find.

Thomas Wells *is a composer, author, and professor at Ohio State University and has been involved with electronic music and audio production for more than 25 years.*

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All about Additive

Putting sounds together one little piece at a time.

By Scott R. Garrigus

Most desktop musicians are familiar with the term "additive synthesis," but how many know exactly what it is and how it can be used to create sound? Like other methods of synthesis, such as subtractive, FM, or phase distortion, additive is a common technique that has great potential for synthesizing a wide range of sounds. In this article, I'll talk about the basic principles behind this technique and the different ways it has been implemented over the years.

STEVE RAMIREZ

To put it simply, additive synthesis is a sound generation technique that combines simple waveforms at various frequencies and amplitudes to create more complex, "composite" waveforms. Today's electronic instruments handle this task with ease, but additive synthesis actually dates back to the very beginnings of electrical theory.

THE FOURIER THEOREM

During the early nineteenth century, a French mathematician named Jean Baptiste Joseph Fourier theorized that any complex sound can be broken down into a series of simple sounds. The inverse of this is also true: any complex sound can be created by using the basic building blocks of sound. These building blocks are known as *sine waves*, and just as the atom is the smallest known unit of any element, the sine wave is the simplest known unit of sound. A sine wave is a pure, continuous tone with only one specific frequency and amplitude, such as 440 Hz at 0 dB (see **Fig. 1**). It is produced by any object that vibrates in a very simple pattern of back and forth motion, called sine motion. (It can also be produced electronically by nearly any synthesizer available today.)

Because the sine wave is so simple, however, it is also a very boring sound to listen to. You know that tone heard over your television at the end of the broadcast day? That's a sine wave. As

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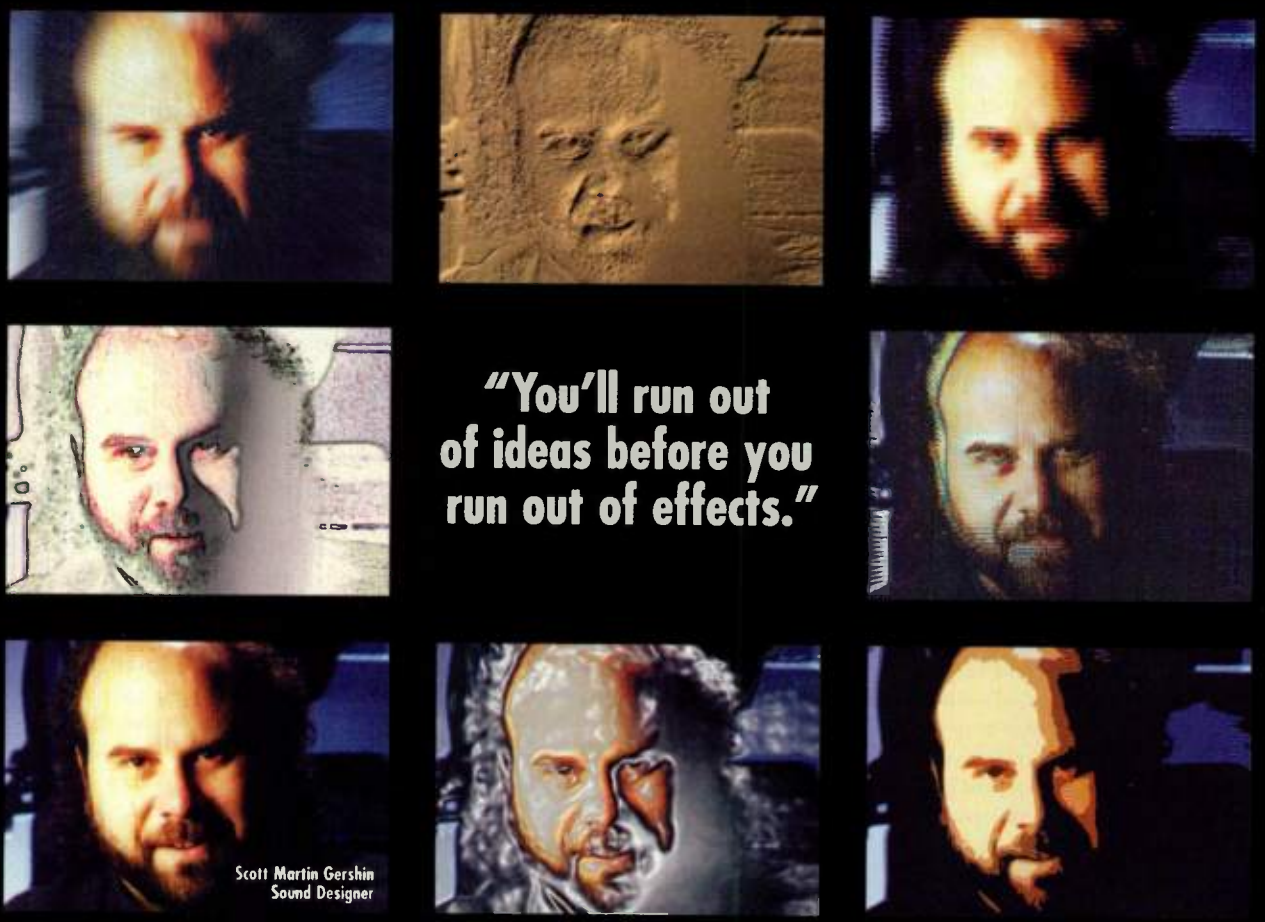

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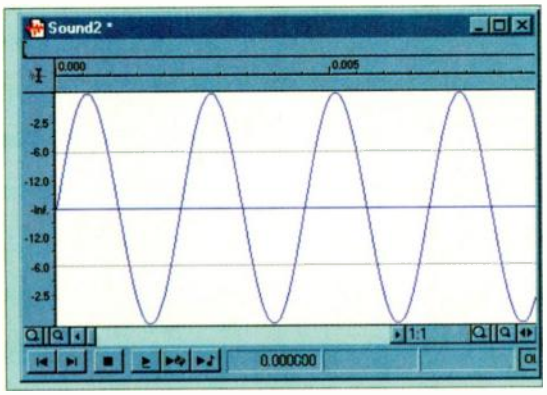

FIG. 1: The simplest component of sound is the sine wave. This display shows a sine wave with a frequency of 440 Hz and an amplitude of 0 dB.

Fourier's theorem states, the combination of multiple sine waves can create complex sounds, and that is the basis for additive synthesis.

The individual sine wave components that make up a complex sound are called partials, and each partial has its own unique frequency and amplitude. The range of these partials makes up the spectrum of the final sound. The first partial, called the fundamental frequency, is the most important because it determines the overall pitch and loudness of the sound. Each additional partial also influences the pitch and loudness but typically to a lesser degree. More importantly, these additional partials determine the timbre, or tone color, of the sound (see the sidebar, "The Timbre Story").

THE VERY FIRST SYNTH

Unfortunately, during Fourier's day there were no practical means of testing out his theorem. It wasn't until the 1860s that Hermann von Helmholtz proved Fourier's theorem by making the first significant musical use of electricity. Helmholtz built an apparatus that consisted of a number of electrically driven tuning forks, each tuned to a specific partial. When played together, they produced a complex sound. This invention was the first "synthesizer," but it was by no means a musical instrument because it could only produce one specific sound at one specific pitch. (You can read more about the history of electric and electronic instruments in Joel Chadabe's excellent book *Electric Sound*, published by Prentice Hall, 1996.)

It wasn't long after the Helmholtz experiment, however, that American inventor Thaddeus Cahill created the world's first electrical musical instrument. Cahill's Telharmonium was also an additive synthesis–based instrument that combined simple sine waves to produce more complex sounds. The Telharmonium was a polyphonic instrument with a touch-sensitive keyboard that produced sine waves by using a series of rapidly spinning alternators. The alternators were driven by banks of electric motors that rotated at fixed speeds and controlled the frequency of the alternators and thus the pitch of the sound. The instrument predated the invention of the amplifier, however, and was a monstrosity that weighed over 200 tons and needed six railroad cars to transport. Because of this and other technological problems, the Telharmonium wasn't an enduring success.

B-4 THE B-3

When Laurens Hammond took the rotating-disk system of the Telharmonium and combined it with more modern electrical technology, the first commercially successful electric musical instrument became available. The Hammond organ was invented in 1935 and first reached the public in 1939. It sported an electric motor that rotated a shaft containing 91 metal disks, each patterned with specific grooves, that were used to control note frequencies. Its additive synthesis–related features came in the form of switches called drawbars, each of which corresponded to a specific partial, and which together could be used to produce over 300,000 different sounds.

But the Hammond organ (along with its predecessors) still lacked two very important features for the creation of truly complex sounds. First, the organ produced sounds with nonvarying amplitudes, meaning you preset the volume of each partial and then every note had the same amplitude. The volume settings could be changed, but not while a note was sounding.

More serious, however, was the fact that the range of sounds the Hammond could produce was, in a sense, limited. Let's look at a little more theory to understand why.

PART AND PARTIAL

The partials that make up a sound's spectrum come in two forms: harmonic

THE TIMBRE STORY

In sounds that have a clear pitch, the partials above the fundamental have frequencies that are related to the fundamental's frequency by simple ratios. For example, the second partial is twice the frequency of the fundamental, the third partial is three times, the fourth is four times, and so on. Nonpitched sounds, such as percussion, typically contain inharmonic partials, whose frequencies are not whole number multiples of the fundamental. In most sounds, the partials' frequencies remain relatively stable, but the amplitude of each partial can change over time. Static waveforms, for example the square or sawtooth, contain partials whose amplitudes are fixed, which is why these tones have, for the most part, a lifeless quality.

Just how much do the partials in a natural sound fluctuate? It's not unusual for the amplitudes of a natural sound to vary every 1/1000 of a second or so. Moreover, certain sounds, such as brass instruments, have a spectrum in which the upper partials enter after the lower ones and disappear sooner. Attempting to recreate the spectrum of a sound "from scratch" is not a trivial task and requires complex envelopes with hundreds or even thousands of breakpoints. Few devices can perform this task in real time.

Given the massive range of frequencies that can appear in a sound and the fact that these frequencies change in strength as the sound evolves, you can see why "sound quality," or timbre, is so difficult to define. Despite attempts by many researchers to classify and organize sound timbres, no widely accepted system of classification has yet appeared.

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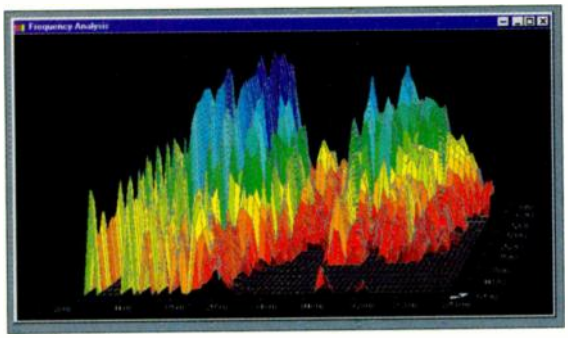


FIG. 2: To find the different partials that are present in a sound, the sound must be analyzed with a mathematical process known as a Fast Fourier Transform (FFT). Here is a single spoken word as shown in the analysis screen of Steinberg's *WaveLab*.

and inharmonic. Harmonic partials are defined mathematically as whole-number multiples of the fundamental frequency. For example, by doubling a fundamental frequency of 440 Hz, we get a harmonic partial with a frequency of 880 Hz, and tripling it produces another harmonic partial at 1,320 Hz. These frequencies are known as the second and third partials, and so on. Inharmonic partials, on the other hand, are those sine waves whose frequencies are not whole-number multiples of the fundamental. For example, partials at 500 Hz and 900 Hz would be inharmonic relative to a fundamental of 440 Hz. The Hammond organ was limited to harmonic partials, which is why it produced such pure and smooth tones.

To create truly complex sounds, any synthesizer should be able to produce both harmonic and inharmonic partials. And it should have the ability to combine several dozen to several hundred sine waves. Each of those waves requires its own oscillator, set to a unique frequency and amplitude. Because the loudness of most complex sounds varies over time, the amplitude of every sine wave must be dynamically controlled by an envelope generator. Each envelope generator requires at least an attack, decay, sustain, and release segment, so even with only 30 sine waves to manage, that's over 100 parameters that have to be controlled and created in real time in order to create a single note. This task was beyond the reach of any instrument in the 1930s and was something that could only be performed by the power of computing.

THE COMPUTER AS SYNTH

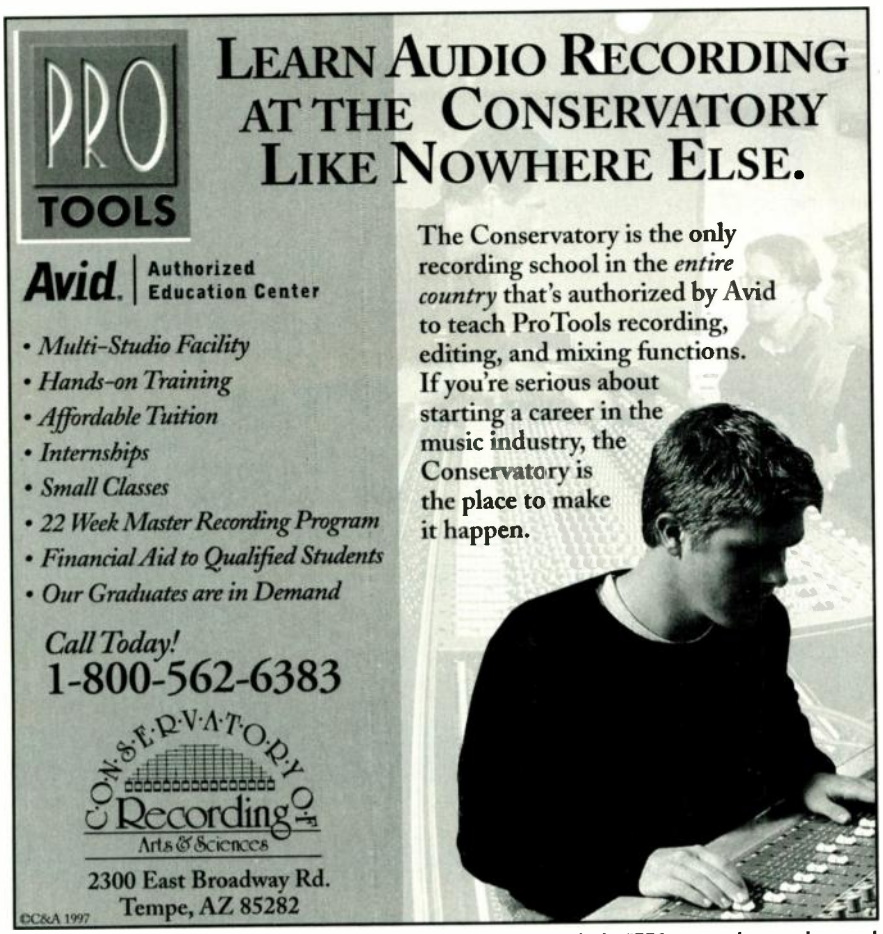
During the 1950s and '60s, digital mainframe computers found in research institutions were first used to generate complex sounds by manipulating specific partials. Researcher Max Matthews at Bell Labs is credited with developing the first sound programming language. Matthews called his program *Music I*, and though the first version was a simple, 1-voice generation utility, it quickly evolved into an application that provided an unlimited number of voices. The program didn't work in real time, however. Sound parameters had to be fed into the computer, which then took a certain amount of time for processing, and the results had to be converted into an analog signal before being played.

Then, in the late 1960s, David Luce built a machine that would analyze a set number of partials for any complex sound and display their individual envelopes as plots on an oscilloscope screen in real time. These plots were photographed, and Luce would then manipulate the partials of the sound by redrawing the envelopes and having the machine scan his drawings (using an optical scanner). The machine would then play back the altered sound in real time. This was one of the first demonstrations of what is known as resynthesis.

RESYNTHESIS

Today, pure additive synthesis is still very scarce even with all of the computing power available on the desktop. That's because the sheer number of parameters that have to be set in order to accomplish even a fairly complex sound is overwhelming. And to accurately mimic acoustic instruments, you need to set the partials for every note because the partial characteristics change for every fundamental frequency, and to a lesser extent, for different loudness levels.

Instead of building sounds from scratch, however, you can try a more



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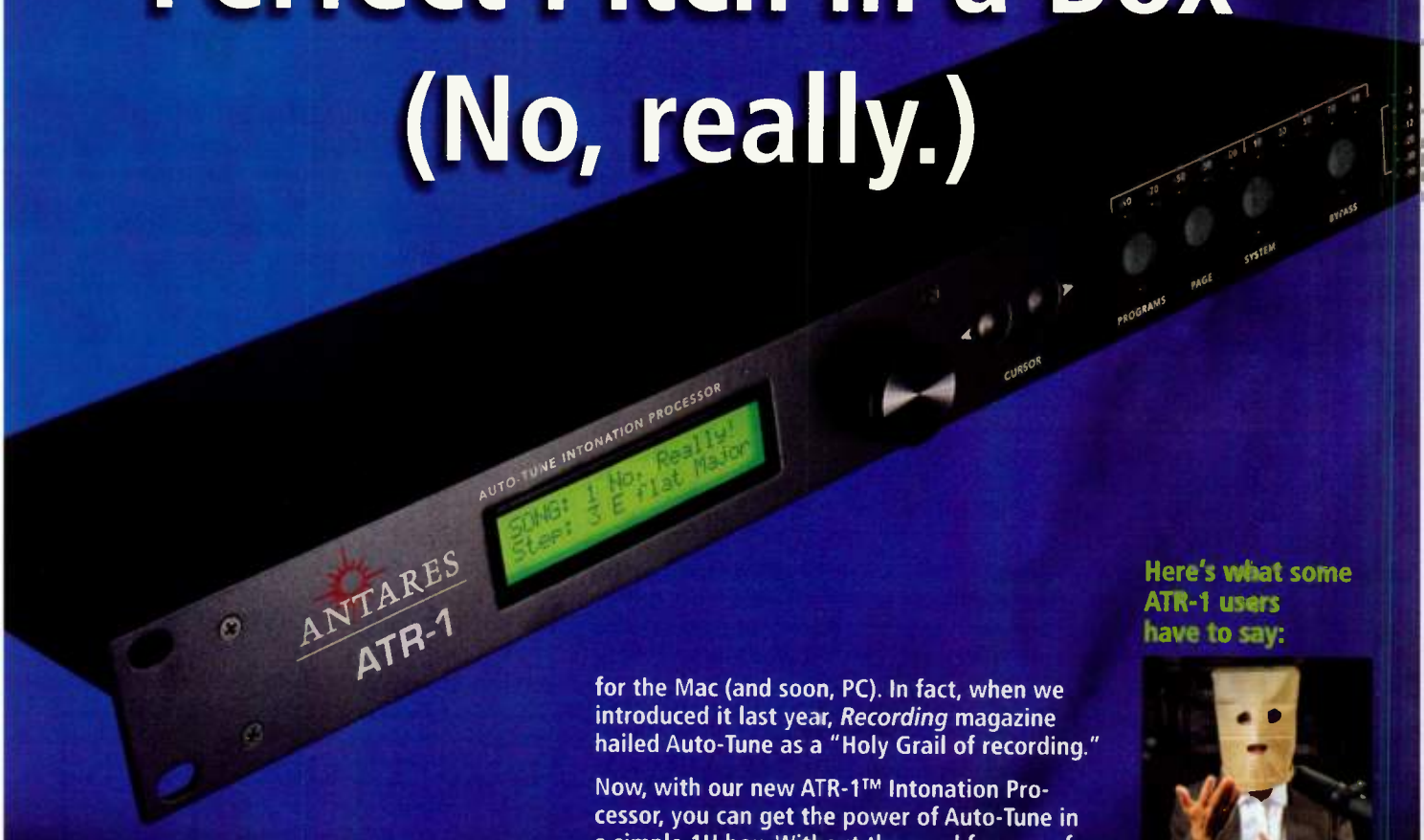

OK, let's be honest. For most of you, "Perfect Pitch in a Box" is right up there on the credibility scale with Elvis sightings and miracle three-day weightloss. Unless, of course, you happen to be one of the thousands of audio professionals who already depend on Antares's amazing Auto-Tune™ pitch-correcting software for the Mac (and soon, PC). In fact, when we introduced it last year, *Recording* magazine hailed Auto-Tune as a "Holy Grail of recording."

Now, with our new ATR-1™ Intonation Processor, you can get the power of Auto-Tune in a simple 1U box. Without the need for one of those pesky computers.

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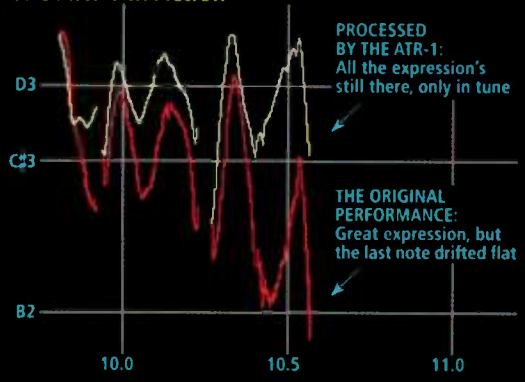
Of course, words are cheap (well, actually, when printed in a magazine ad like this they're fairly expensive). But hearing is believing. Try out the ATR-1 at your local Antares dealer or call us for a free demo CD. Either way, we're confident you'll be convinced. No, really.

The ATR-1 in Action



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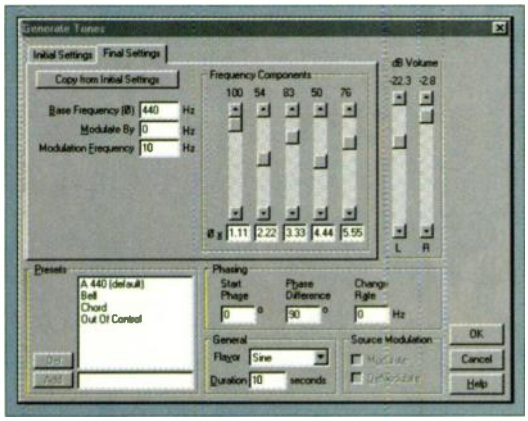


FIG. 3: The Generate Tones feature in Syntrillium's *Cool Edit Pro* allows you to build waveforms by defining the fundamental frequency and up to five additional partials.

practical form of additive synthesis, which is resynthesis. With resynthesis, a computer uses the principles of the Fourier theorem and analyzes a complex waveform to find all of its basic partial components. In particular, it tracks the frequency and amplitude envelopes for as many partials as you want. The computer first samples the sound and then puts it through a mathematical function known as a Fast Fourier Transform (FFT). This makes it easy to take apart any sound, like a spoken word, and find the structure of its spectrum (see **Fig. 2**). Once you know the sound's frequency and amplitude parameters, you can manipulate these building blocks to create a slightly different or perhaps a radically altered new sound.

Even with today's available computing power, however, real-time resynthesizers are few and far between. The reason is that both analysis and resynthesis processes are very complex, and creating the software and hardware to handle them in real time can be expensive. One high-end system that handles real-time resynthesis is the Kyma system from Symbolic Sound. Kyma is a modular, software-based synthesis and processing workstation accelerated by DSP hardware. (For a review, see the January 1998 issue of **EM**.) Sound designers use a graphic signal flow editor on the screen of either a Macintosh or PC to specify how to analyze, process, and resynthesize the sound. The signal-flow diagram is turned into a program for the multiple-DSP Capybara hardware, which connects to the host computer via PCI, NuBus, ISA, or PCMCIA card.

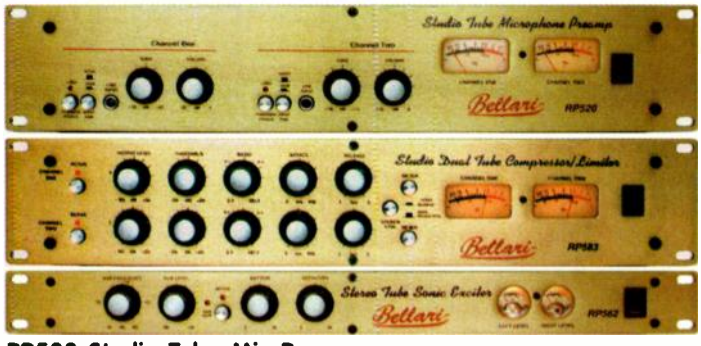
ALL-NATURAL ADDITIVES

Because of the difficulties associated with generating the hundreds of parameters necessary for true additive synthesis, some synthesizers offer a modified approach to the technique and use more complex waveforms as the building blocks for sound production. And rather than letting you manipulate individual partials, they'll provide a limited number of partials whose parameters can be changed in groups.

One such synthesizer is the Kawai K5000, which uses a technique called Advanced Additive Synthesis. The basic building block of a K5000 sound is a bank of 64 partials called a wave set. The wave set can be either partials 1 to 64 or partials 65 to 128 of the naturally

Bellari

Studio Tube Processors



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- All Tube Gain Circuitry

RP562 Studio Sonic Exciter
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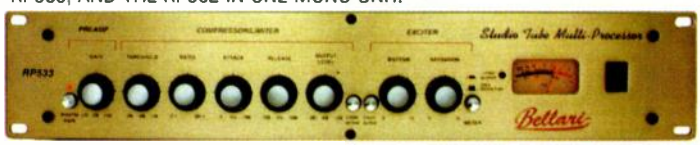

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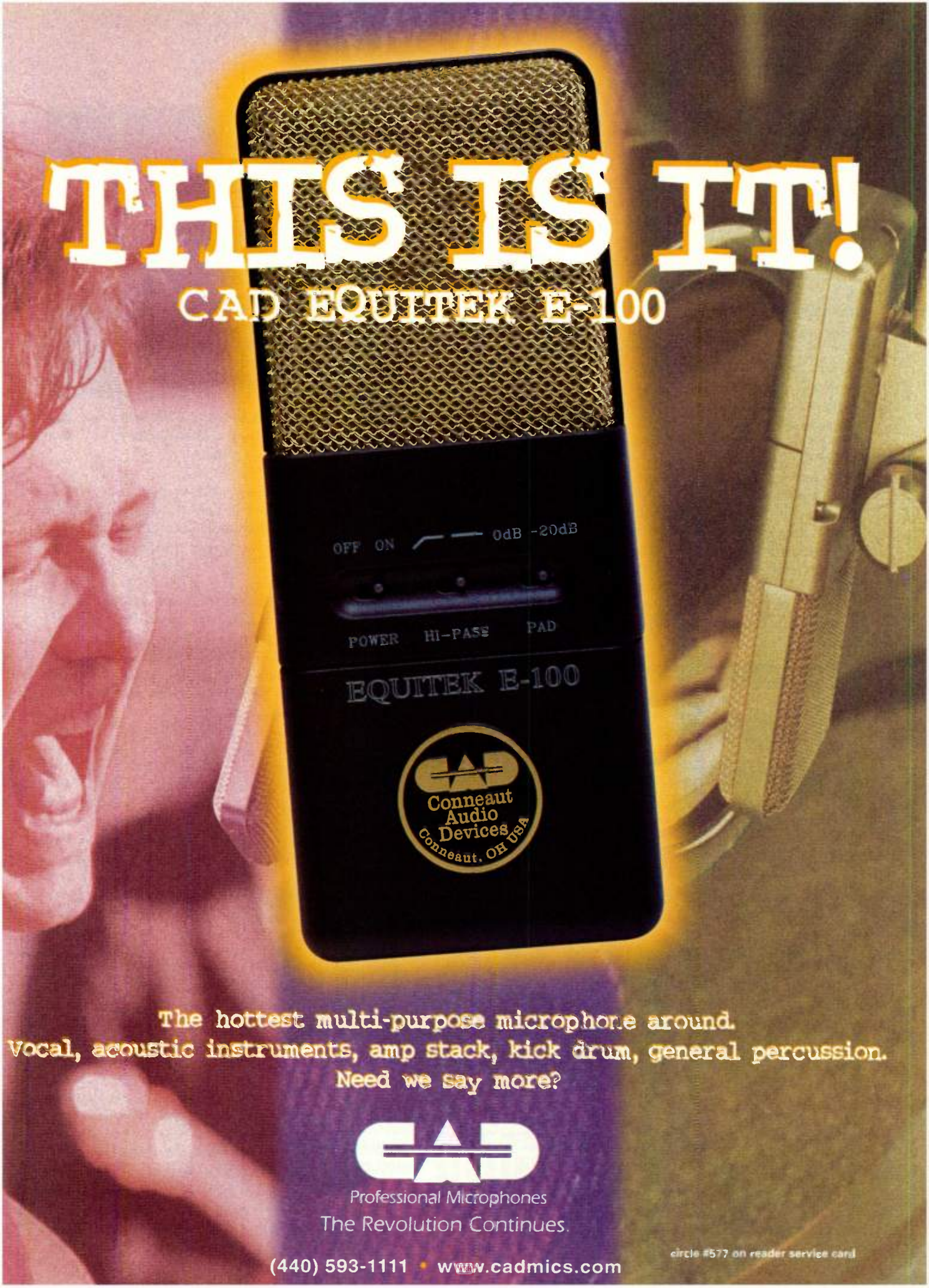

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occurring harmonic series. You can adjust the amplitude envelope of each partial but not its frequency, which means you can't include inharmonic partials. In order to make up for this, the instrument provides PCM samples that can be combined with the wave sets to create more complex waveforms. This feature makes for a very powerful system.

ON THE DESKTOP

If you want to get your feet wet in additive synthesis on your home computer, you can use several software-only applications. Audio-editing programs such as Sonic Foundry's *Sound Forge* and Syntrillium's *Cool Edit Pro* on the PC provide the means for creating and combining simple sine waves in unlimited numbers. Using the Simple Synthesis function in *Sound Forge*, you can create a sine wave with the specific frequency and amplitude of your choice. Then you build complex sounds by continuing to mix new sine waves with the original until you hear something you like. *Cool Edit Pro*'s Generate Tones feature provides even more flexibility: simply choose the frequencies for up to five partials (harmonic or inharmonic) above the fundamental and let the program build the waveform for you (see **Fig. 3**). You can even put simple amplitude envelopes on the partials to vary the sound as it evolves.

There are other programs available that allow you to experiment with all aspects of additive synthesis. One dedicated additive program for the PC is Andy Bridle's *Adsyn32* (see **Fig. 4**). This program generates complex waveforms using additive synthesis and allows you to create any number of partials, each with its own settings. Even though it doesn't perform its calculations in real time, it does them quite quickly and allows you to hear your results in a matter of seconds. Mac users can try out Mike Berry's *GrainWave* 2, a shareware program that offers numerous synthesis methods in addition to additive, and it works in real time.

You'll also find quite a few additive synthesis options in *Csound*, the cross-platform, public-domain synthesis language. This powerful application is the latest in a long line of sound-programming languages that extend directly back to Max Matthews's original *Music* program. Developed by Barry Vercoe at MIT, the program includes a number of additive examples in its basic distribution package. A real-time, PC version of *Csound*, developed by Gabriel Maldonado, provides dozens of partials that you can control from a MIDI keyboard.

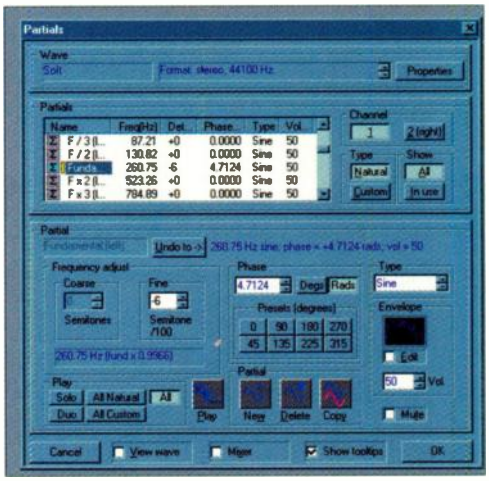

FIG. 4: The shareware program *Adsyn32* creates complex sounds using pure additive synthesis with an unlimited number of partials.

If you're keen on trying out resynthesis, have a look at *smsTools* for the PC, developed by Xavier Serra and his research group at the Pompeu Fabra University of Barcelona. This program gives you extensive control over the analysis process and allows you to modify the analysis data in numerous ways before you resynthesize it. For example, you can modify just the frequency or amplitude envelopes, or combine the spectra of two different files. The results can be truly remarkable.

So now that you know a bit more about additive synthesis and its many facets, get out there and start building some cool sounds. Theoretically, it's possible to come up with any sound imaginable using pure additive synthesis. Who knows, you may invent something spectacular to replace the Windows start sound...please!

Scott R. Garrigus *would someday like to find the time to piece together a complex sound with 250+ partials, all by hand. He can be reached via e-mail at garrigus@pan.com or via the Web at www.pan.com/garrigus.*

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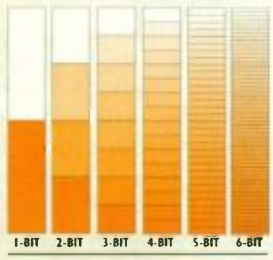

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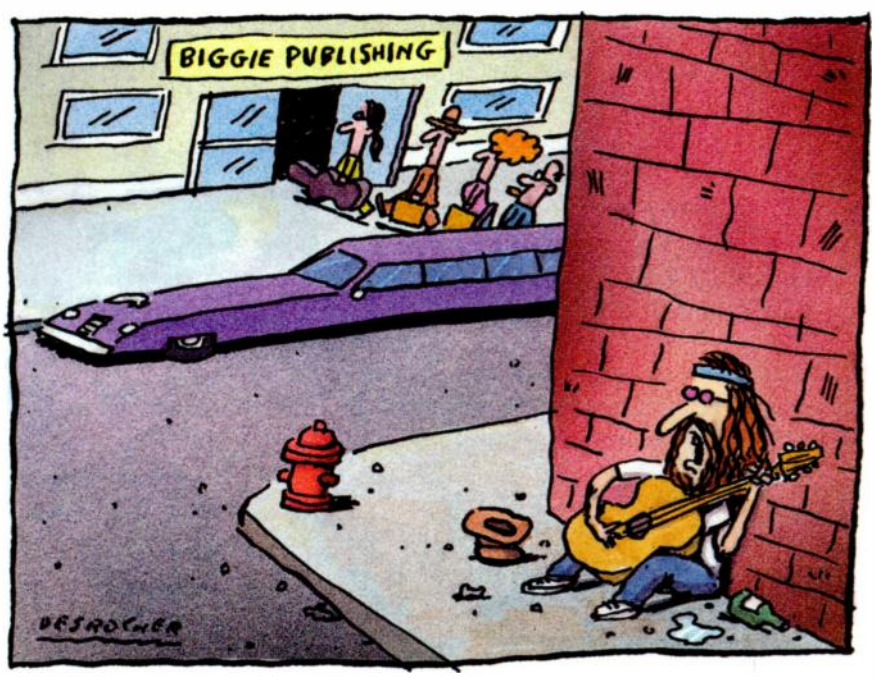
Publishing 101

Don't let your publishing deal leave you singing the blues.

By Michael A. Aczon

Within today's high-tech music industry exists a single low-tech object that requires less than one rackspace in your studio, weighs only a few ounces, and is guaranteed to be a major part of your musical business arsenal. It can roar louder than your subwoofers, change the impact of your songs more than your entire effects rack, and last longer than any recording medium you are using today. This important item is your music publishing contract.

On one side of the publishing bargaining table is a songwriter who owns the copyrights to the songs; on the other side is a music publisher who wants to get maximum exposure and income from the use of those songs. In its most basic terms, the writer sells all or part of the ownership of her songs to the publisher in exchange for 50 percent of the royalties earned from the use of the songs. The publishing contract spells out the finer terms and conditions of this writer-publisher relationship. (The sidebar "A Tale of Two Writers" follows the publishing paths of two fictional songwriters and provides a brief case study of how deals can vary.) Our column this month is devoted to explaining some of the major points of a publishing deal in order to give you a better understanding of how this contract can work for you.



JACK DESROCHER

MAKE THAT A SINGLE

A distinction should be made at the outset between a *single-song* music publishing deal and a *term* publishing deal. These two phrases define which of the writer's songs are included in the deal. Single-song deals specify particular musical compositions that are being transacted; term deals specify all compositions written during a set period of time.

Because a term contract calls for the exclusive writing services of a writer, the length of a term deal is very important. Much like record deals, publishing

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contracts are for an initial period—usually a year—with a set number of options being granted to the publisher to extend the agreement for additional one-year periods. Writers argue that they don't want to be "tied down" too long, while publishers argue that if they get the writer recognized in the industry, they should be allowed to reap the benefits as long as possible.

An artist may simultaneously sign a deal with a record company and its affiliate publishing company (for example, Warner Bros. Records and Warner-Chappell Publishing are both owned by entertainment conglomerate Time Warner). In this case, it is not unusual for the length of the publishing deal to be tied into the length of the record deal. In my practice, I've seen terms ranging between two and six years.

GRANT OF RIGHTS

Publishing companies want to have security interest in their agreements with writers. That security is the ownership of the songs. When signing on with a publisher for the first time, a writer is almost always expected to hand over anywhere from 50 to 100 percent of the copyright ownership of his or her songs to the publisher, for the life of the copyright. (Currently, the life of a copyright is 50 years beyond the life of the songwriter.)

Another requirement that publishers usually make is that they get exclusive administration rights to the songs. These include the right to license others (including record companies, advertising agencies, or movie production companies) to use the songs, the right to collect the royalties generated from the songs, and the right to register the songs' copyrights in their own name. Lastly, the publisher will want permission to use the writer's name, photograph, and biographical material in connection with the sale and exploitation of the writer's songs.

MINIMUM COMMITMENT

Much like a record deal, which requires that a minimum number of masters be turned in by a recording artist, a publishing deal requires that the writer turn in a certain number of songs per year. Some writers claim, "I can't write under pressure!" and vigorously oppose any attempt by a publishing company to force creativity. However, the spirit of this clause is to ensure that the publisher's catalog is guaranteed a minimum number of songs per writer so that a few writers are not stuck pulling the weight for an entire staff of writers.

If a writer doesn't meet the minimum commitment, his contract can be put in suspension, a "holding pattern" that extends the length of the contract until the minimum commitment is met. Minimum commitments vary from writer to writer, based on a number of factors. These factors may include how much the writer collaborates with other writers, the speed with which the artist generates material, what the writer's other professional commitments are (for example, a writer might also be a performing artist who has to record, tour, and promote a new release and therefore has less time than someone who isn't pursuing a performing career),

A TALE OF TWO WRITERS

After playing as a duo for some time, Sally Songsmith and Wally Writer have compiled a catalog of songs that they wrote together, and they've agreed to split their songwriting and publishing rights equally. Biggie Label Records, an independent record label, offers Sally and Wally a record contract but wants them to sign over 100 percent of the publishing rights to all of their songs to Biggie's publishing company, Not So Biggie Music Publishing. Anxious to get the record deal, Wally agrees to enter into this publishing deal with Not So Biggie for his share of the existing songs, along with all of the songs he writes for the next five years. Under this agreement, Not So Biggie collects all of the money earned from the use of Wally's songs, takes a 10 percent administration fee "off the top," and then pays Wally 50 percent of the remaining money as a writer's royalty.

Sally, on the other hand, retains her publishing rights when she makes the deal with Biggie Label Records. While working on the album with Wally, Sally lets Sell Your Songs Music (SYS), a well-respected and established music publisher, hear a demo of the songs Sally wrote with Wally, along with a number of other songs she wrote by herself. SYS picks out two songs from Sally's solo demo and asks if the company can represent only those songs for six months to prove to Sally what they can do. If SYS manages to get either of the songs recorded by another artist or placed in a movie, SYS will offer Sally a copublishing deal, with Sally receiving 50 percent of the gross income as a writer's royalty, as well as 50 percent of the remaining publisher's royalty, with SYS absorbing the administration costs. Then, wanting to develop a long-term relationship with Sally, SYS offers to administer Sally's share of the songs on the upcoming Biggie Label release for 10 percent of the publisher's share only.

Through it's promotional efforts, SYS secures a big-name artist to record both of Sally's songs for a major motion picture's soundtrack. The license fee for the two songs on the movie is $50,000, which, after the 75/25 split between Sally and SYS, nets Sally $37,500, with SYS earning $12,500. The soundtrack CD sells 5 million copies, netting $710,000 in mechanical royalties, of which $532,500 is Sally's, while $177,500 goes to SYS. Riding on the wave of Sally's name as a hit songwriter from the movie soundtrack, that old Sally and Wally CD on Biggie Label Records sells 500,000 units.

Having developed a win-win relationship, Sally and SYS sign a 3-year copublishing deal, during which SYS will actively market Sally's songs for various projects. Because Sally has proven herself as a royalty-earning commodity, she negotiates advances of $100,000 every contract year. Because Biggie Label's primary business is selling records, not songs, Wally's musical catalog is not getting much attention. Based on the publishing deals they made, Sally keeps 95 percent of her half of the publishing income, which is more than double the 45 percent that Wally keeps from the same record.

Hit record?

Hit "record."

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and other factors that are discussed during negotiations. I've seen minimum commitments range from six to thirty songs per year.

REVISIONS AND USES

Many writers negotiate the sole right to make revisions in their songs. This point comes from both artistic and business motives. The artistic reasons should be obvious: a personal experience or emotion may have been the inspiration for a song, and the writer may not want to compromise the artistic statement. On the business side, if the publisher has someone else make revisions, the original songwriter's royalties may be further split to pay the additional collaborator.

Taking this one step further, even though writers want their publishers to cast the net of opportunity far and wide when it comes to finding uses for songs, there are some cases where restrictions may be in order. In my practice, I have negotiated on behalf of writers to restrict the use of songs from X or NC-17 rated movies, political campaigns, advertisements for alcoholic beverages, and as "samples."

THE MONEY TRAIL

Since the inception of the publishing industry, the "standard" split of revenue has been 50/50: the publisher pays 50 percent of the earned income to the writer while retaining the other 50 percent. As writers (especially writer/artists and writer/producers) have gained more bargaining power in their contract positions, publishers have become more willing to relinquish up to 50 percent of their share of the pie with a publishing company owned by the writer. This scenario is known as a copublishing agreement, because there are two publishing companies jointly owning and sharing the revenue from the songs, and it results in a 75/25 split in the songwriter's favor.

Advances are based on expected return on the publishing company's investment in the deal. For example, if you walk in the door to a publishing company with a record deal in hand, or you already have a song on a record that is getting airplay, you are more likely to be able to negotiate an advance than a writer with no track record or apparent means to get songs out there. Future advances can be based on your success after you have

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gotten your foot in the door, e.g., "year two will have an advance of the higher of (a) $50,000 or (b) two-thirds of the royalties earned during year one." First-time publishing advances vary widely from only a few hundred dollars for single-song deals, covering only demo costs, to several hundred thousand dollars for artists who have created enough of a buzz to be perceived as the "next big thing" in the industry.

Other negotiating points can include which fees and costs are to be billed against the writer's royalties. Many publishing companies insist on taking an administrative fee (anywhere from 5 to 15 percent of the gross receipts) off the top for handling the paperwork and collection associated with the compositions. Surprisingly, publishers will sometimes take a smaller administration fee, or even none at all, if they are pushed hard enough in negotiations.

Demo costs (studio rental, musician and vocalist fees, etc.) are also usually billed against the writer's account. When negotiating this matter, it's a good idea to try to put a per-song limit on these charges. I have represented some writers who produced their own demos and wanted to get paid as if they were third-party musicians.

With the current trend of inexpensive gear and DIY recording studios, many publishing companies find it more cost-efficient to negotiate an equipment advance to outfit a studio for a writer, which will result in much lower demo costs. Writers intending to negotiate this type of deal should (a) demonstrate that they already know how to work studio gear and (b) have a reasonable "wish list" ready to present to the publisher.

Hard costs associated with publishing the songs (e.g., copyright registration fees, legal costs associated with particular songs, the cost of purchasing CDs of your songs) are usually billed back to the writers. When you review this part of your contract, be sure to keep in mind what you would consider reasonable and customary to be billed against your account.

EXTRAS

There are two additional negotiable points that you may wish to consider. First, one of the main jobs of a publisher is to find uses for the songs you turn in. Therefore, an important point to try to negotiate is the *reversion* of your ownership in songs that remain unused after a reasonable period of time. If negotiated, and depending on the publisher, I've seen the period of time requested to find a use for a song range from one to five years.

Lastly, a "key person" clause is sometimes invoked if you signed on with a publishing company because of the interest and support of one particular person. Should that "key person" leave the company, you would be able to end your contract and leave as well. Otherwise, you risk letting your songs become dead weight in the catalog, with no one giving them proper attention.

The right publisher can do wonders for your career. Careful coordinating with the rest of your business team, including a good label, manager, and publicist, could result in obtaining the greatest amount of exposure and income from your songs.

When not using his Macintosh to write for **EM, Michael A. Aczon** *is conquering the learning curve of MOTU's* Performer *software to record office memos.*

Expert Advice

We get by with a little help from our friends.

Compiled by Steve Oppenheimer

If you use several sound modules for percussion sounds and you are using a multiport MIDI interface, chances are you will want to map different notes in a percussion sequence to different sound modules. Emagic *Logic Audio*'s Mapped Instrument Environment object (see **Fig. 1**) is well suited for this particular task.

The Mapped Instrument object allows you to name, transpose, scale the Velocity, and set score attributes of individual pitches. An often-overlooked feature is that you can also set each note's channel and route it to any of the top sixteen cable outlets of the Mapped Instrument. By cabling these outlets to the ports that serve your sound modules, you can turn the Mapped Instrument into a "kit" that uses sounds from each module.

You can easily create alternate kits without having to do any additional cabling. Simply Option-drag the Mapped Instrument to create a copy with all of its cables intact. Then open the window of the new Mapped Instrument (by double-clicking on its icon) and change the individual pitch characteristics as desired.

If you are inclined to do some additional Environment tweaking, remember that you can also use the program's Mapped Instrument's cable outlets to feed other Environment processes, which in turn feed one or more sound modules. In particular, you can create layers by "splitting" an outlet (use a neutral Transformer or Monitor to do this) and cabling it to several ports at once.—*Len Sasso*

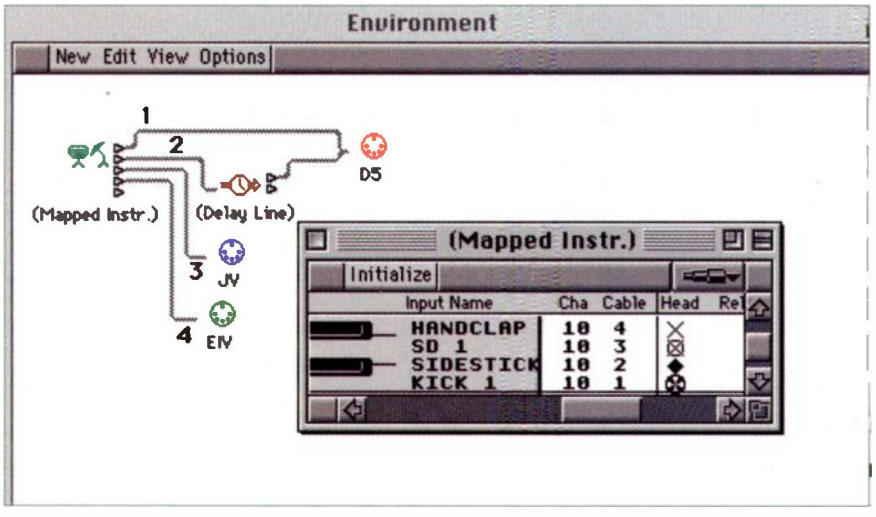

FIG. 1: Using the Mapped Instrument object in Emagic *Logic Audio*'s Environment window, you can create a drum kit that uses sounds from several different synths and samplers.

ACOUSTICS MODELER FX

You can create some very interesting audio effects by processing a sound file in Sonic Foundry's *Acoustics Modeler* using a WAV file instead of an Impulse file. The technique works with any WAV file that is less than twelve seconds in length.

First, pick a WAV file or create some sounds using the FM Synthesis tool in *Sound Forge*. Next, choose those files as

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FIG. 2: Sonic Foundry's *Acoustics Modeler* generally uses Impulse files to add a modeled ambience to a sound file, but you can get interesting effects by selecting a WAV file instead.

the Impulse files in the Acoustics Modeler dialog (see **Fig. 2**) and apply them to your source audio file. Try using several WAV files and varying the Response Width and Response Delay Times and wet/dry mix.

You can use a frequency sweep as an Impulse to create a frequency-dependent delay effect. To generate echo-type effects, use staccato sounds (such as short drum beats) as Impulse files. Try using a panning Impulse to make the stereo image of the output switch between channels. With some experimentation, you can come up with some very cool effects you've never heard before.—*Rick Hoefling of Sonic Foundry*

CREATING REALAUDIO FILES

If you have your own Web site and are interested in adding high-quality audio to it, you've probably started to investigate RealAudio. RealAudio offers surprisingly good fidelity for Web-based audio, and the format has quickly become a de facto standard on the Web. In fact, the *RealPlayer* (which is generally required to hear RealAudio files) is now included as part of the standard installation for many online services and ISPs that provide their own browser software. That's good news for you because the more people who have the *RealPlayer* installed, the more people who can just click on your audio file and hear it play.

To create RealAudio files, you need software that supports the RealAudio format. Thankfully, due to the format's success, the software is not hard to find. Many popular audio-editing programs now let you export your work directly into RealAudio format. Even better, Real Networks (the company behind the RealAudio standard) offers a free, bare-bones *RealEncoder*, which can either convert existing digital audio files (such as WAV files) or record a live signal via your computer's audio inputs.

For $50, the company also offers *RealPublisher* (see **Fig. 3**), which adds the ability to automatically generate the HTML tags necessary to include RealAudio links on your pages, along with a few other enhancements. But *RealPublisher*'s encoding works the same way as the encoding in the free *Encoder*.

Not all RealAudio files are created equal, however. As with most other Web-related tools, changes and improvements to RealAudio come at a fast and furious pace, and only the most recent versions have the quality that my picky ears consider acceptable. (At the time of this writing, that version was 5.1 for the encoding tools, but version 6.0 will probably be out by the time you read this.) I found this out the hard way when I tried to export some files from Sonic Foundry's *Sound Forge XP* 4.0, which has native support for Real Audio. Unfortunately, it uses an earlier version of the RealAudio encoder, and the results were noticeably worse than when I use the free Real Networks *RealEncoder*.

When I went to use *RealEncoder*, however, I found that I could not add to an existing recording session (or do any editing, for that matter) because there was no Pause button. Instead, it just offers to record over the existing file (unless you create a new file, of course). Because I needed to end up with a single file and was recording from two cassette tapes, that didn't work, either.

So I had to go back to *Sound Forge XP* and record the audio as a WAV file. This also allowed me to do some very basic editing and normalize the file with *Sound Forge*'s built-in processing. (Compressing and normalizing a file before you encode it into RealAudio format is always a good idea.)

Once that was done, I switched back over to *Encoder* and encoded the WAV file I had created in *Sound Forge XP*. Though it was a long and convoluted process, this allowed me to take advantage of the higher-quality encoder built into the *RealEncoder* and put great-sounding audio on my Web site. You can check out the results of these efforts at www.everythingcomputers.com/realaudio.htm.—*Bob O'Donnell*

SOUND FORGE SET SELECTION

To select data at specific points in Sonic Foundry's *Sound Forge*, use the Set Selection dialog command (see **Fig. 4**). This allows you to type in selection points or choose a selection from a list of regions. To bring up the Set Selection dialog, choose the Selection/Set command from the Edit menu.

You can also modify the Channel, Start, End, and Length of your selection using the Set Selection dialog. Previously defined regions can also be chosen from the Selection drop-down list. In this dialog, you will also find Snap Zero and Snap Time buttons that

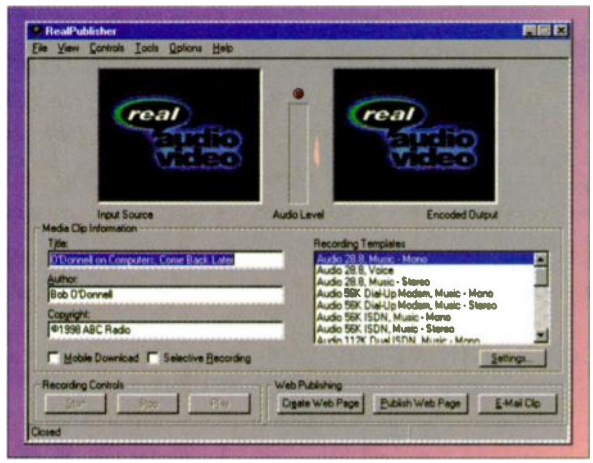

FIG. 3: *RealPublisher*, available for $50 from Real Networks, automatically generates the HTML tags required to include RealAudio links on your Web page.

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bring the current start and end selection points to their nearest zero crossings or time increments.

Some of *Sound Forge*'s commonly used functions can be performed in a number of different ways. For example, you can reach the Set Selection dialog by clicking on the Playbar field to the left of the OLE box, or you can pick the Selection item from the Waveform Display shortcut menu.—*Rick Hoefling of Sonic Foundry*

METASYNTH FILTERING

Users of U&I Software's *MetaSynth* (distributed by Arboretum Systems) should be sure to check out the program's Analyze feature in the Image Synth Palette. This extremely useful function uses Fast Fourier Transform (FFT) analysis to convert the current sample into a sonogram. Resynthesizing the sonogram using sine waves produces something akin to the original sample, but the real point of this processor is to graphically manipulate the sonogram to produce something completely different.

FFT analysis can result in the presence of undesirable, low-intensity pixels caused by either quantization noise or less-relevant harmonics. These artifacts are especially prevalent when speech samples are analyzed. You can use the Image Synth's Contrast & Luminance tool to scroll the luminance down until these pixels disappear, but here is a more precise solution (see **Fig. 5**):

1. Copy the analyzed picture to the clipboard by typing C.

2. Use the Eyedropper tool (activated by holding down the Option key) to pick up the luminosity of the brightest pixel to be eliminated. It's easiest to do this when the Picture window is zoomed to a high magnification.

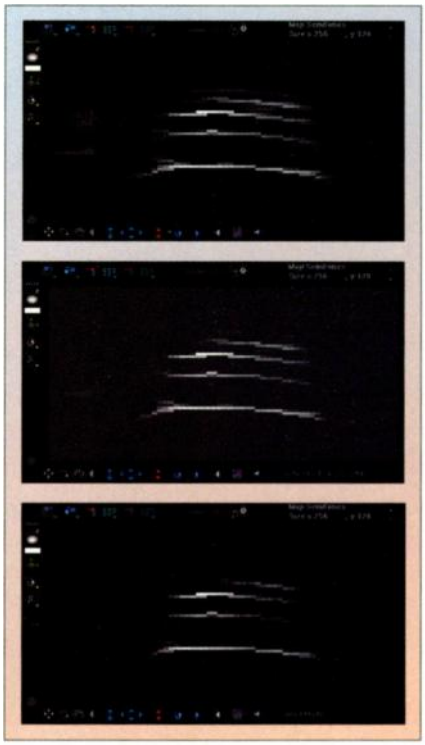

FIG. 5: The Analyze feature in the Image Synth Palette of U&I Software's *MetaSynth* uses FFT analysis to convert a sample into a sonogram. Shown here from top to bottom are the results of steps 1 (the analyzed picture), 4 (results of the Max Pict command), and 7 (inverted and normalized).

3. Use the Pencil tool with a brush size setting of 64 × 64 (the largest possible) to paint the entire picture area with this luminosity. (This is easiest at low-magnification zooms.)

4. Use the Max Pict command from the edit menu (or type K). Now all pixels in the original sonogram that are of lower luminosity than the gray wash created in step 3 will be raised to the luminosity of the wash, and all other pixels from the picture will remain unchanged.

5. Invert the picture by typing I.

6. Normalize the picture using the Normalize button at the bottom of the Image Synth. Now, all the lower-level pixels will be white.

7. Invert the picture again (by typing I) and, optionally, normalize it again. The lower-level pixels will now be black, and the remaining pixels will be scaled in proportion to their original relationship.

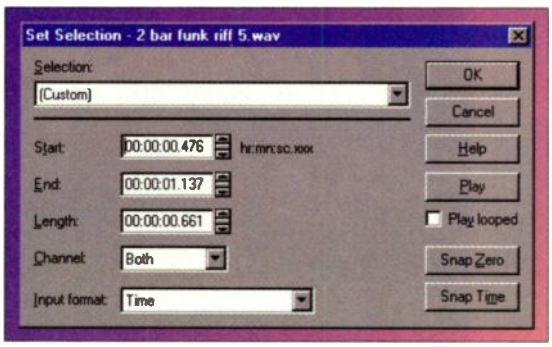

FIG. 4: The Set Selection dialog command in Sonic Foundry's *Sound Forge* allows you to type in selection points or choose a selection from a list of regions.

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If you resynthesize the picture now, using sine waves, it will probably not be very close to the original, but it may be a better starting point for further manipulation.—*Len Sasso*

BALANCE THE BASS, PLEASE!

Despite all the money spent on biamplified, active studio monitors, many users fail to take advantage of a feature commonly found in the better systems: the room-response controls. The pioneers of active monitoring found it necessary to design bass-compensation (or room-response) controls in order to set the proper balance in many different listening environments. Some manufacturers of biamped models offer a couple of LF controls and, typically, a single HF control. Do not ignore these features!

Speaker responses are usually tested in a nonreverberant, or *anechoic,* chamber. But a speaker that delivers reasonably flat response (for example, from 50 Hz to 15 kHz) when tested in an anechoic chamber most likely will not be flat when used in a personal studio. By definition, there is very little, if any, reflective energy in an anechoic chamber, so there is no buildup in low or high frequencies. But the story is very different in the average personal-studio control room.

Keep in mind that bass energy is largely omnidirectional, and the wavelengths of low-frequency signals are very long. (For example, the wavelength of a 100 Hz sine wave is 11.3 feet.) Most control rooms, with their hard, isolating walls, usually contain and reinforce more low-frequency energy than shorter-wavelength, high-frequency energy. In addition, many standard room treatments absorb only the mids and highs.

As a result, you get an excess of bass relative to mids and highs. This problem becomes more exaggerated if the speaker is placed close to a wall. The low-frequency boost can be as high as 6 dB, 12 dB, or possibly even 18 dB if the speakers are placed in corners. The lack of balance makes it difficult to balance frequencies and levels.

Most control rooms reinforce more low-frequency energy than high-frequency energy.

Room-response controls are provided to correct this imbalance. In a typical room, setting at least -2 dB of bass-tilt attenuation is advisable. If the speakers are relegated to sitting on top of the console's meter bridge, you might consider using a setting of -4 dB. If the speaker is closer than 16 inches, or right up to the front wall, consider a -6 dB setting.

Modest high-frequency reduction should also be considered in rooms where there is little to no absorption in the listening environment. These simple tweaks help achieve proper frequency balance, and your final product will sound better as a result.—*Will Eggleston of Genelec*

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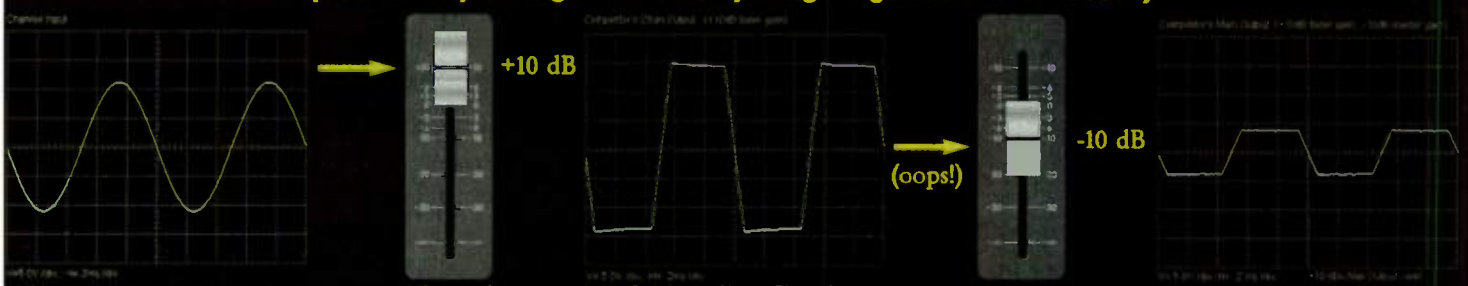
(actual scope images from competing "high headroom" mixer)



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ENSONIQ

PARIS (MAC/WIN)

A cross-platform digital audio workstation with hardware options.

By Rob Shrock

Ensoniq's PARIS (Professional Audio Recording Integrated System) crosses the price/performance threshold previously established by other professional DAWs, making the dive into tapeless recording an even safer leap for smaller commercial and personal studios, without sacrificing features or audio quality. A comprehensive recording environment, PARIS offers audio recording, editing, mixing, and DSP processing software; a hardware surface controller; and a choice of hardware interfaces.

The system was designed under a technical alliance between Ensoniq and Intelligent Devices (creator of TDM plug-ins and author of an operating system for Spectral's PC-based DAW). Ensoniq provided the hardware, and Intelligent Devices designed the software. PARIS currently is a closed system (that is, you can't control its hardware with third-party software), and it has a proprietary plug-in architecture. However, the two companies have been working toward making PARIS compatible with both the VST and DirectX formats, and an upgrade should be available by the time you read this.

FIG. 1: With its 100 mm faders, transport controls, jog wheel, and channel-assignable buttons and knobs, the sleek Control 16 allows you to control Ensoniq's PARIS with your fingers rather than your mouse.

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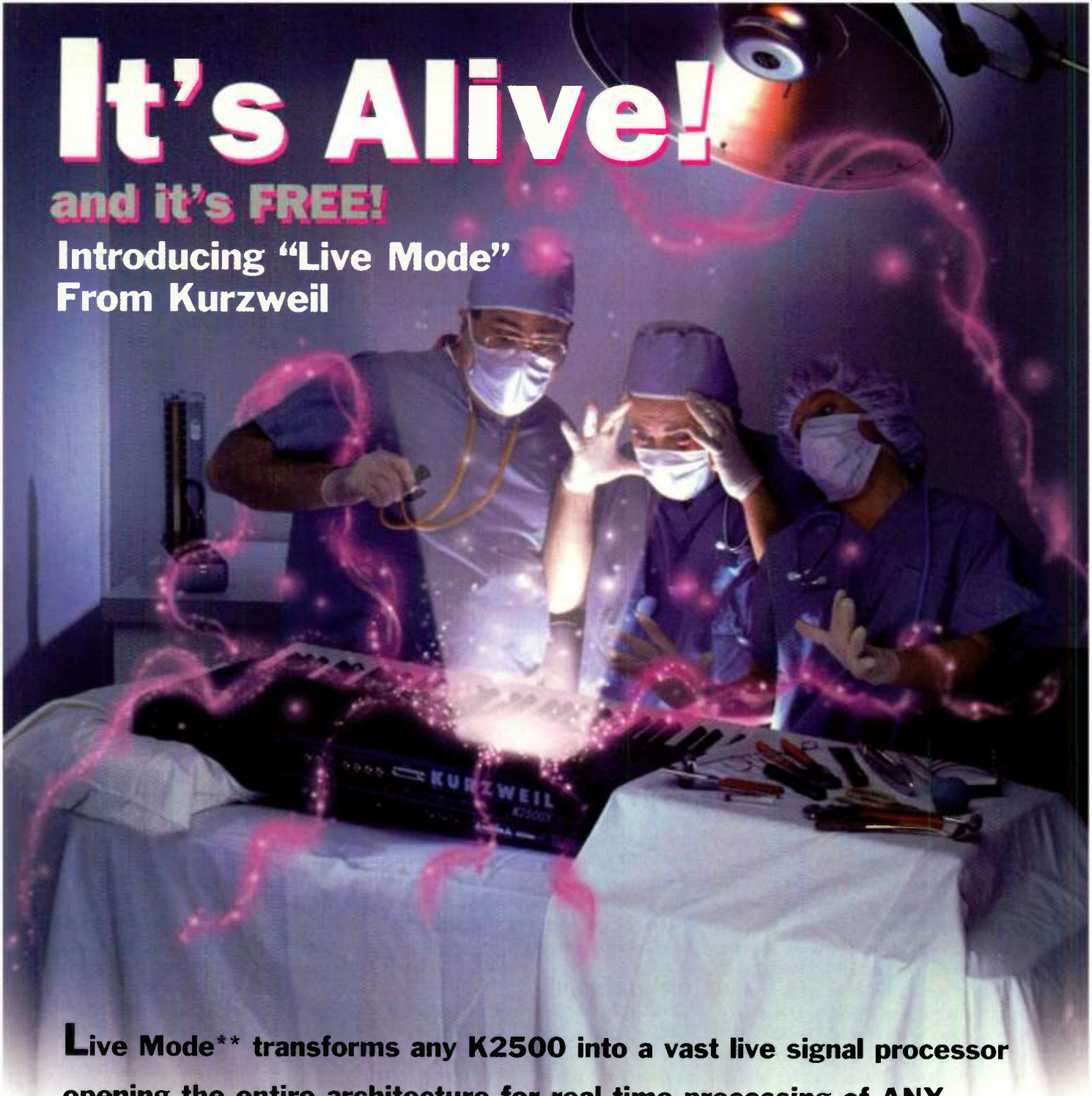

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FIG. 2: The Interface 442 offers four channels of 20-bit A/D and D/A conversion, in addition to S/PDIF I/O, connections for external clock, and an expansion port.

EDS-1000 PCI card, which provides sixteen tracks of audio recording and DSP processing; the Control 16 hardware controller (see **Fig. 1**); and the PARIS software. Additional EDS-1000 PCI cards can be added for up to 128 tracks.

Bundle 1 ($2,895) ships with the Interface 2, a 2-channel, 20-bit A/D and D/A interface. Bundle 2 ($3,395) comes with the 1U rack-mount Interface 442 (see **Fig. 2**), which offers four channels of 20-bit A/D and D/A conversion, S/PDIF I/O, external clock (word clock or Digidesign Superclock), and an expansion port for daisychaining an additional Interface 2. Both interfaces use balanced, ¼-inch jacks for analog connections.

Bundle 3 ($3,895) replaces the aforementioned I/O hardware with the MEC (Modular Expansion Chassis), a 5U rack-mount, expandable interface (see **Fig. 3**). The basic MEC contains the same features as the Interface 442 but offers nine additional expansion slots for adding a variety of existing and upcoming modules.

Three expansion modules are currently available. The A8iT-24 and A8oT-24 modules ($499.95 each) provide eight channels of 24-bit A/D and D/A conversion, respectively. The EDS-ADI-01 ADAT Optical Digital Interface ($499.95) allows 2-way transfer of digital data with a single ADAT (more on this later). The EDS-ADI-01 also provides an ADAT sync connection for sample-accurate control of an ADAT's transport. There are plans for an EDS-STC SMPTE module, as well as interfaces accommodating TASCAM TDIF and AES/EBU connections. Multiple modules can be added to the MEC in any desired configuration. For this review, I tested the PARIS Bundle 3 with one each of the three currently available expansion modules.

SETUP

Hardware setup and software installation went smoothly, once I had doubled the RAM in my Mac G3/233 from 32 MB to 64 MB. Ensoniq recommends that Mac users have at least 48 MB of RAM and allot at least 36 MB to the PARIS application. Your hard drive must deliver 1.6 MB/second of data throughput to play sixteen tracks of simultaneous audio. Although PARIS will run with virtual memory turned on, my system really wasn't stable until I disabled it.

One of the beauties of PARIS is that it can turn a modest Power Mac or Pentium-based PC into a humming digital audio workstation, because it handles almost all computations on the full-sized EDS-1000 PCI audio card. This leaves your computer free to handle simple disk subsystem chores, manage recorded data flow, and even run a simultaneous MIDI sequencer. The software is designed to guarantee a specific performance level: the number of playback channels and most DSP functions are not dependent upon the power of your computer, provided it meets the minimum requirements (see the sidebar "PARIS Minimum System Requirements").

ON THE INSIDE

The latest PARIS software (version 1.56) illustrates Intelligent Devices' sincere desire to improve an already great product by constantly refining its user interface. A DAW's interface should be detailed, uncluttered, organized, customizable, and easy on the eye. One glance at the screen told me that PARIS is elegantly designed, although, to some, it might seem a bit too detailed in certain areas while other things should have stood out more. Overall, I found the interface to be organized in an intelligent and logical manner.

In the software's current incarnation, there are twelve windows, each of which can be accessed through a drop-down menu, from the computer keyboard, or from the Control 16 hardware unit. Recordings are started in the Project window, where fundamental information such as frame rate, sample rate, SMPTE offset, and basic file-management data is established. However, you'll spend most of your time in the Editor, Mixer, and Automation Editor windows, where the main recording chores are handled. There is an Audio window for importing and exporting audio files, and a Background Tasks window keeps you apprised of background processing. Transport, Locator, Patch Bay, and Mini Mixer windows are also available. Up to 99 customizable views can be saved with a Project and recalled for specific sessions.

Recording with PARIS is simple. After selecting a hard-disk destination for the audio files, you're ready to go. You can record in either Constrained mode or Free Form mode. Constrained mode operates basically like a multitrack tape machine: you arm a track and record, and then arm the next track for further recording. Each track is played back through a corresponding channel in the Mixer window (e.g., track 1 is controlled by channel 1). This makes PARIS comfortable for those just getting their feet wet with DAWs.

Free Form mode is much more involved and allows you to record multiple passes of a single part. This mode offers up to 999 Flextracks (virtual tracks) for each group of sixteen tracks. After a track has been recorded, it is moved down in the Editor window, and

FIG. 3: The Modular Expansion Chassis (MEC) can accommodate up to five I/O modules. Three modules are currently in production: the A8iT-24 8-channel, 24-bit A/D interface, the A8oT-24 8-channel 24-bit D/A interface, and the EDS-ADI-01 8-channel ADAT optical interface. Future modules will provide AES/EBU and TASCAM TDIF I/O.

For manufacturer information, please see Contact Sheet, p. 195.

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"I'm a big fan of the concept of software, the concept of synthesis, and the concept of Reality."

Rob Arbittier, co-founder of Noisy Neighbors Productions, writes and records music for TV and for movie trailers and has numerous album production credits. Much of this work is done in his state-of-the-art digital home studio. With a busy schedule of music production at multiple levels, Rob counts on the best tools to complete his work. He needs power, reliability, and performance. That's why he chose Reality as a crucial part of his studio.

"I've always been fascinated with the original synthesizers, the modular patchable synthesizers, and the evolution from those giant Moog modular systems to what we have today. The thing that got me excited about Reality was that I knew it was going to be very flexible and that it would model in software the types of synthesis that I've always loved in hardware. It's a new approach to the kinds of sound generation that I've used for many years.

"I love the fact that it's so easy to design sounds on the screen. I use it the way I would have used a modular synthesizer 20 years ago. It's a very quick, easy way for me to design a sound from scratch.

"I use Reality as a stand-alone synthesizer because I don't like having my computers multi-task during a session. I like being able to look up at any one screen and see everything that computer is doing during the session. I keep it on the PC that's right next to the Cubase VST™ PC, so while the sequencer is playing I can be fiddling with the sounds on the Reality PC. I have Reality installed on a machine that has a high quality digital output. When you hear Reality through a digital out, the richness of the sound it generates is just amazing."

Rob's work can be heard on albums by many artists, including Stevie Wonder, Michael Jackson, Whitney Houston, Ray Charles, Stevie Ray Vaughan, and Diana Ross. He has scored hundreds of television commercials for companies such as Coca Cola,® Anheuser-Busch,® Kodak,® and the four major television networks. Recent film trailers include *Godzilla*, *Les Miserables*, and *One Night Stand*.

For more information about Reality professional synthesizer software and Rob, visit our website at www.seersystems.com or call us toll-free at 888.232.7337.

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a new Flextrack is automatically created above it. This new Flextrack is assigned to the same channel strip as the previous Flextrack. Upon completing each take, the most recent pass is given the highest priority, meaning it will be the one that you hear on playback; the rest will be muted. You can then cut and paste various sections of different Flextracks to compose a final track for that instrument, or you can assign the different recordings to whatever faders you like. (In this mode, you map tracks to faders in the Instruments window.) This powerful editing feature makes PARIS a valuable tool for any audio production arsenal.

Before you dive in, you may want to feel your way around the application a bit. Ensoniq provides a demo (complete with 250 MB of audio files) that walks you through the entire recording process. By the end of the tutorial, I felt like I had a solid grasp of the system, and a couple of hours later I was recording and saving rudimentary mixes.

THE JOY OF EDITING

A lot of action takes place in the Editor window (see **Fig. 4**), so of course it's full of tools and buttons. However, the window is not at all cluttered; in fact, it's ergonomically well designed. The number of tracks displayed vertically and the horizontal width of the Editor window can be tailored to your taste and monitor size.

After a track has been recorded, a waveform representation of the audio appears in the Playing Field. The waveforms can be zoomed from an entire file to a single-line waveform. Zooming in vertically automatically adjusts the size of the waveforms to show fewer tracks. Waveforms can also be viewed as bipolar (a zero-crossing line runs through the center axis of the audio) or as gain rising above the zero line. The Now line shows the transport's current position and scrolls through the audio on playback. When the transport is stopped, you can scroll (either in Shuttle or Jog mode) with the physical jog wheel on the Control 16, which is much easier than trying to find locations with the mouse. As of this writing, audio scrubbing has not yet been implemented, but it is planned for the next software upgrade. In addition, although you can zoom in to set cut points, the software does not currently support waveform editing.

The right side of the Editor window contains the Object Bin, where audio files (Objects) are stored until they're activated by being dragged onto the Playing Field. All audio files that are part of a Project appear in this list, regardless of whether they were recorded into PARIS directly or imported from a hard drive. Below the Playing Field, track time can be displayed as SMPTE, minutes:seconds:milliseconds, seconds, samples, or bars/beats. All time displays can be simultaneously active, or you can pick and choose any combination.

In the upper left corner of the Editor Window is the SUSHI Bar (Standard User Show/Hide Indicator Bar—I'll forgo the bad jokes!). When you press one of the seven buttons on the SUSHI Bar, rows of tools and information related to a particular function are displayed. The SUSHI Bar keeps the screen simple and uncluttered, while giving you quick access to tools when needed.

The six feature sets currently available through the SUSHI Bar are Object Data (cursor position, start and end times, Instrument name); Show/Hide (waveform, bipolar view, track name, Instrument name, color-coding of tracks, sync points, Object Bin, Instruments); Grid & Snap (grid display, ruler display, Snap locations, vertical time display); Tools (selector, time-locked selector, move, zoom, audition, split Object, join Object, auto-scroll, waveform zoom); Nudge & Slip (start, all, end, slip); Object Jails (clipboards); and Information (a help feature). The seventh button, Crossfade, is not yet active—the crossfade Editor has not been implemented yet but is planned for the next software upgrade.

This system's ease of use is especially apparent with its Nudge & Slip functions, which allow you to alter the position of the audio in several ways. Objects can be moved left or right in

PARIS Interface Specifications

	INTERFACE 2	INTERFACE 442	MEC AND MODULES
ANALOG I/O			
Inputs	(2) ¼" TRS	(4) ¼" TRS	(4) ¼" TRS (MEC); (8) ¼" TRS (A8iT-24)
Outputs	(2) ¼" TRS	(4) ¼" TRS	(4) ¼" TRS (MEC); (8) ¼" TRS (A8oT-24)
I/O Level	+4 dBu/-10 dBV	+4 dBu/-10 dBV	+4 dBu/-10 dBV
A/D Conversion	20-bit, 128x oversampling	20-bit, 128x oversampling	20-bit, 128x oversampling (MEC); 24-bit, 128x oversampling (A8iT-24)
D/A Conversion	20-bit, 128x oversampling	20-bit, 128x oversampling	20-bit, 128x oversampling (MEC); 24-bit, 128x oversampling (A8iT-24, A8oT-24)
DIGITAL I/O			
ADAT	No	No	8-channel optical (EDS-ADI-01)
S/PDIF	No	Yes	Yes (MEC)
OTHER CONNECTIONS			
External Clock	No	2 BNC	2 BNC (MEC)
Expansion	No	8-pin mini-DIN	8-pin mini-DIN (MEC); 9 expansion slots (MEC)

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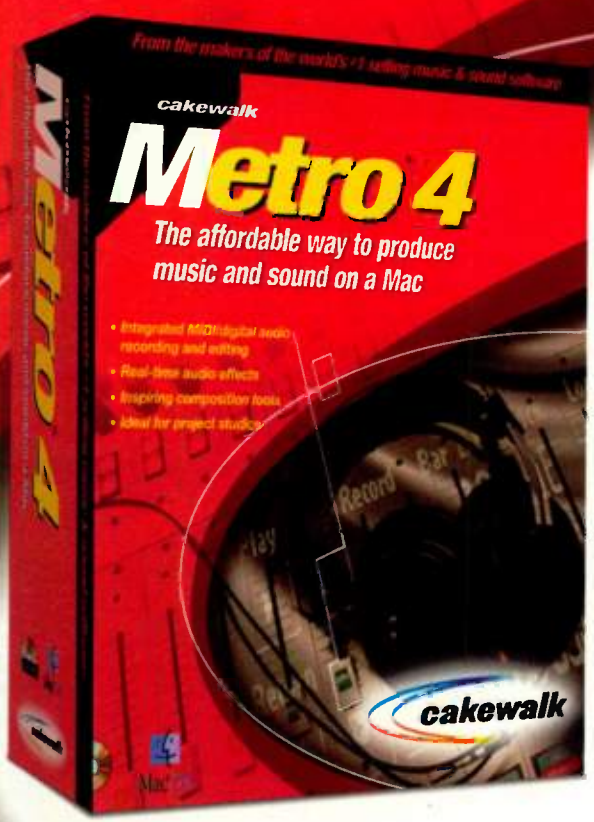

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time, and waveforms can be slipped left or right within the fixed end points of an Object. A row of icons lets you select time values for nudging and slipping in milliseconds (100, 75, 50, 25, 10, 5, or 1 ms) and choose the direction in which the time adjustments are made.

Object Jails are collections of 32 drag-and-drop clipboards that can be used to store Objects while performing edits. Objects can either be moved or copied to the Jails from the Playing Field, and each Jail can hold Objects from multiple tracks. You can also choose to have Objects restored to their original, time-locked position when dragged from a Jail back onto the Playing Field. Because the data stored in a Jail is simply the start, end, and location information of an audio file—not actual audio data—the Object Jails allow flexible experimentation with files. (Experimentation is also encouraged by PARIS's 99 levels of undo.) The contents of the Jails can be saved with the Project, so they're available when the session is recalled. These are practical, useful features that can save a lot of time.

The Editor window allows you to drop in up to 999 Markers. These can be inserted on the fly, from either the screen or the Control 16, and fine-tuned later. PARIS places the Markers exactly where you tap them in; if you have good rhythm, they'll show up in the right spots on the first pass. Another great feature is the ability to scroll between Markers in Play mode by using the Next and Previous buttons on the Control 16. Playback automatically jumps to the Marker location. Markers can also be numerically entered from the Control 16, which makes it extremely easy to navigate a song.

PARIS also ships with BIAS *Peak LE* for Mac and Steinberg *WaveLab Lite* for Windows, for further editing and file compatibility. That's nice, but neither application is compatible with the PARIS hardware, so you must use either another sound card or, if you have a Macintosh, Apple Sound Manager and the Mac hardware.

MIXED NUTS

You'll probably spend a lot of time in the Mixer window (see **Fig. 5**), and you'll love it! Each channel strip contains all of the essentials you'd expect from a hardware mixer: a long-throw fader; a level meter with headroom indicator; solo and mute buttons; a pan pot; EQ controls; an aux send section; an insert section; and Record Enable, Record Automation, and Edit Automation buttons. The latest software also features a Live Mixing mode, which allows PARIS to act as an automated, 16-channel mixer for live inputs.

Ensoniq knows how to do DSP (have you ever played with a DP/4?), and the company hasn't cut any corners with PARIS. Every channel offers four independent, 20 Hz to 20 kHz EQs, each featuring ±18 dB of gain, five EQ types (low shelf, lowpass, parametric, high shelf, highpass), and continuously variable, parametric bandwidth and bandpass/shelf slope rate. The equalization is comprehensive: an All EQ button toggles the channel's EQ on and off, a trim pot adjusts the gain of the EQ path, and a phase switch reverses the polarity of the EQ signal. Each band also has an On/Off button and a clip indicator. To conserve screen space, users can select how many EQ bands are visible, and the entire EQ section can be collapsed or expanded at the click of a button.

Each channel can be configured with up to four mono insert effects (dynamics processors or delays), as well as up to eight stereo or mono auxiliary sends. (The EPS-1000 audio card can

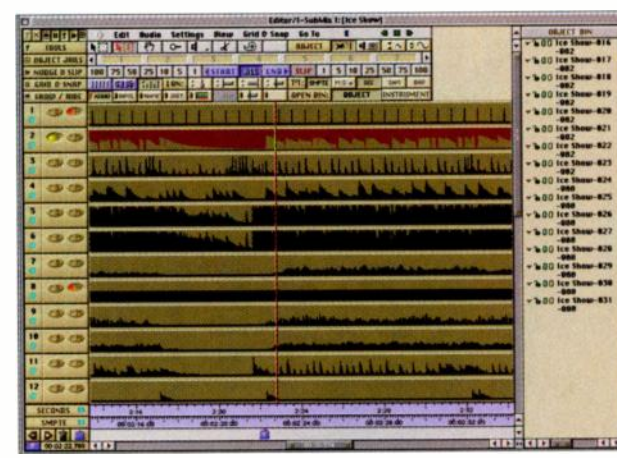
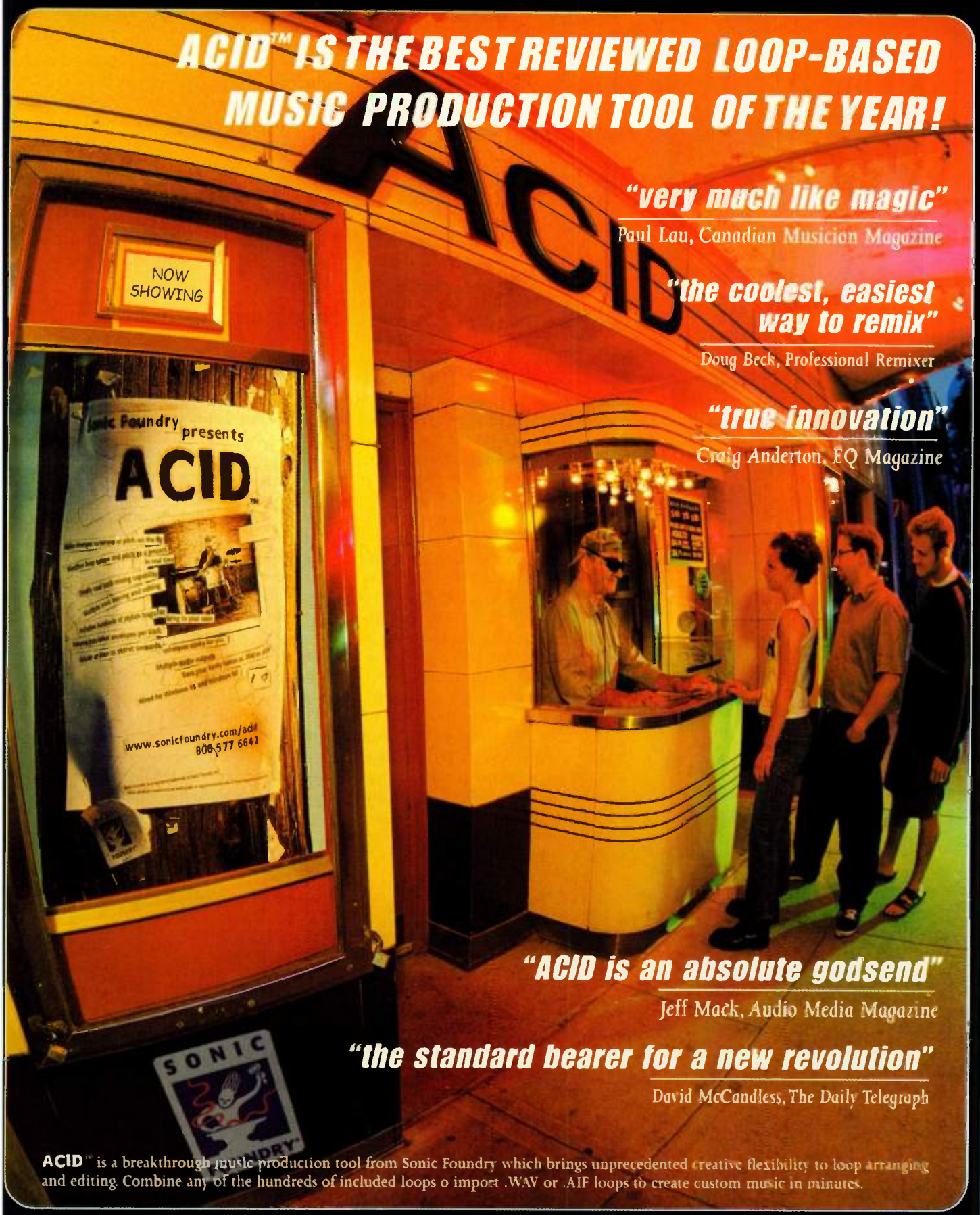


FIG. 4: The Editor window is where much of the action takes place in PARIS. Up to 99 customizable views can be saved and recalled, and the SUSHI Bar provides instant access to a number of tools without cluttering the display.



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accommodate a total of 64 sends.) Once VST and DirectX support have been added, four additional mono inserts will grace the insert section.

Each EDS-1000 card can handle up to sixteen mono or eight stereo effects (or any combination that totals sixteen returns). PARIS ships with a selection of 24-bit, native, real-time DSP plug-ins, including a stereo compressor, expander, gate, delay, reverb, and several chorus-based effects. There are three types of reverb: room, non-linear, and plate. All are derived from the reverb algorithms of the Ensoniq DSP24 Pro. The room and nonlinear reverbs are true stereo in/out, while the plate reverb is a mono in/stereo out effect. The chorus-based effects are comprehensive, including several types of choruses, flangers, phasers, and auto-panners.

I'm not quite sure how PARIS's DSP allocation works, but I do know that using multiple stereo reverbs will eat up the available processing power before you max out the typical insert/send limit. However, I was able to run a couple of stereo reverbs, in addition to a chorus and delay effect, without having a DSP problem. Here's the best part: the DSP allocation doesn't affect the channel EQs. All 64 are available simultaneously and are not compromised by other employed DSP programs! If you do max out the system, PARIS simply won't let you open another insert effect (which is preferable to having an effect die on playback). Intelligent Devices plans to incorporate a DSP-allocation meter in the near future.

PARIS can perform several non-real-time processes, including gain change, polarity change, and sample-rate conversion. Time compression and expansion are available in five levels of quality, in addition to one level of pitch shifting. A Super Normalize feature works similarly to Waves' *L1 Maximizer* plug-in, providing an apparent level increase with selective peak limiting and normalization.

The effects all sound great and are totally professional; I would have no problem using any of them for the most demanding project. And, between the channel EQ, dynamic effects, and multi-effects, you get a ton of processing power. Furthermore, as of this writing, Ensoniq claims to be only weeks away from implementing VST (Mac and Windows 95) and DirectX (Windows 95) plug-in support. This opens the door to the world of third-party plug-ins. The future looks bright for PARIS.

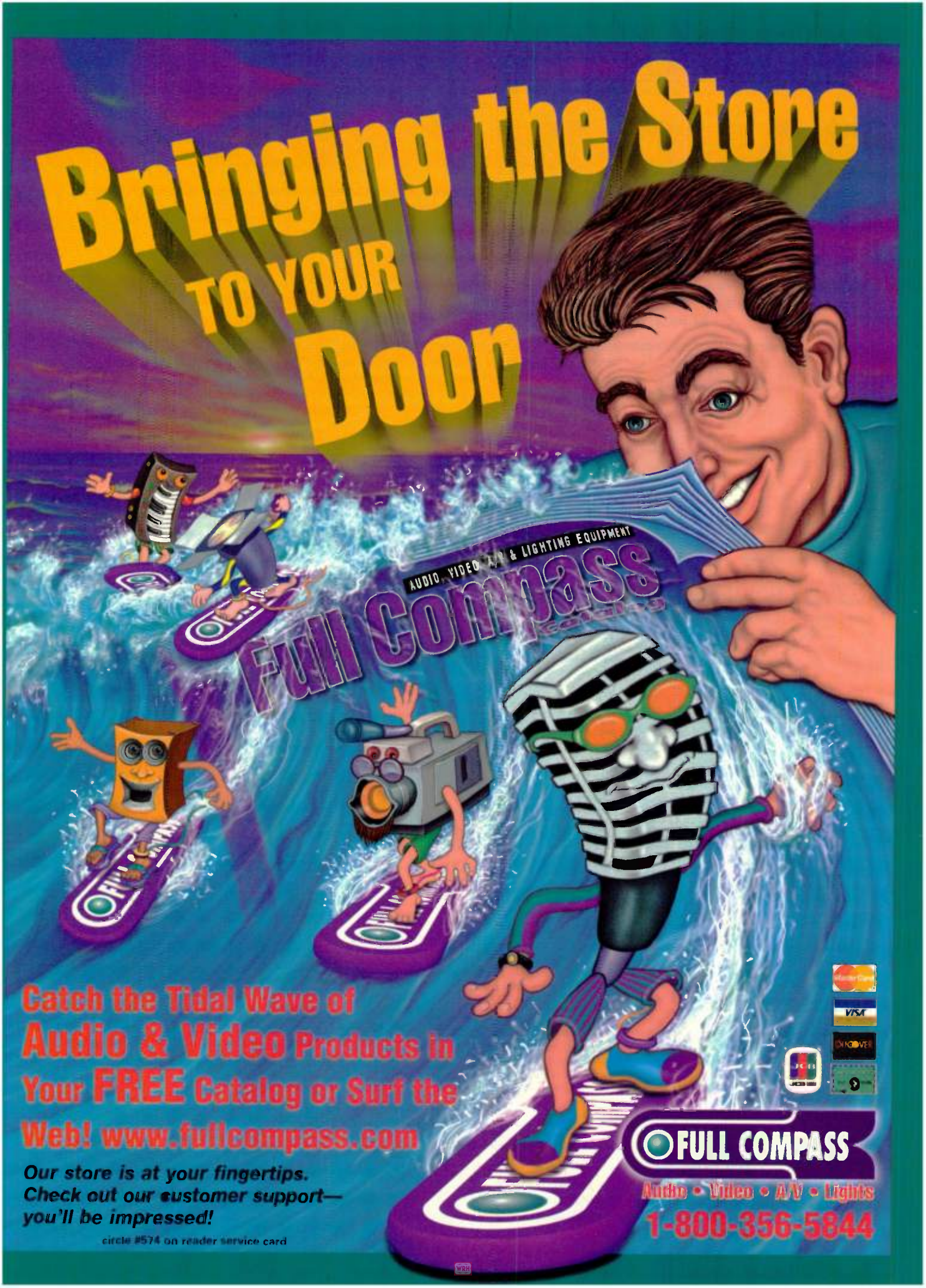
MIXES AND MORE MIXES

One great feature that PARIS offers (unlike many other DAWs) is intelligent submixing. This feature, new to version 1.5, allows you to store up to eight submixes per Project, for a total of 128 tracks. A submix is a stereo audio file created from a mix of the sixteen tracks appearing in the Mixer window. This new audio file can then be played back from disk while sixteen additional tracks are added on top. These new tracks can also be submixed and the process repeated. Any of the submixed, 16-channel groups can later be remixed, if needed (none of the original audio data is lost), and each submix has its own Editor, Mixer, Automation, and Mini Mixer windows.

Once you've submixed a track group, DSP allocation is freed up for the next group of tracks—another very hip feature. The submixes are currently written in real time, and Intelligent Devices is adding software that will allow them to be written in the background.

Submixing is a great way to augment your track count and to monitor large

FIG. 5: The Mixer window is comprehensive, offering a long-throw fader, a level meter with headroom indicator, solo and mute buttons, a pan pot, EQ controls, an aux-send section, an insert section, and record-enable and automation buttons.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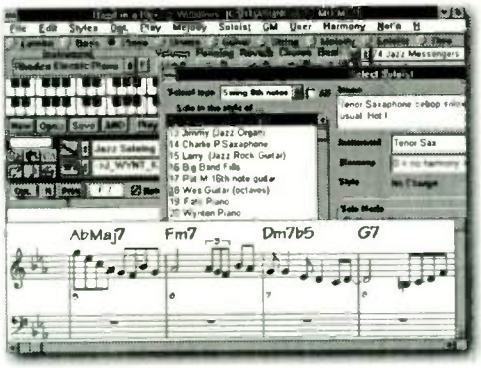

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- **Soloist Disk Set 6: Killer Pop & Older Jazz**
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An exciting aspect of the Soloist feature in Band-in-a-Box Ver. 7 is that the program is able to increase its musical intelligence by analyzing new 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 Band-in-a-Box with your favorite types of music. **(NOTE:** Soloist Disk Set #1 is included with Band-in-a-Box 7.0 and upgrade, so is not offered as an add-on.)

Styles Disk 9 (Latin). 20 authentic Latin and Salsa styles as designed by top Latin pianist **Rebeca Mauléon-Santana**. Including Salsa, Conga, Cumbia, Merengue, Son, Mambo, Cha-cha-cha, many more.

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Band-in-a-Box prices...

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Band-In-A-Box Pro *(first time purchase)* *Version 7, Styles Disks 1-3, Harmonies Disk 1 + Soloists Disk 1*	$88
UltraPAK *(first time purchase)* *The UltraPAK includes Pro version 7, Styles Disks 1-8, Harmonies Disk 1 plus Soloists Disk 1*	$189

UPGRADES

Regular Upgrade to Version 7 *(Windows/Mac)* *Includes Styles Disk 8 + Soloists Disk 1* *Upgrade from Version 6 for Windows/Mac*	$49
Upgrade to UltraPAK *Includes Regular Upgrade (above) plus Styles 1-8 for Band-in-a-Box*	$89
Upgrade to MegaPAK from Band-in-a-Box Pro	$149
Upgrade to MegaPAK from Band-in-a-Box UltraPAK *The MegaPAK contains Version 7 and ALL of the ADD-ONS (see list below), as well as the 2-volume Video Instruction set*	$109

ADD-ONS

Styles Disk 4 *(Windows/Mac/Atari)*	$29
Styles Disk 5 *(Windows/Mac)*	$29
Styles Disk 6: Jazz & Latin Styles *(Windows/Mac)*	$29
Styles Disk 7: Country & Pop Styles *(Windows/Mac)*	$29
Styles Disk 9: Latin/Salsa *(Windows/Mac)*	$29
Styles Disk 10: Pop & Rock *(Windows/Mac)*	$29
Styles Disk 11: Classical & Classical MIDI-FakeBook *(Windows/Mac)*	$29
SPECIAL! **Styles PAK** – Styles Disks add-ons #4-11 (adds over 220 styles)	$99
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MEMORY REQUIREMENTS: DOS (640K), Windows (8 mb), Macintosh (8 mb), Atari (1040)

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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 and David Torkanowsky playing a wide variety of New Orleans, R & B, Blues, and Ragtime piano music.

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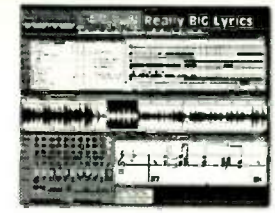

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Vol. 1 (50 pieces) $49 • Vol. 2 (50 pieces) $49 • Vol. 3 (60 pieces) $49

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 plus files in Band-in-a-Box format. On-screen notation makes sight-reading fun! (NOTE: Macintosh users get on-screen-notation only when running the files in Band-in-a-Box; Volumes work together or as standalone programs.)

The Jazz Guitarist™ (Windows & Macintosh) $49

Over 50 jazz standards played on MIDI guitar by top jazz/studio guitarist Oliver Gannon

Hear the music with CD-quality through your sound card or MIDI system. Most pieces have bass/drums plus guitar so you get a full sounding jazz trio for the tunes! On-screen fretboard shows you exactly what notes & chords are being played on the guitar. **PLUS MUCH MORE...** ✔ Jazz Trivia game & Guess that Song game ✔ Memos, & bios (all on disk) ✔ Over 50 Top jazz standards with complete guitar arrangements ✔ Background playback so you can listen while working in other programs ✔ Special support for Roland GS or General MIDI modules ✔ Standard MIDI files can be used in other programs or for presentations ✔ Use your existing sound card or MIDI synthesizer.

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 and piano keyboard, piano notation printout, background playback, Music Trivia and Guess the Song games, plus much more!

The Gospel Pianist™ $49

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

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"INSIDE BAND-IN-A-BOX" 2-volume Video Instruction set for Ver. 7 $49
Over 3-1/2 hours of video instructions, narrated by program creator Peter Gannon. Vol. 1 Basics, creating & entering songs, solos & entering notation; Vol. 2 Advanced, creating harmonies, new soloists & new Styles. NOTE: Video demonstrates Windows version. Mac version has similar features.

"Virtual Sound Canvas VSC55" from Roland for Windows $20*
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projects. This feature is particularly handy for people working on film and video scores, as each submix could represent a particular stereo element (e.g., dialog, live music, synths, Foley, and sound effects).

C'EST LA VIE

I was a little disappointed in the automation section: unfortunately, it's still a work in progress. Although you can record and edit your level, return, pan, and mute automation settings (either onscreen or with the Control 16), there is currently no graphic automation editing.

Also, as of now, PARIS will sync to MTC and supports MMC but has no other MIDI features. It is possible to run a full-featured sequencer simultaneously (which could sync via MTC), but it would be nice if PARIS had more MIDI features. To Ensoniq's credit, its excellent Web site has several documents that help users get many popular Mac and PC software sequencers to peacefully coexist with PARIS. I used PARIS with Emagic's *Logic Audio* and Steinberg's *Cubase VST* and had no problems once I had configured OMS according to Ensoniq's recommendations. Intelligent Devices has assured me that MIDI-controlled record/playback support is in the planning stages.

ON THE SURFACE

One of the more impressive aspects of PARIS is the Control 16. This sleek control surface seamlessly incorporates the feel of tape-based recording with the flexibility of hard-disk recording. Durably built, the Control 16 provides sixteen 100 mm channel faders and a master L/R fader, transport controls, a jog wheel, mute and solo buttons, record-enable buttons, and various buttons for controlling functions such as markers, views, loops, and punches. In addition, the Control 16 sports a dedicated set of channel-assignable controls for EQ (frequency, level, and bandwidth), pan, and aux-send value.

Although you can't handle every aspect of PARIS from the Control 16, the controller definitely minimizes the amount of time spent with your hand

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ENSONIQ

PARIS hard-disk recording system
Bundle 1 (PCI card, Interface 2, Control 16, PARIS software) $2,895
Bundle 2 (PCI card, Interface 442, Control 16, PARIS software) $3,395
Bundle 3 (PCI card, MEC Interface, Control 16, PARIS software) $3,895

FEATURES ■■■■
EASE OF USE ■■■■
AUDIO QUALITY ■■■■▮
VALUE ■■■■▮
1 2 3 4 5

PROS: Affordable. Supports 24-bit audio recording. High-quality DSP plug-ins. Expandable I/O options. Intelligent submixing. Control 16 hardware surface makes for easy operation. Sample-accurate ADAT synchronization (with EDS-ADI-01).

CONS: Control 16 doesn't offer metering, editing controls, or file commands. Waveform automation editing not implemented as of this writing. Few MIDI capabilities.

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And there are 3 great 20-bit ADAT Type II recorders to choose from! Want the ultimate in low-cost, pro-quality recording? Choose the LX20. The "work-horse" of the Alesis 20-bit line is the powerful XT20. And for top installations where only the best will do, consider the amazing M20. No matter which 20-bit ADAT you choose, you get the phenomenal sound quality of true 20-bit recording. Of course, your new 20-bit ADAT Type II will play any current 16-bit ADAT tapes.

Why wait another minute to enjoy 20-bit ALESIS ADAT TYPE II quality? Take advantage of this unique offer from Sweetwater Sound today!

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*Want some proof? What other retailer has a full page ad in this magazine offering to pay you money when you upgrade to 20-Bit!

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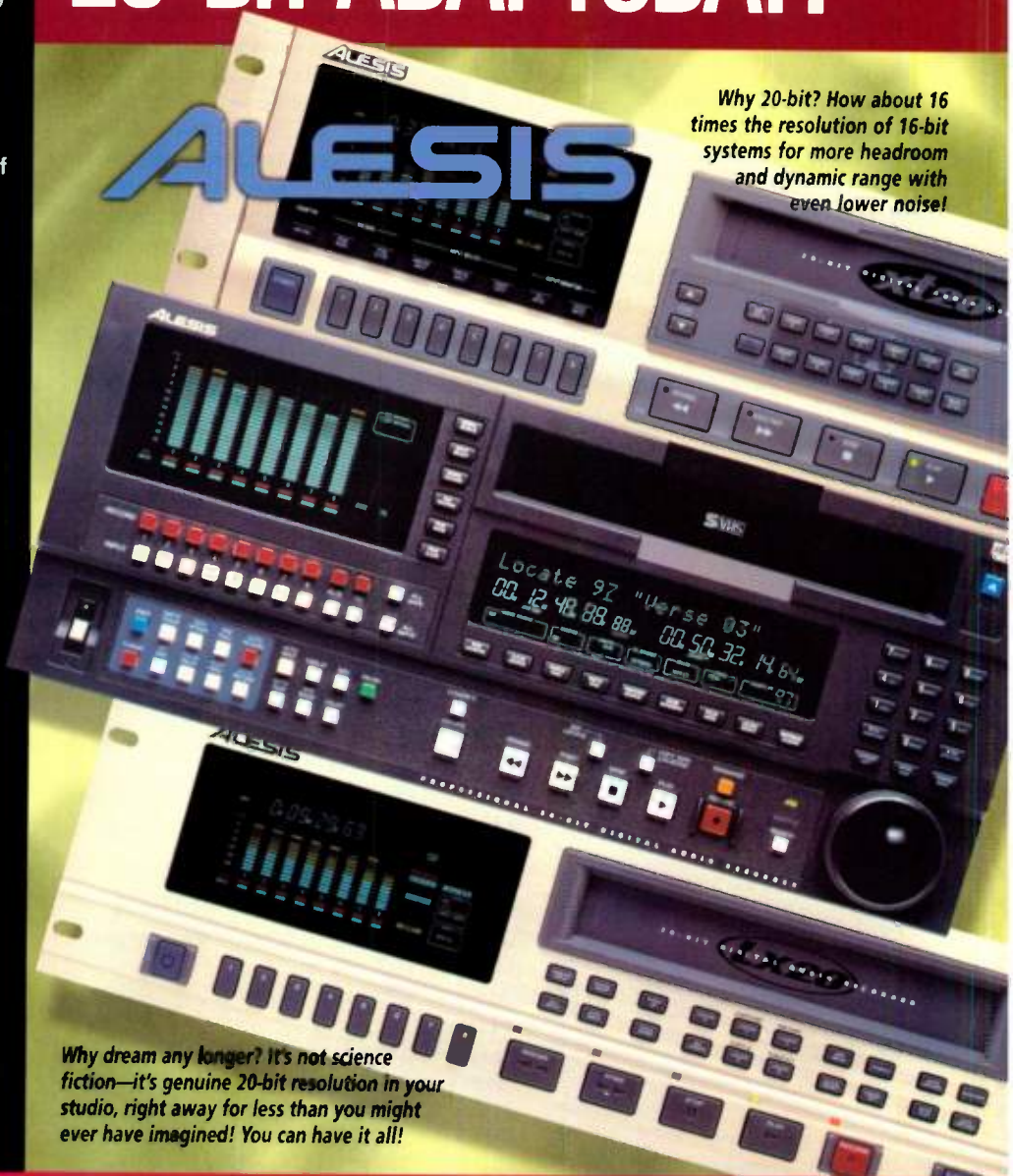

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on a mouse. The feel of the Control 16 is solid overall: the transport controls and jog wheel are magnificent, the faders are adequate, and the buttons seem durable. Unfortunately, you can't save your work or do cut/copy/paste operations from the Control 16, and there is no visible metering.

Still, it feels good to grab real faders and familiar transport controls. Adjusting equilization, panning, and aux sends with knobs and buttons allows you to quickly throw together a rough mix from scratch. The Control 16 is definitely one of the hippest features of the PARIS system.

OPTIONAL I/O

The ADAT interface is well designed and a joy to work with. The EDS-ADI-01 module (which requires the MEC Interface) provides eight channels of ADAT Optical (Lightpipe) I/O, in addition to a 9-pin ADAT Sync Out for controlling ADAT transports. Up to sixteen ADATs can be synched with PARIS through a master ADAT. If you wish, the software can fully automate the digital transfer of data between PARIS and one ADAT (per EDS-ADI-01 module) with sample accuracy. (In contrast, several popular DAWs cannot perform true sample-accurate MDM synchronization.)

An ADAT window in PARIS allows you to arm record tracks on the master ADAT, locate specific tape positions, and set which ADATs in the chain will chase and which will not. Additional windows allow you to route incoming ADAT signals to various tracks, external I/O devices, and insert effects. There are also provisions for exporting tracks pre- or post-EQ, and for exporting tracks with the channel inserts active. If you are transferring tracks from a 20-bit ADAT, you need to select 24-bit recording in the Project window to maintain audio fidelity. The 24-bit files will lose the bottom four bits of data when they are transferred to a 20-bit ADAT, but hey, it's still going to sound pretty darn good!

I also tested the other available I/O expansion modules. The 8-channel input (A8iT-24) and 8-channel output (A8oT-24) modules provide 24-bit I/O through ¼-inch tip-ring-sleeve connectors. Of course, the stock, 20-bit MEC converters sound good, but these 24-bit modules really shine; they're definitely worth it if you're going to mic live instruments. I tried the modules out with some AKG 451s on my Yamaha 6-foot grand piano. Sonically, the recording was exquisite and detailed, and surpassed the sound of the 20-bit converters, hands down.

PARIS Minimum System Requirements
Mac: Power Mac 603/150 (G3-compatible); 32 MB RAM (48 MB recommended); Mac OS 7.5
PC: Pentium 133; 32 MB RAM; Windows 95

PARIS Specifications

GENERAL	
Platform	Mac or Windows 95
Number of Tracks per EDS-1000 PCI Card	16 simultaneous (128 virtual)
Sampling Rate	44.1 kHz or 48 kHz, selectable
Resolution	16-bit or 24-bit, selectable
AUDIO SPECS	
Frequency Response	7 Hz–20 kHz (+0/-0.5 dB) @ 44.1 kHz; 1.5 Hz–23.1 kHz (+0/-3 dB) @ 48 kHz
Crosstalk	>-90 dB @ 1 kHz; >-76 dB @ 15 kHz
THD	0.0002% @ +4 dBu
Signal-to-Noise Ratio	>94 dB
MIXING SECTION	
Channel Functions	level, solo, mute, pan, aux send levels, EQ control, record-enable, record automation, edit automation
Channel Inserts	4 (64 total per EDS-1000 card)
Aux Sends	8/channel
Aux Returns	8 stereo
Automation	dynamic, scene
Submixes	8 x 16 track groups
DSP EFFECTS	
Real-time DSP Processing	4-band parametric EQ, chorus, reverb (room, plate, nonlinear), compression, expansion, gate, delay
Non-real-time Processing	time compression/expansion, pitch shifting, normalization, phase inversion, sample-rate conversion
CONTROL 16	
Faders	16 channel + 1 stereo master (100 mm, long-throw)
Channel Controls	record-enable, signal source, pan, mute, solo, aux-send levels
Global Controls	transport, locate, shuttle/jog wheel, numeric entry pad, studio monitor level, assignable EQ controls

I LOVE PARIS

I love PARIS in the springtime—and I'll still love it in the summer, fall, and winter. I don't know of another digital audio workstation in this price range with so many well-implemented features. Most of my complaints can be easily addressed through software upgrades, and many fixes are already on the way. As Ensoniq and Intelligent Music continue to enhance the software and the line of hardware expansion modules, PARIS could be the DAW to beat in *any* price range. This system is a real winner.

Composer and producer **Rob Shrock** *is the musical director and keyboardist for Burt Bacharach. He was recently in the recording studio with Bacharach and Elvis Costello, working on an upcoming collaboration between the two legendary songwriters.*

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ALESIS

XT20 AND LX20

Two new ADATs bring 20-bit tape recording to the personal studio.

By Michael Cooper

With a price tag of $1,899, the new Alesis LX20 makes tape-based digital recording a practical reality for almost any studio.

There's no question that the ADAT has made its mark in the recording community. There are currently over 100,000 of these units sitting in the racks of professional and personal studios around the world. But the ADAT's climb to the top has not been completely rosy. Sure, the original (often called "blackface") ADAT took the industry by storm; after all, it was the first mass-produced modular digital multitrack. But at the same time, this revolutionary recorder drew an equal amount of criticism from professionals who felt that some of its performance features were somewhat "illogical" and "below par."

In 1996, Alesis addressed those concerns with the ADAT-XT, a product whose main purpose was to quell the critical masses. It succeeded brilliantly. This year, Alesis introduced even more new ADATs, but this time the company is ahead of the game: more than addressing shortcomings, the new models look to the future.

A FEW GOOD ADATS

The XT20 and LX20 are both 20-bit recorders that introduce Alesis's ADAT Type II line. They replace the 16-bit ADAT-XT, now referred to as "Type I." Lest there be any confusion, these resolutions are not limited to the A/D or D/A conversion; Type II machines not only have 20-bit A/D converters but they also record 20-bit digital audio to tape. Theoretically, 20-bit audio has sixteen times higher resolution than 16-bit audio. Imagine a television screen that shows sixteen times as much detail as your current boob tube, and you get the picture (so to speak).

But why *two* new 20-bit ADATs? Because, like any smart company, Alesis recognized the importance of meeting the needs of several groups within the audio-recording market. (Actually, there are now *three* 20-bit ADATs; several months after the release of these two units, Alesis shipped the M20, which is geared toward higher-end recording and post-production applications.)

These two ADATs are aimed at the personal studio market, but they are designed for different users. The XT20 ($2,599) offers a lot more features than the LX20 ($1,899)—but don't jump to conclusions! As you'll see, many of the XT20's advantages evaporate when an Alesis BRC and a digital mixing console enter the picture. Either one of these new MDMs might be right for you, depending on your needs.

MATING GAMES

To answer the most obvious question, all Type II ADATs are fully compatible with Type I ADATs. I had no problems taking tapes that were recorded on an original, blackface ADAT and playing them on the new Type II machines. The blackface ADAT also played back 16-bit tapes recorded on the XT20 and LX20 with no problems. I even synched up an original ADAT with an XT20 for some 16-track work; aside from the fact that the new machine had much quicker wind times (the Type II machines employ the ADAT-XT's improved transport), everything worked without a hitch.

The new ADATs can play or record in 16-bit mode, and they automatically recognize whether an S-VHS tape has 16- or 20-bit data on it. The two things you *can't* do are record 16- and 20-bit data on the same tape and play a 20-bit, Type II tape on a Type I machine.

OUTPUT CRAZY

You can set the digital output of the new ADATs to 20- or 16-bit resolution and add dither to the 16-bit output. The latter is useful for making a 16-bit digital copy of a 20-bit tape for use with Type I ADATs. But for some reason, the digital outputs default to 16-bit on power-up, which seems odd for 20-bit machines. This is true even if the output was set to 20-bit the last time the unit was turned on. It's entirely too easy to forget this, and you could unknowingly throw away four precious bits during digital mixdown. Alesis is aware of this situation and is considering making the digital output default to 20-bit.

Thankfully, all analog and digital outputs are hot simultaneously. If you own a digital mixer, this opens the door to a number of creative applications. For example, I was able to trigger a snare sample using the analog output of a recorded snare drum track while using the digital output to send the signal to my Yamaha 02R for EQ, effects, and dynamics processing. I then mixed the two together to create a fantastic snare sound.

Here's another cool application: because there's a slight time delay between the analog and digital inputs of a

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digital mixing console, you can pan the ADAT's analog and digital output signals opposite each other for a subtle stereo effect. Just watch out for phasing when you collapse the mix to mono!

STANDARD OR DELUXE?

Obviously, Type II recorders offer better fidelity than their predecessors. But what do you get for an extra $700 when you buy an XT20 instead of an LX20? Let's take a look at the major differences between the two machines.

Converters. The XT20's A/Ds are 20-bit linear, 128-times oversampling, and the D/As are 24-bit linear, 128-times oversampling; the LX20's A/Ds and D/As are all 20-bit linear, 64-times oversampling. The XT20 has discrete A/D and D/A chips, and its A-weighted dynamic range through both converters is 102 dB in 20-bit mode. The LX20's A/D and D/A converters are on the same chip, causing the dynamic range to suffer a bit: only 97 dB, A weighted, in 20-bit mode. That, however, is still considerably better than the original ADAT's dynamic range of 92 dB.

For a real-world perspective, I set up A/B tests to compare the converters. I recorded male lead vocals with a Lawson L47MP tube condenser mic run through a Millennia Media HV-3 preamp. Eight ASC Studio Traps were arranged around the singer to even out the tracking room's frequency response. A full ASC Attack Wall, which uses around twice as many Studio Traps as well as four Monitor Traps arranged in a soffit configuration, was employed in the control room. Playback of the A/D tests was through the D/As on a Yamaha 02R.

Compared to the LX20's A/D converters, the XT20's converters provided a bit more midrange clarity and better transient response. To a much more subtle (but still audible) degree, the XT20's converters also provided more sonic depth and nuance. That is, they produced a sound that was a tad more 3-dimensional and real sounding than the LX20's A/Ds. Forget the hype about increased dynamic range and lower noise floor—this increased depth is what I find most compelling about high-resolution digital audio.

The D/A comparisons were made using a track that was recorded to the LX20 via Apogee AD-8000 24-bit A/D converters (world-class stuff) and the ADAT's digital input. Thus, the LX20's 20-bit A/Ds were not involved in the test. Again, the XT20's D/As were the winners: their sonic clarity, detail, nuance, and depth were superior to the LX20's D/As.

Construction. Cosmetic differences between the two new ADATs are minor; the units look almost identical at a casual glance. However, the XT20's 6-pound, die-cast aluminum chassis is much sturdier than the LX20's bent-metal chassis. (The latter is similar to that used in the original ADAT's construction.) So if you're planning to use your new ADAT on the road (or in any situation where durability might be a factor), you'll want the XT20 instead of the LX20.

The XT20's front panel buttons are also sturdier than the ones found on the LX20. The buttons on the XT20 are made of molded plastic, leveraged over a tactile switch. These give a reassuring click when they're pressed. The LX20's buttons, on the other hand, are made of rubber that contacts a conductive surface directly on the PCB. In essence, there's no switch involved.

Connections. Both units have -10 dBV RCA jacks for analog I/O, in addition to ADAT Optical (Lightpipe) I/O. The XT20 also offers +4 dBu, balanced I/O via a 56-pin EDAC (ELCO-compatible) connector, providing greater RFI/EMI immunity for long cable runs. This should be a consideration for those people doing remote recording.

The XT20 offers friendlier Remote-jack accommodations (see **Fig. 1**): two separate ¼-inch jacks are provided for the LRC remote (locating/playing) and for punching in and out. Both of these jacks can be used with the provided LRC remote or with a standard,

XT20 and LX20 Specs

	XT20	LX20
GENERAL		
Tape Format	S-VHS	S-VHS
Heads	4 (2 read, 2 write)	4 (2 read, 2 write)
Number of Tracks	8	8
AUDIO		
Sample Rate	44.1 or 48 kHz selectable	44.1 or 48 kHz selectable
Resolution	16- or 20-bit selectable	16- or 20-bit selectable
Frequency Response	20 Hz–20 kHz (±0.5 dB)	20 Hz–20 kHz (±0.5 dB)
Dynamic Range	120 dB, A weighted	97 dB, A weighted
Total Harmonic Distortion	<0.003%	<0.009%
Channel Crosstalk	> -90 dB @ 1 kHz	> -90 dB @ 1 kHz
TRANSPORT		
VariSpeed Range	+100/-300 cents (@ 44.1 kHz)	+100/-300 cents (@ 44.1 kHz)
Fast Wind Rate	40 x play speed	40 x play speed
I/O		
Analog Inputs	(8) unbalanced RCA; 8 on balanced EDAC multipin	(8) unbalanced RCA
Analog Outputs	(8) unbalanced RCA; 8 on balanced EDAC multipin	(8) unbalanced RCA
A/D Conversion	20-bit, 128x oversampling	20-bit, 64x oversampling
D/A Conversion	24-bit, 128x oversampling	20-bit, 64x oversampling
Nominal Input Levels	+4 dBu, -10 dBV	+4 dBu, -10 dBV
Maximum Input Levels	+19 dBu, +5 dBV	+19 dBu, +5 dBV
Digital I/O	8-channel optical	8-channel optical
Other Connections	(2) ¼" remote jacks (LRC, punch in/out)	(1) TRS remote jack (LRC, punch in/out)
PHYSICAL		
Dimensions	5.25" (H) x 19" (W) x 11" (D)	5.25" (H) x 19" (W) x 9.25" (D)
Weight	20 lbs.	16 lbs.

For manufacturer information, please see Contact Sheet, p. 195.

FIG. 1: The XT20's rear panel offers both -10 dBV, unbalanced I/O (through RCA jacks) and +4 dBu, balanced I/O (via a 56-pin EDAC connector). ADAT Optical connections are also provided, as well as two discrete jacks for the LRC and a punch in/out pedal.

momentary, single-pole footswitch. (When used with the Locate/Play jack, the footswitch takes you to location 1 on the first press and into Play mode on the second press.) The LX20 offers only one TRS jack for both functions: the tip connection is for the LRC, and the ring connection is for punching. To use a footswitch for punching, you would want to use a Y-adapter so that both jacks are accessible simultaneously.

Both ADATs feature IEC-standard, detachable, 3-prong AC cords (yes!). Unfortunately, both rear panels are quite crowded. The Lightpipe connectors are crammed into a tight space between a 9-pin sync connector and the remote footswitch jacks, making patching the fragile optical cables a somewhat difficult proposition.

Locate points and editing. The XT20 offers ten locate points, compared to the LX20's five user-definable locations. Both machines allow you to set, recall, and edit locate points via front panel buttons. The XT20 also allows you to enter numerical values through the locate buttons (0–9)—great for quickly punching in editable parameters.

Onboard editing is far more sophisticated on the XT20. The more expensive machine offers cut-and-paste editing, as well as track delay, track copy, and tape offset. Track copy lets you simultaneously bounce up to four source tracks to four destination tracks without ever leaving the unit. Track delay allows you to slide individual phrases forward or backward in time, again without ever leaving the XT20. And, the very useful tape-offset feature alters the XT20's tape position relative to other ADATs in your system. Using tape offset, you can perform copy-and-paste editing between machines.

Although the LX20 doesn't have internal capabilities for executing these functions, it can perform all of these chores if used in conjunction with an Alesis BRC (Big Remote Control). So, for those people who already own a BRC, this will not be an issue.

Display. Both ADATs offer 2-second, peak-hold metering. On the XT20, this feature can be turned on and off, and there is a function for holding the highest peak indefinitely (that is, until the meters are cleared). The latter mode is quite useful, as the meters on

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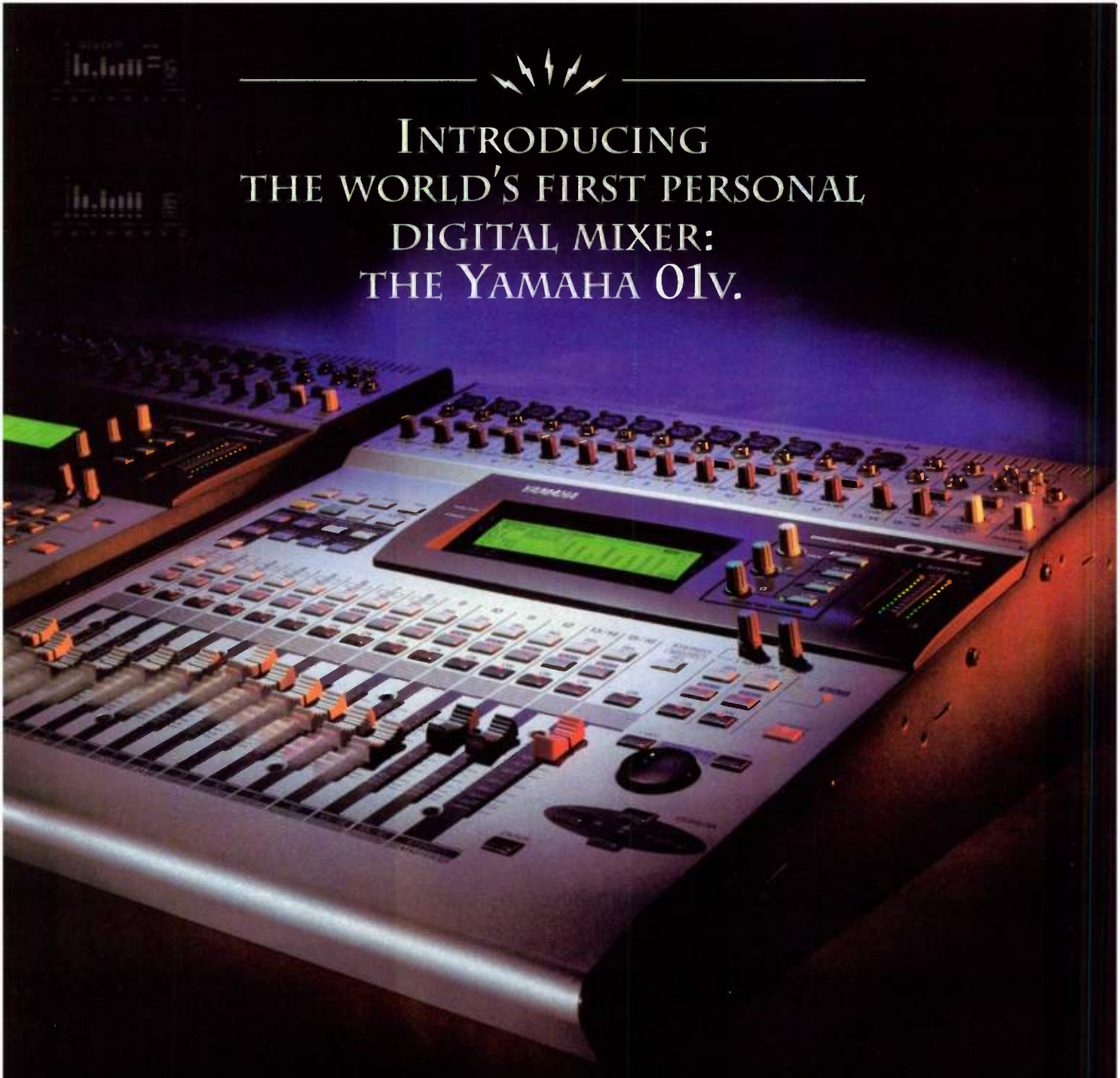

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both ADATs are somewhat hard to read. The XT20 also offers a fine meter mode, in which the entire range of the meters becomes -18 to -12.5 dBFS (decibels below full scale) in 0.5 dB increments. This mode is useful for precision recording of test tones. The XT20 also allows you to adjust the contrast of its display (although I think you'll want to keep it at its brightest).

As with the original ADAT-XT, the XT20's tape counter can show relative time. This mode displays the elapsed time relative to where you have zeroed the counter, so if you are working in a song other than the first song on the tape, you can see how far into the song you are. The LX20 does not have this feature.

Power. I like the XT20's conventional power switch better than the one provided on the LX20. The latter is a software switch, much like what you'd find on a VCR. It shuts off the display and the tape transport but does not disconnect the power supply from the main board or turn off the fiber optic output. This *can* be convenient, as the machine will power up when a tape is inserted.

But there's a downside to this design. When I use my Yamaha 02R to remaster DATs in the digital domain, I'm working at 44.1 kHz. If the LX20's digital outputs are connected to the chain, and the LX20 was last set at 48 kHz, I

ALESIS
LX20 20-bit MDM
$1,899

FEATURES ■■■
EASE OF USE ■■■■▮
AUDIO QUALITY ■■■■
VALUE ■■■■▮
1 2 3 4 5

PROS: High-quality sound at an entry-level price. Backward-compatible with Type I ADATs. Fast transport and lock-up times.
CONS: Omission of tape offset feature precludes copy and paste editing without additional gear. Digital output setting is volatile and defaults to 16-bit. Crowded connections. No infinite peak-hold metering. Meters are hard to read.

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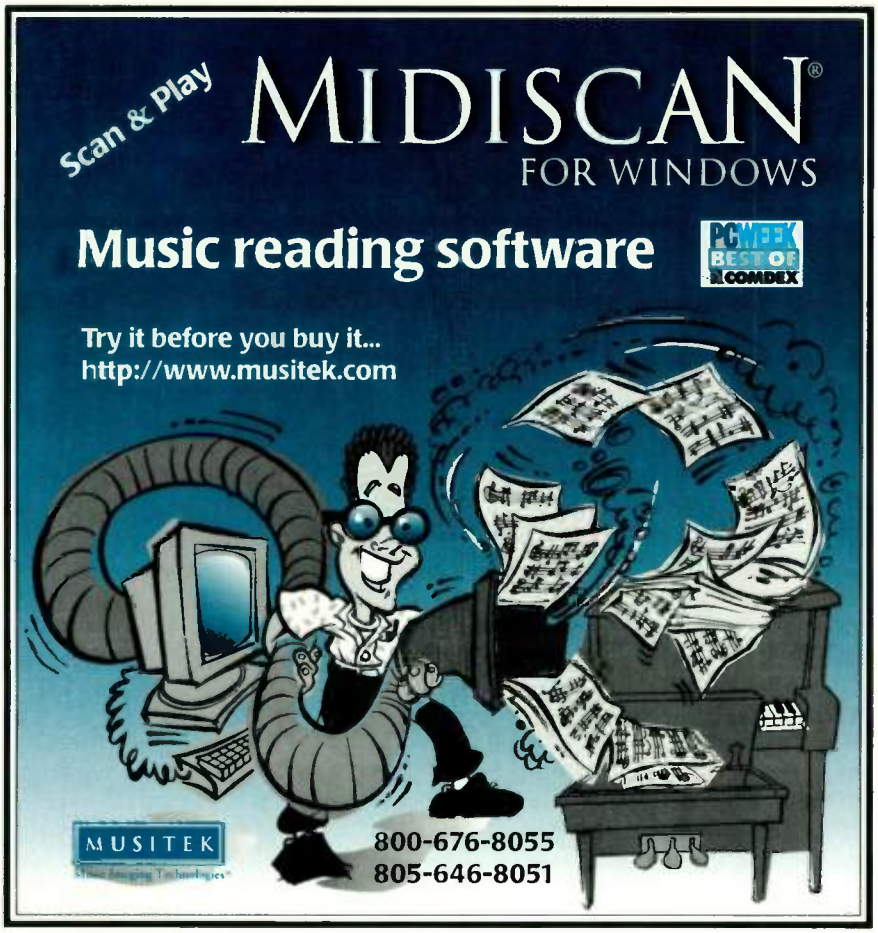

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have to change its sample rate (even if the unit is "off") to avoid loss of sync with my 02R, simply because the LX20's fiber optic output is always on. My only alternative is to turn off the power conditioner that the LX20 is plugged into (which also happens to serve my DATs). It's a minor annoyance, but worth mentioning.

REMOTE CONTROL

Both ADATs are fully compatible with the BRC (and any other synchronizer with Alesis 9-pin sync). The BRC offers elaborate, sample-accurate editing features, over 400 locate points, song and locate-point titling, a SMPTE time-code generator/reader, and a host of other highly useful features. A BRC can make all ADATs in a system chase in Stop mode with tapes wrapped, whereas a slave LX won't chase to an XT's position until play or locate is initiated.

The LX20 and the XT20 both automatically detect and lock to the BRC's sampling frequency (via their rear-panel 9-pin sync connectors), making digital synchronization a no-brainer. This is true even if the BRC is synched to an external signal, such as word clock from a digital console. Apart from reading Alesis sync, however, the units cannot automatically detect and lock to an external clock's sample rate. This is what the Clock Select buttons are used for; I set these to sync to my digital console for digital recording without a BRC.

ALESIS
XT20 20-bit MDM
$2,599

FEATURES ■■■■
EASE OF USE ■■■■
AUDIO QUALITY ■■■■■
VALUE ■■■■■
1 2 3 4 5

PROS: Backward-compatible with Type I ADATs. Sturdy construction. Balanced/unbalanced I/O. Excellent A/D and D/A converters. Onboard tape offset, track copy, and track delay. Fast transport and lock-up times.

CONS: Digital output setting is volatile and defaults to 16-bit. Crowded connections. Meters are hard to read.

CIRCLE #437 ON READER SERVICE CARD

WHO NEEDS WHAT?

The two 20-bit ADATs sound exactly the same when using the digital I/O (bypassing the converters), so if you use quality outboard converters and a digital console, you'll hear no difference. Mechanically, both machines performed admirably. Furthermore, most of the XT20's additional onboard features are implemented in the Alesis BRC. So choosing between the two is really a matter of evaluating your existing setup, your budget, and your future production needs.

Those who do not own a BRC should strongly consider purchasing the XT20 for its cut-and-paste editing, track-copy and track-delay capabilities, and more sophisticated interface. The XT20 is also a better bet if you do any remote recording, due to its sturdier construction and balanced I/O. And if you plan to use the ADAT's onboard converters for tracking and mixing, the XT20 is clearly the better-sounding machine. The sonic difference is subtle, but it will add up after you've gone through the converters a few times.

If you already own a BRC and a digital console and plan to use your ADATs only in a fixed installation, the LX20 presents few significant drawbacks in return for considerable savings. If you don't own a BRC, and your mixer is analog, another option would be to buy one master XT20 and add on slave LX20s as your budget permits. This is your ticket to copy-and-paste editing at a bargain price. The downside is that you'd have to swap tapes between machines occasionally to add track delay to digital bounces or to consistently use the XT20's superior converters for recording overdubs.

SOLD!

In virtually all regards, both machines operated trouble-free through many hours of demanding sessions. (I used the XT20 for over 150 hours, and the later-arriving LX20 for over 60 hours.) No matter which machine is right for you, the ADAT has never sounded better or been this affordable.

Michael Cooper *is a recording engineer, producer, and owner of Michael Cooper Recording, which recently relocated to the resort town of Sisters, Oregon.*

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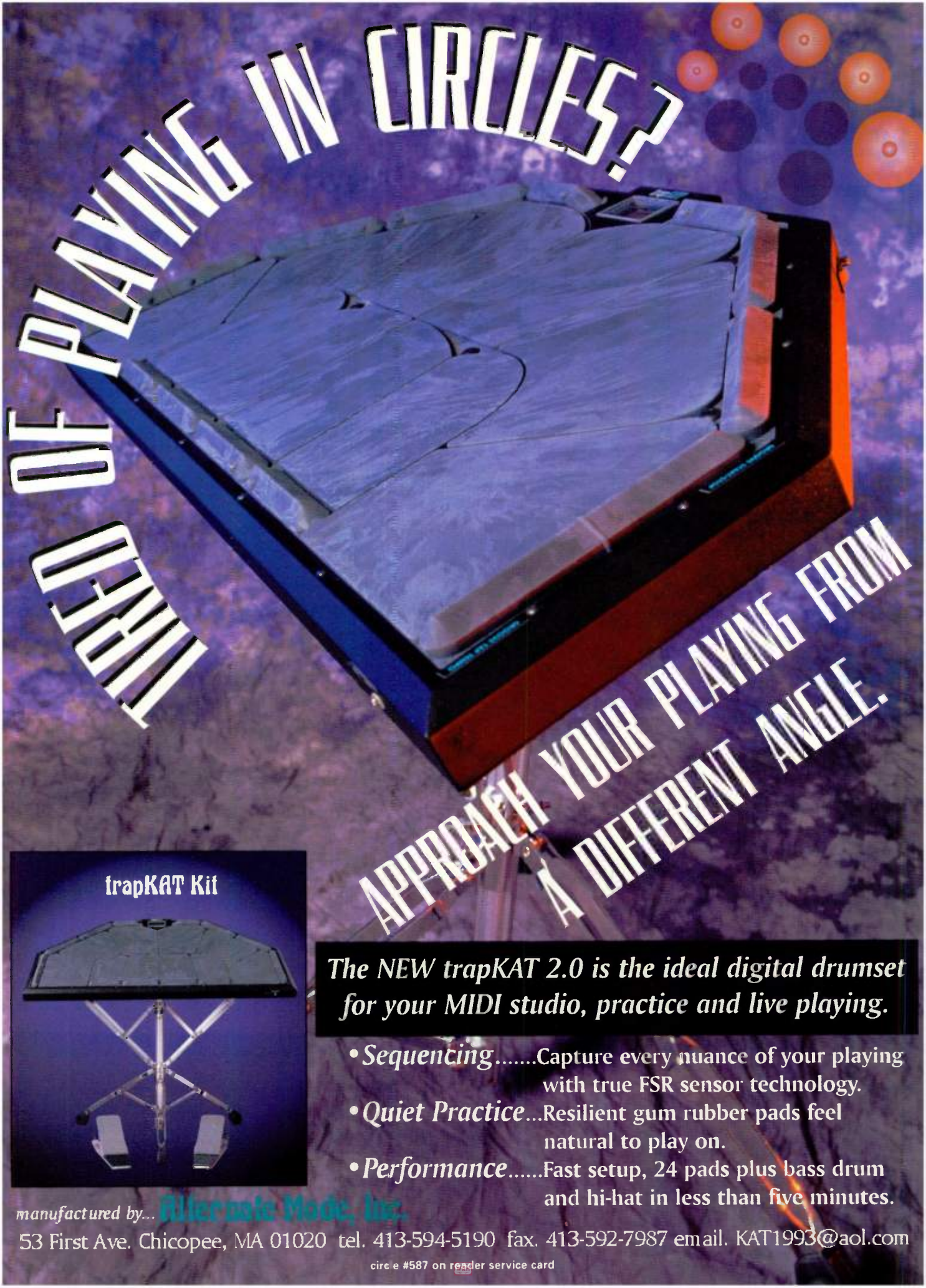

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By David M. Rubin

Despite its well-rounded feature set, modest price, and friendly user interface, *Metro* has had a hard time settling down. Initially distributed as *Beyond* by Dr. T's Music Software, it was later licensed by OSC, which renamed the program *Metro*. OSC was then acquired by Macromedia. That company continues to market *Deck II*, the multitrack audio-recording software that can share timing information with *Metro* for audio/MIDI synchronization.

Recently, *Metro* and Jeremy Sagan, the program's creator, have found a home at Cakewalk as part of the company's push into the Macintosh music-software market. The good news for *Metro* fans is that Cakewalk is taking a serious interest in the program and has substantially upgraded the sequencer to include digital audio capabilities and several other new features. Now you don't have to combine *Metro* with *Deck* to get the benefits of MIDI and audio together.

Although its price tag is a smidgen under $250, in many ways *Metro* rivals the big boys. For example, each sequence can have up to 99 tracks with support for as many as 512 MIDI channels. The sequencer offers variable resolutions from as low as 24 to as high as 960 ppqn. Interestingly, those low resolution options make it possible to run *Metro* on an antique, 8 MHz Mac Plus (if you're willing to forgo the digital audio functions). Those of us with more modern equipment can take advantage of *Metro*'s new audio-handling capabilities. They're pretty good for a program at this price point.

Metro supports 8- and 16-bit mono and interleaved stereo AIFF files with sample rates up to 48 kHz. In addition, the program can play back as many as 64 stereo audio tracks (depending on RAM and CPU power), even if the tracks were recorded at different sample rates. (You'll get better performance, however, and take a load off your computer's processor, if all of your tracks use the same rate.)

Currently, *Metro* supports the Macintosh native audio hardware as well as Digi-design's Audiomedia III, Korg's 1212 I/O, and Sonorus's StudI/O card. For processing digital audio, *Metro* provides a collection of built-in DSP effects and also supports other Cakewalk Audio Effects, Steinberg VST, and Adobe Premiere plug-ins. Moreover, *Metro* can import and synchronize to QuickTime movies and can also sync to SMPTE time code (in the form of MIDI Time Code).

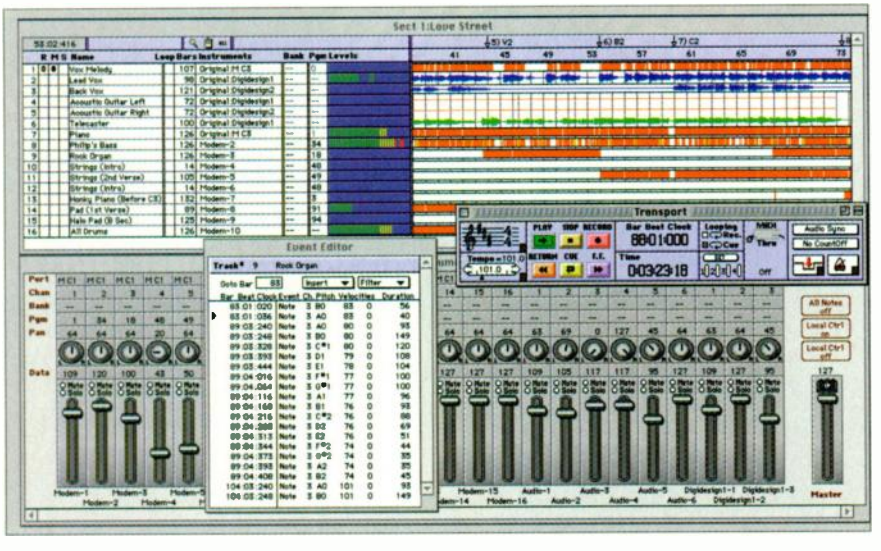

FIG. 1: Cakewalk *Metro*'s Tracks window is shown here with the Event List, Instruments, and Transport windows.

ENVIRONMENTAL STUDIES

When you first open *Metro*, you're confronted with a familiar-looking Tracks window (see **Fig. 1**). Track names and assigned Instruments appear on the left, along with Record, Mute, and Solo boxes. Expandable, tricolor peak-hold meters show playback levels for each track.

The right side of the Tracks window provides the usual graphic representation of MIDI and audio data. *Metro*, however, takes a unique approach to representing its data. Audio tracks appear as miniature waveforms color-coded by track. MIDI data appears as blocks of different lengths color-coded by type (e.g., orange for note data, yellow for Continuous Controller data, red for SysEx). Different shades represent varying densities of data. When you click on any of the colored blocks or waveforms, *Metro* opens a graphic editing window of the appropriate type for that data.

As clever as the Tracks window is, *Metro*'s Graphic Editor window is clearly its strongest viewing and editing environment. Actually, the Graphic Editor is much more than a single display. The window changes like a chameleon, depending on the type of data shown: a standard piano roll for notes, graphs for tempo and controller data, a specialized drum machine–style grid for rhythm tracks, and a waveform display for audio.

Moreover, the Graphic Editor window can have as many as sixteen separate displays open simultaneously from any combination of tracks and display types. In other words, you can display eight tracks showing only MIDI notes or four tracks showing both notes and pitch bend data in eight displays. You can also add a drum display, Aftertouch and tempo graphs, and several waveform displays to the collection.

Whatever combination you choose, the different tracks appear in a stack within the Graphic Editor window (see **Fig. 2**). Each track has its own title bar with Record, Mute, Solo, and Close boxes. Drop-down menus allow you to change the display type. And most importantly, all the tracks are aligned and scroll together during playback. The result is a highly unified yet highly versatile editing environment that's easy to change when necessary.

The individual displays offer features that are not commonly found in other

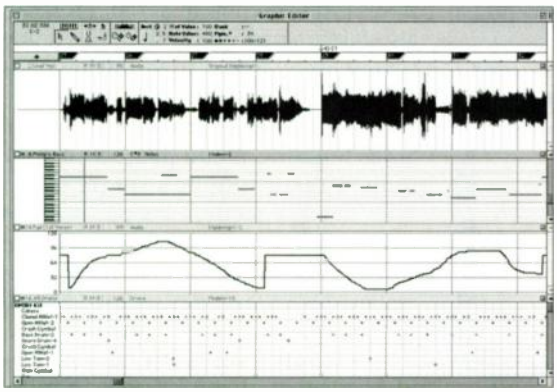

FIG. 2: The Graphic Editor window can display multiple tracks and multiple data types simultaneously.

sequencers. The piano-roll display in particular can do some pretty nifty tricks. As is common with this type of display, notes appear as horizontal bars against a pitch/time grid. But *Metro* also has an optional Velocity Stems function, which adds a thin vertical line to the head of each note (see **Fig. 3**). The length of each "stem" graphically represents the Velocity value of the attached note, and you can edit the value by dragging the stem up or down with the Forceps tool. You can even select several notes and drag all the stems simultaneously. The Velocity Stems feature is a terrific idea, because it eliminates the confusion that results from trying to relate Velocity values in a separate display with groups of tightly packed notes in a piano-roll editor.

Another great feature, called Pitch Bend Note View, lets you see the *actual* pitches of notes as they change over time—without leaving the piano-roll display. In other words, if you play a note and then bend the pitch downward, the note will appear as a horizontal bar that droops at the end (see **Fig. 4**). I really love this feature, because it provides a much more musical context for viewing and correlating the effects of Pitch Bend.

Unlike the Velocity Stems function, however, Pitch Bend Note View doesn't let you directly edit the data. For editing Pitch Bend (and other Continuous Controller data), *Metro* provides a graph display with Pencil and Curve tools for drawing or reshaping the data. Velocity Stems and Pitch Bend View are such wonderful and practical features, I'm surprised that they aren't included in other sequencers. Unfortunately, you can't have both functions active in *Metro* at the same time. Although it's easy to toggle from one mode to the other, it would be great to see everything at once.

For developing rhythm section parts, *Metro* provides a variant of the piano-roll called the Drums display. It lets you deposit drum "hits" on a grid that shows percussion instruments on the left and elapsed time along the bottom. Drum grids are increasingly popular additions to many sequencers these days, and *Metro*'s version, though not innovative, offers a complete set of tools for developing rhythm section tracks.

You simply use the program's Loop Record mode and enter notes onto the grid in real time from a MIDI controller. Or you can use the mouse to step-enter hits with any of seven user-defined Velocity values. Each Velocity appears with its own symbol to identify it. As you listen to your drum track taking shape, you can mute or solo individual instruments and make changes (by dragging, cutting, etc.) as the music plays. A handy Pause Recording button lets you experiment with new parts before recording them (and without halting playback). When you're ready to record again, just click the button, and you're back in Record mode without missing a beat.

Metro's other displays include a standard audio waveform (more on this later) and a simple yet versatile Continuous Data display. In addition to the usual Continuous Controller data—such as Pitch Bend, Modulation, and Aftertouch—the Continuous Data display provides a graphic viewing and editing environment for a variety of other types of data, including tempo, program change, average Velocity (when several notes are playing at once), and polyphonic Aftertouch (you must specify which note the display refers to). You can even use the Continuous Data display to view and edit volume and pan data for audio tracks.

Metro also includes an Event List window, and an Instruments window provides a virtual automated mixing board (for MIDI and audio) with knobs and faders (see **Fig. 1**). One aspect of the Instruments window that I particularly like is that you can adjust the knobs and faders while the window is in the background. That means you can keep the Tracks or Graphic Editor window on top and active and still make tweaks to the mix in real time.

In a surprising omission, however, *Metro* lacks a window for viewing MIDI data in standard music notation. This may not be much of a problem for some users, but if you need to view and print music in traditional notation, the lack of a notation window should certainly give you pause.

MOVIN' WITH MIDI

Getting around in *Metro* is a breeze. Recording, playback, and navigation functions are controlled from the floating Transport window, which includes both bar/beat and SMPTE elapsed-time displays. In addition to the usual Play, Record, Stop, and Rewind buttons, a Cue button provides looped playback of the most recently played or selected region. You can also save up to four regions and assign them to

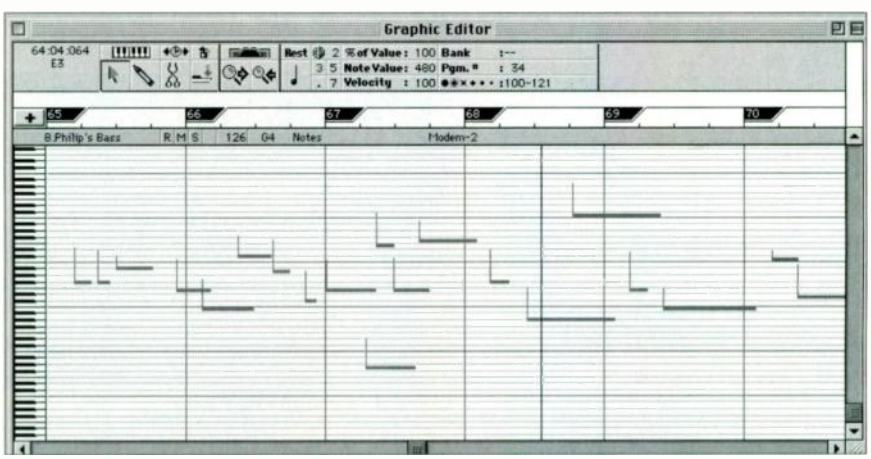

FIG. 3: In the piano-roll display, the Velocity Stems function adds a vertical line to each note.

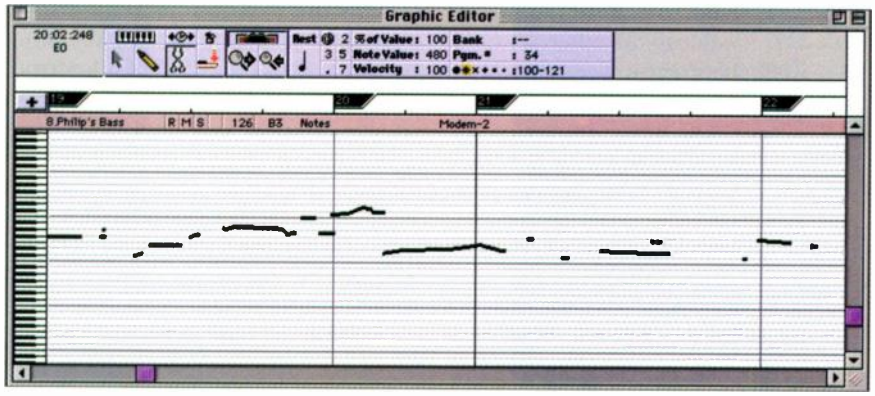

FIG. 4: The Graphic Editor's piano-roll display can show the effects of Pitch Bend on individual notes.

the Set Cues buttons for later playback or looping.

Metro's recording functions are flexible enough for most situations, although you can't record audio and MIDI tracks simultaneously. In fact, even when you're working with MIDI alone, *Metro* can only record one track at a time. That may be a serious limitation for some people.

As with most sequencers, the primary recording modes are Replace and Overdub. (Overdub only works with MIDI.) These are combined with such recording options as Punch-In recording and Loop recording. The handy Partial Track Recording function causes recording to kick in at the current selection point. And a Tap Tempo function lets you establish the tempo during recording by tapping a key on your MIDI controller or computer keyboard.

Loop recording can be activated in either Song Building mode or Multiple Take mode. In Song Building mode, you continue to hear each recorded pass as you add new material. (You can also reject passes on the fly.) This mode is most useful for creating rhythm parts by building up tracks, drum-machine style. Combined with Overdub mode, Song Building mode puts all of your looped recording in a single track. With Replace mode, each pass will appear on a separate track. In either case, you'll hear all of the passes, which makes this an excellent way to create complex, multilayered parts.

In Multiple Take mode, *Metro* mutes each previous pass so you only hear the current recording. In Multiple Take/Replace mode (the most useful one), each pass goes on a different track. In Multiple Take/Overdub mode, the passes are layered onto a single track. Multiple Take mode is ideal for inserting a difficult solo into an arrangement, because it allows you to perform a section over and over without breaking your concentration. When you're through, you can listen to all the takes and choose the best one (or edit together the best parts).

Aside from these real-time recording functions, *Metro* also provides step-time

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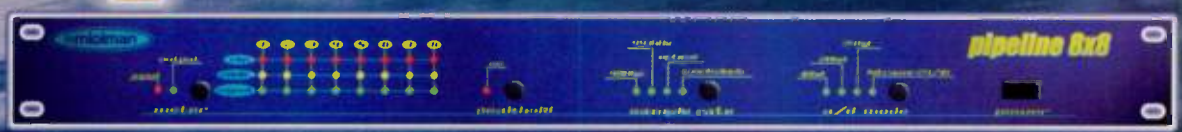

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Power Macintosh; 8 MB RAM; Mac OS 7.0; Sound Manager 3.2; QuickTime 2.5

recording. You can enter notes from your MIDI controller, with the Pencil tool in the Graphic Editor window, or using key equivalents from your computer keyboard.

Whatever recording method is used, *Metro* combines MIDI and audio tracks into sequences called Sections. For more complex arrangements, Sections can be combined into Subsections, which you can view and edit in the Tracks, Event List, and Graphic Editor windows. Subsections make it possible to rearrange the elements in a song and to move and combine large blocks of data. Sections and Subsections are "dynamically linked," so edits that are carried out on one automatically affect the other. You can, however, break the link and create independent Subsections.

Metro offers a full complement of MIDI editing functions. You can transpose notes chromatically or from any scale to any other scale and change Velocity and Duration by a specific amount or by percentage. Quantize functions include Strength, Swing, and Humanize, and groove quantizing is also available. A Selection Filter lets you apply edits only to notes that meet specified criteria, such as Velocity or Duration range or rhythmic position in a measure.

MY GENERATION

For those times when the creative juices need a little boost, *Metro* offers some entertaining tools for generating new music. The Spray Paint tool uses algorithmic composition techniques to spew forth notes that are constrained by various parameter settings. For example, you can restrict notes to any of eighteen scale types (major, minor, blues, pentatonic, various modes, and others) based on any tonic note. You can have the notes quantized or not, and you can specify a duration and Velocity range. You can even have the notes conform to a set of chord changes.

I enjoyed fooling around with the Spray Paint tool, but I never managed to produce anything musical enough to use. In general, I got better results with pentatonic and blues scales than I did with diatonic or chromatic scales. Once in a while, a small group of notes would form a nice riff, and I can see how that might spark one's imagination, but overall, the results sounded too random. The same was true when I used the Spray Paint tool with the Drum display. Drum hits tended to cluster in unmusical patterns and often became too dense on the beats. Still, the Spray Paint tool makes a nice diversion, and it might come in handy once in a while.

Metro's Rhythm Explorer, on the other hand, is not only fun; it's highly useful. The Rhythm Explorer is a real-time algorithmic composition tool that generates variations on preexisting MIDI material. First you select a region of music in a single track; then you use the Cue function to loop the playback. The Rhythm Explorer window offers seventeen algorithms that you can use individually or in any of eight combinations created by the program. A Variability setting lets you control how far from the original music the variations can stray (see **Fig. 5**).

The algorithms process the existing MIDI data in a number of interesting

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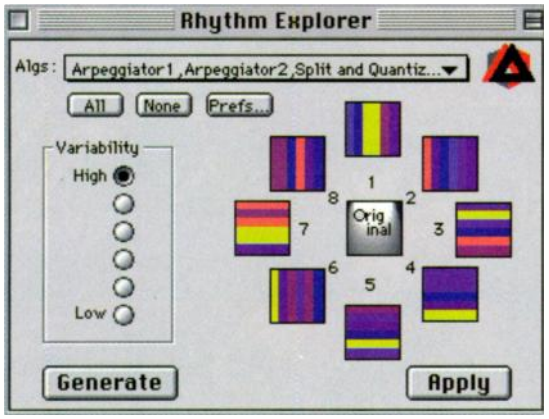

FIG. 5: *Metro*'s Rhythm Explorer combines different algorithms to generate variations on selected music.

ways: they generate arpeggios and rhythmic patterns, split notes, create trills and flams, quantize randomly, and change Velocities. As the music loops, you can switch between the eight combinations or set up new combinations.

To test the Rhythm Explorer, I selected a few measures from the right-hand part of a Bach 2-part invention (one of several MIDI files that come with *Metro*). With a moderately high Variability setting and three or four algorithms selected, I immediately began generating some wonderful variations. As a general rule, the lower the Variability setting, the more "musical" the results, but I got great variations even at high Variability, as long as I didn't pile on too many algorithms (or the wrong kinds of algorithms). The same was true when I applied the Rhythm Explorer to a drum part. Within a short period of time, I discovered several usable variations that, with some tweaking, would make fine alternate patterns. The Rhythm Explorer is unique, very easy to use, and addictively entertaining. It's a nice addition to the program.

Metro's other compositional aids include a Harmony function that generates up to four chromatic or scale-related lines relative to any root. The added lines can appear on a single track or on separate tracks. The program also includes a Real-Time Arpeggiator that lets you use any of three preset patterns or a user-defined pattern with as many as twelve designated steps.

AUDIO ASPECTS

Metro's audio-handling capabilities should be adequate, as long as your needs aren't too demanding or overly exotic. Setting up the computer and software for audio recording is a bit confusing, at first, because the necessary dialog boxes aren't always where you'd expect them to be. Once you get a handle on the system, however, recording audio tracks is pretty straightforward. You simply assign an audio source to a new track and use the Transport window to initiate recording—with or without a user-definable count-off.

Each track has its own level meter in the Tracks window, and *Metro* lets you expand the meters quite a lot, which makes them easier to read. Unfortunately, there aren't any markings on the meters, so in spite of the tricolor displays, the process of setting levels tends to be more approximate than precise. And if you're using the Mac's

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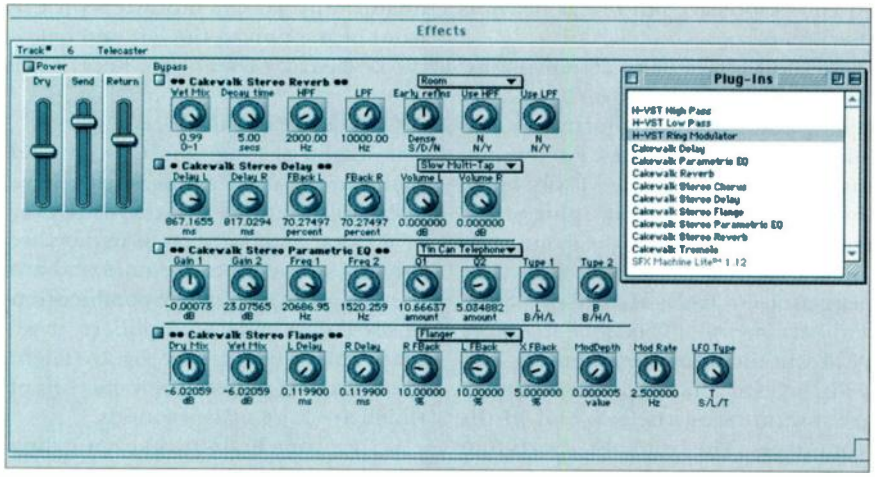

FIG. 6: *Metro*'s Effects window can combine several plug-ins to apply a series of effects to a track.

internal audio, a separate dialog box provides an enlarged meter, but it also lacks markings.

For closer viewing and editing, you can open each track's recording as a waveform display in the Graphic Editor window. The display, however, lacks vertical scale markings for amplitude, and the elapsed time can only be shown in bars and beats or SMPTE time. Those options are much too coarse for delicate audio surgery, and the markings all but disappear if you zoom in or out too much. Seconds and milliseconds would make a better option for close-up work. And speaking of close-up work, the zoom function doesn't get in quite close enough to clearly view individual cycles in sounds with a lot of high frequencies. One or two more zoom levels would make precise editing more practical.

Aside from the usual Cut, Copy, Paste, and Merge commands, *Metro*'s modest list of audio-editing options includes Normalize, Reverse, Scale Amplitude, and Fade. The Fade command applies a simple linear fade-in or fade-out based on beginning and ending amplitude settings. A handy Group Normalize command enables you to select and normalize several tracks at once. The software looks for the highest peak among the selected tracks and raises all of the amplitudes based on that one reading. A Zero Crossing function is also available, but unfortunately, the Scrubbing feature offered for MIDI tracks does not work with audio tracks. In addition to importing QuickTime movies and AIFF files, *Metro* can extract Red Book audio from an audio CD and import it directly into a track. That's a very handy feature, especially if you work with sampling CDs a lot.

Perhaps the strongest feature among *Metro*'s new audio capabilities is the program's real-time Effects window. For processing tracks with DSP effects, *Metro* supports Cakewalk Audio Effects, VST, and Premiere plug-ins, and the *Metro* CD includes about a dozen effects to get you started. Using and combining effects is a snap. The names of plug-ins appear in a list in the Plug-Ins window. Each time you double-click on one of the entries, that plug-in is added to the Effects window, along with the appropriate onscreen knobs and sliders.

If you choose several plug-ins, they appear in a stack in the Effects window (see **Fig. 6**). The order, from top to bottom, represents the sequence in which the effects are applied to the selected audio. You can rearrange the sequence of effects by dragging the plug-ins into new positions within the Effects window. In addition, each effect includes a Bypass button to temporarily drop it out of the chain. All together, you get a powerful and versatile multi-effects unit complete with several presets for each effect.

The Cakewalk reverb effect (available in mono or stereo) is serviceable, if unexciting. It provides an adequate sense of spaciousness, although it lacks the smoothness and clarity of high-end reverbs. Controls include knobs for Decay Time, Highpass and Lowpass Filters, and Early Reflections. Its eight presets range from "Room" to "Cosmos." The similarly Spartan stereo delay provides left and right controls for Delay, Feedback, and Volume (processed). Its eight presets include several typical fast and slow delays and multitap effects.

The easy-to-use 2-band parametric EQ has several interesting presets, including Dixie Cup, Sea Shell, and AM Radio. Arboretum Systems supplied highpass and lowpass filters and a preset ring modulator. Other plug-in effects included with *Metro* are tremolo, flanger, and chorus. My favorite plug-in, however, is the "Lite" version of Berkley Integrated Audio Software's *SFX Machine*. It comes with twenty wacky presets and includes many of the features of the full-blown version. I really enjoyed warping sounds with the presets and six onscreen sliders. It makes a great addition to the *Metro* package and ought to come in handy for sound designers. (For a review of *SFX Machine*, see the December 1997 issue of **EM**.)

Aside from *SFX Machine Lite*, none of the included plug-ins qualify as truly outstanding in either design or function. But taken as a whole, they form a useful toolbox to get you started in processing your tracks. More advanced users can always add more sophisticated plug-ins as needs arise.

THE LAST BITS

Metro comes with a 500-page owner's manual that is written in a friendly, easy-to-use style. The book offers plenty of useful information in spite of being poorly organized and (in the 4.0 version) riddled with minor mistakes. (Cakewalk is shipping a revised edition with version 4.0.1.) Many of the program's main menus also seem poorly organized.

Fortunately, *Metro* has a clean, accessible, user interface that makes it easy to navigate once you understand the general layout. And the owner's manual does provide a modest tutorial section to get you started.

All in all, *Metro* offers an appealing blend of user-friendliness and powerful features. The program's MIDI and audio recording capabilities are flexible enough for most situations, and *Metro*'s editing features rival those of sequencers that cost much more. The program's lack of support for music notation may bother some users, but with its innovative graphic displays, unique compositional aids, and flexible architecture, *Metro* has a lot to offer at a very modest price.

Associate Editor **David M. Rubin** *lives and works in the Los Angeles area.*

K O R G

N1

Welcome, if incremental, improvements mark this 88-key PCM synth.

By Jeff Burger

One of the biggest tasks for keyboard manufacturers is addressing the widely varying needs of today's musicians. One moment, we musicians are setting up our own traveling big top, complete with two-fisted acrobatics. The next moment, we're in the studio, connecting to a computer and assuming the guise of the Man with a Thousand Faces. Furthermore, manufacturers have to take into account that the only thing tighter than our budgets is the skin on the Bearded Lady's snake.

Korg clearly did a lot of homework before offering up its new N1 as a solution for this three-ring circus. I put this latest implementation of Korg's tried-and-true AI^2 technology through some flaming hoops of my own. Here's what I found.

WEIGHTY MATTERS

At 52 pounds, the N1 is about as sizable and weighty as you'd want to have to carry to a gig single-handedly. This owes in large part to its 88-note, weighted-action keyboard with Aftertouch. (The unit's smaller sibling, the N5, is considerably more petite in size, weight, and price; see the sidebar "He Ain't Heavy, He's My Brother.") The feel of the keyboard on the N1 is middle-of-the-road: the action is definitely weighted and responsive but not as heavy as that of a piano.

The unit offers 64-voice polyphony, but as with other synths, you'll get fewer actual notes when triggering sounds built from multiple voices. For live performance, front-panel controls assign the keyboard as normal, split, or layered. Other buttons on the front panel include Octave Up, Octave Down, arpeggiator controls, MIDI Start/Stop, and Portamento. (This is the first Korg PCM synth to offer portamento.)

Pitch bend and modulation wheels are mounted on the left end of the front panel. The front also sports four Real Time Controller knobs, each of which has two functions determined by a single Select switch. Normally, the four knobs are hard-wired to Attack, Release, Cutoff, and Effect. Toggling the Select switch changes the knob functions to user-assignable parameters for the current sound. (Though you can't assign every parameter in the N1 to these knobs, the majority of the ones you'd likely need to access in real time are addressable here.) The high-noon position of each knob represents the programmed value for the current parameter, so you can add or subtract from that value.

Korg is clearly convinced that many people use computers for sequencing: the N1 has no internal sequencer. Instead, a direct serial connection for a computer (Mac or PC) allows a software sequencer to address a total of 32 discrete channels. As mentioned above, an onboard arpeggiator is included.

The N1's rear panel is pretty straightforward (see **Fig. 1**). In addition to the standard three MIDI jacks, there are four ¼-inch audio outs, one jack each for assignable footswitch and continuous controller pedal, the computer port, and the external power cable. The headphone jack is mounted on the front of the unit to the left and below the keyboard. (Thank you, Korg!)

Korg's N1 delivers a wealth of good sounds; solid effects; 88 keys; weighted action; and an arpeggiator. Instead of having an onboard sequencer, it offers a computer interface for use with software sequencers.

MODUS OPERANDI

The staples of Programs, Combis, and Multis from the N1's Korg lineage have been preserved—in fact there are over 1,700 total sound objects. Programs are the most basic units of sound and are based on the obligatory combination of oscillators, filters, amplifiers, modulation, and effects (see **Fig. 2**). There are a total of 1,269 Programs, 400 of which are Korg-voiced sounds.

Before your brain tilts at navigating and distinguishing this many sounds, let me point out that the Korg sounds are organized into four banks of 100. The additional sounds cover the GM, Roland GS, Roland CM-64, and Yamaha XG standards. You'll find 100 of the Korg sounds in RAM, which means they can be overwritten by the user.

Combis provide combinations of up to eight Programs for zone-assignable performance (see **Fig. 3**). There are a total of 402 Combis, 100 of which are in rewritable user locations. Multi mode, first introduced with Korg's NS5R module, lets you address the full 32-channel multitimbral shebang, assuming that you're using the direct-connect cable to your computer. Each part can be either a Program or a Combi, with its own volume and pan controls, MIDI channels, and more. There are no onboard storage provisions for Multis. The only way to save all 32 parts of the current Multi setup is via SysEx on the computer. This is another great case for writing sound-bank and selection information directly into your sequencer tracks.

PERFORMANCE TIME

Given that I've been a Korg T2 owner for eight years, I must admit to being initially confused by the new Performance mode. Performances provide a "meta" level that incorporates both Programs and Combis. A Performance can place under keyboard control two Programs, a Program and a Combi, or two Combis. The last variant means that you could play up to sixteen distinct internal sounds from differently assigned ranges of the keyboard. Performances also contain settings for layer or split assignments, arpeggiator patterns, and the four Real Time Controller knobs. The addition of these

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four programmable functions to the four fixed knob parameters makes it possible to control important aspects of every sound without having to delve into the depths of programming—a welcome feature. Changes to the knobs' assignments can also be saved to the Performance.

As icing on the cake, Performance mode addresses a total of sixteen parts, leaving fourteen parts left over for sequencing. Each part can be a Program or a Combi. (You might think of Performance mode as offering Combis of Combis!) The sixteen parts correspond to the first sixteen parts of Multi mode, and their parameters transfer seamlessly between the two modes.

Perhaps the best way to think of Performances is as templates that provide you with setups for split points, the arpeggiator, effects, real-time knob assignments, and sequence channel assignments. You can call one up, change the associated Programs or Combis, and toggle splits, layers, and arpeggios on and off. Unfortunately, Performances cannot be named. About half of the factory Performances are very useful, going on lethal, while the remainder serve as good examples of what's possible.

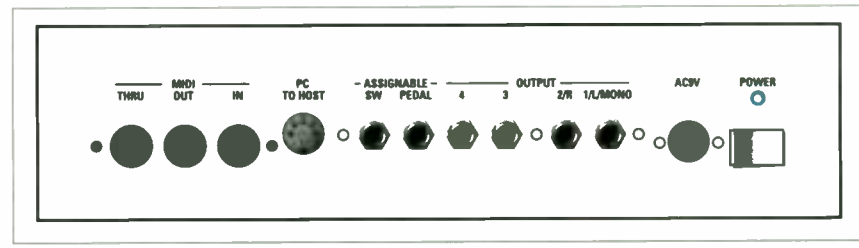

FIG. 1: The rear panel holds the MIDI jacks, audio outs, footswitch, and pedal jacks. The computer serial port can be used with a Mac or PC, but a cable is not provided.

GETTING AROUND

Because Programs and Combis are now just sound objects for Performances and Multis, there are no longer dedicated buttons for selecting them as modes. Instead, the keys on the numeric keypad double as Bank Select buttons: four Combis, four Programs, GM, SFX, and Drum. You just hit the Bank button prior to selecting a bank; subsequent keypad entries call up the sound number within the current bank. Similarly, pressing the Effect button prior to numeric entry calls up a new preprogrammed effect for the current sound. A slider and increment and decrement buttons can also be used to change effects.

The N1 has inherited Korg's longstanding method of organizing similar sounds using the same lower-value digit. For example, most Programs ending in the numeral 1, (01, 11, 21, 31, etc.) are pianos of some kind. This holds true across all banks, making it easier to surf variations on a theme. The 10s Hold button also helps by locking the lower-place digit so that you increment and decrement by ten, taking you through similar sounds. This system is invaluable, given the number of sounds on hand.

The unit offers no program chaining for live performance, although you can use the 32 Performances to place the sounds you'll need for a gig at your fingertips.

While Korg's method of numbering sounds makes it easier to keep track of things, I still found the sheer abundance of sounds overwhelming. It's one thing to search for other pianos by sticking with like numbers. The second you leave the easy sonic pigeonholes, however, it can be difficult to locate a sound that fits a more esoteric category, such as "ethereal" or "plucky." Manufacturers unleashing synths with this many sonic choices need to implement operating systems that provide for user-defined hierarchies (such as folders) and aliases for multiple classifications. (Such a system is found in E-mu's current EOS, for example.) The inclusion of a limited edition of MOTU's *Unisyn* patch editor and librarian helps, but only when you're connected to a computer.

The N1's operating system is fairly intuitive once you get the Zen of the instrument's architecture. The LCD relies heavily on icons depicting such things as elements of the sound chain, keyboard, knobs, and faders. There are, of course, the obligatory increment and decrement keys, data slider, and cursor keys. The universal Edit button always drills down to the next deeper parameter level of the currently selected function. Similarly, Exit always brings you back up one level. The Page/Part button performs multiple tasks depending upon what mode you're in: changing Performances, toggling between Parts in split/layer Performances, Combis, and Multis, and moving between sound blocks when editing Programs.

GETTING THE EFFECT

The sound objects in the N1 have a pan pot for stereo placement on the main outputs, as well as send amounts for outputs 3 and 4. As with most of the N1's ancestors, the unit incorporates two

N1 Specifications

Polyphony	64 notes
Multitimbral Parts	16 (32 with computer interface)
Synthesis Engine	AI² (PCM sample-based subtractive)
Sounds	1,169 ROM Programs, 100 RAM Programs, 302 ROM Combis, 100 RAM Combis, 37 ROM drum kits, 2 RAM drum kits, 32 Performances
Effects	2 digital multi-effects processors, 48 total effects algorithms
Keyboard	88-note, weighted; Velocity- and Channel Aftertouch–sensitive
Controllers	Pitch-bend and modulation wheels; (4) real time, programmable controller knobs; volume and data sliders
Audio Outputs	(4) ¼" TRS (2 balanced, stereo pairs)
Headphone Output	(1) ¼" TRS (stereo)
Computer Interface	Mac/PC-compatible serial (cable not included)
Additional Ports	MIDI In, Out, Thru; (1) assignable continuous pedal; (1) footswitch
Removable Storage	None
Dimensions	52" (W), 15.5" (D), 5.5" (H)
Weight	52 lbs.

For manufacturer information, please see Contact Sheet, p. 195.

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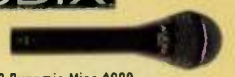

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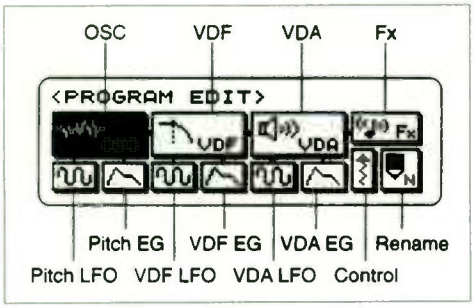

FIG. 2: As with most Korg sample-based synths, the N1's voice architecture features an oscillator; a nonresonant, lowpass filter (VDF); and an amplifier (VDA). You get three LFOs and three envelope generators. The Control section contains parameters for the modulation effects as well as such settings as Portamento. Effects are provided by two independent, stereo processors.

effects processors. Six different parallel and serial routing structures determine how the various effects are connected with respect to the audio sends and hardware audio outs. Overall, this arrangement is quite flexible.

There are 48 effects algorithms spanning reverb, chorus, exciter, rotary speaker, multitap delay, distortion, tremolo, parametric EQ, and more. Some algorithms combine two effects, and using two of these can provide four relatively independent effects!

On the whole, the effects are decent sounding for a synth at this price point. Unfortunately, there appears to be no way of correlating the time domain of the effects to the rest of the sound chain. (You can't, for example, slave the time base of the pan effect to MIDI Clock.) Most algorithms do have other parameters that can be dynamically changed using various modulation sources. These can be physical controllers, such as knobs or the mod wheel, or various envelope generators.

Effects algorithms are not applied directly to a sound object. You apply one of the 100 effects presets from any of eight effects banks. (Of the 800 effects presets, 200 are programmable.) If you want to change the detailed parameters of an effect, you modify the applicable effects preset. This system provides an elegant method of applying effects settings to various sound objects without having to copy and embed them in each object. Unfortunately, the naming system for effects only provides for terse titles like Cho/Rev, reflecting the component algorithms.

In Performance mode, selecting a Program calls up the effects preset associated with it. Selecting a Combi invokes the global effect for that Combi, overriding the effects associated with its component Programs. While working in Performance mode, you can override the default effect of the sound object by calling up a preset effect directly or even programming one of your own. There's also an easily accessible effects bypass toggle. Multi mode provides for one global effects program at a time.

WHAT GOES UP...

The N1's arpeggiator offers twenty basic patterns, the speed of which can be determined by the tempo knob or via external MIDI Clock. If you're like me, you'll find a few patterns that really float your boat and wonder why the remainder are there. An associated

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Do you like the N1's sonic features but find that it's a bit much on your back, your space, and your budget? Though Korg has made no mention of a module version (yet), the unit's little sibling, the N5, may be your answer.

The N5 has a standard, 5-octave synth keyboard, making it comparatively lightweight at fourteen pounds. The sonic architecture is nearly identical to that of the N1, although the N5 has only 12 MB of ROM compared with the N1's 18 MB. Some of that difference is in critical areas, such as the longer piano samples in the N1.

The N5 offers only stereo outputs (and therefore fewer effects routing options), and its headphone jack is the ¼-inch variety. The only other difference worth mentioning is the price tag: the N5 comes in at $1,095 suggested retail, which is $1,000 less than the larger synth.

octave button determines the octave range of the current pattern. Two other buttons control whether the arpeggio will trigger freely or only when you touch a key, as well as whether or not it will latch (continue) after you release.

Editing the Performance allows you to make more detailed changes, such as assigning the arpeggiator to a keyboard zone (upper, lower, or all parts) or setting whether the notes will be sorted according to pitch versus the order in which they were played. Although each of the twenty pattern types is composed of events with their individual metric values, Velocities, and gates, you can override these globally. For example, the arpeggio can play according to the Velocity of the individual factory-programmed events, the Velocity of your individual key depressions, or at a global Velocity.

You can change the base step value from, say, quarter notes to eighth-note triplets or use Global Swing to move the even-numbered steps forward or backward with respect to the beat, as well as globally alter the gate times by percentage. All in all, the arpeggiator is very flexible. The only feature I would add would be the ability to actually program the step patterns.

SOUNDS FAMILIAR

Seeing that the N1 employs Korg's AI^2 technology, Korg veterans will recognize some familiar sounds and architecture. (Korg's AI architecture first made its appearance in the venerable M1, with sixteen PCM-based voices. The Korg X3 introduced the AI^2 technology, which upped the polyphony and the modulation routing.)

As with most synths in this price range, the sound output is in the 30 kHz range, so don't expect the same audio quality as you might from a high-end sampler. Nonetheless, the sound is quite acceptable for most applications.

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The N1's 18 MB PCM library incorporates plenty of Korg classics as well as some new fuel for the fire. You might also recognize some sounds imported directly from the X and N series or wave data from other Korg units.

The synth's sonic architecture is well endowed. For each Program, dual oscillators are processed through a dynamic filter and amplifier and routed through stereo effects. The filter is not resonant, however, so this may not be the ideal centerpiece for a techno or rave rig. A DSP algorithm comes somewhere close to emulating classic analog filter feedback, but it's definitely more limited than the real thing. Though the unit does not offer matrix modulation, you'll find all the usual suspects hardwired to modulate the elements of the sound chain.

There's something for everybody in the sea of factory sounds. You'll find all the meat and potatoes you crave. And to make quick adjustments, Korg has, in many cases, programmed the fourth assignable knob to control an important component of each sound, such as the speed of the rotary speaker.

The pianos are decent for this class of synth, although they're not as rich and expressive as some dedicated digital pianos or Korg's own SGProX. The most realistic is "N Piano," which relies on a PCM multisample borrowed from the SGProX (although the number of samples has been reduced). The wide range of electric pianos includes many variants of Rhodes (barking, mellow, dyno) and DX (chorused, layered, bright, mellow) and decent Wurlitzer emulations, and you get a respectable harpsichord and a Clavinet. (The Clav could use a bit more bite.)

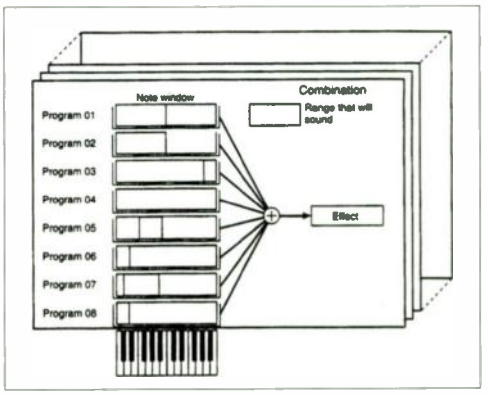

FIG. 3: Combinations ("Combis") contain up to eight timbres, each of which comprises a Program and zone assignment. Stereo effects can be applied to the entire Combi, and you can set an overall Combi note range.

Some of the synthesizer's organ sounds really have grit to them, and the Leslie effect is convincing enough for most purposes. Sounds such as "WhiteShade," "KnifeEdge," and "RockSteady" earn their names—especially for an instrument that is not dedicated to emulating drawbars.

The N1 has enough good string pads to keep you sound surfing for a while. Korg has also placed a nice orchestral complement in the GM and GS banks: big timpani, resonant strings, bright brass, warm woodwinds, smoky saxes—the works. In the Korg banks, "Brassfalls" seems like it has interesting possibilities for Latin applications and Phil Collins clones. "Arabesque" provides a haunting recorder, complete with a trill that lends a Middle Eastern flavor. Several sounds integrate pitched percussion, notably the forest of bells in "12ToneBelz."

Korg products have traditionally offered plenty of acoustic guitars, most of which do the job but aren't overly convincing. The same holds true for the N1. The electric guitars have come up in the world, especially the clean Strat and overdriven lead variety. The N1's "O.D. Lead," "Stadium GT," and "The Ripper" are very playable examples of the latter. Similarly, "Monster Wah" has a muffled overdrive reminiscent of Carlos Santana—until you dig into the Aftertouch and the wah effect opens up to a scream. Yowza! The guitar and bass harmonics are tasty, too.

There's also a healthy assortment of bass sounds, my favorites being "DynamoBass"; "NuFretless"; the funky, low-cutoff "Dance Bass"; and several smoky standup basses. Though there are plenty of attempts at fretted electric bass guitars, I was disappointed that no one Combi pulled them together as a single, highly expressive, rock-solid instrument.

Ever since the days of the M1, Korg has included sounds that combine rich pads with bits of animated "sonic junk," such as the original "Universe" patch. The N1 is no exception, with tinkling pads such as "Universe X" and "PowderSnow." If you're looking for inspiration for that big sci-fi opera you've been planning, the N1 has plenty to offer. Unlike those on a lot of synths I've tried, most of the N1's spacey sounds are very usable in the proper context. "The Futurist" and "Moonrise" are examples of great animated pads, and the delicate, delayed reverb strings of "Padonomic" and the deep space "Encounters" evoke memories of Tomita's classic work. There are also plenty of great spatial synth sweeps, as found in "The Abyss" and the rushing power of "SolarFlare."

There are ethnic flavorings, as well, including "Lost Tribe" and "Javanese," "EastAfrica," and "Ghame Jana," the last of which combines East Indian percussion and stringed instruments. I could go on and on describing the sounds, but suffice it to say that there are tons of great synth patches (both traditional and dance), orchestra hits, pads, and drum kits.

My favorite sounds in the N1 tend to be those that words can't adequately describe. After all, the instrument has zillions of building blocks, spanning just about every imaginable category. Sound-design wizard Jack Hotop and the other folks at Korg who worked on the factory presets have done a great job of combining them into composite sounds with unique character and compelling animation. Hats off!

KORG
N1 keyboard synthesizer
$2,095

FEATURES ■■■■
EASE OF USE ■■■■
QUALITY OF SOUNDS ■■■■
VALUE ■■■■
1 2 3 4 5

PROS: Plenty of useful, inspiring sounds, splits, and layers. Direct computer connectivity for 32 addressable channel timbres. 64-voice polyphony with decent action. Four programmable real-time controller knobs.

CONS: Overwhelming number of programs with no user-definable organization method. No program chaining. LFOs and effects can't sync to external clock. Resolution yields less-than-smooth portamento and pitch bends. MIDI control limited to two simultaneous channels. Lacks true resonant filter.

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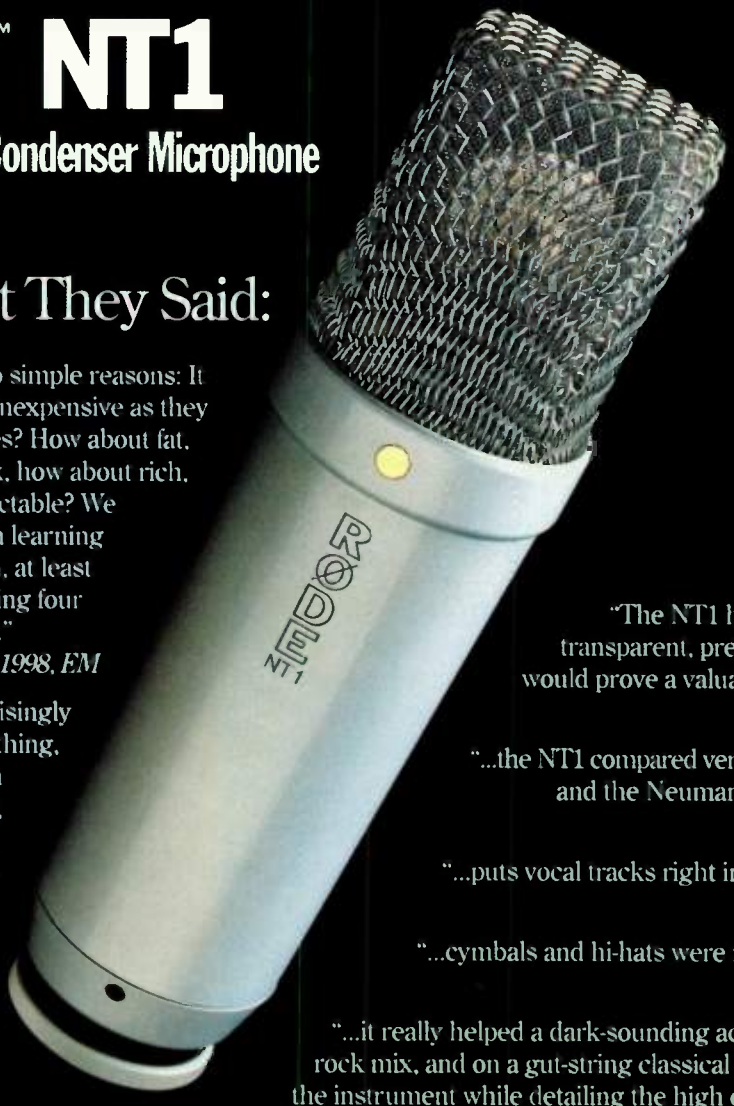

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WELL CONNECTED

You can use most computer-based MIDI software with the N1 via normal MIDI connections. In order to access the full 32 channels from your computer, however, you'll need to use the serial connection, which means you must purchase or make the appropriate cable for Mac or PC. (Korg was courteous enough to publish the pin-outs in the manual.) The Korg end has an 8-pin mini-DIN. The Mac has the same on the other end (a standard Mac printer cable will do), and the PC end has a 9-pin, D-sub (DB9) connector.

The N1 comes with a disk that includes the necessary drivers for Windows and Mac, the latter with options for both Apple MIDI Manager and OMS. These drivers present the N1's 32 channels as A1 to A16 and B1 to B16. The disk also includes a dedicated sound editor for the N1 (Mac and Win), which will make life a lot easier for many people. There's also a utility that converts between SMF formats 0 and 1. The unit I received shipped with a CD-ROM copy of MOTU's *FreeStyle LE* sequencer program and a special Korg N1/N5 edition of MOTU's *Unisyn*.

IN THE N

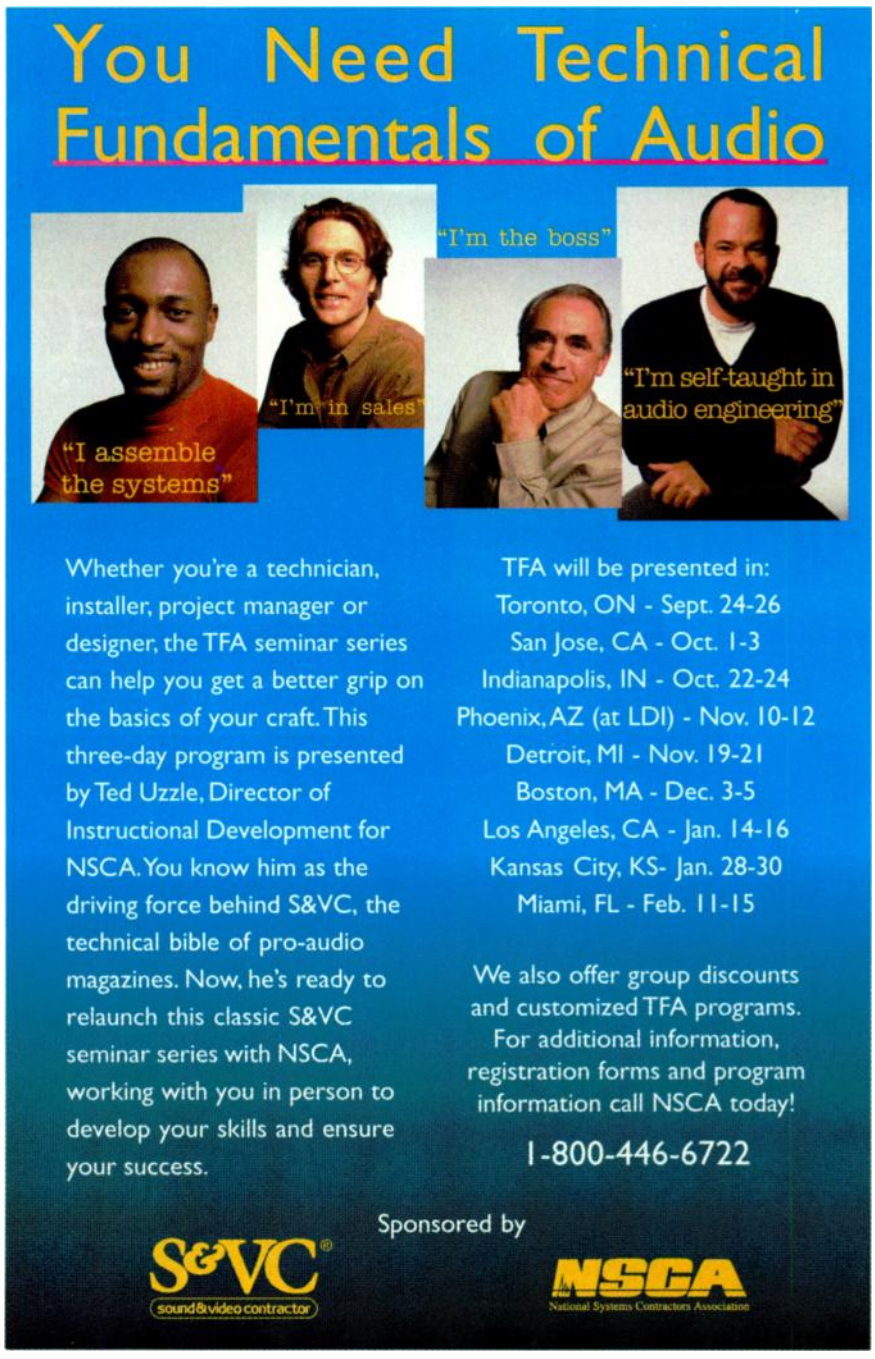
I give Korg a definite thumbs up on the N1. Nonetheless, I have several relatively small qualms. For openers, I'm always disappointed to see a powerful synth in which the LFOs and effects cannot be synched to MIDI Clock. This eliminates a slew of useful techno and sci-fi possibilities.

There may always be a debate over individual preferences for left-hand controller style. Personally, I was glad to see wheels for pitch and modulation. The wheels have protrusions for your fingers to grip, as opposed to the classic depressions spawned by the Minimoog. Unfortunately, you can hear the quantizing of the pitch on fast bends. This is particularly noticeable if you play in the Jan Hammer–esque style of using the pitch wheel for both bending and vibrato. This same pitch-glitching is also apparent with longer portamento times. This is not so much an indictment of the N1 as it is a commentary on the limitations of many digital synths.

All in all, the Korg N1 offers a lot of bang for the buck. With its extensive PCM library, processing abilities, and sheer number of program locations, it manages to offer something for everybody. Sonically, it is a jack of all trades and master of some. If you're looking for pristine copies of real-world sounds, a dedicated sampler may serve you better. Conversely, if you're into techno, rave, and the like, you might find that a synthesizer dedicated to emulating analog sounds (including resonant filters) might better fit the bill. Given its lack of onboard sequencer or storage media, the N1 clearly isn't vying to be a stand-alone workstation. And its ability to control only two external MIDI channels from the keyboard make it less than the ultimate dedicated MIDI controller.

So then what makes the N1 so compelling? Korg has put together a solid, good-sounding, playable instrument at a decent price and positioned it right where most of us need it: a dual solution for gigging and multitimbral computer connectivity.

Jeff Burger *is a composer, digital artist, and multimedia producer/consultant based in Sedona, Arizona.*



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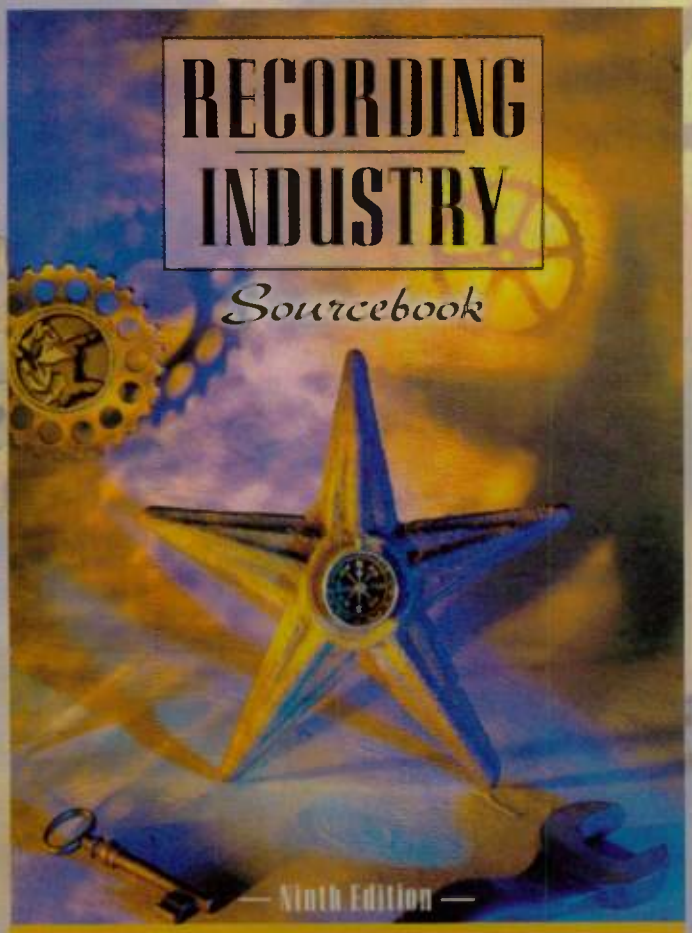

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C A N A M

QUARTZ STUDIO 3.1 (WIN)

Simplified desktop audio recording.

By Scott R. Garrigus

Computers are wonderful tools, but they sure can make studio life complicated. Some recording programs are so deep that novice (and even journeyman) users are often tempted to give up on desktop production, record with a good old tape deck, and let sleeping silicon monsters lie.

The folks at Canam Computers hope to make you feel better about your desktop studio by attempting to bring the simplicity of tape-based systems—or at least something approaching it—to desktop production. *Quartz Studio* 3.1, an 8-track digital audio recording program, is designed to look and feel like a multitrack tape recorder and mixer, but with the convenience and power that one expects from software. Some of its more powerful features include real-time, channelized effects; the ability to sync to MIDI, CD, and AVI files; and pan and level automation. As you'll see, however, the program's feature set is uneven; some features are not so convenient because they lack sufficient power.

The program comes on two floppy disks, and a fairly good user's manual is included in the package. I tested *Quartz Studio* on a Pentium 150 MMX machine running Windows 95 with a Sound Blaster–compatible sound card. Installation was simplicity itself.

CHANNELS AND BUSES

Unsurprisingly, *Quartz Studio*'s user interface is divided into sections similar to those found on a standard mixing console and multitrack tape deck (see **Fig. 1**). The left side of the console contains eight channels that represent the program's eight monophonic tracks of digital audio recording. Channel controls include the track input and output assignments, balance, on/off and solo status, effects routing, track name, and level. There is also a level-meter display for each track, which, unfortunately, does not include decibel markings.

The right side of the console contains bus and master level faders and meters. (There are no decibel markings here, either.) The transport controls work just like their tape deck equivalents but with the added bonus of instant activation. You can easily shuttle back and forth to any section of the virtual tape while the current-position counter displays your location in hours, minutes, seconds, and frames. There are also left and right locator readouts, which are used during recording, and an end-of-mix counter that shows you the location of the last bit of audio.

The row of buttons below the transport controls allows you to activate the program's synchronization features. In addition to sending (but not receiving) SMPTE/MTC code, the program allows synchronous playback of a MIDI file, CD audio track, or video file. These features are a nice touch, especially if you work with audio for video. For instance, you can easily lay down narration or additional digital audio tracks with any of the supported formats, and everything will stay in perfect sync. You can also set an offset so that the external file starts playing at a designated place within the mix.

The Functions menus round out the onscreen controls. These menus give you access to common computer commands, such as saving and loading files.

GETTING STARTED

Before recording in *Quartz Studio*, you have to set up your sound cards. The program supports up to four stereo sound cards and treats each card as two mono channels of input and output. This means that, if you're lucky enough to have four sound cards (or a sound card with four stereo connections), you can record all eight tracks at once. I wasn't able to test this, but I did get my hands on an Audiotrix 3D-XG card from Mediatrix Peripherals and tried using it with my Sound Blaster–compatible card. They worked together nicely.

To begin laying down audio, you select a track by clicking on its input indicator. If you have only one sound card, the indicator is permanently set to input A. You then select the left or right channel of the assigned sound card by clicking on the appropriate input button. As soon as you do, the corresponding card input is activated and you're ready to set your levels. It's all very straightforward.

Quartz Studio allows you to record your audio direct to disk or into your computer's RAM. If you have a fast drive and data bus, you can just record straight to disk. Recording to RAM is better if you have a slow hard drive,

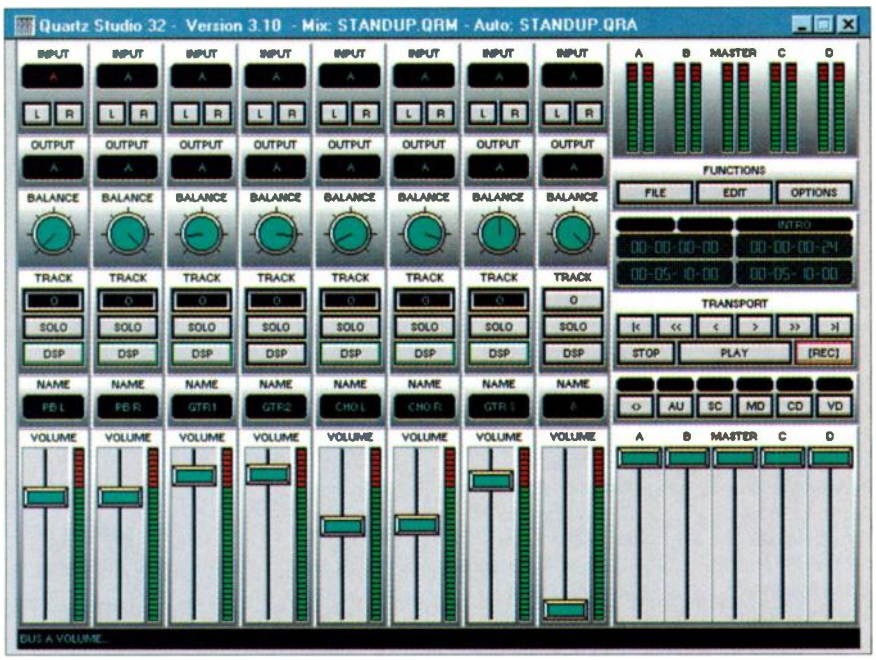

FIG. 1: The main interface of Canam's *Quartz Studio* resembles the control surface of a multitrack tape recorder. You can set each track's input, output, balance, level, and other parameters by manipulating the onscreen controls with the mouse.

For manufacturer information, please see Contact Sheet, p. 195.

but you need a substantial amount of system memory to use this feature. If you record to RAM, the file is saved to disk as soon as you stop recording, and the RAM is then cleared. All editing is done to a disk file and is destructive.

There are a few real drawbacks here. For one, *Quartz Studio* can only record 16-bit, 44.1 kHz audio, which is a drag if you are recording for multimedia and need smaller files (and hence, lower bit rates and sampling rates). It's also not so great if you want to digitally transfer audio into a DAT machine at 48 kHz via S/PDIF.

The program uses its own file format, called a Mix, which includes the audio data, markers, and automation data. Audio tracks are mixed in real time, and the program can simultaneously record and play back audio, which makes the mixing process more natural and tapelike than it is in programs where you have to wait while a mix is calculated.

In order to achieve this, Canam used a proprietary file format, which is to be expected. However, tracks are interleaved in 40-millisecond slices, and this requires the use of a fixed file size, according to the developer. Consequently, in *Quartz Studio*, a Mix file always takes at least 40 megabytes of space per minute of recording, no matter how many tracks you use. This can be a problem if you are short on disk space, and frankly, it seems wasteful when you aren't using all eight tracks. Other programs manage to achieve real-time mixing and simultaneous playback and recording without having a fixed file size.

FIG 2: The Waveform window displays the digital audio data contained in all eight tracks simultaneously. Unfortunately, graphical editing with copy, cut, and paste isn't allowed.

Quartz Studio is permanently set for punch-in, punch-out recording. This means that audio is only recorded during the time that occurs between the left and right locator positions. This is good, in a way, because it lets you selectively record within a track while protecting the rest of the previously recorded take. Just be sure to set the left locator to zero if you want to record at the beginning of a track. It's also a good idea to set the right locator to a value a little larger than what you need, because you never know when a good solo might go long.

As promised, the recording process is reasonably tapelike, given that this is, after all, software. After everything is set, you're ready to hit Record. When you're finished with a take, hit the Stop button, and the program will ask you

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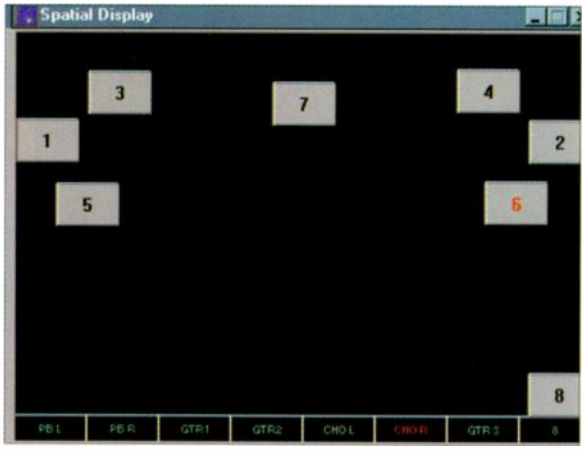

FIG. 3: The Spatial Display provides an intuitive way to adjust track panning and levels. Any changes made here are automatically reflected on the *Quartz Studio* main console.

whether you want to keep the recording. To play back the take, you turn off the track's input section and unmute the track output. Then "rewind" and play. Of course, you can continue the recording process until you've filled up all eight tracks.

If you need more recording space, you can use the program's Tracking feature to mix up to seven tracks down to a destination track (or in the case of stereo, a pair of tracks). This Tracking feature provides the same function as bouncing tracks on a regular tape deck.

SPLICE IT UP

Quartz Studio's audio-editing features could use major improvement. The only editing functions that the program provides are Copy, Cut, Paste, Clear, and Move. You simply adjust the left and right locators to edit the audio in between. One consolation is that you can import and export audio data as WAV files for editing outside of the program. Still, this is very cumbersome and in no way makes up for the lack of editing functions.

The Waveform window displays the audio data in all eight tracks simultaneously (see **Fig. 2**). Unfortunately, this window doesn't allow any kind of graphical editing, such as selecting data with the mouse. Its only purpose seems to be to make the left and right locator positions a little easier to set. It would be nice if you could select a region of audio and edit it from this window. There is also a problem navigating within the window because it doesn't provide a horizontal scroll bar. The only way to move to a different time location is by manually setting the current-position cursor. This process is very cumbersome and unintuitive, to say the least. In addition, you can not zoom in or out to get a better look at the audio data.

The Markers window makes navigating a little easier by allowing you to add, delete, and edit markers for specific time locations. During playback, you can click on the Catch button in the Markers window to record the current cursor position as a marker. You can also use the window to quickly move the left or right locators, as well as the current cursor position, to a selected marker. However, this feature only allows a maximum of 32 markers to be defined for an entire Mix.

MIX IT DOWN

Canam has provided a nice set of mixdown tools. The program lets you set the track parameters via familiar, intuitive controls, such as a pan pot for balance and a fader for volume level. You can easily solo and turn tracks on or off with buttons. You can also name each track, albeit the names are limited to eight characters.

▼

Canam has provided a nice set of mixdown tools.

You can't group a set of track faders, but you can get around this by assigning the tracks to the same output bus and adjusting their relative levels using the bus fader. If you have only one sound card in your system, you can still assign tracks to buses B, C, and D, which are routed to the A bus. So in this case, it's a good idea to just keep the A bus at maximum level and then use the other buses for grouping (if you need them). There is also a master level fader through which all audio is routed.

In addition to the traditional mixdown method, *Quartz Studio* supplies a feature called the Spatial Display (see **Fig. 3**). The Spatial Display allows you to mix down your tracks visually by providing a graphical representation of the sound stage along with each track's pan and level positions within that stage. This is a simple but cool concept that is rarely found in this type of software. Tracks are represented by small, gray squares that are labeled with the appropriate track numbers. Unfortunately, track names aren't reflected here, so it can sometimes be difficult to determine which instrument is where.

To adjust a track's balance and level, you simply click and drag its square around the sound stage. Dragging the square left or right adjusts pan position, and dragging it up or down adjusts level. Any changes you make in the Spatial Display are automatically reflected on *Quartz Studio*'s standard console display. This is a very nice feature for testing out different soundstage placement.

If you have a large number of changes that must be made throughout your mix, *Quartz Studio* lets you easily record those changes using its Automation feature. Automation recording is handled in a similar manner to audio recording. You must set the left and right locators for the punch-in and punch-out points of your take. The only difference here is that, when you hit the Record button, all changes on all tracks are recorded whether the tracks are on or off. According to Canam, this is done so that, in addition to recording pan and level changes, you can automate the track on/off settings. Although the ability to automate mutes is handy, I don't care for this implementation; I want to be able to record individual track and mute automation separately.

After you've recorded your mixdown changes, you can easily edit them via the Automation window. This window displays a list of automation events similar to an event list in a MIDI sequencer. The first column shows the time position at which each event occurred, displayed in hours, minutes, seconds, and frames. The second column shows on which track the event occurred and whether any changes were made to the A, B, C, and D bus faders as well as the master fader. The third column lists the

event type—track on/off, volume, or balance—and the fourth column shows the value of each event. Events can be sorted by time, track, or type, and you can easily add, edit, or delete events by selecting them and clicking on the appropriate button.

One drawback is that, even though multiple events can be deleted at once, they have to be edited one at a time. For example, you can't scale a group of volume changes. What you *can* do, though, is save your Automation events as a separate *Quartz* QRA (Mix) file. This lets you record as many different mixdown scenarios as you'd like and then choose the best one later.

ADD EFFECTS

Quartz Studio sports an impressive signal-processing arsenal. The package includes eight basic effects (Auto Pan, Band Pass Filter, Stereo Chorus, Compressor, Stereo Delay, Equalizer, Noise Gate, and Vibrato) and can accept up to eight more. These effects are provided as plug-ins in the program's own proprietary format. Surprisingly, the program doesn't support DirectX, an omission that stands in sharp contrast with most Windows audio editors. Still, the supplied 32-bit effects plug-ins are quite good and very versatile.

All effects in *Quartz Studio* are applied in real time to each individual track. This means your computer system will need quite a bit of processing power to make good use of them. On my test system, I was able to apply a total of thirteen different effects to various tracks before the program ground to a halt and displayed an "Audio Flow Break" error message.

You add effects to a track by clicking on the track's DSP button, which brings up the Effects Connection dialog box (see **Fig. 4**). There, you can select which effects you want by clicking in the appropriate checkbox. You can apply as many effects to a track as you'd like (and your computer system will allow)

Quartz Studio
Minimum System Requirements
Pentium 133; 16 MB RAM; Windows 95; Windows-compatible sound card capable of playing and recording stereo, 44.1 kHz audio; 800 x 600, 256-color display

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and specify the order in which the effects occur. You can also set whether you want each effect to be applied pre- or postfader.

Each track maintains its own set of effects parameters, so in essence, if your computer system has enough power to support it, you can have all effects on all eight tracks simultaneously. That's very nice, indeed. To set the parameters for an effect, you simply click the appropriate parameter button. This will bring up a hardware panel–style display for the selected effect. For example, the Stereo Delay has options for Time, Feedback, and Mode, as well as Direct and Effect levels. Each effects module comes with a Bypass button so you can easily compare the wet and dry track. You can also save and load your own presets for use in the current or any other Mix project.

FIG. 4: Track effects are assigned using the Effects Connection dialog box. Each track can have its own chain of effects with individual parameter settings.

The only thing that disappointed me here was that the program doesn't let you record your effects changes in real time via the Automation feature. Because each track has its own set of parameters, it should be easy to add this feature. This would provide a truly automated environment in which you could have dynamic effects changes throughout a Mix. One other oversight is the fact that effects can't be applied to any of the output buses. It would be nice to be able to group a set of tracks to a single bus and then apply an overall effect.

RIGHT LOCATOR = END

With today's high-tech music software tools becoming more and more complex, *Quartz Studio* provides a nice transitional interface and working method for those of us who still have our minds in the traditional tape-deck world. It also augments this metaphor with a number of higher-end features such as support for SMPTE/MTC, MIDI/CD/video playback synchronization, multiple sound cards, automated mix playback and recording, and a healthy supply of 32-bit real-time effects.

However, the program's lack of all but the simplest editing commands and its basically useless waveform display keep it from measuring up to some other products in the same price range. Other limitations—the fixed sampling rate and resolution, lack of support for DirectX, 40 MB per minute minimum file size, and others I've pointed out—also are significant. Despite these issues, *Quartz Studio* is a reasonable choice for some users, but it's not compelling.

Scott R. Garrigus *has been reviewing software for over ten years and publishes his own online computer software publication,* comp-media. *You can reach him by e-mail at garrigus@pan.com or visit his Web site at www.pan.com/garrigus.*

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EASE OF USE ■■■■
DOCUMENTATION ■■■
VALUE ■■
1 2 3 4 5

PROS: Extensive synchronization support. Multiple sound card support. Real-time channelized effects. Mixdown automation recording.
CONS: Poor audio-editing features. Proprietary real-time plug-in architecture. No automated recording of real-time effects. No DirectX support. Fixed sampling rate and resolution. Minimum 40 MB file size.
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BEST SERVICE

ADVANCED ORCHESTRA

An orchestra at your fingertips.

By Rob Shrock

Anyone attempting to pull off complete symphonic simulations, demo mock-ups, or even light orchestral sweetening with a MIDI setup is familiar with the myriad challenges involved. In order to create convincing performances, you must start with convincing sounds. Peter Siedlaczek, creator of the critically acclaimed *Orchestral Colours* CD-ROM of orchestrated symphonic phrases, has sampled some of Europe's finest symphonic musicians to create a library of multisampled instruments. *Peter Siedlaczek's Advanced Orchestra* is a 5-disc library divided into separate sections of the symphonic orchestra: String Ensembles, Solo Strings, Woodwinds, Brass & Effects, and Percussion & Harp. There is an additional 3-disc update titled *Upgrade '97*, which contains more articulations, additional instruments, and new programs.

The main library is available in Roland, E-mu, Akai, and GigaSampler formats. *Upgrade '97* is currently available only in Akai and E-mu formats, but Roland and GigaSampler versions are in progress. I reviewed the Roland version of the main library and checked out *Upgrade '97* in Akai format loaded into a Kurzweil K2000RS.

Each disc has the included instruments or sections divided into separate Volumes (banks) by type of articulation or dynamic level. None are larger than 16 MB. The range of each instrument or section is true to the actual instrument; for instance, the violin samples do not play lower than G2 (the lowest note possible on a violin). In addition, most instruments can be loaded as a lower-fidelity, 22 kHz sample-rate version, consuming much less memory and allowing the basic instrument and a few of its articulations to be auditioned at once. This is a very handy feature when you're trying to find a specific sound and time or sampler RAM is at a premium. This feature also makes it possible to load more instruments while sequencing—you can load the 44.1 kHz versions later, before printing to tape.

STRING ENSEMBLES

Disc 1 of the main library contains long, looped samples of fourteen violins, ten violas, eight celli, and six basses, each at fortissimo *(ff)* and pianissimo *(pp)* dynamic levels. Each section also contains Volumes of sordino (muted), detaché, pizzicato, *ff* tremolo, *pp* tremolo, crescendo, and crescendo/ tremolo. The violins and violas also have col legno (played with the wood side of the bow) samples, and all except the basses have major and minor trills.

All instruments contain unlooped samples of slow and fast glissandi. All of them except the basses contain various grace notes (whole tone ascending, half tone ascending, and half tone descending), major and minor ascending 1-octave runs, short chords and broken chords (major, minor, and diminished).

The "String Ensembles" disc is a mixed bag. The long pianissimo violin samples are often too weak and hollow sounding for anything other than long sustains, and I didn't find them suitable for carrying a melodic line. The fortissimo samples are, indeed, much heavier by comparison, but they have so much rosin in their attack that they are not ideal for melodic lines, either. Their basic characters also make the two difficult to combine seamlessly—I wish there was at least a mezzo forte selection to bind the other two together.

The muted strings, however, are uniformly superb and very usable. Although they don't offer variations in dynamic levels, they provide a useful alternative to the regular sustained Volumes, and I used them to great effect on several projects.

The trills, grace notes, chords, pizzicati, and arpeggios are all well recorded and can add authenticity to a phrase when properly used. However, some of these effects are very specialized and must be used sparingly. In fact, I would have preferred that the sound designers forgo some of the specialty articulations in favor of more complete and usable sustained sections. Without a solid set of "meat and potatoes" sounds, the overall usefulness of a library suffers, and this is the case with disc 1 of *Advanced Orchestra*.

SOLO STRINGS

Disc 2, "Solo Strings," contains a solo violin, viola, and cello. (There is no solo bass.) The samples are based on the same articulations as those in the "String Ensembles" disc. Once again, the loud and soft sustains are too disparate in timbre for easy transitions; there are no alternate versions to draw upon, here, either. The detaché Volume in the solo violin section is held too long and has too much vibrato, but otherwise the samples are beautifully played and recorded. Interestingly, the solo viola provides three different *ff* and *pp* Volumes each (the solo cello has two each). I would have preferred that more alternate dynamics be provided for the solo violin and solo cello instead.

The "Solo Strings" sustains are not looped, and this severely limits the capabilities of the provided instruments. Each violin sample is held approximately five seconds, but the viola and cello samples are much shorter: two to three seconds. I sometimes like to layer

***Peter Siedlaczek's Advanced Orchestra*, from Best Service, is a 5-disc CD-ROM or audio-CD collection featuring some of Europe's most talented musicians. A 3-disc update is also available.**

Orchestral simulations are hard to pull off. See our Web site, www.emusician.com, for a look at the problems involved—and some solutions.

several different solo instruments to create small sections when recording, but for this purpose, I found the lack of loops disconcerting. In fact, I wasn't able to use the solo viola or solo cello for many applications that required longer sustained notes. Instead of ending softly, most of the sustained samples (especially in the forte Volumes) end abruptly and even have a little push on the end, making them really stick out when layered with other samples.

The first *ff* solo cello has a hint of the open C string in the bowed C2 sample, and it also shows up in the B1 and C♯2 samples. This instrument is a little too boisterous for my taste, anyway, but the second *ff* cello is milder and much more melodic.

As with the "String Ensembles" disc, I really liked the sordino (muted) Volumes of each solo instrument. To my ear, they were the best compromise between the loud and soft versions, and the most usable. I also loved the runs, although they are limited to one octave in either a major or minor key. (Some minor runs contain a dominant seventh, and others contain a major seventh.) The chord, arpeggio, and glissando Volumes are all great sounding but suffer from the same limited usefulness as the ensemble samples of disc 1. Worthy of special mention are the pizzicato Volumes—they're superb.

WOODWINDS

Disc 3 contains some gorgeous samples of the symphonic woodwinds. Articulations for most volumes include *f* and *p* sustains, staccato notes, grace notes, major and minor trills, crescendos, runs, turns, and pickups. The Volumes with three flutes are very good for unison flute lines, and both the solo flute and solo alto flute are wonderful. Although there is no oboe section, the solo oboe Volume contains a second, 4.4 MB Volume called "Oboe Solo Vibrato."

It's strange that the woodwind sections are looped, especially considering that the solo strings are not. If you wanted to write idiomatically for a string instrument, you would want to be able to have very long, sustained notes in a passage; but woodwind parts need to be written with breathing in mind. So it would make more sense to include loops for the solo strings and not for the woodwinds.

The runs, trills, grace notes, and other articulations were more useful with the woodwind instruments than they were with the strings. Flutter-tongue Volumes are also available for all flutes, clarinets, and contrabassoon. When used properly, the library lets you create very convincing lines, and it does a good job of capturing a bit of orchestral ambience without making the samples sound too distant or too close. Curiously, although the solo clarinet Volume is actually located on the "Brass & Effects" disc (because of space limitations) the documentation lists it on "Woodwinds."

BRASS & EFFECTS

Brass is generally the toughest instrument group to pull off with samples, but the brass samples in *Advanced Orchestra* are very good. The same basic group of articulations is represented here as in the rest of collection. The crescendo Volumes are especially effective for brass samples, and the flutter tongues are nice to have, as this particular articulation is only shyly represented in most other libraries.

Once again, I wish there were a more complete collection of sustains for each instrument. Especially with French horns, there are a multitude of timbres that show up in orchestral work; however, only basic loud and soft are provided in this collection. No muted French horns are available, either, except in a 4-horn glissando patch.

I liked the solo trumpet and piccolo trumpet. They are both extremely playable, and as a former trumpet and French horn player, I don't say this lightly. Even the 3-trumpet Volume is outstanding. I especially liked the amount of ambience in the samples; as on the "Woodwinds" disc, it strikes a pleasing balance of space and clarity.

The effects Volumes on disc 4 are an eclectic collection of sounds created with the traditional instruments of an orchestra. Here you will find everything from wind noises to scratches, animal sounds, clusters, and just plain silly sounds. You'll just have to audition them yourself to see if you have a use for them.

PERCUSSION & HARP

Although "Percussion & Harp" is not a huge collection of instruments, the

Advanced Orchestra Contents

DISC	CONTENTS
String Ensembles	14 violins, 10 violas, 8 celli, 6 basses
Solo Strings	violin, viola, cello
Woodwinds	3 flutes, solo flute, solo alto flute, solo oboe, solo English horn, 3 clarinets, solo bass clarinet, solo bassoon, solo contrabassoon
Brass & Effects	3 trumpets, solo trumpet, solo piccolo trumpet, 3 trombones, solo trombone, solo French horn, solo tuba, various orchestral effects, solo clarinet
Percussion & Harp	American Symphonic cymbal, 24" cymbal, 18" cymbal, timpani, gran casa, snare drum, tam tam, gong, Thai gong, Chinese opera gong, triangles, marimba, xylophone, orchestra bells, tubular bells, vibraphone, harp
Upgrade '97 (3 discs)	violin section; viola section; cello section; contrabass section; Hollywood strings (violins, violas, cello); silver strings (violins, violas, cello); string combis; percussion (dry and ambient); percussion construction kits; timpani construction kits; brass staccato notes; bass flute solo; harp; short loops of string ensembles, brass, and woodwinds from main library

For manufacturer information, please see Contact Sheet, p. 195.

basics of orchestral percussion are well represented here with great samples. Three different cymbals—an 18-inch, a 24-inch, and one called "American Symphonic"—are provided with an assortment of strokes and rolls at various dynamic levels. The samples are well recorded, and the stereo placement within the soundstage is very good. A single snare drum Volume contains six single hits at different dynamic levels, as well as three rolls. There are several good gong samples with multiple strokes, and each of the two triangles offers a long and short stroke. The marimba, xylophone, orchestra bells, and tubular bells are uniformly excellent, though not exhaustive (there are no variations to the dynamic levels).

The harp collection includes only glissandi and chords—there aren't any single-note harp samples in the main library. If you can find an appropriate spot for any of the harp Volumes, the effect is wonderful. The glissandi, in particular, are beautiful, and they are provided in variations of slow and fast, up and down, and major, minor, diminished, and whole-tone scales.

UPGRADE '97

The 3-disc *Upgrade '97* includes new samples as well as programs that use the sounds from the original collection. I was dismayed to learn that the Roland version was not yet available. Since I don't own an Akai or E-mu sampler, my only choice was to import the programs into my Kurzweil K2000RS. The samples, keymaps, and programs translated fine. After a little envelope tweaking, I was able to easily audition the disc.

Siedlaczek must have been aware of the deficiencies in the main library, because *Upgrade '97* provides completely new string ensembles, a multisampled harp, additional percussion, solo bass flute, and shorter looped versions of many of the main library's string ensembles, brass, and woodwinds.

The articulations in the string ensembles are especially good, and the timbre differences between the sustained forte and mezzo piano samples are much more musical than in the main library. Initial-attack samples and separate staccato down-bow and up-bow samples let you add further articulation to melodic lines by adding the attacks to the legato sustains on appropriate notes. There are also quarter-note and sixteenth-note samples for playing fast lines. An additional, Velocity-switched category called Hollywood Strings offers a completely different set of violin, viola, and cello volumes. These samples are equalized for scoring and modern music. A mystical set of strings called "Silver" is also included.

I found the string ensembles here much more pleasing and usable than the set in the main library. These new articulations, combined with the pizzicato and muted samples of the original library, give you a really good set of string sounds (although the ambience and miking don't always match perfectly).

The percussion instruments include claves, cowbell, various chimes, tambourines, temple blocks, castanets, Japanese bowl, and crotales. You get a variety of strokes appropriate for each instrument, and the recordings are uniformly excellent. There is a memory-saving, triple-Velocity-switched Volume of the original timpani sounds, including hits and rolls.

In addition to a solo bass flute, the update includes the sorely missed single harp notes. In fact, there are now four very good harps to choose from: a single-note harp, prés de la table (near the resonance board), "Hollywood harp wide" (equalized for ensemble mix), and "Hollywood harp close" (equalized for foreground mix).

The set is rounded out with looped, Velocity-switched, memory-saving versions of the string ensembles, brass, and woodwinds from the main library. With *Upgrade '97*, the collection is fairly complete for most orchestral and film-style composing.

THE WHOLE

Overall, the recordings and performances in *Advanced Orchestra* are superb. I really like the natural ambience in the samples. Although the crucial initial attacks of the samples are well preserved, I felt the envelopes were a bit abrupt on the key-ups, and I wanted longer release times on most patches throughout the library.

Monophonic versions of the patches in the main library are provided for those needing to conserve memory, but aside from that, I am disappointed in the programming. The documentation states that certain Volumes contain additional Aftertouch- and Velocity-controllable filter patches, but I noticed very little, if any, difference in most of these programs. There are no patches in the main library that switch between samples with different dynamics based on Velocity or Modulation—perhaps because the fortissimo and pianissimo samples do not blend together well. Also, I believe all the string instruments should be looped and wish the ensemble woodwinds were not looped.

Upgrade '97 saves the day. The 3-disc set provides more value with great samples and Velocity-switched programming. When combined with the main library, it provides a fairly complete set of orchestral instruments and articulations. However, if you're a Roland user, you may want to wait before investing in *Advanced Orchestra:* you can't yet exploit the whole library unless you also own an Akai- or E-mu–compatible sampler and don't mind fussing with the conversion process of the necessary *Upgrade '97* samples. If you're willing to work at it, *Advanced Orchestra* can bring the virtual symphony closer to your fingertips.

BEST SERVICE

Peter Siedlaczek's Advanced Orchestra
CD-ROM complete library
(5 discs Roland and Akai; 6 discs E-mu) $995
audio only complete library (5 discs) $495
CD-ROM individual disc $249.95
audio only individual disc $119
Upgrade '97 (3 discs) $399.95

QUALITY OF SOUNDS ■■■■
PROGRAMMING ■■
DOCUMENTATION ■■▮
VALUE ■■■
1 2 3 4 5

PROS: Well-recorded and clean samples. A large library. Specialty articulations are quite good. *Upgrade '97* fills in the gaps and makes creative use of combination programs.

CONS: Not enough dynamic variety in main library. Solo strings are short and not looped. Many envelope releases are too short. *Upgrade '97* is not yet available in all formats.

CIRCLE #441 ON READER SERVICE CARD

OPCODE

FUSION:EFFECTS

Three classic analog effects enter the digital age.

By Mikail Graham

Everyone knows that Opcode is a veteran in the world of MIDI sequencing and digital audio recording software. What many people don't know is that the company recently jumped into the DSP plug-in market with the introduction of its new *fusion:EFFECTS* series. Offering more than just the typical multi-effects/dynamics-processing package, Opcode's *fusion:EFFECTS* serve up simulations of vintage analog processing with the convenience and precise parameter control of DSP plug-ins.

The first plug-in is *fusion:VOCODE*, a software vocoder that lets you create custom effects, such as robotic vocals, guitar talk boxes, and morphed, rhythmic pulse effects. Second is *fusion:VINYL*, a plug-in designed to emulate classic turntable effects, such as scratches, warped playback, and rumble. In addition, *fusion:VINYL* can simulate AM radio and telephone bandwidths.

Last (but certainly not least) is *fusion:FILTER*, a comprehensive collection of analog-filter simulations. *FILTER* features resonant filters that can be rhythmically modulated, LFOs that can be matched to any tempo or groove, a wicked Pulse Sequencer, and the ability to extract amplitude information from one file and use it to modulate another.

THE BASICS

The cross-platform *fusion:EFFECTS* plug-ins are available in a number of formats: Adobe Premiere, Digidesign AudioSuite and TDM (*VOCODE* and *FILTER* only), Microsoft DirectX, and (by the time you read this) Steinberg VST. (The TDM package includes the AudioSuite and Premiere versions, as well.) Of course, the TDM and VST versions operate in real time, but the AudioSuite, DirectX, and Premiere versions do not. Processing files can take anywhere from a few seconds to a few minutes, depending on the speed of your computer and the size of your file. On my Power Mac 9500/233 running System 8.1, the processing time was only a few seconds for 4- to 8-bar loops.

Opcode has designed easy-to-use interfaces for these plug-ins; they offer a lot of control without a lot of clutter. For example, numeric values for any parameter can be set by typing them in or using the small up and down on-screen arrow keys. Rotary wheels can be changed by grabbing a knob with the cursor or clicking at any point along its travel path for instant adjustment. These features make the interfaces very intuitive, regardless of your work style.

One very useful feature common to all three *fusion:EFFECTS* plug-ins is the Auto-Normalize function. Option-clicking on any Peak indicator automatically adjusts the output level of the file to its loudest possible unclipped value, which is quite handy. All the *fusion:EFFECTS* also offer online help, which can be turned on or off. This is a very helpful feature that I'd sure like to see incorporated into all plug-ins. There are some minor differences in each plug-in's interface with the various formats; check the online manuals for more detailed information.

Having owned a multispeed turntable, a Roland SVC-350 vocoder, a vintage ring modulator, and a sample-and-hold VCF filter, I speak from hands-on experience when it comes to using the real things. So how do these new software plug-ins stand up in comparison?

For anyone who likes to explore innovative signal processing, I can honestly say that Opcode's *fusion:EFFECTS* series is a dream come true. In the past, achieving any of these effects would have required some very expensive outboard gear and a lot of effort. But thanks to the advent of DSP and the work of some very creative programmers, these classic effects are now available to just about anyone with a personal computer at very reasonable costs. Let's take a look at them individually.

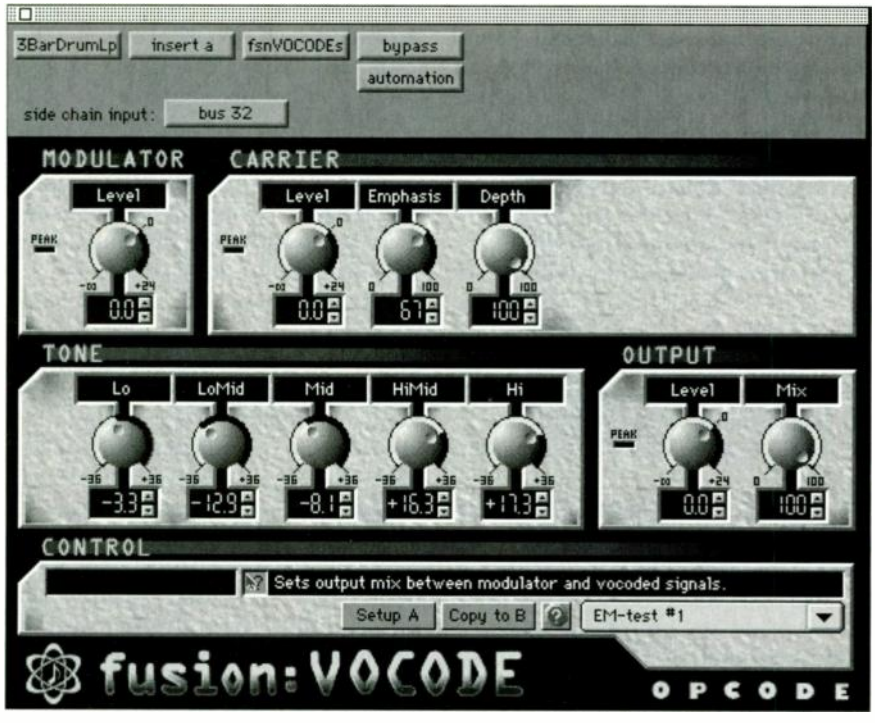

FIG. 1: Opcode's *fusion:VOCODE* combines the classic sound of an analog vocoder with the pristine sonic clarity and superior parameter control of a DSP plug-in.

FUSION:VOCODE

What the heck is a vocoder, you ask? In the simplest terms, it's a processor that continuously analyzes the amplitude of one signal (called the control signal or modulator) in several frequency bands and applies these amplitude measurements to another signal (called the program signal or carrier). As a result, the program signal takes on the timbral characteristics of the control signal. The most common application is to use a vocal signal as the modulator and a

For manufacturer information, please see Contact Sheet, p. 195.

Fusion:EFFECTS Minimum System Requirements
Mac: Power Macintosh; Apple QuickTime2.5 or later; host program that supports Premiere, AusioSuite, TDM, or VST plug-ins
PC: Pentium CPU; host program that supports DirectX or VST plug-ins

pitched instrumental sound as the carrier; the pitched sound seems to "speak" the words being articulated by the voice. (The term "vocoder" is derived from the Voice Operated enCODER technology created at Bell Labs in the late 1940s.)

Because *fusion:VOCODE* is an audio plug-in, it can use any compatible audio file on your hard drive as the carrier. (The TDM version can use any line input, as well.) For example, you can use a sequenced keyboard part to turn a background vocal into a perfectly timed rhythm track. Or you can blend a flute solo with the feel and sound of a hi-hat to create a brand new instrument. The list of ideas is virtually limitless.

VOCODE interface. Let's start with *VOCODE*'s controls (see **Fig. 1**). The interface is divided into five sections: Modulator Input, Carrier Input, Tone, Control, and Output. Both input sections and the output section offer level control and peak indicators, and there is a master Mix level at the output.

The Carrier Input also features Emphasis and Depth controls along with a pop-up menu of 23 built-in carrier waveforms to get you started (Vox Aah Choir, Bottle, Flute, Strings, and White Noise, to name a few). The Emphasis control lets you tailor how much resonance is applied to any carrier frequency matching the frequency of the current modulator. Setting this control higher than 70 produces a more noticeably vocoded sound.

Depth controls the amount of carrier signal that is processed by the modulator; a setting of 100 percent provides a completely vocoded sound, while lower values allow more of the original audio to pass through. Using the preset carrier waveforms from the pop-up menu is a breeze, and you can easily select a designated carrier pitch with the on-screen Pitch Select Keyboard.

The Tone module provides a 5-band EQ that affects the vocoded signal as well as any unfiltered audio that passes through from the carrier waveform. The Control module provides most of *VOCODE*'s global controls, including Preview, Bypass, Lo-Fi, Setups A/B (for quick comparisons of your last two edits), and a pop-up menu for selecting global presets.

Of these last controls, I found the Lo-Fi button to be one of the most useful because it serves two functions. First, it can be used to create some very interesting distortion-like effects, which you might actually find more to your liking than the standard processing mode! Even better, it can also speed up the previewing process, because it doesn't tax the operating system as much as the standard mode does.

In addition to the 23 preset carriers, Opcode also provides a wide variety of custom carrier waveforms, including didgeridoos, techno synth arpeggios, ambient soundtracks, and some very cool short drum loops. I especially liked the didgeridoo samples for turning an otherwise basic drum track into something quite ethnic and surreal.

VOCODE TDM

At the time I reviewed these plug-ins, *VOCODE* was the only *fusion:EFFECTS* plug-in that supported the TDM format. The TDM version of *FILTER* should be available by the time you read this.

VOCODE provides two modes of operation in a TDM system. As a Master Insert plug-in, the left channel is the modulator and the right is the carrier. Sidechain mode lets you assign any track as the modulator and any Aux send or bus as the carrier. (Aux buses can also be used to process a live input.) This effectively makes *VOCODE* just as flexible as a stand-alone hardware device, with the added benefit of automated levels and pans. All in all, this a very powerful plug-in for the TDM domain.

TDM negatives. I did find a few problems, however. Contrary to the standard followed by all other TDM plug-ins, when you edit a parameter,

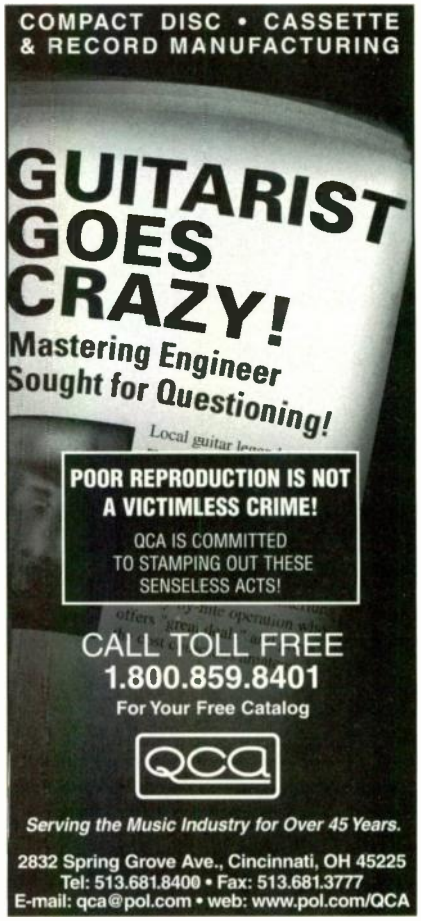

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FIG. 2: The *fusion:VINYL* interface is intelligent and intuitive, delivering more than enough control to replicate virtually any condition of a vinyl record.

you can't hear the change until you release the mouse. You can work around this by using numeric entry rather than clicking on a knob, but I see no reason for this limitation in a real-time plug-in. Opcode apparently agrees with my observation, and they are looking into modifying this for future versions.

In addition, unlike the Premiere and AudioSuite versions of *VOCODE*, the TDM version doesn't let you use any of the preset or custom carriers unless you first import them into your session as Pro Tools audio tracks. This means you must manage them within the session, which requires a bit of extra work. This is not a serious issue, but you will need to think about it, nonetheless. In fairness to Opcode, this limitation exists because the current crop of Digidesign DSP Farm cards don't have enough horsepower to support *VOCODE* completely. Maybe the next generation of DSP chips will enable Digidesign and Opcode to resolve this problem.

I also find it odd that *VOCODE* TDM does not support either *Pro Tools* 4.0 automation or the TDM plug-in *Librarian Manager*. Instead, Opcode uses a standard *fusion:EFFECTS* preset manager for loading and saving *VOCODE* presets. (Opcode has assured me that they are working on a solution to the *Pro Tools* 4.0 automation dilemma, first with the VST version and subsequently with TDM.)

I encountered some random crashes with version 1.2.1 of *VOCODE* TDM while using *Pro Tools* 4.1.1, especially when quitting *Pro Tools* with the *VOCODE* TDM window still open. Lastly, I suggest not opening more than one *VOCODE* TDM plug-in per session; doing so will force you to restart your Mac. *VOCODE* TDM also runs on NuBus Pro Tools systems (which is a plus), but I did not find it to be nearly as stable as the other versions.

The verdict. All in all, *VOCODE* is a fun plug-in to work with. It's great for spicing up solos or instantly transforming basic rhythm tracks, vocals, or synth parts—pretty much anything you throw at it—into something truly unique. Sure, it takes some time to master, but it's definitely worth the effort.

You might be wondering how it compares to my old Roland SVC-350 vocoder. Although I'd be hard-pressed to let my 350 go, *fusion:VOCODE* does pretty much everything I'd want it to do, with the added benefit of working in the easy-to-use digital domain. Opcode is the first kid on the block in this arena, but there are several other new software vocoders about to hit the market. It will certainly be interesting to see how the others compare to *fusion:VOCODE*.

FUSION:VINYL

There was a time when scratchy record sounds were something to be avoided at all costs, but that vintage sound of yesteryear has now become chic. Everything from hip-hop and rap to acid jazz and techno has incorporated the sound of the scratched record, which has become a staple in the sonic arsenals of sampling masters. For me, there is something very warm and fuzzy (you might say, "analogish") associated with the vinyl mishaps of yore. Instead of spending hours looking for that perfect old record to sample, you can have *fusion:VINYL* do the work for you in mere minutes.

VINYL interface. As with *VOCODE*, *fusion:VINYL*'s bulletproof interface couldn't be simpler to use (see **Fig. 2**). At the top is the Record Surface module, which lets you select various vinyl conditions, such as dirt, hiss, static, wear, and scratches. A very cool Warp feature controls the amount of sun warpage with an editable waveform display. The Fade Out control emulates a record that is more warped at the outer edge than at its center, and it works in tandem with selectable rpm speed controls.

VOCODE TIPS

The custom carrier AIFF files that Opcode supplies with *VOCODE* are multisampled files, which are required in order to play different notes with the onscreen Pitch Keyboard in the Premiere, AudioSuite, and DirectX versions. (The TDM version has no Pitch Keyboard.) The *Pro Tools* software will import these AIFF files and appear to save the session just fine. However, when you try to reload this session, *Pro Tools* will not be able to find the files, and you will have to manually import them again.

You can get around this problem by first exporting the multisampled AIFF files to standard AIFF or SDII files using a compatible host program, such as *Pro Tools*, *Peak*, or *Sound Forge*, and then reimporting them into *Pro Tools*. But be careful not to write over the original versions, or you'll lose the pitching feature of *VOCODE* for Premiere and AudioSuite.

Here's an easy way to create some interesting custom waveforms for any version of *VOCODE*. Create a file with nothing but silence; make the length whatever you want your final file to be, and use this file as your modulator. Next, choose one of the preset or custom carriers and set the various controls to your taste. You can then create some interesting waveforms that are derived from playing chords on the Pitch Keyboard. Once you have one you like, click on the Process button to create a new file. Of course, you need to create these waveforms in the AudioSuite, Premiere, or DirectX version, because the TDM version has no Pitch Keyboard.

A pop-up menu recalls Record Condition parameter presets, including Virgin Play, 1000 Plays, Worn Out, and more. In addition, you can store your own settings and even link them to the Scratches parameter.

The Turntable/System module features a section called Fidelity, which includes Bandwidth, Stereo Width, and Compression settings. Bandwidth is essentially a pair of highpass and lowpass filters that work quite well to create the illusion of a badly cared-for piece of acetate. The Stereo Width control adjusts the spread of the stereo image, but it can only narrow the stereo field, not make an existing mix wider. (I'd sure like Opcode to enhance this parameter, perhaps with some cool mono-to-stereo processing.)

The Compression control works quite well and has a fixed threshold of -12 dB with a selectable ratio between 1:1 and 16:1. Of course, you can also select turntable speed settings of 33, 45, and 78 rpm, all of which interact with the cyclic rates of the Warp and Scratch effects. However, these controls do not affect the audio's playback pitch. A knob called Rumble specifies the amount of turntable motor noise that is picked up by the stylus.

The Output section includes a Depth control (which basically sets the overall wet/dry mix), a Master Output Level, and a multifunction peak indicator. *VINYL* ships with fifteen global presets and eleven subpresets, and you can create user-defined patches, as well.

Negatives. While working with the AudioSuite version of *VINYL,* I found that making adjustments while audio was playing caused random crashes for no apparent reason. After mentioning this bug to Opcode, they assured me that it would be addressed by the time you read this with a free update on their Web site. My greatest request for *VINYL* is for a "skip" parameter that would simulate a skipping record. That would make this plug-in truly amazing. Oh well—I can dream, can't I?

The verdict. My experiences with *VINYL* constantly put a big smile on my face. In the past, I've spent days trying to put the right samples together to do what *VINYL* does in minutes. The final word? It's a must-have for sound designers, dance artists, or anyone who likes to have fun with audio. *VINYL* really delivers a lot of scratch for the buck.

FUSION:FILTER

So far, we have dealt with vintage vocoding and vinyl effects, but *fusion:FILTER* is a different plug-in altogether. In a nutshell, *FILTER* is just that: a collection of filters, and an impressive one, too. There are two different lowpass filters (one with variable poles); a highpass filter with variable poles; a bandpass filter; a notch filter; a single-band, semiparametric EQ boost filter; a ring modulator with sine, sawtooth, square, and triangle waveforms; and an overdrive section for creating distortion effects.

Opcode has come up with easy-to-use interfaces for these plug-ins.

You can use up to three filters in a single patch, and they can be arranged in serial, parallel, or a combination. What makes *FILTER* so powerful is that the filter, frequency, and resonance parameters can all be modulated by up to six separate LFOs, six separate pulse sequences (which will be discussed shortly), six user-definable envelopes, six envelopes extracted from audio files, or the integrated envelope follower. We're talking about some powerful processing here, folks.

FILTER interface. As with the other *fusion:EFFECTS* plug-ins, the *FILTER* interface is clear and to the point (see **Fig. 3**). The Filter module includes a pop-up menu for selecting filter types. Clicking on any of the three Filter Assignment buttons instantly displays all the parameters for that particular filter and a graphic display of the selected modulation source. Each of the three filters has an output-level control with a peak indicator.

The Order module allows each filter to operate in one of three modes: Active, Bypass, or Open-Circuited. Active and Bypass do pretty much what their names imply, though Bypass mode still gives you control over the filter's input level. When a filter is bypassed, all noneditable parameters are

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automatically hidden, which is a very cool feature. The Open-Circuited mode effectively stops any audio appearing at a filter's input from passing to its output. A Connection Order parameter routes audio through the filters with four possible signal paths: serial, parallel, serial/parallel, and split serial.

In the Modulator module, each filter has two possible modulation destinations: frequency and either resonance, width, or depth (depending on the type of filter being used). There are three modulation sources: LFO, Envelope, and Pulse Sequence. Five copy options let you easily paste settings from one source to another.

The LFO modulator offers several parameters, including Waveform, Phase (which determines the trigger or start position within the waveform), Rate, and Ramp Time (which determines how long it takes an LFO to reach its maximum amplitude). The Sequence Tempo control and Rate Mode selector let you use note values or absolute frequency values to specify the Rate parameter. Entering LFO rates as bpm makes it easy to set up complex rhythmic effects.

The Envelope modulator is quite impressive, offering three envelope sources: Draw lets you draw your own envelope shapes, Extract creates an envelope from any compatible audio file, and Follow uses the volume or amplitude envelope of the current file for modulating the selected filter. All three of these modulators offer some unique possibilities for shaping the final filtered effect.

FIG. 3: The most complex plug-in of the *fusion:EFFECTS* series, *FILTER* offers a number of resonant filters and LFOs, in addition to a very cool Pulse Sequencer.

The Pulse Sequence modulator creates a pattern of various "pulses" to modulate a filter. Each pulse applies a selected waveform to the modulation destination for a specific amount of time. Several pulses are arranged to occur sequentially at a specified tempo within a grid, which lets you determine the duration of each pulse (expressed as a rhythmic value) and the time signature of playback. The Shape control offers square, triangle, sawtooth, and reverse sawtooth waveforms, and the Width control adjusts the duty cycle of each pulse (i.e., the amount of time in which the pulse is active within its allotted duration).

Each pulse includes an On/Off button and a control to set the depth of the pulse's waveform. The software includes ten Pulse Sequence patterns to get you started, and you can enter a separate tempo for each Pulse Sequence modulator you use, making it easy to create polyrhythmic effects for a single audio file.

As with *VOCODE* and *VINYL*, the Output module lets you set the overall level of the final processed audio, and the Control module offers the same set of features as the other *fusion:EFFECTS* plug-ins.

The verdict. I was entertained for many hours while playing (uh, I mean working) with *FILTER*. I tried a number of experiments, such as mutating a clean-sounding guitar solo into an industrial grungefest and turning some basic drum loops into moving, liquid grooves. I was also able to create several classic Mutron Bi-Phase patches without adding any extra high-end "swoosh" noise. The bottom line? I wholeheartedly recommend *FILTER* to anyone looking for ways to make their drum loops and bass grooves more interesting, or simply to add a bit of color to any old black-and-white audio file.

THE FINAL JUDGMENT

I do have a couple of items for the wish-and-complaint department that deal specifically with the Preview mode. First of all, it would be much more useful if playback didn't stop when you select new presets. I also found that the AudioSuite versions of the *fusion:EFFECTS* performed poorly in Preview mode, the most serious examples being audio stuttering and occasionally stopping for no apparent reason. In all fairness, though, this seems to be a problem with most AudioSuite plug-ins and is not specific to Opcode products.

Opcode has created three very useful and powerful digital audio tools with *fusion:EFFECTS*. I must also give the company big bonus points for their outstanding documentation. Although the manuals come in PDF format only, I commend Opcode for offering a lot of information that can get anyone up and running in no time. Updates, bug fixes, and demo versions of all three plug-ins can be found on the Opcode Web site, making it easy to stay current with the latest improvements to the *fusion:EFFECTS* series. Opcode is also designing a user area on the Web site for exchanging patches.

I give a big thumbs up to all three of these new plug-ins. They offer a lot of power, they are reasonably priced, and they make great additions to any audio toolbox.

Mikail Graham *is currently studying advanced landscaping practices for his backyard and his next series of aural sound paintings.*

OPCODE
fusion:EFFECTS DSP plug-ins
fusion:VOCODE $149
fusion:VOCODE TDM $495
fusion:VINYL $99.95
fusion:FILTER $149

FEATURES ■■■■■
EASE OF USE ■■■■
DOCUMENTATION ■■■■■
VALUE ■■■■■
1 2 3 4 5

PROS: Useful assortment of classic analog effects. Excellent interfaces. Affordable prices.
CONS: Poor AudioSuite preview modes. VOCODE TDM version somewhat unstable. VOCODE TDM doesn't support *Pro Tools* 4.0 automation.
CIRCLE #442 ON READER SERVICE CARD

HAFLER

TRM8

Heavyweight powered monitors at a middleweight price.

By Erik Hawkins

Since their introduction in the early 1990s, powered, near-field reference monitors have garnered a loyal following of audio professionals. These systems offer bi-amped designs, portability, and uncompromised audio quality. Wiring is kept to a minimum, amplifiers are matched, and all components are contained within the unit.

For years, though, these convenient monitors were reserved for the upper echelons of the recording community; their price tags were simply too high for the average personal studio owner—often more than $2,000 for a single speaker! Recently, however, several budget-conscious companies have entered the market with lower-priced systems (under $1,500 a pair), and personal-studios owners have been snatching these bargains up.

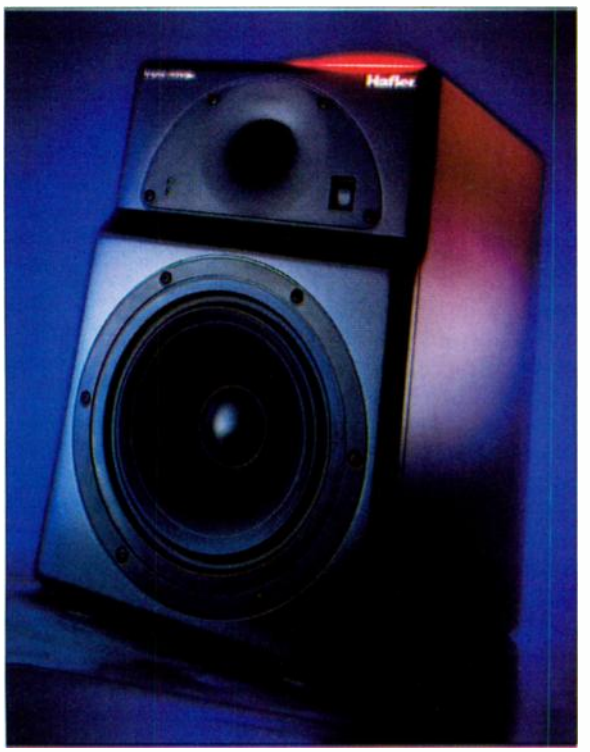
Hafler has a solid reputation as one of the industry's leading power-amplifier manufacturers. Combine their Trans•Nova amplifiers with Rockford Acoustic Design speakers, and you've got a system that scores prestige points right from the start. And lest I forget, with a retail price of $1,200 each, the Haflers fit squarely in the middle of the market.

BUILT FOR POWER

With its semigloss, lightly spackled black finish, the slick-looking TRM8 looks similar to a Genelec but is bulkier. The cabinet is made of acoustically dead, 19 mm, medium-density fiberboard (MDF). At 35 pounds, this speaker is a real heavyweight.

Unlike some speakers, the TRM8 does not accommodate an optional speaker grate, so the speakers always remain open and unprotected. All the visible screws on the cabinet are hex screws. For appearances, this is a nice touch, but it makes accessing the inner workings a bit trickier.

Each monitor comes with its own vibration-isolation pad, which is a dense piece of foam with an adhesive back. The adhesive is extremely sticky, and the TRM8's finish is so nice that I was afraid to use the pad for fear that it wouldn't come off. A nonresidue adhesive (like the one used on Post-Its) would have served the same purpose without endangering the monitor's finish.



Hafler's TRM8 powered, close-field monitor delivers excellent audio quality at a price that won't kill your budget.

Threaded holes are provided on the bottom of the TRM8 to accommodate an Omnimount Systems mounting bracket (e.g., the 100 ST-MP or the 100 WB). The isolation pad has holes that align with the mounting holes so the pad can be used in conjunction with a mounting bracket. If you mount these units on a wall, it would be a good idea to attach an additional safety cable as an extra precaution, as these speakers are heavy enough to do some serious damage if they fall.

CONNECTIONS AND CONTROLS

The power switch is located on the monitor's face, which is much more convenient than reaching around to the back of the unit to power it up. Each monitor comes with a fat, 16-gauge, IEC Type II power cable that plugs into a rear input. The TRM8 runs on standard 115 VAC at 60 Hz and has a 250V, 5A line fuse to protect against surges and spikes. A European-voltage model is also available as a special order. I work in both Europe and the U.S. and like to carry my reference monitors with me to different studios, so I was disappointed that the voltage isn't internally switchable.

Two multipurpose LEDs are located on the monitor's face, with the top LED tied to the high-frequency amp and the bottom one to the low-frequency amp. They glow green to indicate power, flash red when clipping, and glow a steady red if the amplifier is overheating. (Hafler refers to this as a "thermal warning.") Hafler claims that, because the TRM8 employs a heat sink, the amplifiers should never overheat during normal operation.

An array of miniature DIP switches, several of which are used for tuning the speaker, grace the back of the unit (see **Fig. 1**). The Haflers have low and high shelving filters, and you can vary the high shelving frequency between 3 kHz and 20 kHz and the low shelving frequency between 40 Hz and 200 Hz. The levels for the two filters can be independently adjusted by ±4 dB (in 2 dB increments). This is wonderful for tweaking the TRM8's output to match the acoustics of your room.

Other DIP switches mute the input of each amplifier, which is a nifty way of testing the individual components of the system. For example, if you think your tweeter is blown, simply mute the woofer to "solo" the tweeter. A handy diagram above the DIP switches explains the switch settings in case you misplace the manual. Additional DIP switches allow you to attenuate the TRM8's input sensitivity from +4 dB to -11 dB. This lets the speaker interface with a variety of professional and consumer gear. (The unit comes preset at +4 dB.)

Audio connections are made through either an RCA jack or through a Neutrik

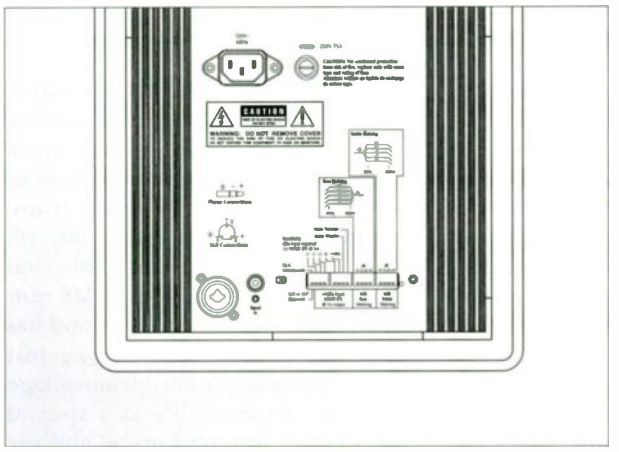


FIG. 1: An array of miniature DIP switches on the TRM8's rear panel allows you to perform a number of functions, such as tailoring the speaker's frequency response, selecting input sensitivity, and muting the individual transducer components.

dual, ¼-inch and XLR connector. The ¼-inch jack is balanced but accepts an unbalanced plug. The RCA jack is accessed by changing a DIP switch that disables the XLR and ¼-inch inputs.

HIGHS AND LOWS

The amplifiers employ the same patented Trans•Nova technology found in Hafler's popular line of studio amps (the P1500 and the P3000). The active, fourth-order Linkwitz-Riley crossover is set at 2.5 kHz (with a 24 dB slope). A second-order, subsonic filter protects the woofer by limiting frequencies below 30 Hz. This is a nice touch for protecting your monitors from bass-happy producers.

The high frequencies are handled by a 1-inch, ferrofluid-filled, silk-diaphragm tweeter. The tweeter is housed in Hafler's proprietary waveguide horn. The waveguide, by virtue of its shape, improves the dispersion of high frequencies, resulting in a wide sweet spot.

The woofer is a standard, 8-inch design and features a 20 mm polypropylene cone with a ½-inch voice coil. The cone is suspended by nitril rubber, a fairly new, inert, and UV-stable rubber that has a longer life than the butyl rubber commonly used in woofer designs. The woofer's 44-ounce, ferrite magnet is shielded, cutting its magnetic field down to four inches, so you can place these monitors quite close to your computer screen.

The tweeter is set back about an inch behind the woofer. This aligns both transducers' voice coils on the same plane, making them phase-coherent. In monitors that are not phase-coherent, high and low frequencies reach the listener at different times, resulting in inaccurate sound replication.

The Exoport (bass port), is located on the TRM8's back. It's a thin, 1-inch-long slit situated at the top of the unit's rear-access panel. (Bass ports allow air pressure generated by the low-frequency driver to escape the confines of the cabinet.) Because the insides of powered monitors are stuffed with electronics, manufacturers are often forced to compromise the placement of the bass port. Haf-ler's choice to locate the TRM8's port in the rear is commendable; with forward-facing ports, you can sometimes actually hear the air rushing out. The downside of a rear port is that you can't place the monitor too close to a wall, or you'll block the air's escape route.

THE TEST DRIVE

I spent over a month working with these speakers, doing everything from MIDI production to mixing and mastering. The first thing I noticed was that the TRM8s are far more pleasant to listen to than Genelec or Mackie monitors. They have a very even sound that isn't harsh or exaggerated: the bottom end is nice and round but not too boomy, the midrange is punchy but not dominating, and the high frequencies are smooth but still cut through the mix. After long hours of listening, I found the TRM8s to be easy on the ears—listening fatigue was less of a problem than it is with many monitors.

I did discover a slight upper midrange bump (around 8 to 10 kHz) that was particularly noticeable when listening to cymbals. I also heard a little boost around 80 to 100 Hz. However, these quirks were easy to overlook, because I found that my mixes seemed to transfer well to the outside world.

TRM8 Specifications

AUDIO	
Frequency Response	45 Hz–21 kHz (±2 dB)
Peak Output	123 dB
THD	<0.5%
AMPLIFIER	
Power Rating	75W @ 6Ω (high frequency); 150W @ 4Ω (low frequency)
Signal-to-Noise Ratio	>100 dB
Slew Rate	100V/µs
Input Impedance	47 kΩ per phase
Input Sensitivity	500 mV–3V (unbalanced); 275 mV–1.5V (balanced)
SPEAKERS	
High-Frequency Driver	1" soft dome
Low-Frequency Driver	8" polypropylene cone
CROSSOVER	
Crossover Frequency	2.5 kHz
Crossover Slope	24 dB/octave
Subsonic Filter	30 Hz @ 12 dB/octave
ENCLOSURE	
Material	19 mm, medium-density fiberboard (MDF)
Dimensions	10 ¼" (W) x 15 ⅞" (H) x 13" (D)
Weight	35 lbs.

For manufacturer information, please see Contact Sheet, p. 195.

Besides, by checking the mix using the boost/cut DIP switches, I was able to emulate the characteristics of different speakers. I even went so far as to mute the woofers and just listen to a mix through the tweeters in an effort to simulate a cheesy car stereo.

When testing powered monitors, I always check to see how hot they get after being used for long periods of time (more than six continuous hours). If they really heated up—as some powered monitors do—I would be concerned that the monitors could fail prematurely. After a solid eight hours of use, I found the Haflers to be hot, but not burning hot; you could still rest your hand comfortably on the heat sinks without getting injured. The TRM8's heat dispersion and operating temperature seemed to be reasonable, and I suspect that these units have a pretty long life.

I also like to check the amount of residual air noise that is put out by the bass ports. I do this by running a high-amplitude, 40 Hz tone through the speakers. Doing this test, I've heard some powered monitors' bass ports mimic a gortex jacket fluttering out of the window of a car on the freeway! However, the TRM8s passed with flying colors; I was amazed at how quiet and efficient the Exoports were. All I heard was a barely audible whooshing sound. Apparently, the unique shape of the port helps keep air flow noise to a minimum.

POWER HUNGRY

As any honest engineer (or sales person) will tell you, there is no such thing as a truly "flat" monitor. Determining whether a speaker sounds good is a completely subjective matter. I think the TRM8s sound great. Their response, while not totally flat to my ears, was definitely something I could work with. They're also designed intelligently, and Hafler's attention to detail is evident in everything about the product, including the back-panel diagrams, DIP switches, hex-screw assemblage, and well-written manual.

Although they are somewhat more expensive than most models in the current deluge of low-priced systems, they are far less expensive than anything manufactured by Genelec or Meyer, yet still of the same caliber. I recommend the TRM8s for their flexibility, dependability, and sound quality. I'd like a pair in my studio—not only because they sound great, but because they will impress people!

Erik Hawkins *is a musician/producer in the San Francisco Bay Area and Los Angeles County. You can check out his projects and music at www.muzicali.com.*

HAFLER
TRM8 active, near-field monitor
$2,400/pr.

AUDIO QUALITY ■■■■
VALUE ■■■■
1 2 3 4 5

PROS: Great sound. Accepts all standard input connectors. Frequency and volume-sensitivity controls. Intelligent design.
CONS: Extremely heavy. No optional speaker grilles. Isolation pad adhesive is very sticky.

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GADGET LABS

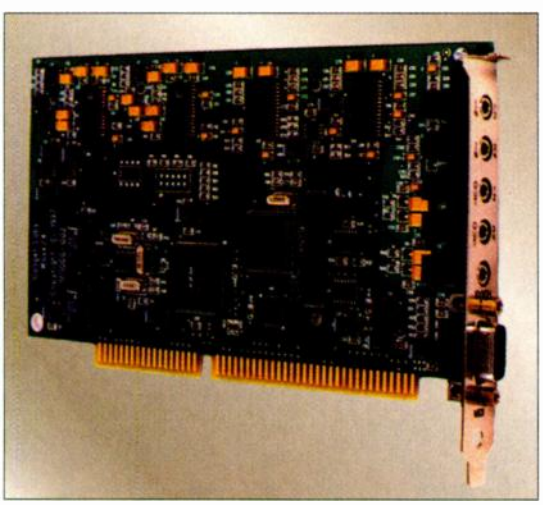
WAVE/4 (WIN)

Four channels of audio in one low-priced card.

By Don Washington

If you've been waiting to jump into hard-disk recording, Gadget Labs wants to help you take the plunge. The company's Wave/4 four-channel digital audio card is a viable contribution to the ever-growing PC production-studio market. This card is easy on the wallet, but it nonetheless offers pro features and a few nice surprises.

The Wave/4 is a half-sized ISA-bus card with two pairs of stereo analog inputs and three stereo outputs. (The extra stereo output is for an optional wavetable synth daughterboard.) There is no digital I/O, so you digital purists are out of luck. The card serves up its I/O as four Y-adapter cables configured as ⅛-inch, TRS, stereo miniplugs to RCA jacks. MIDI In, Out, and Thru are supported by an included 9-pin DIN MIDI adapter cable. The Wave/4 also includes a 26-pin connector (13x2), which allows mini wavetable synth daughter cards to be used. Gadget Labs supplied a Kurzweil HOMAC 32-voice wavetable card for this review. Full-size daughter boards do not fit the Wave/4 card.



Gadget Labs' Wave/4 audio card delivers four channels of audio, as well as MIDI In, Out, and Thru. This ISA-slot card uses Sound Cache Architecture to increase throughput.

The Wave/4 supports sampling frequencies of 11, 16, 22, 32, 44, and 48 kHz. Some of these may seem obsolete, but believe it or not, there are still multimedia applications that don't require CD-quality audio. The card offers full-duplex audio recording and playback capabilities, but there is no software-based monitoring available, so an external mixer is required to utilize this feature.

The documentation accompanying the Wave/4 provides guidelines for configuring your system using several integrated MIDI and digital audio programs. Because the audio signals must be routed through an external mixer, there are recommendations for optimum audio routing configurations, as well. Keep in mind that, to use the multitrack and duplex recording features to their full capacity, you'll need a fast CPU with as much RAM as you can afford. A large amount of hard-disk space is also highly recommended.

SOUND BY DESIGN

Several of the card's design elements are modeled on more expensive audio cards. For example, the card employs a technique called Sound Cache Architecture. This method uses fast, streaming data I/O to overcome the limits and compatibility problems of the PC's DMA architecture. The Wave/4 incorporates 64 KB of static RAM, which offers adequate audio buffering to overcome DMA-based dropouts. (Such dropouts are often caused by PCI graphics cards.) Also, like some other cards—the Digital Audio Labs CardD+, for example—the Wave/4 uses discrete converters. This means that each of the four ins and outs has its own DAC or ADC, which can result in less crosstalk and distortion than cheaper, integrated codec designs.

The Wave/4 is designed to be truly plug-and-play, and there are no jumpers to hassle with. I did encounter a slight problem when I first installed the card, but Gadget Labs sent me a new card which installed with no complications.

According to Gadget Labs, the Wave/4 is the only multichannel card in its price range to support Windows DirectSound applications. This will improve audio performance with software that supports DirectSound, especially during playback and mixing.

Wave/4 Specifications

Card Type	ISA
Analog Inputs	(4) unbalanced ⅛"
Analog Outputs	(6) unbalanced ⅛"
Digital I/O	N/A
D/A Converters	16-bit, 64x oversampling
A/D Converters	16-bit, 128x oversampling
MIDI ports	In/Out/Thru
Sample Rates	11–48 kHz at standard intervals
Frequency Response	20 Hz–22 kHz (± 0.5 dB)
THD + N	0.005% (20 Hz–22 kHz, A weighted)
Dynamic Range	92 dB

ALL TOGETHER NOW

A MIDI interface is included on the card, which eliminates the need for a separate MIDI card. This is useful because slight delays of a few milliseconds can occur when synchronizing separate audio and MIDI devices. (It also frees up a slot.) As mentioned previously, the Wave/4 uses ⅛-inch stereo connectors with Y adapters for audio in and out. This configuration leaves you with a lot of cables hanging from the back of your computer. I would have preferred RCA connectors over the somewhat fragile miniplug connectors. However, Gadget Labs claims that the addition of the RCA jacks would have increased the cost significantly.

Also in the bundle is a full version of Chris Craig's stereo audio editor, *GoldWave*. This popular program includes numerous DSP functions, such as compression, stereo chorus, stereo delay, and noise reduction. (The included version only works with the Wave/4.) And in case you were wondering, NT drivers for the Wave/4 should be available by the time you read this.

TESTING, TESTING...

I tested the Wave/4 by connecting its line inputs to a mic and guitar via an external mixer. Using *Cakewalk Pro Audio* as the recorder, I made audio

GADGET LABS
Wave/4 four-channel audio card
$259.95

FEATURES ■■■▮
EASE OF USE ■■■▮
AUDIO QUALITY ■■■■
VALUE ■■■■▮
1 2 3 4 5

PROS: MIDI included. Low price. Wavetable daughtercard support (mini size only).
CONS: No digital I/O. Needs sturdier connectors. Limited to 16-bit resolution.
CIRCLE #444 ON READER SERVICE CARD

samples of varying lengths from line-level sources. I got excellent audio quality on a multiple-track recording with no dropouts. In fact, the audio quality exceeded my expectations. Overall, the audio clarity seemed comparable to some of the pro-level A/D converters I've worked with. The simultaneous record and playback features also worked perfectly, and the sync with MIDI tracks was seamless. Everything I tried lived up to the manufacturer's specifications.

There are some enhancements that I'd like to see, however. For example, the Wave/4 could benefit from the addition of digital I/O, if only to facilitate digital transfers to a DAT deck. Sturdier I/O connectors would also be a welcome addition. Even with those limitations, I believe the Wave/4 can compete with "professional" audio interfaces in audio recording quality and in features offered. (The duplex capability deserves repeat mention). Despite the fact that it will only sample at 16-bit resolution, overall Gadget Labs' Wave/4 is comparable to audio cards in a higher price range. This card is a true value.

Don Washington *is a musician, writer, producer, and project studio owner, as well as a devout gearhead.*

Wave/4 Minimum System Requirements
Pentium 100; 16 MB RAM; Windows 95/98 or NT 4.0

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QUICK PICKS

F7 SOUND AND VISION

Concept:FX, vol. 1

By David M. Rubin

One quick glance through the table of contents makes it abundantly clear that *Concept:FX* ($49.95; Mac/Win) is no ordinary collection of sound effects. Names like "Android Cafe," "Bigfoot Car Crush," and "Larval Gas Discharge" let you know you're entering some pretty strange sonic territory. If you're looking for traditional sounds like footsteps, car door slams, and breaking glass, this ain't your disc.

F7 Sound and Vision's *Concept:FX* is not your average sample CD. Its bazaar of unusual noises is provided in WAV and AIFF formats with a variety of sampling rates and bit depths.

The *Concept:FX* collection comprises an assortment of heavily processed experimental and abstract sounds that are especially well suited to games, multimedia, film, and video production. The 195 sounds on the CD-ROM were originally recorded to DAT using Crown SASS-P and Audio Technica AT825 microphones. Most of the sounds were then processed through different combinations of equalization, time compression or stretching, filtering, sample rate reduction, and other techniques.

Here, There, and Everywhere

To maximize its usefulness for multiple media, the dual-platform CD-ROM offers its entire collection of sounds in five formats: 16-bit, 44.1 kHz stereo AIFF and WAV (for broadcast and video); 8-bit, 11.025 kHz mono AIFF and WAV (for the Internet); and 16-bit, 22.05 kHz stereo WAV (for multimedia).

The sounds aren't categorized—they're simply listed alphabetically—so finding the right sound for a particular project might take a little trial and error. The only documentation is the 3-page CD insert, which lists the sounds and gives durations in seconds and hundredths of a second. A few of the sounds, such as "MechanicalTap" and "Short Buzzer," last less than a tenth of a second, but most of them are one to ten seconds long.

Gimme Some Air

My favorite effects are the long, dark, ambient sounds, some of which last more than half a minute. They should make great backgrounds for someone's next postapocalyptic sci-fi adventure game. I especially liked "Alien Science Project," with its low, pulsing analog sounds, and "Benthos Trough," with its somber, subterranean quality.

Other noteworthy sounds in this category include "The Walls Live," a creepy ambient effect with vague, threatening sounds woven in; "Orca Call," a wonderful whale song that drifts across the stereo field; "LSD Birds," a swirling, dreamlike texture with strange animalistic sounds; and "FlutterAmbience," a long, atmospheric sound with train-track-like pulses that evolve into polyrhythmic patterns.

All of these sounds are quite easy to loop. And speaking of loops, the CD includes a few rhythmic phrases, such as "Crude Dog Cycle," "DS Dance," and "Forensic Groove," which could serve well as the basis for unusual techno or hip-hop cues in a game or video. These last two sounds are already looped and ready to go.

Not for Squares

The sounds in the *Concept:FX* collection run the gamut from weird to very weird. Some of the best sounds, such as "Drips," "Intestinal Woes," and "WaterLoop," are based on dripping and sloshing water; others are derived from mechanical and electronic equipment, animal sounds, percussive effects, and vocal recordings. Many of the sounds, such as "Venus Flychew," simply defy description and fall into the category of totally bizarre noises, which are great for animation. If you're tired of the same old sound effects CDs, check out the *Concept:FX* collection. You'll find yourself in a whole new sonic universe.

Overall EM Rating (1 through 5): 4

CIRCLE #445 ON READER SERVICE CARD

DISCOVERY FIRM

TR-808/TR-909

By Jeff Obee

Rap and hip-hop rhythms over the years have been fueled largely by beatboxes such as the Roland TR-808 and TR-909 drum machines. Discovery Firm offers a CD-ROM ($199.95) for Kurzweil K2000/K2500 samplers that lets you load up these time-honored drum sounds, with the additional benefits that V.A.S.T. synthesis offers.

Gimme the Funk

Beaming my laser into the disc's layers, I was immediately struck by the excellent sound quality and the producer's thoughtful perspective on the original machines. The sample files all take up around 1 MB or less, so it was easy to assemble kits from the individual programs in the combo banks without eating up too much memory.

There is some good programming here that enhances the original sound. In the TR-909 kick drums, for instance, the mod

Discovery Firm's TR-808/TR-909 library for Kurzweil K2000/K2500 takes classic drum-machine sounds and adds the flexibility of V.A.S.T. synthesis.

For manufacturer information, please see Contact Sheet, p. 195.

wheel deadens the sound, and the data wheel lengthens the release a bit. The benefits of using a high-end synth/sampler, as opposed to the original machines, quickly become evident.

The combo banks give you one to ten variations of each drum sound, each run through a custom-tweaked effect to give it a slightly altered texture. The combo snares are cool: they use the data wheel to bend the pitch and the mod wheel to mute the sound. Moving the mod wheel as you play the sample gives you a resonant-filter sweep effect.

The combo kits are also well done. They use consistent keymaps, so any kit could be substituted for another. The effects are also intelligently used so you can diversify your tracks. In the Vintage section, a GM kit is also provided for each machine.

Loop the Loop

Both the TR-808 and TR-909 directories have a generous selection of loops. They aren't quite as funky as I'd like, although a couple have a fat, laid-back groove to them. Nonetheless, there are enough to suit many tastes.

Each loop is followed by reverse and bidirectional loops, for you esoteric types; three "DataModGrunge" versions, where the mod wheel mutates the loop, and a version with a preassigned delay bouncing around through the groove. Those delay versions can get pretty wacky. Again, you can use your controllers to bring out more reverb, crossfade between forward and reverse play, and so on.

Kickin' Rhythms

This is a fine disc. I found it very useful, and it stirred my creative juices. Having so many takes from both the TR-808 and TR-909 on one CD-ROM simply kicks. No matter what kind of electronic music you make, you'll get great mileage from this collection.

Overall EM Rating (1 through 5): 3.5

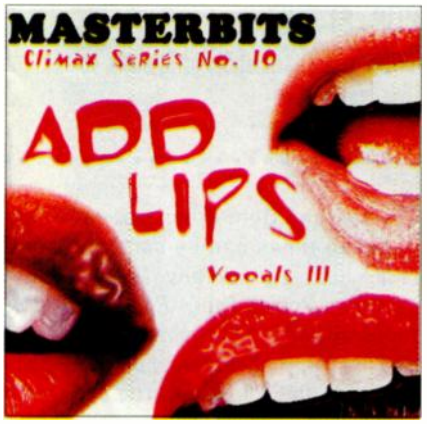
CIRCLE #446 ON READER SERVICE CARD

MASTERBITS

Add Lips Vocals III

By Jeff Obee

The human voice is the most expressive of all instruments, so I enjoy auditioning vocal samples when the opportunity arises. Most recently, I checked out Masterbits' *Add Lips Vocals III,* ($69 audio CD; $39 WAV-file CD-ROM). The disc presents several styles of vocal samples, but on the whole, it strikes me as best suited to R&B, dance, and DJ artists.



Packed with vocal phrases, Masterbits' *Add Lips Vocals III,* caters to R&B, dance, and DJ artists.

Variety Show

Add Lips Vocals III is a mix of new recordings and selected samples from other Masterbits libraries. These are one-shot samples, not loops. The featured vocalists are mostly European, ranging from music students to studio pros; some singers from Africa and other parts of the world are sampled, too.

The first third of the CD is filled with lyric vocal phrases, mostly in A and D minor, with their tempi given. Each track has from three to eighteen sung licks, some repeated with slight variations in inflection. These aren't deep lyrics; they come from the "oooh baby" and "let's groove" school of songwriting. A few cool jazz scat lines are thrown in for good measure.

The rest of the disc is a salad of different types of vocal bits. There are ad-libbed sung phrases and spoken-word phrases, five raps in different styles, and quite a few percussive vocal syllables. Numerous synthesized voices are featured, and a good selection of world vocals round out the CD. A few unlicensed NASA and telephone samples are included at the very end.

Vocal Critic

The raps are of dubious usefulness because they tend to be too fully formed to mix and match with other musical elements. Choir samples are given minimal representation, and I wanted more in this area—especially in the R&B and gospel styles included in the first third of the CD. On the male vocal percussive tracks, each singer is repeating the same syllables. It would be more effective if each did his own

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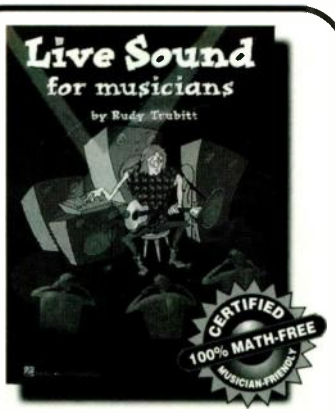

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I used the synthesized voices in a sequence and grooved on them considerably. These "robot" voices were created using the Clavia Nord Lead, an old Roland Vocoder 350, and effects processors such as the Boss VT-1. The 150 world voices made me smile: I could find a lot of uses for these ethnic soundbites in my music. The African vocalizing, buoyant Latin articulations, and sensuous Muslim and Indian chants and warbles are all wonderful.

Find Your Voice

Add Lips doesn't give you a huge amount of sounds in any particular category, but what is here sounds good. The disc caters particularly to practitioners of R&B, dance, and DJ music, but it may appeal to other composers and sound sculptors. The documentation is passable, and the price is reasonable. I recommend you check out the company's Web site, where you can download eleven demo files and see whether it's right for you.

Overall EM Rating (1 through 5): 3

CIRCLE #447 ON READER SERVICE CARD

POCKET FUEL

Rhythmic Architectural Design Systems, vol. 1 (Win/Mac)

By Jeff Burger

Finding the right drum groove for sequenced tunes can be something of a snipe hunt—especially if you're not a drummer. Pocket Fuel's *Rhythmic Architectural Design Systems (RADS)*, vol. 1 ($99.95), is—in theory—a very flexible approach to this challenge. The concept is that you use a digital audio sequencer or editor to build just the right groove from the sampled snippets of drum patterns on the CD-ROM.

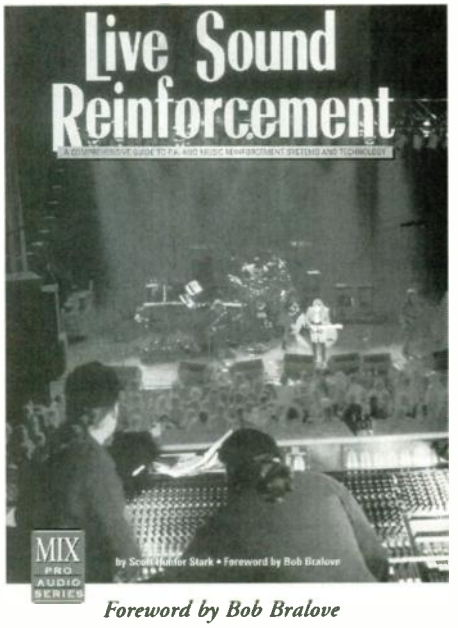
Detail Work

The files are supplied in SDII and WAV formats with loop points already set for *Sound Designer* and SampleCell users. Kick and snare patterns are supplied in split stereo files for Macintosh users. All patterns are recorded at 89 bpm; you need to use your software's time compression and expansion capabilities to adjust the tempo.

The 2-beat kick and snare combos are recorded separately from the cymbals. You string two kick/snare phrases together to get a measure. The hi-hat and ride cymbal patterns are looped four times, on the theory that kick/snare patterns change more often. The samples are recorded well, but they are pretty much limited to standard rock kits.

For cataloging purposes, *RADS* breaks each 2-beat segment into eight subdivisions (four per beat). The disc's file names convey the placement of the hits. Take Queen's "We Will Rock You," for example. The appropriate pattern for this song is named K13S5, signifying a kick on subdivisions 1 and 3 and a snare on subdivision 5 (the beginning of beat 2). These files are cataloged in a hierarchical folder structure (see **Fig. 1**). Hence, our example is found in the "K1 Files" folder, inside the "Kick on #1" folder, inside the "Kick/Snare Patterns" folder. Yikes! I found this system to be rather arcane.

The Queen example demonstrates another problem: many of the patterns have "ghosted" syncopation, a naturally played echo effect, on the snare—in this case with a light snare on subdivisions 2 and 7.



Foreword by Bob Bralove

Live Sound Reinforcement

by Scott Hunter Stark

The simple language, detailed illustrations, and concrete examples of this book convey the fundamentals of sound reinforcement theory in an intelligent and intelligible manner.

Written for novice to intermediate-level users, it outlines all aspects of P.A. system operation and commonly encountered sound system design concerns.

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There's no way of knowing this from the cataloging system. Fortunately, *RADS* includes a library of straight and ambient drum samples that you can use to replace waveform segments in an audio editor. They also incorporate variants with and without ambience for looping purposes.

Ain't Got That Swing

With well over a thousand files, *RADS* is certainly ambitious. Unfortunately, tracking down the right feel can be a pain. If you already knew what beats you wanted

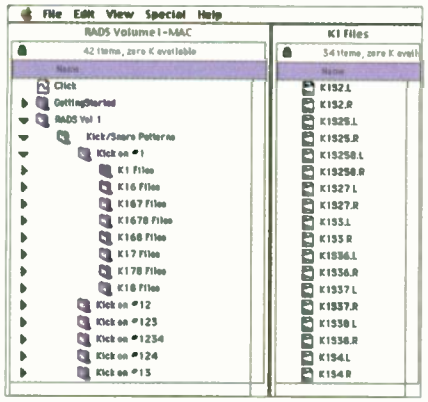

FIG. 1: *RADS* catalogs kick/snare patterns according to folders that cite the kick placement (left). The names of the files themselves cite the placement of kick and snare (right). The Mac version provides split stereo files.

the hits on, it would be easier to enter the events into a sequencer and trigger samples. Also, many digital audio sequencers won't let you play audio directly from a CD-ROM—you have to copy to a hard drive first or use a CD-auditioning utility.

My biggest beef with *RADS* is feel—or lack thereof. Musically, Pocket Fuel's metronomic grid can't catalog things like swing. Also, 2-beat snippets of isolated parts of a drum kit are difficult to get a good feel from. Procedurally, the process of importing, auditioning, and marrying 2-beat kick/snare phrases (both left and right), along with appropriate cymbal tracks, and then time-shifting for tempo adjustment and possibly replacing ghosts and ambiences is so tedious that it overshadows the benefits of the product's premise. *RADS* would be much more usable if a utility were included that made the process of exploring and combining the library more like surfing than like a science project.

Overall EM Rating (1 through 5): 2.5

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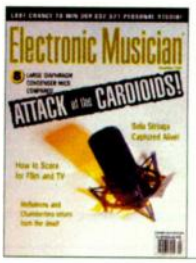

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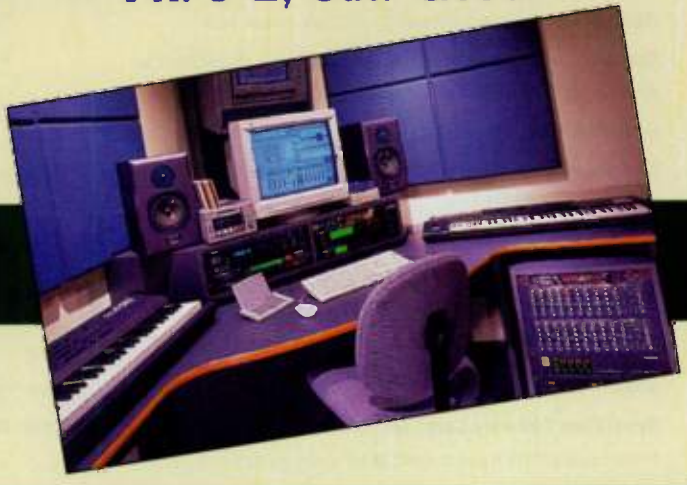

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DIGITAL MIXERS

MACKIE. Digital 8 Bus Mixing Console — New

Well, it's finally here and just like the analog 8 bus a few years back, it's everything you've anticipated! Great sound quality, full recording and mixdown capabilities, motorized faders and an array of digital features geared to take you flying into the next century.

FEATURES-
- 48 channels of automated compression, gating, EQ and delay
- Built in 3-way meter display keeps you on top of your mix.
- Built-in meter bridge,
- Ultramix II automation for complete control, hook up an S-VGA monitor and you'll feel like you spent a lot more money.
- All functions can be automated, not just levels and mutes. Store EQ, reverb, compression, gating and even Aux send information.
- Fast SCENE automation allows you to change parameter snapshots on every beat.
- Reads Standard MIDI tempo maps, displaying clock info on the built-in position counter.
- Truly the cutting edge of mixing technology.

Panasonic WR-DA7 Digital Mixing Console — New

Stop dreaming about your digital future, it's here! The Panasonic WR-DA7 digital mixer features 32-bit internal processing combined with 24-bit A/D and D/A converters as well as moving faders, instant recall, surround sound capabilities, and much more. Best of all, it's from Panasonic.

FEATURES-
- 32 Inputs/6 AUX send/returns
- 24-bit converters
- Large backlit LCD screen displays EQ, bus and aux assignments, and dynamic/delay settings.
- 4-band parametric EQ
- Choice of Gate/Compressor/Limiter or Expander on each channel
- 5.1 channel surround sound in three modes on the bus outputs
- Output MMC
- Optional MIDI joystick

TASCAM TMD1000 Digital Mixing Console — New

You want to see what all the digital mixing buzz is about? The NEW TMD100 from Tascam will have you smilin' & automatin' in no time. It features fully automated EQ, levels, muting, panning and more in an attractive digital board with an analog 'feel'. Your digital future never looked, or sounded, so clear.

FEATURES-
- 4 XLR mic inputs, 8 1/4" balanced TRS inputs.
- 20-bit A/D D/A conversion, 64x oversampling on input, 128x on output.
- Store all settings, fully MIDI compatible.
- Optional **IF-TD1000** adds another 8 channels of TDIF and a 2-channel sample rate converter.
- Optional **FX-1000** Fx board adds another 4 dynamic processors and another pair of stereo effects.

MIC PREAMPS

Focusrite Green 3 "Voicebox MKII" — New

The Voicebox MKII provides a signal path of exceptional clarity and smoothness for mic recording, combining an ultra-high quality mic amp, an all new Focusrite EQ section optimized for voice, and full Focusrite dynamics. The new MKII now includes a line input for recording and mixdown applications.

FEATURES-
- Same mic pre section as found on the Green Dual Mic Pre includes +48V phantom power, phase reverse, and a 75Hz high-pass filter. Mute control and a true-VU response LED bargraph are also provided
- EQ section includes a mid parametric band with frequency and gain control as well as a gentle bell shape to bring out the character of the voice.
- Dynamics section offers important voice processing functions of compression and de-essing combined with a noise reducing expander
- Single balanced Class A VCA delivers low distortion and a S/N ratio as low as -96dBu

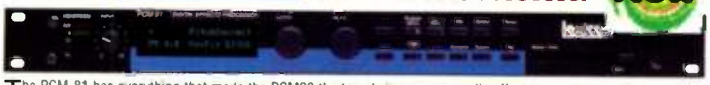
EFFECTS PROCESSING

t.c. electronic Finalizer Plus — New

Improving on the multi-award winning Finalizer platform, The Finalizer Plus delivers an unprecedented level of clarity, warmth and punch to your mix. Inserted between the stereo output of your mixer or workstation and your master recording media, the Finalizer Plus dramatically rounds out your material, creating that "radio ready" sound.

FEATURES–
- Balanced Analog as well as Digital outputs including AES/EBU, S/PDIF, & TOS.
- 24-bit precision A/d & D/A Converters
- 5-band 24-bit stereo EQ
- Enhance - De-essing, stereo adjust or digital radiance
- Real-time gain maximizer
- Variable slope multi-band expander
- Multi-band compressor
- Word Clock Sync
- MIDI section useful for controlling sequencer fades or any of the Finalizer's parameters from a remote MIDI controller.

Lexicon PCM81 Multi-Effects Processor — New



The PCM-81 has everything that made the PCM80 the top choice among studio effects processors and more. More effects, more algorithms, longer delay and full AES/EBU I/O.

FEATURES–
- 300 Presets include pitch, reverb, ambience, sophisticated modulators, 20 second stereo delays, and dynamic spatialization effects for 2-channel or surround sound applications
- 2 digital processors including Lexicon's Lexchip for the reverb and a second DSP engine for the other effects
- 24-bit internal processing
- Dynamic patching matrix for maximum effects control
- PCM card slot

EQUALIZERS

Focusrite Green 2 "Focus EQ" — New

The Green 2 Focus EQ is suitable for a variety of applications combining a Focusrite equalizer section with a multi-source input section. Use it as a high-quality front end for recording applications or patch it into the send/return loop to upgrade a single channel of console eq, either way, it sounds great.

FEATURES-
- XLR & 1/4" inputs are similar to the Dual Mic Pre but have been adapted to cope with a wider range of levels.
- VU metering via a 10-LED bargraph
- EQ section derived from the Red and Blue range processors for superb audio quality.

COMPRESSORS

JOE MEEK VC1 Studio Channel — got meek?

The Joe Meek Studio Channel offers three pieces of studio gear in one. It features an excellent transformer coupled mic preamp, a great compressor and an enhancer unit all in a 2U rackmount design. Find out why more and more studio owners can live without one.

FEATURES-
- 48V phantom power, Fully balanced operation
- Mic/Line input switch
- Mono photo-optical compressor
- High pass filter for large diaphragm mics
- Extra XLR input on front makes for easy patching
- Compression In/Out and VU/compression meter switches
- Twin balanced XLR outputs with one DI XLR output for stage use
- Enhancer In/Out switch and enhance indicator
- Internal power supply 115/230V AC

dbx Blue Series 160S Stereo Compressor

The dbx 160S combines the best features of all the great dbx compressors in a well-built unit where the craftsmanship is as stunning as the engineering is innovative. This is truly a desirable compressor.

FEATURES-
- 127dB dynamic range • Program dependent "Auto" or fully variable attack and release
- Hard knee/OverEasy switchable

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HARD DISK RECORDERS

Roland VS1680 Digital Production Studio

New

The new VS-1680 Digital Studio Workstation is a complete 16 track, 24-bit recording, editing, mixing and effects processing system in a compact tabletop workstation. With its advanced features, amazing sound quality and intuitive new user interface, the VS-1680 can satisfy your *wanderlust*.

FEATURES–
- 16 tracks of hard disk recording, 256 virtual tracks
- 24-bit MT Pro Recording Mode for massive headroom and dynamic range
- Large 320 x 240 dot graphic LCD provides simultaneous level meters, playlist, EQ curves, EFX settings, waveforms and more
- 20-bit A/D D/A converters
- 2 optional 24-bit stereo effects processors (VS8F-2) provide up to 8 channels of independent effects processing
- 12 audio outs: 8x RCA, 2x stereo digital & phones
- New EZ routing function allows users to create and save various recording, mixing, track bouncing, and other comprehensive mixer templates for instant recall
- 10 audio inputs: 2 balanced XLR-type inputs w/ phantom power, 6 balanced 1/4" inputs, and 1 stereo digital input (optical/coaxial)
- Direct audio CD recording and data backup using optional VS-CDR-16 CD recorder.

KORG D8 Digital Recording Studio

New

The new D8 Digital Recording Studio features an 8-track recorder, a 12-channel mixer, onboard effects, and basically everything else you'll need to record and mix your music, you supply the talent.

FEATURES–
- 8-track recorder, 12-channel mixer.
- 1.4GB hard disk for up to 4.5 hours of recording on a single track.
- High and low EQ on each channel.
- 130 high-quality stereo digital effects for complete recording in the digital domain.
- MIDI clock sync, SCSI port and S/PDIF digital interfaces all standard.

DIGITAL MULTI-TRACK RECORDERS

TASCAM DA-98 Digital Audio Recorder

The DA-98 takes all the advantages offered by the DTRS format and significantly ups the ante for the professional and post-production professional alike. With enhanced A/D and D/A convertors, a comprehensive LCD display and full compatibility with the DA-88 and DA-38, the DA-98 delivers the absolute best in digital multitrack functionality.

FEATURES–
- Confidence monitoring for playback and metering
- Individual input monitor select switch facilitates easier checking of Source/Tape levels
- Switchable reference levels for integration into a variety of recording environments with internal tone generator
- Digital track copy/electronic patch bay functionality
- Comprehensive LCD display for easy system navigation
- Dedicated function/numeric keys make operation easier
- Built-in sync with support for MMC and Sony P2
- D-sub connector (37-pin) for parallel interface with external controller
- Optional RM-98 rack-mount ear for use with Accuride 200 system

DA-88 A standard digital multitrack for post-production and winner of the Emmy award for technical excellence, the DA-88 delivers the best of Tascam's Hi-8 digital format. Its Shuttle/Jog wheel and track delay function allow for precise cueing and synchronization and the modular design allows for easy servicing and performance enhancements with third-party options.

DA-38 The DA-38 was designed for musicians. Using the same Hi-8 format as the highly acclaimed DA-88, the DA-38 is an 8 track modular design that sounds great. It features an extremely fast transport, compatibility with Hi-8 tapes recorded on other machines, rugged construction, ergonomic design and sync compatibility with DA-88s.

ALESIS ADAT XT20 Digital Audio Recorder

New

The New ADAT-XT20 provides a new standard in audio quality for affordable professional recorders while remaining completely compatible with over 100,000 ADATs in use worldwide. The XT20 uses the latest ultra-high fidelity 20-bit oversampling digital converters for sonic excellence. It could change the world.

FEATURES–
- 10-point autolocate system
- Dynamic Braking software lets the transport quickly wind to locate points while gently treating the tape
- Remote control
- Servo-balanced 56-pin ELCO connector
- Built-in electronic patchbay
- Copy/paste digital edits between machines or even within a single unit. Track Copy feature makes a digital clone of any track (or group of tracks) and copies it to any other track (or group) on the same recorder.

CD RECORDERS

HHB CDR-800 Compact Disc Recorder

The new CDR-800 Compact Disc Recorder from HHB is built rock-steady for the best recording on this widely accepted format. You can record direct from either analog or digital sources and it comes loaded with features, making it ideal for professional studios looking to output quality CDs.

FEATURES–
- Built-in Sample rate converter
- Analog and digital inputs and outputs
- 1-bit A/D converters for lowest possible distortion
- Synchronized recording and editing
- Digital fader for natural fade-in and fade-out

STUDIO DAT-RECORDERS

Panasonic SV-3800 & SV-4100

The SV-3800 & SV-4100 feature highly accurate and reliable transport mechanisms with search speeds of up to 400X normal. Both use 20-bit D/A converters to satisfy even the highest professional expectations. The **SV-4100** adds features such as instant start, program & cue assignment, enhanced system diagnostics, multiple digital interfaces and more. Panasonic DATs are found in studios throughout the world and are widely recognized as the most reliable DAT machines available on the market today.

FEATURES–
- 64x Oversampling A/D converter for outstanding phase characteristics
- Search by start ID or program number
- Single program play, handy for post.
- Adjustable analog input attenuation, +4/-10dBu
- L/R independent record levels
- Front panel hour meter display
- 8-pin parallel remote terminal
- 250x normal speed search

TASCAM DA-30MKII

A great sounding DAT, the DA-30MKII is a standard mastering deck used in post-production houses around the world. Among many other pro features, its DATA/SHUTTLE wheel allows for high-speed cueing, quick program entry and fast locating.

FEATURES–
- Multiple sampling rates (48, 44.1, and 32kHz).
- Extended (4-hour) play at 32kHz.
- Digital I/O featuring both AES/EBU and S/PDIF.
- XLR balanced and RCA unbalanced connections.
- Full function wireless remote.
- Variable speed shuttle wheel.
- SCMS-free recording with selectable ID.
- Parallel port for control I/O from external equipment.

Fostex D-15

The new Fostex D-15 features built in 8Mbit of RAM for instant start and scrubbing as well as a host of new features aimed at audio post production and recording studio environments. Optional expansion boards can be added to include SMPTE and RS-422 compatibility, allowing the D-15 to grow as you do.

FEATURES–
- Hold the peak reading on the digital bargraphs with a choice of 5 different settings
- Set cue levels and cue times
- Supports all frame rates including 30df
- Newly designed, 4-motor transport is faster and more efficient (120 minute tape shuttles in about 60 sec.)
- Parallel interface • Front panel trim pots in addition to the level inputs

D-15TC & D-15TCR

The D-15TC comes with the addition of optional chase and sync capability installed. It also includes timecode reading and output. The D-15TCR comes with the further addition of an optional RS-422 port installed, adding timecode and serial control (Sony protocol except vari-speed).

SONY PCM-R500

Incorporating Sony's legendary high-reliability 4D.D. Mechanism, the PCM-R500 sets a new standard for professional DAT recorders. The Jog/Shuttle wheel offers outstanding operational ease while extensive interface options and multiple menu modes meet a wide range of application needs.

FEATURES–
- Set-up menu for preference selection. Use this menu for setting ID6, level sync threshold, date & more. Also selects error indicator.
- Includes 8-pin parallel & wireless remote controls
- SBM recording for improved S/N *(Sounds like 20bit)*
- Independent L/R recording levels
- Equipped with auto head cleaning for improved sound quality

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MIDI HARDWARE

Mark of the Unicorn

MIDI Time Piece™ AV
8x8 Mac/PC MIDI Interface

The MTP AV takes the world renowned MTP II and adds synchronization that you really need like video genlock, ADAT sync, word clock sync, and even Digidesign superclock!

FEATURES–
- Same unit works on both Mac & PC platforms.
- 8x8 MIDI merge matrix, 128 MIDI channels.
- Fully programmable from the front panel.
- 128 scene, battery-backed memory.
- Fast 1x mode for high-speed MIDI data transfer.

Digital Time Piece™
Digital Interface

Think of it as the digital synchronization hub for your recording studio. The Digital Timepiece provides stable, centralized sync for most analog, digital audio, and video equipment. Lock together ADATs, DA-88's, ProTools, word clock, S/PDIF, video, SMPTE, and MMC computers and devices flawlessly. It ships with "Clockworks" software which gives you access to its many advanced features and remote control of some equipment settings such as record arm.

OPCODE

Studio 64XTC
Mac/PC MIDI Interface

The Studio 64XTC takes the assorted, individual pieces of your studio-your computer, MIDI devices, digital and analog multitracks and even pro video decks, and puts them all in sync.

FEATURES–
- 4 In / 4 Out, 64 channel MIDI/SMPTE interface/patchbay with powerful multitrack & video sync features
- ADAT sync with MIDI machine control
- Simultaneous wordclock and Superclock output, 44.1kHz or 48kHz for perfect sync with ADAT, DA-88 and ProTools
- Video and Blackburst in (NTSC and PAL)
- Cross-platform Mac and Windows compatibility

SAMPLING

AKAI
S-Series
Rack Mount Samplers

Starting with 64X oversampling, Akai's S-Series Samplers use 28-bit internal processing to preserve every nuance of your sound and the outputs are 18- and 20-bit to ensure reproduction of your sounds entire dynamic range. These three new samplers add powerful capabilities, ease-of-use, expandability and affordability to set the standard for professional samplers.

KEYBOARDS & SOUND MODULES

Roland

XP60 & XP80 Music Workstations

The XP-80 delivers everything you've ever wanted in a music workstation. An unprecedented collection of carefully integrated features provide instant response, maximum realtime control and incredible user expandability. The XP-80 features a pro-quality 76-note weighted action keyboard while the NEW XP-60 features the same sound engine in a 61-note keyboard.

XP80 FEATURES–
- 64-voice polyphony and 16-part multitimbral capability
- 16 Mbytes of internal waveform memory; 80Mbytes when fully expanded (16-bit linear format)
- 16-track MRC-pro sequencer with direct from disk playback. Sequencer holds approx. 60,000 notes
- New sequencer functions like "non-stop" loop recording and refined Groove Quantize template
- Enhanced realtime performance capability with advanced Arpeggiator including MIDI sync and guitar strum mode and Realtime Phrase Sequence (RPS) for on-the-fly triggering of patterns
- 40 insert effects in addition to reverb and chorus
- 2 pairs of independent stereo outputs; click output jack with volume knob
- Large backlit LCD display

SR-JV80 Series Expansion Boards

New

Roland's SR-JV80-Series wave expansion boards provide JV and XP instrument owners a great-sounding, cost-effective way to customize their instruments. Each board holds approx. 8Mb of entirely new waveforms, ready to be played or programmed as you desire.

Boards Include–
Pop, Orchestral, Piano, Vintage Synths, World, Super Sound Set, Keys of the 60's & 70's, Session, Bass & Drums, Techno & Hip-Hop Collection.

KURZWEIL
K2500 Series Music Workstations

The K2500 series from Kurzweil utilizes the acclaimed V.A.S.T. technology for top-quality professional sound. Available in Rack mount, 76-key, and 88 weighted key keyboard configurations, these keyboards combine ROM based samples, on-board effects, V.A.S.T. synthesis technology and full sampling capabilities on some units.

FEATURES–
- True 48-voice polyphony
- Fluorescent 64 x 240 backlit display
- Up to 128MB sample memory
- Full MIDI controller capabilities
- 32-track sequencer
- Sampling option available
- Dual SCSI ports
- DMTi Digital Multitrack interface option for data format and sample rate conversion (Interfaces with ADATs or DA-88s)

KORG

Trinity Series Music Workstations DRS

Korg's Trinity Series represents a breakthrough in sound synthesis and an incredible user interface. It's touch-screen display is like nothing else in the industry, allowing you to select and program patches with the touch of a finger. The 24MB of internal ROM are sampled using ACCESS which fully digitizes sound production from source to filter to effects. Korg's DSP based Multi Oscillator Synthesis System (MOSS) is capable of reproducing 5 different synthesis methods like Analog synthesis, Physical Modeling, and variable Phase Modulation (VPM).

FEATURES–
- 16 track, 80,00 note MIDI sequencer
- Flexible, assignable controllers
- **DRS (Digital Recording System)** features a hard disk recorder and various digital interfaces for networking a digital recording system configured with ADAT, DAT recorder and hard disk
- 256 programs, 256 combinations
- Reads KORG sample DATA library and AKAI sample library using optional 8MB Flash ROM board

TRINITY — *88 Weighted-key/Solo Synth*
TRINITY — *76-key/Solo Synth*
TRINITY — *61-key/Solo Synth*
TRINITY — *61-key*

**(Digital IF, SCSI, Hard Disk Recorder, and sample Playback/Flash ROM functions are supplied by optional upgrade boards)*

MONITORS

Hafler

TRM-8

Winner of Pro Audio Review's PAR Excellence Award in 1997, Hafler's TRM8s provide sonic clarity previously found only in much more expensive speakers. They feature built-in power, an active crossover, and Hafler's patented Trans•nova power amp circuitry.

- 45Hz - 21kHz, ±2dB
- 75W HF, 150W LF
- Electronically & Acoustically matched

MACKIE.

HR824

These new close-field monitors from Mackie have made a big stir. They sound great, they're affordable, they're internally bi-amped. "What's the catch?" Let us know if you find one.

FEATURES-
- 150W Bass amp, 100W Treble amp
- Full space, half space and quarter space placement compensation
- Frequency Response 39Hz to 22kHz, ±1.5dB

TANNOY

Reveal

New

The latest playback monitor from Tannoy, the Reveal has an extremely detailed, dynamic sound with a wide, flat frequency response.

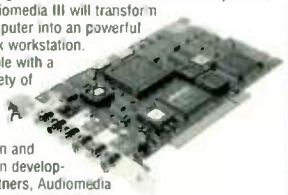
FEATURES-
- 1" soft dome high frequency unit
- Long throw 6.5" bass driver
- Magnetic shielding for close use to video monitors
- Hard-wired, low-loss crossover
- Wide, flat frequency response
- Gold plated 5-way binding post connectors

SOUND CARDS

digidesign — A Division of Avid Technology, Inc. — AVID

Audiomedia III
Digital Audio Card

Working on both Mac and Windows OS systems, Audiomedia III will transform your computer into an powerful multitrack workstation. Compatible with a wide variety of software options from Digidesign and Digidesign development partners, Audiomedia III features 8 tracks of playback, up to 4 tracks of recording, 24-bit DSP processing, multiple sample rate support and easy integration with leading MIDI sequencer/DAW software programs.



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e musician
electronic musician online

Hey Herb!
Check out all the cool stuff on the EM Web site this month! http://www.emusician.com —John

- Cool sample files, demo software, and audio samples from this month's issue of EM.
- I found that mic review you were looking for in the "Article Archives" database!
- Michael Laskow from TAXI has some great tips in "The Biz" column to help promote our current project.
- The "Re:Views" column this month has some really happening new CD releases you need to check out.
- Remember that piece of gear we were thinking about buying? It's the hot topic on the "Perspectives" discussion group this month!

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FINAL MIX

By Larry the O

It's around Here Somewhere

With an ever-increasing amount of audio work taking place within the computer, the quantity of files audio professionals have to deal with has soared. Nevertheless, the development of asset-management tools (a more general term than "file-management tools") has badly lagged behind the development of audio features in digital audio software. Although a few high-end systems have implemented some real asset-management features, the typical workstation or digital audio sequencer offers very few. A small number of utility programs fill in some of the gaps, but the bottom line is that most people's primary recording and editing environments offer much more facility for creating files than for taking care of them.

You can name a few systems that present a list of all files and regions used in a session, but how many offer the ability to identify each instance of a region within the current session? How many audio applications do you know that offer multiple library "bins" into which regions can be sorted? How many will import files from a text list of file paths dragged and dropped onto the session window or, even better, offer direct links to a database through Open Database Connectivity (ODBC) or some similar database-linking scheme?

Moving to a much simpler level, why do workstation/sequencing programs prompt you individually for each file that can't be found when opening a session? Both Mac and PC platforms have file-searching routines; why couldn't the program search for exact (or even close) name matches on mounted disks for each missing file? Then, after all files have been either located or searched for, the program could present a dialog that shows the missing files and candidate matches and allows the user to simply select the correct file (or elect to skip) for each missing file?

Even batch processors, utility programs that are designed specifically for dealing with groups of files, fall down: very few are capable of receiving a nested directory structure dragged and dropped on them, processing all the files in the entire nested structure, and depositing the processed files in a duplicate of the original directory structure. On the Mac, these tasks are straightforward Finder manipulations; if I can hack these in AppleScript (and I have), the hotshot programmers who create these programs certainly can.

At the last National Association of Broadcasters (NAB) show, Avid Corporation (parent of Digidesign) announced the Open Media Management framework, which is intended to allow the sort of database links I'm calling for. Currently, the database partners involved in this initiative (Cinebase, Virage, e-motion, and Bulldog), all have built large-scale, video-oriented, media asset-management systems on industrial-strength engines like Informix, Sybase, and Oracle. Their products are powerful and pricey, but they don't do diddly with audio. Let us hope that, as Open Media Management is formulated, there will be a few chairs around the table for audio folks from Avid and Digidesign. Maybe some other DAW manufacturers could join in; the more the merrier.

Further, let's hope that somebody keeps in mind how many of us, for better or worse, use less glitzy database engines such as *FileMaker Pro*. Without these considerations, Open Media Management may not be of any use to **EM** readers, even if it becomes wildly successful in the upscale video realm.

That goal, too, may be missed if the process (and its result) is too closed. The Open Media Framework, which Avid created some years, ago sees some use amongst owners of Avid video editing products, but it has never reached the broad level of acceptance envisioned for it.

I think we're at a critical juncture with the lack of solid asset management. The people who make our tools will soon be groping for solutions. I heartily welcome this, for it comes not a moment too soon.

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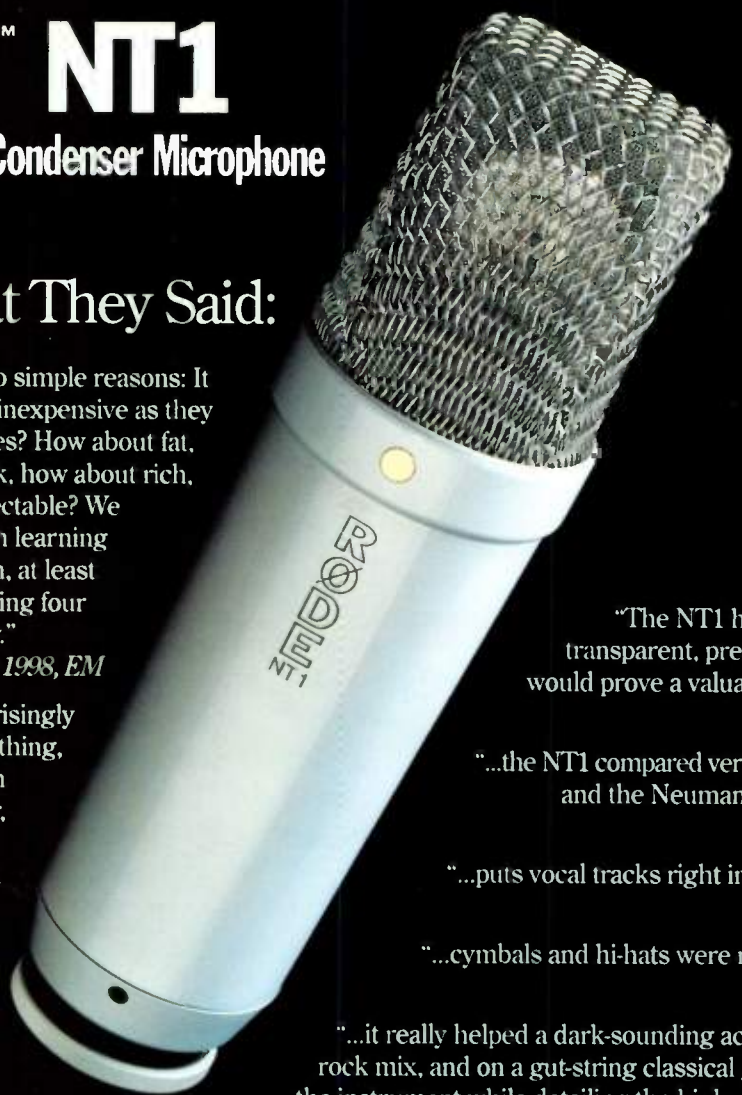

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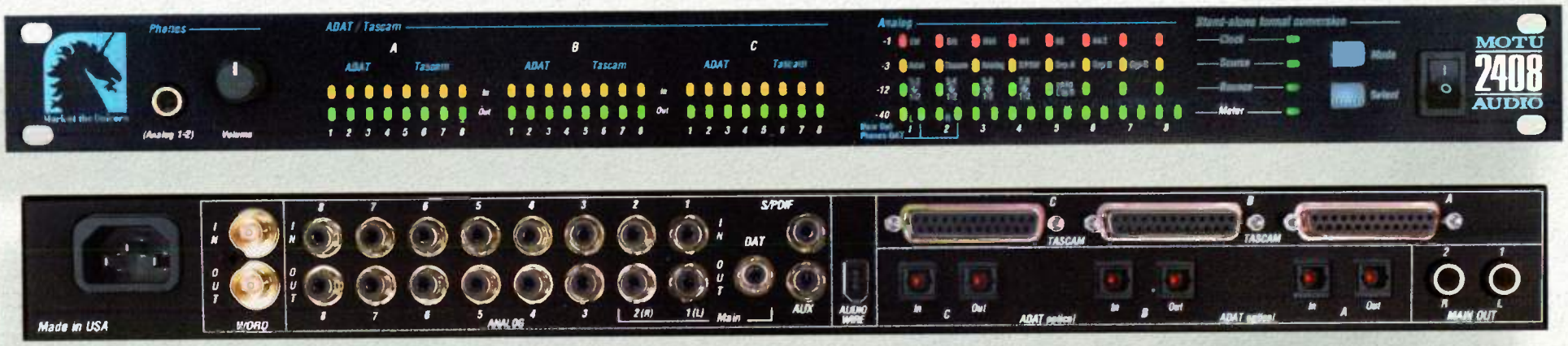

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