Fostex VF-16, Soundscape R.Ed, Kurzweil K2600, and 11 more reviews

# Electronic Musician®

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February 2001

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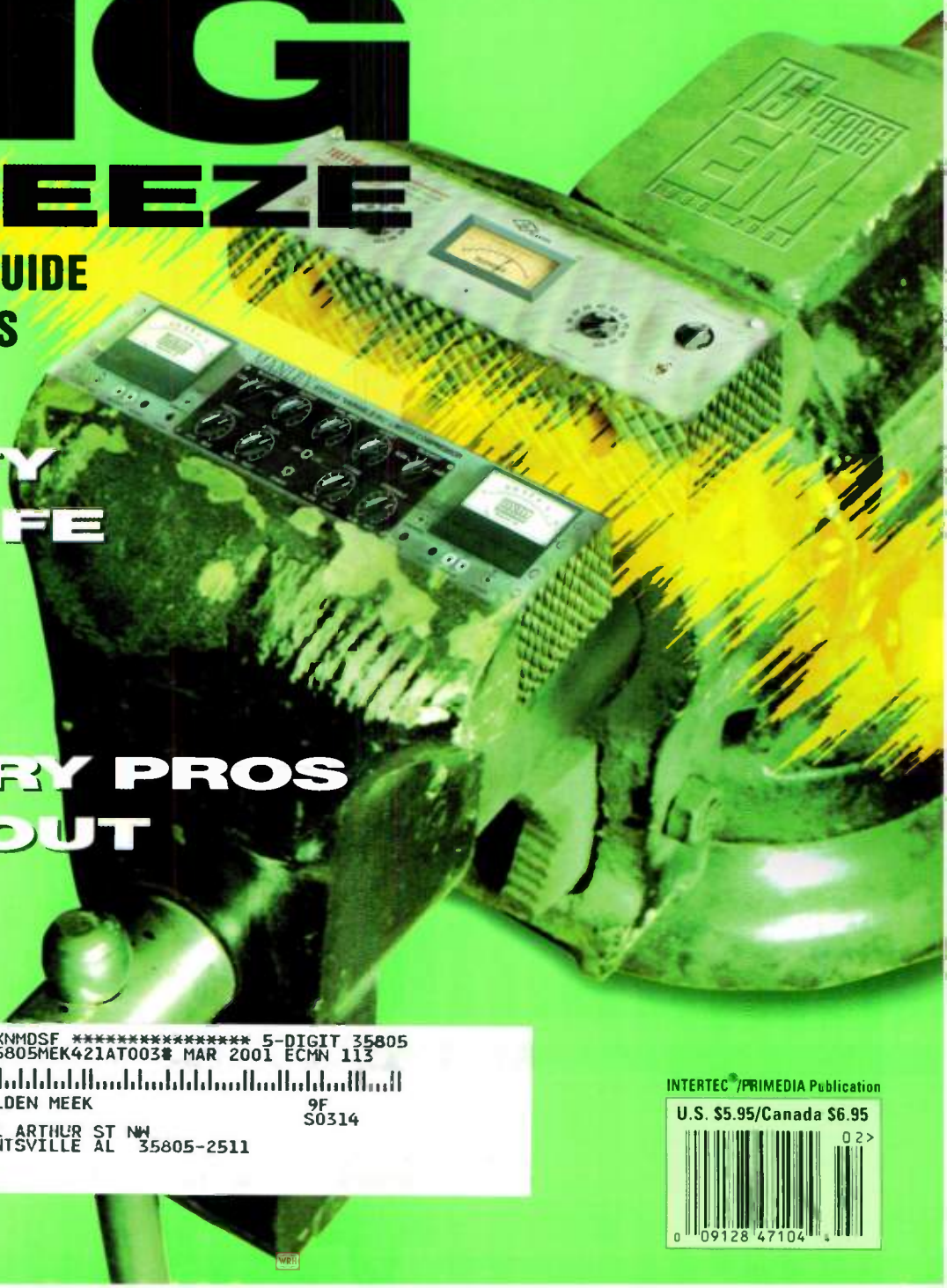
EM'S ULTIMATE GUIDE TO COMPRESSORS

## SIMPLIFY YOUR LIFE

THE DEFINITIVE GM SYNTH ROUNDUP

## INDUSTRY PROS SPEAK OUT

LORA HIRSCHBERG, RACHEL PORTMAN, K.K. PROFFITT, DJ RAP





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# Mackie's new standalone 24-track digital hard with any analog or digital mixer...and records on each affordable M•90 pull-out cartridge!

**The new HDR24/96 is** the affordable alternative to expensive, complicated digital audio workstations... and the natural successor to tape-based 8-track digital recorders. You get:

- A familiar, analog recorder interface – just hit PLAY and then RECORD;
- 24 tracks and 192 virtual takes (8 per track);
- Built-in internal hard disk with over 90 minutes of recording capacity[1]...
- ...plus a pull-out Mackie Media drive bay that uses affordable M•90 cartridges with 90-minute capacity[1];
- One or two songs can be saved to $29 removable cartridge;
- 24-bit accuracy with 44.1 and 48kHz sample rates[2];
- Sample-accurate sync for slaving any number of HDR24/96s together and locking to SMPTE, NTSC and PAL black burst, MIDI or internal work clock;
- Standard 100BaseT Ethernet port;
- Two sizes of optional remotes;
- Analog, ADAT™, TDIF and AES/EBU I/O via mix-and-match 8-channel cards including our new $99[3] OPT I/O•8 card.

## Built-in graphic waveform editor.

The HDR24/96 is also a full-featured digital audio workstation with waveform editing. Just plug in a monitor, keyboard and mouse! No extra computer or software needed.

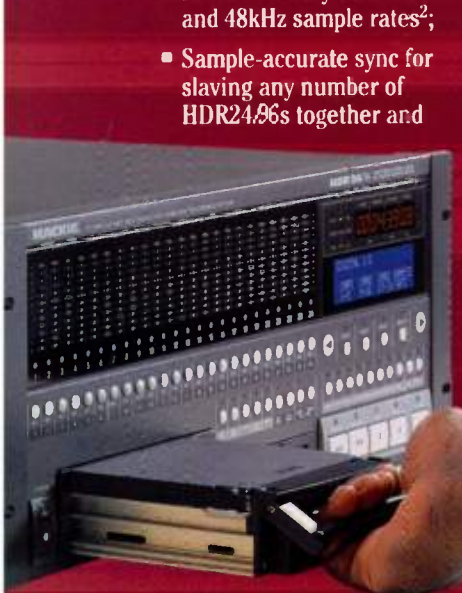
Slide, edit, copy, fade and crossfade tracks minutes after unboxing your HDR24/96 with an interface so intuitive you many not even have to crack the manual.

We've included 999 levels of undo (all operations are non-destructive so you can experiment to your heart's content), Regions, unlimited cue points, volume automation, quantization, Cue, History, Group and Region list displays, drag-and-drop crossfades/fade-ins /fade-outs, Time Bar with user-defined resolution, Punch, Loop, Cue and Tempo Change markers, 8 virtual "takes" per track and many other music production tools.

The HDR24/96 on-screen display duplicates every front panel control including meter bridge and features true scrolling tracks you can view in groups of 24, 12, 8, 4 or 2.

## Superior audio specifications.

Whether or not you immediately take advantage of the HDR24/96's workstation capabilities, you're getting a sonically-superb 24-track digital recorder for less than the price of three tape-based 8-track boxes. Consider these HDR24/96 specs: 0.00001% THD. 144dB internal dynamic range. 2Hz to 22kHz frequency



*2.2 GB cartridges store a couple of 24 track masters for only $29!*

**Plug and Play!** Think of M•90 media as 24-track tape cartridges that are so affordable you can keep one for each project. Or record on the HDR24/96's internal hard disk and use M•90's for lighting-fast back-up at many times the speed of typical SCSI transfer to Jaz® or magneto-optical disks.

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# disk recorder works over 90 minutes

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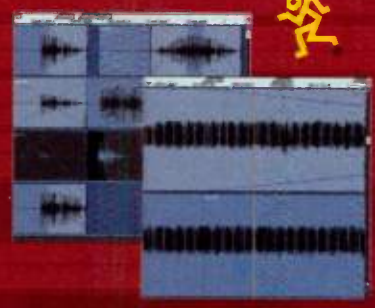
response ±0.5dB. The HDR24/96 also has blazing-fast internal processor speed for fast multi-track punch-ins.

## Easy back-up.

Equally as important, the HDR24/96 is the first hard disk recorder to satisfactorily address the problem of transfer and storage. Its built-in Ethernet "*HDR Bridge*" lets you FTP data from the recorder to your computer's desktop, existing SCSI peripherals and the outside world at the near-realtime speed of 100Mb/second. The reasonable cost of our pull-out M•90 media cartridges means you can afford to have one for each project. And, 2.2 GB cartridges can be stored or loaded into Orb™ drives connected to Macs or PCs.



## A real value when all factors are considered.

We firmly believe that the HDR24/96 is the best digital recording buy on the market today…in spite of the fact that others are touting lower "base prices" for their products.

Consider the reasons:

- The HDR24/96 ships with twice as much recording capacity as some competitors' models.
- It uses pull-out media that are significantly less expensive than the competition's SCSI drives;
- It uses standard Mackie D8B I/O cards that start at just $99 for eight channels;
- For the price of a monitor, keyboard and mouse, the HDR24/96 becomes an intuitive-waveform editing platform. You don't need to add a computer and deal with interface hassles.

Get the excruciatingly complete story of the HDR24/96 today by calling toll-free or logging onto our web site. Then get your hands on one and start tracking some hits.

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## Supports your recording software

Choose any VST-compatible audio recording software package, such as Logic, Spark, Cubase or Nuendo – and you will instantly be able to take advantage of **TC•POWERCORE**'s superior signal processing capabilities. What's more – SparkLe is included to get you started!

## Supports any I/O card

Whether it be Direct I/O, ASIO or SoundManager – **TC•POWERCORE** will work with any audio card or system supported by the recording software.

## TC Tools/96 included

At last, the renowned TC TOOLS/96 studio-quality FX package with TC MEGAREVERB, TC CHORUS/DELAY and TC EQ[SM] Plug-Ins is accessible from within any VST-compatible recording software. In fact, you can run all 3 TC TOOLS/96 Plug-Ins on a single **TC•POWERCORE** DSP, something previously impossible on even the fastest available CPUs!

## Expand your virtual racks

Of course, **TC•POWERCORE** can run a lot more than just the included awesome TC TOOLS/96 Plug-Ins – also available:

- **TC VoiceTools**
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- **TC MasterX 3+5**
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**3RD PARTY SUPPORT**

- **Open Platform**
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### Key Features

- **5 hi-end processors**
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- **Works with any VST application**
  Compatible with Logic, Cubase, Nuendo, Spark
- **Works with all sound cards**
  Seamlessly integrates into your existing setup
- **Includes SparkLe**
  The 2-Track processing, mastering & editing software with VST Plug-In support

VST 24/96 Mac

## Available from March 2001

*System requirements: G3 or G4 PCI PowerMac, 128 MB RAM, MacOS 9, VST-compatible recording software and any supported sound system.*

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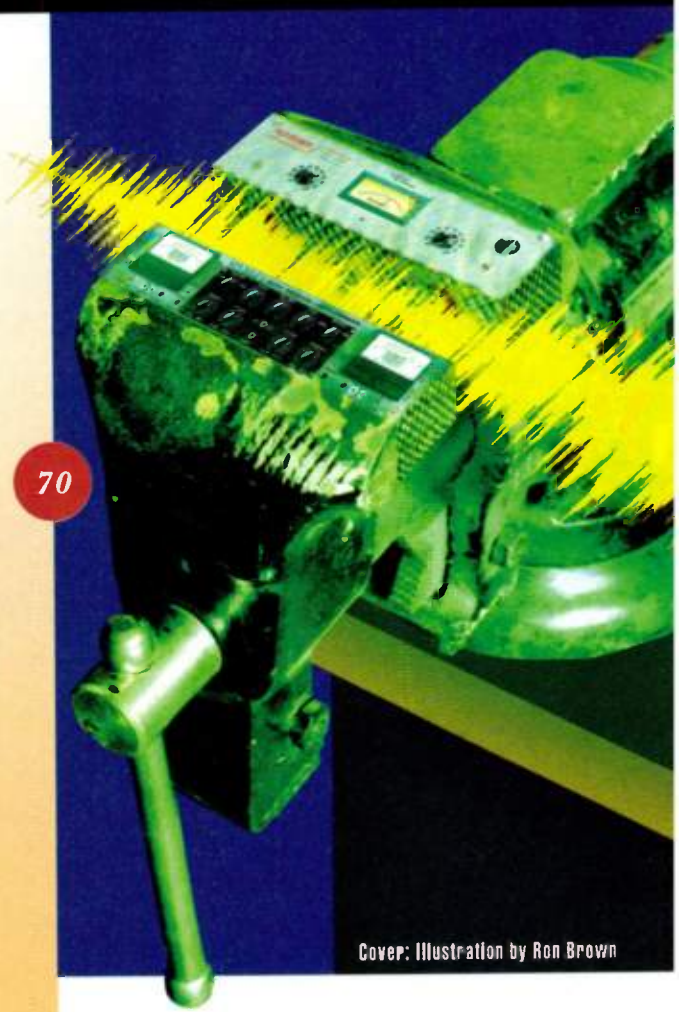
# I N S I

## FEATURES




Cover: Illustration by Ron Brown

## DEPARTMENTS

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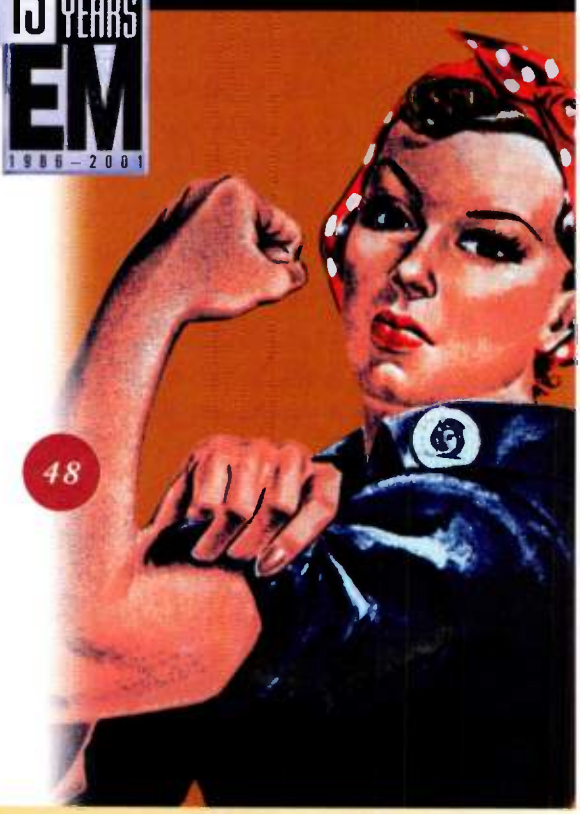
15 YEARS EM 1986–2001



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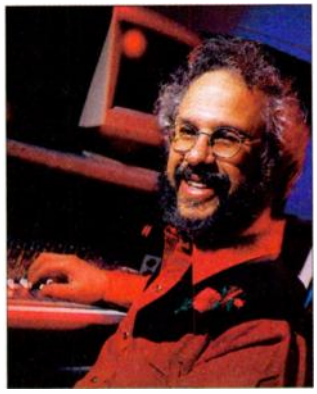
# You Better? You Bet!



ANTHONY PIDGEON

How many times have you heard someone say, "you're not getting older, you're getting better"? It's pure poppycock, of course—the kind of thing someone says when they want to make you feel good about a potentially unpleasant topic. You know good and well that you are getting older; whether you are getting better is another question entirely. Not everyone becomes wiser with age. But you can—if you choose to.

If we don't get better physically, we can at least improve our strategies and tactics. We can plan more carefully, taking our time and considering the possibilities thoroughly before acting—something we might not have done as often when younger. In short, we can learn to play and work smarter, even if we aren't brighter. And we can learn patience.

Part of working smarter is setting priorities. What is really important to the job at hand? For instance, when you first became serious about recording, you may have felt that every track had to be absolutely perfect. But do you really need to edit for endless hours? Do you need to worry about every sonic artifact?

Well, yes, sometimes. But if your objective is to create music that people will want to buy, your top priorities might be songwriting, arranging, and performing. The recording quality must be good, of course, but the music is the point, not the recording. Besides, often enough, the timbre that doesn't seem rich enough or the artifact that is driving you nuts will be masked in the mix. Knowing when that is the case—and hence, when you can quit sweating the small stuff—is the result of hard-earned experience. Acting on that knowledge takes good judgment—and that's what you hope to gain as you get older.

Yet some people keep micro-editing things nobody will ever notice and fearing sonic boogeymen at every turn. As a result, projects take ages to finish. These folks might do well to heed the great American philosopher W.C. Fields: "If at first you don't succeed, try, try again. Then quit; no used being a damned fool about it."

No, I don't mean quit working on the project. Quit obsessing and getting intimidated by the scope of your ambitions. If the problems seem overwhelming, it doesn't necessarily mean you have to get hung up for an extended period. It might even mean you need to attempt less. Perhaps the arrangements could be sparser. Do you really need to layer and balance ten different sounds in that pad? Maybe, but at least ask yourself the questions.

Remember that you don't have to make everything perfect. In fact, you can't: perfection is not an attribute of humans or their works (although some great music comes awfully close). Go back to your first priority: producing the music. Try putting the problem track or piece aside for awhile. Consider changing your basic concept, or find a different way to accomplish your objective.

Like it or not, getting older is unavoidable. Getting better is a matter of choice.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**National Editorial, Advertising, and Business Offices**
6400 Hollis St., Suite 12, Emeryville, CA 94608
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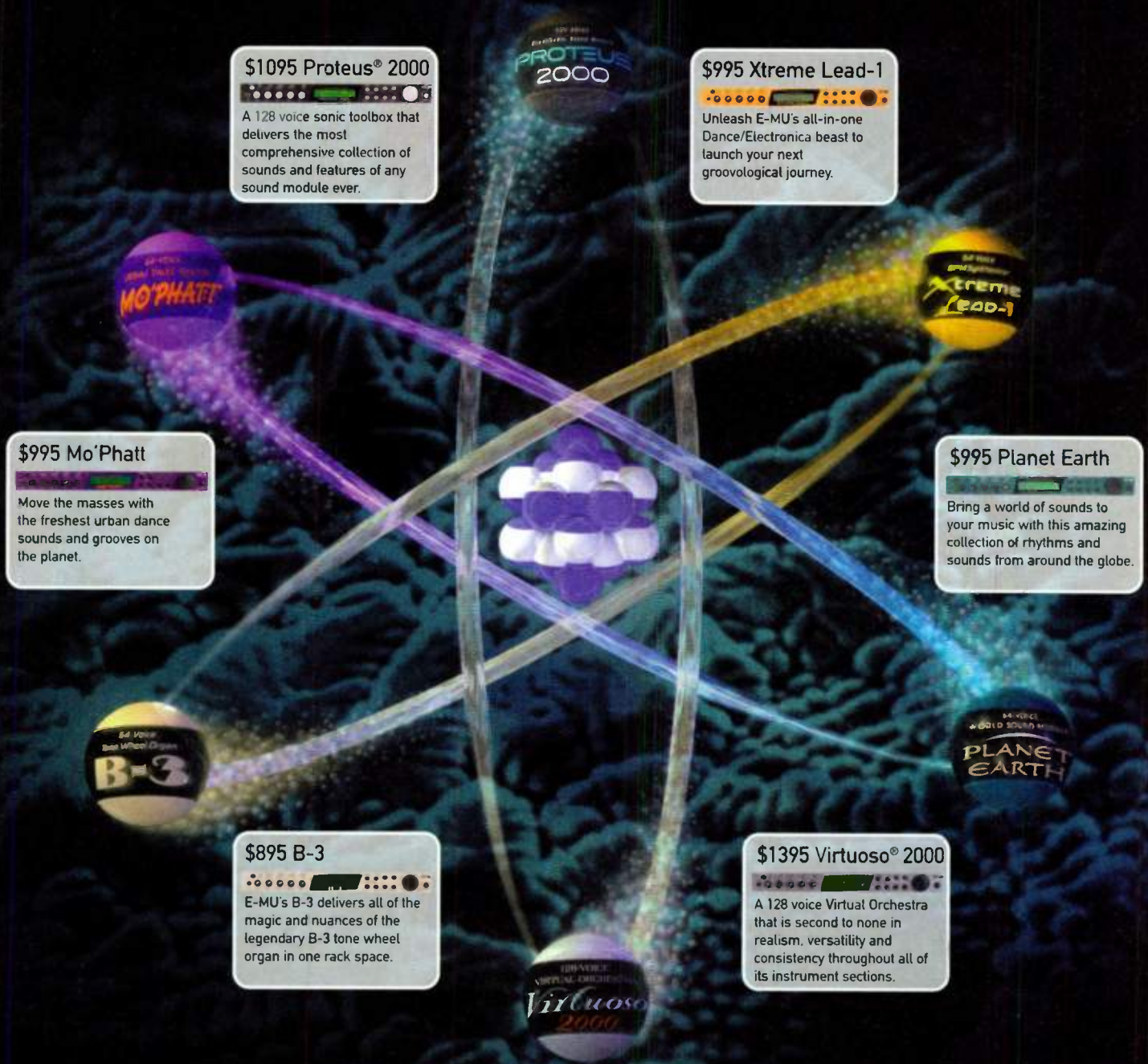


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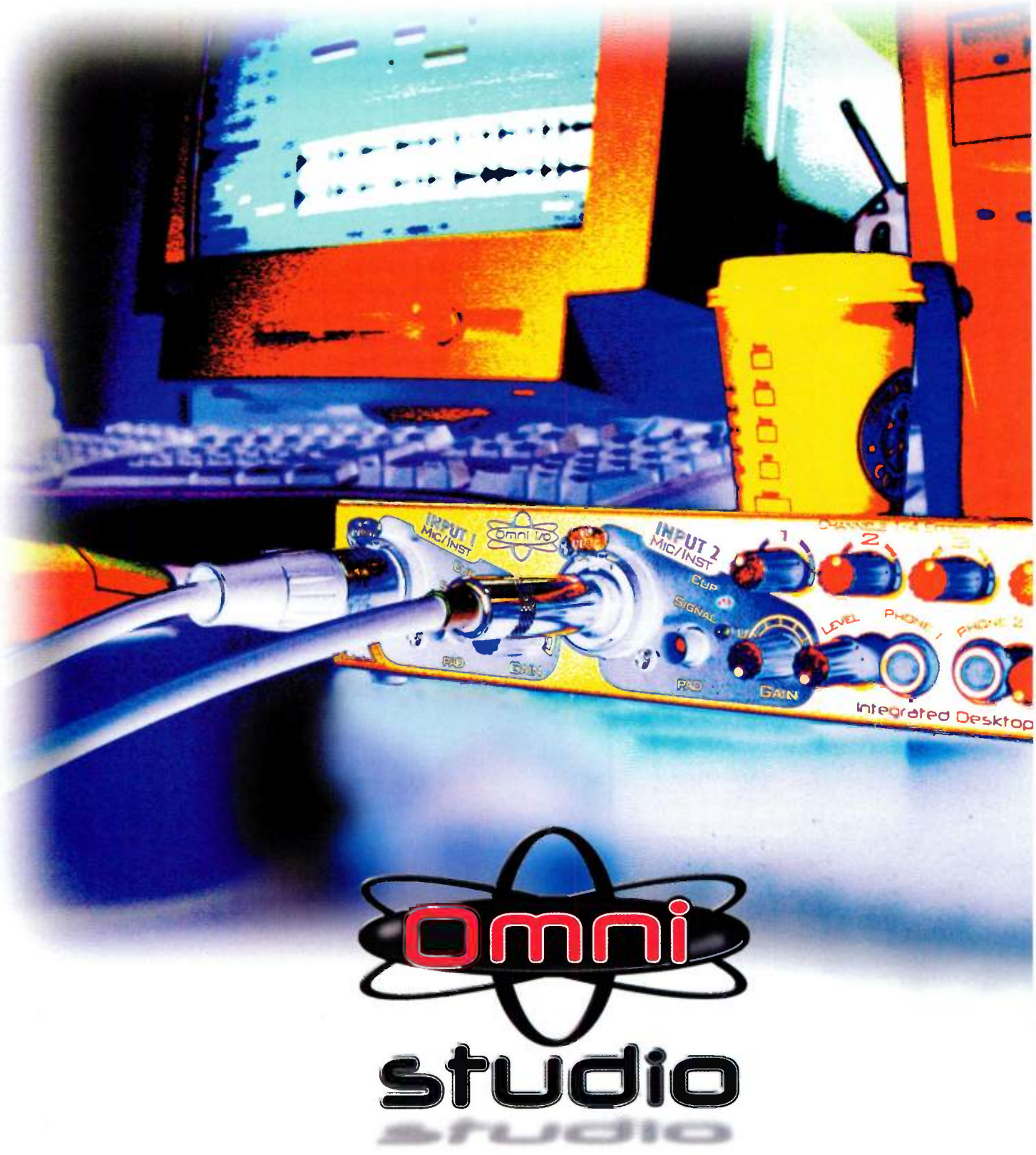

# Except the Coffee.


Everyone is looking for the right solution for computer-based recording: a system that not only sounds good but also deals with the unexpected hassles that can come with the territory. You need more than a soundcard with mic pre's, you need something that actually helps you make music.

That's why we made the **Omni Studio**. The Omni emulates a "split console" mixer design, making it capable of adapting to many studio scenarios and providing solutions that would usually require a lot of gear.

Now with the **Omni Studio** you can:

- *Utilize 6 ins/6 outs to the PCI card and an **additional 8 inputs** to the mixer section*
- *Record/monitor at 24 bit/96kHz with **no latency***
- ***Insert compressors** on your mics*
- ***Buss** to outboard FX or submixers*
- ***Mix** to DAT/CD burner and cassette*
- ***Monitor** your MIDI gear in playback and record*
- *Track with **2 headphones** and/or monitors*
- *Forget about your gear and just make music*

The **Omni Studio** includes a **Delta 66** soundcard and the **Omni i/O** Integrated Desktop Audio Station, and is compatible with Mac and PC, **Logic**™, **Cubase**™, **Cakewalk**™, **Digital Performer**™, **Vegas**™, **Gigasampler**™ and everything else. Espresso machine not included.


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MIKE CRUZ

## SEX SELLS?

I am offended by the October issue cover with its reference to Zen. What does that have to do with a music tech magazine? Although I am a Christian, I don't expect to see something about Jesus Christ in your magazine. Why not stick to your main objective of serving the readers with great music info, as you have in the past? While the December cover is not quite as offensive as October's, it certainly cheapens your otherwise fine publication. The title "Cheap Thrills" and the nude mannequins really degrade your image and are not indicative of the otherwise fine information inside. In that case, I'm glad you can't judge a book by its cover. I suggest you rethink your strategy for covers, or else give the task to someone else. Thank you for the many fine previous issues of great value. I hate to see you go down a cheesy and offensive road.

**Victor Fouquet**
**via e-mail**

*Victor—Oh, please! Those were clearly mannequins on the December cover, not real flesh and blood! We wanted to have some innocent fun with our holiday-issue toy story by spoofing popular magazines that display scantily clad models on their covers. We used male and female mannequins to avoid any hint of sexism. Using nude mannequins may have been a bit risky, but the picture was not risqué.—Steve O.*

## ZEN AGAIN ...

I had to smile when I read Paul Weiss's letter regarding **EM**'s ill-conceived "Zen" reference on the October issue's cover. As a practicing Buddhist, I empathize with Paul's feelings about the use of the word. However, most practicing Buddhists can slough off the unintended offense pretty easily. Someone who has been practicing Buddhism for 38 years should not let someone's poor choice of words "tick [him] off."

I too wish journalists and (especially) editors would be more considerate in their language choices. On the other hand, the last thing I allow to tick me off is someone's improper use of a mere word related to my religion. My religious practice constantly reminds me to respect people's differences, even if those differences are merely in understanding concepts or in sensitivity to others' feelings. Buddhism is a practice, not an end product. We strive for perfection while realizing it is nearly impossible to achieve. Here's to all our imperfections!

**Robin Duggar**
**via e-mail**

## SAY WHAT?

I am a new subscriber, and I have seen only a couple of issues of **EM**. Although I have played around with a cheap keyboard for a while—I have been into playing instruments since the late '40s—I only recently become fascinated with the possibilities of MIDI. I bought Cakewalk's *Home Studio* 9 and a Crate Pro Audio mixer (mainly so I won't have to constantly rewire everything when I record, play back, and so on). Everything's hunky-dory, but I am dismayed as I leaf through the magazine and realize that I am totally clueless. What the heck are you guys talking about? None of my local bookstores have anything worth looking at (only MIDI booklets copyrighted in the mid-'80s). How about one page in every issue for the poor souls who only play keyboards but want to get into all this other stuff? I suspect you don't realize how much of what you write is gibberish to many of your readers.

**Gene Yoknis**
**via e-mail**

*Gene—The majority of our readers have more experience than you might think; if we were to focus on entry-level articles, we would lose our core readership. However, we do want to help everyone get up to speed, and we try to do that in several ways.*

*Our "Square One" column introduces basic recording and electronic-music concepts and technologies. Some columns are more advanced than others, but most are pretty accessible. Our annual* Desktop Music Production Guide *offers a variety of articles, including basics. It goes out free to U.S. subscribers and is sold on the newsstands. Our annual* Digital Home Keyboard Guide, *available only at newsstands, is the most entry-level magazine we publish. The 2001 issue is on sale now, and it has an introduction to MIDI, a story explaining General MIDI, and articles that offer basic information on synths.*

*As for books, you need search no further than our friends at Artistpro.com (www.artistpro.com), which publishes the* **EM** *Books product line. These books—many of which were written or edited by* **EM** *editors—are a treasure trove of information. One of the best for learning basic concepts is* **EM** *technical editor Scott Wilkinson's* Anatomy of a Home Studio. *You will find many other excellent books and instructional videos on the Artistpro Web site. Tell 'em I sent you!—Steve O.*

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15 YEARS EM 1986–2001

# FIFTEEN YEARS AGO IN EM

Our February 1986 issue reflected our interest in drum machines, digital delay effects, and, of course, sequencers, and we were starting to get excited about the Macintosh computer. Including the covers, the issue was 72 pages long—a little more than a quarter of the size of this 260-page February 2001 issue.


Our cover photo featured a Mac running Opcode's *Sequencer* software, a predecessor of *Vision*. To the right of the computer, you can see an E-mu Drumulator, a Fender Polaris, and a Fender Rhodes Chroma—still my favorite analog synthesizer. These were cutting-edge tools for electronic musicians of the day.

Inside the issue, Digidesign cofounder Peter Gotcher's "Mac the Axe" extolled the merits of mice, menus, and the Macintosh—then widely considered the best music computer around. Larry Fast's "Studio Notes" column discussed why the same tempo setting did not, in practice, produce identical bpms on different drum machines. (Reason: some older front-panel readouts couldn't resolve fractional bpm, so a reading of 120 bpm might actually indicate anything from 120.1 to 120.9.) Fast also explained how jitter in the sync signal could prevent you from perfectly synching two devices, even when you locked them to the same sync signal.

Of course, we had plenty of do-it-yourself projects, which was typical in those days. Thomas Henry offered a story about turning a computer into an electronic drum controller. James Chandler's "Bassmod" essentially combined a ramp-to-triangle-wave converter, envelope generator, and VCA to simulate an organ's bass sound. You added this mod to an analog synth and layered its sound with the synth's bass sound to provide extra low-end punch. Our third DIY project, by Tim Dowty, showed how to build an external delay-time readout, helpful because many delay lines of the day lacked delay-time readouts.

The February issue also marked our first major article about digital reverb. In fact, "Sing a Song of Reverb," by current **EM** contributing editor Larry the O, was so deep that we had to break it into three parts, of which this was the first. Incidentally, in February 1986, no digital reverb could offload its programs as SysEx.

Our new products column introduced Ensoniq's rack-mount Mirage sampler, the Syntovox SPX 216 vocoder, Blacet's Time Machine II analog delay, Roland's SBX-10 sync box, and Pearl's Drum-X electronic drums. A new adapter from JLCooper let you use the then-standard Roland MPU-401 MIDI interface with an Apple IIc computer.

Noteworthy reviews included Blank Software's *Sound Lab* Macintosh sample editor for Ensoniq's Mirage sampler, the Korg DW-8000 synth, and SDD-2000 sampling delay. Another important review was of Dr. T's groundbreaking *Keyboard Controlled Sequencer (KCS)* for the Commodore 64 computer. We also covered the Akai ME10D rack-mount MIDI delay, which created a simple echo effect by doubling incoming MIDI Note messages and delaying the duplicate messages.

To top it off, we interviewed Mark Isham. Isham's hot new purchase at the time was an Oberheim Xpander analog synthesizer, and he was contemplating buying his first sampler, the new Sequential Prophet 2000.

*—Steve Oppenheimer*

## ● LETTERS

### DREAM, DREAM, DREAM

I was pleased to see your review of [Audio Simulation's] excellent *Dream Station* software synthesizer (November 2000). I have been an avid user of this program since it was released, and I'd like to correct a few items your reviewer missed.

I'm not sure what was wrong with his computer, but *Dream Station* definitely shows up in Windows' Add/Remove Programs. I upgraded computers three times, and *Dream Station* always installed and uninstalled properly. Also, I assure you that *Dream Station* is not copy protected. I am well known in the pro audio industry for my opposition to copy protection, and I would never buy a protected program.

Finally, I felt your review—while favorable overall—was unfair on a few points. I agree it would be nice if *Dream Station* supported stereo samples or exported MIDI files, but who cares? *Dream Station* is a software version of classic analog synthesizers, and for that it is the best program I've tried. Moreover, after hundreds of hours of use, it never crashed or even behaved unpredictably. To me, that is worth more than all the features in the world.

**Ethan Winer**
**via e-mail**

*Ethan—I'm glad you agreed with the overall* Dream Station *assessment. We're not sure why the reviewer's version did not appear in the Add/Remove Programs Properties dialog box. However, at our request, he verified that his statements to that effect were correct. The problem, however, appears to be a relatively minor one and apparently only affects certain system configurations.*

*As far as copy protection is concerned,* Dream Station *is indeed copy protected. The Audio Simulation Web site states unequivocally that "*Dream Station *is copy protected. If you are using a hacked/downloaded version with pirated serial number(s), the copy protection may activate and turn the sound output false, then mute it completely." The company points out that* Dream Station *"comes with a single site license only." If you install* Dream Station *on a second computer (even within your own studio) and use it to*


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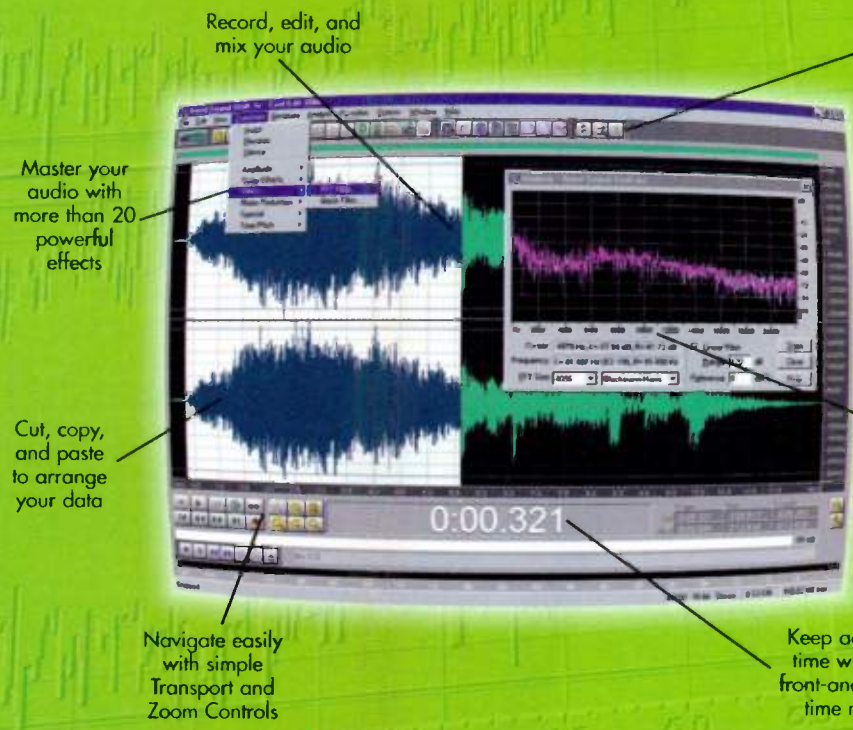


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*play files created on the original computer, the files will not play back properly. In addition, some users have experienced problems with* Dream Station *malfunctioning due to conflicts between the copy-protection scheme and some virus-protection programs.*

*Finally, the review's mention of* Dream Station*'s lack of support for stereo samples and Standard MIDI Files was intended simply to suggest some wish-list items for future versions. It hardly seems unreasonable to suggest that even good software has room for improvement.—David Rubin*

## ERROR LOG

**December 2000,** "Contact Sheet," p. 203: Contact information for the Boxer Voice Changer and the Crown Micro Royal Piano featured in the article "Cheap Thrills" was omitted.

Boxer Voice Changer; Boxer Toys Company; tel. 852-2397-2628; e-mail boxer@asiansources.com.

Crown Micro Royal Piano; Mei Fong Toy Company; tel. 886-4-563-0098; e-mail mftoytown@ms2.hinet.net; Web www.crowntoy.com.tw.

**December 2000,** "Music for New Media," p. 56: A printing error partially obscured two lines of text. The complete text reads, "When properly executed, this tactic sends emotional information to the player and also smooths over any harmonic or rhythmic inconsistencies, creating the illusion of a seamless but responsive piece of music."

**WE WELCOME YOUR FEEDBACK.**

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


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KORG

2000 EDITORS' CHOICE

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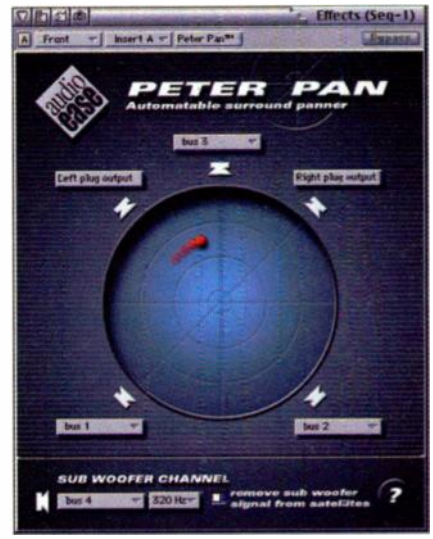
# WHAT'S NEW

By Marty Cutler

## ▶ AUDIO EASE PETER PAN

Users of Mark of the Unicorn's *AudioDesk* and *Digital Performer* will want to check out Dutch developer Audio Ease's *Peter Pan* ($39.95), a 5.1 surround-panning plug-in for MAS. *Peter Pan*'s screen presents a spherical arena with a red ball. You position the sound source by dragging the ball toward one of the five bus outputs, which you can assign with pop-up selectors. The movement between buses sources can be recorded and automated. Furthermore, you can separate sources to a subwoofer channel using an adjustable lowpass filter.

Audio Ease claims that *Peter Pan* drains very little processing power from your computer. You need a Power Mac with a 604/200 MHz processor, 1 MB of free RAM, and *Digital Performer* 2.7 or *AudioDesk* 1.01 or later.




Audio Ease; tel. 31-30-243-3606; e-mail sales@audioease.com; Web www.audioease.com.

## ▲ SOUNDTREK JAMMER LIVE

Live performance with sequenced accompaniment can often be a thorny undertaking. Soundtrek aims to change that situation with *Jammer Live* ($59.99).

Soundtrek's Real Feel composition engine enables you to use your computer's keyboard, a mouse, or any MIDI-equipped musical instrument to control computer-generated accompaniment parts. You can also conduct changes in tempo, chords, orchestration, fills, and style. The program can even spontaneously interact with your improvised melodic lines. When finished with your performance, you can save it as a Standard MIDI File.

*Jammer Live* requires a Pentium/100, Windows 95, and 16 MB RAM. Soundtrek; tel. (800) 778-6859; e-mail sales@soundtrek.com; Web www.soundtrek.com.

## ▼ CAKEWALK CLUB TRACKS

The world of drag-and-drop loop-sequencing software seems highly competitive these days, and Cakewalk has entered the fray with *Club Tracks* ($49). Billed as a "multitrack remix studio," the software allows you to produce loop-based music and remixes that you can save as stereo WAV files or MP3s.

The package includes a library of PowerFX hip-hop, drum 'n' bass, and house-style loops, and you can record your own samples or extract samples from CDs. *Club Tracks* also bundles Image Line's *Fruity Loops Express*, which can generate new loops from its own sample library. *Club Tracks* can play up to eight stereo tracks simultaneously, and you can combine loops to play back sequentially on a single track. You can bounce tracks if you need to free up recording space.

An onscreen console allows you to mix tracks in real time, and you can add chorus, reverb, flanging, and other effects. *Club Tracks* supports DirectX plug-ins, so you can add third-party plug-ins. The program can import WAV and native files from Sonic Foundry's *Acid;* imported audio will automatically stretch to fit the song's tempo. You can also import and synchronize AVI video to edit, remix, or replace the soundtrack.


*Club Tracks* comes with a 30-day trial version of Cakewalk *Pyro*, a program for burning and ripping CDs. Minimum system requirements are a Pentium II/200 MHz PC with 32 MB RAM and Windows 95 or later. Cakewalk; tel. (888) CAKEWALK or (617) 441-7870; e-mail sales@cakewalk.com; Web www.cakewalk.com.

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## ▼ CLAVIA NORD LEAD 3

The Nord Lead 3 ($2,500) from Clavia is not a retooled version of earlier Nord Lead Synths; it is completely new, 18-voice, 4-part multitimbral, analog modeling synthesizer. Clavia has completely redesigned the Nord Lead 3's synth engine, which uses high-speed DSPs and improved quality DACs.

The synth's 49-note keyboard is Velocity- and Aftertouch-sensitive. The unit has 26 assignable knobs with 360-degree rotation; each knob can be assigned to one parameter, and its value is shown on a dedicated LED graph.

Among the instrument's new features is a Unison mode that retains the synth's full polyphony. With a touch of the Mono button, you can stack all of the available oscillators onto a single sound.

You get two oscillator groups, with six waveforms: triangle, sawtooth, sine, pulse, and noise. The Sinus Modulation feature offers simplified, real-time access to a two-operator FM synthesis engine. You can gang two oscillators together for four-operator FM. In addition, the Nord Lead 3 offers a separate sync oscillator, so you can create classic oscillator-sync sounds without sacrificing audio oscillators.

In addition, you get two resonant, multimode filters per voice. You can select lowpass, highpass, band-reject, and bandpass filters, or you can configure lowpass and highpass or two lowpass filters in series or parallel. There are two additional filter modes: Classic allows you to select among different slopes, and Dist LP offers the same choice of slopes and adds the ability to overdrive the filter.

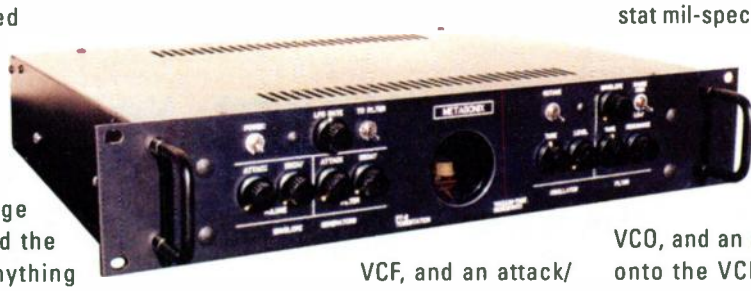
Each Nord Lead 3 patch can have up to three LFOs or three ADSR envelopes. You also get a global vibrato that can affect all voices in a patch. You can synchronize LFOs to MIDI Clock.

A Morph function gives you continuous control of up to 26 sound parameters using a single control source for creating dramatic changes to a sound without the need to twist all knobs at once. Each of the 26 parameters can be scaled for an individualized response to controls. You can store several morph functions as Morph Groups; each group can be hardwired to one controller, which can be Velocity, Aftertouch, Modulation Wheel, Expression Pedal, or keyboard scaling. The Timbre function lets you switch between two different Morph setups.

Audio Outputs are on four ¼-inch, unbalanced jacks, and you can send each part to a separate output or to two outputs at once. You also get a ¼-inch headphone output. Two ¼-inch TRS jacks accommodate an expression pedal and a sustain pedal. You also get MIDI In, Out, and Thru jacks. When software upgrades are available, you will be able to update your instrument via MIDI. Armadillo Enterprises (distributor); tel. (727) 519-9669; e-mail info@armadilloent.com; Web www.clavia.se.

## ▼ METASONIX PT-2 TUBESTATION

The Tubestation from Metasonix ($949) is a 2U rack-mount, tube-driven, monophonic analog synthesizer. It has generalized control-voltage and gate inputs, so the PT-2 is compatible with virtually any CV controller or MIDI-to-CV converter. The pitch CV input accepts any voltage between 0 and 5 VDC, and the gate trigger accepts anything between 8 and 12 VDC. You can purchase the PT-2 with Metasonix's optional CV/MIDI converter ($1,049).



The PT-2 Tubestation has built-in modulation and control circuits. You get a single triangle-waveform LFO, an attack/decay envelope generator for the VCF, and an attack/release envelope generator for the VCA. The VCO uses a gas-filled tube and offers a range of approximately four octaves. The VCF is a resonant bandpass filter that can be driven into self-oscillation. All controls are analog and use only premium Bourns or Clarostat mil-spec potentiometers.

All inputs and outputs are unbalanced, ¼-inch tip-sleeve Switchcraft jacks. The PT-2 also has a CV and a gate input, an audio-only FM input to the VCO, and an auxiliary modulation input onto the VCF. The unit also has one audio output jack. Metasonix; e-mail synth@metasonix.com; Web www.metasonix.com.

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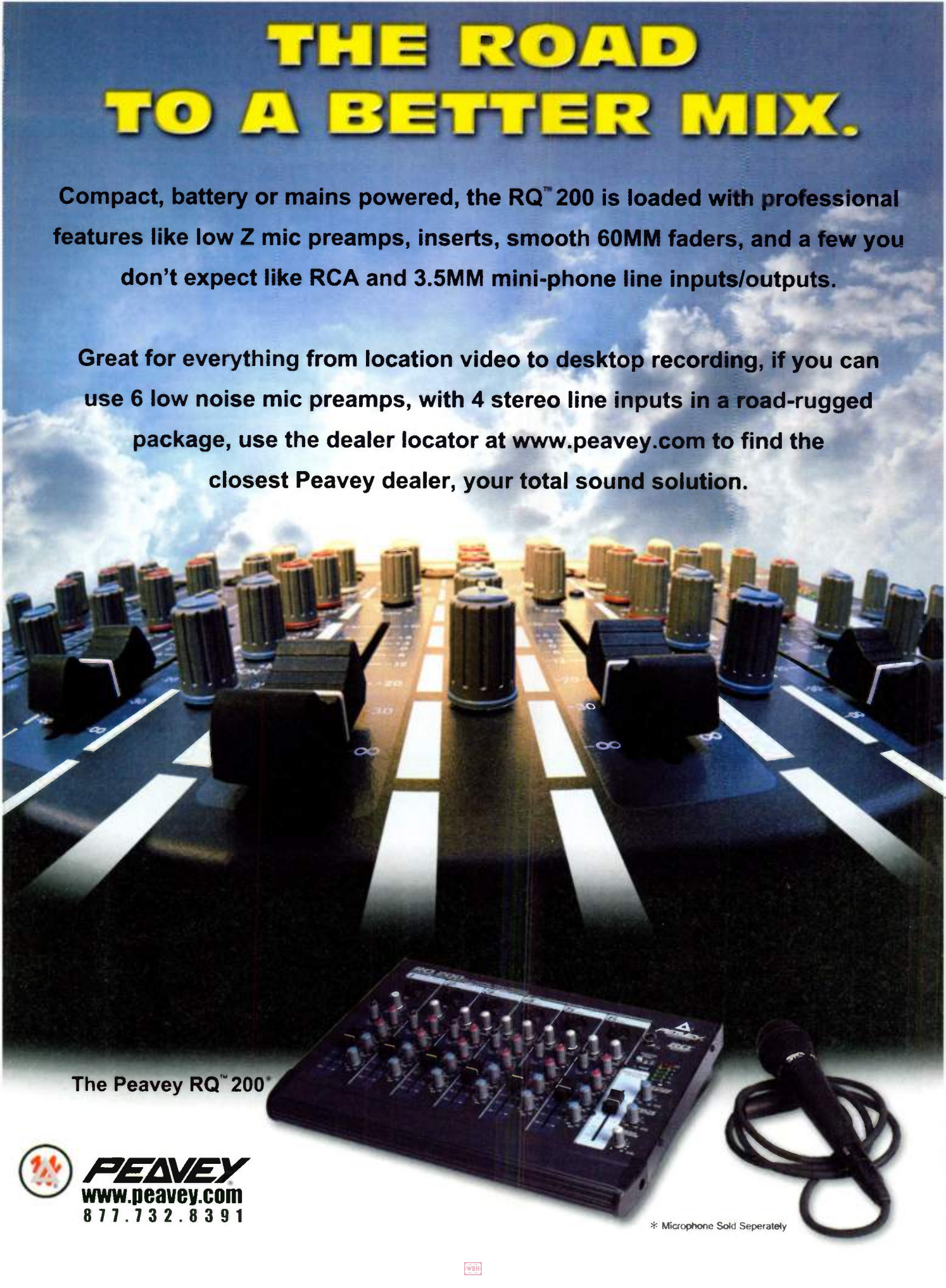

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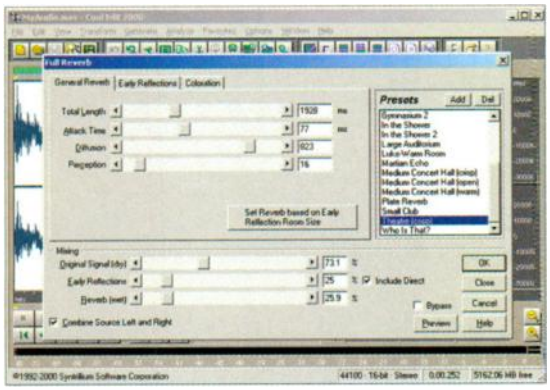


## ▲ SYNTRILLIUM PHAT PACK AND TWEAKIN' TOYS

Phat Pack and Tweakin' Toys ($49 each) are two sets of plug-ins for Syntrillium's *Cool Edit 2000* ($69). Phat Pack concentrates on delay-based effects. Tweakin' Toys focuses on mastering tools and special effects.

Phat Pack offers reverb, multitap delay, chorus, and phaser plug-ins. The Tweakin' Toys plug-ins include *Hard Limiter* for increasing perceived loudness without clipping; *Pan/Expander* for creating a wider stereo field; *Pitch Bender* for correction of pitch problems, creating turntable-like effects and others; and *Convolution* for creating various acoustic environments by sampling impulses.

In addition to *Cool Edit 2000*, running the plug-ins requires a 486/60 MHz PC or better, Windows 95/98/NT/2000, and at least 8 MB of RAM. Syntrillium Software; tel. (888) 941-7100 or (480) 941-4327; e-mail info@syntrillium.com; Web www.syntrillium.com.

## ▼ SOUNDSCAPE IBOX 2

Soundscape adds the iBox 2 ($549) to its line of digital audio interfaces. The unit provides stereo analog, line-level, balanced XLR inputs and outputs and eight

channels of TDIF digital I/O. A second TDIF connector allows you to cascade up to four iBox 2 units.

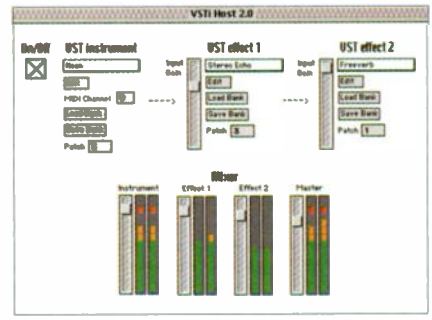
You get two independent channels of high-gain, low-noise microphone preamplification on the analog inputs. Each input offers defeatable 48V phantom power and a front-panel gain control. The unit has a ¼-inch stereo headphone jack with a level control. An LED indicates TDIF activity and lockup, and there is a clipping indicator LED for each channel on the front of the unit.

A/D/A conversion is 24-bit, and you can choose sample rates of 44.1 or 48 kHz. Levels are adjustable to a maximum of +24 dBU. Soundscape Digital Technology; tel. (805) 658-7375; e-mail ssus@west.net; Web www.soundscape-digital.com.

## ▼ DEFECTIVE SOFTWARE VSTI HOST

If you have ever wanted to use a VST instrument as a standalone synth or use it with a non-VST sequencer, here's your chance. *VSTi Host* ($14.99) from Defective Software not only provides a shell for loading VST instruments but also allows you to use up to two VST effects in series without a host sequencer.

*VSTi Host* was created with Cycling '74's *MAX* and *MSP* and uses the OMS IAC bus to enable communication with non-VST sequencers. You simply enable




an OMS input device and select your VST instrument and plug-ins from the *VSTi Host* menus.

*VSTi Host* is compatible with plug-ins from Steinberg, Native Instruments, and Waldorf, as well as several other third-party plug-ins. You'll need OMS 2.38, a Power Mac 604e/240 MHz or better, Mac OS 8.5 or later, a VST instrument, and at least 5 MB of free RAM. Defective Software; e-mail dan@defectiverecords.com; Web www.defectiverecords.com.

## ▶ STEINBERG HOUSTON

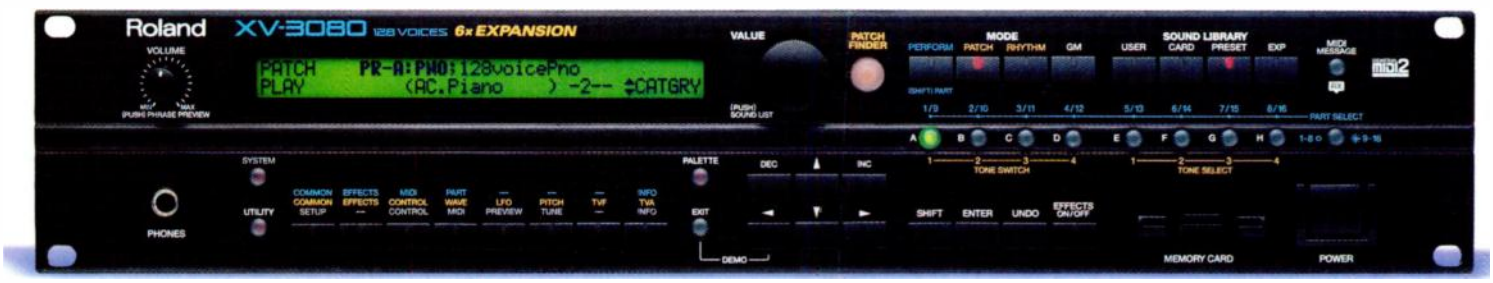
Steinberg's Houston ($1,499), a USB-based MIDI-control surface for the company's *Cubase VST* and *Nuendo* systems, is designed to provide access to all fundamental VST parameters with the push of a single button. The unit features nine 100 mm, touch-sensitive, motorized faders; eight rotary encoders with LED position indicators; a large LCD; and a matrix of buttons for controlling all VST mixer parameters. The illuminated function matrix indicates the current display mode.

Other controls include a transport control, a jog/scrub wheel, and a numeric keypad for entering values and selecting setups and marker positions. The Steinberg Houston also features MIDI In and Out ports for connecting external MIDI devices.

You can display, edit, and automate parameters for VST effects and instruments. The display and rotary encoders allow you to view the same parameter for all eight channels or see eight related parameters for a single channel. Houston also supports *Cubase* mixer views and window sets, so you have remote control over your computer monitor's display.

The control surface occupies roughly the same footprint as a standard PC keyboard and has a built-in power supply. Steinberg North America; tel. (818) 678-5100; e-mail info@steinberg-na.com; Web www.steinberg-na.com.

# Another way to get there.

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XV

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www.rolandus.com Faxback information: (323) 890-3780 XV-3080 doc #10420.
Specifications and appearance are subject to change without notice.

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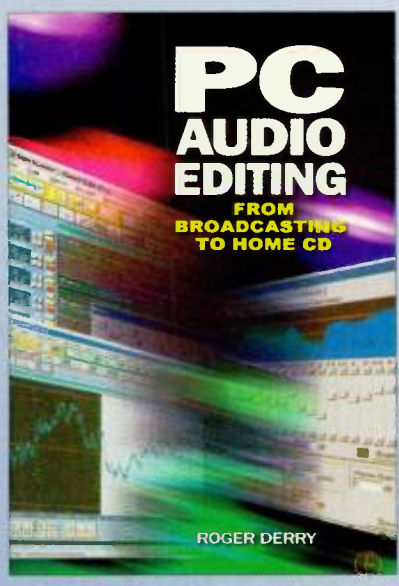
# GET SMART ▲▲▲▲


## ▲ EMEDIA

*Blues Guitar Legends* ($29.95) is a CD-ROM that can teach guitarists to play classic blues tunes with the help of the original master recordings, a graphic fretboard display, and MIDI files. The selection of tunes spans six decades and includes such classics as the Allman Brothers' version of Blind Willie McTell's "Statesboro Blues," Robert Cray's "Smoking Gun," and Freddie King's "Hideaway."

Original recordings of the artists' songs are synchronized to an animated fretboard that displays and highlights the fingerings in real time. *Blues Guitar Legends* offers complete, note-for-note transcriptions of lead and rhythm guitar parts, and you can choose to view either tablature or standard notation. Beginners can also choose simple chordal accompaniments that provide an easy alternative to the full transcriptions. Each song is prefaced with playing suggestions and photographs of the artist.

MIDI tracks supplement the audio recordings of each tune, so students can adjust songs to a comfortable tempo for learning. Because *Blues Guitar Legends* is an enhanced CD-ROM, students can play the disc on a regular audio CD player. The CD-ROM contains several guitar-oriented software accessories, including a tuner for visually tuning the guitar and a built-in metronome for keeping in tempo. EMedia; tel. (206) 329-5657; e-mail custserv@emediamusic.com; Web www.emediamusic.com.




## ▼ FOCAL PRESS

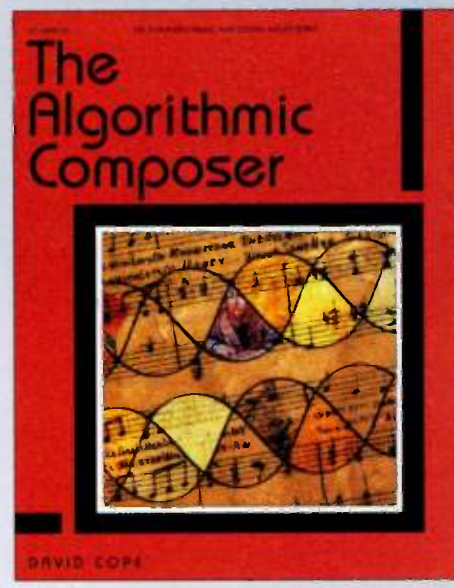
There are a daunting number of audio-editing tools for the Windows PC, but precious few books provide an overview of what the PC has to offer. With this in mind, Focal Press has released *PC Audio Editing From Broadcasting to Home CD* ($39.95) by Roger Derry.

The guide examines audio-editing techniques for broadcasting and music recording, without assuming prior knowledge. Topics include visual editing, hardware and software requirements, multitrack production, post production, sound design, tweaking, and archiving.

A CD-ROM supplied by Syntrillium Software accompanies the book and contains video tutorials for *Cool Edit Pro*. Focal Press (Butterworth Heinemann); tel. (781) 904-2500; Web www.focalpress.com.

## ▼ A-R EDITIONS

*The Algorithmic Composer* ($49.95) by David Cope explains the uses of algorithmic composition. The author explores several algorithmic composition programs, including *ALICE* (Algorithmically Integrated Composing Environment), *Experiments in Musical Intelligence*, and *SARA*. In addition, a Macintosh-format CD-ROM that contains *ALICE* accompanies *The Algorithmic Composer*.




*The Algorithmic Composer* explains the various elements of the process of algorithmic composition, including Markov Chains, randomness, and association nets. Cope also explores aspects of tonality, variation, and texture. The book includes a discussion of structure with relation to understanding signatures and pattern-matching. Cope's discussions of aesthetics will challenge many readers' preconceived notions of computer-assisted music, as he looks to "music of the future" in which computerized craft is more closely fused with human ingenuity. A-R Editions; tel. (608) 836-9000; Web www.areditions.com.

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# SOUND ADVICE ▲▲▲▲


## ▲ AMG

Celtic music offers a deep well of sample sources for electronic musicians. AMG's *Complete Celt* ($99.95; three audio CDs) contains samples of authentic Celtic instrumental music for sampling, ranging from traditional ballads to contemporary Celtic music.

The first CD features songs with isolated sections: each includes a full mix followed by individual song elements. You also get samples of the bodhran, a Celtic frame-drum, on all three CDs.

The second disc gathers Celtic female voices and a collection of chords and riffs, Irish tunes, and ballads played on the fiddle. It also provides bagpipes in a variety of articulations and drones.

The third CD offers mandolins, Uillean pipes, whistles, and mandocellos. Additional samples include ceilidh-style piano and accordion. East West (distributor); tel. (800) 833-8339 or (212) 541-7221; e-mail sales@eastwestsounds.com; Web www.soundsonline.com.

## ▶ SPECTRASONICS

*Vocal Planet* ($149, CD-Audio; $399, Roland, Akai, SampleCell, and Kurzweil formats, with Groove Control) is a collection of vocal samples from Spectrasonics. The 5-disc set offers over 12,000 samples, including multisamples and phrases taken from hundreds of vocalists around the world.

Gospel selections include shouts, humming, and phrases. It also provides a selection of jazz and blues samples, including multisampled scatting, jazz chords, and sforzando articulations. A world-music section offers up Tuvan throat-singer drones; mariachi yelps; Rastafarian toasting; and sounds from Serbia, Macedonia, and the Middle East.

The collection of R&B and dance vocals includes background licks, phrases, and hip-hop; DJ boasts; and more. The CDs also include vocal effects such as rock 'n' roll screams, unusual vowel drones, breathing, processed vocals, and chaotic utterances. Ilio Entertainments (distributor); tel. (800) 747-4546 or (818) 707-7222; e-mail ilioinfo@ilio.com; Web www.ilio.com.

## KID NEPRO

Despite the variety of sounds that synthesizers can produce, solid acoustic piano and Rhodes-type sounds are ever in demand. With that in mind, Kid Nepro offers *Volume #5 Killer Keyboards* ($20), a collection of patches for Korg's Triton and Triton Rack synthesizers.

The bank of sounds includes many new electric and acoustic pianos; jazz, rock, and pipe organs; Clavinets; harpsichords; and Mellotron patches. The Kid used the Triton's effects section to help improve upon the factory sounds; for example, many of the rock organ patches achieve extra grit with judicious use of overdrive.


In some cases, additional waveforms layered with piano samples beef up the piano patches.

There are no Combis; instead, the collection offers useful, playable single patches. You can get *Killer Keyboards* on floppy disk in Korg's PCG format (Programs, Combis, Global) or download it from the Kid Nepro Web site. Kid Nepro; tel. (246) 420-4504; e-mail kidnepro@aol.com; Web www.kidnepro.com.

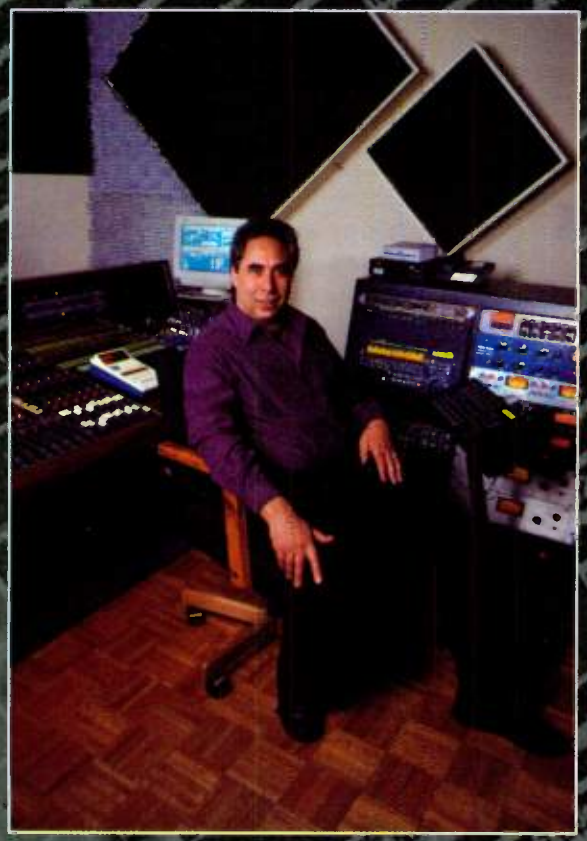

## ▲ BIG FISH AUDIO

Big Fish Audio's *Play the Tango* ($99.95) captures the romantic, smoky-café feel of the tango. The audio CD offers a variety of idiomatic phrases, openings, endings, and multisampled instruments recorded by some of Argentina's best practitioners.

Chromatically recorded instruments include bandoneon left- and right-hand samples. Additional bandoneon articulations include long and short bursts, tremolos, bellows samples, and fills.

All phrases, openings, and endings are ensemble recordings with bandoneon, piano, and guitar; single-instrument versions of the same passages are included. The musicians created performances in several major and minor keys, with tempos from 110 to 133 bpm. Big Fish Audio; tel. (800) 717-FISH or (818) 768-6115; e-mail info@bigfishaudio.com; Web www.bigfishaudio.com. ❦

# MX-2424 Profile:
## Rudi Ekstein of Foxfire Recording



Rudi Ekstein may not be a household name. But his studio, Foxfire Recording, has been thriving for over ten years, with over 40 hours of bookings every week. And the new cornerstone of Foxfire is the TASCAM **MX-2424 24-Track 24-Bit Hard Disk Recorder.**

When you can have any recording system you want, why pick the MX-2424? "After looking at other hard disk multitracks, I chose the MX-2424 based upon its incredible versatility," says Rudi. "First and foremost, the MX has fantastic sound quality that is comparable to anything I've ever heard. The ability to use 24 channels of analog and digital I/O simultaneously was another big reason for my decision. Plus, the ability to edit from the front panel, to easily set locate points and to use the auto-punch and scrub features have helped make sessions run smoother and quicker."

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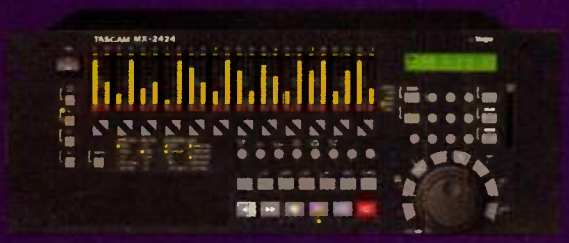


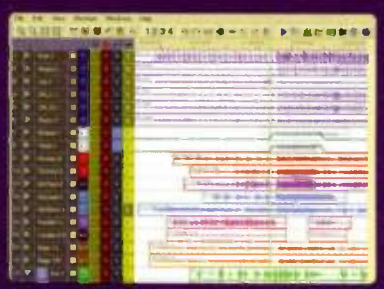

The new MX-View graphic user interface software, available soon for all MX-2424 owners. Includes powerful waveform editing and much more.

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# WEB PAGE

*By Roger Maycock*

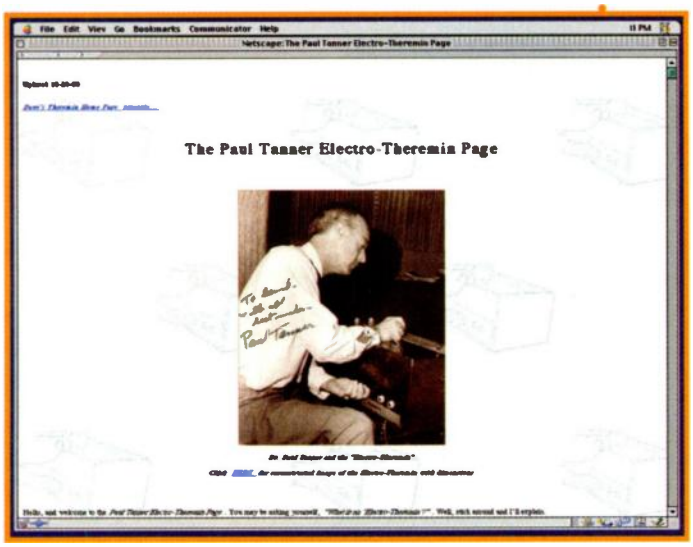
## WEB SITE OF THE MONTH

In the late '50s, Paul Tanner, a Hollywood session trombonist best known for his work in the Glenn Miller Orchestra, set out to create his own version of the difficult-to-play theremin. Tanner took his idea to actor Bob Whitsell, who designed and built a new instrument: the Electro-Theremin. With it, Tanner could play melodies in tune far more easily than a theremin player could. David Miller's excellent Paul Tanner Electro-Theremin Page (www.geocities.com/Vienna/4611/PTE-TPage.html) charts the instrument's history.

Unlike a traditional theremin, which uses the body's capacitance to cause heterodyning between two ultrahigh-frequency oscillators, the Electro-Theremin involves a single, variable oscillator with a slider to control pitch. The oscillator is housed in a rectangular wooden box, and the slider moves parallel to the edge. Tanner placed a nonfunctioning keyboard on top for pitch reference, and he could play transposed parts by moving the keyboard template horizontally. He controlled volume manually with a knob.

The Electro-Theremin was received with enthusiasm in the Hollywood studios, and its sound soon accompanied onscreen drunks, ghosts, space creatures, and assorted eerie phenomena. Tanner's numerous session credits include *My Favorite Martian, Lost in Space,* and *I Love Lucy.* However, his Electro-Theremin performance on the Beach Boys hit "Good Vibrations" (no, it's not a standard theremin) secured him a place in pop culture history. Sadly, Tanner sold his Electro-Theremin to a hospital in the '70s, effectively ending his career on the instrument.

In 1999, Darian Sahanaja of the Wondermints commissioned instrument designer Tom Polk to build an updated version of the Electro-Theremin (renamed the Tannerin) for an upcoming tour with Brian Wilson. More Tannerin information can be found at www.tompolk.com.




## DOTDOTDOT.COM

Mac users can now take advantage of the Windows Media format's increasing popularity by downloading and installing ***Windows Media Player 7*** (WMP7) for Mac (www.windowsmedia.com). In beta as of this writing, WMP7 for Mac includes an MP3 player and supports playback of Windows Media 7 audio and video that has been encoded using the latest versions of the Windows Media format codecs. WMP7 is more reliable than previous versions of the player, incorporates a much improved interface, and handles streamed and downloaded files . . . Does your VST plug-in need a control interface? **Spin Audio** (www.spinaudio.com) has introduced *VST SkinRack* 1.0 (Win), which lets you add a customizable control interface—a skin with sliders or knobs—to VST plug-ins that don't have an editor. With the *VST SkinRack Wizard,* you can specify the type and number of parameters you want to control. You can create multiple skins for each plug-in, and the application works with plug-ins that support MIDI-controlled automation. *VST SkinRack* comes with 28 skins, and more are available from the Spin Audio Web site . . . **FindSounds.com** (www.findsounds.com) is a Web-based sound-effects search engine that lets you search by keyword or sound similarity. You can also create your own sounds and use them to search for related ones. The search engine asks for specifics on the audio files you're seeking: file type (AIFF, AU, or WAV), resolution (8- or 16-bit), minimum sampling rate (8 to 44.1 kHz), and maximum file size (16 KB to 2 MB). Next to each search result is a button marked "Find sounds like this one" that lets you search further for the perfect sound.

## DOWNLOAD OF THE MONTH

Digidesign's Pro Tools—made up of a combination of proprietary hardware and accompanying software—is one of the leading digital audio workstations for audio production. Digidesign has just released its standalone version, *Pro Tools Free* 5.0.1. *Pro Tools Free* runs native on Mac and PC platforms, which gives you the editing and MIDI sequencing capabilities of *Pro Tools* 5.0.1 without the need for special hardware. In fact, *Pro Tools Free* is incompatible with most Digidesign hardware, with the exception of the Audiomedia III card on the Windows platform. *Pro Tools Free* includes Windows 98 and Millennium Edition WAV drivers and supports Mac Sound Manager.

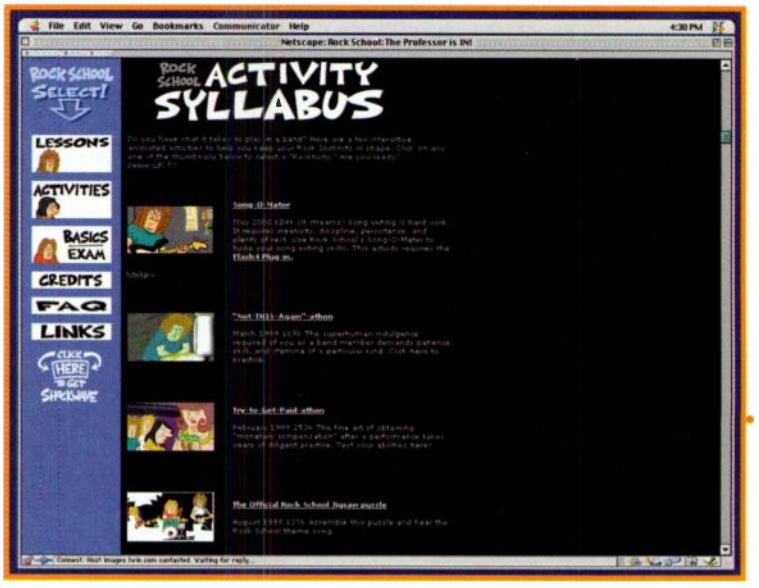
*Pro Tools Free* lets you work with eight audio tracks and 48 MIDI tracks, although you can record only two audio channels at a time. Like its fee-based siblings, *Pro Tools Free*'s graphical user interface includes editing and mixing windows. In the Edit window, you can edit audio and MIDI data simultaneously. Each mixer channel includes five inserts and sends. The program also comes with DigiRack RTAS plug-ins (including *Dynamics, EQ, Mod Delay, Dither,* and *DirectConnect*), and Digidesign says it works with most third-party RTAS and AudioSuite plug-ins.

*Pro Tools Free* is compatible with Macintosh G3s and G4s and with PCs that have Pentium II or III processors. Minimum requirements include 128 MB of RAM and a 7,200 rpm hard drive. Installation procedures, compatibility details, and additional information are available at www.digidesign.com.

## WEBCAST

One of the most hilarious Web destinations I have encountered in a long time is Rock School (www.rockschool.com). Anyone who has ever played in a band will enjoy the wealth of courses the site has to offer, such as "Striving for Excellence in Songwriting 101," "Using Your Status as a Band Member to 'Score' 101," and "Video Production—on a Budget." Rock School also provides information on the subject of ergonomics as it relates to playing in a band, as well as an overview of common music-related injuries.

This Macromedia Shockwave–enabled Web site uses animation as an instructional tool and features three main sections: Lessons, Activities, and Basics/Exam. From Rock School, roadies will learn the right and wrong ways to lift heavy objects in "About Roadies"; guitarists will discover how low a guitar should hang in "The Belt Law"; and drummers will get a kick out of the fascinating aspects of "The Cymbal Law." Gigging musicians should check out "Try-to-Book-a-Gig-athon" and "Try-to-Get-Paid-athon." These two lessons will ensure that your marketing and collection skills are finely honed. No doubt about it, Rock School rocks!



## BAND ON THE WEB

Hashim Al-Alawi's album *Desert Beat* (www.alfanan.com) straddles the divide between new Arabic contemporary music and its Western counterpart, new age. Al-Alawi—born in Manama, Bahrain, and currently residing in Lewisville, Texas—is influenced by the music of Enigma and Yanni, but his Middle Eastern roots recall a world few Westerners understand. Al-Alawi has a strong command of the *ney* (a Middle Eastern flute) and the *oud* (a Middle Eastern lute). His melodies take us to faraway places, and his keyboard and vocal performances combine to create sonic textures that unite two disparate cultures.

*Desert Beat* is a solo effort—Al-Alawi wrote, performed, and engineered all of the tracks. Although music has been his passion since childhood, his involvement with computers and sequencing has taken shape more recently. "I have been dealing with computers for about six years now," Al-Alawi says. "When it comes to the Internet, however, I only began posting and promoting my music within the past year. The Internet has been a terrific medium for exposing people to my music. I've been contacted by people from all over the world and was featured on Now TV [www.now.com], an online network that showcases new, unsigned artists."

Al-Alawi emphasizes the Internet's ability to bring people together and compares it to the universal language of music. "Coming from a Middle Eastern background, my musical vision is to create a transition between Western musical styles and the pure Arabic intellect that shaped my early years. I want my music to be a musical and cultural bridge that can be appreciated by both groups of people."

The enthusiastic response to his music is turning into business opportunities. "I'm currently working on a score for a documentary about Muslims in North America. This is a coordinated effort between a small church in Tennessee and a group of Muslims to bring about better cultural understanding between the two communities."

Al-Alawi offered his perspective on the future of music and the Internet: "I see a bright future for music on the Internet. With broadband becoming more affordable and accessible, people have unlimited access to the artistry of independent musicians, while musicians have greater freedom to express themselves."


## WEB APP

If you're seeking new ways to add dynamic content to your Web site, have a look at Macromedia Flash 5 (www.macromedia.com/software/flash). The number of Web sites with Flash-enabled content increased dramatically in recent years, and Macromedia reports that 92 percent of Internet users (more than 248 million people) are able to view Flash content.

Macromedia Flash has gained widespread acceptance due to greater compatibility with the competing browsers than other Web-design formats. For example, dynamic HTML and Java have a tendency to deliver inconsistent results with Netscape's *Navigator* and Microsoft's *Internet Explorer*.

Flash 5 is excellent for integrating audio with Web animation. It uses a timeline interface with an "outline colors" mode that makes it easy to distinguish between the various layers—animation, sound, and text—that make up the final product. With the ability to visually synchronize audio to animation, the content creator can easily lock audio to picture and ensure consistent playback and timely delivery of the accompanying sound.

Flash 5 imports and exports MP3 files, letting you produce long-form animations complete with voice-overs and background music. Because file size is generally quite small, you can deliver high-impact material over low-bandwidth connections. To reduce file size, Flash can automatically convert audio data from stereo to mono. You can also define the audio's bit rate and quality and the Flash version you want the file to be compatible with.

You can choose from two categories when integrating audio into Flash animations: Event sounds and Streaming sounds. With Event sounds, the audio is positioned at key frames in the animation. When an Event sound is triggered, the audio "free runs" to completion. Furthermore, you can drag and drop your audio tracks onto the timeline to conform to any button state. This enables you to produce sound as a visitor hovers over a button or clicks on it. In such cases, the audio is slave to the animation.

Streaming sounds are used in more complex situations, such as those in which an animated character speaks. When the finished animation and sound files are exported, all of the sounds designated for streaming merge into a common soundtrack, which is played during the length of the animation clip. With Streaming sounds, Flash gives precedence to the audio and drops animation frames as necessary to maintain synchronization.

For content authoring, Macromedia Flash 5 is available for Mac and Windows platforms. For playback of Flash-enabled content, the Flash 5 Player is free; it is available for Mac, Windows, Linux, and Sun Solaris.

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# VINTAGE PAGE

By Julian Colbeck

# Wurlitzer EP200a

*Produced: 1972-1981*
*Made in: United States*
*Designed by: Wurlitzer, from an original design by B. F. Meissner*
*Number produced (200 series): 100,000*
*System: hammer action, reed*
*Price new: $995*

| *Today's prices:* | | |
|---|---|---|
| | *Like new* | *$625* |
| | *Like, it's okay for its age* | *$475* |
| | *Like hell* | *$300* |

From *Dark Side of the Moon* to *The Miseducation of Lauryn Hill*, from the Carpenters to Jellyfish, no instrument—including the Fender Rhodes—has had quite as broad and uninterrupted a following as the Wurlitzer EP200a electric piano.

Wurlitzer's first electric pianos came out in the 1950s, starting with the EP100 and a range of 100-series variations. The series culminated in the physically revamped EP200, which was released to an eager public in the late 1960s. Produced in a range of colors—from red to beige to green—the EP200 was a great success.

Equipped with an updated, solid-state amplifier, the EP200a came out during the general explosion of keyboards in rock in the early '70s. It went on to become the accepted classic Wurlie model for players and collectors alike.

The Wurlie employs a light but genuine hammer action. The hammers hit the center of a metal reed that vibrates in front of an electrostatic pickup. The reeds vary in size to generate the different pitches and are tuned based on the amount of solder present at the tip. More solder flattens pitch; less sharpens it. Some degree of tuning can also be achieved by adjusting the distance between the tip of the reed and the pickup. Scraping solder while the reed is in place will cause endless buzzes and electrical shorts, so the tuning process is one of continual removal, filing, and reinsertion. Wurlitzer owners get used to this, as reed breaks are not uncommon.

The Wurlie's major tone-altering proposition is your style of keyboard playing. The tone can go from soft and muted to spitty and harsh. The instrument also has a speed-alterable tremolo. Its small, built-in amplification system is extremely useful for monitoring. Reeds and tuning aside, simplicity has been the key to the Wurlie's success. The sound is simple, direct, and identifiable, and it is great at cutting through a mix and being heard onstage. The instrument is relatively light (56 pounds) and portable, with removable chrome legs. The action, though often rickety and always shallow, doesn't present anywhere near the vagaries and stamina requirements of a Fender Rhodes. A nonkeyboardist can easily play a Wurlitzer. Many did, and many still do.

Perhaps this accounts for the instrument's measly A–to–C, 64-note keyboard. Don't plan on stretching out, and don't expect too much out of either end. The Wurlitzer's prime range is an octave and a half on either side of middle C. If you want to add more punch in a recording situation, try using compression. The Wurlie's sustain-pedal arrangement is fairly stable, but the amount of natural sustain you can get out of a note is minimal; the length of the reeds renders the sound quite short and abrupt.

If you're after the Wurlie's sound and not the actual instrument, the basics aren't hard to replicate. Try starting with a clarinet sample, a trick Korg used to great effect on its X-series instruments. Straight Wurlitzer samples are, of course, littered about the sample-library landscape. The Web has become a rich source for information; the Wurlitzer Electric Piano Archives (http://members.stratos.net/riderz/wurlitzer.html) is a particularly well-maintained site. For repairs and parts, contact Morelock's Organ Parts in Rienze, Mississippi; tel. (662) 462-7611; Web www.MitaTechs.com/morelock1.html.

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

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By Scott Wilkinson

# Vocal Modeling

Ever since Yamaha introduced the VL1 in 1994, the importance of physical modeling as a synthesis and signal-processing paradigm has continued to grow. This technique requires lots of computational power to re-create the sound of most acoustic instruments, but it's relatively simple compared with modeling the human voice. Wind and string instruments all have fixed dimensions and constant acoustic properties, with the exception of changing the length of a vibrating string or air column. By contrast, the human vocal tract changes size, shape, and stiffness continuously and dynamically, making an accurate mathematical description almost impossible.

*Modeling the human voice is a daunting challenge.*

A more manageable approach is to analyze the acoustic properties of vocal sound and use this information to modify certain aspects of that sound. TC Helicon (www.tc-helicon.com), a joint venture of IVL Technologies and TC Electronic, is using this method to develop tools for people who work with the singing and speaking voice.

The first step is to understand the characteristics of various types of singers and styles of music. According to Brian Gibson, chief technical officer at IVL, "We look at things that happen in the resonant structures of the vocal tract as people sing higher and lower. We also look at different effects in the glottis [see **Fig. 1**], such as vibrato and trilling." In addition, the team does perceptual studies to determine which acoustic features of various vocal sounds make an identifiable difference to the average listener.

Even though TC Helicon is not trying to model the actual physics of the singing voice, the task is daunting enough. For example, most people think of vibrato as simple pitch modulation, but vocal vibrato is much more complex: it involves modulation of pitch, amplitude, resonance, phase, and other aspects of the sound. These patterns are very difficult to simulate, but without them it's immediately apparent that the vocal sound is not natural.

The result of all this analysis is a set of more than 100 parameters applied to an input signal in near–real time. The signal is dissected into various elements, such as voiced (periodic) and unvoiced (aperiodic noise) components. These elements are then modified according to the model parameters and resynthesized, all within 15 or 20 ms.

The first commercial product to use this research is the VoiceCraft plug-in card for the VoicePrism pitch and formant processor. The card—which should be shipping in March 2001—is a monophonic lead-vocal processor that uses a Motorola DSP56362 chip running at 100 MIPS. (The rest of the unit provides four conventional harmony voices and various effects.) The preset models let you select, among other things, the type of sound, musical style, and gender of the output. For example, you can give your voice that popular raspy quality without the physical damage caused by actually singing that way. Also, the VoiceCraft can subtly enhance your vocal quality—giving it more resonance, say, or more body in the upper range. Using the model to improve such deficiencies goes beyond static equalization because the precise effect depends on the frequency and other vocal parameters.

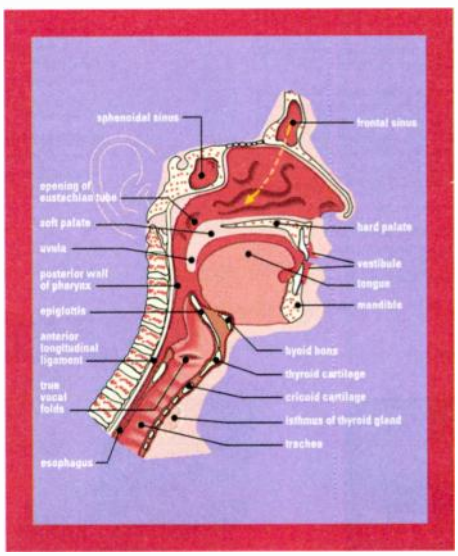


**FIG. 1: The "reed" of the human vocal tract is a pair of folds in the trachea. The glottis is the area between and immediately around the folds. During the course of a musical phrase, the size and shape of the tract's resonant cavities change dramatically.**

Of course, nothing beats improving your technique, but in the meantime this technology can really help. It also lets you create timbral variations you might not be able to achieve naturally.

Other possible applications include speech in addition to singing. For example, one individual could provide many different voices for commercial voice-overs. The potential of this technology is vast, befitting any activity that makes use of the human voice. I look forward to trying it out and following its development in the future. ❀

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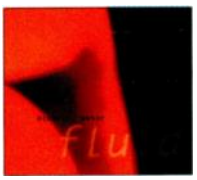
PRO FILE

By Matt Gallagher

# Flood Advisory

Michael Oster's passion is recording common environmental sounds to create unusual, otherworldly ones. Oster is a musician, recording engineer, and sound designer in Tampa, Florida. In 1993, he purchased Digidesign's Pro Tools system, started a recording studio that he christened F7 Sound and Vision, and produced two sample CD-ROMs of his sound effects—*Concept:FX,* vol. 1 and *Concept:FX2.* "I was working on *Concept:FX3* when I stopped to make *Fluid,*" Oster says.

*A sample of trickling water gives rise to an entire album's worth of epic noises.*



Oster completed *Fluid* in two months and used no MIDI devices or digital audio sequencers in its production. Each of its 11 tracks is based on a single 14-second sample of a water fountain. The CD includes his source material, and the final tracks are ordered in the same sequence that he created them. Oster mutated the water sample into a series of mesmerizing, sci-fi soundscapes that conjure up insects, animals, mechanical hums, fire, howling monsters, and more. "It's hard for me to describe what it sounds like. It's an offshoot of the *Concept:FX* idea, except that I wanted to make a compositional work based on the production processes that I've used.

"I noticed that I was manipulating the same sound in different ways, coming up with new sounds," Oster says. "I started thinking, 'What if I did this on a bigger scale?' I've never done sound design work on this scale before. I wanted to make a statement about what I can do with sounds. I wasn't going for a certain sound or style; I made this on my own terms.

"I could have done this with almost any sound," Oster says, but he felt that trickling water "had different dynamics and harmonics that I thought would manipulate better. I put that into Pro Tools and I'd cut it up into little pieces, loop it, run plug-ins, and things like that. Whatever was coming out of Pro Tools was going straight to a CD recorder or a DAT. I ended up with six-and-a-half CD-Rs, two DATs, and a hard drive full of materials that had come from this one sound, and that's what I used as the palette for *Fluid.*

"Once I had those sounds, I might use pieces of them and equalize them, or put in five different layers," Oster says. He processed a sound until he found an interesting sound bite that lead him in a new direction. Oster used a Pro Tools 24/Mix system on a 266 MHz Power Mac G3, a TC Electronic FireworX multi-effects processor (but avoided using its presets), ¼-inch analog tape, and an Echoplex tape-echo unit. Oster recorded audio CDs playing back through his Apple iBook, a 1950s Telefunken radio, and an FM transmitter using an inexpensive contact mic from Radio Shack. "I might send something though that radio and then put a microphone 10 or 12 feet away as opposed to using reverb," he says.

He used BIAS' *Peak* 2.1 and Digidesign plug-ins, experimenting with their distinctive time-stretching algorithms for varied results. On the track "Frogs," Oster says, "I was stretching these things so far out that it was taking *Peak* maybe 20 or 30 minutes to process the sound." Oster says sound design is "a lot easier to do in the digital domain than with analog rack-mount gear, because you'd be left with nothing but noise. It just wouldn't happen."

Oster mixed the album the same way he would mix conventional instrumental tracks, using the frequency range of each sound to determine its place in the mix.

"Sometimes people can take aluminum cans and build a castle out of them," he says. "With sound design, you're taking a sound, turning it into something completely different, and making it a new art form."

*For more information, contact F7 Sound and Vision; send e-mail to f7sound@gte.net; Web www.f7sound.com.*

***Fluid*/Michael Oster**

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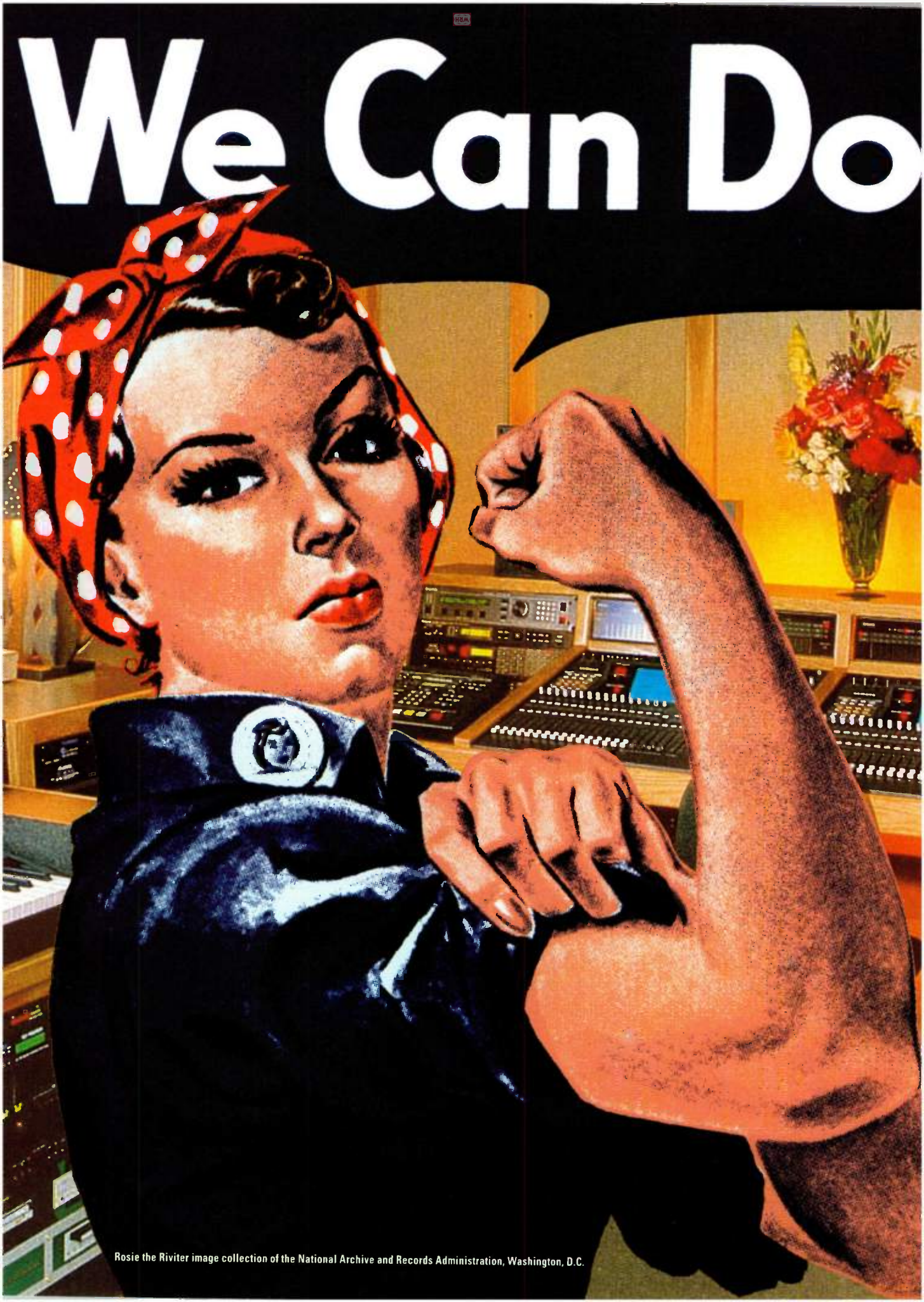



Rosie the Riviter image collection of the National Archive and Records Administration, Washington, D.C.


# BREAKING THE SOUND BARRIER

## Four top female audio professionals share the secrets of their success.

By Carolyn Keating

Women who have a passion for audio—living on a steady diet of gear magazines and talking technology all day—might seem like a rarity in this industry. In fact, I often wonder where all the other women audio professionals are when I read music technology magazines, flipping through articles about male producers and engineers, opposite ads only rarely showing a woman who looks like she is actually using the gear instead of lying on it in a state of undress. But appearances can be deceiving. Women are out there mixing sound, composing music, and playing around with gear, too—and in ever-increasing numbers.

I set out to talk to some of those women and learn about their careers, how they got started, and whether they encountered any barriers due to their gender. Surprisingly, the glass ceiling wasn't really an issue. All the women I spoke with just went ahead and did want they wanted without worrying about being in the minority. They simply pursued their dreams.

Following are profiles of four successful women in the music industry: Lora Hirschberg, a mixer at Skywalker Sound; Rachel Portman, an Academy Award–winning feature film composer; K.K. Proffitt, co-owner and chief engineer of JamSync, a 5.1 surround facility; and DJ Rap, a DJ, songwriter, and vocalist. These women were kind enough to take time from their busy schedules to discuss their paths to success and share their views on women in the industry.


## LORA HIRSCHBERG

Lora Hirschberg is a rerecording mixer at Skywalker Sound (a division of Lucas Digital Ltd.)in Marin County, California, where she does the final mix for feature films. Her numerous credits include *Titus, Titanic, The Horse Whisperer,* and *One Fine Day.* She also assisted in the sound design for *Strange Days, Mrs. Doubtfire,* and *Toys.* In 1996 she was nominated for an Emmy for her work as a rerecording mixer on HBO's *The Celluloid Closet.*

**Could you explain what your job entails?**

I mix a lot of sound effects. The sound-effects editors will cut all the movie's sound effects, and they'll bring them to me in certain groupings, like the backgrounds, or what is sometimes called ambience; the hard effects—like if there's a fight in the movie, the punches and things getting knocked over; and the Foley, which is footsteps or prop movements. In premixing, I take those sounds, place them across the different speaker channels, decide what's going to be left, center, and right; or if something moves across the screen, I'll pan it that way. But I also have to plan ahead and organize these things in case the director says, "That's a great chin sock, but I don't like the crunch sound there; I want just the face punch." So part of my job is to know what things not to marry together and how to plan for the inevitable throwing away of things, which we often do.

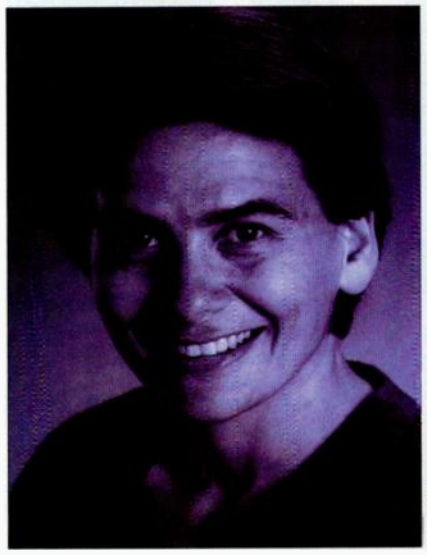
So I'll premix all the sound effects for a couple of weeks, and at the same time the dialog person will premix the dialog. Then in the final mix we bring together all the premixes and the music, and then it becomes this big battle, trying to figure out how all that stuff is going to go together. Our job is to take those elements and balance them out, decide what works and what doesn't, and combine them.

**How did you become a film mixer?**

I went to film school at NYU, and I was also studying music, so I sort of gravitated toward the audio side of things. I worked in small video post houses in New York, and then I moved out here and I got a job in the machine room—which is basically the back room of a film studio—at Zoetrope. I just learned about mixing by hanging out and seeing how things were done. That's kind of the traditional way people become mixers; they start in the machine rooms.

**Are there more women in your field now as opposed to five years ago?**

I don't think it's changed that much. There are a lot of women sound editors and a lot of women in editorial and sound design. In the nontechnical jobs, like producing, it's maybe 50/50 men and women, and as you go into the technical jobs, it's like 5 percent women and 95 percent men. I think there are a variety of reasons for that. There are probably a lot more production jobs than there are technical jobs. In this country, there are only about 200 people who do my job on the feature film level, so it's still a small percentage that are women. I think a lot more women are coming out of recording schools, but many of them go into music. I think many people don't know that you can work in the film industry and have a good audio career.


DAVID OWEN

**Lora Hirschberg is a rerecording engineer at Skywalker Sound, where she has worked on the final mix for such feature films as *Titanic* and *The Horse Whisperer.***

**Have you had the chance to mentor anyone?**

I wish I could do more of that. A couple of years ago Leslie Jones [scoring mixer at Skywalker] and I had a seminar where we got a bunch of applications from women in recording schools and film schools, and set up a two-week program where they just sort of shadowed people at Skywalker. I wanted [them]to know that they could come here and apply for a job, because I think a lot of people just don't see it as a possibility—or they don't even know that those jobs exist. They don't know that you can be a maintenance engineer on a film stage or a transfer operator or a machine room operator. These are all really good, high-paying, interesting jobs. You get to play with a lot of gear and work on good projects. So we had a group of about ten women, and it was a success. I think we hired one of the women—she was a USC grad—and another one applied to ILM [Industrial Light and Magic] and got hired. So


STEVE JENNINGS, COURTESY ILM

**Lora Hirschberg with the mix crew for *Titanic* (from left to right): Hirschberg, Gary Rydstrom, Christopher Boyes, Tom Johnson, and Gary Summers.**

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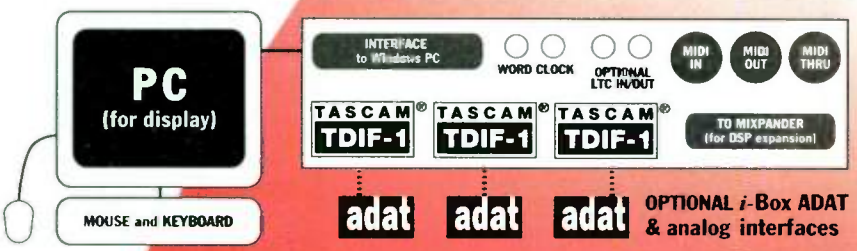


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## Dark Side of the Groove

On Dark Side Of The Groove Neil Conti unveils a totally original drum set-up that enables him to play tribal dance rhythms that sound like two drummers! Recorded on analog equipment, these drums sound fat. As with his first CD, this is more than a mere Sample CD, it is a musical statement from a musician who continues to ask questions of his instrument. AMG (ID#2002)

1 AUDIO/1 WAV

## Monster Beats


The mother of all powerful, driving, 'Kick you in the head' new generation loop CDs. Hard as rock natural born grooves with attitude from classic, untamed, British rhythm ace Chris Whitten. Real human feel but tight with mature, rich and organic sounds side by side with ground-breaking, jaw-dropping leading edge production techniques. ZERO-G (ID#2012)

1 AUDIO/1 WAV

## Groovemasters Bass


2 CDs filled with High Quality Bass Grooves and multisamples using more than 8 different basses. A large selection of fixed tempo loops, played to the grooves from GrooveMasters Drums, so they work seamlessly together, giving you a super groovin' rhythm section. Also included is a huge selection of free tempo loops, to create the ultimate grooves . (ID#2021)

2 CD AUDIO

## KLB Essential Trilogy


Introducing Keith Le Blanc's Essential Trilogy, a 3 disc series (available separately, or get all three for the price of two). Vol.1 is "Hip Hop Hard Phat" where Keith lays down his freshest Hip Hop beats; Vol. 2 is "Old Skool Beats: Class of 2000", the beat gospel according to KLB; and Vol. 3 is "Out There", probably the weirdest drum collection ever produced! AMG (ID#2003)

1 AUDIO/1 WAV (EACH VOL.)

## Seismic Frequencies


Dangerously beautiful landscapes of organic tones, moody washes and powerfully expressive sound energies fused with a multitude of adventurous experiments in audio alchemy makes 'Seismic Frequencies' strong and intoxicating enough to cause an earthquake of sonic influence on all styles of music. Perfect for those in an 'ambient' state of mind. ZG (ID#2011)

1 AUDIO/1 WAV

## Steve Smith Drums


Awarded Keyboard's BUY BUY AWARD, the review said - "As you'd expect, Steve's drumming is perfect - and the recording quality is among the best I've heard. In summary, this collection is first class. From start to finish, Steve's timing and feel are rock solid. 10/10" 2 CD collection from ex-Journey drummer STEVE SMITH. Demo at soundsonline.com (ID#1076)

1 AUDIO/1 WAV

## Intravenous

AudioVirus (Miles Bould & Mike Westergaard), offer a unique collection of dance loops with an emphasis of subtlety of both performance and production. Although the loops cover a wide range of dance styles, including many subtle grooves and unusual time signatures, the constant element is the organic, human feel they will bring to your tracks. AMG (ID#2006)

1 AUDIO/1 WAV

## Pure Trip Hop


Wide ranging ingredients for constructing accomplished Trip Hop including 30 musical pieces divided into their separate elements plus extra helpings of beat loops, bass lines, EP chords and drum hits. These building blocks for Trip Hop producers are spread over 2 discs which include AUDIO/AIFF/AKAI/REX/WAV that are ACID/ PHRAZER ready!!!! ZERO-G (ID#2014)

AUDIO/ACID/AIFF/AKAI/REX/WAV

## Pure Guitars


This collection of unique, high quality sounds gives you utmost control over all aspects of the recorded instruments. 3 different nylon guitars, 4 different steel string guitars (1 jumbo, 2 dread nought, 1 ovation), 2 different 12-string guitars, 3 different acoustic basses, 5 different samples per note slides, chords, natural harmonics etc. No loops, just sustained notes. (ID#2018)

AKAI/GIGA/EXS24

## The Vinyl Frontier 2


Simeon's back with a sequel to the hugely successful Vinyl Frontier covering completely new ground. This CD is much more up-tempo and features loops ideal for a wide range of modern dance styles - the heaviest lo-fi drums, from head-nodding hip-hop to ruffneck drum'n'bass, underground rhythms and raw soul breaks are all included. AMG (ID#2010)

1 AUDIO/1 WAV

## Pure R'n'B


Extensive toolkit for assembling polished RnB including 35 song ready musical pieces divided into their separate elements plus extra helpings of beat loops, bass notes and EP chords. These quality building blocks for RnB production are spread over a 2 disc Audio/CD-ROM set which includes AUDIO/AIFF/AKAI/REX/WAV and are ACID/ PHRAZER ready!! ZG (ID#2013)

AUDIO/ACID/AIFF/AKAI/REX/WAV

## da nu R'n'B hip hop


A unique variety of new RnB Hip Hop styles. 2 CDS packed with a whole bunch of flippn nu stuff from da East Coast. Twistin' construction kits, supablastin' beats, for all ya people out dere who dig da flava of Missy & Busta ... Dis one's a killa! All of the material is also excellent for commercials. Over 2 hours of content including extended song arrangements. (ID#1073)

2 AUDIO CDS/ACID/PHRAZER

## Seminal House


Seminal House, produced by "The Matrix" is "the" definitive Future House Sample CD! If you're looking for a Sample CD crammed full of fresh, specialty-produced loops, hits, effects, synths to create House tracks, and much more then look no further. The Matrix lays down beats that are sure to become House classics in the near future! AMG (ID#2007)

1 AUDIO/1 WAV

## The Chill Out Room


Enter "The Chill Out Room"! trancey analogue chemistry! The Chill Out Room is packed with Atmospheres (mini pieces of underscore/drones for looping and using as the basis for 4am compositions), Loops (mostly pretty long with variations of effects and filters for a less static result), Sequences, Single Note Synths, Dub Events and Synth Effects. AMG (ID#2008)

1 AUDIO/1 WAV

## NY Cutz Off Da Hook


Filled with over 1000 phat beats, vintage keys, wak guitars, skrachin', old skool vocal lix, hi & lo fi live drums, vintage drum machine loopz, butta bass, fuzz bass, akoustic bass, madd bakgroundz, old recordz, lounge recordz, mellotronz, soopah fonky brush loopz, stank akoustik piano, and a brand new tip: frequency loops; plus hundreds more. ZG (ID#1093)

2 AUDIO/1 WAV

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Ethno World contains more than 70 rare and ethnic instrumental and percussion sounds from around the world on multiple CD-ROMs. Hear the squeaking and scraping of strings, the breathing of woodwinds, hands on drum skins, and the moods of other countries. Instruments are multi-layered and feature many styles, loop variations and high quality sounds. (ID#1095)

### Skunkworks


2 CD AUDIO/WAV/AKAI

Famous STEELY DAN and DOOBIE BROTHERS guitarist Jeff 'Skunk' Baxter delivers the ultimate guitar sample collection. The sounds are killer, the playing is impeccable, including rhythm guitar licks that have never been offered before in any collection - but that's not all!! You get acoustic to heavy metal, and everything in between, this is it!! (ID#2023)


### QUANTUM LEAP BRASS

The Definitive 5 CD-ROM Collection of Multisampled Brass Instruments & Sections (read what the reviewers say about this award winning sound library - full text at soundsonline.com)

"Quantum Leap Brass sounds great, and in one or two areas (notably the consistency of the attacks) raises the standard of professional sampling. That fact, combined with the overall quality, justifies giving it the KEY BUY AWARD. Despite the large stylistic variation, the recordings are remarkably consistent, all sharing an attractive (but not overstated) large room or small hall ambience which adds just the right amount of "air" to the sound. Nick Phoenix's latest offering is a laudable achievement, providing samplists with an impressive, versatile, and musically convincing brass library. - 10/10" - KEYBOARD

Producer Nick Phoenix aptly describes his collection as a "purist, no-compromise library with an emphasis on expression and dynamics." Armed with a variety of high-quality ribbon and condenser mics, Neve and Manley preamps, and Apogee converters, Phoenix recorded all of the samples in large rooms and small to medium halls. The hard work clearly paid off; this is a stellar collection of samples that mix together beautifully and encourage creative brass writing. - ELECTRONIC MUSICIAN

"This is an impressive and versatile brass library, whose attacks raise the standard of professional sampling. Just the thing for any samplist who wants to put some polish on his brass! 5/5" - SOUND ON SOUND (UK)

"Instrument quality, player quality, and recording quality are all super high. There is a very large quantity of material very sensibly mapped. The documentation is fabulous, even suggesting tunes that fit the style of a particular patch. If you need sampled brass, Quantum Leap Brass is a must-have" - FRONEC

"The next step from here is hiring a live musician, I guess, and even then I'm not convinced that you would get a better result. Sonic Quality 10/10" - SOUND USER

"Quantum Leap Brass is the flagship of brass libraries, and has undoubtedly set the standard for things to come in the future" - SONIC CONTROL

### Downtown Strings


AUDIO

The finest collection of R&B/Hip Hop strings ever made. This beautifully recorded collection features string arrangements written specifically for today's urban producers. String quartet construction kits, full string ensemble passages, killing upright bass grooves, unique and useful Harp loops and riffs and an ample selection of multisampled scales. (ID#2015)

### Smart Violins


3 CD-ROMS AKAI/EMU/GIGA

Another of Peter siedlaczek's unique sample libraries: outstanding construction tools for creating perfectly realistic lead violin lines. forget playing artificial string melodies note-by-note with single note samples! This library uses real, ready-to-use 1-3 bars long patterns performed by a 16 violin ensemble: various runs and slow phrases. Listen online (ID#2016)

### Total Hip Hop


2 AUDIO/1 WAV

The third release (the others are "Total Drum'n'Bass" and "Total Funk") in Zero-G's highly-rated 'Total' series. "Total Hip Hop" is 100% Hip Hop. Don't get this collection unless you are a dedicated Hip Hop producer. Over 1600 Raw samples, from the Old Skool to the Fresh. All you need to add is rap and you're done. Total Hip Hop - total coverage! (ID#1092)

### Percussive Adventures


2 CD AUDIO/4 CD-ROM

"With so much soundware available to the discriminating producer, it's getting harder for any one CD package to stand out. Percussive Adventures definitely stands out, which is why we gave it our KEY BUY AWARD. Both the sheer amount of material and the freshness of the performance mark it as a must-have for composers." Now in 6 formats. EW (ID#1045)

### 2 Step Garage


2 AUDIO CDS

One of the most innovative styles 2 Step unites elements of soulful House, Dub, Drum&Bass, RnB, Reggae and Breakbeat. This double Step audio CD contains 30 dance construction kits. More than 120 minutes of pure entertainment. Drum arrangements of up to one minute, backings, instrumental loops, vocals, complete mixes, for film and commercials too. (ID#2017)

### Complete Celt 2


3 CD SET

Complete Celt 2: Jigs, Reels & Polkas. Some of the finest Celtic musicians in the British Isles, including Riverdance's Luke Daniels, bring you a triple CD set of authentic, specially recorded licks and performances to add a Celtic influence to your tracks. Celtic Fiddle, Uillean Pipes, Mandolin, Bagpipes, Voice, Bodhran, Mandocello, Accordian etc. AMG (ID#2009)

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those kinds of programs work, but we just haven't had the time to keep it up, and I'm really hoping we can do it again next year.

**Have you encountered any sexism in your job?**

No. It's not worthwhile to think about gender roles in our generation the same way [older people did]. I'd say that regarding the glass ceiling and people giving you attitude and all that stuff, you get that from people a little older than you. You don't get it from your peers. Traditionally, the perception of mixers has been that you want some powerful, authority-type person to be doing the job, and then when people see some little woman, sometimes that kind of shatters the myth, and I think that's fine. Maybe some of the older guys don't like that, because that's part of their image—"Well, only people like me can do this"—but it's not true.

**Do you have any advice for women who want to follow in your footsteps?**

I would say that probably the best advice is, just don't give up. If that's the job you want, you should just go ahead and get that job. Don't give up. When I started out, people said, "You really don't want to do this, because you're not going to get to, and why don't you do that . . . there are a lot more jobs in that field. . . ." You don't need to listen to that. If it's the thing you want to do, you'll be good at it. And I think it's important to know what it is you want to do. Look around and [find out] what jobs there are. Try and make personal connections with people. The odds are, if you like movie sound, you should contact people who do movie sound and say, "I like this job. Is there anything you can do to give me some advice as to where I should start?" And probably ten of them will say no, and one of them will say, "Yeah, why don't you call that guy, or why don't you do that or think about this," or that kind of thing. And just keep after it. I don't think people brush people off because they're rude; I think that they're all just very busy. But if you ask an intelligent question, you'll get a useful answer.

## RACHEL PORTMAN

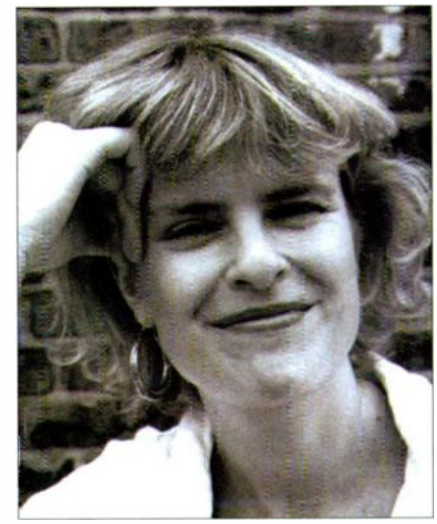
Born in England and educated in classical music at Oxford, composer Rachel Portman was the first woman to win an Academy Award for Best Original Score (*Emma*, 1996). Her other credits include *The Legend of Bagger Vance*, *The Cider House Rules* (for which she was an Academy Award nominee), *Beloved*, *Marvin's Room*, and *The Joy Luck Club*.

DAVID JAMES

**Among Rachel Portman's recent credits is *The Legend of Bagger Vance*, directed by Robert Redford and starring Will Smith (left) as caddie Bagger Vance and Matt Damon (right) as golfer Rannulph Junuh.**

**How did you get your start scoring films?**

In America I think there's more of a "composer's industry" that women need to break into, whereas I never studied film composition; I just sort of wormed my way into it with a lot of luck, a lot of persistence, and an incredible amount of ambition. I remember when I very first started working as a television composer in England doing films for the BBC and thinking, "Oh, when I go to do an interview, they probably won't treat me as seriously as they would a man, so I'm going to just make sure they know that I'm really competent and that I'm really efficient." But apart from that, I've never really paid any attention to the fact that I'm a woman, and I think it's probably been quite a good thing, because I want people to think of me as a composer, not as a female composer.



JOFRE MASCEÑO

**Rachel Portman won the 1996 Best Original Score Academy Award for *Emma*. She also composed scores for such major motion pictures as *The Cider House Rules*, *Beloved*, and *The Joy Luck Club*.**

**What is your scoring process? I understand you hardly ever use synthesizers or electronic instruments.**

I write in a big studio room, but it doesn't contain any machinery except for a DAT recorder, a microphone, a TV, something for me to watch the film on, and a great big grand piano. That's it. I don't work on a computer of any sort. I'm not at all against using electronic instruments for sounds, I just am naturally more curious about acoustic instruments and oddball combinations.

When I'm scoring, I tend to go through a film and watch it many, many times. And then I just make myself start writing music for it. By that time, I know where I think music should be, and I sort of pinpoint the different scenes. Then I go through

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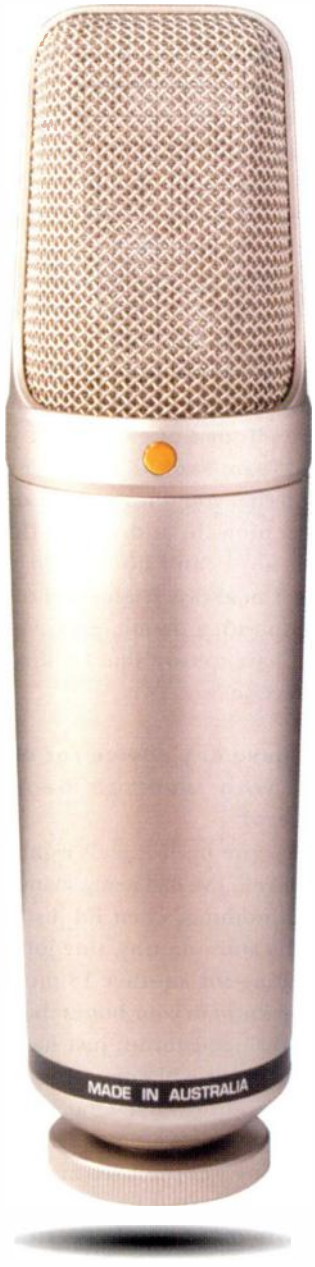


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the film from beginning to end, trying to do a first draft of the whole score. And then I might hit on a theme that I know I can make work, that feels right for the film. I begin to work quite quickly once I have a theme—I might need four themes or something, you never know; on a big film like *Bagger Vance,* I had about five different melodies in there, some of which were related to each other. When I have enough material, I play it for the director—all prerecorded, lined up to the film, but on piano—and I tell [the director] exactly the instrumentation. And with [the director's] comments in mind I carry on, so I tend to be continually adjusting the whole score until the end, as opposed to starting at cue 1 and 1 and writing the main title and going through like that. But it's very, very simple the way I work. Also, when I'm scoring—when we're actually on the scoring stage—95 percent of the time I don't use click tracks, so the players aren't wearing [headphones]. I find that that makes it much more musical, because the players aren't playing to a beat and they can completely hear the instrument that they're playing, and it gives the performance a real fluidity.

KAREN WILL ROGERS

**K.K. Proffitt, shown here at the controls of JamSync, advises aspiring audio pros to get a solid math and technical background and to log a lot of studio time.**

**How do you overcome creative challenges?**

I just try and—this is something that you get from experience—really focus when I am working, not to just sort of wait for inspiration and think, "Oh, you know, I'm going to have to go out for a walk," but to stay there all day. And just keep trying from different edges, from different angles. Because eventually you're going to crack it quicker that way. So just put the hours in. It's always hard at the beginning—there are all sorts of games that your mind plays on everything, on every single job that you do. You have negativity creeping in, and you're thinking, "Oh no, I can't do it," and stuff like that. I'm always frightened of not coming up with a theme. And eventually I just have to trust that I will, and I always have so far.

**Do you have any advice for other women who want to become composers?**

Don't ever give up if it feels right that you're doing it. I've had many, many lean years with nothing, when I'd just have 18 months and one tiny, tiny job and then nothing for another 18 months. And if you know in your bones that this is what you need to do, just hang in there because it will come. Just keep trying different doors. That's what I did. And it does take time. The other thing is—for people who are really beginning—is to start on small things. Don't try to go to big things straight away, because big things are scary. And it's the best way to grow anyway, to work on smaller projects and then gradually, as you learn to orchestrate—if you do indeed orchestrate yourself—go from smaller projects to bigger projects.

## K.K. PROFFITT

K.K. Proffitt is the chief engineer and co-owner of JamSync, a 5.1 surround facility in Nashville. Along with mixing, mastering, music editing, and producing,


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**Could you explain some of the aspects of your job?**

We do a lot of digital encoding—Dolby Digital encoding. Much of what we do is for corporate clients. We do 5.1 mixes for people who make HDTV equipment; and we did audio sweetening for Tim McGraw's "Something Like That," which went number one twice on CMT [Country Music Television]. We're doing 5.1 effects, and we've gotten into trademarking and intellectual property. We're actively looking to license certain libraries to upmix and to remix for 5.1, and we're doing a sound effects library in 5.1.

**How did you get your start in audio?**

I went to graduate school in experimental psychology, which is really where I started to learn about audio, strangely enough. Then, in the early '80s, MIDI was starting, and I was crazy about it. I had one of the first SBX-80 SMPTE machines from Roland. I started working as a consultant on these projects where people didn't want to read the manual. So I would be called in at two in the morning to help producers plug all the stuff together, or do a takedown when the drummer couldn't play in time—I'd sync up the SMPTE and we'd sample the drums. In 1986 I went to Northeastern and got a degree in software programming. I bought my first 24-track Otari MTR-90 III in 1991, and I bought a fairly good board, an Amek TAC Magnum with 36 channels, 72 inputs—which is still around if anyone wants to buy it—and about that time [Tascam] DA-88s came out. I dropped all this money for analog, and digital was starting to happen.

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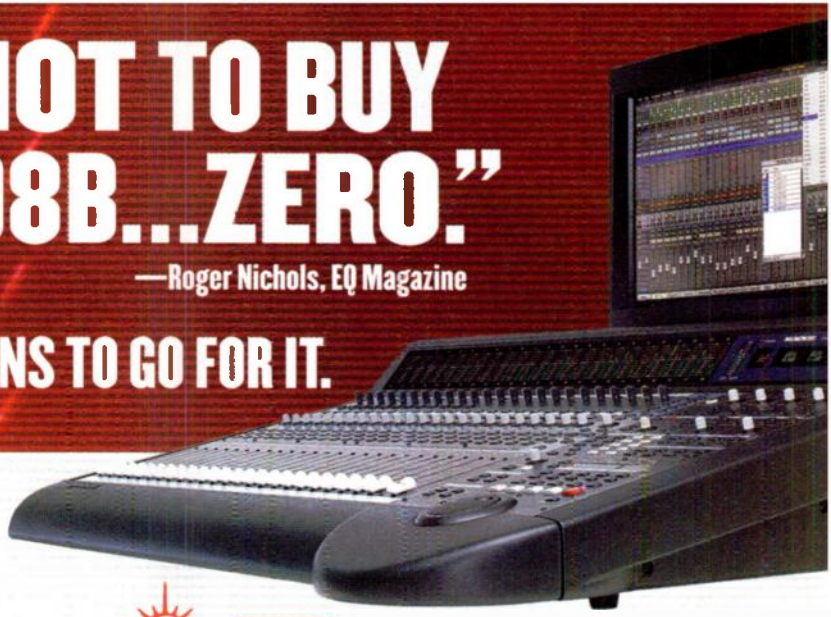

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Then I met [partner] Joel Silverman, and we built this studio.

**How has it been for you as a woman in your field? Has it improved in the past five years?**

I think it still sucks. When I was younger, I never became an assistant, because most assistants when I was growing up were just girlfriends of these guys. I realized pretty quickly that I was not going to be mentored by anybody. I also realized pretty quickly that nobody needed me, and nobody wanted me, if I didn't have any way to make money for them. That's the name of the game in this business: If you can bring money into a studio, everybody wants you. But if you just come in and say, "Oh, I want to be mentored; I want you to need me," which is a curious attitude among a lot of people that I meet these days, you're bound to fail. People hired me because I had a skill. It wasn't because I said, "Gee, I just wanna come and make coffee . . . I'll run your errands and I'll sweep your floors . . . and maybe I'll get to become a famous producer some day!" That may be true for men, and maybe for some women, but from my point of view, that is a fantasy. It's a cruel fantasy. It gets a lot of free work for people who are established.

**As a beta tester for Drawmer and Kind of Loud Technologies, do you have any favored plug-ins?**

I don't want to put one manufacturer over any others; they're all useful. The VST stuff is good, the DUY and Waves plugs are great—they all have their uses. Even plugs that one might not think are so interesting—some of the more mundane Digi plugs—still have their uses. I use them all the time in conjunction with other plugs to change the sound a bit. There's no one plug-in I reach for. If I don't like a vocal . . . like I didn't like a vocal yesterday, and I went through every stinking EQ I have. I think I wound up just using part of the vocal with part of the EQ, bussing it out to different strips, having different parts be in different EQs and stuff. Once you have as many plugs as I have, you don't care if it's real-world emulation or not; you really start thinking about, "Well, for this program material, does this thing work?" I would like for something to really do a great Pultec like I used to use way back, 20 years ago—I don't know if Bomb Factory does Pultecs or not—but I haven't seen the old Pultec EQP-1A in plug-in emulation yet. There may be one out there, but I haven't got it yet. That was a cool thing.

**What is your favorite aspect of your job?**

Making new stuff. Making stuff sound better. I once had a rap group [in the studio], and I said to them, "Well, you know, this drum sound, the snare . . . it's obvious that you were overdriving the input to your board. And I can help you with that. I can sample . . ." This guy looked me square in the face and said, "Don't mess with my stuff. I like just how it sounds. You leave it alone, put it together, make it sound like it is, but better." This is the way he liked his sound. Some people like certain things, and that's the point of what they're doing. It's like those paintings where they just squirt paint and step in it; that is the art for them. It's the same thing with music. You're not a critic if you're an engineer. You're an engineer, and your job is to make the client happy. And make it sound better—not only the way you think it sounds better, but the way they think it sounds better. That's the gig.

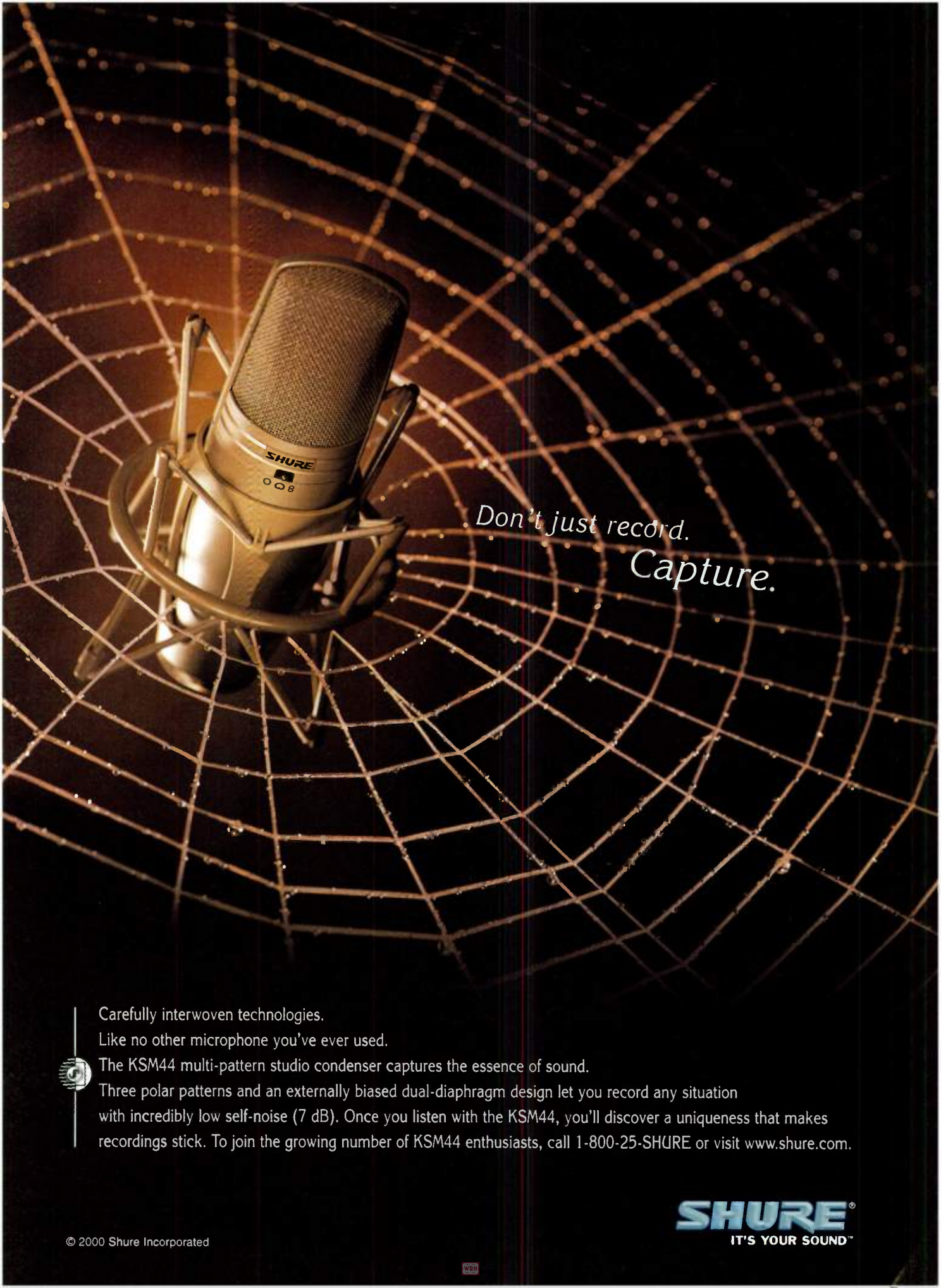
TOM GATLIN

**JamSync, a professional 5.1 surround recording facility, is located in Nashville.**

**Any advice for women who want to become engineers?**

Work for a manufacturer who does matching funds and go get a degree from MIT. Women, if they want to get ahead, have to take math. Because you're going be a secretary in the music industry or a promoter unless you know the math. Everything requires it. Everything. You also have to know how to read charts. You also have to understand statistics, physics, and stuff like that. You don't have to be a genius at it, but you have to be able to look at a chart in the AES Journal and know what they're talking about. Audio engineering school is great—it's a trade school.

But I'll tell you, people who are really successful and really stick

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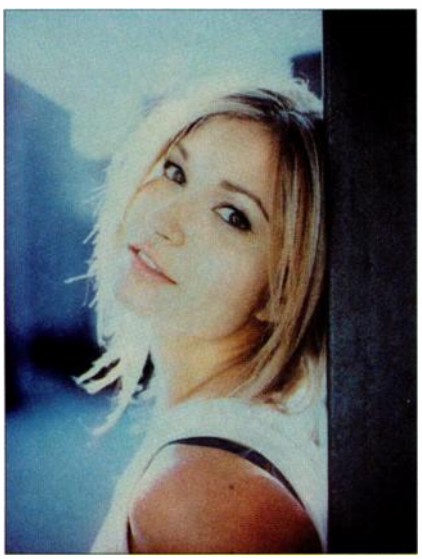
around in the music business and in audio engineering, they have done more than just learned stuff from books—they have been in studios and they have also been innovative in accomplishing something. You have to start thinking about what you can do that's different, that makes you a valuable commodity. For me, it was being able to do takedown. I was known as The Chick Who Can Put All of the Cheap Japanese Crap Together. That was my title. *[Laughs.]* That was my thing. And even today, that comes in very handy.

## DJ RAP

DJ Rap (aka Charissa Saverio) is one of the world's leading female DJs on the hard-core, jungle, and drum 'n' bass scenes, known for such successful singles as "Ambience—The Adored," "Bang the Party," and "Spiritual Aura." A songwriter and vocalist as well as producer and mixer, she was signed to Higher Ground/Columbia in 1997 and released her debut major-label album *Learning Curve* in 1999. Based in England, she also runs her own label, Proper Talent.



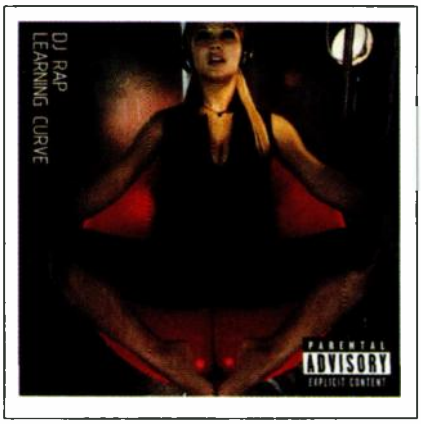
DANNY CLINCH

**In addition to being a leading DJ on the drum 'n' bass scene, DJ Rap is a songwriter, vocalist, mixer, and producer, and she runs her own record label, Proper Talent.**

**What inspired you to become a DJ?**
Pretty much most people start deejaying first and making tunes afterward, but for me it was the other way around, so it was always about making music. One night while I was out raving, I saw these two DJs and it just blew me away. The thought didn't even occur to me, "I wonder if there is any other female thing," because I just presumed there was; I just thought, "Oh, this looks like so much fun, I want to do it." What inspired me to start deejaying was I'd made my first record ["Ambience—The Adored"] and wanted to promote it as best I could. Then when I started to do it, I realized that there were a couple of female DJs around, but they were getting a pretty crap deal.

**Did you network with them?**
Quite a few female DJs were just starting out—I was the first female DJ to say, "I'm playing with the boys," because up until that point those girls were always put in the back room; they always played with girls and got little to no money. And I come along, and I think, "What the f*** is this? I'm not having this; I'm good and I can rock it." My goal was always to be among the top DJs. I believe strongly if you have a vision of where you think you should be, you'll get there. Anyone can do anything they want; it depends on how determined they are and how brave they are. I made a point of not being paranoid and jealous about my thing, because I wanted to encourage any other female who comes along. But women are much more competitive and much more territorial.

**Your song "Bad Girl," off *Learning Curve*, has the lyric "That glass ceiling should be radically erased."**
Definitely the glass ceiling should be broken. People like Madonna are breaking it all the time, setting new boundaries, but she's doing it in a very provocative, sexual way and that kind of offends me. Let's do it in a way where our brains speak for us. I am trying to break real barriers, not by going on about it but by just doing it.




**With *Learning Curve*, her major-label debut, DJ Rap displays her dance-pop prowess and renowned jungle grooves.**

**What is your production process?**
I'll write a track, maybe just on the guitar or the piano—just basic production, nothing complicated, no production at all. You do a song and you think it's great, wonderful—and then you listen to it like a month later, and you think, "It's really not that good." So what's the point in spending all that time producing it? Make sure the song is great, the words are great, the melody's fantastic, it all flows, because if it works acoustically, then it will work whatever you do with it. Then when I think the song's good, I leave it alone for a little while; maybe come back to it in a couple of weeks, remix it again, then start to work on the production. If after three months I think the song is still really good, then I'll actually start to produce it—[adding] hats, getting the right snares, and layering. I layer a lot of strings. I tend to remix and regurgitate my work constantly. On my jungle stuff I do every single thing myself. My first album I comixed, coproduced, and wrote the whole thing.

**What are your current goals?**
Just to do a great [new] album. I'm taking acting lessons at the moment, and I am learning to take some time off. I'm interested in breaking into new territory, I don't want to carry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on doing the same thing. So every time I work with someone like Brian [Transeau, also known on the DJ scene as BT] or Liquid Todd, we're not doing what they normally do, we're not doing what I normally do; it's more like, "Let's fuse and make something new." That's what's exciting; no one can stay the same. It would be boring. You can't just think you can make jungle forever and that's it. It's not going anywhere. Make some new forms.

**What advice do you have for women who want to follow in your footsteps?**

Do not worry about how good you look—obviously it's a bonus—but what's more important is that your music comes from you and it really is you. Be as good as you can on the decks. Be all about the music, be all about the crowd. And get all that without being a "ho." You have to maintain credibility, you have to have respect, you have to be good, and you have to not play on the fact that you're female. But use your femininity when you have to.

**Any final thoughts?**

You don't need all the elaborate equipment I've spent ten years getting. I have a portable studio, I have a Mac with a sampler inside it, and I use [Steinberg's] *Cubase* and [Emagic's] *Logic* with it. I have a little keyboard that I take away with me—really, you can do a hell of a lot just inside a laptop. I have all the audio plug-ins, a little microphone, and a Kawai 70, and I can do a tune on a plane with that. All of the equipment in the world means nothing if you can't write songs, if you can't make music.

---

**Carolyn Keating** *is a composer, songwriter, and engineer in San Francisco. She is the editor of* Home Digital Recording.


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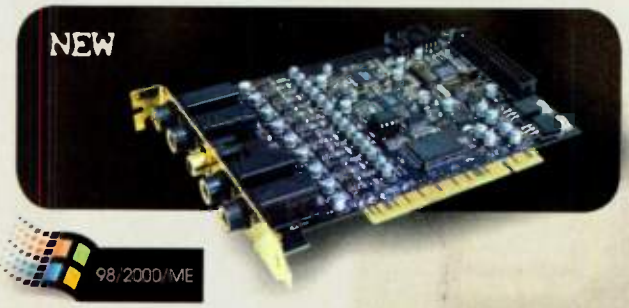


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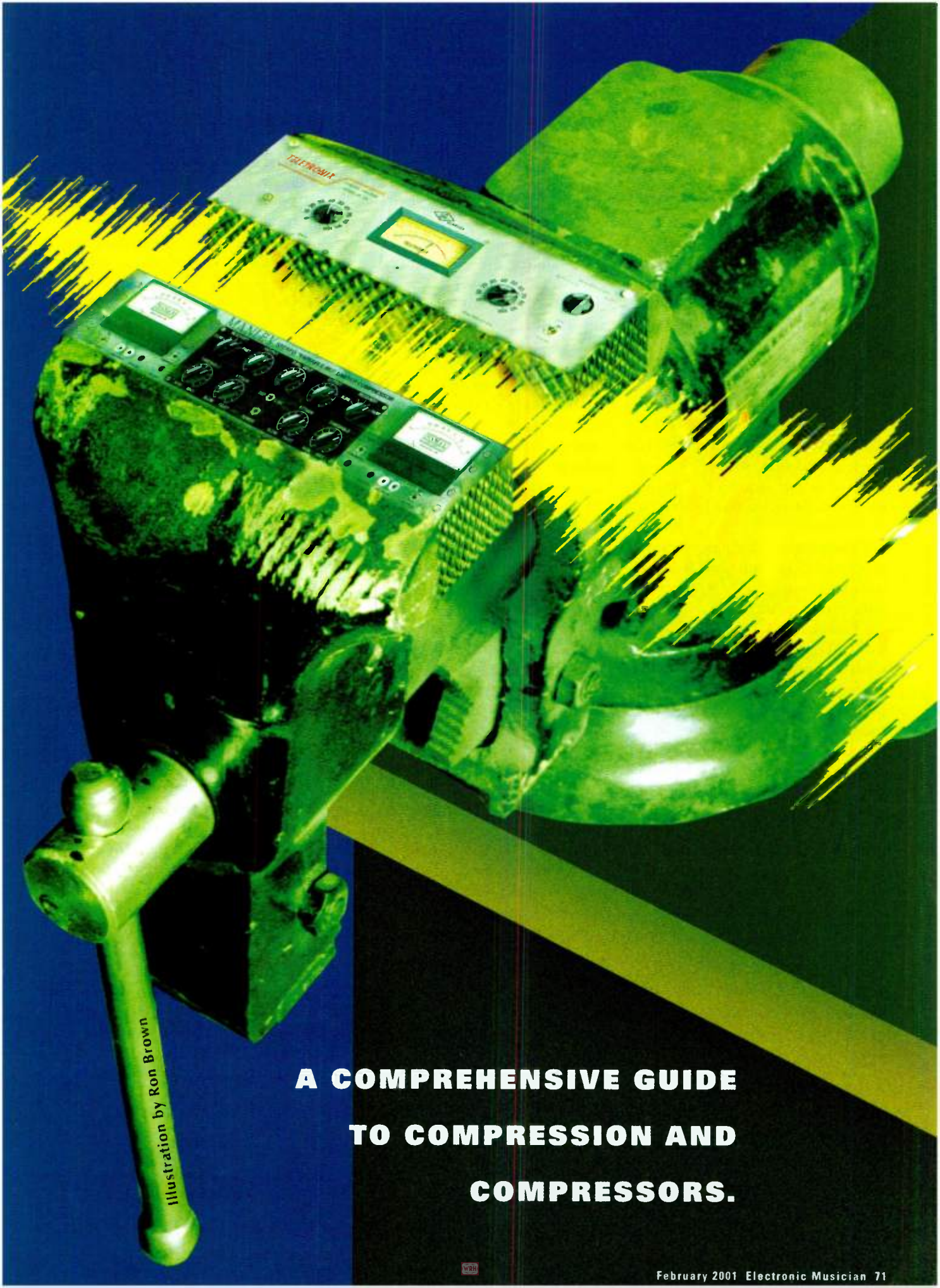
# THE BIG SQUEEZE

By Michael Cooper

Of all the processes used in modern music production, compression is perhaps the least understood. One reason is compression's sonic results are often subtle and thus hard to hear—especially for budding engineers. Another hurdle is presented by the various and differing compressor control parameters; those, too, are typically subtle in their individual sonic effects, and they work together interactively, further complicating the stew. Then there's the confusion that lies in the bewildering array of product types and models the engineer must choose from before even reaching for a control knob. For example, for a given application, should you select a VCA-based compressor or one controlled by an opto-electrical element? A solid-state or tube design (or a hybrid of the two)? Analog or digital compression? A hardware compressor or one that is software based? And so on.

With so many variables, it's no wonder compressors and compression remain a mystery for many users. Yet, if you want to master the arts of recording and mixing, learning compression's intricacies is imperative. After all, the production processes for most of today's popular music forms—with the notable exceptions of classical and some jazz—rely heavily on compression. Simply put, if you're not compressing properly, you're not getting the best sounds possible.

This article will guide you through the maze of compressor options and explain practical compression applications in plain English. I'll start with the basics of compression, citing examples of various production techniques and the theories behind them. I'll also tell you which features to look for in a compressor and why they're important. Finally, I will survey specific types and designs of compressors, describe some models, and offer opinions about which models do the best jobs on which instruments.



# A COMPREHENSIVE GUIDE TO COMPRESSION AND COMPRESSORS.

Illustration by Ron Brown

# BIG SQUEEZE

## IMPROVEMENT PLAN

Compression falls under the broader category of *dynamics processing*. The term "dynamics" refers to changes in loudness level, so *dynamic range* is the difference between the softest and loudest sounds that a source produces, or that a track contains. A dynamics processor's purpose is simply to increase or decrease a signal's dynamic range, which alters how the levels fluctuate within that range. Types of dynamics processors include gates, expanders, limiters, levelers, and compressors.

A compressor is a type of dynamics processor that "squeezes" a signal's dynamic range—that is, it reduces the difference in volume, or level, between the loudest and softest parts of a performance. The process of reducing volume is called *gain reduction*. Properly applied, gain reduction makes a performance sound more consistent from beginning to end. For that reason, compression is a great remedy for a performance in which the levels fluctuate too widely.

By reducing dynamic range, a compressor also allows for the processed signal's overall level to be raised—that is, become "hotter"—resulting in increased loudness without pushing the signal's loudest parts into distortion. Bringing up the overall level has the additional benefit of making lower-level sounds louder than they were before compression. The result is that subtle nuances such as mouth sounds and ghosted notes—as well as burps, string buzzes, and snare rattles—are louder, clearer, and easier to hear.

Of course, you may not want to make burps, string buzzes, and other incidental performance sounds more audible. Therefore, apply compression only when musically appropriate—when the end result will sound better than what you started with.

You can always add compression after a track is recorded (during mixdown), but sometimes it is desirable to use compression during the recording process. That approach has several potential benefits. For one, a compressor makes it easier to capture usable tracks when recording an instrument with a wide dynamic range. Moreover, solving level-fluctuation problems during tracking frees you from having to solve them at mixdown. That, in turn, leaves more time and brain power—not to mention gear—for focusing on the mix's creative aspects.

For those recording to any digital medium, using a compressor during tracking ensures that sounds are encoded at a higher level. Because more bits are used, better bit resolution results. Furthermore, by putting a lid on peaks, the compressor also helps avoid digital clipping on extraloud notes. For those recording to analog tape, compressing during tracking allows the signal level to be raised higher above the noise floor, which results in an improved signal-to-noise ratio.

## TRICKS OF THE TRADE

In addition to problem solving—smoothing out rough performances, improving digital resolution and signal-to-noise ratio, avoiding digital clipping, and the like—you can also employ compressors in numerous creative applications. For example, a compressor can dramatically change the envelope of a sound in much the same way an envelope generator works in a synthesizer. That and other compression tricks can give a vicious attack to a lackluster snare drum, add crunchy edge and sustain to a mild-mannered electric guitar, make a lead vocal sound so urgent that listeners will dial 911, or pump up an entire mix until the band sounds like it's exploding out of the speakers.

In simplest terms, think of a compressor as an automatic volume controller. Indeed, before compressors were invented, engineers typically had to "ride gain" on a channel to maintain consistent volume levels. (Then again, many engineers still ride gain, even when using compressors.) However, a compressor controls levels with a speed and accuracy that is impossible to achieve manually—sort of like a magic genie adjusting the track's fader with lightning-fast reflexes. The compressor's control settings determine when and how much that fader moves.

Depending on how its controls are set, a compressor reduces either *transient peaks*—the short-lived, attack portions of a sound—or the *average-level* portions of the sound, and sometimes both. Examples of transient peaks include the stick strike on a drum head and guitar-string plucks. A sound's average-level portions include a snare drum shell's ringing and the sustain of a guitar note after it is plucked. Certain instruments—a wood block, for instance—produce mostly transients and very little sustain. Others, such as vocals and organs, typically produce mild transients that barely peak above their average levels.

The number of controls on compressors varies greatly, depending on design, cost, and other factors. Units that employ voltage-control amplifiers (VCAs), for example, typically have at least five controls: threshold, ratio, attack time, release time, and output level. Full-featured VCA models may offer more than twice that many controls, whereas some expensive opto-electrical compressors may provide only two control knobs.

Note that units with fewer controls are not necessarily less capable; rather, they typically provide automatic control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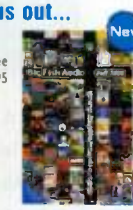

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of parameters such as attack and release time, or they "gang" two parameters (threshold and ratio, for example) on to one knob. I'll discuss those types of compressors in more detail later. First, I'll analyze the five controls common to most VCA-based compressors.

## HIGH FIVE

*Threshold* is the level at which compression kicks in and starts to reduce the signal's level, or gain; the threshold control lets you set that level. With threshold at 0 dB, for example, all signals at or above 0 dB get compressed, while those that fall below 0 dB are unaffected. Therefore, to control peaks, set the threshold to a level below the level of the peaks but above the average level of the signal. That way, peaks that exceed the threshold get attenuated while the average levels pass unaffected through the unit. Clearly, a proper threshold setting is critical to a compressor's performance: if the threshold is set too high, the unit will not process any of the signal; if the threshold is set too low, the unit will react to—that is, attenuate—every portion of the signal.

*Ratio* expresses the difference between signal increases (volume) at the compressor's input and increases at its output; the number on the left refers to input and the right to output. Therefore, the ratio control determines how much the signal will be attenuated once it exceeds the threshold. For example, a 2:1 ratio will let a signal increase in level only 1 dB for every 2 dB it exceeds the threshold (see **Fig. 1**). Likewise, if the signal exceeds the threshold by 6 dB at a 2:1 ratio, the compressor attenuates the signal by 3 dB, a net gain increase of only 3 dB. In that case, the compressor's gain-reduction meter (if it has one) will show 3 dB of gain reduction.

Typically, different instruments and performances call for different compression ratios. For example, to compress a ballad's near-perfect vocal track, a mild 2:1 ratio would probably suffice; at that ratio, and with the appropriate threshold dialed in, the compressor tightens up the performance enough to ensure quiet phrases are not lost in the mix and higher levels are not overbearing. At the other extreme, a bass guitar track that alternates between mellow finger-pad technique and aggressive pop 'n' slap can easily have a huge dynamic range. To yield consistent levels from that type of performance, a higher ratio such as 10:1 may be in order.

Note that threshold and ratio work together to affect a signal's output level. The lower the ratio, the less control the compressor has on the signal; the lower the threshold, the lower the signal level subject to compression. The relationship between the two controls affords flexibility and sonic variation. There are, for example, two different-sounding ways to get the same amount of gain reduction out of a compressor—low threshold and low ratio or high threshold and high ratio.

*Attack time* is how long it takes—measured in milliseconds (ms) or microseconds (μ)—for the compressor to kick in once the signal exceeds the threshold. A slow attack time lets inherently fast transient signals pass threshold before compressing the rest of the signal; a fast attack catches transients, but may diminish high-frequency content.

One thing worth noting is that manufacturers sometimes measure attack times differently. Some specify attack time as the time it takes for the compressor to react after the threshold is exceeded, and others specify attack time as how long it takes for the compressor to reach, say, 67 or 90 percent of the maximum gain-reduction level it will ultimately achieve. Fortunately, the exact definition is of little importance, as typically attack time is set by ear. Depending on what kind of effect you're going for, simply decrease the attack time until unruly peaks are tamed or increase it until average levels are lowered and desirable peaks get through unscathed. If you're having trouble hearing your settings' effect, watching a downstream peak-level meter (that is, one that monitors the levels after the

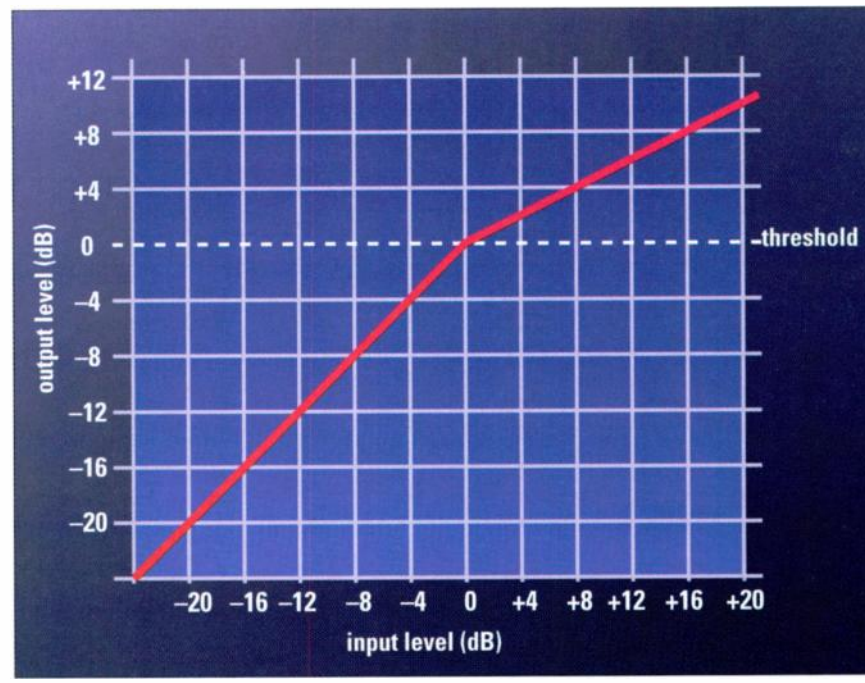


**FIG. 1: A compressor set to a 2:1 ratio with a threshold of 0 dB produces an equal increase in output level respective to input level below the threshold, assuming that make-up gain is kept at unity. Above the threshold, output level rises only 1 dB for every 2 dB increase in input level. The compression curve shown is hard knee.**

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is related to the compressor's threshold control. The knee determines how quickly and smoothly the compressor will transition from no action to the full ratio of gain reduction set on the unit once the signal passes threshold. Generally, a compressor's knee is hard or soft, though some units—the Aphex 661 tube compressor/limiter ($749), for example—provide switchable hard- and soft-knee compression.

In hard-knee compression, the unit processes the audio signal at the selected ratio once the input signal passes the threshold. Although useful for applications such as peak limiting and de-essing (discussed later), a hard knee can sound abrupt, especially with higher ratios.

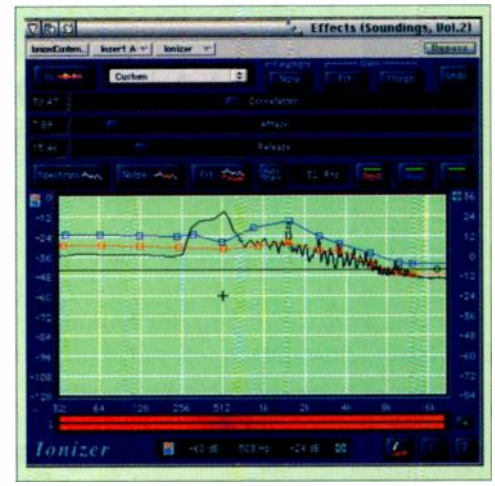
A soft-knee compressor, or one set to soft-knee compression, begins to compress as the signal approaches the threshold level and gradually increases the ratio until the signal attains threshold, at which point it equals the selected ratio value. The gentler, logarithmic increase of soft-knee processing tends to sound more transparent (less noticeable) than hard-knee compression, and thus is usually preferable for most vocals and instruments.

In addition to manual controls for attack and release times, some compressors offer an automatic mode, called auto mode, that does some of the tweaking for you. That is often referred to as program-dependent or adaptive processing. In auto mode, the compressor's detector circuitry analyzes the program content (the audio-input signal) and dynamically adjusts the attack and release times accordingly. For example, if a guitarist starts picking harder, the unit automatically decreases and therefore quickens its attack time to catch the increased peaks. On the other hand, an increase in average levels typically prompts longer release times to avoid pumping while the compressor returns to unity gain.

Auto mode's main benefit is it precludes the need to tweak attack and release settings on performances in which the dynamics change radically. It also lets you set up quickly yet still get good results when the pressure is on. The downside is you lose some control over the sound. For example, you may like those peaks when the guitarist picks harder—in which case you probably would not want to use auto mode.

Some compressors—such as the MindPrint T-Comp Stereo Tube Compressor ($1,099)—offer a semiautomatic mode of operation. As the name suggests, semiautomatic mode lets the attack and release settings exert some influence on the adaptive processing.

Opto-electrical compressors may or may not offer an auto mode; however, even without one, those units provide something akin to automatic processing in that attack and release times—manually set or not—fluctuate based on program content. That is due to the inherent nature of opto-electrical compressors, which in general are slower and less exacting than VCA-based designs. Because the attack and release controls on optical compressors provide only approximate response times, many manufacturers simply put "fast" and "slow" on either side of the knob, rather than hash marks indicating exact times. (More on optical compressors in a bit.)

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## DOUBLE DUTY

Most dual-channel compressors offer *stereo linking*, a feature that lets you run two channels—for example, stereo acoustic guitar or even an entire mix—through the compressor and have each channel be attenuated the same amount. That keeps one side's level from dipping more than the other, which would throw the stereo image out of whack.

True stereo linking works by having the channel that exhibits the most gain reduction determine the gain reduction for the other channel. Another form of linking establishes a master/slave relationship between the two channels in which one side (typically the left) is the predetermined master and the other follows its attenuation pattern.

It is commonly said that compression becomes limiting at ratios of 10:1 and higher, but that is not the entire story. Actually, the detector circuits in compressors and true limiters differ by design. A compressor's detector circuit is usually designed to detect RMS, or average, levels rather than transient peaks. Therefore, transient peaks almost always overshoot a compressor's threshold level, no matter how high the ratio and how fast the attack time is


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set. A true peak limiter, on the other hand, employs a detector circuit that responds to peak energy levels and thus reacts faster.

Whereas all true compressors use RMS-sensing detector circuits, detectors for different models can differ substantially in their reaction times. That means two different compressors set to the same attack, release, threshold, and ratio values may nevertheless respond quite differently to the same signal. (That is one of the many reasons it is difficult to recommend specific control settings for compressing various instruments.)

## CHAIN, CHAIN, CHAIN

Every compressor has a sidechain detector circuit that "sees" when the threshold has been exceeded and tells the compressor's gain-control element or amplifier to attenuate the signal. The sidechain is not in the audio path; it's merely a traffic cop that tells the compressor when to attenuate the signal. The circuits for threshold, ratio, attack, and release are also found in the sidechain.

Full-featured compressors typically provide sidechain inserts on their rear panels. Think of a sidechain insert as an effects loop that patches into a compressor directly before the detector; like the rest of the sidechain, it is not in the audio path, so its effect isn't directly heard. Sidechain inserts therefore let you process the compressor's input signal before it reaches the detector. That permits de-essing and other *frequency-conscious* applications. Here's an example of how to perform de-essing.

To de-ess a vocal, first patch the send and receive from the compressor's insert into an equalizer's input and output, respectively. Next, boost the equalizer's high frequencies and cut its lows and mids. That causes the compressor's detector to hear the vocal as having excessive highs. Whenever the

## STARTING FROM SCRATCH

Here's a quick guide for setting a compressor's parameters. First, make sure the compressor is switched on and set to soft-knee mode. If processing a mono track with a dual-channel unit, make sure the stereo link or "slave" switch is turned off. Also, disable or bypass any other special functions such as tube-saturation circuitry, expansion, and so forth.

Next, set the compressor's ratio to its minimum value, usually 1:1, and the threshold to its highest value. Those settings render the compressor inactive but still in the signal path.

Now, set up the compressor for unity gain throughput. Most units have hash marks—typically labeled 0 dB—screened around the input and output control knobs. If your unit provides those reference marks, set both knobs at 0 dB for unity gain. If no marks are provided, you'll either need to call the manufacturer to find the unity gain for each knob or use a tone generator in conjunction with the unit's input and output meters to determine unity settings. If the compressor has no input meter, you'll have to rely on the manufacturer's word.

To determine unity with a tone generator (the one in your console will do), feed a 1 kHz tone to the compressor's input and set the input-control knob so the compressor's input meter reads the same level as the tone generator's output. Then switch the compressor's meters to show output levels and adjust the compressor's output control knob for the same reading. It's not a bad idea to mark unity gain settings for future reference.

At this point, the compressor is set so that what goes in comes out unchanged in level. You're now ready to make ballpark settings for processing the signal.

Set the attack and release time controls to an average value, usually close to the twelve o'clock position, and the ratio to roughly 2:1 or 3:1. Those mild settings reduce the risk that you will overcompress the signal. Switch the compressor's meters to show gain reduction and lower the threshold until approximately 4 to 6 dB of gain reduction is attained on peaks. It is most important here that the lowest signal levels do not exceed the threshold and trigger the compressor. In other words, make sure the gain-reduction meters do not kick in during soft passages.

Once you've set the threshold, it's time to start varying the ratio, attack, and release time controls and begin listening to the results. If you want more compression, increase the ratio; if you want less, reduce it. Use fast attack and release times for compressing only the peaks. Use slow attack and release times to make a signal sound more dense. Most importantly, let your ears be the guide.

After finding settings that provide the results you want, adjust the output control to make up the gain that was lost to gain reduction. Of course, you can add more or less than that amount if you wish—just make sure you're paying attention to proper gain staging with regard to any downstream gear. That is, don't boost the compressor's output if doing so requires you to lower the input on the next device below its unity gain setting.

These general rules will get you started and prevent most processing mistakes. Once you have some experience, you can tweak settings for more extreme processing. Just remember: the rules are meant to be broken!

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whistling sound of sibilance raises its ugly head, the sensitized detector circuit hears it much louder than it really is, causing the circuit to vigorously reduce gain in the audio path. With attack time set to around 50 µ and release time between 50 and 60 ms, the compressor can be made to quickly attenuate the sibilance and get out so the rest of the vocal is left unchanged. Of course, the compressor's threshold must also be set properly—above the vocal's average levels—for that to work.

You can also use a sidechain insert to make the detector react to a signal entirely unrelated to the audio-input signal. The classic example here is "ducking": a sidechain application in which an announcer's voice is set to trigger a music bed's attenuation. To set up this type of ducker, play stereo music tracks through a dual-channel compressor and patch the voice-over track (or channel) into the sidechain insert's receive jack. Next, set the compressor threshold low enough that it responds to every vocal utterance. When the announcer speaks, the detector hears the voice and instructs the compressor to lower the music bed. You can also use that technique to automatically lower, say, guitar levels whenever a lead vocal comes back in. To accomplish this, patch a mult of the vocal into the insert receive jack of the guitar's compressor channel.

## FREQ SHOW

The misconception that *splitband* compression is the same as *frequency-conscious* compression is common. A splitband compressor splits the audio signal into two or more frequency bands so each band can be processed by its own independent compressor circuitry (each with its own controls). That lets you compress, for example, a guitar's bass frequencies differently from the highs.

A compressor that offers—or is set up to provide—frequency-conscious compression is still a full-band device acting on the entire signal. The difference between it and normal compression is simply that the detector is set to be called into action by the prevalence of specific, user-selected frequencies. Frequency-conscious compression has dozens of useful applications, but space limitations dictate I save that vast subject for a future article.

## DOWN AND DIRTY

Now I'll discuss various types of compressors on the market and which designs and models are best for different recording and mixing applications. I'll start with analog compressors, which can be subdivided into four categories based on the type of gain-control element they use: opto-electrical, Variable-Mu, FET, or VCA. Each design has benefits and drawbacks.

To increase the usefulness of this article, I tested a sampling of compressors chosen to represent the various design and feature sets available. Bear in mind that this sampling is not meant to be comprehensive, nor is it

## DIALING IN HOT SOUNDS

Ask any experienced engineer for suggestions on compressor settings for various instruments and you're likely to be met with a blank stare. He or she is not trying to be evasive. The best settings depend on a host of variables: the type of compressor used, the unit's detector-circuitry response, the amount of peak versus average energy in the track you want to process, the dynamics of the performance, what kind of envelope shape or sound, the outboard gear's noise floor, and on and on. "Use your ears" is a tired phrase, but ears are still the best tools to contextually evaluate the sound of dynamics processing.

Just the same, here are a few ballpark settings for getting great sounds from some of the compressors mentioned in this article. As always, use your ears to make additional adjustments if the initial sound is not to your liking.

**Joemeek C2 power-pop snare sound:** Set the attack and release time knobs fully counterclockwise (CCW) and the compression knob fully clockwise (CW). Boost the input almost to the point of clipping, aiming for 16 dB of gain reduction on peaks.

**Empirical Labs Distressor on electric bass guitar:** Use the "Distortion 3" setting with a ratio of 6:1, attack time set to 2.2, and release set to 2. Tweak the input for 6 to 8 dB of gain reduction on peaks. Those settings preserve some of the instrument's attack, but tame it enough to allow a hotter level in the mix for a fat-sounding bottom end.

**Stereo-linked Aphex Expressors on a stereo rock mix:** Here, optimal settings depend greatly on the mix's spectral balance, the type of music, instrumentation, how much individual tracks were compressed during the recording process, and more. To pump up the levels and add thickness, set both units to soft-knee processing and no low cut in the sidechain, and then dial in a 2:1 ratio, about 10 ms attack time, and roughly 0.2-second release time. Set the threshold to achieve 4 to 6 dB of gain reduction and apply enough make-up gain to print as hot as possible without clipping. If drum hits get softened too much, you can increase (lengthen) the attack time or shorten the release time.

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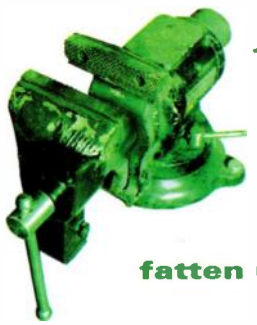
intended to overlook or denigrate units not mentioned here.

An opto-electrical compressor (opto, for short), uses a special opto-electrical cell in its sidechain that consists of either an electro-luminescent panel—basically a night-light—or an LED that shines on a light-dependent resistor (LDR). In simple terms, the light panel, or LED, shines with increasing intensity on the LDR as the audio-input signal gets louder, and the LDR causes a corresponding increase in compression of the audio-input signal. Because the LDR has an inherent memory effect, it releases slower when the light is brighter or has been shining for a while. In practical terms, that means heavy or near-continuous compression results in longer release times.

Vintage-style optos generally have only two control knobs, typically labeled gain reduction and gain. Turning up the gain-reduction knob feeds more signal to the opto cell, effectively lowering the threshold and causing more compression. The gain knob sets post-compression output level, or make-up gain.

As mentioned earlier, opto elements have a natural lag time in their attack response; indeed, all the time constants are inherently adaptive. Optos also have, by nature, a soft knee. For those reasons, opto compressors tend to have a natural-sounding attack and release. The downside is they are usually not quick enough to catch fast transients, so substantial overshoot is not uncommon. Typical applications for opto compressors include vocals, bass, and electric guitar. However, one thing I've learned is not to try to pigeonhole equipment based on general design characteristics.

A case in point is the Joemeek C2 stereo opto compressor ($399). A solid-state unit, the C2 sounds great on snare drum, serving up an outstanding power-pop snare tone with a dark yet explosive attack (see the sidebar "Dialing in Hot Sounds"). The ability to get a defined but warm edge also makes the C2 a good choice for creating crunchy electric-guitar sounds. The C2 also does a surprisingly good job of smoothing out levels on inconsistent kick drum tracks. Whereas some optos respond to such transient material with inconsistent attack and release responses, the C2 is rock steady. You get a bit of transient overshoot, but overall the control is excellent. Overall, the Joemeek C2 is—at least for certain applications—the best compressor I've heard in its price class.



**The Manley can really fatten up a mix.**

Another dual-channel opto compressor that does a good job of reining in kick drum tracks is the Bellari RP583 ($650). This hybrid unit employs a tube circuit for the internal processing and solid-state op amps for the input and output circuits.

An even better-sounding unit on kick drum is Joemeek's SC2.2 stereo optical compressor ($799). The SC2.2 offers outstanding level control yet doesn't thin out the drum sound very much—a universal problem when heavily compressing that instrument. It is one of the best compressors I've heard on kick drum.

In general, opto compressors are not my first choice for compressing arpeggiated acoustic guitar tracks. That's because optos tend to pump in this application; you can clearly hear the level dipping and then recovering. Pumping occurs when the bass frequencies in a plucked note trigger heavy compression, which in turn attenuates highly noticeable mid and high frequencies. That said, the SC2.2 delivers a surprisingly transparent sound on acoustic guitars.

The C2 and SC2.2 also sound smooth, natural, and beautifully warm on vocal tracks. But the most venerable of vocal compressors is the single-channel Universal Audio Teletronix LA-2A Leveling Amplifier ($3,495), a faithful reproduction of the highly coveted, '60s-era LA-2A tube compressor. The LA-2A has an uncanny ability to warm up a piercing or thin vocal, and it smooths the most unruly vocal dynamics with a transparency hard to match in other compressors. The LA-2A also sounds great on bass guitar, kick drum, and snare drum.

Another unit that sounds absolutely gorgeous on vocals is the aforementioned Millennia TCL-2 Twincom, a dual-channel unit with switchable tube and solid-state audio paths for each channel. If you're looking for a compressor with stunning clarity, nuance, and depth, look no further than the TCL-2.

The Anthony DeMaria Labs ADL 1500 ($2,995) is another great opto/tube compressor for recording and processing vocals. It's a dual-channel, vintage-style (two-knob) opto with a fat sound and a soft top end.

Although out of production, the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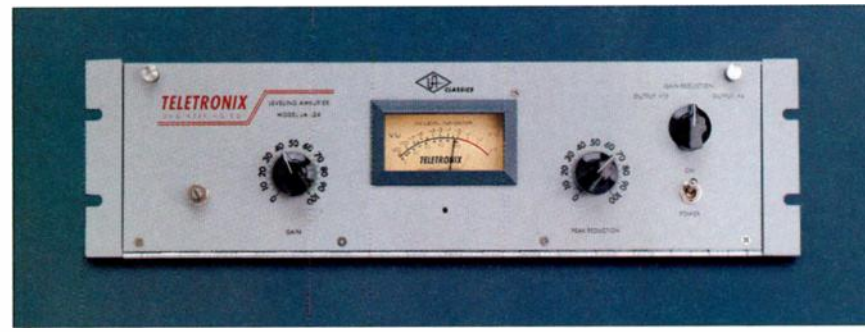



**Universal Audio reissued the legendary Teletronix LA-2A Leveling Amplifier—a favorite for processing vocals.**

Groove Tubes CL1S dual-channel opto/tube compressor is worth mentioning in case you can find one used (the original price was $2,295). The CL1S is one of the most lush-sounding compressors ever made; it imparts rich yet present textures to everything it touches. The unit's only downside is it is quite finicky; it pumps readily if not set up with painstaking care. But for dialing in huge, velvety vocals, thundering bass, or slammin' electric guitar, it's the compressor to get—if you can find one. The CL1S also sounds great on kick and snare.

## CONTINENT OF MU

The first compressors ever made incorporated a Variable-Mu design. Those use a vacuum tube—such as a dual triode or pentode—for the gain-control element. Technically oriented readers will be interested to know that this is a fully differential, push-pull design in which one side of the tube handles the positive waveform phase and the other side the negative phase.

Variable-Mu compressors do not offer an adjustable ratio control. What people love about the Variable-Mu compressors is that they continuously increase their ratio the harder they're pushed (the higher above threshold that the input signal rises), resulting in an increasing desensification of sound. Though Vari-Mu compressors offer faster attack and release times than optos, they are not as fast as VCA designs, and therefore they're not as effective at handling peaks as VCA-based units. Also, as a class, Vari-Mu compressors cannot produce as much gain reduction as other types of compressors because the employed tube typically runs out of dynamic range sooner than other types of gain-control elements. A Vari-Mu usually gets 12 to 15 dB of gain reduction and sometimes considerably more.

Few Variable-Mu models are currently on the market. I am aware of high-end units made by boutique manufacturers such as Manley Labs and Pendulum Audio. Because of design differences, Pendulum Audio's Variable-Mu compressors typically offer faster attack times than Manley's.

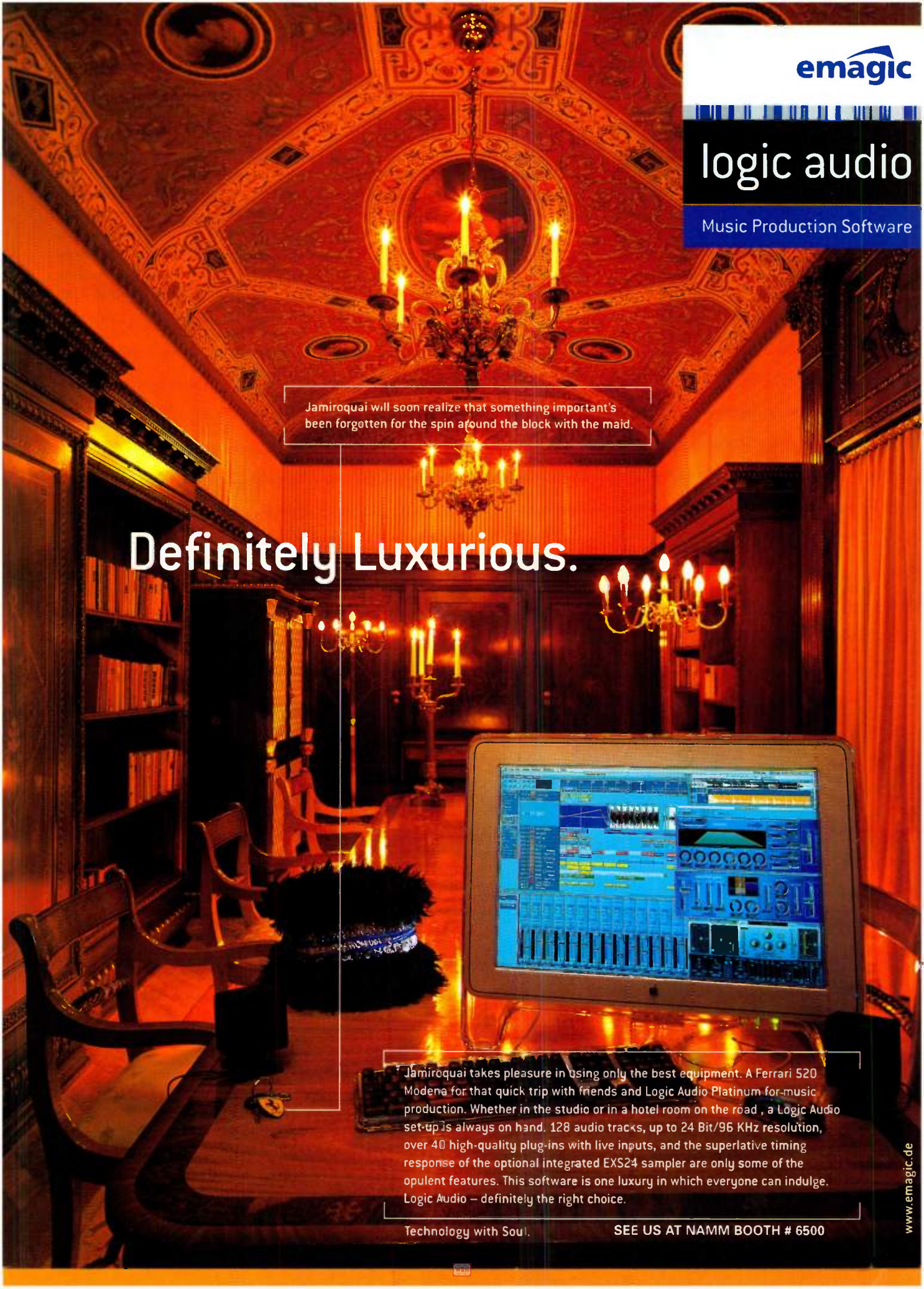
The Manley Stereo Variable-Mu Limiter/Compressor ($4,000) sounds awesome on bass and electric guitar; it imparts a fat, lush tone with plenty of presence and clarity. When set to limit mode, the Manley also sounds great on snare drum. However, the unit is intended primarily as a stereo-bus compressor for processing an entire mix. In this application, I had to keep the attack time near its slowest setting to avoid pumping. But properly dialed in, the Manley Stereo Variable-Mu can really fatten up a mix.


**The single-channel Universal Audio 1176LN Limiting Amplifier ($2,295) is a faithful reproduction of the late '60s-era, FET-based compressor prized for its lightning-fast attack and crystalline sound.**

## FET IN THE CAP

FET-based compressors are scarcely available now. They use an FET (Field Effect Transistor) as the gain-control element, which has advantages and disadvantages. On the plus side, FETs offer attack and release times that are much faster than optos can provide, and even faster than many VCAs. The downside is FETs have a somewhat limited dynamic range. In traditional FET designs, very hot levels can cause amplitude-modulation artifacts (for example, pumping) and waveform distortion.

Crane Song's single-channel Trakker ($2,550) and dual-channel STC-8 ($4,450) compressors use a unique Pulse Width Modulator (PWM) FET design to solve the distortion problem. Unlike traditional FET designs, a PWM FET does not modulate the gain reduction, so there is less distortion at high gain. In technical terms, the PWM is essentially a switch that turns the audio signal on and off at a 1.1 MHz frequency, letting only a percentage of its energy through at any given time to control the gain. A filter rids the signal of switching artifacts. Because the signal is either on or off, it doesn't modulate the gain-control element's resistance or resulting gain reduction. The result is that the distortion content is linear as gain reduction increases. In addition, attack time can be as fast as a few microseconds. Unfortunately, I have not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in the audio path and an auto mode. The 661 features the same ultratransparent VCA 1001 gain-control element, but the audio path sounds a bit veiled compared to that offered in the original solid-state Expressor.)

Another really great VCA-based compressor is the Empirical Labs Distressor ($1,499 for the single-channel version, $2,899 for the dual-channel). The Distressor is a digitally controlled analog compressor featuring a custom Class A VCA and standard Class A/B op amps in the signal path. The digital circuitry actually switches the unit between four different and independent solid-state compressors—all in one box—making for one of the most versatile compressors on the market.

If you buy a Distressor, order the new British mode option, which costs an additional $100. Simply put, British mode "kills." With the right settings, you can make a Distressor in British mode sound a lot like a vintage 1176LN; it serves up unbelievably savage power-pop snare sounds, crunchy guitars with beautifully long sustains, and in-your-face vocals with crystalline highs. (See the sidebar "Dialing in Hot Sounds" for sample control settings.) The Distressor also delivers fat, burpy electric bass-guitar tracks (with British mode turned off) that sound quite similar to what a great tube compressor would produce.

The MindPrint T-Comp Stereo Tube Compressor ($1,099) is a tube- and solid-state hybrid, soft-knee compressor that performs transparently on stereo mixes and acoustic guitar. However, it's quite noisy and lacks the headroom to handle really hot pro levels. Just the same, the T-Comp is a good workhorse compressor for vocals, bass, and snare-drum tracks.

At the bargain end of the VCA price scale is the PreSonus Bluemax Smart Compressor/Limiter ($199). This fixed-stereo unit provides numerous compression presets, and it also offers a manual setting with which you can dial in attack and release times to taste. Despite its low cost, the Bluemax is one of the best compressors I've heard on kick drum. It also provides excellent control of acoustic guitar tracks.

## RUBIK'S TUBE

Many engineers lust after the warm, round tones that great tube gear can deliver. Tubes—especially when driven hard—generally produce more even-order harmonics than solid-state devices and they also tend to saturate in a more gradual and pleasing way. On the other hand, the most pristine solid-state designs tend to offer a more focused sound and slightly better transient response (detail). Both topologies have their place.

Quite a few hybrid devices are available for purchase. Hybrid designs employ both tube and solid-state devices in their audio paths. The dual-topology Millennia TCL-2 Twincom lets you switch between completely independent all-tube and all-solid-state audio paths in the same box.

It's helpful to know a compressor can be marketed as a tube processor and yet

## THE SQUEEZE IS ON: COMPRESSOR MANUFACTURERS

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e-mail sales@aphex.com
Web www.aphex.com

**Arboretum Systems**
tel. (800) 700-7390 or (650) 738-4750
e-mail info@arboretum.com
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**Crane Song**
tel. (715) 398-3627
e-mail staff@cranesong.com
Web www.cranesong.com

**Empirical Labs/Wave Distribution (distributor)**
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e-mail info@wavedistribution.com
Web www.empiricallabs.com

**Joemeek/Peninsula Marketing, Inc. (PMI) (distributor)**
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e-mail themeekman@joemeek.com
Web www.joemeek.com

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Web www.manleylabs.com

**Millennia**
tel. (530) 647-0750
e-mail info@mil-media.com
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**MindPrint/ Steinberg North America (distributor)**
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e-mail info@steinberg-na.com
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**PreSonus Audio Electronics**
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e-mail presonus@presonus.com
Web www.presonus.com

**Rolls Music Corp./Bellari**
tel. (801) 263-9053
e-mail rollsrfx@rolls.com
Web www.rolls.com

**Universal Audio**
tel. (831) 454-0630
e-mail info@uaudio.com
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have a solid-state device—for example, a VCA or opto cell—in its audio path. Some purists insist a compressor is not "all tube" unless the gain control element is also tube-based (as in Variable-Mu designs), but that is not a practical concern. The gain-control element affects the compression curve's envelope, which in turn can affect the sound's timbre. But a well-designed tube output amplification stage can certainly give the lush timbral coloration and depth most folks are looking for in a tube device. For example, the Groove Tubes CL1S combines an opto element with a tube output stage, and that box has incredible warmth and depth.

On the other hand, just because a compressor has a tube in it doesn't mean it's going to give a fat sound. Just by listening to the Bellari RP583, for example, I would never know it was a tube compressor. Also, I've heard other tube units that sound more like distortion pedals than pieces of studio equipment. Generally speaking, you get what you pay for—and the best-sounding tube gear tends to cost a lot.

Interestingly, there are also quite a few solid-state compressors that offer wonderfully warm tones (the Empirical Labs Distressor and Joemeek units immediately come to mind). My advice is to judge each compressor, tube or solid state, on its sonic merits and try not to get caught up in the hype.

## ONES AND ZEROS

One advantage of digital compressors is most of them offer "look ahead" circuitry. (Interestingly, dbx also offers an analog compressor with that feature.) Because the compression algorithm is in software, the compressor can analyze what it is about to process and place the attack time right at the onset of—or even before—the sound, resulting in a zero attack time. However, while a super-quick (or zero) attack time is great for catching transients, it doesn't always sound the best. Therefore, use such power judiciously; the crack of a snare drum without any attack just doesn't sound right.

In addition, digital compressors usually offer incremental control of every parameter imaginable, as well as the ability to store settings for later recall. Perhaps the biggest benefit of working with digital compressors is the ability to stay in the digital domain. If you're working with a digital audio workstation or digital mixer, there are strong arguments for not re-entering the analog circuits. Most importantly, by staying in the digital domain, you avoid the signal degradation and distortion caused by multiple conversions.

If you're considering buying a hardware digital compressor, make sure it has great-sounding A/D and D/A converters. It's also helpful if the software is upgradeable through user-installable EPROM, CD-ROM, or some other user-friendly method. In addition, you should insist on a box with a word clock input. Without word clock inputs, you will be limited to using only one digital compressor at a time.

The main reasons to buy a software digital compressor are easy upgrade

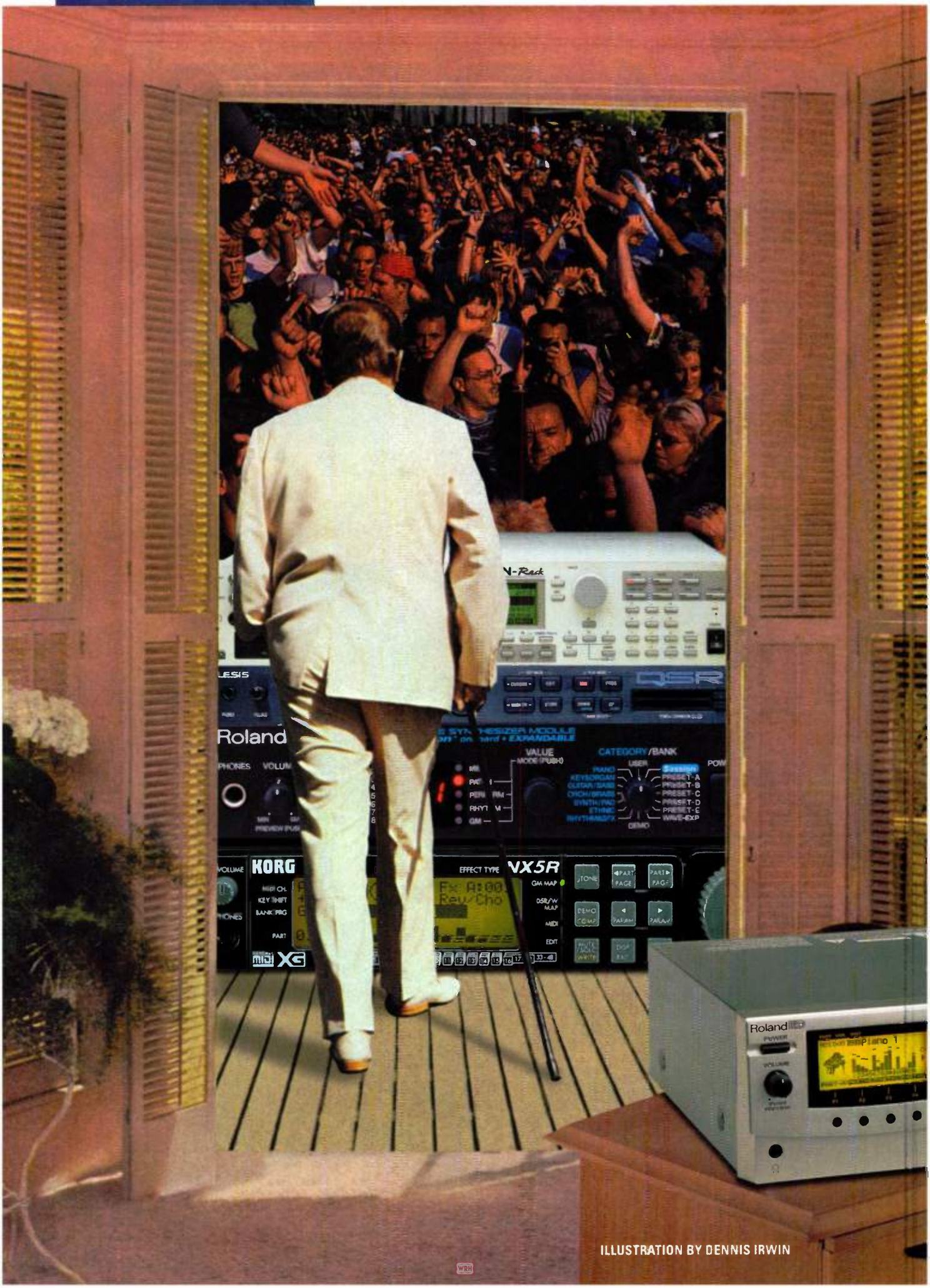



ILLUSTRATION BY DENNIS IRWIN

# GM MODULES for the MASSES

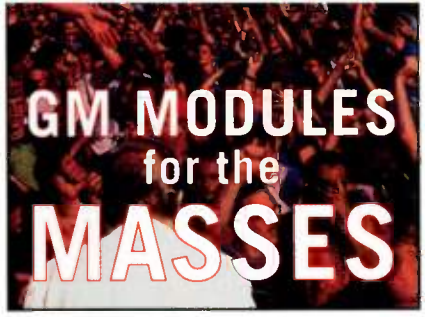
**Our GM/XG/GS sound module roundup reveals some winners with general appeal.**

By Julian Colbeck

In the beginning there was MIDI. Well, actually, there wasn't; there was chaos, at least when it came to communication protocols for electronic instruments. With each manufacturer paddling its own canoe, the time was ripe for a new standard that would let synthesizers and sound modules speak to each another. The development and acceptance of the MIDI specification was a wonderful testament to cooperation within an otherwise contentious industry, and it provided a level of cross-fertilization that had never been seen before.

In 1990, the computer and game industries threw increasing support behind a proposal for an even greater level of MIDI standardization, which would provide more conformity of sounds within a MIDI sequence. General MIDI (GM), as it became known, was ratified at the NAMM show in 1991. It lays down the law about the number of sounds a GM-certified instrument must offer, as well as the sound categories and program change assignments that it must use (see the sidebar "The GM Instrument Set"). It also specifies, among other things, the required amount of polyphony, some controller assignments, and the specific note numbers of individual percussion sounds within multi-sound drum kits (see the sidebar "The GM Drum Kit"). In addition, GM drum kits were assigned to MIDI Channel 10. The introduction of General MIDI brought about a new breed of instrument, and the General MIDI logo began to appear on synths and sound modules from several major manufacturers.

From the start, however, professional users grumbled about the dumbing down and homogenization of MIDI and computer-based music. Although such criticisms were unwarranted, MIDI soon faced serious competition from other camps. Digital audio, which many users deemed as more real, more cool, and more powerful than MIDI, gained suddenly in popularity. And from within the MIDI industry, the trend started to move from multitimbral boxes to more specifically hands-on instruments from new companies such as Clavia, Novation, Waldorf, Quasimidi, and Access.




General MIDI never really recovered from this double whammy. While GM modules continued to sell, and a niche market for Standard MIDI File (SMF) song libraries continued to grow, manufacturers began to show reservations about GM. In essence, they neither knew what to do with General MIDI nor what it could develop into, and that imbued the GM landscape with an almost apologetic air.

With all its problems and perceived unhipness, however, GM is an incredibly useful tool. GM allows a healthy (albeit never foolproof) level of uniformity that is a lifesaver for composers in the game, corporate, and broadcast industries. The Web, too, has benefited greatly from this universal language of musical delivery.

## VARIATIONS ON A THEME

Although the intent of General MIDI was to create a single, uniform playback standard for MIDI sequences, some manufacturers found GM's inherent limitations too restrictive. Roland and Yamaha promoted their own flavors of General MIDI with expanded capabilities. More recently, the original GM, referred to as General MIDI Level 1 (GM1), was updated to General MIDI Level 2 (GM2). Here's a brief description of the variations.

**Roland GS.** Roland's turbocharged GM superset offers additional sounds (a minimum of 226) that are selected by using MIDI Program Changes along with Bank Select commands. MIDI NRPNs (Non-Registered Parameter Numbers) are harnessed to give users an element of sound-programming control over synthesis parameters, such as filter cutoff frequency and envelope shape. A special SFX (sound effects) set is also offered.

**Yamaha XG.** Yamaha's equivalent format expands slightly on Roland's GS format as well as on GM1. It specifies a minimum 32-note polyphony and three separate effects processors, including

## THE GM INSTRUMENT SET

**Piano**
1. Acoustic grand piano
2. Bright acoustic piano
3. Electric grand piano
4. Honky-tonk piano
5. Electric piano 1
6. Electric piano 2
7. Harpsichord
8. Clavi

**Chromatic Percussion**
9. Celesta
10. Glockenspiel
11. Music box
12. Vibraphone
13. Marimba
14. Xylophone
15. Tubular bells
16. Dulcimer

**Organ**
17. Drawbar organ
18. Percussive organ
19. Rock organ
20. Church organ
21. Reed organ
22. Accordion
23. Harmonica
24. Tango accordion

**Guitar**
25. Acoustic nylon guitar
26. Acoustic steel string guitar
27. Electric guitar (jazz)
28. Electric guitar (clean)
29. Electric guitar (muted)
30. Overdriven guitar
31. Distortion guitar
32. Guitar harmonics

**Bass**
33. Acoustic bass
34. Electric bass (fingered)
35. Electric bass (picked)
36. Fretless bass
37. Slap bass 1
38. Slap bass 2
39. Synth bass 1
40. Synth bass 2

**Strings**
41. Violin
42. Viola
43. Cello
44. Contrabass
45. Tremolo strings
46. Pizzicato strings
47. Orchestral harp
48. Timpani

**Ensemble**
49. String ensemble 1
50. String ensemble 2
51. Synth strings 1
52. Synth strings 2
53. Choir aahs
54. Vocal oohs
55. Synth voice
56. Orchestra hit

**Brass**
57. Trumpet
58. Trombone
59. Tuba
60. Muted trumpet
61. French horn
62. Brass section
63. Synth brass 1
64. Synth brass 2

**Reed**
65. Soprano sax
66. Alto sax
67. Tenor sax
68. Baritone sax
69. Oboe
70. English horn
71. Bassoon
72. Clarinet

**Pipe**
73. Piccolo
74. Flute
75. Recorder
76. Pan flute
77. Blown bottle
78. Shakuhachi
79. Whistle
80. Ocarina

**Lead Synth**
81. Lead 1 (square wave)
82. Lead 2 (sawtooth wave)
83. Lead 3 (synth calliope)
84. Lead 4 (chiff)
85. Lead 5 (charang)
86. Lead 6 (voice)
87. Lead 7 (sawtooth wave in fifths)
88. Lead 8 (bass + lead)

**Synth Pad**
89. Pad 1 (new age, fantasia)
90. Pad 2 (warm)
91. Pad 3 (polysynth)
92. Pad 4 (space choir)
93. Pad 5 (bowed glass)
94. Pad 6 (metallic)
95. Pad 7 (halo)
96. Pad 8 (sweep)

**Synth Effects**
97. FX 1 (ice rain)
98. FX 2 (soundtrack)
99. FX 3 (crystal)
100. FX 4 (atmosphere)
101. FX 5 (brightness)
102. FX 6 (goblin)
103. FX 7 (echoes)
104. FX 8 (sci-fi)

**Ethnic**
105. Sitar
106. Banjo
107. Shamisen
108. Koto
109. Kalimba
110. Bagpipe
111. Fiddle
112. Shanai

**Percussive**
113. Tinkle bell
114. Agogo
115. Steel drums
116. Wood block
117. Taiko
118. Melodic tom
119. Synth drum
120. Reverse cymbal

**Sound Effects**
121. Guitar fret noise
122. Breath noise
123. Seashore
124. Bird tweet
125. Telephone
126. Helicopter
127. Applause
128. Gunshot

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- Ambient Realms
- Blues Guitar: *Whiskey, Cigarettes & Gumbo*
- Classic Country
- Classic Drum Machines: *Syntonic Generator*
- Dark Ambient Soundscapes: *Pandora's Toolbox*
- Drum Components: *RADS*
- Drum Tools
- Electro Hip-Hop: *Mac Money*
- Electronica Grooves: *Cyclotronic Resonator*
- Essential Sounds II
- Ethnicity
- Futurist Drum 'n' Bass
- Hip-Hop/R&B Vocals: *Mac Money*
- Industrial Toolkit: *Methods of Mayhem*
- Jazz Solos and Sections
- New York Dance
- On the Jazz Tip
- Psychedelic Guitar: *Harvey Mandel*
- R&B Drums: *Groove Spectrum*
- Sounds of Asia: *Opium*
- Street Beats
- Techno Club Grooves I & II
- Techno Synth Loops I & II
- Textures and Soundscapes: *Rapoon*
- Twisted Reality: *Synthetic Sound Effects*
- Universal Groove Elements
- Voices of Native America
- World Percussion: *Marc Anderson*

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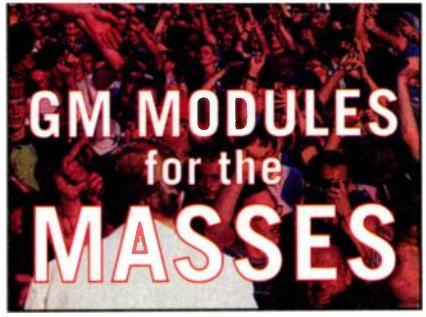


some dedicated effects banks. NRPNs are also supported, and XG specifies a minimum of 480 instrumental sounds. An XG instrument may also include a stereo analog-to-digital input that allows for mixing and processing incoming audio signals.

**GM2.** Ratified late in 1999, General MIDI Level 2 raises the GM1 bar by specifying 32-note polyphony, two simultaneous drum channels (10 and 11), and a host of Control Change (CC) assignments, including filter cutoff, resonance, envelope attack and release, vibrato rate, and a number of Universal System Exclusive Messages (an oxymoron, if ever one was) regarding tuning and chorus/reverb types.

Although the new features laudably take on some of the facilities of Roland's GS and Yamaha's XG formats, the very notion of a GM2 is confusing. It's a bit like the trap of naming a file Final and adding a Final2, Final3, and Final4. Still, GM2 represents an important evolutionary step for General MIDI.

## THE ROUNDUP

With so many software synths and samplers entering the marketplace, do GM sound modules still have a future? Without continued support, we may be seeing the last generation of GM-compliant modules.

Let's take a closer look to see if these relatively unsung heroes can still hold their own in today's music making environment. The following mini reviews focus mainly on the GM characteristics of the instruments. Many units, of course, do much more. Several of the modules in this article are akin to other models from the same manufacturers and offer similar features (see the sidebar "Family Ties"). Past issues of **EM** contain more detailed reviews of many of these sound modules.

All of the units were tested using Steinberg's *Cubase VST* on a Mac, playing an assortment of commercial and noncommercial Standard MIDI File sequences.


**FIG. 2: The NX5R is essentially a Korg NS5R GM1 module with a preinstalled Yamaha TG300 XG-compatible daughterboard.**

## ALESIS QSR

The module version of Alesis's highly popular QS7 and QS8 keyboard synths offers a basic level of GM compatibility at a good value (see **Fig. 1**). This module is strong on synths and keyboards (acoustic piano in particular) and offers expandable sounds.

**GM sounds.** For a company that doesn't specialize in General MIDI instruments, Alesis has made a decent stab at the GM sound set. The pianos and other keyboards work best. The basses are a little clunky, but the drums are good. Unfortunately, the strings and brass are exceptionally dreary, which could prove decisive in a GM assessment.

The basic GM sequences work fine, but as a whole, the sounds don't blend together terribly well, so SMF playback is more satisfying technically than artistically. The QSR also lacks the enhanced features found in GS, XG, and GM2 modules.

**Other sounds, features, and drums.** Although it's not exactly an afterthought, General MIDI is not the main attraction in the QSR. The QSR is, however, a handy box of Alesis sounds, and it's brimming with ultra-high-quality effects. It also provides direct access to ADAT-compatible gear. The sounds include plenty of spangly pianos, Velocity-switching guitar-string things, lush orchestras, raucous organs, indescribably exotic synth patches, and rhythmic Wavestation-style patches. The QSR's drum kits are big and punchy. The drum selection is a bit limited, but the available sounds are eminently usable.

The QSR also features full onboard editing and allows loading personal samples via flash RAM and PC Cards. Each Bank of sounds stores 100 multitimbral Mixes. Two card slots provide access to new sounds.

**Effects and controls.** The QSR provides four separate multi-effects buses for routing chorus, delay, reverb, "lezlie," flanging, resonator, gate, detune, and a host of others. Each effect is fully editable, although users need to stay focused while routing them, especially when choosing effects for a Mix.

Controllers A–D (physically present on the QS keyboard but just "available" on the QSR) provide instant control over Program parameters such as filter cutoff, envelope attack, and modulation. Each Program has its own set of controllable parameters, so experimentation with what's available is necessary. The range of possibilities is impressive: pitch, effects, LFO, filter, portamento, and more.

**Bottom line.** GM alone is not the reason to buy an Alesis QSR. In fact, if GM is anything more than a testing requirement, other modules provide better GM capabilities. If the Alesis way of doing things is favorable, however, or connectivity to an ADAT device is needed, the QSR is worth considering, especially if just GM1 mapping and playback facility are necessary.


**FIG. 1: The Lightpipe-equipped Alesis QSR is a rack-mount version of the company's popular QS7 and QS8 keyboard synths.**

## KORG NX5R

Korg's NX5R is an odd one (see **Fig. 2**). Although Korg has never gone overboard for General MIDI, it has nonetheless produced a few respectable

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If you've ever had occasion to pitch correct a melody line whose key was not exactly clear, or which had too many accidentals to fit comfortably into a conventional scale, you'll appreciate the ATR-1a's new Make Scale From MIDI function. Simply play any line into the ATR-1a from a MIDI keyboard or sequencer and let the ATR-1a automatically construct a custom scale containing only those notes that appear in the line. No muss, no fuss.

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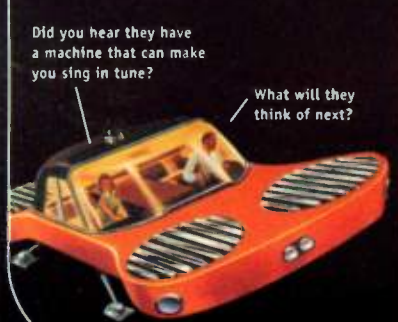


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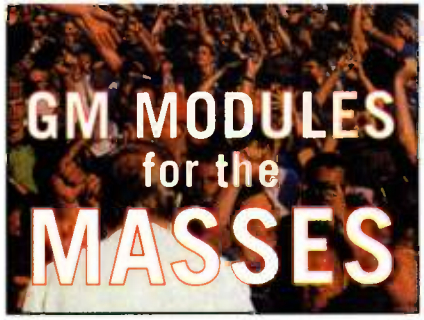


units with basic GM capabilities. The modules, dating back to the 01/W, incorporate the company's highly prized and respected AI Synthesis technology. The 05R/W and X5DR combined Korg-style sounds and programmability with GM compatibility, and the NS5R continued the trend with more (and newer) sounds and drum kits. The NX5R is an NS5R with a preinstalled Yamaha XG TG300 daughterboard.

Just to add to the confusion, the TG300 side of the NX5R has two modes: XG and TG300 (the latter is compatible with standard GM1). It also has two GM banks (A and B). The first is a regular GM1 sound set; the second is compatible with data written originally for Korg's 05R/W.

**GM sounds.** From both the GM1 and Yamaha XG perspective, the NX5R offers excellent support. The guitars tend to be a little stiff, but the keyboards are uniformly good, and even the brass is less embarrassing than on many modules. Within a sequence, the overall gloss of a Roland ED Sound Canvas (covered later) isn't quite there—the individual sounds are good, but they don't blend together that well.

Regular GM sequences work fine, and sequences written specifically for XG or 05R/W also call up sounds within those formats. In addition, users can mix and match daughterboard and internal banks, which is quite handy.

In SMF tests, the NX5R performed well in both GM modes. The only problem concerns sequences that manipulate resonance using MIDI CC 71. The NX5R doesn't implement resonance, so that effect parameter is missing. Similarly, while doing some real-time control from a MIDI controller, filter cutoff, envelope attack, and release are accessible from CC 72 through 74, but not resonance on CC 71.

**Other sounds, features, and drums.** The NX5R's main feature is access to a full set of Korg AI synthesis sounds with full programmability. Editing on the tiny screen is not bad, and the editing capability extends to detailed, individual drum editing within a drum kit. From the nicely designed front panel, users can quickly embellish the current sound with the full range of top-notch Korg effects, and they can easily call up, edit, layer, and use sounds in single and multitimbral (48-part) format.

## FAMILY TIES

Roland's XV-3080 has a sibling in the form of the XV-5080 synth/sample player. This versatile module can load Roland and Akai samples in addition to its huge number of internal and SR-JV80 Series expansion-card sounds. While the XV-5080 retains the XV-3080's GM2 capability, its many pro features take it even further out of General MIDI territory.

Yamaha's MU Series has many extensions and diminutions from the major current models detailed in this overview. The MU50 is an inexpensive, 32-note, tabletop module that offers XG features, including Performance layering. The MU100, with 1,267 Programs and 46 drum kits, is essentially the same as the MU100R, but in a chunky tabletop unit that can still receive PLG expansion boards. The MU90R (R for rack-mount) is slightly less well stocked, with 779 Programs and 30 drum kits, but it still offers 32-part multitimbral operation and 64-note polyphony. Its two independent outputs are useful extras. A/D inputs are present on all of these MU series units.

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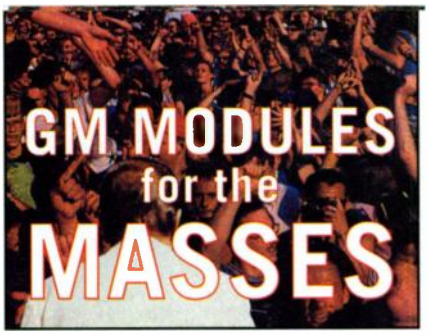



FIG. 6: In addition to GM2 and GS sound sets, the Roland XV-3080 offers over 700 non-GM patches.

of level per Part. The quality is great, but the flexibility is limited without editing software.

Standard CCs 71 through 74 control filter cutoff, resonance, envelope attack, and release. CCs 80 through 83 control tone level for all tones within a patch, as well as standard volume, pan, chorus, and effects level. An external controller will substantially enhance the JV-1010's power, especially if a user wants to store edited patches externally in a sequencer.

**Bottom line.** The JV-1010 is more useful than it is exciting. GM is offered at its most basic level, and even the massed banks of Roland pro-synth sounds are offered only as presets, without editing and storage software. But if buyers want the high-quality sounds that this box offers and only need some access to GM for reference, the JV-1010 offers simple, no-hassle operation at a great price.

## ROLAND MC-80EX

Roland's MC-80EX is a unique instrument comprising a tabletop sequencer and synth engine (see **Fig. 5**). It's actually an MC-80 with the Roland VE-GSPro Expansion Board preinstalled. If it's not everyone's idea of fun, it certainly is practical and extremely useful in live situations for backing tracks or for just playing MIDI files. The GS sound engine is an exact replica of the SC-88 Pro Sound Canvas, widely regarded as the pinnacle of GM sounds and capabilities.

**GM sounds.** The MC-80EX offers Roland's GS format all the way, with more than 1,000 custom-built sounds displaying both depth and quality. The electric pianos are a joy, the guitars and basses are cool, and it features plenty of interesting synths and sound effects. In fact, the MC-80EX boasts only a few less options than Roland ED's top dog, the SC-8850 Sound Canvas.

The MC-80EX offers full compatibility with GM1 and GS sequence data. Its own DD/HD disk drive permits users to load and store sequences in a wide variety of formats, including Roland MC-80, MRC/S-MRC, and SMF Type 0 and 1.

**Other sounds, features, and drums.** First, the MC-80EX is a hardware sequencer. Descended from a long and illustrious line of sequencers that began with the MC-500, the MC-80 is the world's premier hardware sequencer. It has survived in spite of the computer-sequencer revolution because of its dependability, durability, and lack of frills that can easily cloud the creative process. The MC-80 offers 16 tracks, each of which can hold 16 MIDI channels of data. With 120,000-event capacity, 480 ppqn, phrase tracks, arpeggiator, and handy Mark/Jump buttons, this is a professional tool.


FIG. 5: Roland's MC-80EX adds GS support to a standalone tabletop sequencer.

And MIDI drums have almost never sounded better. The toms in Standard Kit 2 are of top quality and indistinguishable from acoustic studio-recorded instruments. The Hip Hop kit instantly creates a vibe, and the Jazz and Brush kits are delicate and subtle. With 42 kits to choose from, you'll find something for every occasion.

**Effects and controls.** The MC-80EX's global effects offer eight each of chorus and reverb. Sixty-four fully editable insertion effects can be applied to the individual Parts (Part = sound + MIDI channel + routing). The effects types include rotary speaker, distortion, auto wah, tremolo, and an assortment of delays and pans.

As a GS sound engine, the MC-80EX offers NRPN control over filter and envelope, as well as control via standard CCs 71 through 74. Filter movements are recordable in real time on the sequencer, which makes this an extremely compact, self-contained purveyor of cool sounds and effects.

**Bottom line.** If not in the market for a hardware sequencer, buyers will unlikely be tempted to buy the MC-80EX purely for its GS sound expansion board. But its availability, especially given the first-class GM job that it does, should provide food for thought. Do artists play live, and would they like to trigger sequence data for control or performance? Do they sometimes curse the limitless landscape of modern software sequencers? Would they like to have sequencers at rehearsals without having to unplug their entire computer systems? If the answer is yes to any of these, the MC-80EX could be a wise investment.

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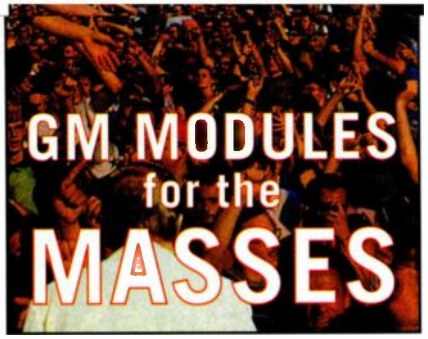


SC-8850 just works fabulously. The screen displays a meter level of MIDI activity per channel and includes a little picture of the first Part's instrument type (for those who don't know what a piano looks like, for example).

**GM sounds.** The SC-8850 has some killer Clavis. Yes, everyone has loads of Clavis, but has anyone ever played a Clavinet? It can produce a wide range of variations in sound, and Roland ED deserves points for exploring many of them.

The same goes for organs. The SC-8850 includes more than 50 patches, covering all the major types and harmonic permutations from Hammonds to Farfisas to church organs, and from rock to jazz to cheese (and is it ever!).

Bass can be tricky to simulate on any synth, but the SC-8850 has many top-notch acoustic basses for applications ranging from rockabilly to modern jazz. The new range of synth basses is great; as the originator of the TB-303, the dance scene's most favored device, Roland does have an advantage here. The lead synth department is less impressive.

The SC-8850 boasts several excellent vocal sounds, including a superb random scat patch and some silky oohs, aahs, and la-las. They're a million miles away from those ghastly duhs and dahs that infested Eurotrash dance music a decade or so ago. In addition, the SC-8850 offers a spectacular collection of sound effects—urban street noises, heartbeats, and scratches—along with component sound effects, such as slides, scrapes, buzzes, and clicks.

For SMF playback, the SC-8850 provides a stylish and glossy delivery of most GM formats. Some variations occur in terms of articulation, but the basic mapping and sounds are excellent.

**Other sounds, features, and drums.** You're always in GM mode on the SC-8850, so the sounds tend to be more defined and straightforward than on a regular synth. That's not to say they're dull, though; the pianos are deliciously rich and vibrant, and you have almost instant access to alternate sounds (by pressing the Vari button) and the ability to flip through Variation tones.


**FIG. 7: Roland ED's SC-8850 Sound Canvas provides excellent-sounding GM1, GM2, and GS support, as well as USB connectivity.**

Being able to audition a sound in context (as it plays) by pushing a single button is a nice feature that's now on all Roland synths, but serious sound designers may miss being able to freely combine sounds.

The SC-8850 is awash in grade-A drum sounds and drum kits. With 63 kits to choose from, there is something for everyone, from gentle country brush work (the second Brush kit is a gem) to rampaging techno. It represents world music particularly well, with one Asian, one Ethnic, and two Gamelan sets. The multicultural world of hip-hop is similarly represented, with a full range of classic Roland beatboxes, three Rhythm FX banks, and a dedicated Hip-Hop kit—another killer set.

**Effects and controls.** One push of the SC-8850's Effects button reveals a host of reverb and time-based effects that can be applied to the overall sound. The front panel is wonderful to navigate: it's crystal clear and nicely limited. More specific effects can be added as insertion effects at the Part level. These include rotary speaker, distortion, and amp simulation.

The SC-8850 is a dedicated GM unit, but it's not merely a static box; it has a few tricks up its sleeve. An external controller can dial into the filter cutoff, resonance, and LFO parameters for real-time control via GS NRPNs. Users can store edited sounds (actually, an edited Part) in any of 256 User Instruments and can apply lowpass resonant filtering, reshape the envelope, apply effects, and set the LFO—all that normal people (as opposed to professional sound designers) are likely to need day to day.

**Bottom line.** Controlling the SC-8850 directly from its front panel or from a computer is a cinch, and the sounds are clean, numerous, and totally professional. From all perspectives, this is as good as GM has gotten to date, and frankly, that's pretty darned good.

## YAMAHA MU100R

Yamaha's most current professional XG rack-mount unit, the MU100R (see **Fig. 8**), offers a large number of sounds (based on the company's AWM2 technology) with a surprising degree of flexibility. Notable features include mono mode operation, VL voices, auto harmony, and detailed voice editing. This module has plenty to investigate.

**GM sounds.** The MU100R boasts impeccable XG material throughout. The basses, both acoustic and synth, are particularly good. The acoustic pianos are


**FIG. 8: Yamaha's MU100R features not only GM1 and XG sounds but VL-series modeled sounds, quality effects, and ease of operation.**

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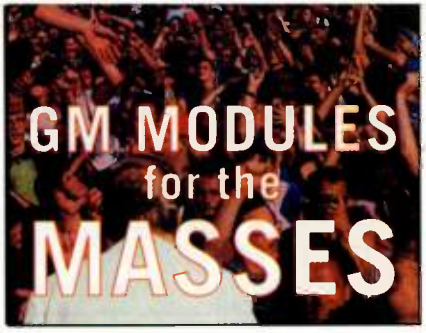


whole thing to one set of stereo outputs—very neat.

If musicians still hunger for more sounds, they can retrofit the MU128 with up to three new XG plug-in boards: the PLG100-VL (Yamaha VL modeling sounds), PLG100-VH (vocal harmony), and PLG100-DX (FM synthesis). The plug-ins expand the number of sounds as well as the polyphony. That's impressive.

Many of the drum kits have a level of realism and fresh air that isn't commonly found on most synths, much less a GM unit. My personal favorites include Ambient Kit and Rock Kit 2, with excellent, un-MIDI-like hi-hats. XG allows for detailed editing of drum sounds, so you can tweak individual drum filtering, individual volume, and the application of effects.

**Effects and controls.** Effects have always been a strong suit for Yamaha (especially the XG modules), and the MU128 is almost overwhelmed with effects options. Six effects banks are available: three system effects (reverb/chorus/variation), two insert effects for individual Parts, and a five-band EQ that is applied globally.

As with the MU100R, the MU128 offers real-time access to filter cutoff, resonance, basic envelope parameters, effects levels, and more, using NRPNs as well as CC numbers 71 through 74. Users can also set up (per Part/MIDI channel) dedicated footpedal or Breath Controller control over basic sounds and effects parameters.

**Bottom line.** Although onboard sound editing is only at the individual Part level and is more an offset than actual editing, XG is an incredibly powerful engine to dive into, which you can do with XG editing software.

The MU128 clearly offers more GM bang than any other module on the market. XG is an extremely powerful system, but it can often seem like a dense and complicated programming language. The MU128's additional power is therefore only available to those who are motivated and able to access it. Such endeavors, however, will be richly rewarded.

**FIG. 10: The battery-powered QY70 is a portable workstation with GM1 and XG sounds, a sequencer, and editable effects.**

### YAMAHA QY70

Yamaha's QY70 is a battery-operated, walkstation-style, music production gadget that can slip into a raincoat pocket (see **Fig. 10**). But size should not be case for dismissal. This blinder of an instrument's XG sound set can deliver sequences and real-time filterable music with aplomb. Size is not everything.

**GM sounds.** The QY70 offers top-notch XG sounds. Yamaha's finest may still not quite reach the pinnacle of Roland ED's Sound Canvas, but with 519 AWM2 patches, this is way more than a basic instrument. The pianos and

## GM Sound Module Specifications

| Company | Model | Price | Type | GM Format | Maximum Polyphony |
|---|---|---|---|---|---|
| **Alesis** | QSR | $649 | rack-mount 1U | GM1 | 64 |
| **Korg** | NX5R | $725 | half-rack 1U | GM1, XG | 64+32 |
| **Korg** | Triton-Rack | $2,500 | rack-mount 2U | GM1, GM2 | 60 |
| **Roland** | JV-1010 | $595 | half-rack 1U | GM1 | 64 |
| **Roland** | MC-80EX | $1,295; $495 for GS Expansion | tabletop | GS | 64 |
| **Roland** | XV-3080 | $1,795 | rack-mount 2U | GM2 | 128 |
| **Roland ED** | SC-8850 Sound Canvas | $1,195 | half-rack 2U | GM1, GM2, GS | 128 |
| **Yamaha** | MU100R | $1,195 | rack-mount 1U | GM1, XG | 64 |
| **Yamaha** | MU128 | $1,295 | half-rack 2U | GM1, XG | 128 |
| **Yamaha** | QY70 | $600 | tabletop | GM1, XG | 32 |

keyboards are great, as is the collection of basses, especially for dance music.

Because the QY70 has a built-in sequencer, you might not think it would work well as a standalone module, but it does. All GM and XG sequence data is delivered crisply and clearly, but with only a single stereo output.

**Other sounds, features, and drums.** The QY70 is a cleverly designed music-production gadget with raw material of more than 4,000 preset MIDI phrases. It also includes a chord sequencer and chord templates, as well as preset and programmable pattern sequencing capability. With 480 ppqn resolution, this box is no slouch, and anyone can offload sequences onto a more sophisticated sequencer.

It has plenty of gutsy drum kits, including Hip Hop and Jungle kits (even if they only use a dozen or more sounds that differ from the Standard kit). Two effects kits are also provided, but the selection of sound effects is not huge.

**Effects and controls.** As with the other Yamaha modules, the QY70 boasts nice effects. Eleven types each of reverb and chorus are included, along with more than 40 Variation effects that users can apply to an individual Part. The effects are fully editable and controllable in real time.

The external control is much better than you would think. Strangely, such things as filter and resonance (with XG NRPNs) can be manipulated only when using the QY70 simply as a box of sounds. In other words, it doesn't offer the same level of control with internally generated sequences. CCs 71 through 74, however, are supported.

**Bottom line.** This is a deceptively powerful instrument that is quite capable of holding its own as a mid-level GM unit for sequence playback, testing, and other tasks. The limited number of audio outputs may be a deterrent, and operating an instrument the size of a PalmPilot is not everyone's idea of fun. On the other hand, for recent graduates of Game Boy Color, the QY70 is a remarkable tool on which to discover and produce cool music.

## WRAP-UP

Keyboards of one sort or another are always safe from the threat of software as long as keyboard players continue to be the largest group of instrument buyers. Nonetheless, software sound sources are replacing sound modules. Scarcely a day seems to pass without the announcement of another plug-in synth.

Although computers frequently make stage appearances these days, running a trio of plug-ins in a sweaty club could be a risky venture. Sound modules, on the other hand, seldom crash, and touring musicians can still pack them in their gig bags if they want to practice in hotel rooms.

As the jack-of-all-trades in the world of electronic music, General MIDI modules have evolved into powerful and versatile tools for the widespread distribution of MIDI music. As this roundup shows, General MIDI and its offshoots provide more than a simple set of standards for playback; they offer an impressive set of features with great potential for creativity. If some musicians have been ignoring GM sound modules because they thought they were for amateurs and game players, it might pay to take a closer look. These boxes definitely deserve some respect.

**Julian Colbeck** *devised the idea for the Twiddly Bits MIDI Sample series on the first Roland Sound Canvas SC-55. Since then he's been a keen GM user as a musician, writer, and head honcho at Keyfax Software.*

| GM/GS/XG Sounds | Other Sounds | Drum Kits | MIDI Ports | Audio Outputs | Other Ports |
|---|---|---|---|---|---|
| 128 | 640 | 16 | In/Out/Thru | stereo ¼"; stereo ¼" aux | ADAT, serial |
| 1,117 programs | 56 | 512 combinations | In/Out/Thru | stereo ¼" | serial |
| 1,664 programs | 1,664 combinations | 144 + 9 ROM GM2 | In/Out/Thru | stereo ¼"; ¼" S/PDIF, ADAT (Lightpipe) | 4 individual |
| 768 | 18 (2 GM) | | In/Out/Thru | stereo ¼" | serial |
| 1,117 | 42 | | 2 In/2 Out/Thru | stereo ¼" | none |
| 768 patches | 64 performances | 16 | 2 In/Out/ Thru | stereo ¼"; 6 individual ¼" | none |
| 256 user | 63 | | 2 In/2 Out | (2) stereo RCA | USB, serial |
| 100 preset | 100 user performances | 10 | In/Out/Thru | stereo ¼"; 2 individual ¼" | serial |
| 100 preset | 100 user performances | 47 | 2 In/Out/ Thru | stereo RCA | serial |
| User edits per song only | 20 | | In/Out | stereo RCA | serial |

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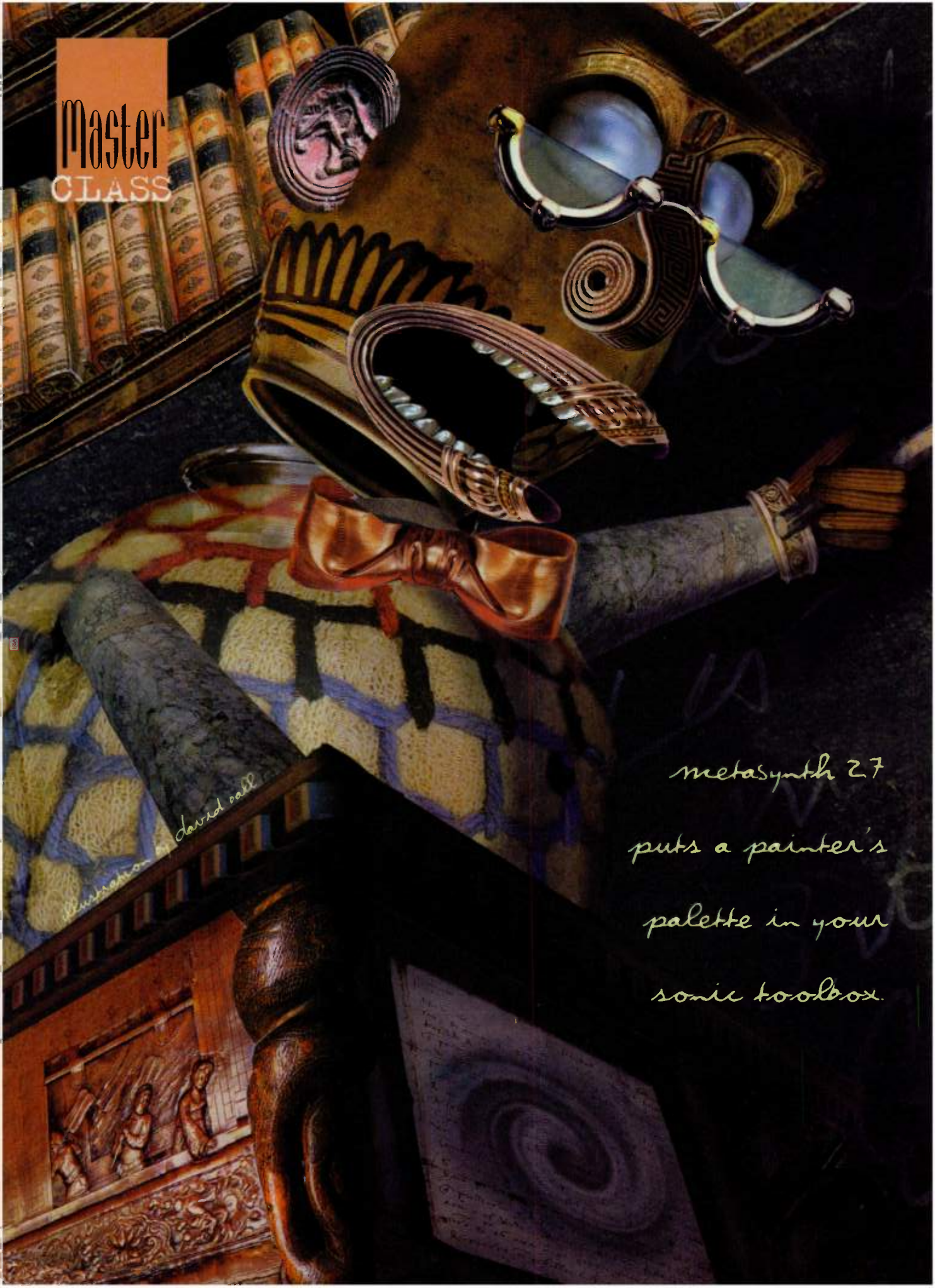


Illustration by David Hall

metasynth 2.7 puts a painter's palette in your sonic toolbox.

# MASTERING META SYNTH

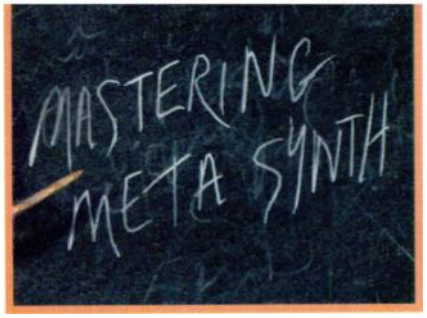
by Len Sasso

The multifaceted *MetaSynth* 2.7 sample editor and synthesizer from U&I software offers a broad range of DSP functions. But what really sets it apart is its palette of graphic sound-design tools. Not only can its Image Synth turn images into sound, but it also converts sound files to sonograms for graphic manipulation and resynthesis. *MetaSynth*'s assortment of standard and not-so-standard DSP tools offers a range of possibilities not found anywhere else. This makes it an essential tool for both sound designers and composers.

Yet because *MetaSynth* is such a deep program and, frankly, doesn't conform to conventional Mac interface design, unlocking some of its mysteries requires a bit of know-how. In this article, I will provide an overview of some of *MetaSynth*'s more advanced features, including the Image Synth, the extensive array of filters, and the Cross Convolution tool. Along the way, I'll touch on other aspects of the program, but keep in mind that this only scratches the surface of *MetaSynth*'s capabilities.

## IN THE HEART OF THE IMAGE SYNTH

To fully appreciate the uniqueness of *MetaSynth*'s Image Synth, here's a brief look at how it works. At its heart, the Image Synth is a graphics editor with tools specially selected for sound manipulation. In converting a picture to sound, think of each horizontal line of pixels as representing a single note that will play the built-in synthesizer or a sample of your choice (the sound-making option is called the "rendering source"). The line's vertical position indicates the note's pitch, the horizontal position marks its position in time, and the line's length shows its duration. The line also provides time-varying volume and pan information for the note: changes in brightness control volume, and changes in color on the red/green scale control pan position. (The RGB spectrum's blue component doesn't affect the sound.)




Pictures are rendered into sound using a variety of sound sources, including a variable-waveform oscillator, a sample player, a multisampled instrument, a pseudo-FM synth, and a granular synth. The Image Synth can be approached as a kind of glorified piano roll–style note editor or as a sound canvas for painting and analyzing sound files. The view you adopt during any session will greatly influence how you use *MetaSynth*'s many graphic-editing tools, and it will also affect your choice of rendering sources. I'll describe both approaches in this article.

**Analyze this.** Analyzing sound files is a good way to get acquainted with the Image Synth. The process is as simple as loading a sound file into *MetaSynth*'s Sample Editor, switching to the Image Synth, and selecting "Analyze current sound . . . (n)" from the File submenu (shown as the disk icon at the top left of the Image Synth; see **Fig. 1**). *MetaSynth* performs an FFT (Fast Fourier Transform) analysis of the sound file and displays an editable sonogram. If you then render this image using sine waves, you will get a resynthesized approximation of the original sound file. The quality of the resynthesis depends on the resolution you have chosen for the horizontal (time) and vertical (frequency) dimensions of the Image Synth.

**Fig. 1** shows the Image Synth Palette (top) together with an analysis of the spoken word "welcome" at three resolutions. The Image Synth's frequency resolution is controlled by the scale selected from the Map menu at the top right of the window. From left to right, the three analyses were made using the Semitone, Micro8 (eight divisions per whole tone), and Micro16 scales. As seen in the pictures, higher resolution (that is, more frequency bands) results in a finer analysis of the sound file.

**Getting around in the Image Synth.** The Image Synth's tools and pop-up submenus are arranged along the image area's borders. Some of the tools are invoked by a single mouse click, and others by clicking and dragging in one or two dimensions. In the latter case, the Shift key constrains dragging to the horizontal, and the Shift+Option key combination constrains dragging to the vertical dimensions. Double-clicking on many of the drag tools provides access to additional parameters, and many Image Synth functions can be invoked by keyboard commands.

The Image Synth's time resolution is controlled by the Tempo and Duration dialog, which is opened by double-clicking on the watch icon on the top border. Because the sound file's length is measured in samples and the Image Synth's width is measured in pixels, the natural unit of time resolution is samples per pixel (SPP). Fewer samples per pixel means higher time resolution

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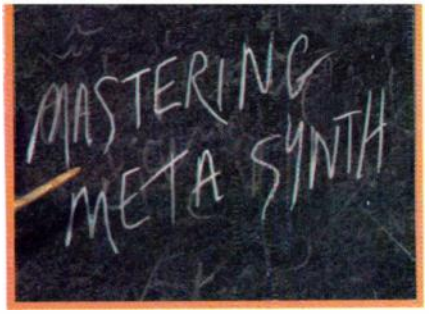


but requires correspondingly wider pictures for the same size sound file. (Once you select the picture width using the Size *x* menu, *MetaSynth* can calculate the SPP setting required to fit the sound file into the Image Synth.)

From left to right, the three analyses in **Fig. 1** were made using 343, 171, and 85 SPP settings.

To better illustrate the differences in resolution, the pictures at the bottom of the figure show only the first few octaves of the analysis. There is, of course, a good deal of information above this, as you can see from the full view of the Image Synth (top of **Fig. 1**). In an analysis using microtonal scales, typically you will find large vertical clusters of pixels because the analysis smears over adjacent frequencies. During rendering, if the playback phase relationships are exactly right (or better said, exactly wrong), clipping can result. The solution is to lower the amplitude of the rendering input source. If this source is *MetaSynth*'s Wave Table Palette, simply use the Scale Tool (third button from the left) while holding down the Shift and Option keys.

**Sound file resynthesis.** Although resynthesizing an analyzed sound file may seem pointless, many interesting variations can be produced by applying the Image Synth's graphic tools to the image before resynthesizing. A simple starting point is to change the Image Synth's resolution by altering the tuning, Frequency Map, or SPP setting. For example, try analyzing a short speech clip with the Micro8 scale. Then change the scale setting to Micro12 and render the clip at twice the SPP. Also try to set the tuning (using the tuning-fork icon on the top-right border) an octave higher.

Another effective approach is to change the input source used for rendering the picture. Again, analyze a speech clip. With the sound file still in the Sample Editor, render the image at four times the SPP using the Sample Granular input source. (The Sample Granular method is new in *MetaSynth* 2.7.) You'll hear four somewhat different versions of the original clip because the grain must cycle through the sample four times to render the elongated picture. As an alternative, choose Narrow Noise from the Sounds menu before rendering the image with the Sample Granular input source. This produces a kind of outer-space radio effect, but the words remain intelligible. Finally, try applying some of the filters from *MetaSynth*'s Filter Palette to the noise sample before rendering.

**Pitch and time effects.** *MetaSynth* has three effects groups for quick picture modification (that is, modifications that you don't have to paint in with the brush tools). The Hot Filters that are invoked using the buttons along the Image Synth's lower-right border are time based; they modify horizontal

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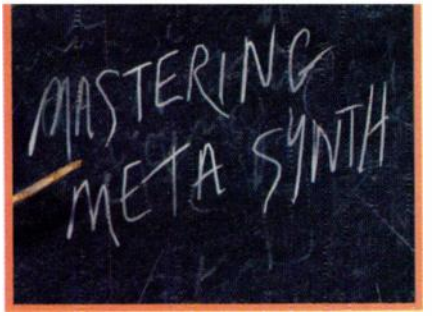


aspects of the picture. The effects available on the Pitch and Harmonics submenu (on the left border with the notes icon) are pitch based and modify vertical aspects of the picture. Finally, the effects on the Process submenu (on the left border with the water-drop icon) modify the picture in both dimensions.

Because you're working graphically, you're not restricted to using any of these effects in their intended dimension. For example, applying a pitch effect to time is as simple as rotating the picture 90 degrees. Of course, there's a tool for this, too. The button on the bottom border with the quarter-circle icon can be used to rotate pictures by dragging or by using numerical values. One effective application of this technique is to use the Add Harmonics pitch effect to generate an accelerating echo or "bouncing ball" effect.

This process works best with short, percussive hits with a little silence at the end. (If the sound file you're analyzing has no silence at the end, increase the SPP setting by about 20 percent after fitting the Image Synth to the sound file.) The first step is to multiply the picture's horizontal dimension (Size *x*) by four and set the vertical dimension to match. Next rotate the picture 90 degrees counterclockwise by double-clicking on the rotate tool and entering "–90" for the rotation amount with "Wrap around" turned off.

Echoes are created by adding harmonics for each pixel in the picture. Harmonics are integer multiples (2:1, 3:1, and so forth) of the fundamental frequency. New pixels need to be inserted on the rows that represent those frequencies in the same columns as the original pixels. The Image Synth's Add Harmonics process does this, and because it works relative to the chosen Frequency Map, you can spread out the harmonics by choosing one of the micro scales (Micro32 and Micro50 are good choices). Once you've chosen a scale, select Add Harmonics from the Pitch and Harmonics submenu. If you hold the Option key while doing this, you will get more harmonics, hence more echoes.

The last steps are to rotate the picture 90 degrees clockwise and restore the original Frequency Map. The harmonics now become echoes of the original pixels, and they die out because the Add Harmonics process adds harmonics with decreasing intensity. An interesting variation is to rotate the picture a little more or less than 90 degrees clockwise at the end—this will make the echoes rise or fall slightly in pitch.

**Stealing the groove.** A nice thing about analyzing a rhythmic sound file is that its groove comes along for free. **Fig. 2** shows the steps taken to analyze the groove of a 2-bar bass loop. At the top, the bass loop is analyzed in semitones at 32 pixels per beat. Low resolution is fine and even preferable here, because the goal is not to resynthesize the sound, but rather to find the accents.

This sound file is particularly easy to analyze, because though most of the action is in the bottom register, the string slap leaves a trail in the higher harmonics. Therefore, you can throw away the bottom part of the image and still retain the groove. This can be seen in the second frame from the top in the figure. In some cases, you may need to manually clean up the picture a little. The "Shorten" Hot Filter and "Noise Filter" options on the Processes submenu are helpful for that purpose.

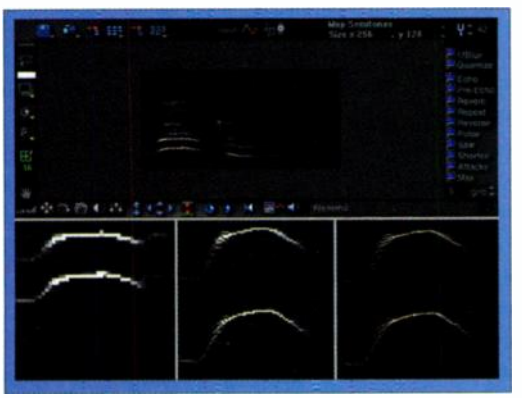

**FIG. 1: You can create and modify pictures to render as sound files in the Image Synth (top). You can also analyze sound files to produce sonograms such as the three analyses of the word "welcome" shown at the bottom.**

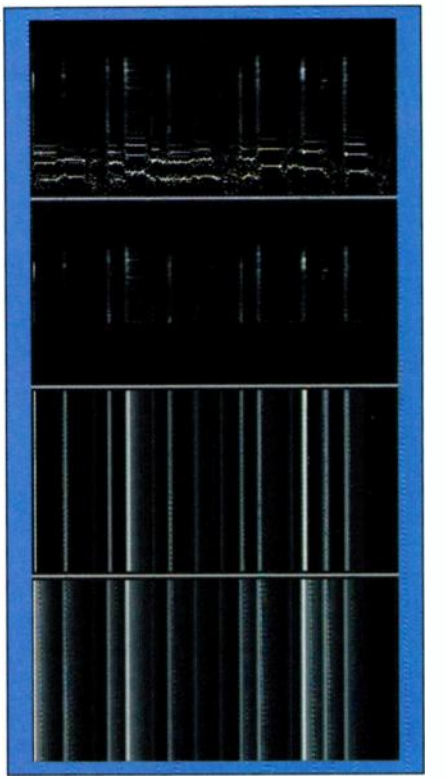

**FIG. 2: This groove filter (bottom) was created from a bass loop's sonogram (top) by isolating the string-slap portion of the sound (second from top), creating vertical bars (third from top), and adding some reverb for smoothing.**

The next step is to use the "Max" Hot Filter to turn the beats into bars, as shown in **Fig. 2**'s third frame. When you apply this particular effect, the program determines the brightest pixel in each column and gives all of the pixels in that column the same brightness value as the brightest pixel in their respective columns. (The Pitch and Harmonics submenu has a similar function for pitch.) Notice that the groove bars are rather narrow. You can use the "Reverb" Hot Filter with a small grid size to expand the bars and make a more effective filter (**Fig. 2**, bottom).

Once you have a groove filter, you can use it for filtering pictures or sound files. In either case, because the filter is imposing the groove, the effect works best on nonrhythmic source material. Try copying the groove filter to the

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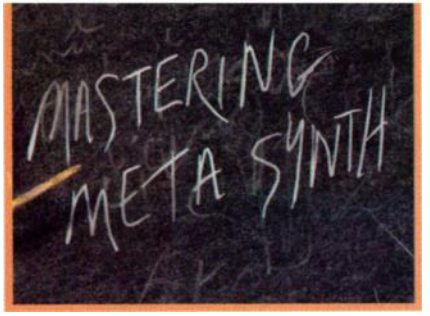


Image Synth's clipboard (type the C key), then opening *MetaSynth*'s Filter Palette and pasting the filter (type V). Change the original loop to noise in the Sample Editor, and apply the filter to the resulting noise sound file. You might mix this with the original sound file or use it as a source for *MetaSynth*'s Convolve and Formant Filter Morph operations. As an alternative, you could apply the groove bars to one of the other filters in the Filter Palette. Just type Shift+8 to filter whatever is in the Filter Palette with the groove-bars image on the clipboard.

**Vocoder-like effects and the Filter Palette.** A variety of DSP techniques, in effect, impose the time-variant frequency spectrum of one sound file (typically speech) on another sound file (usually pitched or noise). *MetaSynth* provides four such processes on its Morph menu: Cross Convolve, Formants Filter, Osc Bank PhaseVocoder, and Convolve. You can also produce a wide variety of these kinds of effects by using filters in either the Image Synth or the Filter Palette. The use of groove filters, described previously, is one way to produce such an effect.

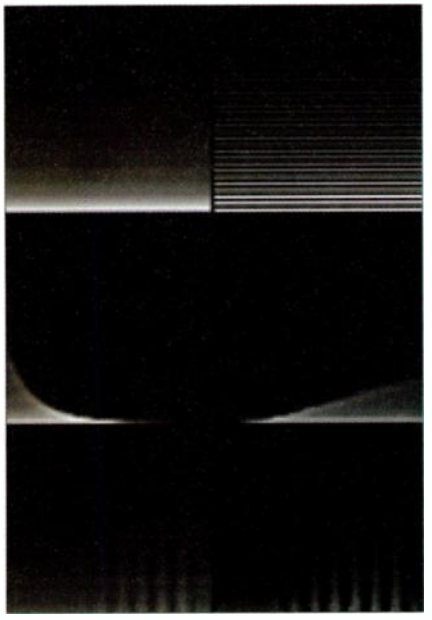

**FIG. 3: These sonograms resulted from analyzing typical synthesizer sounds with an exponential scale in which each row is a harmonic of the fundamental. The sounds are: sawtooth and square waves (top), sawtooth with decay and attack envelopes (middle), and sawtooth with volume and filter LFO (bottom).**

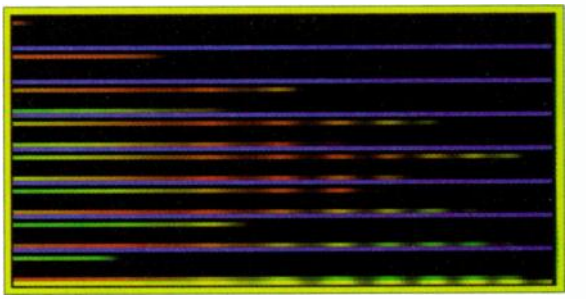

**FIG. 4: *MetaSynth*-style additive synthesis is accomplished by creating lines for each desired harmonic. In this figure, the harmonics have been panned (red/green aspect) independently, and some tremolo (intensity variation) has been added at the end. The blue lines serve as a grid but don't affect the sound.**

*MetaSynth*'s Filter Palette is similar to the Image Synth, except that it has fewer tools (for example, no Hot Filters), and the window size, Frequency Map, and tuning are fixed. The window size is 256 (horizontal) by 128 (vertical) pixels, and the Frequency Map is in semitones tuned to the pitch A1. Keeping these limits in mind, you can transfer pictures freely between the Image Synth and the Filter Palette. Just make sure that the Image Synth's parameters are set to match the Filter Palette's. The active filter library is shared between both windows so that when you open or change a filter file in one, the change is reflected in the other.

Using the Filter Palette for vocoding is a simple matter of transferring a sonogram of the source material to the Filter Palette and applying it to any sound file with sufficient harmonic content to produce intelligible results. As a quick example, set the Image Synth's dimensions to match the Filter Palette, load a short speech sound file into the Sample Editor, fit the Image Synth duration to match the sound file, and analyze the sound by typing N. (The reason to analyze the sound file in the Image Synth is that analysis in the Filter Palette produces a reference template rather than a filter.) Now copy the sonogram to the Image Synth's clipboard and paste it into the Filter Palette. With the sound file still in the Sample Editor, select "WhiteNoise" from the Sounds menu. This creates a noise sound file of the same length. Apply the filter by clicking on the Filter Palette's Synthesize button (the Mac icon on the bottom border).

As with resynthesis, the ability to graphically manipulate the pictures used as filters distinguishes this process from run-of-the-mill vocoding. The five tools at the bottom left of the Filter Palette—scaling, rotation, offset, contrast, and displacement—are particularly effective. For example, the scaling tool used horizontally provides time compression and stretching without formant or pitch shifting; the offset tool provides pitch and formant shifting without affecting time; and the displacement tool provides a variety of effects from simple vibrato to a total mangling of the sound. Each of these can be used by clicking and dragging in one or two dimensions or by double-clicking to enter parameters numerically.

**Stereo and color.** The images shown here have all been black and white, which means the analyzed and rendered sound files have all been mono. *MetaSynth* can also analyze and render stereo files when the Image Synth is in stereo mode. (To switch between stereo and mono modes, click on the sample icon in the middle of the top border.) If you analyze a stereo sound file in mono mode, *MetaSynth* analyzes the left (red) channel.

Analyzing mono sound files is faster, and for things like groove analysis, it is generally a better choice. Once you have analyzed a file in mono, however, you may want to convert it to stereo in the Image Synth. This is handy for rendering stereo effects and creating templates in the silent blue channel.

When the Image Synth is in stereo


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mode, a blue-grid submenu appears on the top border. You can use this to create various horizontal and vertical grids quickly, and you can paste the clipboard's contents here. In the case of a groove analysis, setting the grid size to 16 and typing G produces blue gridlines at eighth-note intervals. The gridlines give you a guide against which you can compare the groove to straight eighths. If you copy the groove analysis to the blue channel, you can utilize it as a painting template. You can also use the blue-grid submenu to apply the image on the blue channel as a filter.

**A little of this, a little less of that.** The Image Synth is easily configured for additive synthesis, and with the use of both graphic and audio filters, it produces a unique collection of synth-like samples and multisamples. **Fig. 3** shows Image Synth analyses of six typical analog synthesizer sounds: unfiltered sawtooth and square waves (top row), sawtooth with decay and attack filter envelopes (middle row), and sawtooth with LFO applied to volume and filter cutoff (bottom row).

These analyses were made with a custom Frequency Map in which each row's frequency is a harmonic of the bottom row's frequency. Rendering these with sine waves gives a reasonably accurate additive replica of the original sound. However, because the phase relationships between the harmonics can vary with each rendering, the resulting sound

## AUDIO SEQUENCING WITH METASYNTH AND METATRACK

*MetaTrack* is a 16-track audio sequencer companion to *MetaSynth* that is included on the *MetaSynth* Studio CD. Like *Xx* (see the sidebar "MIDI Sequencing with *MetaSynth* and *Xx*"), it will not replace your digital audio sequencer, but it is specifically designed to make creating montages of rendered presets a seamless process. Each track has independent pan and volume control as well as one optional insert effect. Your CPU's speed and your hard disk, as well as the number of insert effects used, determine how many tracks can be auditioned. Because the final mix is not done in real time, you can always mix a full 16 tracks including effects.


**FIG. A: *MetaTrack* allows sound files from rendered *MetaSynth* presets to be arranged on separate audio tracks with independent pan, volume, insert effect, and fade curves. The top tab shows the presets in the preset library. Below it are displayed 6 of the 16 possible audio tracks.**

*MetaTrack* and *MetaSynth* share preset libraries, and *MetaTrack* searches for split-stereo sound files with the default *MetaSynth* names "Sound##.L" and "Sound##.R." *MetaTrack* also lets you assign any sound file to any library preset. However, when it does this, it creates a sonogram of the sound file and replaces the preset graphic with this sonogram. Because these changes are automatically saved to disk, the original graphic is lost in the process.

For this reason, it is advisable either to create a new preset library or copy an existing one for use in any *MetaTrack* project. It is also a good idea to create a preset and associated sound file for each sound used in a montage. For example, if you render a preset and apply a filter or effect to it, then wish to use both versions, you should create a new preset for the processed version. Finally, keep all files related to a montage—preset library, sound files, montage files—in a separate project folder.

**Fig. A** shows the *MetaTrack* window. The tab below the menu bar contains the preset library. Below it, six audio tracks are displayed, and below those are shown various transport, display, and editing controls. When you click on the speaker icon to the right of the library tab, the associated sound file plays. If no sound file with the default name is found, you will be prompted to select one. You can also double-click on the preset to reassign its sound file.

You fill in the audio tracks in *MetaTrack* by dragging presets onto them. The presets are snapped to an invisible grid measured in pixels, which you can set in *MetaTrack*'s Preferences. By default this is set to 32 pixels (that is, one standard *MetaSynth* beat). You can also set the size of a measure in pixels (128 by default) and the tempo in samples per pixel (SPP). When you open a preset library, *MetaTrack*'s tempo is already automatically set to that of the first preset.

If you have *MetaTrack* and *MetaSynth* running at the same time with the same preset library (the standard operating procedure), several shortcuts can facilitate creating and editing a montage. From *MetaSynth*, the F9 function key will cause the picture in the Image Synth to be rendered, saved to disk, and saved as a preset replacing the currently selected preset and sound file. In the other direction, *MetaTrack*'s MetaSynth menu contains several options for processing the selected preset in *MetaSynth*, including opening it for editing, rerendering it, and applying *MetaSynth* filters or effects.

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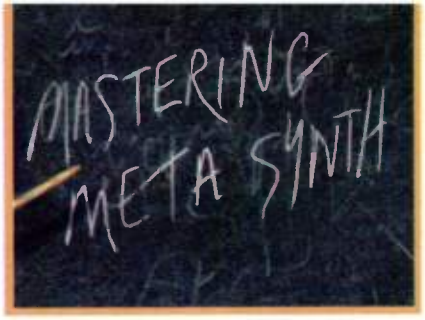


does not have the same graphic waveform. A sawtooth rendered additively, for example, does not look like a sawtooth in the Sample Editor.

**Add 'em up.** For pure additive synthesis, an exponential Frequency Map should be used. Other custom scales can be used for additive synthesis, but typically they should contain at least as many steps per octave as the picture height, and the steps should bear some harmonic relationship to each other (more on this in a moment).

Building an additive sound in the Image Synth gives you control over each individual sine component's amplitude and pan envelopes. For each component, start with an empty window and use the Line brush to create a line at the desired harmonic (that is, row). Then use filters or the Filter brush to color and contour the intensity of the line. Finally, save the line as a preset, clear the Image Synth, and work on the next harmonic. Saving the individual components as presets lets you mix and match them later to create any

## MIDI SEQUENCING WITH METASYNTH AND Xx

*Xx* is a 16-track MIDI sequencer included on the *MetaSynth* Studio CD. Although it is fairly rudimentary in some respects and won't replace your full-featured MIDI sequencer, it has some interesting and unique features for automatic pattern generation and manipulation. Its simplicity, combined with easy linking to both *Beatnik* and QuickTime Musical Instruments for playback, also makes it an excellent MIDI sketching tool.

The real reason for *Xx*'s existence, however, is to facilitate the transfer of MIDI files to and from *MetaSynth*. These can be MIDI files created directly in *Xx* or imported as Standard MIDI Files (SMFs) from some other source. The more obvious use—transferring MIDI files to *MetaSynth*—is a great improvement on entering music note-by-note with *MetaSynth*'s Note Brush tool. The reason to do this at all is, of course, to use specifically *MetaSynth* techniques to turn the MIDI file into a sound file. These might include anything from graphically editing individual notes to applying large-scale horizontal (time) and vertical (pitch) modifications, such as adding echo, reverb, or harmonics.

Converting graphics to MIDI files (that is, transferring pictures from *MetaSynth* to *Xx*) can also be useful, though the considerations about rendering high-density graphics also apply to converting them to MIDI files. In short, you can produce a wide variety of note patterns by using some of *MetaSynth*'s brush tools (albeit sparingly), then converting the picture to a MIDI file.

*Xx* was designed to convert graphics to MIDI files, which makes using it with *MetaSynth* extremely simple. **Fig. B** shows *Xx*'s Export to *MetaSynth* dialog, where you'll notice a number of settings that affect the transfer. The Export menu at the top left lets you decide how the sequence will be exported: as a picture file, as a new preset I library with or without separating tracks, or as presets added to any existing preset library you select. *Xx* uses 16 samples per pixel and assigns Middle C (262Hz) as MIDI note number 48 by default. Because the Image Synth's default resolution is 32 samples per pixel and *MetaSynth* Instruments assign Middle C to MIDI note number 36, *Xx* automatically compensates when exporting presets by halving the tempo in the Image Synth and transposing down an octave. When you export as a picture, however, only the graphics are exported. You will need to make any time and tuning corrections manually.

The Harmonic maps at the lower left of **Fig. B** let you differentiate between how high- and low-velocity notes are translated. For example, you can add harmonics to higher-velocity notes. This works like a velocity crossfade rather than a velocity switch. The Poly/Mono switch determines whether only the active *Xx* track or all tracks are transferred. Remember that the Export menu determines whether multiple tracks are exported as separate pictures. The Controller settings on the right affect the velocity sensitivity and the transfer's attack/release characteristics.

**FIG. B: *Xx*'s Export window provides control over various aspects of the transfer of MIDI files to pictures for use in *MetaSynth*.**

There are fewer choices when importing pictures in *Xx* (note that this is not restricted to pictures generated by *MetaSynth*). The options are to separate the red, green, and blue channels to individual *Xx* tracks or set an intensity threshold below which pixels will not be imported. The threshold applies to lines rather than individual pixels; if any pixel in a line is above the threshold, the whole line is imported.

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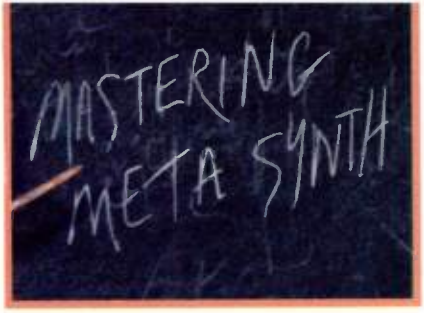


number of sounds. You can do this by recalling the first preset, copying it to the clipboard (type the C key), recalling the next preset, adding the clipboard data to it (type E), copying the composite result to the clipboard, recalling the next preset, and so on.

A faster approach is to work on several rows at a time. You could do this by creating a horizontal blue grid and using it as a filter to select groups of rows. To quickly create the grid, activate the blue channel, set the Hot Filter Grid Size to the desired row spacing, type G to create a blue grid with this spacing, and use the Rotate tool to rotate the grid to horizontal. If there is unevenness in the grid, drag the Contrast and Luminance tool to the right to eliminate the contrast. Next select the red and green channels, type I to invert the empty Image Synth to full yellow, and select "Filter with Blue" channel. As before, use filters and the Filter brush to contour the remaining lines, then save the image as a preset. After you've filtered the full-yellow image with the blue channel, use the Arrow keys to move the remaining lines up and down as desired to create the other harmonics.

**Fig. 4** shows an example with blue gridlines spaced eight rows apart, harmonics added on two rows within each



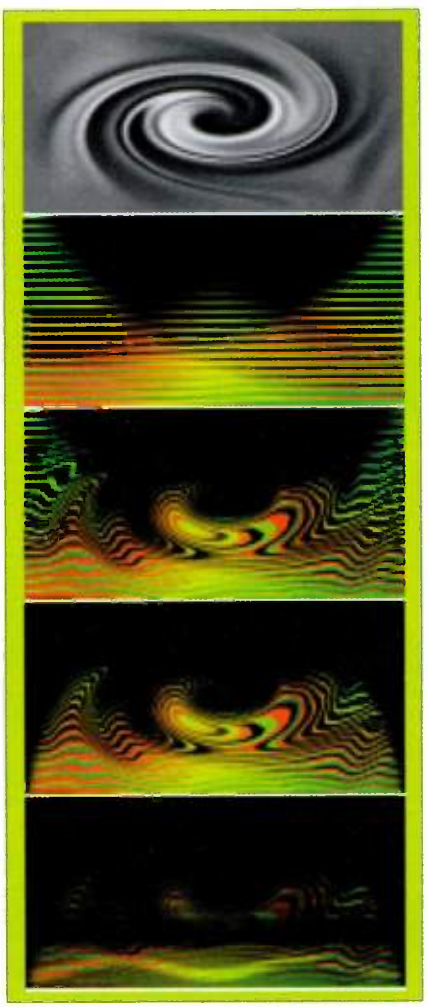

**FIG. 5: Displacement is one of the many graphic tools *MetaSynth* provides for manipulating an additive-synthesis image. From top to bottom, the frames show the displacement map; the original additive image; the result of displacement; fade-in and fade-out filtering; and phasing and lowpass filtering.**

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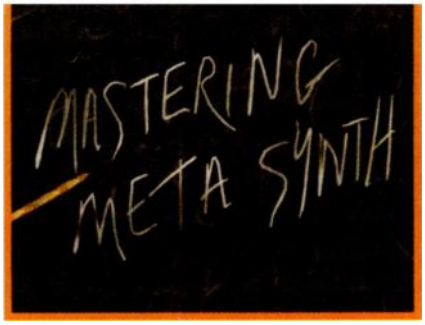


section, and the fundamental in full yellow at the bottom. An increasing tremolo was added to the right half of the image. You can render this image, then use the resulting sample in the Sample Editor as a sound source. (See the sidebar "MIDI Sequencing with *MetaSynth* and *Xx*" to see how you can use standard note sequences to trigger sounds.) However, the standard disadvantages apply: the sample's length and tremolo speed will change when transposed, and the upper harmonics will become unnaturally shrill at higher pitches. Building a multisample will produce better results for use in either a *MetaSynth* Instrument or another sampler.

To build a multisample, simply render the image using different tunings. Spacing by major or minor thirds usually keeps the speed changes of any motion (for example, tremolo) within acceptable limits. Additional lowpass image filtering for each octave change in pitch knocks down the shrillness. Finally, appending the tuning pitch to the end of each sound file's name will facilitate building instruments from the multisamples in *MetaSynth* and many other samplers. In *MetaSynth*, selecting "Build Instrument" from the Instruments menu—then selecting any of the sound files—results in all of the samples being loaded, set to the correct root pitch, and correctly mapped relative to the semitone Frequency Map.

**Beyond the norm.** You can produce interesting and unusual samples by using custom scales and some of *MetaSynth*'s more graphic tools. One of the most interesting ways to create a custom scale that works well for additive synthesis is to analyze the harmonic spectrum of some sampled sound. This technique works with any sound, but pitched sounds work best. Once you have loaded a sound file, select a region in the sustained part of the sound and choose Instant Spectrum from the Morph menu. *MetaSynth* extracts the harmonic spectrum of a small clip at the selection's beginning. To import the spectrum file as a custom scale, first select Custom Scale from the Frequency Map menu. In the Custom Scale window, hold the Option key and click the Open icon (the disk with the upward-pointing triangle). Use these custom scales to build additive samples as you would with the Exponential scale.

The Displacement tool stands out as one of the more creative tools for image manipulation. This tool moves pixels in the Image Synth based on the intensity of pixels in the displacement-map picture. **Fig. 5** (middle frame) shows the result of applying the displacement map shown in the top frame to the picture shown below it. Displacement can be applied with or without automatic smoothing; smoothing is usually desirable in this context.

The Filter Palette is another place to turn for sculpting unusual sounds. One thing to remember is that graphic filters can be applied to any selected part of a picture. The bottom two frames in the figure illustrate this—first, semicircular filters were applied to the right and left quarters, then a phasing filter was applied to the bottom horizontal section, and finally, a lowpass filter was applied to the middle horizontal section. The resulting picture produces various speechlike effects when rendered with harmonic-spectrum Frequency Maps. You can also use the Hot Filters or groove filters, like the bass groove described previously, to add rhythm and motion to the sound.

When applying filters, keep in mind that any *MetaSynth* filter can be applied in two ways: graphically to a picture before rendering or as a 128-band EQ to the sound file in the Sample Editor. Applying a filter graphically is generally harsher because its effect is absolute—filtered-out pixels make no contribution to the sound. Audio filtering, on the other hand, produces resonant peaks and valleys.

## EVEN MORE TOOLS

*MetaSynth* provides a broad range of DSP tools. Some of these are found on the Transform and Morph menus, and among these some have their own unique graphic interfaces. A typical example is the CrossConvolve window shown in **Fig. 6.**

Cross convolution is one of the vocoder-like effects mentioned earlier. It operates on two sound files by performing an FFT analysis of each and multiplying the resulting spectra. The effect is similar to analyzing both sound files in Image Synth, then using one image to filter the other. However, cross convolution uses much higher resolution. Because image filtering is simply pixel-by-pixel multiplication, it is symmetric. It makes no difference which picture filters the other. The same is true of cross convolution.

*MetaSynth*'s approach to cross convolution provides independent envelopes for mixing each of the source sound files with the cross convolution. Some familiar graphic tools are provided across the bottom of the envelope window, and you will find wave-shaping tools along the right edge (see **Fig. 6**). In the figure, the sound file in the Sample Editor is faded in (green envelope), while the sound file on disk is faded out (red envelope). The cross convolution fades in and out with a bell-shaped curve (blue envelope). To hear the result of cross convolution by itself, flatten the red and green envelopes at the bottom and flatten the blue envelope at the top.


**FIG. 6: The CrossConvolve window offers separate envelopes for the sound in the Sample Editor (green envelope), a sound file on disk (red envelope), and the cross convolution of the two (blue envelope).**

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**FIG. 8: *MetaSynth*'s Effects Palette applies DSP effects to sound files in the Sample Editor. The Inertia effect shown here simulates sympathetic vibrations.**

**Loop Bassix.** Here's an example of how you might apply cross convolution along with the *MetaSynth* processes described above to produce variations of a bass loop. First load a bass loop into the Sample Editor, fit the Image Synth duration to it, and analyze the loop to make a groove filter (see the section "Stealing the groove"). Save the groove filter in the Filter library.

With the bass loop still in the Sample Editor, select a small clip with as much harmonic content as possible and make an Instant Spectrum from the clip. Then select Custom Scale as the Frequency Map and import the spectrum as a scale. (To have the spectrum recognized as a scale file, hold down the Option key when clicking on the import-scale button—the disk icon with an upward-pointing triangle.)

Next clear the Image Synth and paint or recall a picture suitable for additive synthesis (see the section "Add 'em up"). Ensure that the Image Synth's duration still matches the bass loop's length and that its Frequency Map is set to the spectrum scale from the previous step. Then either render the picture and filter the resulting sound file in the Filter Palette or graphically filter the picture before rendering. Save this sound file to disk, so you can recall it for each application of cross convolution.

The final step is to cross-convolve the sound file with the original bass loop a number of times using different envelopes. To keep the various convolutions consistent and have the original bass loop high in the mix, set the red envelope to a horizontal line fairly high in the window and modify only the green and blue envelopes for each variation.

Once you have a number of variations on the original bass loop, you can use them in your audio sequencer or sampler, or you can use *MetaTrack* to create composite loops (see the sidebar "Audio Sequencing with *MetaSynth* and *MetaTrack*"). You can also quite easily build composite loops directly in the Image Synth.

**Taking note.** The simplest way to gain access to all the loop variations as rendering-input sources is to first build an Instrument from them. (See the end of the section "Add 'em up" for an Instrument-building shortcut.) Because you probably don't want to play the loops at different pitches and speeds, they should be mapped to consecutive notes. This will restrict you to working in a vertical region of the Image Synth, which has a height determined by the number of loop variations. Use the blue channel's Line tool to mark this region's upper and lower boundaries.

**Fig. 7** shows a note sequence for combining six bass-loop variations from the previous section. To create this sequence, the picture width was set to 128 and the duration was fit to the original bass loop, then multiplied by 8. As a result, a line 16 pixels wide will play the loop once. The Note brush was set to a width of 16/1 so that one click enters a 16-pixel line one row high. The Snap Grid (the green grid on the left) was turned on and set to 16 so that entered notes will be quantized to a 16-pixel grid. The horizontal blue gridlines indicate the outside boundaries of the Instrument's note map.

The long notes were painted in first with a yellow Note brush. They were then colored by applying a colorizing filter and faded in and out using a black Filter brush. Rendering the file using the Instrument as the input source at this point would cause each loop variation to fade in, pan across the stereo field, and fade out. The short notes at the top (four pixels wide) were entered later to double the beginning of each loop with a different variation. Each one plays the loop's first quarter at the opposite side of the stereo field from the longer line at the identical horizontal position. Of course, you can do a great deal more with the Image Synth's brushes. This example indicates the complete control you have over volume and pan envelopes and shows how quickly you can enter note sequences.

**FIG. 7: *MetaSynth*'s Note brush creates piano roll–style note sequences like the one shown here. The blue gridlines do not contribute to the sound. The color variation of the red/green lines represents panning, and the intensity variation represents volume.**

## JUST FOR EFFECT

In addition to the effects on the DSP and Transform menus, there are 14 effects accessible from *MetaSynth*'s Effects Palette (see **Fig. 8**). A pair of these—Harmonics and Inertia—use the waveform's harmonic spectrum in the Wave Table Palette to color the sound file. Four others—Stretch, Grain, Shuffler, and Harmonize—use granular-synthesis techniques. Here's an example using a couple of the more unique effects to process the composite bass loop from the previous section.

The Inertia effect simulates sympathetic vibrations based on the waveform's harmonics in the Wave Table Palette. Used sparingly, this can add

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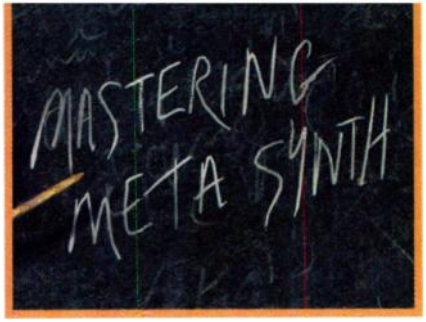


subtle and effective resonances to any sound. Applying it to a sound file's different segments using different waveforms in the Wave Table Palette adds variation to an otherwise repetitive loop. In the context of the bass-loop composite, try applying different Inertia to each quarter (for example, four bars) of the sound file. Save the sound file for reuse later.

The Grain effect breaks the selected portion of the sound file into *grains* that are then fed into and played out of the "grain engine" at different rates. In the process, the playback order can be randomized to varying degrees. This can produce everything from subtle time-shifting effects—when the in and out rates are close and little or no randomization is present—to complete mangling of the sound file with widely varying in and out rates and heavy randomization.

Try processing the Inertia-processed composite bass loop in two halves as follows: set the grain size to quarter-note length (if you have eight two-bar loops as above, this amounts to dividing the entire sound file length by 64). Set the Input Step and Output Step to one-quarter of this value and set Randomization to zero. Audition the loop, and you'll hear little if any difference from the original. Now select the first half of the sound file, increase the Input Step setting slightly, and apply the Grain effect. Next select the sound file's second half, decrease the Input Step to as much below the Output Step value as it was above it, and apply the Grain effect. Finally select "Mix 50%" from the Morph menu and mix the sound file with the Inertia-processed sound file on disk.

Using Cross Convolution, Inertia, and Grain one after the other as described here may be a bit over the top, but it shows that you can get intelligible results even with that much processing. Nevertheless, when it comes to effects processing—in *MetaSynth* as with any application—less is usually more.

## TWO STEPS FORWARD

This article began with sound-file analysis, which produced sonograms in the Image Synth. This is an excellent way to get a sense of what kind of graphic is needed to produce a specific type of sound. Sound-file analysis is also a powerful tool for rhythm, pitch, and harmonic analysis. In the section "Analyze this," you glimpsed several analysis and resynthesis processes that are greatly facilitated with graphic tools, and in some cases impossible without them. Next I looked at *sound painting* using the model of additive synthesis. In addition to using the standard overtone series, I employed custom-designed harmonic structures, including those derived by analyzing other sounds. I then used both graphic- and audio-filtering techniques to modify the sounds before assembling them as multisamples for use in *MetaSynth* Instruments or other samplers.

Finally I explored a few of *MetaSynth*'s vast array of DSP processes, which range from the standard to the exotic. Here I used a subtle mix of additive synthesis and cross convolution to produce variations on a bass loop. I then strung the variations together and processed the result with resonating and granular effects. A functional bass loop with the same pitch and rhythm remained, but with a lot of harmonic variation.

*MetaSynth* is a deep and complex program, and this article is a bit like skipping a stone across a pond's surface. Although I've touched on the program's basic elements, much time can be spent exploring any feature without mastering it completely. As seen here, you can also get usable (and unique) results quickly. So don't be put off by the program's complexity; roll up your sleeves and get started.

---

**Len Sasso** *wrote the* Wizoo Pro Guide to MetaSynth. *For more information or to share tales from the meta-trenches, visit www.swiftkick.com or e-mail him at len@swiftkick.com.* *Special thanks to Edward Spiegel of U&I Software.*

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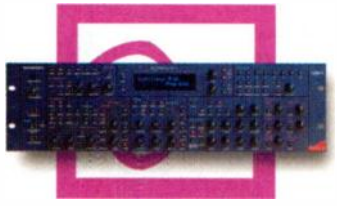

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DESKTOP MUSICIAN

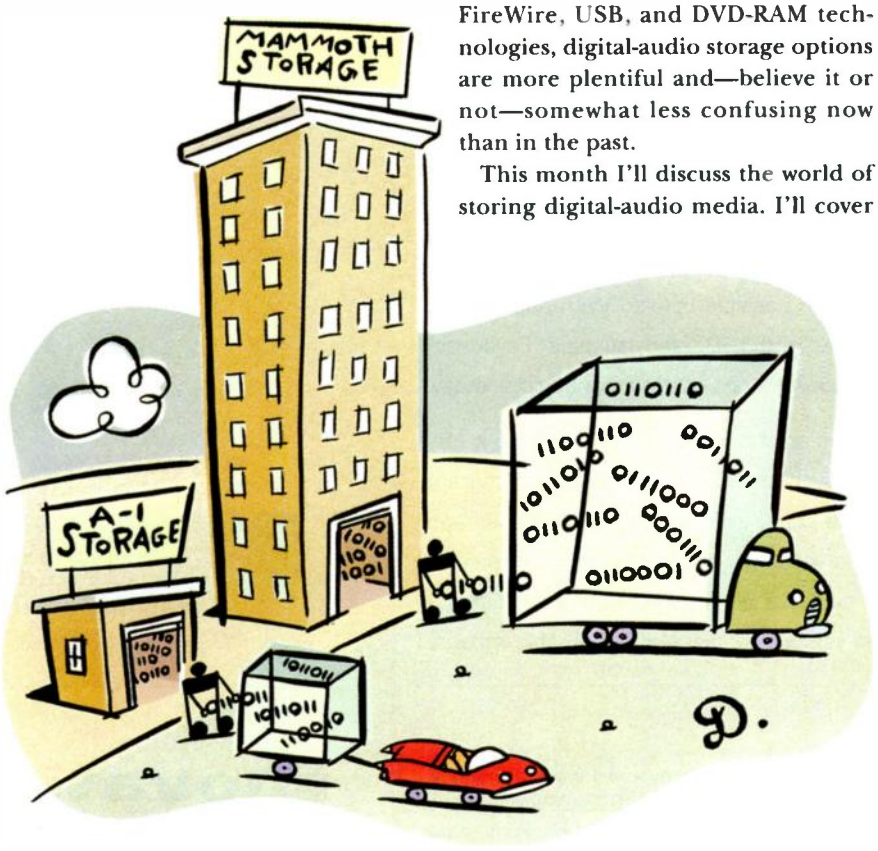
# U Store It

***Shopping for storage devices doesn't have to be confusing.***

By Brian Smithers

In the desktop recording world, it's all about the bits. Whether you capture them 8, 16, or 24 at a time, be prepared to record, distribute, and store bits reliably and in large quantities. Fortunately, with the advent of FireWire, USB, and DVD-RAM technologies, digital-audio storage options are more plentiful and—believe it or not—somewhat less confusing now than in the past.

This month I'll discuss the world of storing digital-audio media. I'll cover what's new, what's best, and what lies ahead. This will help you sort out what's appropriate for your needs—whether you're stoking the star-making machinery or just making your own kind of music.




JACK DESROCHER

## HARD TIMES

There are several factors to consider when assessing a studio drive, whether internal, external, or removable. One of the most important specifications is, unfortunately, often the hardest to come by: *sustained throughput*. That is the measure of the rates at which data can be read from the disk and squeezed through the pipeline steadily during an extended period. Most general-purpose applications tend to read a chunk of data at one time and then process and display it while the disk takes a breather. Recording and editing audio, however, requires a steady stream of bits.

Manufacturers are much more inclined to cite figures for maximum *burst rate* (a short-term, high-speed transfer rate under ideal conditions), because it's a higher and more marketable number. As long as you're comparing apples to apples, burst rates can be a useful—if imperfect—indicator of relative throughput rates. Just

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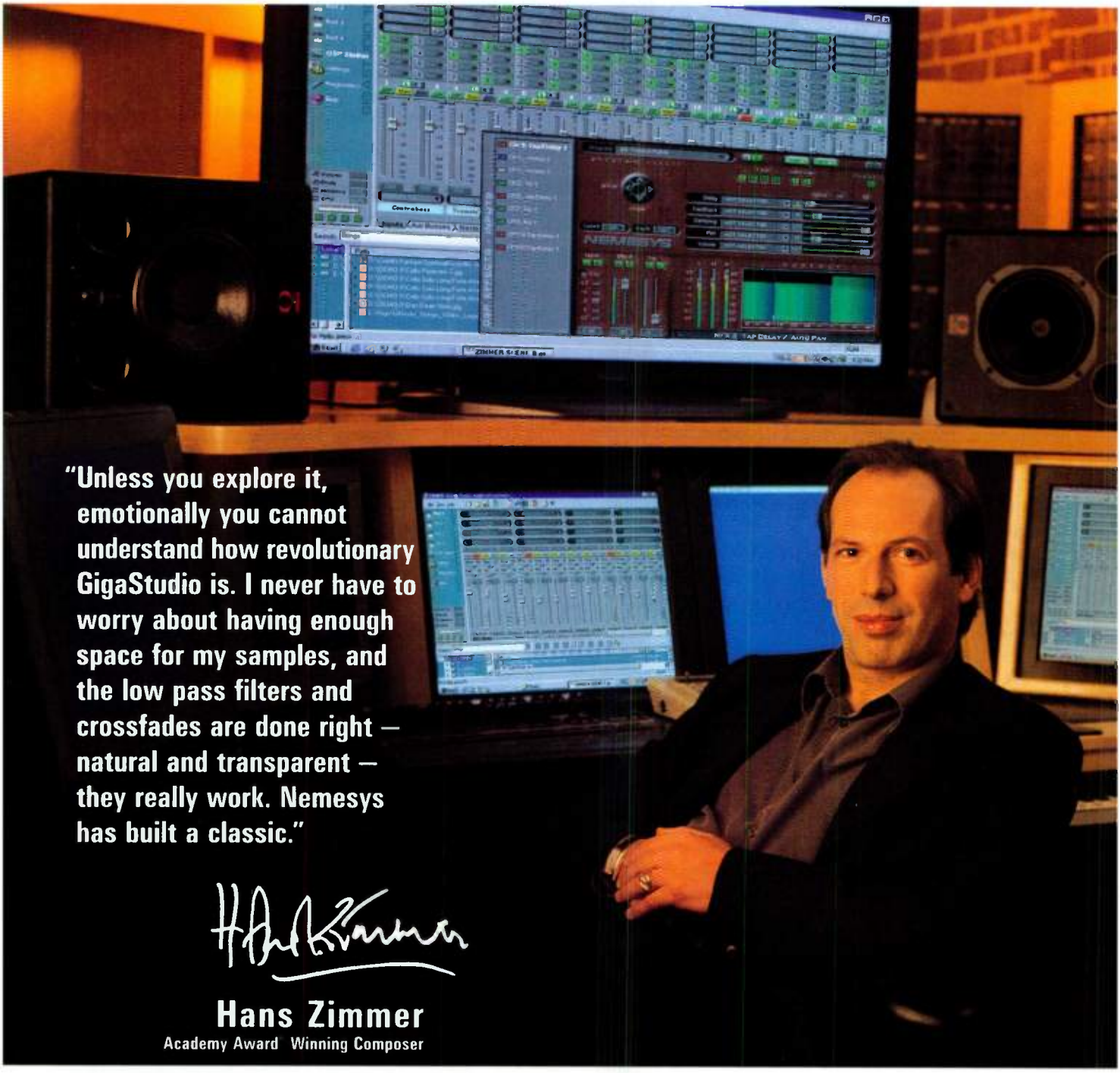

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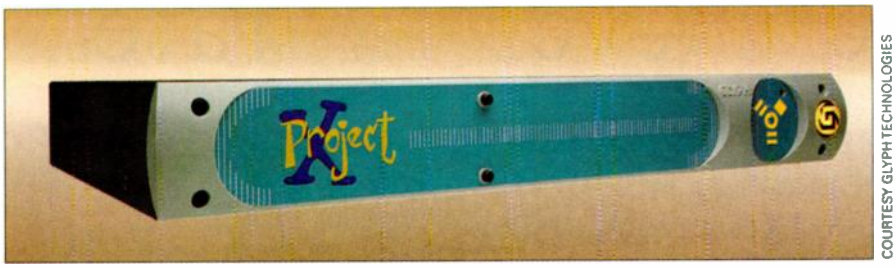


COURTESY GLYPH TECHNOLOGIES

**FIG. 1: The X-Project from Glyph Technologies takes advantage of FireWire's high-speed connection. Built into all new Macs and growing in popularity on PCs, FireWire allows plug and play, hot plugging, and daisy chaining of up to 63 devices.**

don't expect a 66 Mbps drive to sustain that figure.

A major factor influencing a hard disk's ability to crank out the bits is its rotational speed. The faster the disk spins, the faster the head reads it. Speeds of 5,400 rpm used to be impressive, but 7,200 rpm rates are now quite common, with 15,000 rpm drives being state of the art.

Another frequently quoted specification with special meaning to audio jockeys is *access time*. Whenever the computer asks the hard drive for data, the head assembly moves over to read the table of contents to find out where the data is stored. It then scoots to the appropriate position on the disk. In heavily edited audio, the disk "seeks" like this many times, so the faster it accesses the data, the better. Most available hard drives have access times of 9 ms or less.

When deciding between an internal and an external drive, consider the latter's advantages. Digital-audio recording and editing push a disk to its limits, and that generates a lot of heat. A well-made external drive enclosure keeps things running cool, which can mean the difference between disk failure and a long, dependable life. An external drive is often located away from the work area, which helps to keep the overall noise level down. Also, with a dual-drive internal/external setup, applications can remain on the internal drive and audio files can remain on the external drive, which reduces the chances for data corruption and makes it easier to salvage audio tracks if the computer melts down.

## FLAVOR OF THE MONTH

At one time, digital-audio hard disks had to be SCSI devices, and that was all there was to it. Anyone who was serious about computer-based recording had to sort through the various SCSI flavors (Wide, Fast, Fast/Wide, Ultra, and so forth) and deal with other annoyances such as determining if a drive used active or passive termination. Fortunately, that is no longer the case. True, SCSI is the preferred choice for most power users, but it's not the only game in town anymore.

Although SCSI snobs once laughed derisively at EIDE drives, recent advances in EIDE technology brought it roaring into the big leagues. The latest versions—Ultra ATA/33 and Ultra ATA/66—raised EIDE's maximum bus rate to 33.3 Mbps and 66.6 Mbps, respectively. Despite generally slower access times, that brings EIDE within the performance ranks of many SCSI drives. Because Macs and PCs ship with Ultra ATA drives, more users get a healthy track count right out of the box. Now Ultra ATA/100 drives are starting to ship, accelerating the pace of competition even more.

Probably Ultra ATA's biggest liability right now is its limit of four devices per controller. (It's also not designed for use as an external drive.) Typically, an internal hard drive, a floppy drive, and a CD-ROM drive use up three devices right away. You can add a second hard drive or a CD-R drive, but not both. SCSI, by contrast, lets you have as many as 15 devices (internal or external), depending on which flavor you use.

The dominant varieties for digital audio are Ultra Wide, which supports a 40 Mbps maximum bus speed, and Ultra2 Wide, which doubles that rate. In addition to supporting several devices, SCSI has some other attractive qualities for studio applications. Ultra2 Wide allows cable runs up to 12 meters, making it easy to put noisy drives in a machine closet—or even a coat closet, for that matter. SCSI is also a more intelligent protocol than EIDE; it relies less on the CPU for its functions and therefore doesn't tax the operating system as much.

SCSI's long reputation as the high-end solution encouraged manufacturers to make their top-performing drives available first in that format. If you want a 10,000 rpm spindle speed, for example, you'll have to stick with SCSI. The Ultra160, which offers a 160 Mbps maximum bus speed, is the high end for SCSI.

SCSI also faces some competition from the newest protocol on the block: FireWire. Also known by its geeky moniker IEEE-1394, FireWire is a serial protocol that supports hot plugging and daisy chaining of up to 63 devices. Though that makes it far more convenient and flexible than SCSI, FireWire drives have been slow to catch on in digital-audio circles. Even the lack of termination hassles hasn't yet made FireWire the SCSI-killer some predicted. FireWire is supported by Mac operating systems from


COURTESY EXABYTE CORP.

**FIG. 2: The aptly named Mammoth tape drive from Exabyte combines a large storage capacity with excellent reliability.**

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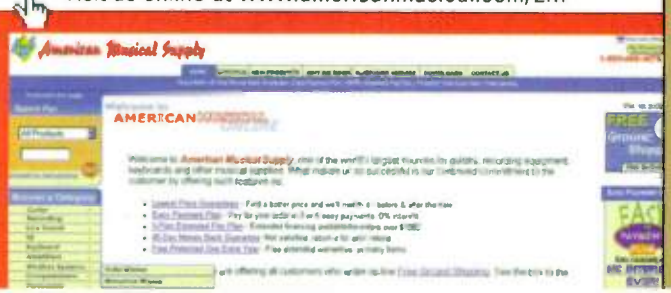


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For technical reasons, FireWire drives have not lived up to their promised throughput—until recently. The latest generation of Macs and PCs can finally take advantage of FireWire's full bandwidth of up to 50 Mbps. That is more than adequate for all but the most Herculean recording tasks, so expect to see many more drives ship in the next few months (see **Fig. 1**). FireWire is slated for a performance boost in the near future. If drive manufacturers take advantage of it, bus speeds should reach 100 Mbps.

In contrast, drives based on the increasingly ubiquitous USB protocol are not quite ready for prime time when it comes to multitrack recording. Though the current USB specification shares FireWire's hot-plugging and daisy-chaining abilities, its 1.5 Mbps maximum throughput is adequate for only a couple of tracks. That could change soon, though—the USB 2.0 specification has already been approved, with throughput increased to 50 Mbps. Serious USB drives may well be on their way.

## BACKUP OPTIONS

Sometimes it's easy to underestimate the storage amount needed for a project, and for multiple projects, the margin for error is even greater. Bear in mind that 24-bit audio uses 50 percent more disk space than 16-bit audio, and doubling the sample rate doubles the file size. So for 24-bit, 96 kHz audio, the total storage required comes to around 16.5 MB per track minute. A 4-minute, 24-track song, therefore, takes up more than a gigabyte and a half. That calls for some serious backup space. For many studios, the best solution is still tape.

Data DAT (DDS) tapes hold up to 12 GB of uncompressed data, enough for an album's worth of songs. DAT's small size makes it convenient for smaller facilities, where shelf space is at a premium. It can back up or restore the entire 12 GB in approximately 2 hours, 18 minutes at its maximum rate of 144 MB per minute.


COURTESY PINNACLE MICRO

**FIG. 3: The Flex drive from Pinnacle Micro is a versatile DVD-RAM drive that reads and writes to 5.2 GB cartridges on the Mac and PC. It also reads a number of CD and DVD formats.**

The popular Exabyte format bridges the gap between DDS and higher-end solutions, with a range of products based on a wider (8 mm) and thicker tape. In addition, Exabyte enjoys a reputation for being exceptionally reliable. Products in that category range from the 7 GB Eliant 820 (with speed comparable to DDS) to the appropriately named Mammoth (see **Fig. 2**) with a 20 GB uncompressed capacity and a transfer rate three times faster than the Eliant.

Other products for such huge applications include AIT, another 8-mm format, and DLT, which uses half-inch tape. Those high-capacity, high-speed formats come in 20 to 50 GB sizes and boast transfer rates of 90 to 360 MB per minute. Naturally, the cost of tape backup increases with capacity and transfer rate, but for some users, the speed and size of devices like those are a must.

The small project studio may be able to get away with other less expensive options. For example, on a recent recording project involving a brass quintet and a simple stereo mic setup, I backed up each day's work to a CD-RW. Using the CD burner, I provided the ensemble with reference CDs of each day's takes. Despite what you may hear about the USB's CD-burning shortcomings, my Sony Spressa CD-RW drive cranks out flawless Red Book discs every time at 4X speed. When I'm done using it to back up my notebook,

I remove its USB connector and hot-plug it into my desktop computer to back it up.

With a DVD-RAM drive (see **Fig. 3**), you can easily back up three high-resolution, 1.5 GB tunes on a single disc. As writable DVD becomes cheaper, more common, and higher capacity, it may become a popular backup method for small operations. DVD-RAM is not as fast as tape backup, but if write speeds accelerate as quickly as they have for CDs, that disadvantage may soon disappear. Like Magneto-Optical drives, DVD-RAM is an optical media and shares MO's physical integrity advantage.

Consumer-oriented products such as Zip 100/250 disks and 120 MB and 200 MB "superfloppies" certainly make sharing and transporting audio files more convenient, but they are generally too slow for serious recording and too small for serious backup and archiving. Their larger 1 to 2 GB cousins—such as the original Jaz drive—are certainly a more appropriate size, and the SCSI versions are fast enough for a moderate number of unedited tracks. (Their seek times aren't fast enough to support much editing.) Nevertheless, I've heard too many horror stories about the catastrophic failure of removable hard disk cartridges to trust my music to them unless I have a secure backup copy on another format. At nearly $100 per disk, they are not exactly cost-effective.

**Consider the advantages of an external hard drive.**

## SPINNING DOWN

Ultimately, the choice of audio storage medium depends entirely on your specific needs. If you're running a busy production facility, you may want to set up the system with the fastest SCSI flavor you can afford. It will take a few bucks, but the track count while recording, the backup speed, and the flexibility to add devices as your needs grow will make it money well spent.

If your needs are more modest, the gods of technology are smiling on you. With an off-the-shelf computer from your local electronics superstore, you have a higher track count at your disposal than high-end systems did just a few years ago. Thanks to FireWire and Ultra ATA, adding a large second hard drive dedicated to audio no longer requires a degree in computer science.

Don't get complacent, though. No matter how big and powerful your system is, it's not immune to the disaster of data loss. Get a tape drive, a DVD-RAM drive—whatever you want—but don't fail to back up your audio drive!

**Brian Smithers** *teaches music technology at Stetson University and Full Sail Real World Education. Contact him through his Web site at members.aol.com/notebooks1.*

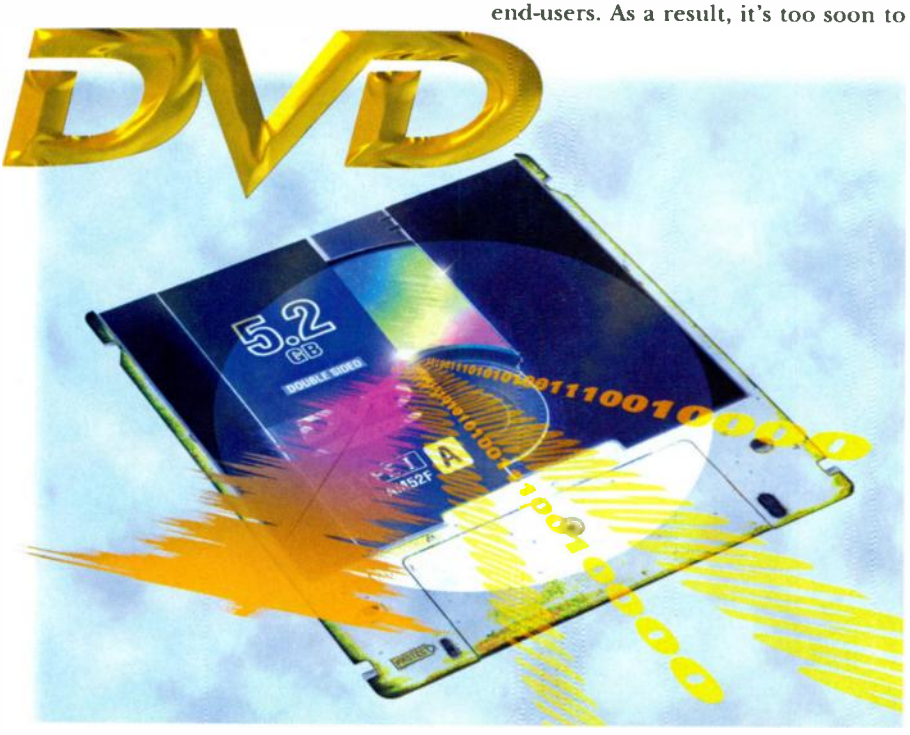

# The Next Big Thing

***The evolving world of DVD.***

By Brian Smithers

What happens when the "next big thing" outlives its buzzword status without achieving its potential? Although DVD-Video players have been available since 1996 and the first DVD-Audio players are just starting to appear, a confusing multiplicity of formats and delayed standards have kept audio DVDs and recordable DVDs out of the hands of end-users. As a result, it's too soon to tell if DVD is a hit or if the format will ever fulfill its promise.

Without a crystal ball, it's impossible to say what DVD's long-term prospects are. While the dust settles, I'll explain where the technology came from and what its future may hold. I'll sort through the standards and highlight the ones that really matter to musicians, and then I'll examine the DVD-Audio specification and tell you what it means from a production perspective.




DMITRY PANICH

## DATA VERY DENSE

The format formerly known as digital video disc is essentially a compact disc on steroids. Like a CD's, a DVD's surface is a spiral pattern of pits "burned" into an otherwise smooth surface, which is read by a laser and interpreted as binary code that represents video, audio, or other data. The main reason a DVD can hold so much more information than a CD—4.7 billion bytes compared with 650 MB—is that its pits are much smaller and its tracks are much closer together.

In addition, a DVD can accommodate two layers of data on both sides of the disc (see **Fig. 1**). This allows for capacities of up to 17 billion bytes on a dual-sided, dual-layered (DS/DL) disc. But two sides times two layers multiplied by

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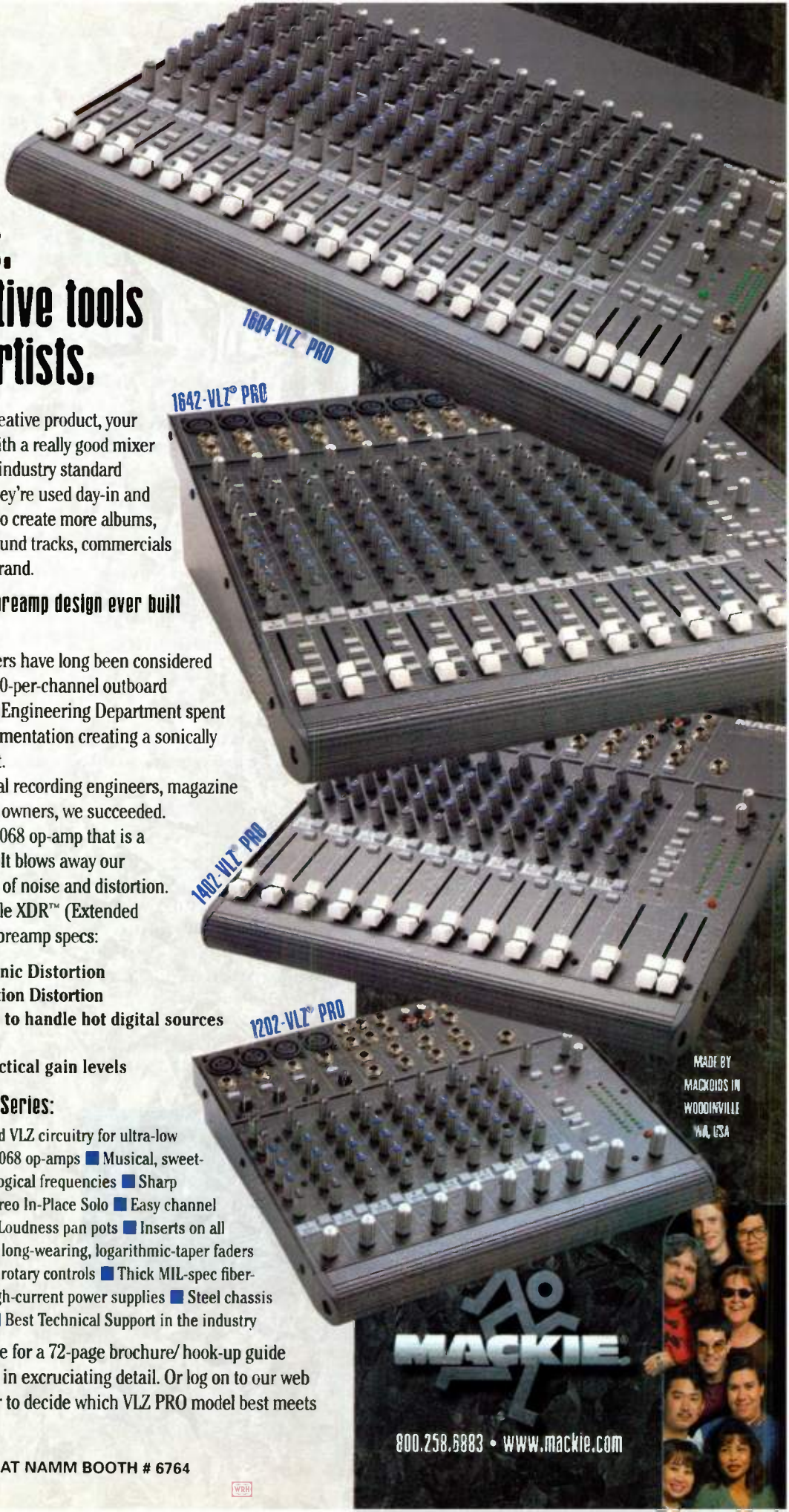


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4.7 billion bytes per layer equals more than 17 billion. As it turns out, the data density in each layer of a dual-layer disc must be slightly less than a single-layer disc. This results in some funny math when calculating the capacities of dual-layered DVDs. Each single-layered side is calculated at 4.7 billion bytes, but each dual-layered side is calculated at 8.5 billion bytes.

Speaking of funny math, not only did someone shamelessly round up when naming the different types of DVD (DVD-18 holds only 17 billion bytes), but DVD capacities are misleadingly measured in billions of bytes, even when gigabytes are used in the spec. Computer storage capacity is typically measured in binary terms, in which a kilobyte is 1,024 ($2^{10}$) bytes, a megabyte is 1,024 kilobytes, and a gigabyte is 1,024 megabytes. When the DVD specification refers to gigabytes, it literally means 1 billion ($10^9$ bytes, not 1,073,741,824 or $2^{30}$ bytes). This makes DVD capacities appear more than 7 percent larger than they actually are.

## DIZZYING VARIETY OF DISCS

By some estimates, there are as many as 15 different varieties of DVD, not counting oddball variations such as DVD-Music, a marketing strategy for music titles in the DVD-Video format; or Divx, Circuit City's ill-fated "pay-to-play" scheme. Fortunately, just as most people don't need to know what Green Book and White Book CDs are, only a few flavors of DVD will have any meaning to musicians.

Currently, DVD-Video and DVD-ROM are the most common types of DVD. It's useful to think of these read-only formats in CD terms: DVD-ROM and CD-ROM are intended for data, and DVD-Video and CD-DA (aka Red Book) are intended for media playback. DVD-Video is now a popular medium for home entertainment releases such as major motion pictures and concert videos. Although its video data is compressed using MPEG data compression, DVD-Video is capable of much better quality than VHS, and its digital audio and surround-sound support have contributed greatly to its popularity.

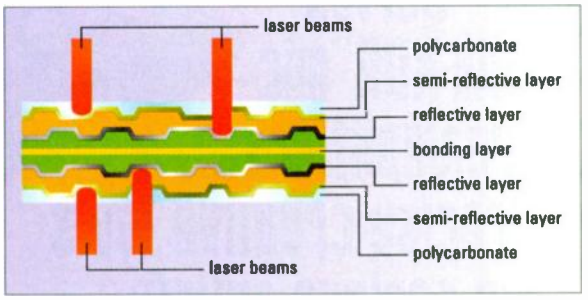


**FIG. 1: The DVD specification provides for up to two layers of data per side; the laser must pass through the first layer to read the second. Labeling is a problem on dual-sided discs because the laser must be able to read each side.**

## DIY DVD

For DVD to become meaningful in the project studio, writable formats must become affordable. A number of competing writable or rewritable specifications are on the market, but most are incompatible with the others and with existing players and drives. The good news is that a couple of them aren't yet available and most of the rest aren't affordable. At least this makes it simpler to sort the whole mess out—for the moment.

The rewritable format worth knowing about now is DVD-RAM. Widely available on new Macs, it is still an esoteric add-on for PCs. DVD-RAM is a convenient format for backing up data because it looks and acts like another hard drive. Instead of using specialized "burning" software to transfer data to the disc, DVD-RAM writes and erases on the fly, and it supports simple drag-and-drop operation. Unfortunately, DVD-RAM drives are generally the only drives able to read DVD-RAM discs.

DVD-RAM has recently gained limited acceptance as an authoring format, but DVD-R is generally considered the authoring format of choice. As if to drive that point home, the DVD Forum recently split the write-once specification into two segments: DVD-R General and DVD-R Authoring. Neither can write to the other's media, but both standards produce discs that are compatible with most DVD-Video players. This gives DVD-R the advantage of broader compatibility than any other writable or rewritable DVD format. Its downside is price: the only available drives (from Pioneer) cost around $4,500.

The race to watch, then, is between DVD-RAM's compatibility issues and DVD-R's price point. Newer DVD players and DVD-ROM drives are more likely to be able to read DVD-RAM, so in time it should become a viable medium for short-run production of audio and video titles. It's also just a matter of time before other manufacturers jump into the DVD-R fray and cause prices to drop into a more reasonable range. Less than two years ago, Pioneer's first DVD-R product sold for $17,000, so if prices continue to drop by almost 50 percent a year, it won't be

### DVD Configurations

Combinations of two layers of data on two sides make for five potential capacities of DVD discs, though manufacturing difficulties have made DVD-18 titles extremely rare thus far. This table includes information pertaining to 12 cm discs only, but 8 cm discs are also allowed.

| DVD DISC FORMAT | CAPACITY |
|---|---|
| DVD-5 (single side/single layer) | 4.70 billion bytes (4.38 GB) |
| DVD-9 (SS/DL) | 8.54 billion bytes (7.95 GB) |
| DVD-10 (DS/SL) | 9.40 billion bytes (8.75 GB) |
| DVD-14 (DS/mixed layers; single layer on one side and dual layer on the other side) | 13.24 billion bytes (12.33 GB) |
| DVD-18 (DS/DL) | 17.08 billion bytes (15.90 GB) |

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Of course, it takes more than affordable hardware to start churning out DVD hits. Unfortunately, DVD-Audio authoring software is still the province of high-end providers such as Sonic Solutions and Spruce Technologies. Solutions for less than $1,000 aren't available just yet. In fact, makers of the CD-authoring tools commonly found in project studios, including Roxio Toast and Jam, and Gear Pro, aren't even teasing about DVD-Audio compatibility yet.

## THE GOOD STUFF: DVD-AUDIO

Are consumers ready to buy entire record and CD collections one more time? Will the first generation of classic titles reissued on DVD-Audio be produced as carelessly as early CDs were? Are studios set up for surround sound yet? Whether these notions are terrifying or exciting, they are just a few of the issues to be wrestled with soon. Well, maybe not that soon, but eventually.

DVD-Audio is either the most flexible or the most poorly defined specification in history. It supports bit depths from 16 to 24, sampling rates from 44.1 to 192 kHz, two to six channels, and optional data compression. Because all DVD-Audio players must support any combination of these options, artists have tremendous freedom to utilize the format's available space and bandwidth as they see fit. The one absolute requirement is that the audio must be in linear PCM (LPCM) format, which can use lossless data compression (more on this to follow).

Balancing issues of resolution and channel numbers against storage space and bandwidth is an important part of the DVD-Audio authoring process. A single-layered DVD can hold about 67 minutes of uncompressed stereo audio at the format's highest resolution of 24 bits/192 kHz (often abbreviated to 24/192). Halving the sampling rate leaves room for about 45 minutes of uncompressed, 6-channel surround sound on the disc. Because consumers are likely to expect DVD-Audio titles to match the 74-minute maximum playing time of CDs, something has to give. To make matters worse, data transfer is limited to a top speed of 9.6 Mbps, which isn't sufficient for multichannel audio at much more than CD-quality resolution.

To the rescue comes a form of data compression called Meridian Lossless Packing (MLP), developed by British manufacturer Meridian Audio. As its name suggests, MLP can squeeze the audio stream into less space and then reconstruct it with bit-for-bit accuracy, thereby satisfying the requirement of LPCM data. By eliminating redundancy in the data stream, it can reduce both storage and bandwidth requirements by approximately 50 percent. With MLP, a DVD-Audio disc can hold and play 74 minutes of a 5.1 mix at 24 bits/96 kHz (24/96) and a stereo mix at the same resolution. Even with MLP, though, the maximum transfer rate of 9.6 Mbps limits DVD-Audio to stereo playback at the highest sampling rates of 176.4 and 192 kHz.

Another technique for balancing resolution, channels, storage, and bandwidth is the use of channel groups. A multichannel mix can be split into two channel groups of different resolutions.

▼

**Only a few types of DVD will turn out to have any meaning to musicians.**

For example, the three front channels (left, center, and right) might be at 24/96 resolution while the rear channels and subwoofer might be only 16/48. Depending on the nature of the material in the surround channels, this could free large amounts of disc space with little or no sonic compromise.

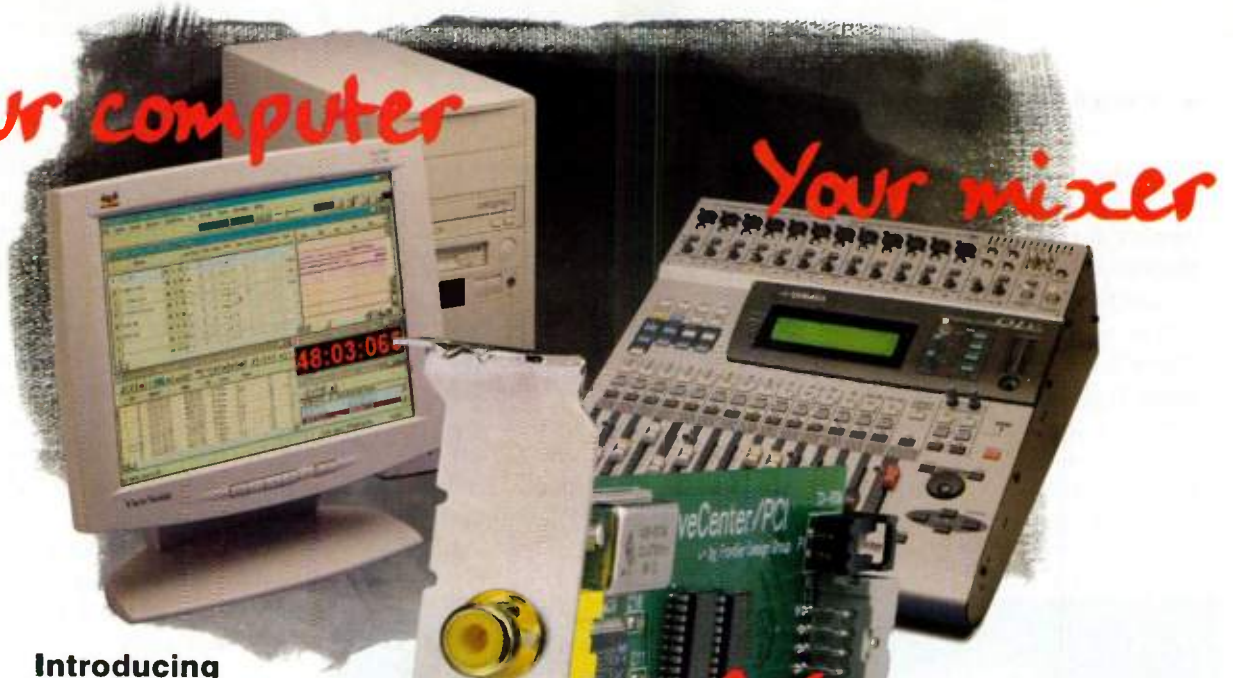
Recognizing that most listening environments are equipped only for stereo playback, not surround sound, the DVD-Audio spec provides for automatic downmixing to stereo. The spec also includes the System Managed Audio Resource Technique (SMART), which provides a set of parameters that can be used by a producer to control the surround-to-stereo downmix. Rather than make do with a one-size-fits-all algorithm, an artist can specify up to 16 downmix coefficients per track to control such things as level and speaker placement for each surround channel.

In addition to the ability to incorporate still pictures and text, DVD-Audio discs can also include material conforming to a subset of the DVD-Video specification. Such video-enhanced discs, sometimes referred to as DVD-AudioV or DVD-Audio/Video, might contain music videos or

### DVD-Audio Formats

The DVD-Audio specification version 1.0 was finally released in March 2000. It establishes a range of sampling rates and bit depths along with multichannel options and lossless data compression.

| | |
|---|---|
| **Bit Depths** | 16, 20, 24 |
| **Sampling Rates** | 44.1, 48, 88.2, 96, 176.4, 192 kHz |
| **Channels** | 2 at 176.4 or 192 kHz; 2–6 at all other sampling rates |
| **Audio Format** | LPCM required; MPEG, Dolby Digital, DTS optional |
| **Data Compression** | Meridian Lossless Packing (MLP) |
| **Maximum Bit Rate** | 9.6 Mbps |
| **Special Features** | 99 still pictures per track, onscreen text, optional video zone |

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live audio/video versions of songs. Another innovative use of the DVD-AudioV format is to include a Dolby Digital version of the audio program in addition to the required LPCM.

Why would anyone bother with a "lossy" compression scheme such as Dolby Digital on a high-resolution disc? DVD-Audio players are just beginning to reach the market, and the installed base of DVD-Video players cannot play DVD-Audio discs, so including an audio format that existing players can decipher ensures that people who haven't yet upgraded to a DVD-Audio player aren't left out in the cold.

## ALTERNATE REALITY

As if there weren't enough confusion already, Sony and Philips have offered an alternative format to DVD-Audio called Super Audio CD (SACD). SACD discs normally include two layers on one side: the inner layer holds conventional CD data that can be read by standard CD players, and the outer, semitransparent layer holds high-resolution data that can be accessed only by an SACD player. As a result, these discs maintain backward compatibility with the enormous base of existing CD players—as long as content producers include the CD layer. (Oddly, many of Sony's initial SACD releases do not include the inner CD layer.)

SACD has a head start on DVD-Audio, with 65 titles already available at the time of this writing and more promised soon. (Only a few DVD-Audio titles were available as of this writing.) On the other hand, virtually all currently available SACDs are stereo only; multichannel discs and players are just about to appear in the marketplace.

SACD doesn't use PCM audio. Instead, it employs a technique known as Direct Stream Digital (DSD), which uses one bit at a sampling rate of 2.8224 MHz to describe the rise and fall of the waveform. This may sound like far-fetched technology, but it's actually how most analog-to-digital (A/D) converters digitize the analog signal before converting it to PCM format. SACD claims a dynamic range of 120 dB and a frequency response up to 100 kHz.

Whether SACD will prevail over DVD-Audio is as difficult to predict as any other aspect of the DVD drama, which continues to be interesting, if a bit challenging to follow. From a commercial perspective, consumer enthusiasm for the new medium can only increase demand for content, which, of course, is good news for musicians. From an artistic perspective, DVD is a bigger and better canvas on which to paint sonic pictures—more good news. How much longer it will be before musicians get to enjoy this good news, though, is anybody's guess.

**Brian Smithers** *teaches music technology at Stetson University in DeLand, Florida. His Web site, http://members.aol.com/notebooks1, covers how to make music with notebook computers.*

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# Realty Reality

***Get the legal lowdown on renting a rehearsal or recording space.***

By Michael A. Aczon

Has your band outgrown the living room as a rehearsal space? Has your recording gear taken over the entire apartment? Maybe the neighbors have had it with you scratching their cars every time you try to squeeze by with your P.A. system. It might then be time to consider moving your music venture into a commercial rental. But before you even begin to look for a space, take some time to think through a few practical and legal considerations.

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## THE PROPER PROPERTY

When searching for a rehearsal or studio space, you are probably going to have limited choices, especially when you consider how specific your needs are. For example, if you're looking for a rehearsal space, you might be best off looking at whatever the industrial area or the outskirts of your town have to offer. That's not say those will be your only options, but resign yourself to having to make some trade-offs to find a place that will let you play loud music and have visitors at all hours. (For more on how to find a space, see the sidebar "Space Quest.") With that in mind, here are some factors to consider when searching for a place to rehearse and record music.

**Size.** When determining how much space to rent, first establish what it will be used for. A one-room project recording studio takes up significantly less room than a rehearsal spot for a seven-piece band. If you have a lot of gear, decide whether you must keep it in your rental space or want to store it off-site and bring it in when needed. Perhaps extra room for an office or a second studio is in your plans somewhere down the road. Factoring in the amount of future space desired and the timing of those

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**Location.** Obviously, your rental should be centrally located for those who will be using it—a rehearsal space should be easy for all band members to reach. A commercial enterprise—such as a recording studio or an office—might require a professional appearance and easy access for visitors. If you're considering a storefront, think about what other kinds of businesses are nearby and whether they complement the space's intended use. Most music rentals house thousands of dollars of equipment, so a safe, secure building is a must. Check out the neighborhood, lighting, alarms, gating, and any other security measures the landlord provides.

**Access.** Let's face it—hauling gear up three flights of stairs is not high on the list of fun things to do after a gig, and neither is squeezing by parked cars or through narrow hallways and doorways. If it is necessary to get gear in and out regularly, try to find a place with ramps, elevators, or easy access to the doorway for loading gear. Take a look at vehicle access, as well. Find out if the landlord puts time restrictions on when you can enter and use the property. Sometimes a production deadline or a creative muse hits you in the middle of the night, so 24-hour access to the space may be necessary.

**Zoning.** The municipality's planning department designates how the town's real estate can be used, which pertains to office buildings, residences, commercial buildings, and mixed-use spaces. Services—such as plumbing—and restrictions on parking, noise, and other types of activities are factored into the zoning equation. For example, the live-work space is popular with all types of artists these days, and those spaces require special zoning. Before moving your microwave and toothbrush in with your keyboard rig, make sure that the unit is zoned accordingly.

**Noise restrictions.** When you're in the middle of rehearsing or recording the groove of the century, the last thing you need is a visit from the police, who were sent by an angry landlord or neighbor. Be up front with a potential landlord about the noise you will be making. Obtain clear guidelines regarding how loud you can get and when you can express yourself at full volume. Some cities have elaborate laws with specific restrictions on how many decibels a business can pump out. Adding sound-dampening walls, doing headphone mixes during certain hours, or simply turning down the volume are a few solutions. You will develop a much better landlord-tenant relationship if you work together on the sound issue.

**Rental improvements and fixtures.** Improvements may be required before you move in. Things like extra electricity for all your gear and adding or removing walls, lofts, and lighting may require building permits from the city. If your landlord has an ongoing relationship with the city, the permit process may be easier for the landlord to take on. If you attach an improvement to the structure, it might be considered a fixture, which essentially means that it becomes part of the property. If you intend to make future improvements or attach what might be construed as a fixture (a lighting system or custom-built equipment racks, for instance), notify your landlord in writing that you want to leave with those items.

## RENTAL AGREEMENTS

A variety of landlord-tenant agreements exist, but I'm restricting this discussion to the two types I see musicians deal with the most: a month-to-month lease and a term lease. In a month-to-month tenancy, the landlord and tenant agree upon a monthly rental for the property. The arrangement lasts until either party gives notice that he or she intends to terminate the relationship or the terms of the agreement are to change. The upside of the month-to-month is that it gives both sides flexibility; the downside is that the prospect of having to move out with short notice makes long-range planning for the tenant somewhat difficult.

When the landlord and tenant agree on a rental arrangement for a set period, they usually enter into a long-term lease. Long-term leases should be made in writing and carefully reviewed before signing. Following are a number of major points to consider and negotiate before signing a long-term lease.

**Length of lease.** Lease terms usually consist of an initial rental period that's followed by a number of option periods, with the total number of years considered the length of the lease. For example, a lease that has an initial term of two years with three one-year options is considered a five-year lease. Most

## SAN FRANCISCO RENTAL NIGHTMARE

San Francisco, a city that has traditionally been an enclave for up-and-coming artists of all types, is in the middle of a commercial real estate boom. The nation's economic upsurge and the incredible success of the Bay Area's high-tech industry have sent residential and commercial real estate prices soaring. Recently, an entire building dedicated to rehearsal spaces and recording studios was sold for millions of dollars, displacing hundreds of musicians. They are now competing with other businesses for limited commercial rentals at prices far above what bands signed to major labels can even afford.

So what can musicians and artists in other areas of the country learn from that situation? The San Francisco debacle is the result of the collision between art and commerce. It can be avoided in other areas if artists, landlords, and municipalities cooperate to create long-range plans that support the arts, landlord rights, and the desire for city growth. When searching for rehearsal or studio space, weigh the benefits of a metropolitan, arts-oriented environment against a slightly more remote location that might have better long-term possibilities for you, your music, and your finances.

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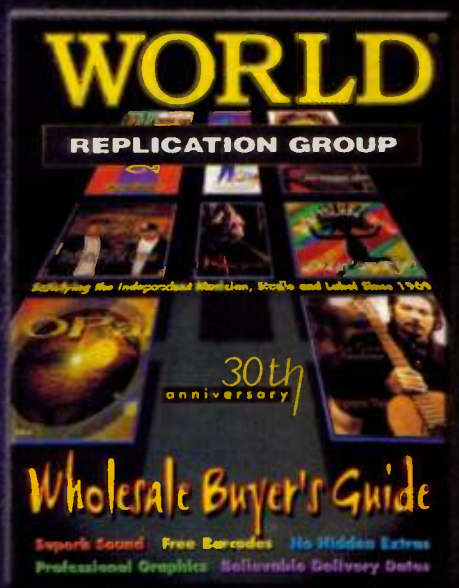


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# Scraping It Together

***Recording string ensembles and exotic bowed instruments.***

By Myles Boisen

In the September 2000 "Recording Musician" column ("String Fever") I focused on techniques for recording individual bowed string instruments in the studio. That column covered members of the traditional string family—violin, viola, cello, and bass—as well as fiddle, and included mic recommendations, acoustical considerations, and performance issues that might affect string soloists in the recording studio.

This month, I will address techniques for recording string ensembles, methods for combining live and sampled string tracks, and tips for dealing with esoteric bowed sound sources. Note that some of the applications discussed here build on the techniques detailed in "String Fever," and that those methods will not be repeated here.

## TRIED AND TRUE

First and foremost in any string ensemble discussion is the string quartet—one of classical music's most revered performance ensembles. The conventional quartet—consisting of two violins, viola, and cello—was popularized by Haydn, who wrote more than 40 quartet pieces, including the influential *Sun Quartets* (1772). Besides Haydn, Mozart and Beethoven contributed heavily to the form, as did such twentieth-century composers as Bartok, Schoenberg, Ravel, and Shostakovich.

For commercial releases, string ensembles ranging from trios to octets are typically recorded in concert halls, chambers, and churches. Recording

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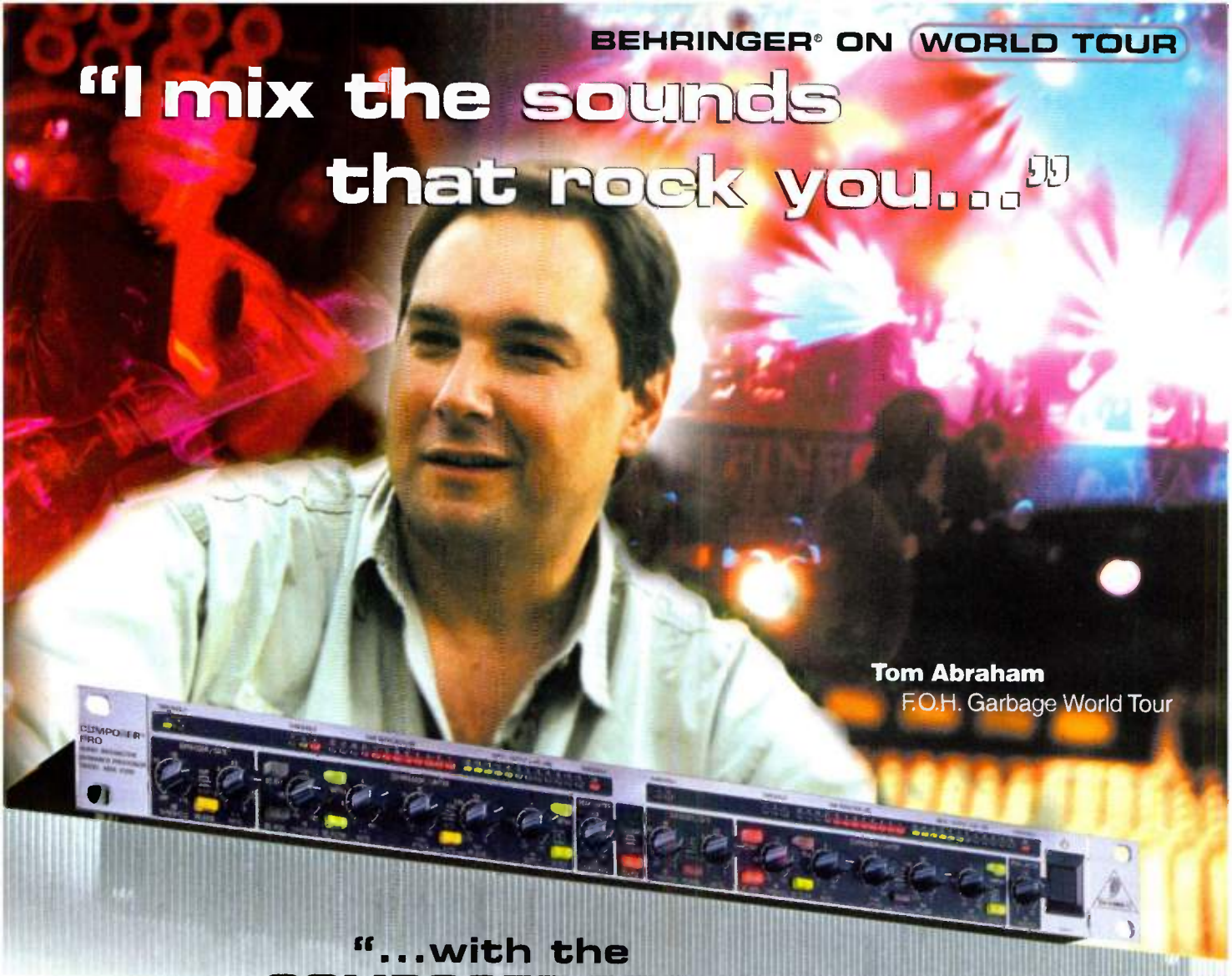

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studios also get used, as long as they have spaces large enough for sufficient natural reverberation.

Although there are countless variations on what is commonly called "classical recording technique," generally the term implies minimal miking at a distance that captures significant room ambience and a minimal signal path using only the best microphones, preamps, and high-resolution recording devices. A conventional classical recording, with full reproduction of dynamic and frequency ranges, strives to replicate the experience of a concert-hall listener (see **Fig. 1**).

To that end, classical recordists typically rely on the most accurate—and often most expensive—condenser microphones. Small-diaphragm cardioid and omnidirectional condensers such as those in the DPA line (formerly known as Brüel & Kjær), AKG's C 460 B series, Sennheiser MKH models, and the Neumann KM 100 series are standard tools. All of those offer low-noise electronics, faithful frequency response, and accurate transient reproduction to create the desired "you-are-there" effect. When using two mics, classical recordists usually stipulate a "matched pair"—that is, two identical microphones with carefully matched frequency plots, pickup patterns, and output levels.

Arrangement, angling, and placement of microphone pairs is subject to much research and debate. For a primer on common two-mic setups—including XY, ORTF, Blumlein, and Mid-Side—see "Recording Musician: Minimum Rig, Maximum Sound" in the June 1999 issue of **EM**. For more information, check out Bruce Bartlett's book *Stereo Microphone Techniques* (Focal Press, 1991), which is the most in-depth text on the subject.

**▼ Every attack grabs the ear and diverts attention from the group as a whole.**

Also prized for string-ensemble recording are dedicated stereo microphones, which typically employ coincident capsules or midside configurations. Several companies—including AKG, Neumann, Sanken, and Schoeps—manufacture high-end stereo mics. Some classical recordists prefer using omnidirectional mics such as the Neumann M50 and the TLM 150, often with three mics in a spaced grouping known as the "Decca Tree" (again, see "Recording Musician: Minimum Rig, Maximum Sound"). Still others choose specialized microphones such as the Royer SF-12 stereo ribbon mic, the Soundfield ST250 multiple-capsule system, stereo binaural heads such as the Neumann KU 81i, and Crown's SASS stereo boundary microphone (see **Fig. 2**).

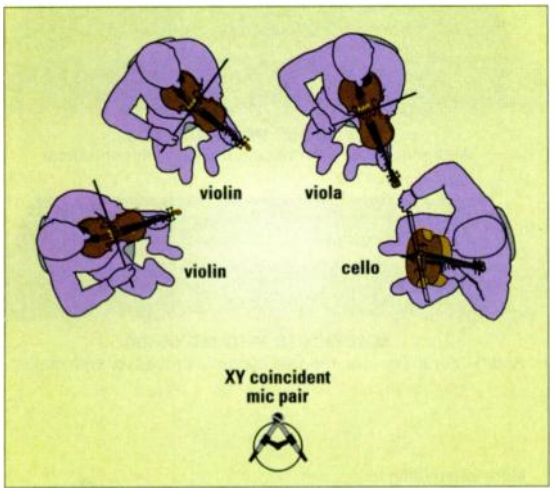


**FIG. 1: Classical recordists typically employ a matched pair of condenser microphones positioned as an XY coincident pair to create a recording that replicates a concert-hall listener's experience of sitting front and center.**

## SPOT ON

No matter which primary mic setup is used, it's commonly supplemented by one or more spot mics positioned to highlight a soloist or quiet instrument (such as the viola). In the final mix, the spot mic could be the finishing touch needed to bring a quartet into perfect focus. But it is important to remember that string ensembles practice diligently to sculpt their dynamics and group balance; therefore, what might be perceived by an engineer as an imbalance could be the intended result of many rehearsal hours. For that reason, any efforts to reinforce individual instruments in a string-ensemble recording should be carefully scrutinized by everyone involved, including the musicians.

Spot-mic selection and placement can follow the same guidelines for soloists as detailed in "String Fever," with the caveat that here it is especially important to consider the effects of off-axis pickup for any spot mics. For example, if a quartet is arranged in a circle, placing a figure-8 microphone in front of the cello bridge also leads to pickup of the instrument or instruments positioned behind the mic, as well as rejection of instruments to the left and right. That could produce more balance problems than it solves, ultimately muddying the sharp image captured by the main stereo pair. Then again, a figure-8 mic might well be positioned between two adjacent instruments without adversely affecting the stereo spectrum. As always, experimentation and careful listening are key.

## ROUND AND HALF ROUND

Whether simply positioning the stereo pair of mics or adjusting a spot mic's panning in the mix, the ensemble's physical arrangement must be considered. The circle and the semicircle are the two most common setups for a string quartet, the latter being the usual arrangement for a concert performance. The semicircle's visual appeal boasts an added recording benefit: all the instruments can be picked up with good balance and imaging by a stereo pair positioned at a "front-and-center" audience perspective. Here, the recordist's primary decisions are the mic heights and

# Dual Mode System

PARIS Pro is actually a unique fully integrated dual mode DAW that allows you to simultaneously use both hardware-based and host CPU-based tracks and DSP. This design gives you the best of both worlds by insuring that PARIS Pro's hardware core functionality is always available, while letting you decide how to tap into your CPU's unused power. And you will find more CPU power free than you thought, because PARIS Pro uses its own hardware for all the playback, mixing, EQ and included effects. When you want more tracks PARIS Pro allows you to use your host CPU to add "native tracks" to your project without additional hardware.

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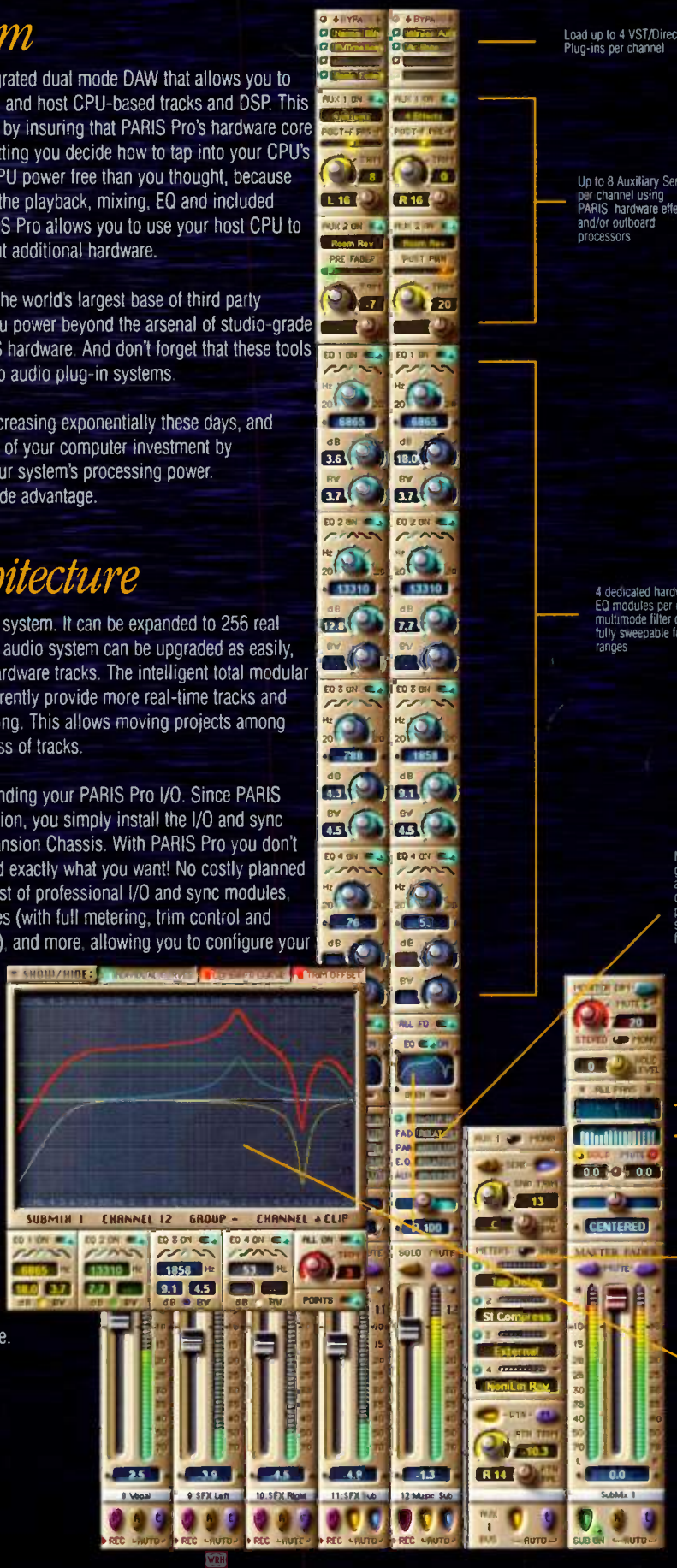
*EDS-1000X Expansion Card*



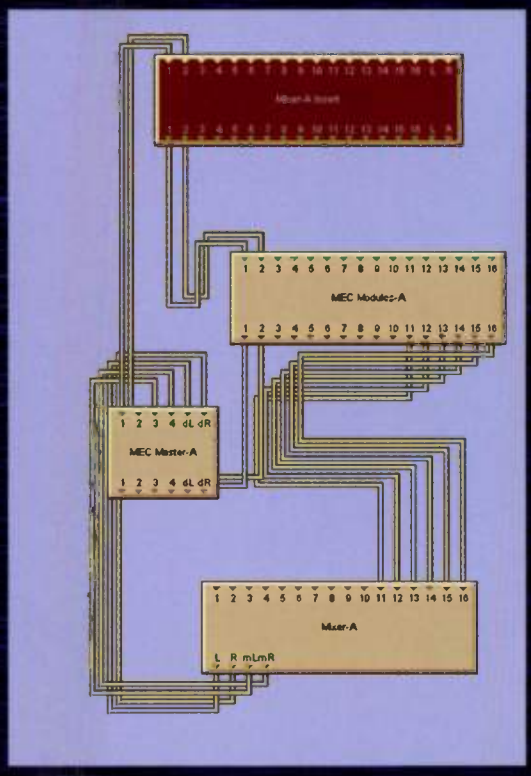
# *Intuitive Interface*

From its inception, PARIS Pro was designed to offer professional users cutting-edge technology with the most intuitive hardware and software interfaces possible. Even the newest DAW users can be up and running in no time due to an exceptionally user friendly system design.

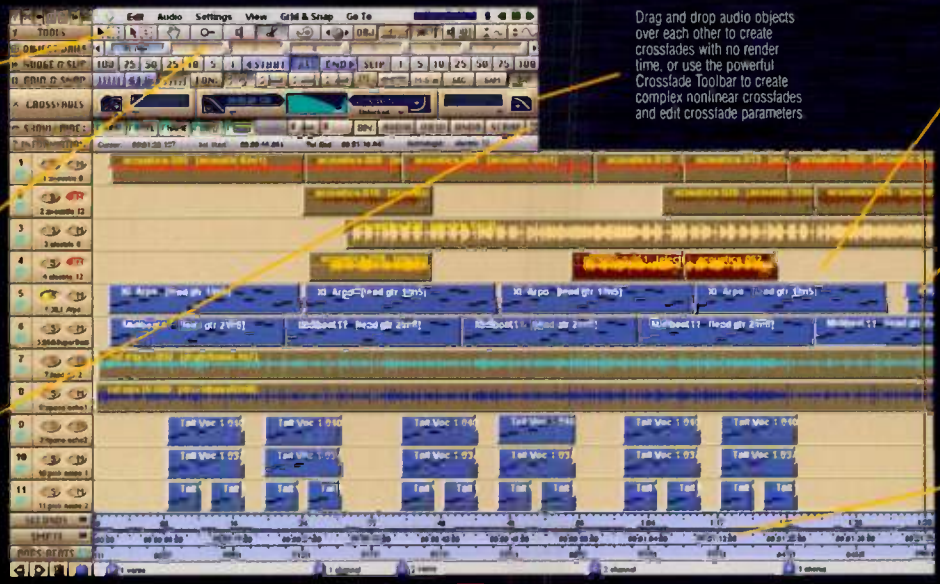
Every PARIS Pro System ships with a C16 Pro Interface, a physical mixing console that puts almost every operation at your fingertips without having to touch your computer's keyboard or mouse. In addition to its 16 high resolution faders, each C16 Pro also has dedicated buttons and knobs for transport control, editing, EQ (level, frequency, bandwidth), effects, solo, muting, automation, navigation, undo/redo, placing markers and much more. And PARIS Pro software is developed specifically to support the C16 Pro, so your control surface will always work seamlessly with every aspect of the overall PARIS Pro System. Want to add motorized faders from another manufacturer? No problem, PARIS Pro also supports 3rd party control surfaces! Once you've experienced the level of tactile control and integration that PARIS Pro offers, you'll never go back to mixing with a mouse!

The PARIS Pro software has been optimized so that you can work as quickly and efficiently as possible, while acting, feeling and even sounding like a top-end analog studio. Imagine the editing and creative power of a professional DAW with the feel and sound of a world-class analog console, patch bay and multi-track tape deck. The user interface is very visual, providing you with graphical depictions of your signal flow for patching signals to and from your MEC and outboard gear. And the software's overall appearance has even been specifically designed to be less fatiguing on your eyes during long sessions. You can create up to 99 custom views per window, allowing you to zoom right in on specific critical locations in your mix and then return to the exact same view with a simple button push. Switch views to quickly set up the 8 aux send busses, and then switch back to adjust 4 bands of EQ per track instantly. And with 99 levels of undo/redo (all saved permanently with the project), you can work quickly while still feeling free to experiment with your edits and mixes. Imagine not worrying about getting back to the last good point if a creative experiment goes awry.

Fading and cross-fading can be as simple as extending the edge of an object or overlapping one object with another. And when you need more control you can use the graphic cross-fade editor to see exactly what you are hearing while adjusting every parameter. PARIS Pro is so user-friendly and intuitive (and sounds so good) that many engineers who have steadfastly refused to work with audio in the digital domain have become some of the most loyal PARIS proponents.




*Patchbay Editor*



# *Compatible Solution*

As a truly professional audio solution, PARIS Pro integrates easily into your studio environment by supporting a variety of file formats, platforms, plug-ins, MIDI sequencers and storage media. While PARIS Pro uses its own true cross platform (Mac/PC) native .PAF file format, it can also read and write .SD2 and .WAV file formats. PARIS Pro can also import and export OMF (Open Media Framework®) files, allowing you to easily work with projects created on other pro audio systems. But unlike other systems, PARIS allows you to record up to 64 individual tracks straight to off-the-shelf IDE drives, saving you the expense and complications of using "proprietary" SCSI drives. And PARIS Pro also supports the many professional MIDI sequencer programs available (i.e. VST™, Logic®, Performer®) in addition to offering you it's own integrated MIDI recording, editing and playback, letting you run your favorite sequencer alongside PARIS.

From tracking the first instrument to mixing down the final product, PARIS Pro is a state-of-the-art audio solution that fits seamlessly into your studio and delivers professional audio results. PARIS Pro was designed in response to thousands of individual feature and performance requests from the recording community, and it shows- PARIS Pro delivers audio quality and flexibility of expansion that is second-to-none. Choose PARIS Pro as your total audio solution and be secure in both your creativity and your final product's quality. Then take the money you saved and pick up those high end preamps and microphones you've been looking at– you deserve it!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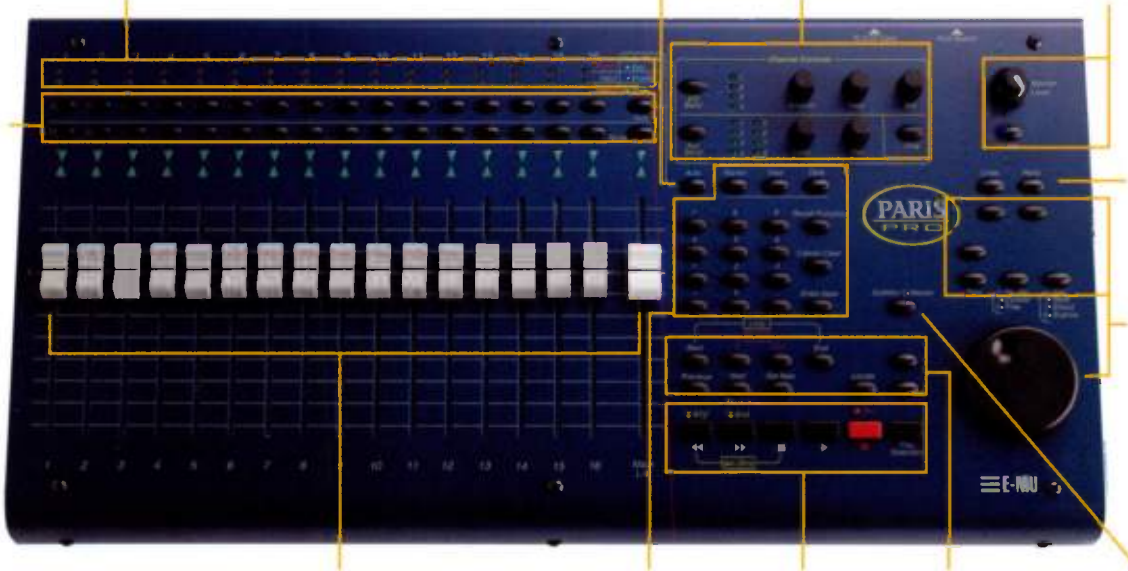
*MEC Back w/Expansion Modules*




**Record/Automation Indicators:** LED's show status record/enable and automation edit/enable for each channel.

**Automation Mode Control:** Turn on/off C16 automation.

**Channel Controls:** Fine resolution control over all EQ, Aux and Pan parameters for each channel.

**Monitor Control:** Dim, mute and level control for Control Room Monitors.

**Select and Solo/Mute Controls:** Buttons with LED's allow you to select channels for automation, editing, soloing and muting.

**Undo/Redo:** Up to 99 levels of Undo/Redo per PARIS window, saved automatically with your project.

**Editing Tools:** Jog, shuttle, scrub and edit audio and MIDI objects without having to use a mouse.

**100mm Longthrow Faders:** Smooth travel faders with greater than .5 dB resolution.

**Numeric Key Pad:** Recall/store project views, data entry, and navigate through PARIS windows.

**Transport Controls:** Tape style transport controls.

**Marker/Loop Controls:** Set/jump to location markers, loop and punch in/out points.

**Submix Master Control:** Assign C16 to either control separate submixes or act as a multiple submix controller (up to 16 submixes).

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their distance from the group (the latter controls the ratio of direct to reflected sound); symmetrical mic placement takes care of the rest.

Of course, if a group normally plays and rehearses in a closed circle, the members may prefer to record that way. In that case, high overhead positioning of a stereo pair—similar to the standard approach for miking drums overhead—is the best way to capture an accurate section blend without any sonic "shadows." Bear in mind that the mic pair's placement determines how instruments are assigned within the stereo spectrum, and positioning can highlight one or two instrumentalists.

Another thing to consider is whether the group uses music stands, which can block some of the instruments' sound and cause unwanted reflections. That is one instance in which spot miking may help out, though often it is possible to simply position the stereo pair of microphones high enough—and angled downward—to clear any obstruction from the stands.

## ROOMFUL OF DUES

A string section might also be part of a larger group, which raises other problems for the engineer trying to record the whole group at once. At one particular session, guitarist/composer John Schott's 11-member group, Ensemble Diglossia, employed a conventional string quartet plus an upright bass. When recording the group, I used an XY coincident pair of Neumann U 87s on the string quartet and an RCA 44BX spot mic on the bass. The strings were clustered at one end of the large room, the horns were at the other end, the percussionists were in an isolation booth, and Schott conducted from the middle.

When mixing the tracks, we found that the XY pair positioned just above the strings worked like a charm, picking up a smooth blend of the quartet. The mics were angled at about 90 degrees, which gave us good separation and wide stereo imaging. Another advantage of this setup is it made it relatively easy to change the balance of the strings in the mix simply by boosting the left or right channel. The U 87 pair yielded a gorgeous solo cello sound, as can be heard on the selection "Poor Mourner: Intro" (see the sidebar "String Thing Discography").

## CLOSE CALL

If traditional stereo-recording methods don't work, why not try close-miking a string quartet? That's what I did with cellist Alex Cort's quartet, a scrappy young group with a repertoire that includes original arrangements of timeless classics such as The English Beat's "Rotating Head," as well as covers by Siouxsie and the Banshees, Joy Division, and Sonic Youth. In addition to its punk leanings, Cort's group also deviates from the norm by including an upright bass.

The musicians arranged themselves in a tight circle in the studio's live room, with the bassist positioned slightly outside the perimeter to keep his aggressive pizzicato playing from overwhelming the other instruments. To capture some rock 'n' roll edge, I used a Neumann M 147 large-diaphragm tube condenser on the bass and another tube condenser—a Neumann CMV 563 with M7 capsule—on the violin. I chose ribbon microphones for the other two instruments: a Coles 4038 for the cello and a Royer R-121 for the viola. (The microphone positioning was in accord with the guidelines suggested in "String Fever.") For a room mic, I employed a Lawson L47MP tube mic set to the omnidirectional pattern.

**FIG. 2: A dedicated stereo microphone—such as Crown's SASS-P Mk II, pictured above—can simplify the process of capturing a realistic stereo image. The Crown SASS (Stereo Ambient Sampling System) is a stereo PZM condenser that uses human-head–size spacing between its capsules to create a well-focused image without a "hole in the middle."**

▼

**Everyone from Charlie Parker to Pat Boone used strings.**

The resulting recording sounds striking in its extreme detail, presence, and definition of the interior voices—attributes that immediately set it apart from standard classical recordings. Unfortunately, the ensemble's overall blend suffered from the close-miking; the setup yielded an overly intimate, hyperreal sound in which every individual attack grabs the ear and diverts attention from the group as a whole. The close-miking also minimized room sound; I had to add digital reverb to the tracks to restore some atmosphere to the sound.

Composer/guitarist Fred Frith observed a similar recording approach during the recording of his *Lelekovice (String Quartet No. 1)* at London's Angel Studios. Frith said each instrument had both a close and distant spot mic, in addition to a stereo pair hung above the quartet, plus another distant pair to pick up room reverberation. With 12 microphones in all, that model offers total control over the ensemble balance and room sound—but at the risk of being a mixer's nightmare. Frith liked the overall recording very much, but said the extra control gained from using so many mics turned out to be fairly minimal during mixing. The difference between sounds per channel was not nearly as significant as he

expected, and he would have gladly traded all that multiple miking for a good stereo recording in a beautiful-sounding room.

## THICKENING AGENT

In addition to the classically oriented models covered here, there are numerous precedents for the use of string ensembles in pop, jazz, and film music. Moreover, with the advent of stereo and hi-fi recording techniques in the 1950s, string sections were no longer relegated to the background. Suddenly, strings were up front in the mix (as in a tense Bernard Herrmann score) or oozing lushly in a swirl of artificial reverb behind a sexy chanteuse. Used by everyone from Charlie Parker to Pat Boone, string sections also figured prominently in massive production numbers concocted for crossover crooners like Roy Orbison and Gene Pitney.

The "country-politan" Nashville sound of the 1960s inspired two bands that came through my studio in recent years, prompting me to attempt historically accurate simulations of string sections for them while being limited to only three or four tracks. One such band, the Wandering Stars, was much enamored of the classic Nashville pop sound pioneered by Orbison, Lee Hazelwood, and others. To achieve that sound, I made extensive use of analog resources such as spring reverb, vintage amps, and reel-to-reel mixdown, as well as idiomatic trappings such as timpani, "bum-bum-bum" male choruses, and twangy guitars.

To create the string section effect, we double-tracked and sometime triple-tracked a violinist and violis playing together, usually voiced in un son or an octave apart. Distant mikin from three to four feet away with a AKG C 414 B/ULS set to a figure- pattern contributed a soft focus to th individual string tracks, which took o a suitable velvety thickness whe combined with abundant quantities spring reverb from a vintage AK BX-10. However, much of the crec for the production's success stems fro the thoughtful arrangements of mul instrumentalist (and former EM ass tant editor) Carolyn Engelmann. Without good arrangements, all the engineering tricks in the world can't create a string section that "sounds like a record."

## REALITY BYTES

Casino Royale's "(The Man Who Sl Liberty Valance" is a fun, knee-slapp nod to Western soundtracks from band's CD *Back to Back Bachara* Singer Danny Shorago eschews t hiccupy excess of Gene Pitney's 19 original, but receives ample kits support from echo-chambered bac ground vocals, fake gunshots, ar Joan Ling's violin. Ling, called in f what she thought would be a quic hillbilly fiddling track, ended u doing double duty—I also had he dress up an unconvincing sample string track that had been laid dow on the tune.

The violinist conferred with key boardist and arranger Pulot to wor out a solo line that traced the song' melodic movement; what went to tap was the existing string patch's acousti double. This "real" track was brought t the fore during the mix; there, in th prominent first-violin role (and again with lots of reverb), it fools the listene into thinking the subdued "orchestra behind it is real. I'm probably not th first person to use this trick, but jus the same, it turned the "Libert Valance" strings from a sore point int a selling point.

If a living, breathing string player not available, try doubling the sample string-ensemble tracks. The minc

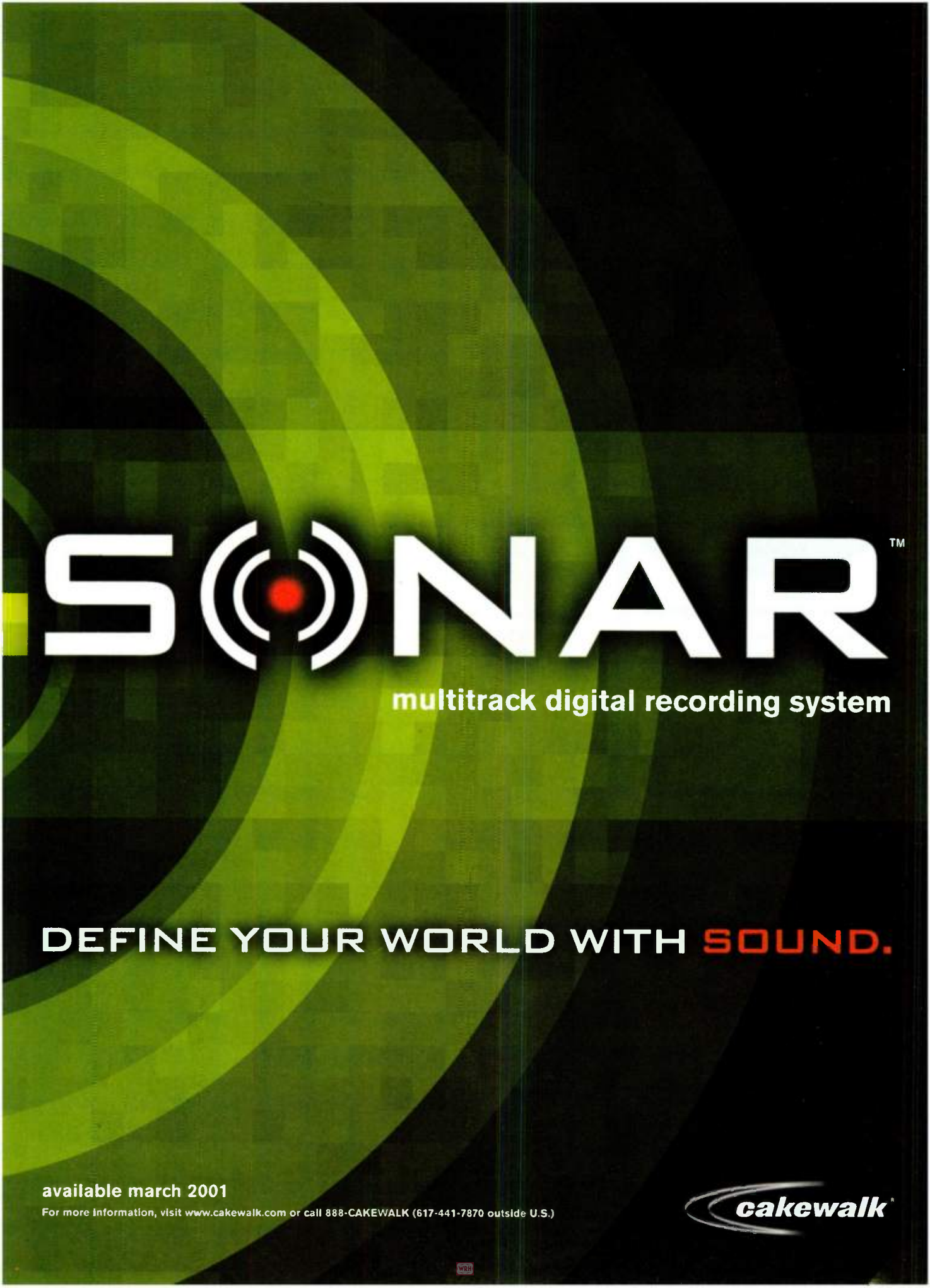
### STRING THING DISCOGRAPHY

The following CDs, engineered by Myles Boisen, are recommended listening for the variety of recording techniques described in this article.

**The Wandering Stars**
***The Wandering Stars***
**(Nuf Sed Records, 1995)**
"You're Still Young"
"Struggle of Life"
"Circumstance"
(All selections exemplify creating a string section using overdubbing.)
Available from Nuf Sed Records, 3595 28th St., San Francisco, CA 94110

**Casino Royale**
***Back to Back Bacharach***
**(Double Play Records, 1999)**
"(The Man Who Shot) Liberty Valance"
(This is an example of doubling sampled strings with acoustic strings.)
Available from www.casinoroyalemusic.com

**John Schott**
***Shuffle Play: Elegies for the Recording Angel***
**(New World Records, 2000)**
"Poor Mourner: Intro" (cello solo)
"Graph with Citation"
"Second Graph"
"Elegy: Yankee Doodle Dandy"
(All selections are string quartet plus bass.)
Available from www.newworldrecords.org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timing variations between two different takes of the same part help create the randomized, human feel our ears expect from an orchestral performance, in addition to obscuring glissandi that are often too uniform when played on a keyboard.

## ROSIN D'ETRE

In the past, I encountered a number of esoteric bowed instruments in the studio and on location. The Indian sarangi and Chinese erhu, for example—though recognized as senior members of the world-music pantheon—are as common in the Bay Area as American folk instruments such as the musical saw and the psaltery. But that's only half the story: on numerous occasions, I have recorded more unusual bowed instruments, ranging from huge gongs to blocks of wood and styrofoam. In the search to satisfy the expressive imaginations of avant-garde and nonidiomatic music makers, almost anything can be adapted for bowing—and it often is. Fortunately for the recordist, anything that can be made to vibrate by a bow can be recorded with studio techniques similar to those mentioned in this article.

The two major components of any bowed-instrument sound are resonance and bow sound, also known as "tone" and "scratch." More often than not, the recordist's job is simply to place a microphone where it will capture an appropriate balance of the two.

To tame an instrument that produces an overabundant bow sound, a little distance between the mic and the source is often all you need. The musical saw, for example, records best from two or more feet away; at that distance, any bow noise is usually softened or overwhelmed by the saw's rich sine waves, and the instrument's haunting harmonics really begin to blossom. As for mic selection, almost any type of microphone will pick up the saw's limited bandwidth adequately. Note, however, that the flat saw blade's sound radiation is highly directional; therefore, miking perpendicular to the saw's broad flexing surface—whether from below or above—yields dramatically better

ELISE RYERSON

**FIG. 3: Strings are not the only things that produce sound when bowed. Avant-garde percussionist and EM associate editor Gino Robair bows a piece of sheet metal—actually, the pilot-light cover from his furnace.**

Nathaniel Kunkel is one of today's hottest producer/engineers. It's his job to know good mics when he hears them. A few of Nathaniel's credits include: Robert Altman, Billy Joel, Little Feat, Lyle Lovett, Graham Nash, Aaron Neville, James Taylor, Anna Vissi, and dozens more.

Legendary studio drummer Russ Kunkel is Nathaniel's father. Russ's credits span four decades of illustrious session work for artists that range from A-to-Z – Herb Alpert to Warren Zevon. And as a successful producer of Jimmy Buffet, Graham Nash and many others, Russ also knows a good mic when he hears one.

"A-T's 40 Series are my 'go to' mics, without hesitation," says Nathaniel. "When I first heard the AT4050, I was very impressed. It was transparent, open and predictable. It is a stunning acoustic instrument microphone with the ability to handle extreme dynamic range very musically."

Take a professional tip from the Kunkels and hear what a 40 Series mic can do for your next session. Who knows? You might just be making musical history – like they have.

Special thanks to O. Henry Sound Studios, Burbank, CA

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tone than miking it from the side.

It's crucial to remember radiation patterns when recording the ghostly, shimmering tones of gongs and cymbals being bowed or stroked with rubber mallets. Like speakers, the metal plates only vibrate in two directions, so they don't radiate much sound parallel to their edges. Once set into motion by a heavy bass bow, the tonal output and harmonics from a gong or cymbal can be spectacular, easily drowning out any bow sound and making the sounds relatively easy to capture. I generally prefer condenser microphones for picking up cymbals played in that manner. Omnidirectional condensers work particularly well for close-miking large gongs, because the buildup of low-frequency energy from the proximity effect is a common problem.

The erhu and other ethnic fiddles tend to have small resonating bodies, so even with ideal microphone placement it's hard to avoid picking up a penetrating sound replete with scratch and high harmonics. In those cases, miking the back of the body with a warm-sounding mic—a ribbon or large-diaphragm dynamic mic, for instance—can really help enhance the instrument's tone and listenability, especially for Western ears. And don't forget a generous dose of reverb!

## BIRDS OF A FEATHER

The sonic extremism of bowed styrofoam offers a new set of challenges for engineer and listener alike. My task when recording percussionist and **EM** associate editor Gino Robair (see **Fig. 3**) as he bowed on packing material and fast-food containers was to pick up every ear-shattering shriek of bow hair against industrial-grade styrofoam. Close-miking with a pair of small-diaphragm Oktava 012 condenser mics proved ideal for documenting the screechfest, which stimulated high-frequency cilia that had lain dormant since my heavy-metal days.

Other instruments attacked or bowed in my studio in the past include electric guitar, Japanese koto, various metal plates and kitchen utensils, a Volkswagen Beetle hood, and the Dachsophone, a system of bowed wooden slats pioneered by German guitarist Hans Reichel.

No matter what kind of outlandish bowed instruments cross your path, you'll be way ahead of the game once you understand the sound-producing mechanisms of typical bowed strings and learn to recognize the characteristics these unusual instruments share with members of the violin family.

**Myles Boisen** *is a guitarist, producer, composer, and head recording/mastering engineer at Guerrilla Recording and The Headless Buddha Mastering Lab in Oakland, California. He can be reached through e-mail at mylesaudio@aol.com.* *Thanks to Gino Robair, Scrote from Casino Royale, Alex Cort, John Schott, Deirdre McClure, Christina Chute, and Fred Frith for their assistance with this article.*

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# REVIEWS



## FOSTEX

### VF-16

***Value outshines quirks in Fostex's latest multitracker.***

By Steve Broderson

When Fostex made the leap from cassette-based multitracks to digital audio recorders, it didn't forget the legions of songwriters and other musicians with big dreams but limited budgets. The company's previous models often emphasized low cost and flexibility over bells and whistles, and this approach is clearly evident with Fostex's newest offering, the VF-16 digital multitracker. With two rows of 60 mm faders, two built-in effects processors, a 5.1 GB internal hard drive, a SCSI interface, variable pitch control, a jog/shuttle wheel, and a modest $1,499 price tag, the VF-16 will undoubtedly raise some eyebrows (see Fig. 1).

The VF-16 provides 16 tracks of uncompressed digital audio along with 8 "virtual" tracks for a total of 24 tracks per project. (The virtual tracks serve mainly as holding places for alternate takes.) With many digital multitrack recorders, you can easily swap virtual tracks and primary tracks, which makes


FIG. 1: The Fostex VF-16 digital multitracker offers eight analog inputs, including a pair of XLR mic inputs that you can swap with inputs 7 and 8. The VF-16 also has 16 channel faders, a graphic LCD, onboard effects and EQ, a jog/shuttle wheel, and upgradable hard drive capability.

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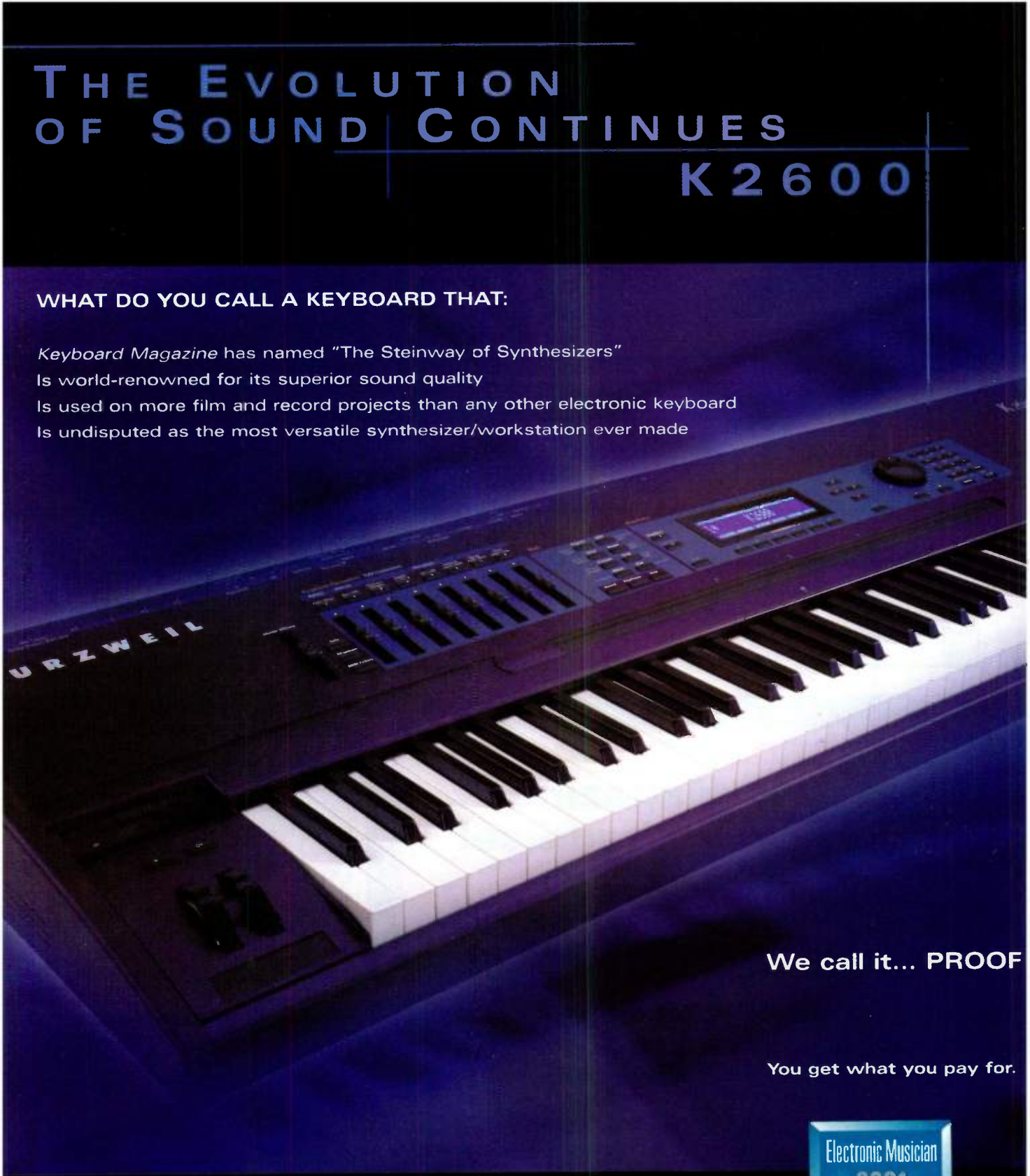


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cutting, copying, and rearranging data simple. The VF-16's implementation of this feature is a bit different. Its virtual tracks (17–24) are swappable with primary tracks (1–16) by means of the Track Exchange command, but you can't edit or hear a virtual track until you exchange it with a primary track. That limitation makes the editing process more awkward than it could be. With a little care and planning, however, you shouldn't have much trouble.

The VF-16 uses a 20-bit A/D converter and a 24-bit D/A converter, but the output is limited to 16-bit, 44.1 kHz audio. To store its digital information, the VF-16 uses Fostex's proprietary FDMS-3 format, which increases hard drive efficiency by optimizing data on the fly. Recorder status, mixer status, waveforms, menus, and various other functions are displayed on a backlit, 64 × 128-pixel LCD screen. Some of the top-panel buttons illuminate or flash to let you know what mode you're in, and the large jog/shuttle wheel is a big help when editing.

## INS AND OUTS

You can record up to 8 tracks at once using the 8 analog inputs, or record 16 tracks at once using the onboard ADAT Lightpipe interface in addition to the eight analog inputs (see **Fig. 2**). Two of the eight unbalanced input jacks are doubled by balanced, phantom-powered XLR jacks. These channels also include a TRS insert jack for adding an outboard device like a compressor/limiter. The phantom power is turned on from the Setup menu, but the VF-16 doesn't retain the setting when you shut down. Each analog input channel includes a Mic/Line trim pot and an LED clipping indicator. I used my Rode NT-1 to test the VF-16, and I found the mic preamps to be detailed and transparent, although a bit quirky in their gain stages. I noticed a smooth, gradual gain rise from line level to about the four o'clock position. (The pots are calibrated with dots rather than numbers.) From four to five o'clock, however, very slight adjustments made big gain differences.

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Although the mixer is flexible in other areas, its primary shortcomings are its lack of auxiliary returns and the inability of the line inputs to function as aux inputs at mixdown. That means if you're bringing in signals from external effects or MIDI gear, you'll need to sacrifice mixer channels. Submixing your outboard gear to a stereo pair still leaves 14 channels, but with the recorder's two aux sends per channel and full MIDI sync features, the lack of aux returns and inputs is puzzling. Another bit of inconvenience is that the onboard Metronome click is automatically routed to track 16. If you have anything on that track, you have to move it, deselect it, or do without it.

Two recording modes govern your tracking: Direct and Bus. In Direct mode the signal bypasses the mixer and is routed through the trim pot directly to the recorder on the corresponding track. You can use Direct mode to record through eight inputs simultaneously. Bus mode offers greater flexibility by letting you send any input through the mixer to any track. With Bus mode you can record multiple inputs to two tracks, and you can bounce tracks. The VF-16 manual suggests that Direct mode results in better recording quality because the signal doesn't pass through the mixer section. Technically speaking, that may be true, but I couldn't hear any difference. If your hearing is especially acute, you can always do your tracking in Direct mode and use the Track Exchange function to send your recording to whichever track suits you.


**FIG. 2: The VF-16's rear panel provides a SCSI port, MIDI I/O, a footswitch jack, an aux-send jack, and optical I/O ports that you can switch between stereo S/PDIF and 8-channel ADAT Optical.**

Generally, getting from input to recorded track was pretty straightforward, but some operations were less intuitive than they could have been. For instance, Input Source is not the same as Input Select. You must activate both and engage Record to hear your input. Additionally, you must turn up the fader to monitor a recording track. Logic and previous experience would suggest that's a sure way to get feedback. This could be a source of frustration for beginners who will no doubt be drawn to this unit because of its affordability. Help is available, however, in the form of two thoughtfully prepared Quick Start guides (in PDF format), downloadable from the Fostex Web site. They turn the somewhat daunting language of the owner's manual into an easy-to-understand walk-through of Direct and Bus recording options.

Like most similar devices, the VF-16 generates sync signals. MIDI Clock (bars/beats) and MIDI Time Code (MTC) are both supported, and in my road test with Emagic's *Logic Audio*, both methods worked flawlessly. You can assign a tempo and time signature when using MIDI Clock/Song Position Pointer, and you can set a global preroll time before a locate point. MIDI Time Code options include an offset and a frame-rate selection. The VF-16 can also act as a slave to an external MTC signal.

## Fostex VF-16 Specifications

| | |
|---|---|
| **Tracks** | 24 (16 physical; 8 virtual) |
| **EQ** | 3-band, ±18 dB: (High) peak, shelving 500 Hz–20 kHz; (Mid) peak 500–20 kHz; (Low) shelving 100 Hz (effective frequency) |
| **Recording Resolution** | 16 bits |
| **Sampling Rate** | 44.1 kHz |
| **A/D Converter** | 20-bit, 64× oversampling |
| **D/A Converter** | 24-bit, 128× oversampling |
| **Frequency Response** | 20 Hz–20 kHz (±1 dB) |
| **Dynamic Range** | 92 dB |
| **Total Harmonic Distortion** | 0.01% |
| **Maximum Recording Time (single track)** | 962 minutes on a 5.1 GB hard drive |
| **Analog Inputs** | (8) ¼" unbalanced; (2) XLR balanced with +48V phantom power (switchable with analog inputs 7 and 8) |
| **Analog Outputs** | (2) RCA Master stereo; (2) ¼" unbalanced L/R Monitor |
| **Digital I/O** | (1) stereo optical S/PDIF switchable with ADAT optical |
| **Other Ports** | Aux send 1 and 2 on single ¼" TRS jack; MIDI In and Out; ¼" footswitch input; ¼" stereo headphone output; SCSI port |
| **Display** | 64 × 128-pixel backlit graphic LCD |
| **Dimensions** | 15" (W) × 4" (H) × 13" (D) |
| **Weight** | 8.8 lbs. |

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## MIXING TOOLS

A 3-band EQ (parametric High and Mid with shelving Low) is available for each input. High, Mid, and Low settings are graphically represented on the LCD screen, and each band has its own button for speedy access to its parameters. Unfortunately, you can control the frequency and Q setting (the width of your EQ curve) only for the High and Mid sections. The Low section simply provides gain boost or cut. Because proper low-end control can really make or break a mix, it seems a shame there isn't more flexibility in this section. A built-in stereo compressor (with control over threshold, ratio, attack, and gain) is assignable to tracks 13 and 14 or 15 and 16, but only with the EQ turned off. You can, however, combine the EQ with a second stereo compressor dedicated to the Master output.

The VF-16 has two independent built-in processors; each channel has two internal effects sends along with the two aux sends. The first processor provides a bank of 28 reverbs along with a few delay/reverb combos. The assortment of halls, auditoriums, plates, rooms, and other reverb types employs a new Fostex technology dubbed Advanced Signal Processing. The company claims that this feature significantly improves processing efficiency and provides greater detail for early reflections. After using the VF-16, I have to admit that the reverbs sound lush and natural with smooth decays and plenty of presence.

The second effects processor provides the same 28 reverbs, along with ten extra effects: delays (including tempo delays), chorus, flange, and pitch shift. Though the number of effects isn't huge, the VF-16 covers the most-used categories, and each effect has a full array of editable parameters. Unfortunately, no storage space is provided for saving your customized variations. As I mentioned earlier, the aux sends are a nice touch, but their potential use is hampered by the mixer's return limitations.

One great advantage of using a digital mixer is that you can store snapshots or "scenes" that recall a particular configuration. The VF-16 provides this feature and a lot more. All level, pan, and effects settings can be saved along with a title to any of 100 Scene Memories. These scenes can be recalled directly with the push of a button, or automatically during playback as part of a scene Event Map. It's not quite the same as "flying faders," but you can automate changes for a hands-free mixdown.

The procedure is easy. First, you define a separate scene for each change you wish to make. Then you create a scene Event Map by entering locations (with the jog/shuttle wheel) to show where the changes are to occur. The Event Map sequences are editable too, in case you want to hear your mix another way. This is an impressive feature considering the modest price of this unit.

## SLICE AND DICE

VF-16 users can section off areas of a track for editing and manipulation by using one of seven Memory buttons. The standard Cut, Copy, Paste, Erase, and Move commands are provided, along with a Clipboard to which the audio is sent before it's pasted or moved. With a couple of clicks, you can hear just the portion you're about to send somewhere (or obliterate), which is a handy double-check feature for editors with itchy trigger fingers.

The Memory buttons also let you mark sections to punch in, repeat, or automatically return to, and by pressing the Shift button, you can set seven regular marker points to quickly tag any place in your song. Because the seven keys serve double duty, some extra button pushing is involved. Pushing a Memory button doesn't simply take you to a location; you must hit Locate, too. Moreover, the Locate buttons aren't lit like some others, so you can't tell at a glance if you have points set. An Event Memories display lets you view and edit all your locate points, however. You can also locate precise audio points with the Scrub feature, which includes a waveform display and audio feedback.

Editing is generally easy and flexible, although you get only one level of Undo. This saves Event memory and increases efficiency, but you'd better like your edit before you hit Record again, because you can't go back.

The VF-16's owner's manual has a few shortcomings. Aside from its lack of an index, the 121-page manual, translated from Japanese, has some serious readability problems. Fostex claims that it's working to improve the instructions, but I have no idea what this ominous warning means: "In the case whereby data registered in the Clipboard is the actual sound point and head of the measure is behind this, then even though you attempted to paste this head of the measure in alignment with this previously head, it will be pasted off alignment by this procedure due to the Clipboard In=Align Sel function."

## BACKUP PLAN

Changing clients as often as I do, I can't let a hard drive's contents pile up for long. The VF-16 comes standard with a SCSI interface and can back up files using optical S/PDIF (switchable to ADAT). Unless you have an ADAT Optical-equipped audio card for your computer, the SCSI option is the best way to go. The S/PDIF approach basically dumps two tracks at a time into

PRODUCT SUMMARY

**Fostex Corporation of America**

VF-16 portable digital studio

$1,499

| | |
|---|---|
| FEATURES | 3.5 |
| EASE OF USE | 4.0 |
| DOCUMENTATION | 2.5 |
| VALUE | 4.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Good feature-to-cost ratio; dual effects processors; easily upgradable hard drive.

**CONS:** No auxiliary inputs at mixdown; limited implementation of virtual tracks; awkward routing and editing.

**Manufacturer**

Fostex Corporation of America
tel. (562) 921-1112
e-mail info@fostex.com
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your digital recorder in real time. That means waiting eight times as long as your song if you've recorded all 16 tracks. The SCSI hard disk route lets the VF-16 send all the data at once to disk if you initialize your media with Fostex's proprietary format. You can also save songs to a DOS-formatted drive as WAV files. This method is handy because it lets you easily manipulate your sound files in an audio editing program. It also lets you save all scene settings and offers the option of saving all or only certain tracks (including virtual tracks).

For speed and convenience, many users will choose to archive their VF-16 recordings with a high-capacity removable-storage device like an Iomega Jaz or Panasonic DVD-RAM drive. But if you have an Iomega Zip drive, the VF-16 can also save to multiple disks. Though not as convenient as dumping everything to a single hard drive, the lower cost of Zip disks and the huge installed base of Zip drives makes this an attractive alternative.

If your studio has optical and coax digital connectors, you'll want to check out Fostex's COP-1 coaxial/optical converter box ($94). I used it to get the VF-16's signal to my sound card's coax inputs and vice versa. Digital output from my Mac's audio card and from my Johnson Amplification's J-Station guitar modeling preamp flowed effortlessly into the VF-16. You can route digital input to any two tracks using the Setup menu.

To expand your recording capacity, Fostex has made the internal EIDE hard drive easily swappable with larger-capacity drives. Although the company doesn't officially recommend taking on the job yourself (it voids the warranty unless Fostex makes the swap), the manual offers an illustrated step-by-step guide to replacing the hard drive.

## FINAL TAKE

I used the VF-16 during the review period for on-location recordings, studio tracking, and audio transfers between the recorder and my Mac. It performed well in these settings and ought to make a worthwhile investment for bands, songwriters, or project-studio owners.

Fostex has done an admirable job of capturing the middle ground in the digital-multitrack arena by offering an attractive balance between price and power. With a little shopping, you could add a removable storage drive and an outboard multi-effects unit and still keep the price tag around $2,000.

On the flip side, the VF-16 could stand a software overhaul to make it more flexible and user friendly. According to a company spokesperson, an update may soon be available through Fostex in the form of a flash ROM upgrade through the SCSI port. Even in its current state, though, the VF-16 offers a lot of recording power at a very reasonable price.

**Steve Broderson** *is a central Kentucky–based songwriter and producer who has recently formed Studio 246. His current clients include the University of Kentucky, Ale 8-1 (a local soft drink), and iHigh.com.*

# SOUNDSCAPE

## R.ED RECORDER/EDITOR (WIN)

### *A high-powered audio box with a splash of color.*

**By Allan Metts**

For a number of years now, Soundscape Digital Technology has maintained a well-deserved reputation for producing high-quality, computer-based digital audio workstations. The British company continues that trend with its latest offering: the R.Ed Recorder/Editor. This new hardware and software combination provides 32 tracks of 24-bit recording (or up to 16 tracks at 96 kHz), 28 audio input channels, and 32 output channels. Complete with professional-grade connections and synchronization options, this DAW has plenty of DSP power onboard.

The R.Ed hardware consists of a 2U rack-mount box, an ISA controller card, and a connecting cable. The rack-mount unit's front panel contains only an on/off switch, indicators for power and disk activity, and two removable drive carriers. The rear panel is where all the action is: three TDIF ports; MIDI In, Out, and Thru; word clock I/O (configurable as a Superclock signal); one stereo AES/EBU input; and two stereo AES/EBU outputs.

The rear panel also has connectors for the host PC and an expansion port: a 512-channel audio bus designed to work with Soundscape's upcoming line of Mixpander cards. These recently announced PCI cards greatly enhance the system's DSP capabilities, because the Mixpander/9 card boasts 11 times the R.Ed unit's processing power.

### POWER WINDOWS

If you have some extra cash, load up the R.Ed box with options. For $799, you can add analog I/O (two channels in, four out) with balanced XLR connectors. The A/D converters on this board provide 24-bit, 96 kHz audio with signal levels at +4 dB. If you're doing video work, you may also want the Sync AV board for $649. This option provides LTC and VITC SMPTE time code (input and output), an RS422 port, and video blackburst sync capability. If your SMPTE needs are simple, you can get by with the LTC-only board for $549.

The host controller card is installed into an ISA slot on your PC. One computer controls up to four R.Ed boxes, with up to two units per host controller. If you don't have an ISA slot, purchase a parallel port adapter. (According to Soundscape, a PCI controller card is also in the works.) Because the R.Ed hardware handles the audio crunching, you can get by with an average-speed CPU. With the parallel port option, you can even use a laptop using EPP printer port mode.

This system is completely professional and high-end except for one thing: the cable that connects R.Ed to your PC is a cheap ribbon cable like the ones typically found inside computers. In a congested rack, this cable easily crimps or tears. You'll need to find some properly sized screws of your own because the connectors don't screw into the hardware; I inadvertently dislodged the cable several times.

What's more, the controller cable that comes with the system is only 5 feet long, though Soundscape says that you can extend the line to 25 feet using inexpensive IDC connectors. I'd like to see the host controller card and cable eliminated altogether, because my PC already contains a device specifically designed to speak to other processors; it's called an Ethernet port, and the R.Ed box needs one.

Because the hardware handles the real-time audio processing, communications should be handled with traditional networking. The software can already run remotely, provided the R.Ed box is directly connected to a PC on the network. An Ethernet connection would eliminate the need for the controller card, the flimsy cable, and a nearby computer. (Soundscape says that because Ethernet ports are not standard on many PCs, the parallel port connector and upcoming PCI controller card are better options.)

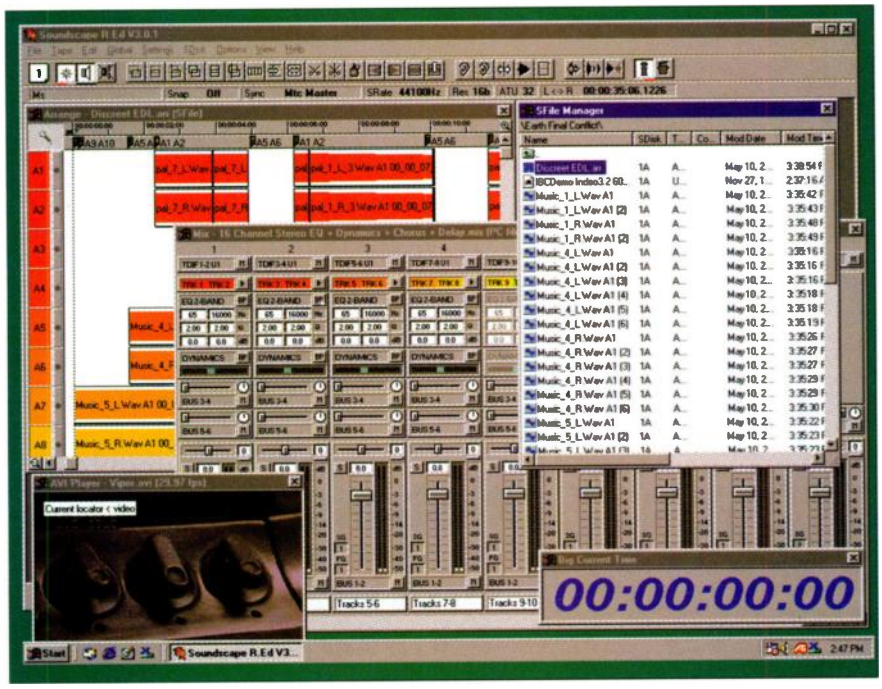


**FIG. 1: R.Ed provides a complete environment for audio recording, mixing, and editing. The system is particularly well suited for film and video post-production.**

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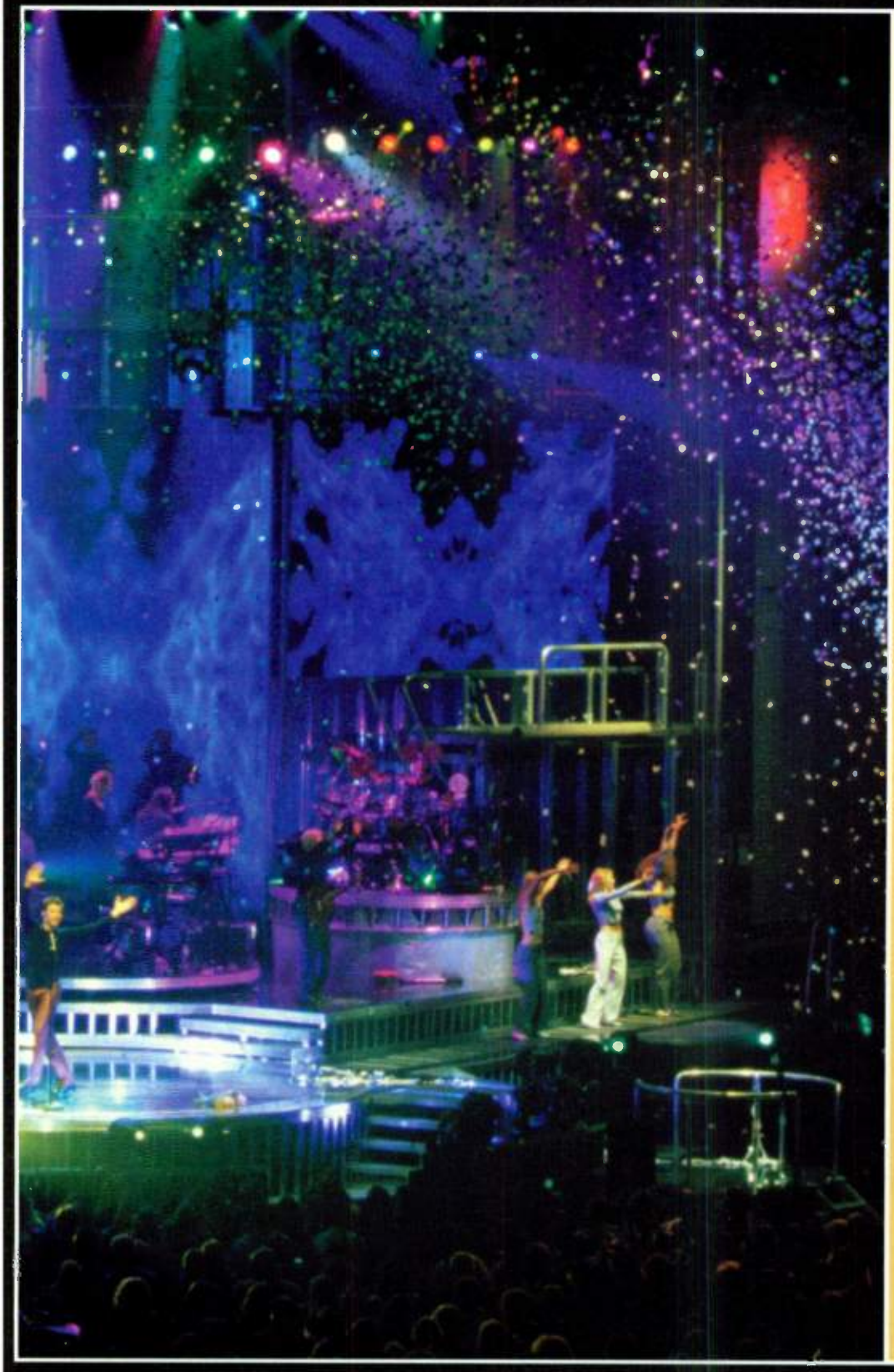

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## R.ED

R.Ed ships without hard drives, so you will need to buy at least one IDE drive to start. The system holds up to four hard disks (two fixed internal and two more in the removable drive caddies) with a maximum 137 GB per drive. That's more than half a terabyte of total disk storage. Kudos to Soundscape for choosing standard IDE drives for its systems; this form of storage is cheaper than tape on a track-per-minute basis, and you can find inexpensive large-capacity drives. Soundscape says that some of its customers are using IDE drives as backup media.

You also need outboard A/D and D/A converters because most of R.Ed's audio connections are TDIF. Soundscape sells TDIF-based converters in a number of configurations, with XLR, ADAT, and unbalanced connectors. Most of those let you choose your audio sync source, and some have extra connectors for word clock or Superclock synchronization. You can use TDIF devices from other manufacturers as well.

**PRODUCT SUMMARY**

**Soundscape Digital Technology**
R.Ed Recorder/Editor (Win)
computer-based DAW
$6,295 (base package)

| | |
|---|---|
| FEATURES | 4.5 |
| AUDIO QUALITY | 5.0 |
| EASE OF USE | 4.0 |
| VALUE | 3.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Heavy-duty feature set. Many synchronization options. Good support for film and video work. Minimal host system requirements.

**CONS:** Heavy-duty price tag. Short tether-to-host system. Nonstandard Windows interface.

**Manufacturer**

Soundscape Digital Technology
tel. (805) 658-7375
e-mail ssus@west.net
Web www.soundscape-digital.com

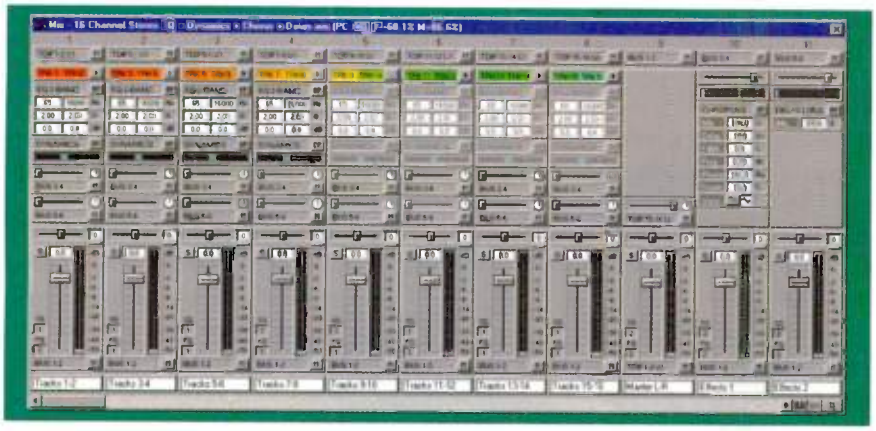

FIG. 2: The Mix window lets you route audio to the I/O connections, to the recording tracks, and to real-time effects. Sixteen internal mix buses are available.

## R.EDDY, SET, GO

Once you've connected the hardware, it's time to load the software. The install process puts the editing software and a driver for the host controller on your system. The host controller is not Plug and Play, so be sure that the I/O address in the driver matches the DIP switch settings on the card.

The editing software (aptly named *R.Ed Editor*) won't run unless the driver and host controller are configured properly, the cable to the R.Ed box is connected securely, and at least one appropriate hard drive is hooked up in the correct manner. Unfortunately, I received a defective host controller from Soundscape, and the lack of any useful diagnostic information turned out to be a real problem. I spent hours replacing hard drives, checking the cables, and mucking about with the driver settings. Yet each time I tried the software, I got the same useless error message—and then the program just quit. However, once I installed a new controller, the system ran fine.

*R.Ed Editor* (see Fig. 1) contains everything you need to route signals, record audio, and produce finished works. For the most part, the program is the same as *SSHDR1 Editor*, reviewed in the July 1998 issue of EM. The current version of *R.Ed Editor* works with Soundscape's older SSHDR1 Plus hardware too. It's heartening to see a company that supports its customer base by releasing new software that is backward compatible.

In *R.Ed Editor*, use the Mix window to route audio signals around your system. The Arrange window lets you manipulate Parts, which is Soundscape jargon for regions in digital audio files.

**Minimum System Requirements**

**R.Ed**

Pentium II/300; 16 MB RAM; Windows 95/98/NT/2000; 3 MB available disk space; ISA/EISA expansion slot or printer port with EPP mode

power when I attempted to play back all of them simultaneously. R.Ed's performance is tied to hard drive speed and Mixer configuration, so your mileage may vary. Punch-In and loop recording are also supported, which means you have several chances to nail that guitar solo. Previous Takes are always saved, in case the solo gets worse on subsequent attempts.

Once Takes are recorded, you'll find plenty of familiar editing tools at your disposal. You can copy, move, reverse, trim, phase shift, and remove DC from your audio. You can adjust volumes, create fades, and drop markers and use them as editing aids. Other tools round out the package, so all the basic audio editing needs are covered.

## TAKING CONTROL

Mixer automation is a new feature in *R.Ed Editor*. You record, move, copy, and edit automation tracks in much the same way you would manipulate audio tracks in the Arrange window. The Mix window lets you decide which automation track records events for a given Mixer control. When you click on the Mixer with the Info tool, the element under your mouse displays which controls can be automated, such as volume, panning, effects, aux sends, muting, and other parameters.

R.Ed also ships with *Console Manager* (see **Fig. 4**), a separate application that is the system's link to the outside world. The program lets you identify the MIDI and serial port devices on your system. *Console Manager* supports many devices, including controllers by JLCooper and Penny & Giles, digital mixers from Tascam and Spirit, and the Mackie HUI.

Soundscape sent me a Mackie HUI as part of this review. After wiping my drool off the console, I discovered that Soundscape's support for this device is quite extensive. In addition to fader, pan, and transport settings, you also control send levels, effects parameters, mute, solo, and track arming. R.Ed track names appear in the HUI channel strips, and the effects' names with their associated parameters appear on the main HUI screen when you access them—very cool. There are a few missing features (the Undo button doesn't undo, and the Save button doesn't save), but overall the HUI implementation is impressive.

*Console Manager* also supports generic MIDI messages, such as MIDI Machine Control, real-time events, MIDI controllers, and NRPN messages. You can map any MIDI controller message to any R.Ed control that supports automation, and then use the system with an external sequencer or MIDI hardware. This is a very powerful feature, but one thing is missing: there is no virtual MIDI port available within the host system for *Console Manager*. So to send MIDI messages from your sequencer to R.Ed on the same computer, you have to use a virtual MIDI router.

**The company supports its customer base by releasing new software that is backward compatible.**

## SPECIAL EFFECTS

Audio recording and mixing is only the first chapter of the Soundscape story. You can purchase additional effects and plug-in packages to greatly enhance the system's capabilities. Real-time effects are inserted into the Mix window's channel strips. Most of those come with extensively detailed control panels (see **Fig. 5**) that allow precise tweaking of the effect settings.

Offline effects are also available—you can access them through the toolbar buttons in the Arrange window. Some of the add-ins provide import and export functionality for entire sessions. For example, Soundscape offers a plug-in for OMF files. This is an Avid format that stores project timings and source material to be used by an Edit Decision List processor when you're working with video.

Some Soundscape plug-ins are actually separate applications, including *EDL Processor* and *CD Writer*. Both of these programs communicate with the R.Ed hardware. *EDL Processor* assembles audio collections and bounces them to new Takes at the appropriate points in time. *CD Writer* lets you assemble stereo tracks and burn them to a recordable CD.

Plenty of big names show up in Soundscape's effects roster. TC Works offers heavy-duty *Reverb* and *Dynamizer* plug-ins; Aphex provides *Aural Exciter* and *Big Bottom* processors. Effects bundles from Soundscape and Arboretum Systems include flangers, phasers, filters, delays, choruses, stereo emulation, ring modulation, sonic decimation, and tube tape saturation.

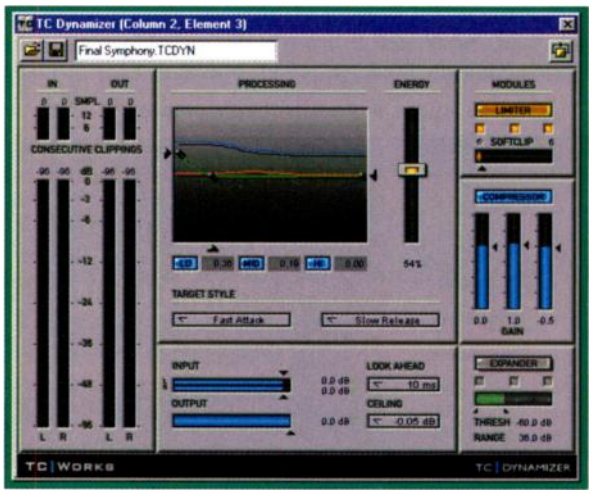


**FIG. 5: Many of the real-time effects have fancy control panels. TC Works' *Dynamizer*, for example, provides extensive mastering and level control capabilities.**

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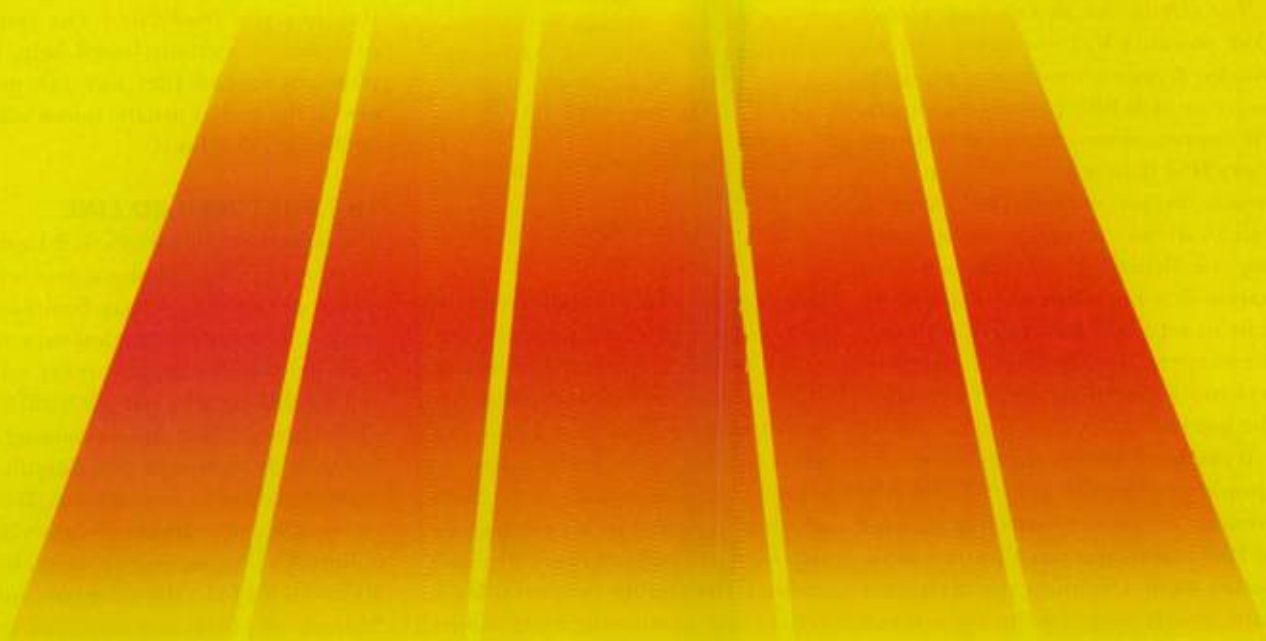

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## SEEING R.ED

The real-time effects aren't free, in more ways than one. Each third-party effects package costs a few hundred bucks, and some will run you much more. For example, the Dolby encoder retails for $1,099, while Cedar's *Dehiss* goes for about $2,500.

The effects can also suck up a lot of DSP power. UV22 encoding and TC Works' *Dynamizer* each use about 45 percent of R.Ed's processing power. Of course, some types of effects use more DSP than others. The basic R.Ed system has just enough DSP power to run 16 stereo channels, each containing one instance of the built-in 2-band parametric EQ. However, R.Ed never fails to tells you how much DSP and memory you're using, and it gracefully lets you know when you've exceeded the limits.

If you need more oomph, there are a couple of places to get it. The forthcoming Mixpander cards feature a lot of DSP power. You can also steal some power from a Soundscape Mixtreme card, which supports the same set of effects as R.Ed, by connecting either 8 or 16 channels to the board through external TDIF cables.

## COLORFUL SOUNDTRACKS

R.Ed is well suited for film and video post-production work. The variety of synchronization options, accurate audio placement, available effects, and support for EDLs and cue sheets all contribute to the system's capabilities in a post-production environment. R.Ed also has a built-in AVI player and supports video capture cards for full-screen, full-motion video playback and audio sync.

**Plenty of big names show up in Soundscape's roster of effects.**

The system is great for producing radio spots or musical compositions as well. I worked quickly and efficiently when creating tracks, and mixdown was a breeze. Sound quality is excellent, which is expected in such a high-end system, and I noticed no sonic abnormalities. Depending on your A/D converters and monitoring environment, the result may vary.

R.Ed has a number of file administration features too. The system provides all the tools you need to manage the files created by the R.Ed hardware, and you can transfer files back and forth to the host PC at will. You can even convert Takes into WAV files for use with other software.

The documentation isn't quite up to speed with the software, though. The latest manual covers version 2.04, yet I was running version 3.01. (Soundscape says that a new version of the manual will be posted on its Web site by the time you read this.) The system provides no software-based help, but plenty of readme files and tech notes are on the Web. I usually found what I needed if I dug for it.

## THE BOTTOM R.ED LINE

The biggest hurdle with the R.Ed system is its cost. This is professional gear, and it comes with a hefty price tag. Soundscape recently announced some less expensive R.Ed models that support fewer tracks and less disk capacity, but you'll still have a hard time getting up and running for less than $4,000—and that doesn't include the cost of a computer or A/D converters. Even so, consider the heavy dose of functionality you receive. If you shop around a bit for a digital mixer and a 32-track recorder, you may even start to think that R.Ed is a bargain.

A decision to invest in the system locks you into the Soundscape platform, in part because the plug-ins don't run on anything else. However, R.Ed is extremely expandable and upgradable, which is more than can be said for a good number of dedicated hardware systems. You can download software updates from the Web, and the company shows a commitment to its customers by maintaining backward compatibility when it releases new hardware.

All things considered, this is a great system. Whether you're shopping for a large post-production house or you simply want to do some colorful home recording, R.Ed won't leave you singing the blues.

**Allan Metts** *is an Atlanta-based musician, software/systems designer, and consultant.*

## Soundscape R.Ed Specifications

| | |
|---|---|
| **Tracks** | 32 @ 44.1 kHz; up to 16 @ 96 kHz |
| **Sampling Rates** | 22.05, 32, 44.056, 44.1, 47.952, 48, 64, 88.112, 88.2, 95.904, 96 kHz |
| **Resolution** | 16- and 24-bit linear |
| **Analog Inputs** | (2) balanced XLR |
| **Analog Outputs** | (4) balanced XLR |
| **Digital Inputs** | (1) stereo XLR AES/EBU (internal jumpers for S/PDIF levels) |
| **Digital Outputs** | (2) stereo XLR AES/EBU (internal jumpers for S/PDIF levels) |
| **Other Ports** | MIDI In, Out, Thru; (1 pr.) RCA Superclock I/O; (1 pr.) RCA word clock I/O |
| **Sync** | Superclock, word clock, MTC, MIDI Clock, Song Position Pointer |
| **Output THD+N** | < –92 dB (@ 1 kHz) |
| **Frequency Response** | 20 Hz–20 kHz (–0.4 dB) |
| **Dynamic Range** | 113 dB (@ 48 kHz; A-weighted) |

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# KURZWEIL

## K2600

## *The best just keeps getting better.*

By Scott Wilkinson

Evolution is a curious thing. According to the theory of natural selection, traits that provide better chances for survival pass from one generation to the next. This can be observed everywhere in the living world, and it's also evident in the realm of music technology. In some cases, improvements in subsequent generations of products are even passed backward to their precursors.

Nowhere is this reverse evolution more apparent than in Kurzweil's V.A.S.T. synthesizers. Talk about survival of the fit; these synths are the best all-purpose electronic instruments on the market. (They are also among the most expensive.) One of the primary reasons for these synths' success is that Kurzweil designs them to be upgradeable and continues to release improvements for older models while incorporating those changes as standard features in newer ones.

The latest instrument in the line—the K2600—represents a significant evolutionary step beyond its predecessor, the K2500. Many of its new features are also available as options for the older model, although the K2600 has a few tricks that are beyond the K2500's capabilities.

I've reviewed several of these synths in previous issues of **EM**—the K2000 (March 1992), K2000RS rack module (May 1993), and K2500 (May 1996)—so I won't repeat myself here. Instead, I'll concentrate on the K2600's new features and point out which are available for the K2500 as software or hardware upgrades.

I looked at the 76-key version with sampling, which is officially known as the K2600S. It's also available without sampling as the K2600 ($6,256). The 88-key version without sampling is the K2600X ($6,820); with sampling, it's the K2600XS ($7,700). The new instrument is also available as a rack-mount unit with or without sampling: the K2600R ($5,175) and K2600RS ($5,950). There's even a soup-to-nuts 88-key model with all the options included: the K2600AES ($20,000). As in previous generations, you can always add sampling to an instrument that lacks it ($900). Unless otherwise noted, I'll refer to the K2600 generically; all features and options are available in all varieties of the instrument (with the obvious exception of a keyboard on the rack-mount versions).

### EVOLVED HARDWARE

The K2600's front-panel appearance is much the same as the K2500's, except for its deep purple color and lighter background behind the controls, which is endemic to all new Kurzweil instruments (see **Fig. 1**). According to the company, the 88-key weighted keyboard action of the K2600X has improved from the one in the K2500X and PC88; Kurzweil worked with Fatar to refine the design, which Kurzweil's representative described as more rugged. The 76-note, semiweighted keyboard is unchanged, which is fine with me; I really like the feel of this action.

The circuit boards were redesigned from scratch, which lets the K2600 include twice as much Flash ROM as the K2500 (from 2 MB to 4 MB). This is critical to accommodate the more advanced software features. The new circuit boards also exhibit a higher signal-to-noise ratio at the outputs, which is always a good thing.

Because of the new circuit boards, the back-panel layout is completely different (see **Fig. 2**). In addition, the ¼-inch outputs are now balanced, which contributes to quieter operation when using balanced connections. However, that means the outputs can no longer serve as inserts as they do in the K2500, which might be a drawback if you wish to use them in that way. (There is another way to get multichannel audio into the K2600, which I'll discuss shortly.)


**FIG. 1: The K2600's front panel hasn't changed much from the K2500 (except for the color). Prominent features include a long ribbon controller above the keyboard, a short ribbon controller below the pitch and mod wheels, two switch buttons above the wheels, eight assignable sliders, a large LCD with six soft buttons below it, a large data wheel, and an alphanumeric keypad in addition to various mode buttons.**

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FIRST WE LISTEN

Another benefit of the new circuit boards is the ability to accommodate four optional ROM blocks instead of two in the K2500, bringing the maximum sample ROM to 44 MB in the K2600 (up from 28 MB in the K2500). Two ROM blocks are available: Orchestral and Contemporary ($450 each). By the time you read this, a third ROM block will be available: the Triple-Strike Piano that first appeared in the PC2 (see the review in the July 2000 issue of **EM**). The new piano ROM block adds 8 MB of soft and medium strikes to the hard strikes in the 4 MB Stereo Piano ROM that is standard in the K2600 and was optional in the K2500. Kurzweil is working on a fourth ROM block, which was under wraps at this writing. To install any ROM blocks, you also need the optional daughterboard ($290).

Kurzweil's KDFX effects processor is standard equipment in the K2600; gone are the K2500's lackluster DigiTech effects. (Hallelujah!) Fortunately, you can install KDFX in the K2500 as an option ($795). Among the many major improvements represented by KDFX are four stereo buses, plus a master stereo bus (as opposed to a single stereo bus; see **Fig. 3**), up to 18 modulators (as opposed to two, plus the wet/dry mix), many more effects and editable parameters, 20 kHz bandwidth (as opposed to 15 kHz), and all-digital operation (as opposed to converting to analog for processing).

Available effects include 15 reverbs, 7 delays, 11 chorus/flange/phaser algorithms, 9 distortion algorithms, 5 tonewheel organ effects, 14 special effects (various filters, shapers, etc.), 24 multi-effects, and 21 studio/mixdown effects (compressors, expanders, gates, and EQs along with tremolo, enhancers, autopanners, stereo image manipulators, and SRS simulated 3D). Perhaps most important, KDFX consists of custom VLSI DSP chips that can be upgraded with new software capabilities at any time.

All of this is wonderful, but how does the instrument sound? In a word: glorious. I played some basic Programs that use the Stereo Piano ROM on my DigiTech-equipped K2500 with similar Programs on the K2600, sending both through some of the available effects. The KDFX reverbs sound much sweeter and smoother than the DigiTech, with full-bodied tone and lush tails. The delays are as clean as a whistle, the chorus and flange effects are luxuriant, and the other effects are equally superb. All in all, this is one of the most significant improvements over the original K2500.

The stock Program RAM (PRAM) has increased from 256 KB to 486 KB, and the maximum PRAM has increased from 1.2 MB to 1.5 MB. (The K2600 PRAM expansion costs $450.) As in earlier models, PRAM is battery-backed and holds Programs, Setups, and other objects (except samples), even when the main power is turned off. Speaking of samples, all K2600 models ship with 64 MB of sample RAM in the U.S. market, but elsewhere, only sampler models ship with sample RAM—and

only 4 MB at that. By comparison, the K2500 sampler models shipped with no more than 4 MB. Both units can increase to 128 MB using standard SIMMs.


**FIG. 2: The rear panel is completely different from the K2500, thanks to redesigned circuit boards.**

One of the most important hardware options for the K2600 is called DIO-26 ($700). Derived from the Kurzweil Digital Stream (KDS) option for the K2500, DIO-26 adds eight channels of 20-bit digital audio I/O. (KDS in the K2500 provided only eight channels of digital audio output.) You can reduce the output to 16-bit resolution with various dithering algorithms.

The audio data is encoded in KDS format, which means you need a DMTi breakout box ($1,309) to interface with AES/EBU and S/PDIF. Because of physical space limitations, a stock DMTi provides only four input channels in addition to eight output channels. You can also get optional 8-channel I/O cards for ADAT ($300) and TDIF ($150).

Together, these options make the K2600 a powerful digital audio/MIDI production environment with eight channels of digital mixing, four effects buses, and a stereo master-effects bus in addition to the internal sequencer and sounds. All the K2600 needs to complete the picture is true hard disk recording, although it does provide something close, as you'll see in a moment.

The DIO-26 option provides the only way to keep the audio entirely in the digital domain all the way to the output of the K2600. (The K2500 requires KDS or KDFX for this; oddly, KDFX in the K2600 does not provide direct digital output as it does in the K2500.) Without the DIO-26, the internal audio converts to analog and back again for the sampler's digital output. This was done on the K2500 to accommodate the DigiTech effects—which could process only analog signals—and Kurzweil wanted to use the same sampling hardware for the K2600. The DIO-26 by itself provides two channels of AES/EBU or S/PDIF out; with the DMTi breakout box, you get eight channels out.

The newest software for the K2600 and K2500 allows partitions of up to 2 GB on hard disks with up to 8 GB in total capacity. A stock K2600 doesn't ship with an internal hard disk, but you can add any internal SCSI drive with a Kurzweil mounting kit ($90 for the keyboard, $50 for the rack-module).

Of course, you can also connect an external storage device to the SCSI port on the back.

Unlike the K2500, some of the hardware options are user-installable in the K2600, which is a real blessing. These include the ROM blocks, sample RAM, and PRAM. You still need a qualified service technician to install the DIO-26 and an internal hard disk in the K2600, but a K2500 requires a service technician for all hardware options.

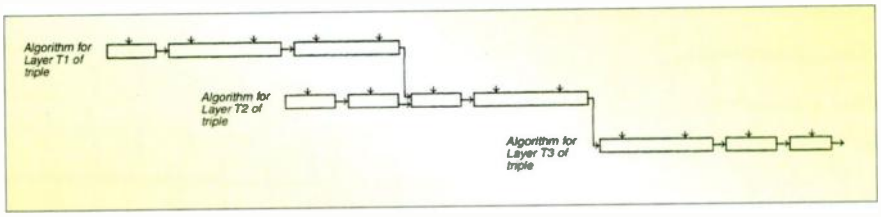


**FIG. 4: Triple mode adds many new algorithms to the V.A.S.T. architecture, and these new algorithms can be chained serially, greatly expanding the timbral-control capabilities.**

## LIVE AUDIO

The K2600 has been out for some time now, but I waited until version 2.0 of its software was available to review it. This version includes a number of very cool features I wanted to touch on, and it was worth the wait. Unless otherwise noted, these features are also available in the latest K2500 software (version 2.99 without KDFX; version 4.48 with KDFX).

Live mode is an exciting new feature that lets you process real-time audio streams from the two sampling inputs through the synth's V.A.S.T. and KDFX architectures. These audio streams are treated just like any other samples, which means they can be pitch-shifted and even played in reverse in addition to any other V.A.S.T. or KDFX manipulation.

With the DIO-26 and DMTi options, you can also process up to eight channels of real-time audio, but these streams bypass the Pitch block in the V.A.S.T. algorithms, so you can't pitch-shift or reverse them. Still, there's an awful lot you can do to them. This powerful feature provides almost unlimited sound-manipulation possibilities.

I used a microphone connected to one of the sampling inputs and had great fun sending my voice through various KDFX chains and V.A.S.T. algorithms. The only problem I encountered was feedback from my studio monitors. If you use Live mode with a microphone, you must be careful of feedback; I used headphones to avoid the problem.

A related feature is the Vocoder, which requires the sampling option and uses the V.A.S.T. architecture rather than KDFX. Like a traditional vocoder, this feature applies one signal's spectral profile—called the master (typically a vocal)—to another signal, called the slave (typically a synth sound). In the K2600, the master signal passes through 20, 22, or 24 parallel bandpass filters, each tuned to different bands in the audio spectrum. Each filter's output level is sent to a set of envelope followers used to control the outputs of another bank of parallel bandpass filters through which the slave signal is sent.

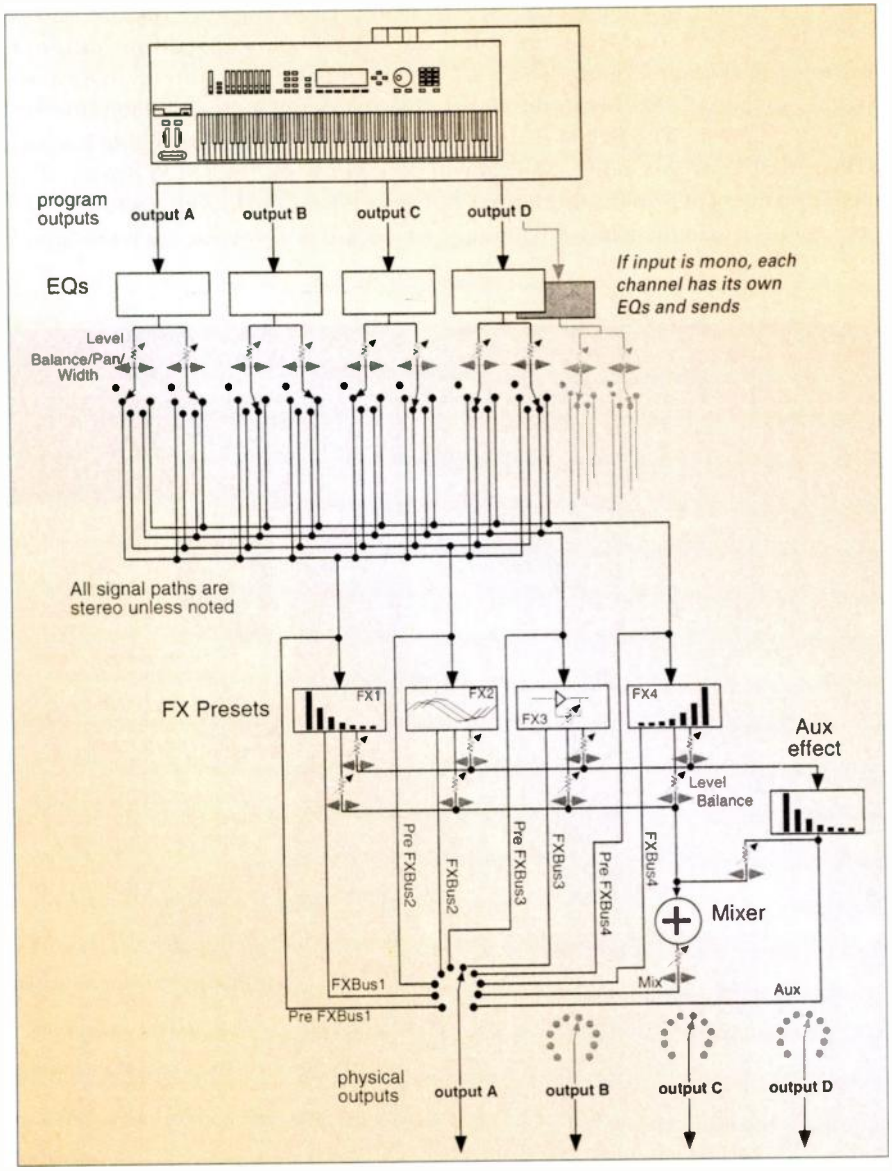


**FIG. 3: KDFX is standard in the K2600, and it offers a complex signal path with four stereo buses and a master stereo bus (not shown).**

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This imposes the master signal's spectral profile on the slave signal, creating the "talking-synth" effect.

To use the K2600 Vocoder, you must bring the signals into the sampler's analog inputs: master signal to the left input and slave signal to the right input. To use a vocal signal as the master and an external synth as the slave, simply connect a mic to the left XLR input and the synth to the right XLR input. (These are low-impedance, line-level inputs with no mic preamp or phantom power. However, you can add 21 dB of gain, so dynamic mics work fine.) In addition, you need to use a matching transformer or DI box between the synth and the input.

Alternatively, you can use a ¼-inch TRS insert cable plugged into the high-impedance, line-level stereo input and connect a mic to the left side and the synth to the right side. However, you need to use a high-impedance mic or a preamp to make this work properly. You can't use one XLR input and one side of the high-impedance input together, because they are mutually exclusive.

The Vocoder Setups include two Drum Programs that use Live-Input Keymaps with 20, 22, or 24 Layers of bandpass filters in the algorithms. Each bandpass filter takes one voice of polyphony, which means you can't use the K2600's internal sounds if you select the 24-band Vocoder. (Do the math: 24 bands for the master + 24 bands for the slave = 48 voices of polyphony with nothing left to play an internal sound.) Therefore, you must use the 22- or 20-band Vocoder if you want the K2600 to provide one or both input signals.

In addition, physically connect the B outputs to the sampling inputs to use the internal sounds. (Fortunately, these outputs are balanced, so all you need is a balanced cable with ¼-inch TRS on one end and XLR on the other end.) If you select the 24-band Vocoder, the Setup's third Program sends MIDI to an external synth.

This is all somewhat cumbersome, but the results are quite good. I really enjoy the sound of a vocoder, and this one doesn't disappoint. The K2600 provides a lot of real-time control over the vocoding process, including envelope-follower speed, filter bandwidth, and center frequency. The preprogrammed values for those parameters work fairly well, and altering them (especially envelope-follower speed) can make some pretty ugly sounds. Nevertheless, I had lots of fun with this function.

Another very cool audio feature, called RAM Tracks, lets you record audio into the sequencer, much like a digital-audio sequencer on a computer. In this case, however, the audio is recorded into sample RAM rather than straight to hard disk. Of course, this places fairly tight limits on the length of audio you can record, especially if you have lots of custom samples loaded; I hope Kurzweil is working on a software update that provides true hard disk recording.

Meanwhile, this is the next best thing. After enabling an empty sequencer

track to record, play audio into any available input (sampling or DIO-26) while the sequence is playing, and the instrument automatically assigns a MIDI note to the phrase. When you play the sequence, the audio plays along with any MIDI tracks.

To test this, I recorded some basic tracks in the sequencer as MIDI data that played the K2600's internal voices. Then I recorded a trombone solo through the sampling input into the sequence, which played right along with the MIDI tracks on playback. Clearly, that is another powerful and useful production tool, although it would be much more useful if the audio recorded directly to hard disk.

## MODEL SAMPLES

One of the K2600's time-saving features is the ability to create automatic Keymaps, which is great for importing multiple samples from CD sample collections. If you dump a bunch of samples into the instrument, it automatically assigns them to root notes and assembles them into a Keymap and a preview Program. This feature doesn't loop or normalize, but it does just about everything else to get samples ready for playing.

I tried this feature with a CD of samples I recorded for Hans Zimmer as he composed the score to the movie *Gladiator*. The samples consisted of me playing sustained notes on various Swiss Alphorns, seashell trumpets, and Jewish shofars (ritual ram's-horn trumpets). I started with the seashell trumpets and dumped them into the K2600, where they were neatly assembled into a Keymap and preview Program. I also created Keymaps for the Alphorn and shofar samples. This dramatically reduced the time it would have taken to assemble those Keymaps by hand.

The only unfortunate thing about the process is that you must start each sample manually; the instrument won't automatically start each one separately. This wouldn't be too difficult to implement; a new sample could start when the input signal exceeded a certain threshold, and the initial transient below the threshold could be recovered from an input buffer. Kurzweil is considering this feature for a future software upgrade.

You might think that 1,000 ID numbers for samples would be plenty, but that's what they said about 640 KB of RAM in the original IBM PC. In fact, those ID numbers get used up in a hurry, especially if you have some ROM blocks installed in addition to using your own samples. To ease this situation, you can join dual-mono samples and use one ID number to address both of them. Also, you can combine up to 255 samples into a single multisample with one ID number, which really helps conserve those precious numbers. Of course, you can't edit the individual samples when they're combined like

that, but you can always split them into separate samples if necessary.

KB3 mode is not really new; it's been available in K2500 software since version 2.52, and it's also part of the PC2. This mode bypasses most of the V.A.S.T. architecture (except the pitch and amplitude blocks) and models the behavior of a tonewheel organ, such as the Hammond B-3. The model includes percussion, key click, chorus, vibrato, tube-amp distortion, and rotary speaker simulation with programmable speed control that ramps up and down in a realistic manner. The eight front-panel sliders and the mod wheel act like drawbars with KB3 Programs; pulling them down increases the level of the corresponding partial.

The upper partials are generated by sample playback, while the lower partials are DSP-generated sine, sawtooth, or square waves. Unlike purely sampled organs, KB3 does not duplicate partials when different notes share common harmonics (say, C4 and G4), which prevents beating between shared partials and more closely emulates the behavior of a real B-3. As a result, the factory KB3 organ Programs sound incredibly realistic; I'd put them up against any sampled or modeled organ out there.

However, that realism comes at a price: polyphony. A KB3 Program that uses 79 tonewheels reserves 40 voices of polyphony, leaving eight voices available for other sounds, such as bass and drums. The KB3 voices remain reserved and unavailable for anything else as long as any KB3 Program is selected for any channel, so make sure there is no such Program on any channel if you're not using it. Fortunately, you can specify the number of tonewheels to use in a Program; if you need more polyphony, reduce the number of tonewheels, which you might not need if you're not using the top few drawbars anyway.

## Kurzweil K2600 Specifications

| | |
|---|---|
| **Analog Audio Outputs** | (10) ¼" TRS |
| **Analog Audio Inputs (Sampling Models)** | (1) ¼" TRS, (2) XLR |
| **Digital Audio Inputs (Sampling Models)** | (1) XLR (AES/EBU or S/PDIF, selectable), (1) optical |
| **Digital Audio Outputs (Sampling Models)** | (1) XLR (AES/EBU or S/PDIF, selectable), (1) optical |
| **Additional Ports** | MIDI In, Out, Thru; (2) SCSI; (2) ¼" footpedal jacks; (4) ¼" footswitch jacks; ⅛" breath-controller jack; ¼" headphone jack |
| **Polyphony** | 48 voices |
| **Multitimbral Parts** | 16 |
| **Sound Engine** | Sample playback with V.A.S.T. DSP; KB3 modeling |
| **Keyboard** | 88-note weighted, Velocity- and Pressure-sensitive (K2600X), 76-note semiweighted, Velocity- and Pressure-sensitive (K2600) |
| **Controllers** | Volume slider; (8) data sliders; (2) ribbon controllers; pitch and mod wheels; (10) switch buttons |
| **Stock ROM/User RAM Programs** | 230/1,000 |
| **Stock ROM/User RAM Setups** | 100/1,000 |
| **Removable Storage** | Floppy |
| **Sequencer** | 16-track; approx. 16,000 events per song (total for all songs depends on amount of P/RAM) |
| **Effects** | (106) reverb, delay, chorus, flange, phaser, distortion, rotary speaker, filter, shaper, compressor, expander, gate, EQ, tremolo, enhancer, autopanner, stereo image manipulator, SRS virtual 3-D |
| **Dimensions** | K2600: 47.8" (L) × 17.8" (H) × 4.8" (D)<br>K2600X: 54.3" (L) × 17.8" (H) × 4.8" (D)<br>K2600R: 16.9" (L) × 13.9" (H) × 5.1" (D) |
| **Weight** | K2600: 55.5 lbs., K2600X: 72.0 lbs., K2600R: 24.6 lbs. |

## EXCLUSIVELY YOURS

There are a couple of features that simply require more Flash ROM space than the K2500 has, which means they are available only on the K2600. Most important among these features is Triple Modular Processing, or Triple mode for short. This powerful new feature represents the first major expansion of Kurzweil's venerable V.A.S.T. architecture since it was introduced in the original K2000.

To review, V.A.S.T. is based on 31 algorithms consisting of several user-selectable DSP blocks that are chained together in a serial fashion and controlled by a variety of modulation sources. A Program is composed of one or more Layers, each of which includes a set of samples in a Keymap sent through an independent V.A.S.T. algorithm that controls pitch, amplitude, and timbre. Normal Programs have up to three Layers, whereas Drum Programs have up to 32 Layers, and all Layers' outputs are routed through the rest of the signal path separately.

Triple mode provides new V.A.S.T. algorithms that can be combined in groups of three Layers. Unlike normal Layers, however, these three algorithms are connected in a serial manner (see **Fig. 4**). There are 30 new algorithms available for Layer 1, 38 for Layer 2, and 26 for Layer 3 of a Triple Layer. The algorithms for Layer 2 include a block that combines the output of Layer 1 with the sample assigned to Layer 2, and the algorithms in Layer 3 further process Layer 2's output. You can even combine a Triple Layer with normal Layers or other Triple Layers in a Drum Program, although be aware of polyphony limits. A Triple Layer takes the same polyphony as a normal three-Layer Program.

Triple mode offers almost-infinite synthesis possibilities, including the ability to modulate one sample with another in various ways and chain several independent filters together,

which is impossible with a standard V.A.S.T. program. In particular, Triple mode offers the potential for much more timbral variation and control. Playing a single note of some Triple Programs and moving the eight sliders results in a swirling kaleidoscope of sound with shifting timbres and—in some cases—looplike beats that you can't duplicate with standard V.A.S.T. Programs.

Another feature unique to the K2600 is its ability to support 16 simultaneous Drum Channels, which means you can have a Drum Program on all 16 MIDI channels. As a result, the entire concept of Drum Channels is rendered moot in the K2600. The K2500 is limited to eight Drum Channels (2 through 8, plus one user-specified channel), so some of the K2600's Setups will not work on the older instrument because it uses channels other than these. Typically, those are the Interactive Groove Setups that depend on groove patterns, which are also not available in the K2500.

## I HEAR VOICES

The K2600 uses exactly the same base waveform ROM as the K2500. However, the latest instrument includes all newly developed Programs and Setups, and plenty of them—it ships with more than 200 Programs in ROM and 200 Programs in RAM just to get you started and demonstrate what this beast can do. In fact, Program ID numbers are becoming more and more precious, so some new Programs actually include two related sounds that you can crossfade or switch between with the A slider.

The first 100 Programs include a good cross-section of sounds, including pianos, V.A.S.T. organs, basses, drum kits, guitars, synth leads, strings, brasses, and choirs, making it easy to audition the instrument. There are quite a few synth Programs in the other banks, including a good number of techno/rave-type sounds (some of which provide repeating loops on their own), as well as a variety of Programs reminiscent of Moog, Prophet, and other classic-synth sounds.

Overall, the new Programs are first-rate; the Kurzweil sound designers have done themselves proud with many exceptional entries. As a brass and woodwind player, I've yet to hear a truly convincing sampled emulation of these instruments, but the K2600 has many Programs that use those samples as a starting point and mangle them in interesting and useful ways. There are many great string, guitar, bass, and vocal sounds, and the drums are uniformly excellent. Because the K2600 uses the same waveform ROM, all standard Programs are fully backward compatible with the K2500.

In the K2600, most of the preset Programs use all eight sliders for subtle and dramatic changes to the sound, unlike the K2500, which typically used only the first slider to control presets. The general paradigm is that sliders A through D affect V.A.S.T. parameters (primarily filter and envelope) while E through H affect KDFX. This is a welcome addition to the presets, demonstrating how much you can do with real-time control.

The new Setups are equally adept at demonstrating the K2600's capabilities. Many are designed to show off the ability to synchronize the sequencer and arpeggiator functions. For example, you can do a sort of wave sequencing, in which the sequencer sends Program Change messages to the sound played by the arpeggiator. This produces a effect reminiscent of the Korg Wavestation.

A number of Setups start the sequencer and/or arpeggiator when you play a note, and some latch the playback to continue after you release it. You can't activate the latch from a footpedal, but Kurzweil is considering that for a future software update. You can also program the arpeggiator to change keys only on measure boundaries or immediately when you play a different note. In addition to a wide variety of melodic patterns, the arpeggiator plays all held notes in a pulsing, repeating chord synchronized to the internal clock, which is another interesting effect.

## CHILDHOOD'S END

The K2600 far exceeds its progenitor, as all good progeny should, while offering its predecessor the fruits of its evolution. The only significant throwback is its relatively skimpy polyphony, which hasn't been expanded since the K2500. Its 48 voices are quickly gobbled up, especially by multiple Triple Programs, KB3 Programs, and complex Setups. Increasing the polyphony would raise the price—which is already stratospheric—but most other high-end synths (and many not-so-high-end instruments) are up to at least 64 voices or more these days.

Despite this one shortcoming, the K2600's power, depth, and flexibility are unsurpassed by any other instrument on the market today, and I suspect it will remain the pinnacle of keyboard workstations—both in terms of performance and price—for years to come. If you can afford to outfit an expedition, you won't find a more advanced species anywhere.

*Like everyone and everything else in the universe,* **EM** *technical editor* **Scott Wilkinson** *was born about 15 billion years ago in the creation event called the Big Bang.*

**PRODUCT SUMMARY**

**Kurzweil**
K2600S
keyboard workstation
$7,140

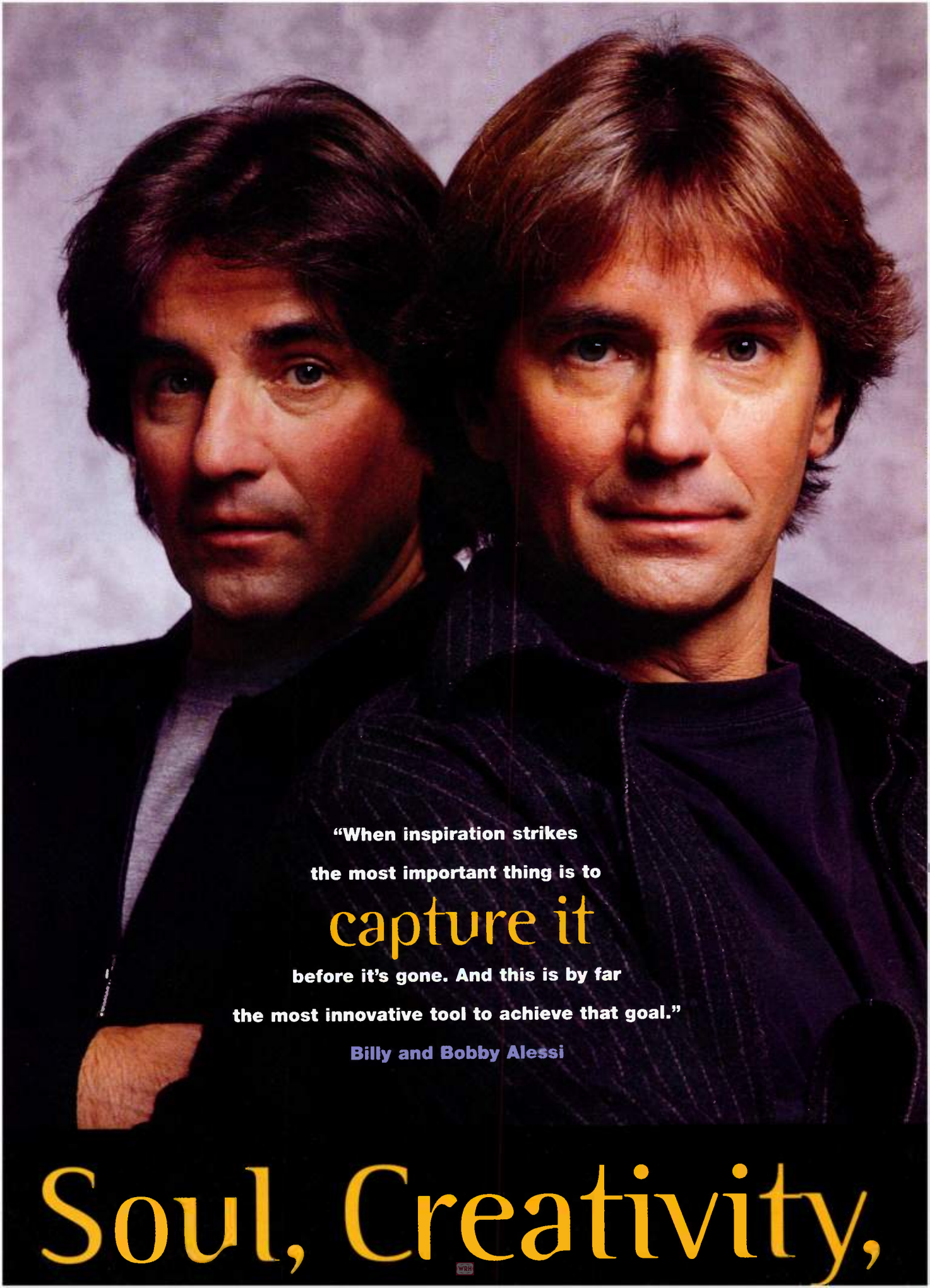
| | |
|---|---|
| FEATURES | 4.5 |
| EASE OF USE | 3.0 |
| QUALITY OF SOUNDS | 4.5 |
| VALUE | 3.5 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Live mode. Triple mode. Superior KDFX effects. Automatic Keymaps. Balanced audio outputs. 16 Drum Channels. Vocoder. DIO-26 multichannel digital audio I/O option. RAM Tracks.

**CONS:** Skimpy polyphony. No true hard disk recording. No direct digital output without DIO-26. Expensive.

**Manufacturer**
Kurzweil Music Systems, Inc./
Young Chang
tel. (800) 421-9846 or (253) 589-3200
Web www.kurzweilmusicsystems.com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# FOCUSRITE

## PLATINUM MIXMASTER

### *A stereo mastering processor that lives up to its name.*

By Myles Boisen

Mastering is both an art and a science, with a bit of voodoo sprinkled in. Some mastering engineers keep their work in the digital domain, crunching numbers with computer plug-ins and avoiding unnecessary analog conversions. Others are more concerned with configuring the right analog signal chain to bring out the magic in a mix.

The latter type of engineer will appreciate Focusrite's Platinum MixMaster, with its suite of powerful analog processing tools, precision metering, and optional digital output. The end result is a multifaceted mixing and mastering processor that offers a fresh and simple alternative to the digital devices dominating the personal-studio realm.

## PLUG AND PLAY

The MixMaster has an uncluttered, friendly front panel with a gleaming brushed-aluminum complexion. The processing elements—optical expander, spectral compressor, equalizer, spatial enhancer, limiter, and output control—are clearly laid out from left to right according to their order in the signal chain (see **Fig. 1**).

All the front-panel controls are stereo linked. Although there are no provisions for using the MixMaster as a dual-mono device, there is no reason for not using it on mono or stereo signals during tracking or mixing.

Around the back, the MixMaster offers +4 dBu balanced analog I/O on gold-plated Neutrik XLR connectors and –10 dBV balanced analog I/O on ¼-inch TRS jacks (see **Fig. 2**). You can use the ¼-inch outputs with balanced or unbalanced cables, and both sets of analog outputs are active simultaneously. The ¼-inch inputs interrupt the XLR input jacks when both are connected.

The MixMaster also includes a pair of balanced ¼-inch Direct Input jacks. The Direct Input signal enters the circuit just before the output-level trim control and limiter, letting you mix an external mono or stereo signal with the processed audio. Focusrite recommends using that additional input when a featured mix element, such as a lead vocal, requires a different type of processing than the primary audio source.

Above the analog I/O jacks is space for the optional digital-output card ($295). The digital card supports 16- and 24-bit word lengths and 44.1, 48, 88.2, and 96 kHz sampling rates. The connections include standard AES/EBU (XLR) and S/PDIF (RCA) output jacks as well as an external word-clock input on a BNC jack. There are switches to select the sampling rate, word length, and output, and an LED indicates when the MixMaster locks to word clock. All of these items are on the rear panel, making them difficult if not impossible to access when the unit is mounted in a rack. The review unit came without the digital-output module, so I couldn't test the MixMaster's digital capabilities.

The MixMaster runs hotter than some tube gear. Along with the rear-panel digital audio controls, that may warrant special consideration for placement in a rack.

To its credit, Focusrite goes further than most companies by making its manual a useful resource for novices. The manual includes several helpful setup ideas as well as a wealth of basic mastering tips.

## DOWN THE PATH

The first effect in the MixMaster's chain is a low-threshold stereo expander optimized for suppressing audible noise at the beginning of a mix or after a fade-out. The expander has two continuously variable controls: Threshold and Release. Threshold sets the triggering level and ranges from –60 to –20 dB. Release governs the amount of time (from 0.5 to 6 seconds) it takes for the expander to fade to silence. The optical sensor used in the circuit provides smooth fades and lower noise and distortion than VCA circuits. The expander has a bypass switch and an LED ladder meter that indicates the gain reduction in 3 dB increments between 0 and –15 dB, and 5 dB increments from –15 to –30 dB.

Next in the chain is the spectral compressor, which is a stereo compressor with an optical sensor and limited multiband EQ capabilities. The bulk of this section includes standard compressor parameters. Threshold is continuously variable between –20 and +10 dB. Ratio controls the amount of compression (1.3:1, 1.7:1, 2.2:1, 3:1, 4:1, and 5:1) once the signal exceeds the Threshold setting. The Slow Attack


**FIG. 1: The Focusrite MixMaster includes a multiband compressor and equalizer. The signal path through the processor is clearly visible from the front-panel layout.**

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WRH

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**FIG. 2: In addition to the main XLR and ¼-inch inputs, the MixMaster includes a pair of balanced auxiliary Direct Inputs.**

switch offers two attack times to choose from: 10 ms when Slow is engaged and 500 µs when it's disengaged.

Release governs the amount of time it takes for a compressed signal to return to its uncompressed state once it drops below the threshold. Release has four preset values (0.2, 0.4, 0.8, and 1.6 seconds) and two automatic settings labeled PDF (program-dependent fast) and PDS (program-dependent slow). Those apply varying release times to the compressed audio based on the transient characteristics of the signals occurring above the threshold. The final knob is a Make Up Gain control, which compensates for any gain reduction due to compression.

When the Lock switch is on, the compressor disregards the mix's frequency content. When the Lock switch is off, the compressor becomes frequency dependent, splitting the audio into three bands and bringing additional controls into play. Separate Low Frequency (LF) and High Frequency (HF) trim pots give you independent control over the level of the bass and treble frequencies, respectively. For example, a dominant kick drum's boom—which may trigger undue compression effects or pumping in a conventional compressor—can be trimmed so the compressor reacts less to the mix's bass range. Both controls are zero-detented and continuously variable from –10 to +10 dB.

There is no trim control for the mid-frequency compression band and no control over the crossover frequency between the high and mid bands. But the MixMaster does offer a useful low-end option with the Slope switch, which toggles the crossover point between the low and mid band to 100 or

200 Hz. In the 100 Hz position, a circuit similar to that used in the Platinum ComPounder boosts the bass below the crossover point.

Red LEDs indicate extreme compression levels (–12 dB and beyond) with lower gain-reduction values indicated in orange. A red LED above the Make Up Gain control indicates overload or clipping resulting from excessive gain boosting. The overload-threshold value is not provided in the manual, but in testing, that LED lit up when output levels approached –2 dB.

## EQUALIZE IT

The MixMaster's stereo equalizer is simple and straightforward. It includes separate low frequency (LF) and high frequency (HF) shelving bands and one parametric midrange (MF) band. Available low frequency shelving bands are 40, 70, and 120 Hz; high frequency shelving bands are 10, 14, and 20 kHz. Both controls also include a Tilt setting that establishes a linear slope from 1 kHz to the extreme of the frequency range (20 Hz for the LF band, 20 kHz for the HF band), allowing broad contouring of a mix. Available gain values are 1.5, 3, 5, 8, and 10 dB of cut or boost. If you use the Tilt setting, the full gain value applies only to the top or bottom of the frequency range, causing the linear slope to pivot around the 1 kHz point.

The MF band has continuously variable Q (0.4 to 1.5) and Frequency (100 Hz to 1 kHz, with 10× switching for 1 kHz to 10 kHz), but it uses stepped gain values that match the LF and HF settings. The Frequency and Q controls have several intermediate markings around their perimeters, so you can re-create settings quickly and easily. As with the compressor, a single red LED indicates overload in the equalizer.

## ON THE WAY OUT

When the Image button in the Output section is engaged, you have control over the stereo image. The first control is a center-detented balance knob that adds up to 3 dB of level to either channel. This is perfect for correcting stereo level mismatches.

Next is the Width control, which narrows or expands the stereo image. The knob ranges from Small on the left to Wide on the right. As you turn the Width control fully counterclockwise, the circuit boosts the information common to both sides to narrow the stereo spread into a tight mono image. Turn the control clockwise toward Wide, and the differences between the channels are amplified. That increases the material unique to each channel and expands the image's apparent stereo character.

The Output Trim control is also center-detented and ranges from –6 to +6 dB. The limiter In switch engages a fixed-threshold limiter at the final analog-output stage. The meter above the switch shows the gain-reduction amount. The Effect Bypass switch at the front panel's extreme right disables the expander, compressor, equalizer, balance controls, and output trim.

when engaging the expander, compressor, spatial enhancer, and limiter; only the EQ module and the Effect Bypass were immune from annoying switching noise.

## SQUEEZE AND STRETCH

The MixMaster's expander works well. The threshold range is specifically designed to minimize background noise. The quick attack time is essential to avoid losing information at the beginning of a mix. It also has ample release time to cover long fades.

Although the expander doesn't harm the mix if set correctly, it is a somewhat redundant feature, at least for any project that undergoes further computer editing or mastering.

When using the spectral compressor, I found it hard to get any appreciable multiband results at low ratio settings, such as 1.3:1 and 1.7:1. At ratios of 2.2:1 and higher, the circuit was much easier to appreciate. The LF and HF trim controls work like threshold controls for their respective frequency bands. Turning the trim clockwise resulted in less compression to the band, and counterclockwise rotation yielded more compression. Although it has no dedicated control, the mid band can be adjusted by lowering the Threshold level and raising the Trim levels.

On a grinding alt-rock number, I liked reducing the high-frequency compression; the grungy mix remained clear and unaffected in the high end, whereas the compression easily controlled the beefy guitars and bass. Turning down the HF Trim targeted the snare drum and female vocals effectively, and a little experimentation told my ears that the crossover point is around 2 to 3 kHz, a useful range for taming harsh mixes. Focusrite later confirmed that the crossover is set at 3 kHz.

I also tried boosting the low frequencies by engaging the Slope button. Although that didn't suit my rock and jazz mixes, I imagined it being useful for hip-hop and dance music. Judging by the meters, that feature also increases the amount of compression in the low and mid bands. In multiband mode, the MixMaster's compressor was responsive and musical, as well as refreshingly simple and fun to use.

In Lock mode, however—when the unit acts as a conventional single-band compressor—the effect was touchy, and it was difficult to get fluid, transparent compression. I yearned for the continuously adjustable Attack, Release, and Ratio controls found on Focusrite's Platinum ComPounder. But after some tinkering, I found low ratio settings and release times of 0.4 or 0.8 seconds added beneficial sustain to the bass range and thickened the mix.

At an overall average gain reduction of 3 to 4 dB, the snare drum was the only instrument in the mix that was noticeably compressed. Nonetheless, everything sounded great. In a number of situations, I preferred the Slow Attack mode, and I gravitated toward medium-range release times or the PDS auto-release mode in conjunction with low ratios. That kept the compressor functioning smoothly.

I drove the compressor's Make Up Gain hard to test the available headroom through the unit. It sounded great under all conditions, even when the DAT machine was pushed to its limits. The MixMaster's limiter would not distort, but at extreme levels, its obvious brick-wall effect didn't exactly sound pretty. Like most VCA limiters, that feature is handy for avoiding the occasional over, but it is best used in moderation.

## EQ IN SITU

Although its single sweepable midrange band and coarse stepped-gain controls limit the EQ section, it works very well. It was easy to hear the minimum 1.5 dB changes at 40 Hz. I could even re-create the "low-end magic" trick I perform with my Focusrite Red 2 EQ by combining a low-shelving boost with a parametric cut at around 120 Hz.

Like its older sibling, the MixMaster has a comfortably wide midrange bandwidth control—one octave at its narrowest setting—which is more conducive to subtle musical results than to surgical cuts or diagnostic frequency sweeping. The 100 Hz to 10 kHz range should handle the most basic jobs, but it wouldn't hurt to have more low-end coverage as well as a tighter, more incisive bandwidth setting. Focusrite's high-shelving EQ is always extraordinarily sweet, and it's almost impossible to make it sound bad, even when reaching for extremes, such as +8 dB of high-frequency Tilt.

## AT PLAY IN STEREO FIELDS

The spatial-enhancement circuit, with its Balance and Width controls, is one of those features you'll love or ignore, depending on how much tinkering you want to do with the imaging and phase relationships in a mix. I can see using it to reduce the dramatic panorama of a stereo live recording, though you could accomplish the same thing by changing the panning through two channels in a mixing board.

When I used it to widen the image of test recordings, I found the Width control usable, but only within a small range. With the Width set beyond the two o'clock position, the auditioned

### PRODUCT SUMMARY

**Focusrite**
Platinum MixMaster
stereo dynamics processor
$1,395

| | |
|---|---|
| FEATURES | 3.0 |
| EASE OF USE | 5.0 |
| AUDIO QUALITY | 4.0 |
| VALUE | 4.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Multiple analog processors. Great-sounding multiband compressor. Optical sensing on compressor and expander. High-quality EQ. Phase meter. Auxiliary stereo inputs. +4 dBu and –10 dBV analog I/O. Precise metering. Intuitive front-panel layout. Helpful and informative manual. Optional digital-output card.

**CONS:** Signal coloration. Switch noise. Expander causes slight gain reduction. Limited fine-tuning controls. Digital output controls on rear panel. Some pots are stiff. Ill-fitting knobs.

### Manufacturer

Focusrite USA Inc./Digidesign
tel. (800) 333-2137
e-mail sales@focusrite.com
Web www.focusrite.com

recordings ping-ponged or lost critical center-image information (on vocals, solos, and drums, for example), and they sounded hollow and washed out. In addition, most of the stereo mixes suffered from significant phase cancellation under extreme Width processing, taking on a disorienting quality in stereo and losing information and gain in mono.

## MASTER STROKE

Focusrite's Web site says that the MixMaster is "designed primarily for project studio mastering," and I can't argue with that. The operation's simplicity and carefully chosen features offer a lot of processing power for much less than what a rack of mastering-grade equalizers and dynamics processors would cost.

Unfortunately, because of noticeable coloration and switching noise in the unit, I wouldn't recommend the MixMaster for mastering in professional facilities above the personal-studio level. When implementing dramatic changes in timbre and gain, or for "set it and forget it" processing, you can dismiss such problems as only minor limitations. But in situations where mixing or mastering decisions are based on critical A/B comparisons, transparency at unity gain and noise-free operation are minimal requirements of any mastering device, regardless of price.

The MixMaster's equalization and compression circuits descend from some of the best analog gear made, and they sound great despite the unit's shortcomings. Don't reserve those effects for only the final mix; they're invaluable throughout the recording process, including tracking, stereo recording, and single-channel processing. For its EQ and compressor alone, the MixMaster is worth its sticker price, and the additional effects are a welcome bonus.

**Myles Boisen** *is the head recording and mastering engineer at Guerrilla Recording and The Headless Buddha Mastering Lab in Oakland, California. E-mail him at mylesaudio@aol.com.*

# PRESONUS

## BLUE TUBE

*An affordable mic preamp with tube warmth and features galore.*

By David Ogilvy

PreSonus Audio Electronics seems it's out to prove good things do indeed come in small packages. First came the Blue Max Smart Compressor, a great-sounding half-rack unit unique in its class for providing compression presets for a variety of applications. Now PreSonus is filling up the other half of the rack tray with the Blue Tube, a stereo microphone and instrument preamp with a hybrid tube and solid-state circuit design. The unit utilizes a single 12AX7 tube and independent drive knobs for dialing in the desired amount of tube "warmth." At less than $100 per channel, the Blue Tube also lays claim to being the least expensive tube mic pre on the market.

### REALM OF THE SENSES

Despite its diminutive size and low price, the Blue Tube is well built and well featured. It uses Neutrik Combo connectors to provide two XLR mic inputs and two ¼-inch high-impedance instrument inputs on either side of its blue, brushed-aluminum front panel. Controls are laid out in mirror image (from left and right of center), with each side providing a Gain knob and Drive knob, switches for polarity reverse, and a 20 dB pad. In the center is a global 48V phantom-power switch. All five switches are push-button style, and the four knobs are continuously variable. Each channel also provides an eight-segment output meter, with green LEDs at –28, –14, –9, –3, 0, and +3 dBu, a yellow "caution" LED at +9 dBu, and a red overload indicator at +18 dBu.

The Blue Tube's enclosure is very sturdy, and the knobs and switches have a nice feel. Although there isn't a dedicated power switch, a red front-panel LED indicates power on when the unit is plugged in through the included wall-wart power supply. (Using an external transformer is one way PreSonus could keep internal noise and costs down.)

The Blue Tube's rear panel provides XLR balanced and ¼-inch unbalanced outputs. Each output has its own amp, allowing for simultaneous output from the two jacks on each channel. That is useful for sending a signal to two places at once, such as to an amplifier and a mixing board.

The Blue Tube's well-written manual explains that each channel contains a dual-servo gain stage—a design that eliminates the need for capacitors and lets the Gain knob "boost the desirable signal without increasing unwanted background noise." The manual also discusses optimum settings for various applications, and even encourages the user to experiment with tubes other than the provided 12AX7.

### APP HAPPY

The Blue Tube has dozens of uses. It fit into my bag so easily that I became accustomed to bringing it along to sessions and concerts, even when I didn't have a clear idea as to how I might employ it. But once I arrived at the studio or venue, I always found a use for it—and sometimes I could not have done as good a job without it.

The Blue Tube is very handy as a DI box for stereo instruments such as keyboards, either live or in the studio. Not only does it provide ample gain and distortion, but also, as suggested earlier, its simultaneously available outputs let you use it as a splitter. For example, you could send signal directly to a console or tape machine through the XLR outputs and to an amplifier or personal monitor through the ¼-inch outs.

The Blue Tube also works well with electric guitar, whether as a preamp before a guitar amp or simply as a DI. I tested the unit as a DI using a Strat plugged into one of the instrument inputs and found that it yielded clean gain, effective and likable distortion, and any combination of the two. The Gain and Drive knobs interact in an additive fashion, with the solid-state amplification controlled by the Gain knob and the tube acting on the signal only as the Drive knob is turned up—a design that allows for a range of variations between clean and dirty tones. (Just remember, as with any tube unit, you should let the tube warm up before engaging the Drive knob.)

The Blue Tube is also helpful when you need extra juice to send a signal down a long cable. When recording a guitar or keyboard cabinet at home, for example, it's often necessary to position the cab far from the record deck—in a bedroom closet, for instance—to achieve adequate sound isolation. The Blue Tube provides plenty of gain for getting the signal to its destination.

Another feature I found very helpful was the Blue Tube's polarity-reverse switches. I typically use two mics to record guitar amp cabinets (usually a Shure SM57 and a Sennheiser 421). Because the sound arrives at the two capsules at different times, that technique can lead to phase distortion. A quick and easy way to hear if the two capsules are out of phase is to reverse


**The PreSonus Blue Tube is a good-sounding, well-featured, and very versatile microphone preamp/DI. A separate Drive control lets you add tube distortion to taste—or leave it out altogether.**

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## Blue Tube Specifications

| | |
|---|---|
| Amplifier Type | Dual Servo |
| Input Connectors | (2) Neutrik Combo |
| Output Connectors | (2) XLR balanced; (2) ¼" unbalanced |
| Maximum Gain | 60 dB |
| Maximum Input Level | +10 dBu |
| Maximum Output Level | +22 dBu |
| Dynamic Range | 120 dB |
| Equivalent Input Noise | –127 dB |
| THD | <0.05% (unweighted) |
| Signal-to-Noise Ratio | >90 dB |
| Phantom Power | 48V DC (globally switchable) |
| Attenuation Pad | 20 dB |
| Tube Type | (1) 12AX7 |
| Metering | (2) 8-segment LED |
| Transformer | external wall mount |
| Dimensions | 0.5U × 4.5" (D) |
| Weight | 7 lbs. |

the polarity on one of the two mics. However, not many mixers—especially among those commonly found in personal studios—provide polarity reversal. The Blue Tube's independent polarity-reverse switches really come in handy, making it easy to quickly hear phase problems.

The Blue Tube is a great tool for location recordists who specialize in stereo recording, whether to DAT, hard disk, or whatever else. Many DAT recorders provide mic preamps, but only a few offer phantom power. Similarly, if you record direct to hard disk using, say, a PowerBook, you'll need preamps and phantom power.

For live recordings of bands, I used the Blue Tube to power various mics, including pairs of Shure SM57s, AKG C 414s, Countryman Iso-Omnis, and Radio Shack PZMs. The unit worked well with all of these. I even used the Blue Tube solely as a phantom-power box during a live recording using a transformer-isolated snake splitter (a device that cannot pass phantom power because of the transformers).

### CRITICAL CONSIDERATIONS

One slight misgiving I have about the Blue Tube is its audible noise floor, which is high enough to be problematic during pianissimo passages or while recording particularly quiet instruments. For that reason, the Blue Tube

would not be a first choice for critical recordings of some acoustic instruments or ensembles. (According to PreSonus, the noise problem resulted from the steep gain curve of the potentiometer used in the original Blue Tube's Drive circuit. PreSonus has since replaced the offending pot, and the Blue Tube now ships with a potentiometer that provides more subtle gain control in the first half of the pot's rotation, resulting in a lower noise floor. At zero tube drive gain, the noise floor specification is better than –97 dBu.)

Also, whereas the preamps in the Blue Tube sound quite good, they do not sound as pristine as some higher-end preamps I compared them to. This, too, was more noticeable on recordings of quiet acoustic instruments. Again, however, price and features must be taken into account—and considering the price of this box and the numerous amenities it offers, the preamps' quality is quite impressive.

One surprise was how effective the Blue Tube was at saving live stereo DAT recordings from sounding cold and sterile. I dialed in a small amount of tube warmth while recording an electric band, for example, and ended up with a DAT recording that sounded punchy and real as opposed to digital. Yes, I actually added distortion to the recording. But after listening to sections of the same performance recorded without the tube circuitry engaged, I preferred the sound with the bit of analog distortion the Blue Tube added.

## BLUE WITHOUT THE BLUES

Considering its low price, the PreSonus Blue Tube far exceeded my expectations. It's a solid, good-sounding, easy-to-use unit that covers a wide range of applications. The Blue Tube serves as a microphone preamp, instrument DI, phantom-power supply, polarity reverser, distortion box, signal splitter, and signal amplifier for long cable runs—indeed, one could easily shell out as much for any one of the functions it provides. That's what I call a great value.

In addition to the versatility afforded by its healthy feature set, the Blue Tube's small size and rugged construction make it ideal for transporting from gig to gig. I highly recommend it as a multipurpose tool for any engineer. And if your digital stereo recordings sound a bit cold, this box lets you dial in the right amount of tube warmth.

The Blue Tube is also a great companion to the PreSonus Blue Max Smart Compressor. Keyboard and bass players, for example, may want to consider pairing the two in their equipment racks. The units fit neatly together in a rack tray (available from PreSonus for $39.95), providing a versatile preamp/DI and affordable dynamic control in a single rack space. They look nice together, too!

**David Ogilvy** *built a stereo mic preamp powered by four 9V batteries. Not only did it cost more than $199 to build, but it doesn't have tubes or phantom power. However, it does go to 11.*

**PRODUCT SUMMARY**

**PreSonus Audio Electronics**
Blue Tube
tube-mic preamp/DI
$199

| | |
|---|---|
| FEATURES | 5.0 |
| EASE OF USE | 5.0 |
| AUDIO QUALITY | 4.0 |
| VALUE | 5.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Very good sound. Nice, warm distortion. Extremely versatile. Great value. Provides phantom power, 20 dB pad, and polarity-reverse switches. Uses Neutrik combo connectors. Balanced and unbalanced outputs.

**CONS:** Low-level noise audible when recording quiet passages or instruments. Gets fairly hot. Wall-wart power supply.

**Manufacturer**

PreSonus Audio Electronics
tel. (800) 750-0323 or (225) 216-7887
e-mail presonus@presonus.com
Web www.presonus.com

# STEINBERG

## WAVELAB 3.0 (WIN)

### *New tools make this the best release yet.*

By Roger Maycock

Today's audio software tends to be so deep and extensive in capabilities that once you get accustomed to a program, there is generally little incentive to look elsewhere. But finding an application with a user interface that matches your working method while combining the right mix of features can be a daunting task. With the recent introduction of *WaveLab* 3.0, Steinberg has taken digital-audio editing to a new level and created a compelling tool for desktop musicians and audio engineers.

At its core, *WaveLab* 3.0 is a digital-audio editor with processing and effects capabilities. The software also includes audio CD-burning features, an audio-file database, batch processing, and spectrum-analysis capabilities. In addition, it serves as a powerful tool for working with samplers. Of particular note is the new Audio Montage feature, which turns *WaveLab* 3.0 into a multitrack editor and facilitates numerous operations, such as fine-tuning crossfades and arranging musical material.

## THE VIEW FROM ABOVE

*WaveLab* 3.0 supports audio files ranging from 8-bit, 11 kHz up to 24-bit, 96 kHz in WAV, AIFF, AU, and Ensoniq Paris RAW formats. After opening a file, you see a screen that resembles **Fig. 1**. In that view, the file is displayed in a double-pane window. The lower pane shows the waveform portion that will fit the window's size at the current zoom level. (Zoom tools at the bottom and top right of the screen are continuously variable and easy to adjust.) The green waveform represents the left channel, and the red waveform represents the right. *WaveLab* 3.0 lets you select color schemes for its interface elements; in fact, it offers tremendous options for customizing and arranging its interface to suit your preferences.

The double-pane display's upper portion shows the entire waveform—called the Overview—which you can also zoom. In both displays, the green vertical cursor represents the virtual playback head and lets you see exactly where you are at any time. In the Overview, the horizontal black-and-white-striped line beneath the playback cursor indicates the overall waveform portion displayed below. As the file plays, the marker updates continuously. The marker's size is variable and relative to the display's zoom level.

In **Fig. 1**, the window to the right of the waveform display is called the Master Section. That window includes clip indicators, left and right level meters, left and right channel faders, and a Reset button. A Dropout indicator lights up if any samples drop during playback.

With all its effects, the Master Section occupies a considerable amount of onscreen real estate. To get around that, use an option that shows only the window's top bar. Unlike minimizing a window, that leaves the Master Section in its position while freeing valuable viewing space. The Window Controller shown just above the Master Section in **Fig. 1** performs a similar function, opening and closing the Markers, Tools, Snaps, and Transport windows as needed.

The Snaps tool is extremely useful. It lets you adjust a waveform's zoom level and then take a snapshot of it for instant recall. Using Snaps, you can jump from a close-up view to a more distant one with a click on the mouse.

## TOOLS OF THE TRADE

As an editor, *WaveLab* 3.0 offers facilities for manipulating audio in just about every conceivable way. The left and right Nudge tools are particularly handy (see the Tools menu at the bottom of **Fig. 1**). By selecting a portion of the waveform, you can kick the selected range forward or backward in increments from 1 ms to 3 seconds. That

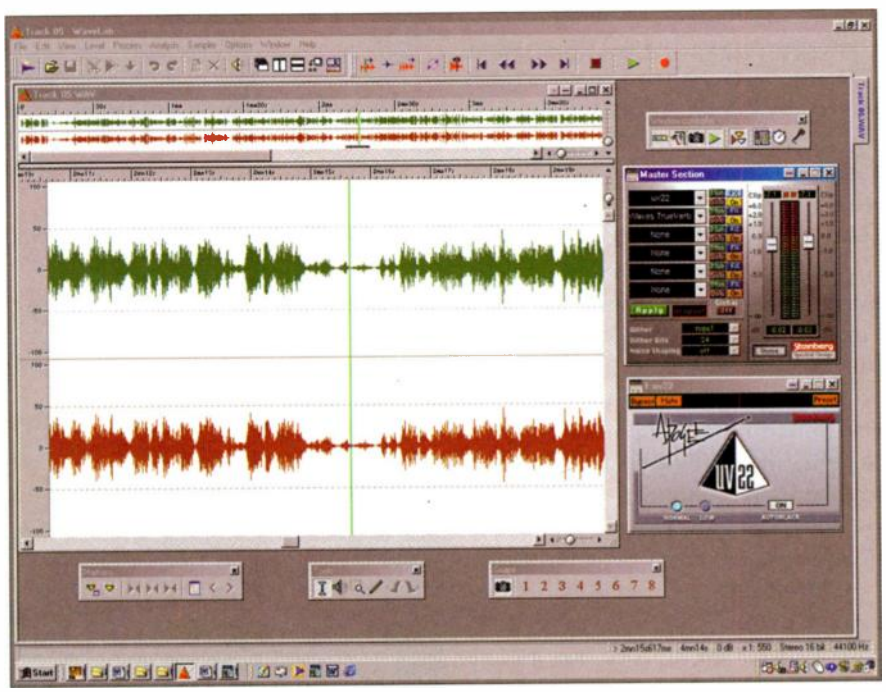


**FIG. 1: *WaveLab* 3.0's interface is highly configurable and includes the ability to position the program's components anywhere on screen. In addition to displaying the waveform data, you can see various editing toolbars and the Master Section on this screen.**

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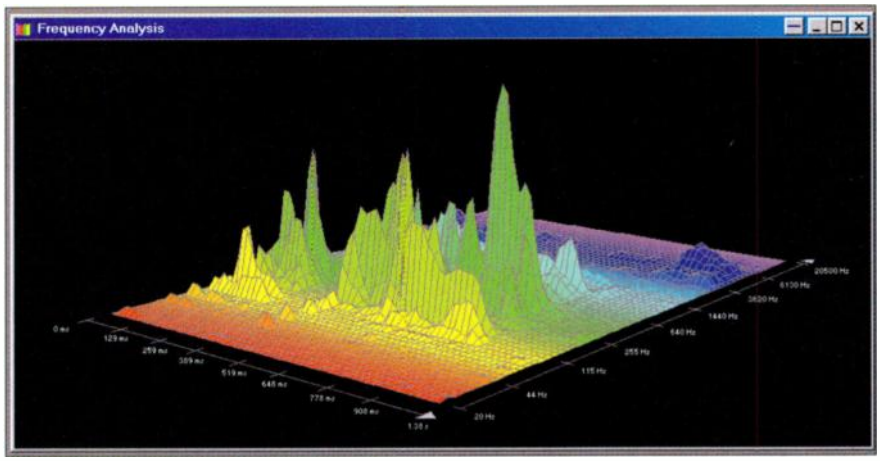


**FIG. 2: The attractive 3D Analysis window presents a clear picture of the individual frequency components in your music.**

lets you reposition a segment such as a spoken phrase without inserting blank space. The Nudge tool is particularly effective for "pacing" dialog. Also, playback starts from any point with the Play tool; you zoom in on an area with the Magnifying Glass, and redraw a portion of a waveform with the Pencil tool.

Interestingly, *WaveLab* 3.0 lacks one of the most essential tools for any audio editor: a de-esser. Dialog editing is a common application for programs such as *WaveLab*. Of course, the Pencil tool allows you to redraw a waveform and remove sibilance or plosives, but doing so is far more tedious than having a dedicated processor for such purposes. Similarly, notching out the offending sound with the EQ is equally laborious. Steinberg offers *SPL De-esser,* an optional plug-in that costs $199.

Speaking of plug-ins, *WaveLab* 3.0 accommodates up to six, which are listed in the left part of the Master Section window (see **Fig. 1**). There you can load VST and DirectX effects plug-ins in any combination. Although those plug-ins typically process the signal in real time, you can make permanent changes to the waveform using the Apply switch. That is also useful for using *WaveLab*-created audio files in another audio environment, and it frees up resources by reducing the system's processing load.

Once the audio is edited, EQ'd, normalized, time stretched, and otherwise mangled to your satisfaction, save it in any of the formats the software will load or export it in even more formats, such as MP3 and Windows Media. Unfortunately, you can't encode to RealAudio. In this day of Internet everything, streaming-media formats are becoming increasingly important. The fact that the dominant streaming format is not supported strikes me as a rather serious omission.

*WaveLab* 3.0 provides an audio-analysis tool for helping identify tricky problem areas within your audio. After selecting the waveform's offending area, instruct the program to analyze the data for information on peaks, loudness, pitch, DC offset, apparent bit resolution, and errors. Then examine the results and use the program's various processing tools or plug-ins to correct problems. You can also store the processor settings and use them as presets for similar situations in the future. For examining the music's spectrum, *WaveLab*'s 3D Analysis window remains the best-looking display of its type (see **Fig. 2**).

## SAMPLE THIS

Massaging audio files for use in samplers is another common use for an audio editor. Creating a seamless loop in a dedicated editor such as *WaveLab* is generally easier than struggling with the limited amount of information provided by a sampler's LCD. *WaveLab* 3.0 provides extensive support for samplers. Depending on your sampler's nature, the program communicates with it in a number of ways, including the generic Sample Dump Standard, SMDI (SCSI Musical Data Interchange), MIDI,

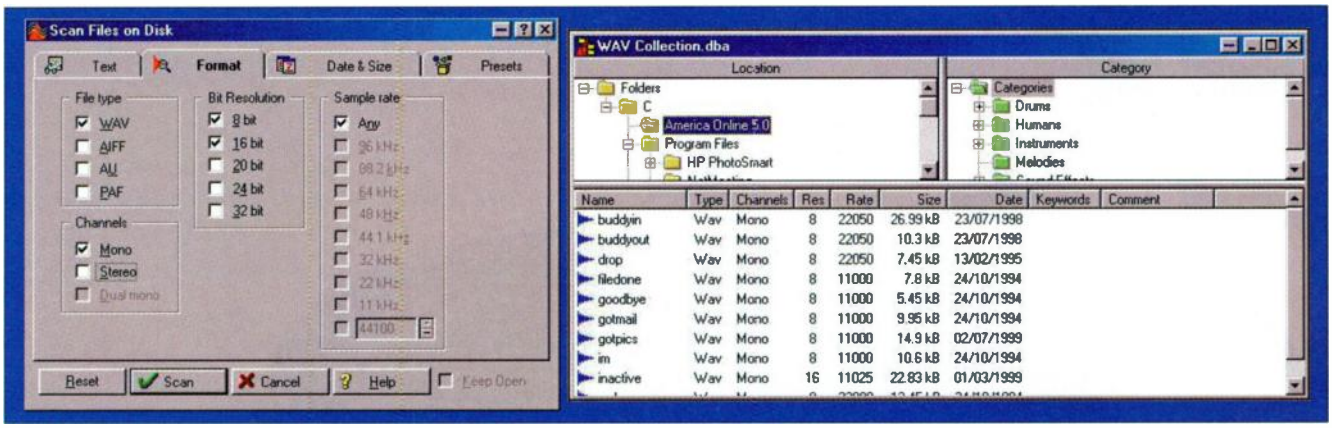


**FIG. 3: *WaveLab* 3.0's database finds the type of files you specify no matter where they are in your system. You identify your search's conditions on the left, and your results appear on the right.**

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To help organize your sample library, *WaveLab* 3.0 provides extensive database capabilities. The database doesn't store the actual sample data but simply maintains pointers to the files in your system. Your computer can store samples anywhere, including hard drives, removable drives, CD-ROMs, and even floppy disks. If you request a sample that resides on a CD not in your CD-ROM drive, *WaveLab* 3.0 prompts you to insert the appropriate disc.

As expected, the database lets you categorize your library's samples and store them in different folders. Identify those folders any way you choose. Furthermore, the database has excellent search functions (see **Fig. 3**). On the left of **Fig. 3**, you see the conditions I set up for the search, and on the right you see the results that appeared moments later. The application accurately identified all corresponding sound files and their locations on my computer.

## AUDIO MONTAGE

*WaveLab* 3.0's Audio Montage multitrack editing environment provides an unlimited number of tracks for nondestructive audio editing, playback, and recording. The Audio Montage's graphic approach makes it easy to structure your work and is an excellent way to visualize the entire project prior to burning a CD.

**Minimum System Requirements**

**WaveLab 3.0**

Pentium II/166; 32 MB RAM; Windows 95/98/NT/2000

In the Audio Montage, your audio is organized onto tracks using Clips, which are pointers to source audio files on your hard drive and other media. Editing functions—such as crossfades, volume adjustments, and fade-ins/fade-outs—are quick because you never touch the actual audio file.

The Audio Montage window is divided into two sections (see **Fig. 4**). The lower pane shows the tracks and Clips, and the upper pane shows one of 11 views—in this case, the Meters Spectrum view, which displays the output level as a real-time analyzer would, dividing the audio range into 55 bands. The other views are Edit, Zoom, Clips, Groups, Files, Markers, Snapshots, History, Notes, and CD. The

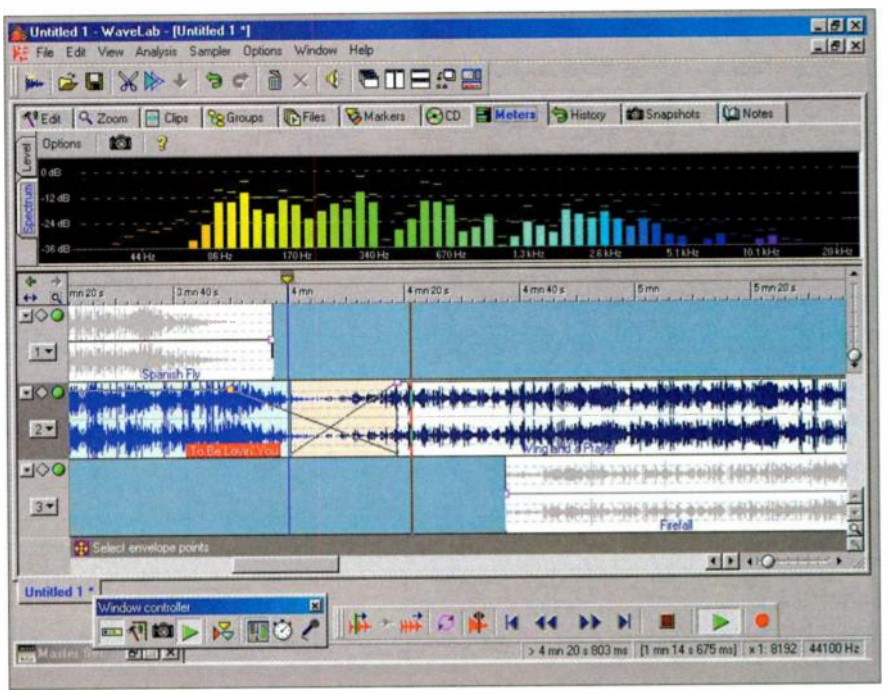


**FIG. 4: The Audio Montage is a multitrack display that helps organize your project graphically.**

CD view lets you burn a CD directly from the Audio Montage.

**Fig. 4** shows a crossfade between two tracks. *WaveLab* 3.0 provides a number of crossfade options, including automatic crossfades with free overlaps and overlaps that retain specific fade-in or fade-out times. Clips can automatically crossfade in real time as one is dragged across another; not only do you see the crossfade on the screen but also hear it. *WaveLab* 3.0 uses a technique called Waveform Recognition Technology to eliminate harmonic cancellations within the crossfade by automatically adjusting the Clip position. That results in smooth, pleasing crossfades.

The Audio Montage is a great place for experimenting with the sequence and arrangement of tracks in your project. In **Fig. 4**, the grayed-out Clips on tracks 1 and 3 represent muted audio. Clips easily slide into position, so rearranging a project's order of events is effortless. It's also easy to move entire tracks up or down in the display.

Each Clip you place in the Audio Montage has a line that spans its entire duration. That line represents the Clip's volume envelope and allows for three primary editing types: fade-in, volume, and fade-out. Clicking on and moving the volume envelope up or down changes the volume. The waveform graphic changes in real time, and a dB value is next to the mouse pointer. However, there is no knob or fader available to change an entire track level.

The Audio Montage provides a selectable time grid, so you can place audio Clips at any time. You can also instruct the system to snap Clips to other Clips or to significant positions within the timeline. For example, by using the Magnetic Bounds feature, you can define whether one Clip snaps to another Clip's start or end.

Another particularly interesting aspect of the Audio Montage is its ability to "duck" the level of one Clip whenever a second Clip's signal is present. Using the Route to Master Section and Upper Track option, one Clip level (such as a music bed) can be reduced when another Clip level (such as dialog) exceeds the threshold defined by the plug-in *Ducker*.

In addition, there's an easy way to change one Clip's duration to match another. First, align the two Clips' start points and then place the cursor at the end of the Clip whose duration you want to match. Next, highlight the Clip whose duration you want to change and select Time-Stretch to Cursor; in an instant, the two Clips will have the identical duration.

With an extensive array of monitoring, editing, and viewing options—including mute, solo, editable crossfade times, and countless other functions—the Audio Montage creates the look

and feel of more expensive digital-audio workstations. Short of Pro Tools, it's perhaps the most sophisticated visual palette for assembling your project.

## SYNC, BATCH, AND BURN

*WaveLab* 3.0 syncs to incoming MIDI Time Code (MTC), but only for starting playback and freewheeling. With MTC alone, *WaveLab* 3.0 and your external source (such as a standalone recorder) will ultimately drift apart. To maintain lock throughout the entire file, your audio card must read the external recorder's incoming word clock in addition to MTC.

*WaveLab* 3.0's Batch Processor processes multiple files with different settings. You can apply any number of processors and even use plug-ins not available in the Master Section. For example, say you have a number of finished songs and are ready to create a CD. In a single stroke, the Batch Processor balances every song's playback levels, encodes an entire group of files to MP3 format or even renames files. Not only that, the songs don't have to be open in *WaveLab*.

In addition to burning CDs from within the Audio Montage, *WaveLab* 3.0 includes the CD Program, a tool for burning discs. It's not much to look at but an excellent tool. You can arrange the tracks' playback order by simply dragging them within the CD Program window. When it's time to create the disc, the Write CD command lets you select your CD-R/RW drive, run a simulation burn, and finally burn the actual CD.

I can't stress enough how important it is to ensure you have the program's latest updates. When I burned my first CD, *WaveLab* 3.0 correctly identified my CD-R drive, passed the simulation, and created a disc—all without the slightest hiccup. Unfortunately, the disc was unreadable by every CD player I tested it in, including the drive that created the disc. During a call to Steinberg's tech support, I was instructed to download and install an updated list of supported CD burners, along with an update that took the program from version 3.01 to 3.01, Build 12. That was the ticket. The next attempt proved successful.

In addition to supporting the creation of the ISRC (International Standard Recording Code) and the UPC (Universal Product Code, *WaveLab* 3.0 supports the DDP (Disc Description Protocol) format on an Exabyte tape. Those options are critical for projects that will ultimately pass on to large CD-pressing plants.

## THE VERDICT

Steinberg's *WaveLab* 3.0 is an extensive, multitiered program. With support for audio files ranging from "multimedia caliber" to professional 24-bit, 96 kHz quality, plus a broad palette of editing functions, processors, and plug-in effects, its range of capabilities is nothing short of exemplary. Nonetheless, it has shortcomings.

The lack of a dedicated de-esser is disappointing. Editing waveforms or notching sibilance with EQ is too time consuming for the busy dialog editor. Yes, *SPL De-esser* is available, but it's not cheap. The absence of an intuitive way to adjust levels for an entire track is another oversight. No sliders or knobs control track levels in *WaveLab* 3.0, nor does it offer an integrated track mixer, such as the one found in *Cubase VST*. Given its suggested retail price of $599, *WaveLab* 3.0 should include those tools.

With the Internet and streaming media playing an increasingly important role in the lives of musicians and audio professionals, the lack of RealAudio encoding is another odd omission. MP3 encoding is included, but that format is too dense for streaming through conventional dial-up connections. Granted, the program does provide Windows Media encoding, but that is not yet as common as RealAudio format.

On the other hand, *WaveLab* 3.0's Batch Processor and Audio Access Database are wonderful. The Batch Processor saves countless hours by executing tasks unattended, and the database is one of several terrific features that makes the application well suited for anyone with a sampler.

As a mastering tool, the Audio Montage elevates the personal computer to a level approaching far more expensive DAWs. The visual feedback, combined with nondestructive editing, also impresses. With its ability to burn CDs from within the Audio Montage or separately, *WaveLab* 3.0 shines. Better yet, the CD burner goes about its business quite expediently.

In the roughly five weeks I worked with *WaveLab* 3.0, the application did not crash or exhibit any other annoying behavior at all. *WaveLab* 3.0 is a robust, comprehensive application with a vast array of capabilities. The interface is a bit steep to learn, but it's well designed and makes working with the program an intuitive proposition. Overall, *WaveLab* 3.0 provides an extensive suite of audio tools for the majority of tasks you're likely to encounter.

---

*As a percussionist,* **Roger Maycock** *spent years hitting things before realizing he should be holding sticks. Sitting at a computer, he now attempts to find the Off button.*

**PRODUCT SUMMARY**

**Steinberg**
WaveLab 3.0 (Win)
multitrack audio editor
$599

| | |
|---|---|
| FEATURES | 4.5 |
| EASE OF USE | 3.0 |
| DOCUMENTATION | 4.0 |
| VALUE | 4.0 |

RATING PRODUCTS FROM 1 TO 5

**PROS:** Excellent batch-processing and database facilities. Excellent and fast CD-burning capabilities. Audio Montage extremely useful for visualizing and assembling CD projects.

**CONS:** No RealAudio encoding. No de-esser (plug-in optional). Audio Montage has limited mixing facilities.

**Manufacturer**

Steinberg North America
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# ILIO ENTERTAINMENTS

## SKIPPY'S BIG BAD BEATS AND RETRO FUNK

***Building a better groove with creative sound design, sliced loops, and MIDI.***

By Dan Phillips

*Skippy's Big Bad Beats* and *Retro Funk* (from Ilio Entertainments and Spectrasonics, respectively, distributed by Ilio Entertainments) are loop collections developed for Ilio's Groove Control series. Groove Control's cool concept offers an audio loop's feel and realism combined with MIDI data's flexibility and easy manipulation. (For a closer look at that technology, see the sidebar "Inside Groove Control.") The simple but well-executed idea adds considerable value and versatility to these already high-quality loop libraries.

*Big Bad Beats* and *Retro Funk* cost $99 apiece for the audio CD versions and $199 for the CD-ROM sets (in Roland, Akai/E-mu, and Kurzweil formats). Groove Control relies on a tight relationship between the sliced samples and the sequencer files; therefore, that function is only available on the CD-ROM versions. I reviewed the Roland and Akai/E-mu versions.

### SKIP-HOP

*Skippy's Big Bad Beats* concentrates on infectious dance, hip-hop, and pop grooves, with an emphasis on creative sound design. Between the expected kicks, snares, hi-hats, shakers, and tambourines (which are often interesting and highly sculpted sounds), you'll find a variety of intriguing percussion and textural effects, such as pitch- and filter-swept cymbals, tons of filtered noise (from percussive hits to atmospheric swooshes), and even a strange animal noise or two.

There are 34 basic grooves, all with many variations, providing more than 300 loops. Sound designer John "Skippy" Lehmkuhl wanted to offer numerous choices within each basic pattern so users could vary the loops during the course of a song and maintain the same fundamental groove. For instance, many grooves offer several different full mixes, small mixes with a reduced number of elements, and mixes without snare or kick. A few also have matching fills.

The library tends toward dry, separated sounds, letting you add your own desired ambience. Tempos range from 66 to 145 bpm, and many have a swing feel. However, Groove Control makes adjusting tempo and feel factors stunningly simple.


***Retro Funk*** **captures the vintage funk sound with the help of four of L.A.'s finest studio drummers.**

### AIRPORT MUSIC

Within the pop, dance, and hip-hop genres, *Big Bad Beats* covers a lot of territory. Some of my favorites include Mozilla, with its deep, thundering house beat; the slow, swirling 70-bpm groove of Candlelight; and Gomer Pyle, featuring distinctive, cool, and almost offensive squonky noises over a heavy groove. Jack Attack showcases submarine noises that morph into a synth rhythm, along with shuffly shakers over a simple, vinyl-tinged drum loop. Jet Set is based on rich, surging noise effects reminiscent of jet planes layered on top of a basic, perky beat. Then there's the jaunty drum 'n' bass angel beat of Future Zone; one of its many alternate mixes adds Latin percussion, a surprisingly effective choice.

If electro is more your style, Greazy Meal delivers great sounds in spades, including juicy, resonant filter blips and a white-noise snare with slapback and filtered reverb. Java includes a mellow, pitched, resonant synth blip element and a juicy, gritty, highpass-filter sweep; ambient drums provide a backbeat in concert with multiple hi-hats and various different metallic percussion. Chewy was another favorite loop (for more on this loop, see the sidebar "Inside Groove Control").

**PRODUCT SUMMARY**

**Ilio Entertainments**
Skippy's Big Bad Beats and Retro Funk sample CDs
$99, audio CD; $199, CD-ROM

**SKIPPY'S BIG BAD BEATS**
**OVERALL** 4.5

**PROS:** Imaginative sound design. Groove Control's ease of use and malleable feel.
**CONS:** Not many fills.

**RETRO FUNK**
**OVERALL** 4.5

RATING PRODUCTS FROM 1 TO 5

**PROS:** Great-sounding drum loops. Groove Control's ease of use and malleable feel.
**CONS:** Auto-wah effect is too prominent on a few loops.

**Manufacturer**

Ilio Entertainments
tel. (800) 747-4546 or (818) 707-7222
e-mail ilioinfo@ilio.com
Web www.ilio.com

*Internet Audio* is *Mix*'s new quarterly magazine focusing on Web–based audio production and delivery. *Internet Audio* is designed to educate the audio production community in making sense of emerging technologies while offering insight and perspective to this expanding market.

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All in all, *Skippy's Big Bad Beats* is an impressive collection of loops. Its innovative sound design and solid, get-up-and-move-your-feet programming make it worth checking out.

## RETRO FUNK

What can shake your booty when it's loaded into your sampler? *Retro Funk* re-creates a wide range of classic funk drumming styles and sounds that are up to the task. Spectrasonics founder Eric Persing and songwriter Bob Wilson co-produced *Retro Funk* (the first CD in Spectrasonics' Classic Drumming series).

The basic elements of any drum loop library are the drummers, and *Retro Funk* features four excellent musicians: Eric Boseman, Gregg Bisonnette, John Ferraro, and co-producer Bob Wilson. Each boasts an impressive and extensive resume; as expected with musicians of this caliber, the playing is superb. All the loops have a great danceable feel, and the timbres vary widely, as if you were needle dropping on a bunch of vintage records. Vinyl noise is provided separately, which is greatly appreciated; sometimes I like the effect, but I'm happy to have loops available untarnished.

## OPUS DE FUNK

So how do you make a loop sound vintage? The documentation doesn't go into specifics, but it sounds like a number of creative recording and processing techniques were used. Of course, there's compression on everything, from the fat, thickly textured Funked Up to the ultrasqueezed Junk Funk. EQ plays a large role, from minor bass and treble boosts to more extreme effects, including some serious band-limiting.


**Pop, hip-hop, and dance grooves filled with creative sound-design ideas propel *Skippy's Big Bad Beats*.**

## INSIDE GROOVE CONTROL

Groove Control is a central feature of *Skippy's Big Bad Beats* and *Retro Funk*. How does it work? "It's important to understand that Groove Control is not a single technology," says Ilio's Mark Hiskey. First, the sound designers create the audio loops. Then, using a combination of custom and off-the-shelf software and labor-intensive manual editing, the loops are sliced into thousands of individual hits. Finally, the sound designers generate and tweak MIDI sequences that, when used to trigger the sliced hits, reproduce the original loop's timing and dynamics.

Groove Control provides sequences in Cakewalk, *Cubase, Logic, Performer, Vision,* and Standard MIDI File formats, so they're broadly compatible. To give an idea of the amount of work involved, *Big Bad Beats* creator John "Skippy" Lehmkuhl says he spent about two months producing the audio loops and then about ten months editing to create the Groove Control version.

Because the sequencer plays individual hits, you can easily change a loop's tempo, impose a straight or swing feel, quantize, alter the pitch or gate times, and more—all independently. Furthermore, it's a relatively simple task to chop up hits and rearrange them to create entirely new rhythms. The audio itself isn't altered when you change the tempo in your sequencer, so you don't suffer the artifacts of pitch-shifting or time-stretching. If you play a loop very slowly, you start to hear gaps between the notes, but the sound designers extended the tails of the hits to allow a good deal of slowing down before that happens.

Here's an example of Groove Control in action: a *Big Bad Beats* loop called Chewy practically jumped out of the speakers for use in a track I was producing. The loop was at 97 bpm, but my song's tempo was 128 bpm. As soon as I pasted the loop's MIDI data into the sequence, Chewy automatically played at the new tempo with no time-stretching necessary. The loop's swing groove didn't match the track's straight-16th feel, so I simply quantized the Groove Control MIDI data, and the feel matched the song.

Then, I went a little further. The loop had a syncopated kick, but the singer wanted a straight four-on-the-floor kick pattern, and he felt a few of the percussion hits didn't match the song's rhythm. So I rolled up my sleeves and dug into the MIDI track. Groove Control sequences use a simple rising chromatic scale to play the hits, so they're easy to follow; I just grabbed a couple of kicks, copied them to beats 2 and 4, and got rid of the syncopated notes. Next, I found the errant percussion hits, reduced the Velocity on a couple of them, and changed some others to use a softer, less intrusive hit from elsewhere in the loop. It took only a few minutes and sounded great—how cool is that?

Some time ago, I moved away from using my sampler for loops. Since then, I prefer using my digital-audio sequencer for beat-slicing and time-stretching. With their combination of fidelity, ease of use, and opportunities for creative loop manipulation, Ilio's and Spectrasonics' Groove Control libraries have lured me back to using my sampler as a sound source for loops with, my MIDI sequencer acting as groovemeister.

Kicks boom on one track; others are squashed into a tiny, band-limited space on another; snares ring out, snap brightly, slam deeply, or are squeezed into dull, cardboard hits. On the other hand, a good number of loops feature a tight, natural sound. The processing suited the material, but I could have done without the few loops that feature a prominent auto-wah effect.

As expected from Spectrasonics, the collection is well-organized. It has 56 basic grooves, ranging in tempo from 75 to 143 bpm. Again, tempo doesn't matter too much with Groove Control libraries. Most of the grooves include alternate versions of the main loop, and almost all feature multiple fills. Other solo loops provide percussion elements such as tambourines (and congas, in a few cases).

Picking favorites is hard—*Retro Funk* has lots of great loops. The highly compressed and band-limited Slinky features bouncy ghost beats on a brushed snare; Funked Up perfectly captures the Parliament-Funkadelic vibe with its thick, bottom-heavy sounds and solid groove. Trippin' has a squashed, ambient sound and a forward-driving beat, while Livin' Large has a natural, unprocessed sound, and its 16th-note tambourines put the polish on a real rump-shaker rhythm. The fat, slightly muffled timbre of Hammerhead's 16th notes set off a great syncopated pattern, playing the kick against the low tom. I couldn't keep my shoulders from swaying in time. Finally, Wicked Bad is light in feel and timbre, with a bouncing 16th-note snare, the kick only on beat one, and a band-limited tone.

## MORE THAN FUNKTIONAL

I really like *Retro Funk*, and the Groove Control features put it over the top. Anyone looking for great-sounding, expertly played funk grooves should definitely give it a listen.

**Dan Phillips** *(www.danphillips.com) is a composer, producer, and songwriter in the San Francisco Bay Area, and he's also a product manager at Korg R&D.*

QUICK PICKS

## BIG FISH AUDIO

### Xperts of Techno

*By Dan Phillips*

It's 1:30 a.m., and the party is just getting started. A subsonic, four-on-the-floor beat pounds straight through your chest, synth riffs pulse in hypnotic repetition, and glossy, treble-hyped percussion keeps things moving with impossibly steady 16th notes. It's time to put on your dancing shoes and enter the world of *Xperts of Techno*. This disc from Big Fish Audio (in audio CD and Sonic Foundry's *Acid* CD-ROM formats; $99.95 each) provides several hundred techno drum loops, music loops, and construction kits. The loops are fairly well organized and offer only three tempos—130, 135, and 140 bpm—making it easy to mix and match loops. *Xperts of Techno* leads off with ten Demo tracks, which are construction kits composed of complete mixes and soloed elements, which use up to 14 layered loops apiece. Many of these tracks come across as complete (albeit brief) techno songs. I particularly liked the lush, fluttery Plastic Men and the deranged rubber-band arpeggios of Warped.


**Big Fish Audio's *Xperts of Techno* sample CD and Sonic Foundry's *Acid* CD-ROM offer creative and surprising variations on an often-formulaic theme.**

### Crunch and Fizz

From there, the collection moves quickly into individual loops. Far from techno's reputation for being somewhat bland and repetitive, the programming here is playful and inventive. As a drummer and drum programmer, I appreciate the artistry on display. For example, take the simple but completely driving percussion of Loop Rave Hat, which is drenched in delayed, fizzy reverb; the crunchy frog noises of Loop Freaky and Loop Funky Tape; or the guttural arpeggios underlying the groove in Loop Oizo. Some groups of samples among the drum loops are related, but don't expect to find multiple mixes and soloed elements. However, you get loops with kick drum or other low-end sounds, snare and percussion, or percussion only, and you can combine them without muddying the mix—an important feature. I do wish, though, that those differences were more clearly noted in the documentation.The music loops include pads, chordal riffs, and arpeggios. The latter are my favorites, as in the Warped demo. The creators of *Xperts of Techno* have a real talent in this area and came up with unlikely rhythms; fun sounds; and surprising, disjointed pitch patterns.

### Techno Cats

Rather than an introduction to the disc's contents, the liner notes present a succinct, passionate argument in favor of techno as an art form and an exhortation for musical creativity. That enthusiasm shows clearly in the product as well. I recommend *Xperts of Techno* to anyone looking for solid foundations for techno tracks or simply inspiration and insight into the genre.

**Overall EM Rating (1 through 5): 4**

## NO STARCH PRESS

### The Book of Linux Music and Sound

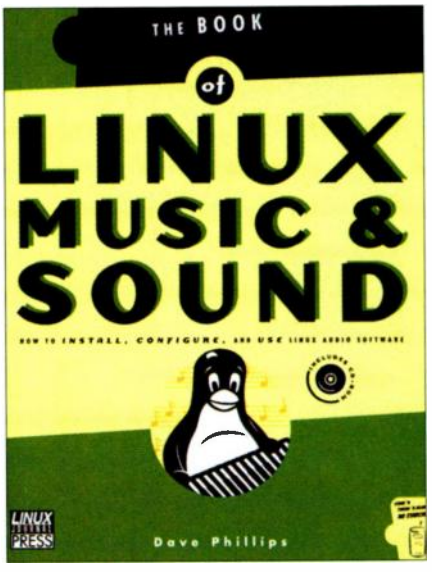
*By Russell Pickett*

When the time came to write a book about Linux music software, Dave Phillips was the obvious choice for author. For the past five years, Phillips has run the Sound and MIDI Software for Linux Web site at www.sound.condorow.net, easily the most complete collection of such information on the Web. *The Book of Linux Music and Sound* ($39.95) is a 366-page compendium of Phillips's knowledge and offers an excellent overview of the art of making music with Linux.

The book begins with the ins and outs of Linux sound and MIDI driver support. Phillips points out that modern Linux versions automatically detect and install support for sound hardware, yet he dedicates most of that section to describing the low-level details of compiling and loading drivers. The information is complete, correct, and concise. The novice Linux user should try not to be intimidated by the information provided here.

In contrast to the book's complex opener, the introduction to digital music basics is comfortingly simple. Phillips quickly and clearly covers the high-level concepts behind PCM audio, MIDI, FM synthesis, and wavetables. That information will prepare the apprentice electronic musician to understand the remainder of the book.

Most of the remaining material covers, in depth, the best music programs available for Linux by comparing, contrasting, and categorizing them neatly. Phillips devotes chapters to digital-audio players and recorders, sound-file editors, MIDI software, MP3 encoders and players, software synthesizers, notation packages, and even players and editors for the venerable MOD format. Each software package discussed contains a quick but thorough




***The Book of Linux Music and Sound* provides a thorough, in-depth introduction to creating music on the Linux platform.**

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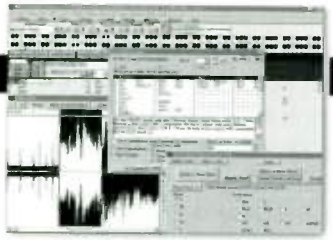

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tutorial, information about availability and licensing, the product's Web page, and other useful items.

Later chapters branch out into less traditional software, such as network audio systems, DJ software, and games. Phillips also touches on various packages that run Windows, Mac OS, and DOS operating systems under Linux, and lists programs that work well in these emulation environments.

*The Book of Linux Music and Sound* also comes with a CD-ROM, which contains copies of almost all of the software discussed in the book, as well as a copy of Phillips's Sound and MIDI Software for Linux Web site from May 2000. It's a great starting point for further Linux exploration on the Web. True to the spirit of Linux itself, the CD provides source code for all software (where licensing permits), so users can build a Linux systems version that can run on virtually any hardware platform.

The only downside to publishing a book about the dynamic world of Linux software is it's out of date before the first copies hit the shelves. Many of the software packages mentioned are still in development—as is Linux itself—so the book and CD-ROM should be considered snapshots of the state of Linux music software in spring 2000. Phillips considers that point and encourages the reader to check his Web site and the various software producers' sites for updates.

*The Book of Linux Music and Sound* is a great introduction to making music on the increasingly popular Linux platform. Both Linux gurus and experienced electronic musicians will find some of the introductory material a bit basic, but the book succeeds admirably in building a bridge between those two camps. Anyone interested in making new music in adventurous ways should check out Linux, and this book is an excellent place to start.

**Overall EM Rating (1 through 5): 4.5**

# WAVES

## C4 (TDM, Mac/Win)

*By Chris Gill*

Multiband parametric processor sounds like a generic description, yet Waves' *C4* is anything but a lackluster signal processing plug-in. Although the software essentially comprises four of Waves' *Renaissance Compressor* plug-ins that operate individually on four separate frequency ranges, *C4* offers much more than ordinary compression. In fact, it's a very flexible sound-shaping tool that provides a combination of limiting, equalization, expansion, and compression functions both independently and simultaneously.

Waves' *C4* is available in TDM and native versions for Mac and Windows (TDM, $800; native, $400). The TDM version reviewed here features a 48-bit processor that dithers the output to 24 bits before transferring it to the TDM bus. The plug-in requires an entire chip on a Pro Tools 24/Mix system or a Mix Farm card. Both of the plug-in versions function identically.


**Waves' *C4* can perform several processes at once. In this instance, it's being used to compress and boost the bass, compress and cut the low mids, boost the EQ of the high mids, and boost and expand the treble.**

### Out of Control

*C4* has three variable low-, mid-, and high-frequency crossover points. Those points divide the input signal into four frequency ranges, as well as a Q control that adjusts the slope of the crossover filters. All four of the frequency bands include variable controls for threshold, gain, range, attack, and release, as well as Solo and Bypass switches. *C4*'s Master controls include Threshold, Gain, Range, Attack, and Release; you can adjust the corresponding controls for all four bands simultaneously. Master controls also include a Manual/Auto-Release control switch; a Behavior switch with Opto (classic opto-coupling) and Electro settings (the inverse of Opto mode); and a variable Knee control that you can adjust in 76 increments from soft to hard.

Most compressors offer individual gain-reduction meters. *C4*, however, features a DynamicLine display that shows detailed information such as the crossover points and slope, the moving EQ curve, the maximum change in dynamic range, the fixed gain, the frequency center points, and the effective gain change. Dragging movable band center markers horizontally changes the band's frequency center and vertically adjusts gain, which makes it easy to mold and shape the sound as you desire.

### All Together Now

The plug-in offers more than the average compressor, equalizer, or expander. For example, you can tighten up the low frequencies of a kick drum or bass guitar with compression; cut or boost the low-mid and high-mid EQ; de-ess vocals; and expand the treble frequencies to add glassy, shimmering high-end sheen to vocal harmonies. By setting the Range controls to boost the gain, you restore dynamics to an overcompressed signal. Also, you can use the processor to remove high-end hiss and excessive low-end hum. By automating the crossover controls, you can even create dramatic filter sweeps.

Whereas you can apply the plug-in to any audio signal, it is best suited for use on sounds or tracks that cover a wide frequency range, such as sampled drum loops or a stereo master output track. *C4* works best for mastering applications such as getting the maximum perceived loudness out of a mix or giving a somewhat lifeless mix a professional polish. *C4*

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may not be a cure for sloppy mixing, but it can definitely enhance a good mix and bring out the best in your recorded performances. Once you've heard what *C4* can do for mixes, you'll probably end up using it to master all your material.

**Overall EM Rating (1 through 5): 4.5**

## SAMPLEHEADS

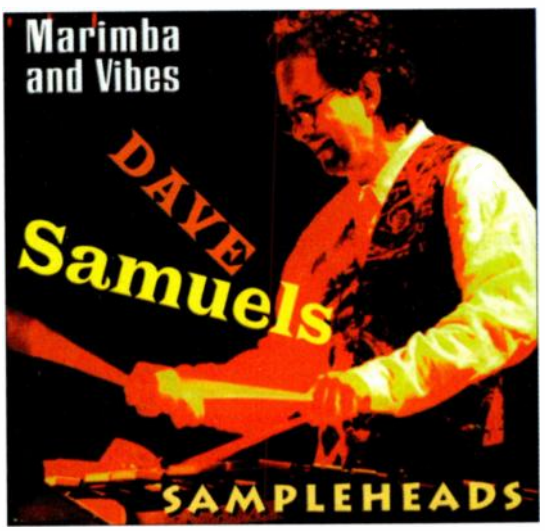
### Dave Samuels Marimba and Vibes

*By Dan Phillips*

I've always loved the smooth, open timbres of mallet percussion. The moment I learned Sampleheads was coming out with a CD-ROM of marimba and vibraphone samples, I had to check it out. As soon as it arrived, I ripped open the package, loaded up a bank of sounds, and went a-malleting. But more on that later. Here are the facts.

Mallet artist Dave Samuels plays all of the samples on this collection. Sampleheads makes a point of collaborating with top-notch players, and Samuels is no exception; his resume reads like a who's who of jazz, including Oscar Peterson, Stan Getz, the Yellowjackets, and Spyro Gyra, among others. The CD contains a few sampled phrases, but it mainly features meticulously recorded chromatic multisamples that are intended for Samuels' own use with a sampler and an Alternate Mode MalletKat MIDI controller.

The *Dave Samuels Marimba and Vibes* CD-ROM is available in Akai S1000, Roland S-700 series, E-mu, SampleCell, and NemeSys' *GigaSampler* formats ($149.95). It's also available as an audio CD ($99.95). What's more, you can download individual multisamples in E-mu's SoundFont format directly from the Sampleheads Web site, with prices from $9.95 to $19.95 for each SoundFont bank. I reviewed the E-mu CD-ROM.




***Dave Samuels Marimba and Vibes* from Sampleheads captures the sounds of Samuels's first-call percussionist's instruments—the way he likes to hear them.**

### With Mallets

The disc includes five multisample presets: sustained notes played soft, medium, and hard; dead notes played medium; and two octaves of bass notes. It also includes marimba roll samples between seconds, minor thirds, and major thirds. When appropriate, Sampleheads provides variations with different file sizes; for instance, the hard mallet is available in 20 MB, 16 MB, and 7 MB presets.

Recording a chromatic samples series demands great precision from the musician, and Samuels is clearly up to the task—the samples play cleanly and evenly across the entire range. Samuels' 5-octave, rosewood Yamaha marimba sounds lovely, pure, and sweet. My favorite sound on the disc is a velocity crossfade between soft-mallet and dead-note samples, which are close-miked and intimate. Medium- and hard-mallet samples include natural room ambience, creating more of a live feel; they sound great on a Steve Reich-inspired mallet ensemble that I created.

The vibraphone samples feature four main multisampled presets: two with sustained notes (soft and medium mallets played mezzo forte and forte, respectively) and two with short, dampened notes (mezzo forte soft mallet and forte hard mallet). As with the marimba samples, each of the vibraphone samples is available in several file sizes. The samples sound great, but not one of them

utilizes the characteristic tremolo produced by the vibraphone's motorized fans.

### Tried and Tremulous

Sampling the instrument with the tremolo effect doesn't work well for several reasons. Most notably, the fans' cyclic effect does not synchronize with different notes on playback. I worked up a reasonable facsimile by routing an LFO to global amplitude and then wondered why Sampleheads hadn't included that workaround. Sampleheads' Jeremy Roberts says a simple LFO-to-amplitude routing doesn't fully re-create an acoustic tremolo's sound, which is certainly true. Additionally, Roberts says, "We're respecting the artist that we sampled. That's not his style; he doesn't generally use the motors."

Nonetheless, I find *Dave Samuels Marimba and Vibes* to be a focused and well-executed collection. Anyone looking for the highest quality mallet samples does not need to look further.

**Overall EM Rating (1 through 5): 4.5**

## DISCOVERY FIRM

### World Groove

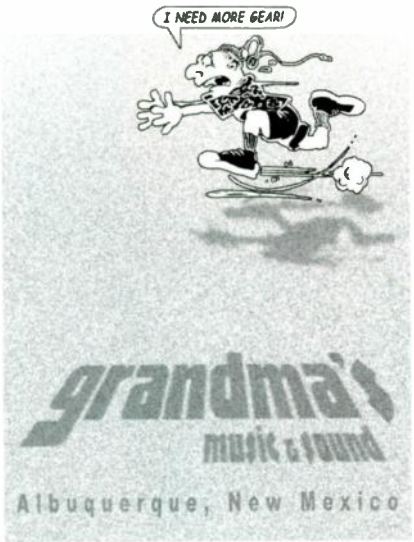
*By Jeff Obee*

Discovery Firm's *World Groove* ($39.95) focuses on esoteric and exotic sounds from Asia, South America, Africa, and the Middle East. The grooves are tight, earthy, and potent, with a pulsing, hand drum emphasis that blends well with trance, electronica, or other contemporary styles.

### Worlds in Collusion

Tempos range from 68 to 175 bpm during the course of the CD's 60 selections. However, *World Groove* is all too brief—it offers only 36 minutes of material. Also, the documentation lists only the track number and the selection's tempo in bpm. Track titles, file lengths, and descriptions of the instruments and musical styles would be helpful.

Nonetheless, I was immediately drawn to Track 2, an inspiring and energetic 21-bar groove reminiscent of Peter Gabriel's best work. I couldn't place the track's






QUICK PICKS

geographical origins, but it has a talking-drum foundation, with a high-pitched drum driving the rhythm, and a brief vocal line at the beginning. Track 4 is similar but with a deep tomlike drum pushing the beat.

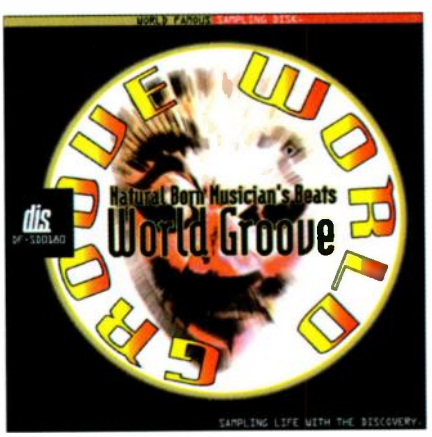
Track 5 cooks at 147 bpm. It begins with a clay drum playing a syncopated, 16th-note groove joined later by an ensemble of low, loose-skinned drums. Track 7 continues in a similar way, with churning, call-and-response tribal drumming. Track 14 is equally appealing, with multiple hand drums and a didgeridoo in the mix.

Tracks 23 through 26 are infused with the flavors of India, emphasizing tabla and sitar. Jumping to tracks 38 through 40 finds slower rhythms (with less percussion) that invite listeners to join in with their own grooves. Track 50 beckoned me with its 6/8 rhythm and two accompanying flutes, as did Track 51, which features a gamelan-like melody line; an insistent ensemble of wooden percussion; and sweet, haunting vocals.

### World View

Besides poor documentation and brevity, my only other complaint about *World Groove* is that the pitched instruments are inseparable from the percussion. The pitched elements should be separate tracks so I am not painted into a harmonic and melodic corner.

Nevertheless, *World Groove*'s outstanding tracks are intriguing, and I find myself wanting more—a lot more. A single, short CD isn't nearly enough. But as a bassist who performs regularly with a loop-based band, I'm excited by the world of possibilities the disc suggests.




**Discovery Firm's *World Groove* audio CD assembles an intriguing collection of exotic rhythms from around the globe.**

**Overall EM Rating (1 through 5): 4**

## STEINBERG

### Waldorf PPG Wave 2.V (VST, Mac/Win)

*By Rob Shrock*

Many classic instruments (such as the Hammond B-3, Moog Minimoog, and Sequential Circuits' Prophet-5) have been resurrected in the past year as software plug-ins. And one of the best re-creations is Steinberg's *Waldorf PPG Wave 2.V* (Mac/Win; $199).

*PPG Wave 2.V* is a VST Instrument with an uncanny likeness in sound and aesthetic to its hardware namesake. The original Wave 2.3—released in 1983 with a $9,000 price tag—derived its unique sound in part from its ability to read digital representations of waveforms sequentially from wavetables. Although other synthesizers later employed wavetable synthesis and scanning techniques, many musicians prefer the Wave 2.3's unique filter, resonance capabilities, and immediacy.

### Virtual Wave

Most of the Wave 2.3's features are faithfully emulated—right down to the blue front panel—and several conveniences are added to take advantage of modern computing power. The True PPG mode re-creates a few of the hardware version's peculiarities, including aliasing noise, irregular LFO oscillation, and fine-tuning filter variations. However, the Wave 2.3's cryptic parameter names have been discarded for clearer terminology.

*PPG Wave 2.V*'s filter accurately reproduces the original SSM 2044 chip's behavior, which attenuated the signal by up to 12 dB when the Emphasis (resonance) was cranked way up. The Wave 2.3's filter and resonance characteristics were definitely distinct, and this plug-in's emulation sounds great.

The Wave 2.3's complex modulation schemes also appear in *PPG Wave 2.V*. In addition, you can graphically edit envelopes, and the onscreen keyboard can be hidden to preserve screen space.

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**Steinberg's *PPG Wave 2.V* VST Instrument gives you the same characteristic sound as the original Wave 2.3, but with updated features.**

*PPG Wave 2.V* does not operate in any digital-audio sequencer other than Steinberg's *Cubase VST*. According to the manufacturer, an update to version 1.01 (available for download from www.steinberg.net) fixes incompatibility problems.

## I Hear Voices

Each *PPG Wave 2.V* sound bank contains 128 programs. In addition to the original hardware's presets, some of Europe's finest Wave 2.3 programming masters contributed eight more preset banks. You can automate program parameter changes, and the Mod wheel setting is stored as part of the program, just like in the original.

*PPG Wave 2.V* has a maximum polyphony of 64 voices (the original maxed out at eight voices) and receives MIDI data on eight channels simultaneously. As with the original, four keyboard modes are available: Poly, Dual, Quad (one, two, and four notes per key pressed, respectively), and Mono (eight voices per note). Poly, Dual, and Quad stack up to 64 voices. With *PPG Wave 2.V*, two stereo pairs of outputs can be routed directly into *Cubase VST* for additional processing or directly to the computer's audio outputs.

## Wave Hello

One cool feature of the Wave 2.3—which modern synths and samplers sorely lack—is the ability to pan individual voices. In *PPG Wave 2.V*'s Poly mode, voices alternate between left and right pan positions. The Basis control sets the panning degree: a zero setting places all voices in the middle.

The Wave 2.3's unique sonic character shines through in *PPG Wave 2.V*. None of the original instrument samples I've heard capture the animated sound of an actual PPG wavetable synthesizer. Even the most ardent hardware zealot will appreciate *PPG Wave 2.V*'s accurate detail. ❀

**Overall EM Rating (1 through 5): 4.5**

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# TASCAM®

## US-428 USB Digital Audio Workstation/ Controller

The US-428 is a 24-bit USB-based audio controller co-designed by TASCAM and Frontier Design Group. The control surface includes plenty of faders, transports and other dedicated controls compatible with the most-used functions in today's DAW applications. The US-428 supports a total of four channels of audio in and two outs simultaneously. The interface plugs right into a USB equipped PC or Mac computer— no opening your computer and no sound card to install. Musicians taking the leap from Portastudios to computer-based DAW programs will feel right at home with the tactile control surface.

**FEATURES–**

- PC and Mac compatible
- Works with most major DAW programs
- 24 bit D/A and A/D converters
- Bundled with Steinberg's Cubasis VST sequencing software for Windows (MacOS version shipping soon)

**I/O–**

- Total of four channels of audio in (analog or S/PDIF) and two out simultaneously via USB
- Two XLR mic inputs, two balanced 1/4" TRS inputs, two unbalanced 1/4" inputs (switchable to Hi-Z)
- S/PDIF digital I/O • Two independent MIDI I/O (32 channels)

**Controls–**

- Unlimited banks of eight faders
- Transport, mute/solo and locate keys
- An EQ module supports control of up to four bands of fully parametric EQ
- Four aux sends and a panpot
- Can be customized to control everything from virtual synths to MIDI lighting panels

# MOTU AUDIO Hard Disk Recording Systems

The MOTU Audio System is a PCI based hard recording solution for the Mac and PC platforms. At the heart of the system is the PCI-324 PCI card that can connect up to three audio interfaces and allows up to 72 channels of simultaneous I/O. Audio interfaces are available with a wide range of I/O configurations including multiple analog I/O with the latest 24-bit A/D/A converters and/or multi channel digital I/O such as ADAT optical and TDIF I/O as well as standard S/PDIF and AES/EBU I/O. Each interface can be purchased separately or with a PCI-324 card allowing you to build a system to suit your needs. Includes drivers for all of today's hottest audio software and AudioDesk, multitrack recording and editing software for the Mac.

**THEY ALL FEATURE–** • Mac OS and Windows compatible • Includes software drivers for compatibility with all of today's popular audio software plus AudioDesk, MOTU's sample-accurate audio workstation software for Mac OS • Host computer determines the number of tracks that the software can record and play simultaneously, as well as the amount of real-time effects processing it can support • Front panels display metering for all inputs and outputs

• **AudioDesk Audio Workstation Software** for Mac OS features 24-bit recording, multi-channel waveform editing, automated virtual mixing, graphic editing of ramp automation, real-time effects plug-ins with 32-bit floating point processing, crossfades, support for third-party audio plug-ins (in the MOTU Audio System and Adobe Premiere formats), background processing of file-based operations, sample-accurate editing and placement of audio, and more


**1296 Features–**

• 24-bit, enhanced multi-bit 128x oversampling 96kHz converters • A-weighted signal-to-noise ratio of 117 dB • 12 Balanced XLR inputs and outputs can support two simultaneous 5.1 mixes. • AES/EBU I/O with sample rate conversion both in and out. • Compatible with existing PCI-324 cards (requires new PCI-324 driver) • Connect up to 3 1296 interfaces to 1 PCI-324 card for a total of 36 inputs and outputs or mix and match the 1296 interface with up to three of the other MOTU audio interfaces


**2408 mkII FEATURES–**

• 7 banks of 8 channel I/O: 1 bank of analog, 3 banks of ADAT optical, 3 banks of Tascam TDIF, plus stereo S/PDIF • Custom VLSI chip for amazing I/O capabilities • • Format conversion between ADAT and DA-88

• 8x 24-bit 1/4" balanced analog I/Os • 24-bit internal data bus for full 24-bit recording via digital inputs • Standard S/PDIF I/O for digital plus an additional S/PDIF I/O for the main mix • Sample-accurate synchronization with ADATs and DA88s via an ADAT SYNC IN and RS422


**1224 FEATURES–**

• 24-bit analog audio interface • State-of-the-art 24-bit A/D/A • Simultaneously record and play back 8 channels of balanced (TRS), +4 dB audio • 24-bit balanced +4 XLR main outputs • Stereo AES/EBU digital I/O • Word clock in/out • Dynamic range of 116 dB (A-weighted) • Front panel displays six-segment metering for all inputs and outputs • Headphone jack with volume knob

# Digital Performer 2.7

Digital Performer is an integrated multitrack digital audio and MIDI sequencing program packed with advanced tools for a wide variety of audio applications. Sample accurate editing, loop based audio capture, realtime DSP effects and the best MIDI timing/resolution available insures unlimited creative potential.

**FEATURES-**

• 24-bit recording and editing • 32-bit native EQ and effects processing • Includes over 50 real-time MIDI and audio effects plug-ins including 64-bit MasterWorks Limiter and Multiband Compressor • POLAR window provides interactive audio loop recording • Sample-accurate waveform editing with the tightest sync you can get • Drag & drop samples between your Mac and your Sampler • PureDSP stereo pitch-shifting and time-stretching • Unlimited audio tracks, real-time editing, full automation and remote control • QuickTime video support

**NEW FEATURES-**

- Full Plug-In FX automation and increased 3rd party support • Drum Editor
- **Adjustable Display Resolution** from 2 to 10,000 PPQ. Tick values up to four decimal places allows 1000 times greater editing resolution.
- **MIDI Time Stamping** (MTS) which exists in MOTU's rack-mountable USB MIDI interfaces, delivers MIDI data from Digital Performer to MIDI devices as accurately as a third of a millisecond for every single MIDI event.

## PORTABLE DIGITAL MULTITRACK RECORDING

### YAMAHA® AW4416 16-Track 24-Bit Hard Disk Recorder

The AW2416 is an easy to use, high quality 16 track hard disk recorder/digital mixing system designed and built without compromise. Choose between 16- or 24-bit resolution at either 44.1 or 48 kHz recording on a song by song basis. The digital mixing capabilities, based on the acclaimed Yamaha 02R digital mixing console, is expandable to a total of 44 input channels and features 32-bit processing, 4-band parametric EQ, dynamics control, two dedicated effects processors, motorized faders and full automation and library storage capabilities. Eight assignable sample pads allow up to 90 seconds of samples to be placed over two banks for a total of 16 samples. A front panel drive bay accommodates an optional CD-RW drive that allows back-up and storage of songs as well as audio CD burning.

**RECORDING/EDITING FEATURES-**
- 16 track playback with 8 virtual takes per track
- 16- or 24-bit recording at 44.1 or 48 kHz with 32-bit processing offers as much as 105dB dynamic range
- Manual or Auto Punch In/Out
- Song, Track/Part and Region editing functions
- Jog wheel with Shuttle control
- Up to 99 locate points per song

**SAMPLE PADS-**
- 8 sampling (trigger) pads, assignable to any channel input of the mixer, x two banks for a total of 16 sounds (90-sec. of sampling time at 16-bit/44.1kHz)

**MIXING-**
- 4-band parametric EQ and Dynamics per channel
- 2 powerful digital effects processors
- Channel pairing plus 4 fader groups and 4 mute groups
- Recallable scene memories of all settings as well as Channel, EQ, Dynamics and Effects libraries
- Fully automated mixing with 60mm motorized faders

**I/O**
- 8 analog Mic/Line inputs w/ inserts on channels 1 and 2
- Stereo digital I/O
- Analog outputs include Stereo and Monitor, plus 4 Omni outs to which you can assign up to 4 Group or Aux buss outs, or additional Stereo or Monitor outs
- World Clock I/O, MIDI In, Out/Thru, MTC Out and a To Host connector for direct connection to a computer
- SCSI connector for external hard drives and other peripheral devices
- Mouse connector offers point-and-click navigation
- Foot Switch jack for triggering Start/ Stop Play, Recording or Punch I/O by foot

**EXPANDABILITY**
- 2 Optional Mini-YGDAI cards provide 8 additional channels of I/O each for a total of 16 inputs and 16 outputs. Available in Alesis ADAT, TASCAM, AES/ EBU or additional analog I/O configurations
- Optional internal CD-RW drive

### FOSTEX VF-16 16-Track Digital Multitracker

The Fostex VF-16 is an affordable fully integrated 16 track digital multitrack recorder and digital mixer designed for project and home recording studios. This all-in-one rugged package offers 8 tracks of simultaneous recording, a 16 channel automatable mixer with pan, mute, EQ, compression, effects and 2 aux sends on each channel as well as 8 mic/line inputs— 2 of which are XLR balanced with switchable phantom power and inserts. Also included with the VF-16 is a dual 24-bit effects processor, a SCSI port for data back-up and a full range of non-destructive editing capabilities.

**FEATURES-**
- 16 tracks plus 8 ghost (virtual) tracks of non-compressed 16-bit, 44.1kHz CD quality recording
- 8 track simultaneous record (16 when using ADAT lightpipe interface)
- 64 x 128 dot-matrix LCD display
- E-IDE 3.5-inch hard drive is used for storage— Up to three hours of recording time per Gigabyte
- Built-in dual 24-bit stereo A.S.P. effects
- 32-bit processing and mixing

**MIXING-**
- 16-input channel faders with mute, pan, three-band EQ with parametric mid-range, Compressor, Effects Send and two Aux Sends (selectable pre/post)
- Auto indication and self--illuminating switches allow you to see the status of the entire mixer at a glance.
- 99-mix scene memory
- Totally controllable via MIDI

**EDITING-**
- Editing functions include COPY/PASTE, MOVE/PASTE, ERASE and non-destructive editing with UNDO/REDO

**INPUTS & OUTPUTS-**
- 8 x 1/4" Mic/Line inputs
- Channels 7 & 8 feature XLR-balanced mic inputs with phantom power and inserts
- SPDIF and ADAT I/Os are included as well as external SCSI for backup

**ADDITIONAL FEATURES-**
- Imports and exports WAV file format.
- ±6% pitch control
- 90 point locate memory

## SOUND MODULES

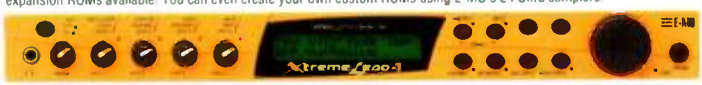
### KORG® Triton Rack Sound Module


The TRITON-Rack is the long-awaited rack-mount version of the TRITON keyboards. It provides all of the sound and sampling functionality of Version 2.0 of the highly respected synth/workstation/sampler and in addition dramatically expands the possible number of sounds, includes a digital output, allows up to eight EXB-PCM boards to be installed as well as other functions that make it a no-compromise sound source.

**FEATURES–**
- 60-voice polyphony, 16-part multi-timbral with up to 5 insert and 2 master effects per multi
- 200 user "multi" memory locations
- Up to 2,057 programs (fully expanded) including 1,664 combinations consisting of up to eight timbres each
- 32MB of ROM with room for up to 8 EXB-PCM 16MB expansion boards
- 102 master and insert effects plus 3-band master EQ
- Dual polyphonic arpeggiator with 328 patterns

**OPTIONS–**
- ***EXB-DI-*** 6 channel ADAT out with a Word Clock IN
- ***EXB-mLAN-*** supports the upcoming mLAN digital network allowing a single Firewire cable to handle all audio and MIDI I/O signals of the TRITON-Rack
- ***EXB-SCSI-*** interface board for adding an external SCSI device, and load AKAI sample data from CD-ROM
- 6 analog and a 24-bit digital S/PDIF out, 2 mic/line ins
- Built-in 16-bit/48kHz linear sampler with 16MB of RAM expandable to 96MB using (3) 72-pin SIMMS
- Export samples as .WAV and AIFF files
- 240 x 64 dot display- Visual waveform editing
- Time-slicing easily matches rhythmic (looped) samples to a master tempo without changing pitch and creates patterns from the sliced samples
- Song data created on the TRITON can be played back via floppy disk or SCSI device by the TRITON-Rack
- ***EXB-PCM01-*** Pianos/Classic Keyboards
- ***EXB-PCM02-*** Studio Essentials
- ***EXB-PCM03-*** Future Loop Construction
- ***EXB-PCM04-*** Dance Extreme
- ***EXB-PCM05-*** Vintage Archives
- ***EXB-MOSS-*** DSP 6-voice synthesizer board with 13 synthesis types including analog and physical modeling

### E-mu Systems, Inc. XL-1 Extreme Lead

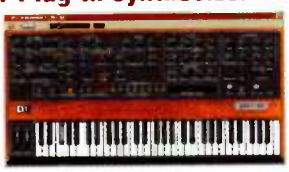


Xtreme Lead-1 is E-MU's new single rackspace techno/electronica BPM synthesizer. It is an all-in-one dance module with powerful filters and unparalleled rhythmic capabilities including 16 simultaneously synced arpeggiators. The new SuperBEATS Mode allows you to effortlessly trigger, latch and unlatch synced loops and grooves from separate keys on your keyboard. Additional internal ROM expansion capabilities allow you to expand your sound with the many Proteus expansion ROMs available. You can even create your own custom ROMs using E-MU's E4 Ultra samplers.

**FEATURES–**
- 32 MB Sound ROM w/512 ROM & 512 User Presets
- 64 voice polyphony (128 w/Turbo upgrade)
- SuperBEATS Mode
- 12 assignable real-time front panel controls
- Rhythmic Pattern Generator/Arpeggiator
- 12th order filters
- Advanced synthesis architecture
- 2 outputs (expandable to 6 + S/PDIF w/Turbo upgrade)
- 24-bit dual stereo-effects processor
- 1 additional internal ROM expansion slot (expandable to 3 w/Turbo upgrade)
- 16 MIDI channels (expandable to 32 w/Turbo upgrade)
- Plays back Flash ROMs authored on E4 Ultra Samplers

## SOFTWARE SYNTHS

### NATIVE INSTRUMENTS PRO-52 VST Plug-In Synthesizer



A VST plug-in synthesizer fashioned after the legendary Sequential Circuits Prophet-5. It combines the sonic brilliance, power, warmth and beauty of the original with the practical requirements and advantages available today. Additions to the classic include: no fixed limit to the number of voices, more preset memories, velocity sensitivity, MIDI automation of all available parameters plus the option to run several Pro-Fives in parallel.

**FEATURES–**
- Operates as VST 2.0 Plug-In
- 2 oscillators per voice
- Choice of pulse, triangle and saw-tooth waveforms
- Detune and synchronization
- 24 dB low-pass filter with resonance and self oscillation
- ADSR envelopes for amplitude and filter
- LFO with numerous modulation options
- Unlimited number of voices (CPU dependent)
- 512 user memories and 512 presets including 50 new sounds by vintage-synth legend John Bowen)
- Velocity sensitivity (optional)
- Real-time MIDI control and automation of all parameters
- Two operating modes: analog warmth or digital accuracy

### emagic ES-1 Software Synth

**FEATURES–**
- Virtual instruments designed for the Logic Series
- Ergonomic user-interface
- Up to 8 simultaneous ES1 instruments, each with up to 16 voices • Sample-accurate timing
- Every parameter can be completely automated
- Instruments can be routed to the effect plug-ins of Logic's internal digital mixer
- With Logic Audio Gold and Platinum, audio recordings can be routed into the ES1 and even used as modulation sources

### emagic EXS24 24-Bit Software Sampler

**FEATURES–**
- Up to 16 instruments can be used simultaneously in Logic Audio with up to 32 voices per unit
- Instruments can be AIFF, WAV, SDII and AKAI S1000/3000 files from 8 to 24 Bit
- Clearly laid out Instrument Editor
- Multi-mode filter • Two full-range envelope generators
- Sample accurate timing
- Full integration with Logic Audio's internal mixer
- Same storage medium for songs and sounds allows total recall of sampler parameters within Logic Audio

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## CD RECORDERS & DUPLICATORS

### ALESIS Masterlink ML-9600
**High-Resolution Master Disk Recorder**

The MasterLink ML-9600 combines stereo hard disk recording, CD burning, DSP, and mastering functions to deliver compact discs in the standard "Red Book" 16-bit/44.1kHz format, or high resolution 24-bit/96kHz CDs that utilize Alesis' revolutionary CD24 technology. The ML-9600's amazing sonic quality and powerful built-in tools offers a uniquely versatile and affordable solution for everyone from large commercial facilities to project studios and recording musicians.

**FEATURES–**

- Reads/writes 16-bit 44.1kHz Red Book Audio CDs as well as files in Alesis' CD24 24-bit/96kHz high-resolution mastering— an AIFF compatible file format that can be read by MacOS, Windows and Unix computer platforms
- 24-bit 128x oversampling A/D/A converters
- Built-in 3.2GB IDE hard drive
- 4x CD burning using standard CD-Rs
- Up to 20-40k Hz frequency response
- 113dB S/N ratio (A-weighted)
- Supports 16-, 20- and 24-bit wordlengths and 44.1, 48, 88.2, 96 kHz sample rates
- Built-in sample rate conversion & noise shaping
- Create and store up to 16 playlists containing as many as 99 tracks

**Inputs and Outputs**

- **Analog-** XLR-balanced and unbalanced RCA connectors
- **Digital-** AES/EBU (XLR) and coaxial S/PDIF (RCA) I/O
- 1/4" headphone out w/ level control

**Editing**

- Gain control
- Cropping allows adjusting start and end points
- Join and Split for combining and separating song sections

**DSP Finishing Tools**

- Equalization, Compression, Normalizing and Peak Limiting

**Includes**

- Infra red remote control and rackmount brackets

### MICROBOARDS Technology, Inc. StartREC
**Digital Audio Editing/ CD Duplication System**

The Microboards StartREC is the first digital audio editing system combined with a multidrive CD recordable duplication system for professionals. Audio is recorded to the internal 6.2 GB IDE hard drive using analog or digital inputs. Sample rate conversion is automatic. Tracks can be edited and sequenced using the StartRECs user friendly interface and up to 4 CDs can be recorded simultaneously. StartREC is the ideal solution for studio recording, mastering, post production or any pro audio environment requiring digital audio editing and short run CD-R duplication.

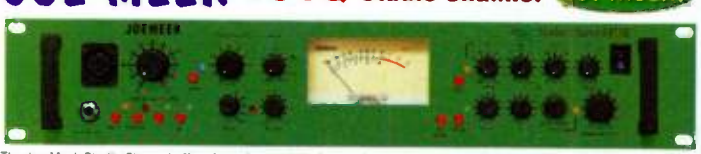
**FEATURES–**

- 2X, 4X, or 8X recording speeds
- 6.2GB IDE hard drive
- Editing functions include move, divide, combine or delete audio tracks, add or drop any index or sub index, and create track fade in or fade out
- Coaxial S/PDIF and AES/EBU digital input plus optical S/PDIF I/O
- XLR balanced and RCA unbalanced inputs and outputs
- Automatic sample rate conversion from 32 and 48kHz
- Automatic CD format detection feature and user friendly interface provide one touch button operation
- Front panel trim pot and LCD display provide accurate input signal and time lapse metering
- SCMS (Serial Copy Management System) is supported, regardless of the source disc copy protection status

| StartREC Models Include | |
|---|---|
| ST2000- w/ (2) 8x writers | ST3000 w/ (3) 8x writers |
| | ST4000- w/ (4) 8x writers |

## PROCESSING

### JOE MEEK VC1Q Studio Channel
got meek?



The Joe Meek Studio Channel offers four pieces of studio gear in one. It features an excellent transformer coupled mic preamp, an EQ, compressor and enhancer unit all in a 2U rackmount design. Find out why more and more studio owners can't live without one.

**FEATURES-**

- Fully balanced operation Mic/Line inputs with 48V phantom power and High pass filter switch
- Mono photo-optical compressor
- Front and rear XLR inputs on for easy patching
- Compression In/Out and VU/compression meter switches
- Twin balanced XLR outputs with one DI XLR output for stage use
- EQ section with fixed high and low shelving EQ with approx 18dB lift and cut at 8kHz and 100Hz respectively, sweepable (600Hz to 3.5KHz ) mid-band EQ with approx 16dB lift and cut. The 'Q' (bandwidth) value of the mid frequencies increase with the frequency
- Enhancer with Drive, Q, enhance/De-ess control, In/Out switch and enhance indicator
- Internal power supply 115/230V AC

### t.c. electronic M3000 Studio Reverb Processor
ULTIMATE SOUND MACHINE

Setting the new industry standard with the VSS-3 technology, the M3000 is the best sounding, most versatile and easiest to use professional reverb today and well into the future. Combining ultimate control of early reflections with a transparent and harmonically magnificent reverb tail, the art of reverberation is brought to a higher level.

**FEATURES–**

- 250 high-grade factory preset-algorithms: Halls, rooms, plates and springs. Ambience, concert halls. Post small, post large, post outdoor, post FX
- 24-bit A/D conversion, AES/EBU and S/PDIF digital I/O.
- Advanced expander and dynamic EQ
- Intuitive user interface with instant preset recall
- 5 band parametric EQ

## MICROPHONES

### AKG C2000B
**Condenser Mic**

Includes Free H-100 Shockmount

The C 2000 B is an all-purpose cardioid condenser microphone perfectly suited for both recording and live sound situations. The newly developed small-diaphragm transducer capsule is made using a unique manufacturing process that ensures high sensitivity, lowself noise, and excellent bass response.

**FEATURES-**

- Cardioid polar pattern
- Switchable bass rolloff filter (6 dB/octave @ 500 Hz) and -10dB pad
- Built-in pop screen reduces unwanted noise
- Rugged construction, elegantly styled die-cast metal housing, and silver-gray finish
- **30 Hz to 20 kHz frequency response**

### SHURE KSM44/SL
**Multipattern Condenser Mic**

The KSM44/SL is a multiple pattern dual large diaphragm condenser microphone built without compromise using premium electronic components and gold-plated internal and external connectors. The KSM44/SL is a premium vocal mic and is equally adept for close miking a wide range of acoustic instruments, amplifiers and for ambient room miking.

**FEATURES-**

- Dual 1-inch,gold-layered, Mylar diaphragms
- Class A, discrete, transformerless preamplifier
- Cardioid, omni and bidirectional polar patterns
- Subsonic filter eliminates rumble from mechanical vibration below 17 Hz.
- Integrated 3-stage pop grille and shock mount
- 15 dB pad and 3-position switchable low-frequency filter virtually eliminates unwanted background noise and controls proximity effect
- Includes ShureLock elastic-suspension shock mount and swivel mount, protective pouch and locking aluminum carrying case
- **20 Hz - 20 kHz frequency response**

## STUDIO MONITORS

### EVENT ELECTRONICS PS-5 Bi-Amplified Project Studio Monitors

The PS-5s are small format, full-range, non-fatiguing project studio monitors that give you the same precise, accurate sound as the highly acclaimed 20/20 series studio monitors. The use of custom driver components, complimentary crossover and bi-amplified power design provides a wide dynamic range with excellent transient response and low intermodulation distortion.

**FEATURES-**

- 5-1/4-inch magnetically shielded mineral-filled polypropylene cone with 1-inch diameter high-temperature voice coil and damped rubber surround LF Driver
- Magnetically shielded 25mm diameter ferrofluid-cooled natural silk dome neodymium HF Driver
- 70 watt continuous LF and 30 watt continuous HF amplification per side
- XLR-balanced and 1/4-inch (balanced or unbalanced) inputs
- 52Hz-19kHz frequency response ±3dB
- 2.6kHz, active second order crossover
- Built-in RF interference, output current limiting, over temperature, turn-on transient, subsonic filter, internal fuse protection
- Combination Power On/Clip LED indicator
- 5/8" vinyl-laminated MDF cabinet

### Hafler M-5 Passive 2-Way Studio Monitors

The Hafler M5s are lightweight, portable studio monitors with all the qualities of the TRM6 in a more compact, non-amplified package. They are an ideal monitoring solution for broadcast and project studio environments.

**FEATURES-**

- 70 – 21k Hz frequency response ±3dB
- 20 - 200 watts power handling
- 5.25" polypropylene/rolled nitrile rubber surround 1" silk dome/waveguide tweeter
- 5-way gold plated binding post inputs
- Shielded woofer magnet
- User selectable front panel 3dB tweeter level control
- 4th order Linkwitz-Riley crossover at 3.2kHz, Zobels, tweeter overload protection
- Dimensions 12.25"H x 6.75"W x 7"D
- Weight 12 lbs. net

### VERGENCE M-00 Powered Mini Monitor System

The M-00s are an integrated, self-powered, 2-way acoustic suspension mini monitoring system designed for near/mid-field monitoring. They're portable enough to take anywhere, have balanced and unbalanced inputs with lots of output power (75 watts/ch) and a tough cast metal enclosure.

**FEATURES-**

- 4.5" treated paper woofer, 1" soft fabric dome tweeter with full magnetic shielding)
- Built-in 75 Watt per channel (continuous) amplification
- 98 - 20k Hz frequency response ±2dB @ 1M
- XLR, TRS & RCA input connectors
- Cast aluminum/zinc alloy body & Glass-filled ABS baffle.
- -10, +4dB input sensitivity & near/mid-field proximity switching
- Power On, Auto-On, Off
- Sensitivity, Power & Standby Display
- Anti-clip circuitry
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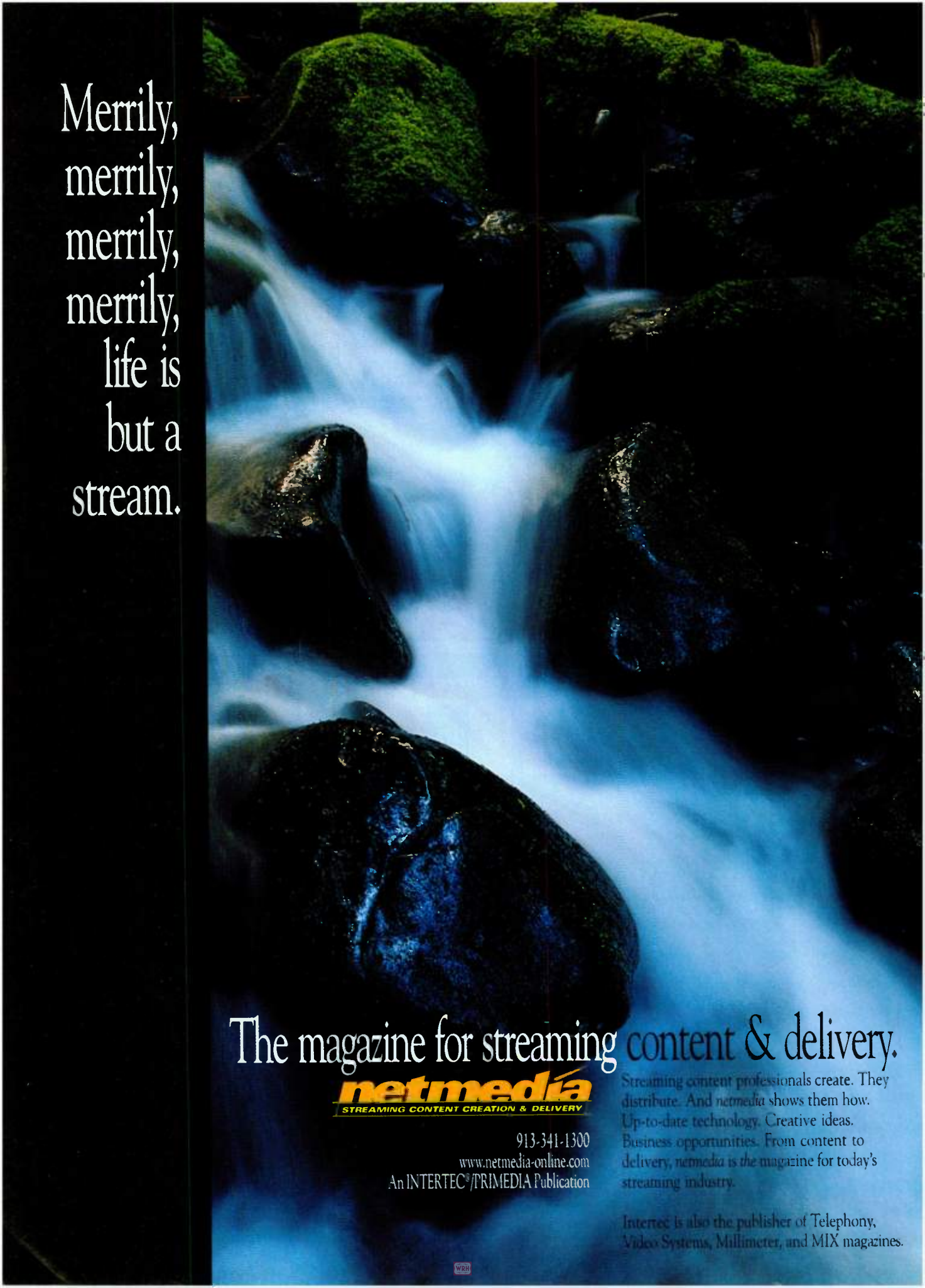
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# more essential gear for MAS

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MOTU AUDIO SYSTEM


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KIND OF LOUD


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MOTU AUDIO SYSTEM


Bomb Factory

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### Pultec EQP-1A

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### Fairchild™ 660

Re-introducing the undisputed champion in price, weight and performance: the $35,000, 100-pound, Fairchild compressor. Bomb Factory's no-compromise replica captures every nuance of the studio classic. But unlike the original, it's affordable enough that actual musicians can afford to own one. Heck, run a dozen at once — even in stereo.

### JOEMEEK™ Compressor


Add a little magic to your mixes with the JOEMEEK SC2 Photo Optical Compressor. In use by top producers the world over, JOEMEEK compression is the secret weapon that gives your sound the character and excitement it deserves!

### JOEMEEK™ Meequalizer


Joe Meek prototyped musical circuits in tiny tobacco tins. One of them was a treble and bass circuit used in conjunction with a sweepable mid control. The Meequalizer recreates the exact circuit used by Joe Meek, offering simple controls and incredibly warm, musical results. Use it on mono or stereo tracks!

### Tel-Ray™ Variable Delay


In the early 1960's, a small company experimented with electronics and technology. When they came up with something great, they would "Tell Ray" (the boss). One invention involved a tuna can, a motor, and a few tablespoons of cancer-causing oil. The creation: an "Electronic Memory Unit." A technology, they were sure, that would be of great interest to companies like IBM and NASA. Though it never made it to the moon, the killer technology that gives Tel-Ray its unique sound was licensed by most every major guitar amp manufacturer. Ad-N-Echo™ to any voice or instrument using the Tel-Ray™ Variable Delay. It provides lush delay, amazing echo, and warms up your tracks and mixes.

### moogerfooger™ Analog Delay

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### moogerfooger™ 12-Stage Phaser

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WRH

# FINAL MIX

By Larry the O

## The Nine-Pound Hammer

*"Well, this nine-pound hammer,*
*It's just a mite too heavy,*
*For my size, Lord, Lord,*
*For my size."*
— Merle Travis, "Nine Pound Hammer"

Sometimes I wake up in the morning and sense its weight holding me down in my bed. Other times it comes on me while I am driving somewhere or doing some planning.

It's not actually a large hammer or a cartoon safe hurtling down on my head from 40 stories. It's not even a cask of amontillado that will lure me into being bricked into a room, buried alive. It's more insidious than that. It's a giant blanket dropping over my head, closing out the daylight as it settles smoothly in place, filtering the clatter and song of everyday life down to a muffled, gray mumble.

It is not calm under the blanket, and it certainly is not peaceful. My heart pounds, driving the adrenaline through my body in great, panicky spurts. The sounds of life in the outside world may be muffled, but under the blanket, it is all shrill screams of alarm and wailing banshees of doom. My mind careens from thought to thought, all of them leaving as fast as they came, unless I scratch them frantically into semicoherent scrawls on random scraps of paper. If I could only generate enough heat with my intent to set the paper afire, maybe I could light the impenetrable darkness and lift some of the ponderous weight.

*What is it?*

It is the feeling of being overwhelmed by work.

People seem to be working harder today than ever before. I keep myself pretty busy, between my day gig at the monkey factory, performing with Action Palace, doing independent engineering and production projects, consulting—and, oh yes, writing for *Mix* and *Electronic Musician* magazines.

Tasks stack up like cordwood, and deadlines align themselves with the moon so that everything is due at once. I want to do a good job on all of it but can't even figure out how I'm going to get it done at all.

How doth it happen? Let me count the ways:

1. I have too many interests. Life is short, and there is much in the world to do, see, and be. How can I limit my choices to just playing drums or only writing articles?
2. I can't say no. When people offer you interesting or lucrative jobs, it takes an awful lot of strength to turn any of it down.
3. I underestimate the job. Hey, I can polish that off in a few evenings work! Nine weeks later . . .

One or two runaway projects, and I'm suddenly so badly swamped that I come home from working all day only to work all night and straight through the weekend. That overwhelmed feeling is dangerous, too, as it is best typified by hopelessness.

In the long run, the only solution is to find a clever exit from the rat maze. In the meantime, I wish I could say "steady as she goes" was my constant motto, but I'm afraid it often isn't. However, I do use a few strategies to stay physically and emotionally afloat. Probably the most important strategy is taking care of myself. Don't forget to eat, and remember to stop. Each week I swim a few miles and try to get one or two decent nights' sleep.

To deal with the work, I sometimes try the Horse approach: put on the blinders and don't think about anything other than what I'm doing at the moment. Then there's the Steam Shovel: grit my teeth and just keep moving, even if slowly. Let's not forget the Slice and Dice: spend some time organizing and segmenting tasks, then tackle them one chunk at a time. Sometimes the Berserker works best: just dive in with crazy energy and viciously thrash the work into submission.

All I know for sure is that I have to keep going. Periodically I manage to finish a bunch of stuff and throw that blanket right off me for a while. I believe that, one bright morning, the blanket is going to settle right on top of that nine-pound hammer.

STEVE CURL

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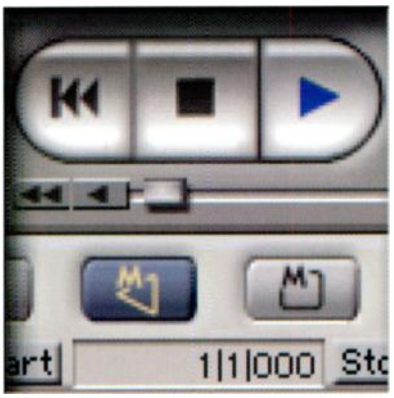


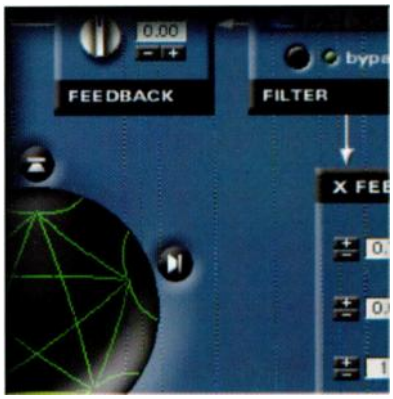



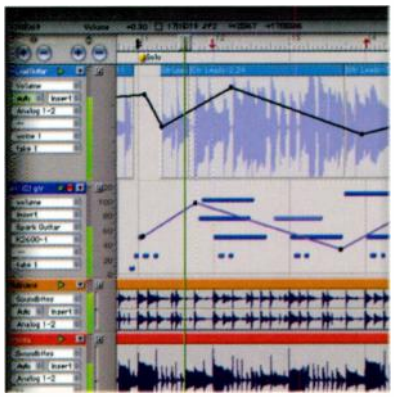

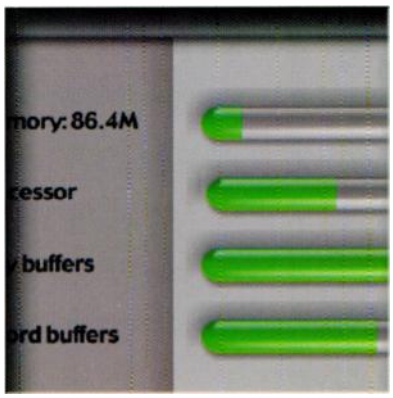


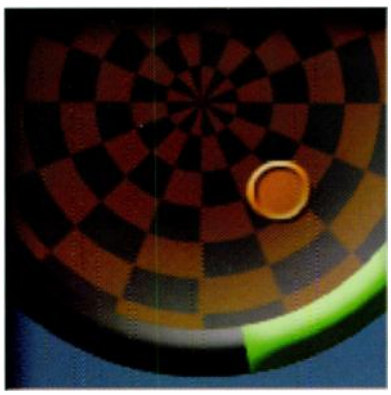


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