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January 2003

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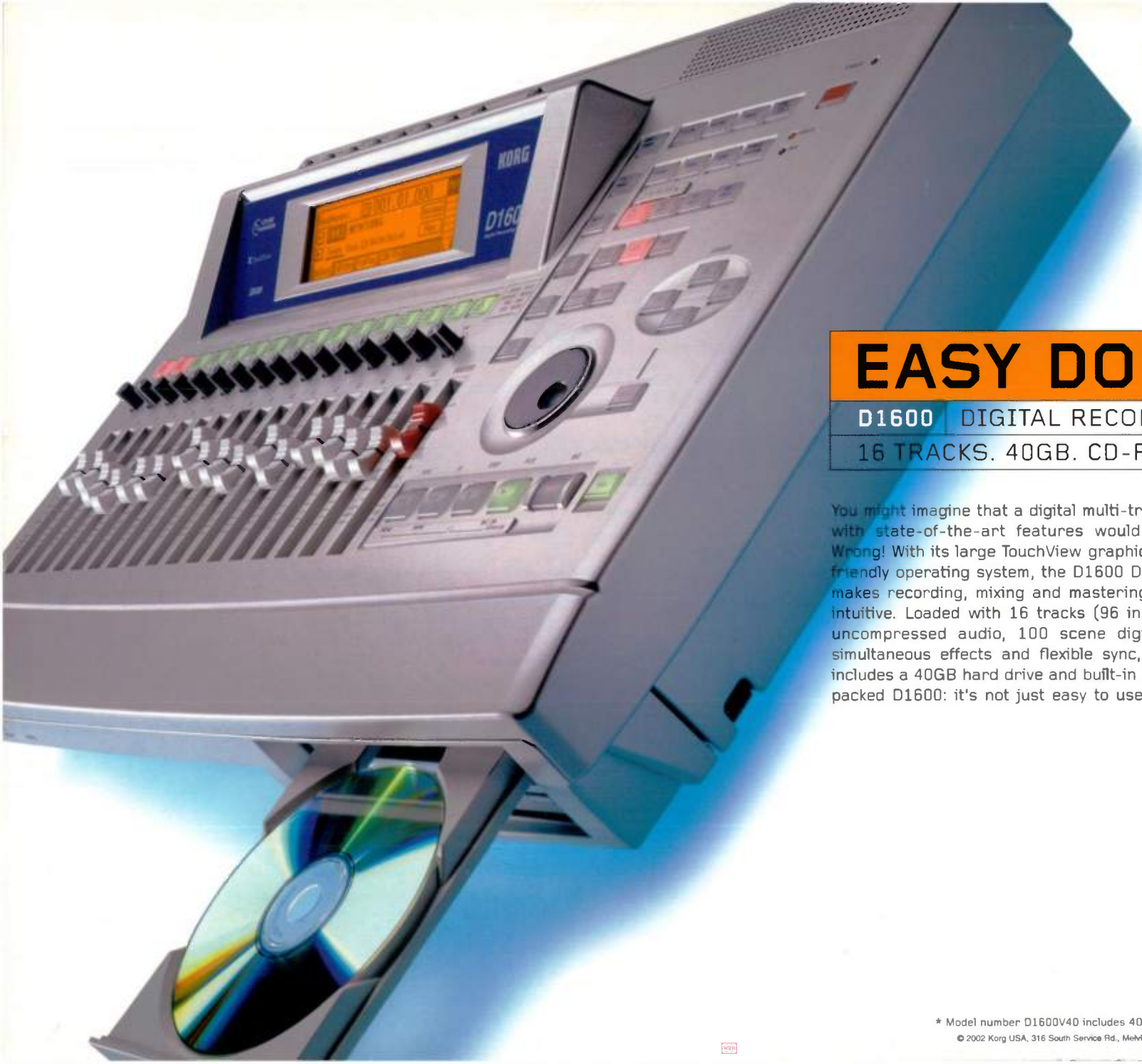

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Check out online demos of the new PLG boards at www.motifator.com

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I N S I

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By the EM *Staff*

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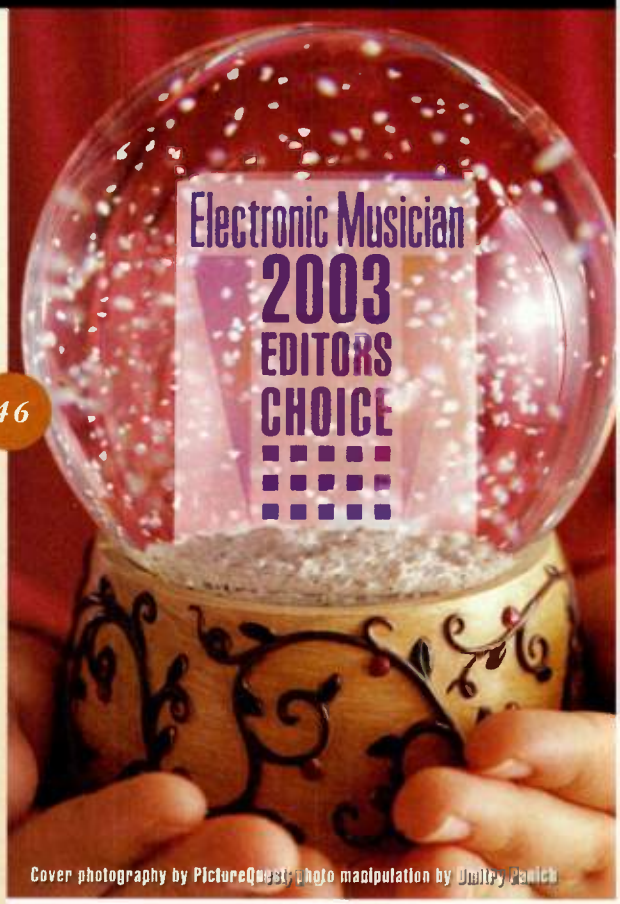
By Qubais Reed Ghazala



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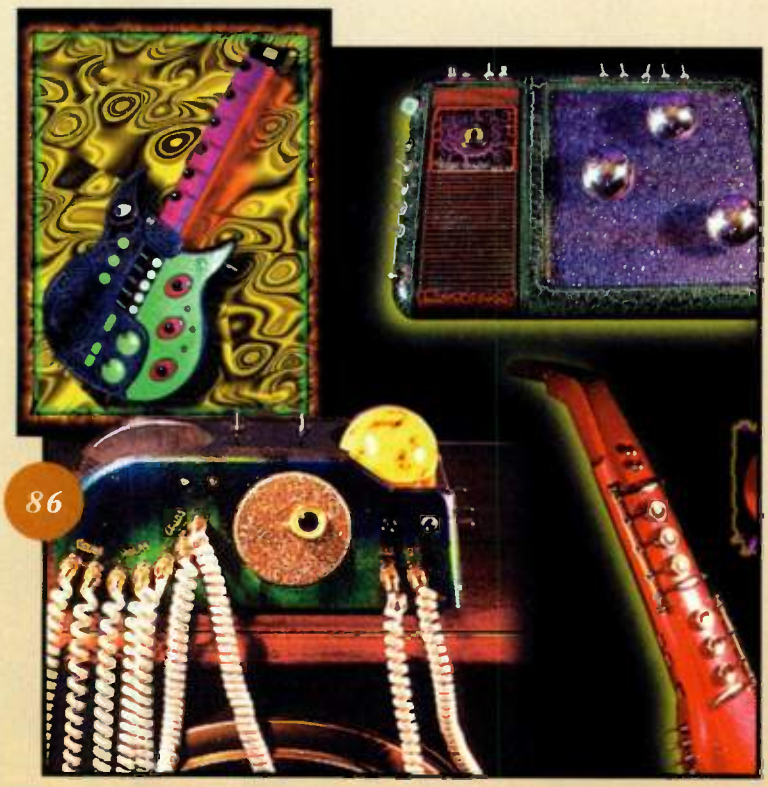

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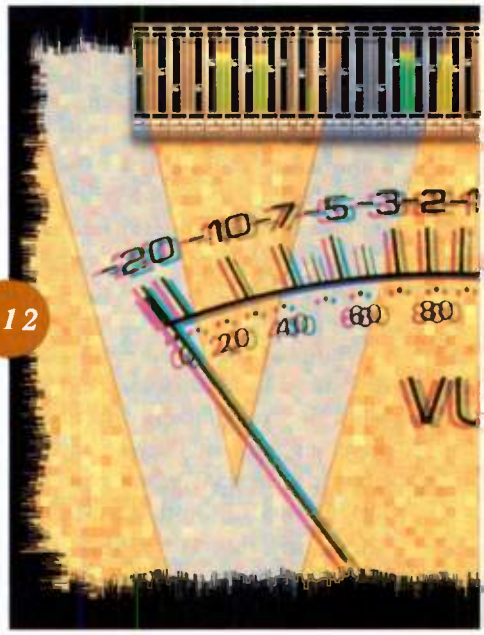

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NEW www.emusician.com

Coming Into Site

DAN PHILLIPS

I'm always a bit nervous about announcing new projects and initiatives that are supposed to happen "by the time you read this," because I write this column well in advance of publication, leaving me at the mercy of Murphy's Law. However, at the risk of wearing an egg facial, I'm asking you to please visit our Web site at www.emusician.com sometime after December 16. By the time you read this—there are those famous last words—our Web site should be completely redesigned.

While the improved emusician site will offer all of the same features as the old site and will introduce several new ones, this redesign is really about accessibility. For example, one major change will be the ability to find many of our articles by subject: you can click on any of 14 product types (Audio Editing Software, Control Surfaces, DAWs/Recorders, DSP Software, and so on) and find every story we've posted about that type of product.

Our new Tutorials section will present an assortment of "Master Class" features, "Square One" columns, and other how-to stories. Every month, the Spotlight section will highlight particularly interesting interviews, reviews, and applications. The News section will present product news from the EMusician Xtra newsletter, much of it information that we have never made available online before.

You've been able to subscribe online for some time, but we now have an enhanced subscriber-services page where you can get help with subscription problems. If you want to write for **EM**, check out our online author guidelines and author style guide. We're also providing an information page for our advertisers (including how to buy reprints and e-prints of our articles), an online Classifieds section, and lots of links to relevant sites. Of course, we'll add more as we go along.

We've retained several popular features of the old site, in addition to our article archives. You'll still find online audio, MIDI, and other example files for **EM** articles in the Web Clips section (formerly EMLinks), and the online portion of our Cool Tip of the Month is alive and well. Our Sell Your Music section is still available, as are NetStudio, the Rocket-powered online studio space, and our online reader service, called Free Product Information.

We've made several cosmetic changes to clean up the site. For instance, our old home page, originally dominated by articles from the current issue, is much less cluttered. It now shows a few key articles from the current issue, with the entire current issue presented on a separate page.

There's even more. But I'd rather you spent your time browsing the site than reading about it.

Subscribers get a bonus from us this month: our *Computer Music Product Guide*. This handy new buyer's guide is part of your subscription, but it is also available wherever **EM** is sold. The new guide is a companion to our *Personal Studio Buyer's Guide*, which focuses almost entirely on hardware. *CMPG* fills that gap by focusing on computer-music products, especially software.

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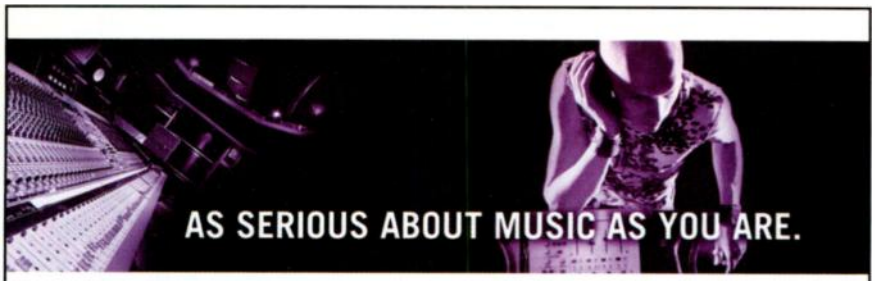

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MIKE CRUZ

SAMPLE-RATE STRAIGHT TALK

I was pleased to finally read some common-sense talk about sample rates ("Bridging the Gap," November 2002). Paul Lehrman's comments were especially relevant. I am constantly amazed by the attention given minutiae such as high sample rates and exotic (read "expensive") mic preamps and tube gear, while far more important issues—such as the sound of the control room—are ignored. Too many people focus on making their signal chain flat to within a tiny fraction of a decibel, blissfully unaware that standing waves and the lack of proper acoustic treatment often cause frequency-response variations of 20 dB or more.

Ethan Winer
RealTraps
via e-mail

CONFLICT RESOLUTION

In the article "Bridging the Gap" (November 2002), author Michael Cooper writes, "From the above discussion of formats (and referring to the table 'Resolution Conflicts'), we can see that the Yamaha 02R96 mixer and Tascam DA-98HR recorder cannot work together in 24/96 mode." Yet the table he referenced shows both the Yamaha and the Tascam can perform 24/96 operations in Single-wire/Double-speed AES mode. Was the table in error?

Keep up the good overall work. I renewed my subscription yet again, which must say something—I don't own a computer.

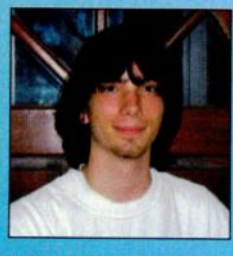
Master Sergeant Pleasant L. Lindsey III
Public Affairs Supervisor
U.S. Army Signal Center
Fort Gordon, GA

EM *contributing editor and author Michael Cooper replies: Master Sergeant Lindsey—sorry for the confusion. In the paragraph that you allude to, which is the last paragraph on p. 50, I inadvertently overlooked the Single-wire/Double-speed AES mode available to both the Tascam DA-98HR and DM-24. When in doubt, refer back to the table "Resolution Conflicts," which correctly notes the supported formats for each of the listed devices.*

That said, there is one caveat regarding the Tascam DA-98HR: this recorder can only implement Single-wire/Double-speed AES transmission and reception using an optional DB25-to-XLR breakout cable. The Yamaha 02R96, on the other hand, can send and receive Single-wire/Double-speed

MEET THE M-AUDIO/EM GEAR GIVEAWAY WINNERS!

Congratulations to the winners of the M-Audio and *Electronic Musician* Mobile/Project Studio Giveaway, as seen in the July 2002 issue of **EM**. Two lucky winners were selected in October to receive products made or distributed by M-Audio, including gear from Groove Tubes, Ableton, Propellerhead, and AMG.



Mike McCoy

Mobile-studio winner. Mike McCoy of Houston, Texas, won a prize package valued at $6,175. Mike plays sax, guitar, and keyboards. His favorite musical styles are drum 'n' bass and jungle, and he is also influenced by rap, rock, and jazz. Mike collaborates with local producers and DJs and notes that "although I am a Texan, I steer clear of country music."

Project-studio winner. Gary Allen, a correctional officer from Susanville, California, won a prize valued at $6,355. Gary has played guitar since age 12. He and his wife Caroline play gospel music. "We have been trying for some time now to put together an album of original songs," Gary says. "This new equipment will come in handy. Thank you so much for such a fine magazine and for the awesome prizes."

Gary Allen

Thanks to Kevin Walt at M-Audio for cosponsoring the contest with us.

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Dave Nicholson – Developer, Cubase SX – The Mixer

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NetStudio is an online recording-studio center where musicians can collaborate on recording projects over the Internet—regardless of their geographical locations!

AES-format audio either by using the console's built-in AES connectors (for 2-channel transmissions) or by way of an optional AES card that also uses a DB25 connector requiring an XLR breakout cable (for multichannel communications). Also note that the DA-98HR and 02R96's DB25 connectors use different "pin-out" (wiring) configurations. The bottom line is that the DA-98HR and the 02R96 won't work together in 24/96 mode straight out of their boxes, but they will when used with the proper breakout cables.

The Tascam DM-24 mixer passes Single-wire/Double-speed AES-formatted signals by way of standard AES/EBU connectors. Taking all of the above into account, the last paragraph on p. 50 should read: "From the above discussion of formats (and referring to the table 'Resolution Conflicts'), we can see that neither the Mackie HDRs nor the Alesis HD24 can communicate in 24/96 mode with the Tascam DA-98HR, DM-24, or MX-2424 SE; the Benchmark AD2402-96; the dB Technologies AD122-96 MK.II; the Digidesign 192 Digital I/O or Digi 002; the Edirol UA-5 or UA-700; the Lucid AD9624; the M-Audio Duo or Quattro; the MOTU 1296 or 896; the Prism Sound Dream AD-2; the Sek'd ADDA 2496S; the Sonifex Redbox; or the Apogee Mini-Me, PSX-100, Rosetta 96, or Trak2 converters. Similarly, the Tascam DA-98HR cannot communicate with the MOTU 2408mk3 or the Apogee DA16 in 24/96 mode. Clearly, it pays to confirm interoperability of all 24/96 gear that you're interested in before you buy."

MOMENT OF CLARITY

I found the following statement in the review of the Mackie UAD-1 Powered Plug-Ins bundle (November 2002): "It [the 1176LN plug-in] faithfully reproduces the sound of the original hardware units, imparting a distinctly high-end, solid-state flavor to tracks." This is not true, and it is not a matter of opinion. You owe it to your readers to be far more exact in your statements.

I own the UAD-1 as well as some "high-end" outboard compressors, EQs, and mic preamps. The UAD-1 does some wonderful things. However, it does not pass audio with nearly the degree of clarity that good hardware units do. All the plug-ins that I have make any audio that goes through them sound harsher, more two-dimensional, and less distinct. Anyone can hear this, although the terms used to describe it may differ. The issue is audio clarity. If you don't think your readers know what that is, well, then, educate them.

I suggest that you reference your reviews and tech pieces to the professional standard that has produced most of the major-label recordings that most of us have come to know and love over the years. Lift this blanketing fog of an idea that says you can have a pro studio in your computer—although there is truth to that, it's a partial truth. It's false to say that a DAW gives you the sonic capabilities of a pro studio. People want to know the difference between using plug-ins and hardware because it helps them plan their purchases and their projects.

In closing, I'll quote another line from the UAD-1 review: "It [the LA2A plug-in] provides the ultimate in clean, clear dynamics processing with a minimum of controls." That's way off base. Any common high-end compressor in a pro studio will blow away that plug-in. But how do you think that statement will affect the people who haven't had the opportunity to compare for themselves?

Dave Cook
via e-mail

Author Erik Hawkins replies: Dave—You're absolutely right. High-quality hardware sounds great. You'll get no argument from me on that point. Do hardware processors sound better than software plug-ins? If you're comparing a $2,000 hardware unit to a $199 plug-in, well, that's a no-brainer—the hardware unit is probably going to sound better.

I'm a big proponent of plug-ins and other such audio applications because of their price-to-performance ratio. Computers and audio applications have brought a level of professional recording and mixing tools into our homes and studios that was previously beyond most people's financial reach. So when I use an adjective like "faithfully" and a phrase like "the ultimate in clean, clear dynamics processing," I'm speaking in relative terms—relative to cost and other software on the market. I think it's important that our readers understand that, to borrow a phrase, "there is no substitute for the real thing."

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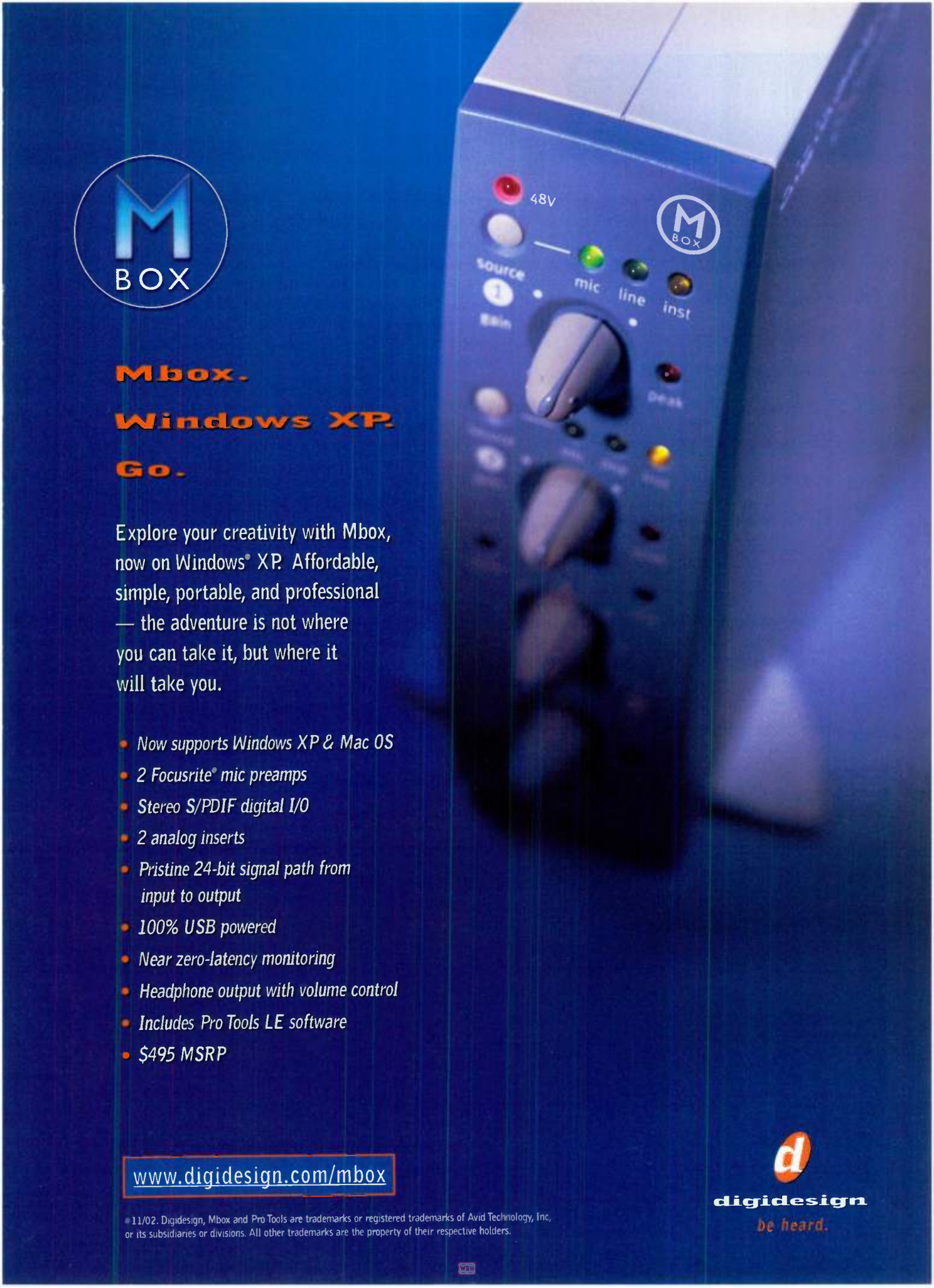

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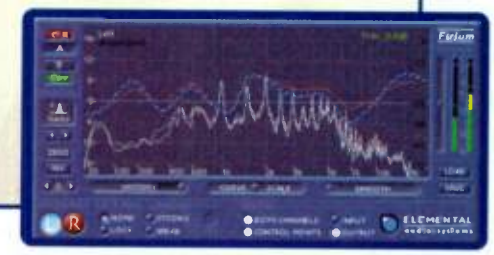
FRONT PANEL

Download of the Month *By Len Sasso*

Eqium and Firium ($99 separately or $129 bundled), two debut products from Elemental Audio Systems, might provide all the EQ you'll ever need. Both plug-ins have extremely well-thought-out user interfaces that feature dual workspaces for easy A/B comparison, graphic as well as slider and button data entry, and multiple display formats to fit your work preferences. Both are currently for the Mac only (VST for OS 9, VST and Audio Unit for OS X), but additional formats are planned for the future. You can download demos and purchase the plug-ins at www.elementalaudio.com. While you're there, pick up the free sonic analyzer plug-in, Inspector, which displays a spectral analysis of your sound file and lets you set alarms to indicate when stereo-balance, clipping, and headroom limits have been exceeded.

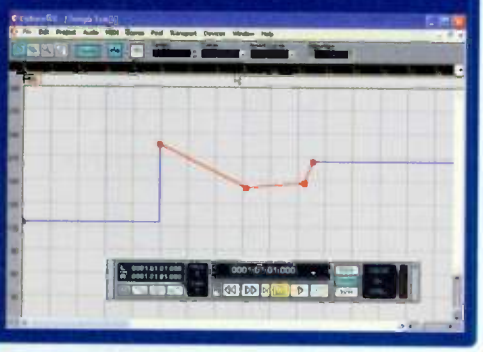
Eqium (left) could easily become your workhorse multiband equalizer. It offers 11 filter types, including 2 high- and low-shelf curves, lowpass and highpass, notch, parametric, and 4- or 8-band harmonic filters. The harmonic filters can cut or boost a chosen frequency along with its first few overtones. You can insert as many filters of any type as you wish (within the limits of your CPU) to build as simple or complex an equalization spectrum as the situation requires. You can toggle individual filters in and out of a complex setup without losing their settings, and unused filters don't use any CPU cycles. Eqium comes in mono and stereo flavors. In the stereo version, any individual filter can have separate settings for the right and left channels. Setups can be saved to disk, and you can conveniently add a saved setup to an existing configuration.

You can think of Firium (below) as a 50-band graphic equalizer. It uses finite-impulse-response (FIR) filters, which have linear response and do not introduce phase distortion that can smear transients and blur stereo images. Firium is an ideal mastering EQ, allowing separate EQ curves for each stereo channel as well as several schemes for linking adjacent EQ bands when setting up the graphic. Other notable features include curve smoothing and scaling and an Undo history that lets you step back through previous EQ curves. Most importantly, Eqium and Firium both sound great and are surprisingly CPU efficient. For an example of Elemental Audio Systems' plug-ins in action, listen to the MP3 file eqfir. EM WEB CLIPS



TIPS

Cool Tip of the Month



Creating tempo maps in Steinberg Cubase SX is a breeze if you know where to begin.

Creating a Tempo Map in Cubase SX

The **EM** *Cool Tip of the Month is presented courtesy of Cool Breeze Systems.*

Whether you're cutting tracks with speed-metal bands or editing music for the next blockbuster film, you need to know how to create a tempo track in your DAW software. This month, I'll explain an option for creating a simple tempo track in Cubase SX. Cubase's Tempo Track is used to create musical time signature and tempo events. Creating such changes in a song is sometimes referred to as tempo and meter mapping.

1. Enable the Master button in the Transport panel. That allows events in the tempo track to control tempo and time-signature changes.

2. Open the Tempo Track Editor by selecting Tempo Track from the Project menu (in Windows, Control + T; on a Mac, Command + T).

3. If necessary, adjust the window magnification by using the zoom sliders in the window's lower right to display the range of the song you'd like to edit. It's usually easier to begin editing tempo

Band on the Web

By Geary Yelton

LIZ ADAY

Hailing from the Seattle area, rock group Superlush is singer and songwriter Liz Aday, guitarist and songwriter Chad Quist, bassist Brian Lake, and drummer Josh Woodman. Since 1999, the band has toured with familiar rock acts such as Pat Benatar and Rick Derringer. Reviewers compare their brand of high-energy rock 'n' roll power-pop to Benatar, Sheryl Crow, Heart, and the Pretenders, but the edgier influences of No Doubt and Garbage are also evident.

Under My Skin is the band's second album, but the first to be released under the name Superlush. Jam-packed with catchy tunes and skillful performances, the CD was produced by Quist, Aday, and their associate Carl Dexter. Its sound is clean, clear, and professional, and the music is top-notch all the way. Liz Aday's strength and versatility as a vocalist, and memorable songs such as "Crave" and "Invasion," prove that Superlush is ready for the big time.

Aday designed the band's well-organized Web site (www.superlush.com). Recognizing the advantages of maintaining the site herself, she says, "I see Web sites as an interactive promotion tool. We realize that each visit [to our Web site] is an opportunity to keep our visitors and make a CD sale." Not content to leave the band's Web presence in someone else's hands, she adds, "Superlush.com is the first Web site I've designed and maintained. Before that I was always at the mercy of a Webmaster." She also maintains a Superlush discussion group on Yahoo.

Aday is quick to recognize that broadband Internet access is by no means universal. "One of the things that many Web designers overlook is that not everyone has DSL. Some people have an old dinosaur connected with a dial-up modem. Too many large files could turn away potential fans. I like to keep things simple and easy to find."

Superlush's site has been a useful promotional tool not only for the band but also for marketing Aday's Web and graphic design services. She credits at least part of learning to avoid bad Web design to the book *Web Pages That Suck* by Vincent Flanders (check out his Web site at www.webpagesthatsuck.com). Considering the band's remarkable musical talent, however, it's unlikely that she'll need to fall back on her design skills for very long.

Key Changes

By Marty Cutler

By the time you read this, **Spectrasonics** (www.spectrasonics.net) expects to offer its sample-playback plug-in modules in versions that support the Mac OS X Core Audio engine. The company's virtual instruments Stylus, Atmosphere, and Trilogy will be available in Audio Unit format as well as VST, MAS, and RTAS. All OS X versions will be available to registered users as a free download . . . Through the end of April, **Mackie Designs** (www.mackie.com) has extended its offer to Soundscape SSHDR-1 and E-mu/Ensoniq Paris workstation users, who will receive a $2,499 rebate to upgrade to Soundscape 32 . . . **BitHeadz** (www.bitheadz.com) has released a version 3.0.5 update for all software in its Unity product line. The upgrade fixes assorted bugs, and it features more reliable MIDI processing when used with MOTU Digital Performer. The update is a free download for registered users . . . **Gefen, Inc.** (www.gefen.com) has moved its sound-effects search software, SFX Search, to the Web. The utility offers a new interface and additional libraries . . . **Dan Dean Productions** (www.dandeanpro.com) now offers its *Solo Woodwinds* collection in a lite version for Tascam GigaSampler and GigaStudio samplers. The single-CD package provides solo bass clarinet, flute, oboe, English horn, and piccolo in an affordable ($199) package . . . **Digigram** (www.digigram.com) is offering open-source licensing for its line of VX sound cards in order to port drivers to Linux-based computers, handheld units, and other devices with embedded operating systems.

TIPS

events with the Snap button enabled so that positions are adjusted to the bar lines.

4. Enable the Pencil Tool and click in the Tempo Curve Display area at the point where you want to insert a tempo change and drag up or down to the desired tempo. For abrupt changes in tempo, repeat the process with the Insert Curve set to Jump.

5. To create tempo changes over time, set the Insert Curve setting to Ramp. With the Pencil Tool enabled, click to insert the destination tempo. A line will ramp up or down from the previous tempo to indicate the transition. Continue adding tempo changes as desired.

It's important to be aware that these tempo changes do not affect any existing audio tracks unless you've created audio slices in them. If you do change tempo settings afterwards, MIDI tracks will drift out of sync with existing audio tracks.

—Steve Albanese

Make sure to check out the streaming movie tutorial of this tip to view additional options and procedures for creating tempo changes in Cubase SX. You won't be sorry! Visit www.emusician.com/cooltip for this online adventure. Also, if you dare, take the quiz to review what you've learned!

Rev Up

By Marty Cutler

Izotope

Ozone (Win, $199; upgrade, $49) is a 64-bit DirectX mastering plug-in. Version 2 adds more than 30 new features, including 5 different noise-shaped dither algorithms. Adaptive DC-offset filtering reduces DC offset to zero in real time, no matter how far it drifts. The software supports word lengths of 8, 12, 16, or 24 bits. You can view the effectiveness of DC-offset adjustments with the new DC-offset-reduction meter.

Other visual enhancements include a Bit Scope, a ⅓-octave Spectrum Meter, and a Critical Band Meter, which displays an audio spectrum that visually compensates for the frequency masking inherent in auditory perception. Multiband processors let you copy settings from one band to another. To save CPU load, you can eliminate specific bands from processing if you don't require them.

Ozone is a modular plug-in; that means that you can load sets of mastering tools by adding reverb, EQ, dynamics processing, and other components in a single application. You can now selectively load presets by individual modules, sort modules by name or date, and audition presets with a single click. Ozone 2 provides DirectX automation of more than 140 parameters.

Ozone requires a Pentium II/500 MHz computer with 60 MB of RAM and Windows 98, 2000, ME, or XP. You will also need a DirectX host. IZotope, Inc.; e-mail izotope@izotope.com; Web www.izotope.com.

Digidesign

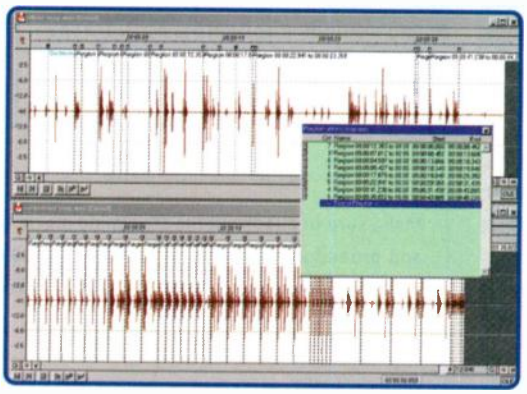
Pro Tools 6.0 for Mac OS X ($195; upgrade, $75) provides a new look, improved database features, and new mixing

TIPS

Scrambling Sound Forge Loops

Most people know Sonic Foundry's Sound Forge as a sophisticated stereo audio editor. With just a few mouse clicks, you can use Sound Forge's Playlist feature to create very complex, stuttering, wacky rhythm loops.

Begin by opening Sound Forge and loading a file such as a drum or bass pattern. Then choose Playlist/Cutlist from the Special menu. Highlight different segments of the pattern and drag them into the Playlist window. You can rearrange entries in the List just by dragging them up or down, or preview each entry by clicking on the arrow to its left. Double-click on an entry to reveal its Edit menu, and then set the number of times you want that entry to repeat (from 0 to 999) before moving to the next one. If you want your entire Playlist under MIDI control (Sound Forge is an audio editor, remember), just set Trigger to MIDI: Note On–Play, and select a note and channel.



Right-click in the Playlist window and select Convert to New. A new audio file will open that contains the entire sequence of events you put in the Playlist. You can't mix different files directly into a Playlist, but you can convert any number of lists into new audio files and then crossfade or mix them together as needed. Without much effort, you can rearrange and scramble your way to some very interesting music!

—*Dennis Miller*

NEW www.emusician.com

and MIDI enhancements. The upgrade offers increased performance with dual processor systems.

The program's new Digibase Pro technology (TDM only) handles file and session management with mini-waveform views, file-duration information, time stamps, and the ability to view file comments. You can use Digibase features to search and audition files and import them directly into the program. Digibase Pro lets you create and share custom catalogs that can reference files wherever they're installed, including offline media.

Pro Tools 6.0's enhanced MIDI functions include support for OS X MIDI services, obviating the need for OMS. MIDI Time Stamping (MTS) offers sample-accurate MIDI events with Pro Tools-compatible software synths as well as submillisecond timing when used with the company's MIDI I/O and other MIDI interfaces that support MTS.

The program now offers groove-quantizing templates with 960 ppqn resolution. Digidesign provides several Digigroove templates to get you started. Beat Detective

(for TDM only) lets you create your own groove templates from analyzed audio files, and it captures dynamics as well as timing. The new Restore Performance feature lets you return to the original MIDI-based performance at any time.

Other enhancements include mixer and plug-in automation, routing assignments, and the ability to retain mixer layout, routing, and plug-in settings when importing audio and MIDI playlists. Pro Tools 6.0 minimally requires a Pro Tools|HD, 24 Mix, or LE system with a Power Mac G4 and Mac OS X. Digidesign; tel. (800) 333-2137 or (650) 731-6300; e-mail prodinfo@digidesign.com; Web www.digidesign.com.

TIPS

The Lost Chords

Steinberg's VST instrument plug-in Virtual Guitar is a handy creative tool for nonguitarists who want to comp guitar parts. If you try to use it on the Macintosh with any program other than Cubase, however, a common problem occurs immediately after installation. When you open either the Acoustic or Electric Guitar in your favorite sequencer, a message says, "Files Not Found!" and you're instructed to reinstall Virtual Guitarist. You can reinstall it until you're blue in the face, though, and it still won't find the files.

To solve the problem, first check the Virtual Guitarist Web site (http://vg.clubcubase.net) to ensure that you have the latest version, and then download the utility VGSetContentFolder. When you run the application, it will ask you to locate Virtual Guitarist and then locate the folder containing Virtual Guitarist's samples. Virtual Guitarist should then work normally.

—Geary Yelton

Simulating 12-String Guitars

Most 12-string guitar patches are simply layered guitar samples that are tuned an octave apart. Unfortunately, that's not an ideal emulation, because the first two string pairs of a real 12-string are usually tuned in unison.

Instead of a using a preset 12-string patch, split the top two pitches from a 6-string guitar track and copy them to two separate tracks. Then, because string pairs don't quite sound at exactly the same time (depending on pick direction), slightly time-shift those tracks relative to each other. Quantizing one of the track pairs with a slight degree of randomization helps remove the timing uniformity between string pairs. Slight variations in Velocity can also help provide a more humanized performance. Additionally, you can add tiny amounts of Pitch Bend to simulate minute differences in tuning.

For the octave pairs, simply copy the notes to a new track and transpose the copied track down an octave. Then time-shift the copied track and add Pitch Bend as before. The results might not provide a letter-perfect simulation, but it will sound far more authentic than a factory-programmed 12-string guitar patch.

—Marty Cutler

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KEYBOARD KB AWARD REVIEW

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15 Years Ago in EM

By Steve Oppenheimer

Our January 1988 issue featured two technologies that had been around awhile but were finally having a serious impact on music production: MIDI and digital audio recorders. For our cover story, founding editor Craig Anderton selected 25 of his favorite MIDI products that cost less than $500. Among his choices were the Akai PEQ6 programmable EQ, the Alesis HR-16 drum machine, Casio's CZ-101 and Yamaha's TX81Z synth, and the Atari 520ST computer (which had a built-in MIDI interface). In the same issue, Bill Thompson offered a very nice story about programming the TX81Z, a popular 4-operator FM synth.

Our special report on the 1987 Audio Engineering Society convention shows how much digital recording has changed in 15 years. Two of our top AES picks were high-end recorders: the Akai DR1200 12-track digital tape recorder, which cost a prohibitive $35,000; and WaveFrame's AudioFrame DAW, which would have set you back a whopping $45,000. (Obviously, those products were not found in personal studios; back then, the AES show was strictly for engineers who worked in large commercial facilities.) Our third show pick was the Eventide Ultra-Harmonizer digital effects processor ($2,395).

Also new in 1988 was the Ensoniq Performance Sampler (EPS), which had several cool features. My favorites: you could play the keyboard while loading sounds; two Patch-Select buttons let you instantly access different sound combinations; and the EPS (as well as the ASR-10, which succeeded it) had the best Polyphonic Aftertouch I've played. (No currently manufactured keyboard offers Poly Aftertouch, although some sound modules support it.)

As usual, we offered a variety of stories. In "Updating the Dinosaur," Charles R. Fischer offered a number of upgrades for vintage analog synths. David Kempton followed Fischer with "Synthetica Exotica," in which he provided a half-dozen ways to get unusual and useful sounds from older synths, tape decks, and even a few acoustic instruments. Jack Orman's "Better Music Through Chemistry" sang the praises of several contact cleaners, lubricants, connector enhancers, and other chemicals useful in studio maintenance. Our January 1988 synthesizer patch sheet was for the ever-popular Oberheim Xpander; I've provided a copy on our Web site (www.emusician.com) for all you Xpander lovers.

EM WEB CLIPS

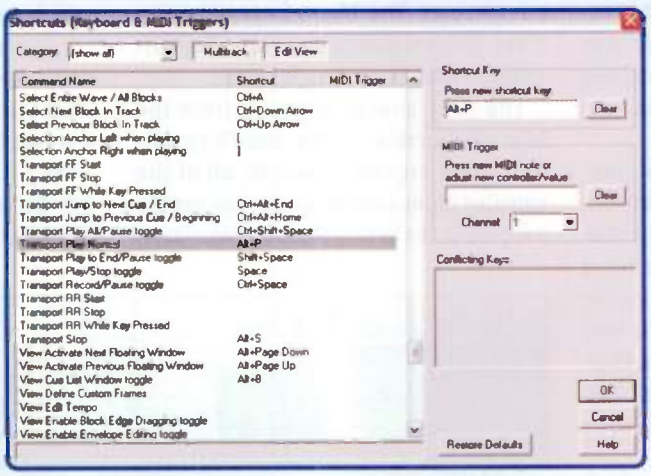
The reviews section featured Geary Yelton's analysis of the Sound Ideas sample library, Jim Johnson's critique of the E-mu SP-1200 sampling drum machine, and reviews of the Casio MG-500 and MG-510 MIDI guitars and the Korg DRV 2000 and Yamaha REV5 digital reverbs. Alan Gary Campbell checked out the DS-8 synth, Korg's attempt at making FM synthesis user-friendly by providing macro parameters with familiar names. Unfortunately, the DS-8 sound engine was based on the weak-sounding Yamaha FB-01 chip set.

TIPS

Trigger Happy

If you're working with a MIDI-only sequencer (hardware or software) and a separate audio editor or you're using two computers with MIDI sequencing on one machine and audio on the other, you might be able to bring the two worlds together.

Some audio-editing programs support MIDI keyboard shortcuts. In Cool Edit Pro 2.0, for example, those shortcuts are called MIDI Triggers, and they're easy to set up. In the Shortcuts dialog box, assign a MIDI note or controller event to trigger Transport Play. Then embed the note or event in your sequence at the appropriate location.



During playback, when the sequence reaches the MIDI event, Cool Edit Pro will play back the sound effect or audio clip. (The audio file must be open and waiting for playback.) Just make sure the computer that's running Cool Edit Pro can receive MIDI input from the sequencer. Remember that triggering a sound this way doesn't guarantee continued sync; for longer audio files that must stay locked to picture, you'll have to use SMPTE time code.

—David Rubin

For more EM Cool Tips, visit our Web site at www.emusician.com.

WHAT'S NEW

By Marty Cutler

AEA R84

Audio Engineering Associates (AEA) is known for its high-ticket re-creations of the classic RCA 44 ribbon microphone. Now the company has introduced the affordable R84 ribbon mic ($999). The microphone is useful for recording a wide range of instruments including vocals, brass, strings, percussion, electric guitar, and bass.

The R84 features an extremely thin (0.00007 inch) low-tension ribbon element for a quick response. The manufacturer reports that the R84 can handle high-frequency sound pressure levels greater than 165 dB while maintaining an intimate, warm, and detailed sound.

With the R84, AEA supplies a sturdy foam-lined carrying case, a ten-foot cable, and a shockmount. The mic is 8 inches long and 2.7 inches in diameter and weighs less than two pounds. Audio Engineering Associates (AEA); tel. (626) 798-9128; e-mail stereoms@aol.com; Web www.wesdooley.com.

BLUE SKY PRODESK

Blue Sky's ProDesk ($1,195) is a 2.1 system designed for critical monitoring and mixing in desktop audio systems. The ProDesk consists of a pair of SAT 5 biamplified satellite speakers and the Sub 8 powered subwoofer. The manufacturer claims that its proprietary crossover and bass-management network delivers the full audio range seamlessly—all the way from the subwoofer to the main monitors—while offering smooth frequency response both on- and off-axis.

All three of the monitors in the ProDesk system are housed in fully shielded cast-aluminum frames that alleviate video-monitor interference. The SAT 5 features a 5¼-inch hemispherical woofer and a ¾-inch dual-concentric tweeter with a built-in waveguide. A low-distortion 60W amplifier with a computer-optimized crossover powers the satellite speakers. The SAT 5 delivers a frequency response of 80 Hz to 20 kHz, ±3 dB. The rear panel has the 80 Hz highpass-filter switch, a gain control with an LED power indicator, a balanced XLR input jack, and the power switch.

The Sub 8 features an 8-inch high-excursion woofer with a 2-inch voice coil, powered by a proprietary 100W amplifier. A fourth-order 80 Hz Linkwitz-Riley lowpass filter governs 2.1 bass management, with second-order 80 Hz highpass filters in each satellite. On the Sub 8's rear panel are right and left inputs and outputs, a sub in and out for connecting multiple subwoofers, and a remote-control port to accommodate the company's Functional Volume Control (FVC; $100). Blue Sky International; tel. (631) 249-1399; e-mail sales@bluesky.com; Web www.abluesky.com.

KURZWEIL MICRO ENSEMBLE

The Kurzweil Micro Ensemble ($449) provides most of the sound set of the company's PC2 keyboard in a half-rack module. The program voicing is identical to the patches found in its keyboard counterpart. The Micro Ensemble provides 32-note polyphony with 16-MIDI-channel Multitimbral capabilities.

The only sounds missing from the Micro Ensemble are Kurzweil's proprietary KB3 organs; however, all of the sampled organs are included. You get 256 programs, including Rhodes, Wurlitzer, and acoustic pianos with Velocity-switched sample maps; electric and acoustic basses; drum kits; string ensembles; voices; and synth pads. The Micro Ensemble includes nine preset effects (chorus and eight types of reverb), which are applied globally.

The Micro Ensemble has two unbalanced ¼-inch outputs, a ¼-inch headphone jack, and MIDI In and Thru jacks. Kurzweil Music Systems, Inc./Young Chang America (distributor); tel. (800) 874-2880 or (253) 589-3200; Web www.kurzweilmusicsystems.com.

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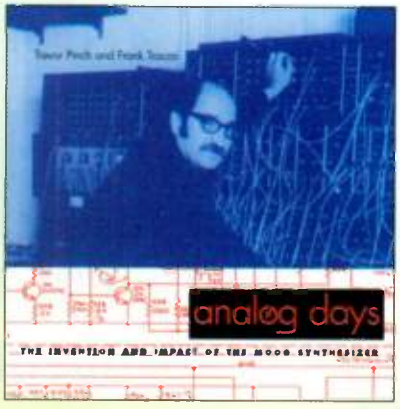
Subtitled "The Invention and Impact of the Moog Synthesizer," *Analog Days* ($29.95) is a compelling new book on the history of analog synthesizers. Authors Trevor Pinch and Frank Trocco use the life and instruments of Bob Moog as an anchor, describing how the early voltage-controlled synths were developed and marketed. The book covers not only Moog instruments but also the creations of Don Buchla, Alan R. Pearlman (ARP), Peter Zinovieff (EMS), and Tom Oberheim.



Along the way, Pinch and Trocco interview a number of influential designers and musicians, from the famous to the somewhat obscure. Behind-the-scenes accounts of the development of particular instruments (such as the Minimoog and the VCS3) will provide fascinating reading to the analog-synth enthusiast. Harvard University Press; tel. (617) 495-2480; e-mail hup@harvard.edu; Web www.hup.harvard.edu.

▶ CHERRY LANE MUSIC GROUP

Donald Fagen and Walter Becker, who are known collectively as Steely Dan, write songs that are harmonically, lyrically, and structurally intriguing. If you're interested in the way they ply their craft, check out *The Art of Steely Dan* ($17.95). The book examines and demystifies the duo's songwriting techniques from a multitude of angles. Instead of presenting full arrangements of songs, the book holds specific phrases and sections from their work under the microscope for detailed analysis.

Author David Pearl starts with a brief history of the band and chronicles its influences. The second chapter emphasizes the band's reliance on 12-bar blues melded with extended song forms, highlighting Steely Dan's use of uneven phrases and mixed meters as well as solo and interlude sections.

Subsequent chapters detail scales and modes as utilized in song melodies, chord movement and modulation, rhythm, and instrumentation. For all of the musical examples the text includes the exact time (in minutes and seconds) at which the example occurs on the CDs. Hal Leonard Corporation (distributor); tel. (800) 637-2852; Web www.musicdispatch.com.

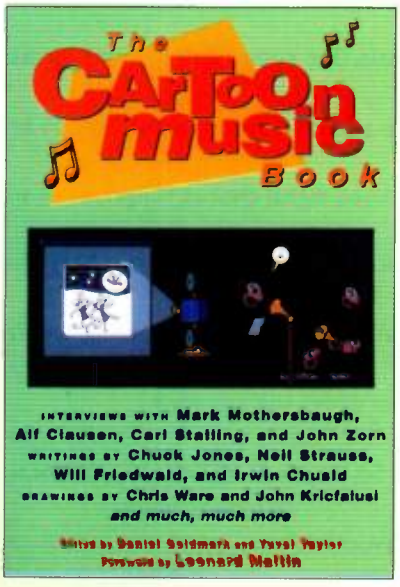
▶ ACAPELLA BOOKS

Daniel Goldmark and Yuval Taylor's *The Cartoon Music Book* ($18.95) offers interviews with notable composers and articles about the craft of scoring animated films. The material presented in the book forms a historical account that begins with the silent-film era and works its way up to the present.

The Cartoon Music Book includes an interview with Carl Stalling, who wrote music that could turn on a dime rhythmically, melodically, and harmonically. In fact, Stalling was responsible for one of the first systems for synchronizing music to visuals: it was a precursor to the click track, based on the intervals between film sprockets.

The book also discusses Leopold Stokowski's contributions to Disney animated features; the work of Raymond Scott; and, in interview format, Mark Mothersbaugh's (of Devo fame) work on *Pee-Wee's Playhouse* in the early days of MIDI (Mothersbaugh used an early Roland hardware sequencer for some of the scores). The essays cover topics ranging from a discussion about cartoon music's influence on the musical avant-garde to Walt Disney's *Fantasia* and its contribution to the development of Surround Sound.

Not only does the book dispense a wealth of information, but it's also a fun read. As the editors declare, "It's about time that the silliest of musical genres be taken seriously." Acapella Books; tel. (800) 888-4741; e-mail frontdesk@ipgbook.com; Web www.ipgbook.com.



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▶ JLCOOPER ELECTRONICS CS-32

The CS-32 MiniDesk ($499.95) is much smaller than your computer keyboard and offers rapid access to the most frequently used controls in a host of digital-audio sequencers. The control surface includes 32 faders, a jog wheel, transport buttons, 6 rotary controllers, and a bank of 10 function keys. In all, the CS-32 provides more than 150 controls.

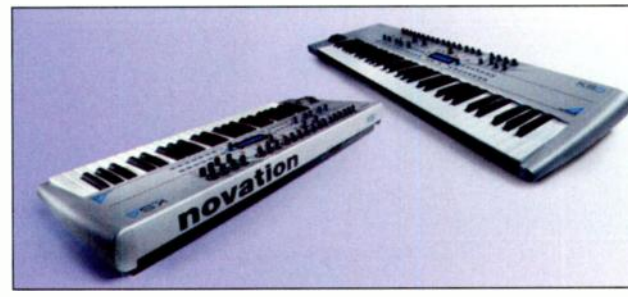
The unit can send MIDI Machine Control as well as MIDI Control Change messages so you can tweak software synthesizers and plug-ins. It also offers a mode that emulates the company's CS-10 controller. A partial list of compatible software includes Digidesign Pro Tools, Steinberg Nuendo and Cubase SX, Mark of the Unicorn Digital Performer, Digigram X-Track, Ableton Live, and Merging Technologies Pyramix.

The CS-32 has 20 mm faders; track buttons that give you mute, solo, and track arming; a two-digit alphanumeric LED display; and dual-LED activity indicators. You can choose a CS-32 with MIDI In and Out ports, a USB connector, or an RS-232 connector. The USB version includes drivers for Mac and Windows applications. JLCooper Electronics; tel. (310) 322-9990; Web www.jlcooper.com.

▼ NOVATION KS-SERIES

Novation has released two new synths based on an updated version of its K-Station sound engine. These synths provide an analog modeling engine and a selection of wavetables. The 49-key KS4 ($1,399) and the 61-key KS5 ($1,499) differ only in key span; both units provide semiweighted keys with Aftertouch.

The synth engine gives you 16-note polyphony and four multitimbral parts with up to three oscillators per patch. The oscillators provide saw, square, sine, triangle, and variable-width pulse waveforms as well as 24 sampled wavetables and four different noise sources. For more metallic, clangorous tones, the keyboards offer FM synthesis and ring-modulation algorithms. The KS series instruments have audio inputs, so you can use external source material as an oscillator waveform or route external signals directly to the mixer, filters, or envelope generators.



You get 33 knobs and 4 sliders for on-the-fly synthesis tweaks, and the backlit LCD provides program descriptions and parameter information. All 400 program memory locations can hold user patches; 200 of them contain factory presets to get you started. You also receive 100 user-programmable multitimbral performance locations with 50 presets.

New to Novation's bag of tricks is its Hypersync feature, which adds instant tempo-synced effects and parameter control. A front-panel knob lets you select from various factory and user-programmable presets for complex sound motion that is locked to tempo. Four independent arpeggiators sync to tempo.

You can use up to six effects per part. In multitimbral mode, patches can retain effects assignments for a total of 24 simultaneous effects, including reverb, chorus, phase, delay, panning, distortion, and a 16-band vocoder.

The KS4 and KS5 offer MIDI In, Out, and Thru; a single unbalanced ¼-inch jack for external audio input; four individual, assignable unbalanced ¼-inch analog outs; a stereo headphone jack; and ¼-inch jacks for sustain and expression pedals. Novation U.S.A.; tel. (800) NOVATION; e-mail salesusa@novationaudio.com; Web www.novationaudio.com.

▼ TOFT ATC-2

Designed by Trident Audio founder Malcolm Toft, the ATC-2 mic preamp ($1,299) is a dual-channel preamp featuring two independent channels of EQ and compression and independently switchable mic- and line-level inputs. The compressor offers classic Field Effect Transistor (FET) compression with variable attack and release. The 4-band EQ offers sweepable overlapping ranges between 40 Hz and 15 kHz, and the VU meter shows gain reduction and output level.

The front and rear panels are constructed of thick anodized aluminum. The ATC-2 offers two balanced ¼-inch inputs, two XLR inputs, two balanced ¼-inch outputs, and two XLR outputs. PMI Audio Group (distributor); tel. (310) 373-9129; e-mail sales@pmiaudio.com; Web www.pmiaudio.com.

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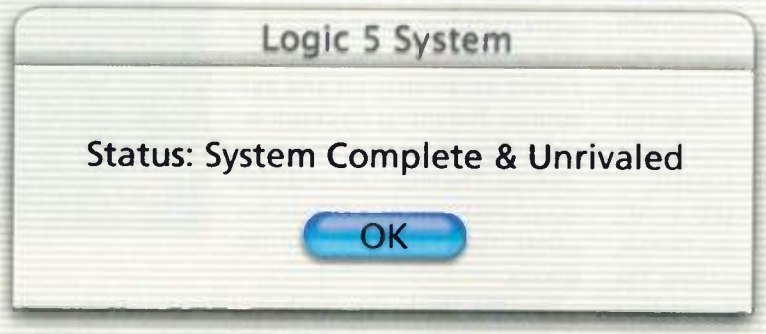

The most modern, reliable equipment is an important requirement for successful professional music production. Apple has created an operating system that more than meets these special demands: Mac OS X. With the release of Logic Platinum 5.4, Emagic is the first manufacturer to deliver a host program that supports Audio Units, Apple's new, system-level standard for DSP plug-ins. In addition, Logic Platinum 5.4 for OS X contains over 50 integrated effect plug-ins and support for all Emagic's optional Software Instruments (right). REX files are also supported, as is Emagic's current range of audio, MIDI and controller hardware. Choose the unrivaled complete studio solution for Mac OS X to fulfill the most important requirement for your success.

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▼ M-AUDIO RADIUM

With its eight programmable sliders and its eight assignable knobs, M-Audio's Radium USB MIDI keyboard ($299) can control as many as 16 different MIDI parameters at once, with independent MIDI Channel assignments for each controller. Add its five user-definable banks and you have control of 80 different MIDI parameters at the touch of a button.

The Radium offers 61 Velocity sensitive keys as well as additional controller functionality; select a target parameter with the MIDI/Select button, and you can send a discrete value for that parameter. The Radium offers Octave Up and Down keys, which extend the keyboard's range. Additional controls include a pitch-bend and a modulation wheel.

The Radium can be powered from its USB port or the included 9V wall-wart power supply. Two separate MIDI Out ports enable you to control two hardware devices simultaneously. M-Audio; tel. (800) 969-6434 or (626) 445-2842; e-mail info@midiman.net; Web www.m-audio.com.

▶ ZOOM MRS-1266

Zoom's latest portable digital studio, the MRS-1266 ($1,329; MRS-1266CD, $1,899) offers ten recordable tracks (each with ten virtual tracks), six simultaneous inputs, and 24-bit A/D/A at 44.1 kHz. In addition to the ten tracks, you get two independent drum and bass tracks and a stereo master channel that also has ten virtual tracks.

The unit has a large backlit LCD, an A/B repeat function, a Scrub/Preview feature, and automatic and manual punching. The MRS-1266 has a built-in 20 GB hard drive for storing songs and data; the MRS-1266CD includes a CD-RW drive for mastering, data storage, or importing WAV- and AIFF-format samples.

The MRS-1266 has 127 drum kits and 26 bass sounds for sequencing. The programming pads are Velocity-sensitive and cover a full octave range. Each channel offers 2-band parametric EQ and pan controls. The effects processor includes reverb, chorus, and compression. The MRS-1266 holds 999 songs; each can store 100 marker points, 100 sequences, and 100 scenes.

The MRS-1266 has six unbalanced ¼-inch inputs, two XLR ins (with defeatable phantom power), a stereo pair of RCA outputs, a S/PDIF optical out, and MIDI In and Out ports. SCSI and USB connectivity require Zoom's optional plug-in card ($99). Samson Technologies Corporation (distributor); tel. (800) 328-2882 or (516) 364-2244; e-mail sales@samsontech.com; Web www.samsontech.com.

▼ ROLAND MC-909

In its latest groovebox, the MC-909 ($1,795), Roland combines a sequencer, a sampler, an XV-compatible sound engine, and expandable ROM and RAM. The stock unit comes with 16 MB of RAM but is expandable to 272 MB using Dual In-Line Memory Modules (DIMM). You can expand the synth's ROM with Roland's SRX-series cards.

You can sample through the MC-909's unbalanced ¼-inch inputs or use the S/PDIF digital input. Alternatively, the MC-909 provides a USB interface that lets you import and export WAV- or AIFF-format files from your computer. The MC-909 provides the tools for trimming and looping samples as well as time-compression and loop-slicing features. You can use samples for grooves, one-shots, or as oscillator fodder for the synth engine.

You can sequence parts with an external MIDI controller or use the MC-909's Velocity-sensitive pads. The MC-909 has a 480 ppqn resolution and lets you create patterns up to 998 measures long. A piano-roll display is provided for editing. The sequencer imports and exports Standard MIDI Files (SMF), and you can store data using the built-in SmartMedia card slot.

You can apply the MC-909's 24-bit reverb to all sequencer parts. A dedicated compressor offers dynamics processing without sacrificing multi-effects algorithms. Other effects include delay, amp modeling, lo-fi processing, and two new filters: one offers a 36 dB slope, and the other is a tempo-syncable step-filter that triggers discrete filter cutoff values in series. The mastering effects include 3-band compression with dedicated knobs for each band.

The MC-909 offers extensive parameter control with an array of 13 knobs, 21 sliders, and 63 buttons as well as a turntable-emulation feature and twin D-Beams. The turntable emulation lets you adjust time and pitch independently for MIDI and audio tracks. Analog connectors include six unbalanced ¼-inch line outputs, two unbalanced ¼-inch line inputs, and a stereo headphone jack. Digital connections are MIDI In and Out and coaxial and optical S/PDIF I/O. Roland Corporation U.S.; tel. (323) 890-3700; Web www.rolandus.com. ●

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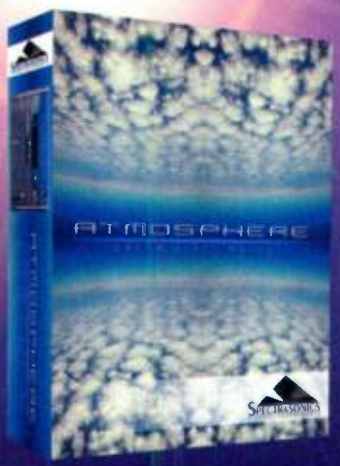

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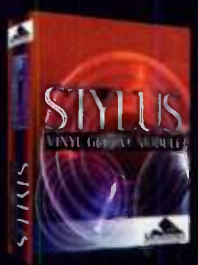

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By Scott Wilkinson

Radio Bits

Radio has changed very little since AM broadcasts began around the turn of the 20th century. FM was introduced in the '30s, and stereo FM broadcasts began in '61. But both types of transmission are analog in nature and are thus prone to problems such as noise, multipath interference (intermittent cancellation caused by reflected radio waves arriving at the receiver at different times), and crosstalk with signals in adjacent frequency bands.

Digital technology gives radio its largest overhaul in 100 years.

On October 10, 2002, the Federal Communications Commission (FCC) announced its approval of the largest overhaul of terrestrial radio broadcasting ever to occur. The underlying technology, developed by a company called iBiquity Digital (www.ibiquity.com), is called In-Band On-Channel (IBOC), which piggybacks digital data on top of conventional analog AM and FM transmissions. As a result, radio stations can send digital and analog signals simultaneously without changing their broadcast frequency, providing full backward compatibility with existing receivers while adding significant capabilities for new digital radios.

Both AM and FM broadcasts include sideband frequencies above and below the primary transmission frequency, and IBOC uses these sidebands to send digital data. In fact, the data is redundantly transmitted in the upper and lower sidebands to help ensure that it arrives at the receiver intact. Another safety measure in the FM domain is iBiquity's First Adjacent Canceller (FAC) technology, which cancels out strong adjacent FM channels that can wipe out the digital sidebands.

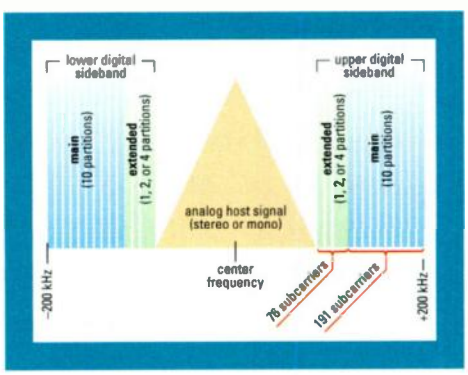
IBOC overcomes noise and multipath interference with a proprietary encoding scheme that is applied to the sidebands and used in conjunction with custom error-correction algorithms. The power in each redundant sideband is then combined within the receiver to maximize signal gain. Digital bandwidth is conserved by using a perceptual audio coder (PAC) to remove certain elements of the audio data based on psychoacoustic models, much like other audio coders, such as MP3.

All digital-transmission systems face a trade-off between signal robustness and the time it takes for a receiver to acquire the signal. This trade-off is determined by a portion of the control software called an *interleaver,* which scrambles the timing of the encoded data, redistributing transmission errors to increase the fault tolerance of the system. Short interleavers use small data packets and allow rapid acquisition, but the signal is prone to dropouts. Conversely, long interleavers use large data packets to provide more robust signals, but they take longer to acquire the signal.

IBOC solves this dilemma by first tuning in the analog signal and then crossfading to the digital signal once it has been acquired by a long interleaver, which ensures robust reception. At the boundary of the station's coverage area, the receiver crossfades back to analog as needed to prevent abrupt digital dropouts.

The new capabilities offered by IBOC include the Main Program Service (MPS), which preserves the primary programming in analog and digital forms and adds other data related to the program, such as artist name and song title. Other new elements include Personal Data Service (PDS), which lets users specify the types of on-demand data they wish to receive; Station Identification Service (SIS); and Auxiliary Application Service (AAS), which allows virtually any type of application to be added in the future. Text information is displayed on the radio's front panel.

Under the commercial name HD Radio, IBOC will soon be available in car radios from Kenwood, Delphi, and others, using chipsets from Texas Instruments that can be retrofitted into existing radio architectures. This technology could change forever the way that your music is broadcast to millions of fans, so watch for its introduction in 2003.



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PROFILE

By Dennis Miller

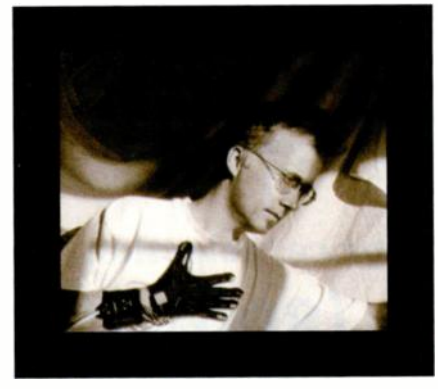
Multimedia Magic

Professor Butch Rovan presents an unusual mixture of media.

Ask anyone around the University of North Texas College of Music about who's doing the most exciting work in music technology, and the answer will certainly be Professor Joseph "Butch" Rovan. Rovan, the director of UNT's Center for Experimental Music and Intermedia (CEMI), is a former product manager at Opcode and an IRCAM research fellow. He builds unusual controllers that he uses in performances of his music. An accomplished sax and clarinet player, Rovan can also be found performing live with only his custom glove controller in tow; yet the sounds emanating through the hall would lead you to believe you were hearing a large-ensemble performance.

Among his many other projects, Rovan has released a DVD of his mixed-media work, *Vis-à-Vis* (2001), based on text by Rainer Maria Rilke. The piece combines live and prerecorded electronic sound with live-generated video and a performance by a live vocalist, Katherine Bergeron, who is Rovan's wife and a musicologist at the University of California, Berkeley. Seeing the work performed in concert is memorable: every aspect of the performance—right down to the lighting cues—is beautifully choreographed by Rovan, and Bergeron's performance is stunning. The DVD captures much of that flavor and also enables the viewer to navigate through short annotated segments of the work before tackling the whole.

Rovan's command center in *Vis-à-Vis,* as in his other works, is a Mac running Cycling '74's Max/MSP. "I'm particularly interested in creating patches that listen to a performer's live input while making some decisions on their own," Rovan remarks. "The goal is to create an environment in which the singer and computer can interact as a duo, responding to each other's musical decisions." To help create this sense of dialogue, Rovan intentionally designed some uncertainty—or what he calls "obstinance"—into the interactive electronics.


KATHERINE BERGERON

***Vis-à-Vis* pushes the envelope**

To generate and control the video, Rovan employs another Mac running Onadime, a video-processing program that uses an object-oriented paradigm reminiscent of Max's. Using Onadime, Rovan built an algorithmic video controller that uses information sent from the audio Mac to generate and control the real-time video projections. Because of the interactive design of the video controller, the visuals are never the same twice.

Rovan and Bergeron produced *Vis-à-Vis* at home on Bergeron's iMac using Apple's Final Cut Pro authoring software. Bergeron, who did most of the montage, says, "This was our first attempt at creating a DVD, and it was a real learning experience. One thing I can recommend is to be very organized. We filmed the raw material with three cameras over an eight-hour day. At the end we had lots of footage to deal with, along with all the 8-channel audio recorded to ADAT. After choosing the final footage, the corresponding ADAT material was mixed to stereo and 'flown into' the Final Cut project, using a simple hand-clap recorded on film as the sync marker. Amazingly, it all worked!"

Rovan's current project is a flute controller for use in a new piece written for virtuoso flutist Elizabeth McNutt. "The controller is a hacked USB game-controller PC board that I sawed in half and retrofitted for the wrist of the flutist. It tracks the motion of the hand in two axes and sends continuous data to Max via the insprock object. It's an experiment to see what can be done with inexpensive materials—I think it's important to make interactive technology accessible and affordable to performers." ●

For more information, contact Joseph "Butch" Rovan; e-mail rovan@music.unt.edu; Web www.music.unt.edu/cemi.

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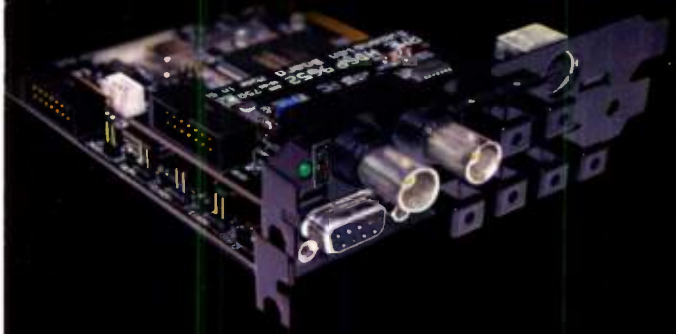

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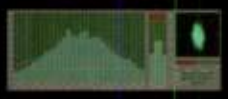

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PRODUCTION VALUES

An interview with New York City mastering engineer Emily Lazar.

By Myles Boisen

Ears, Passion, and Patience

Bright, friendly, articulate, and ambitious, Emily Lazar has become a rising star in a profession typically dominated by males. She is the founder, proprietor, and chief mastering engineer of The Lodge, a world-class mastering facility that has operated in New York City's Greenwich Village since 1997.

Born and raised in New York, Lazar earned a Bachelor of Arts Degree in Creative Writing and Music from Skidmore College. After working in some of New York City's most prominent recording studios, she graduated with a Master's Degree from New York University's prestigious Music Technology Program, where she was also awarded a graduate fellowship.

Lazar's thesis on Sonic Solutions, combined with an internship at Sony Classical, led to a position with Greg Calbi at Masterdisk. In 1996, Lazar was invited to join the faculty at NYU as an Adjunct Professor, teaching graduate-level coursework in the Music Technology Program. And if these credentials aren't enough, Lazar also sings and plays guitar, flute, piano, and violin.

PHOTO BY DANIEL EFRAM

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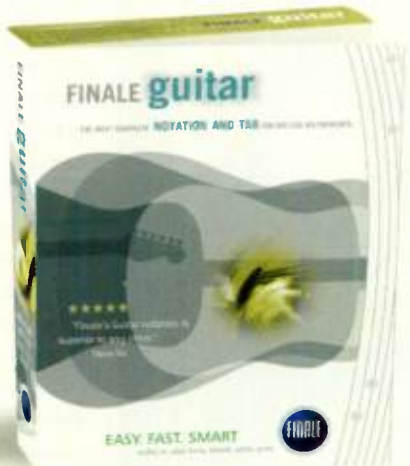

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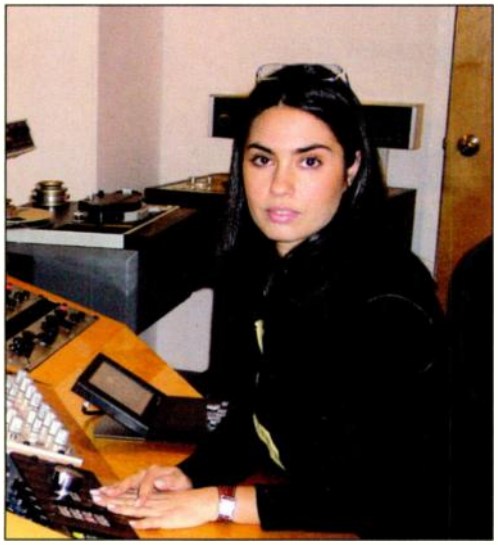
Ears, Passion, and Patience

Equipped with state-of-the-art mastering equipment, a DVD authoring suite, surround sound, and specialized recording studios, The Lodge's unique blend of old-school and cutting-edge technologies has drawn respected clients such as David Bowie, Sonic Youth, Sinead O'Connor, Laurie Anderson, Destiny's Child, El-P, Clem Snide, Gang Starr, Loudon Wainwright III, and Taj Mahal. In addition to mastering projects for those clients and countless others (you can download a discography of The Lodge at www.thelodge.net), Lazar has mastered original soundtracks for the following feature films: *Training Day, Pokemon: The First Movie, Boys Don't Cry, American Psycho,* and *Jesus' Son,* among many others. In between star-studded sessions, Lazar was gracious enough to make time for this exclusive **EM** interview.

Thanks for taking time out of your busy schedule to do this interview. What are you working on these days?

It's my pleasure! It's been a busy few months here at The Lodge and we've been working on some really exciting projects. Most recently, we mastered albums for Atlantic Records' The Donnas, Columbia Records/Music World Entertainment's Solange—Beyoncé's younger sister and the newest sensation from the Knowles family—and Dreamworks' All-American Rejects. We've also just wrapped up the remastering of Sonic Youth's "Dirty" and a fantastic dance piece, "City of Twist," for Laurie Anderson.



DANIEL EFRAM

In addition to her mastering skills, Emily Lazar is also a successful entrepreneur—she founded The Lodge, where she serves both as president and as chief mastering engineer.

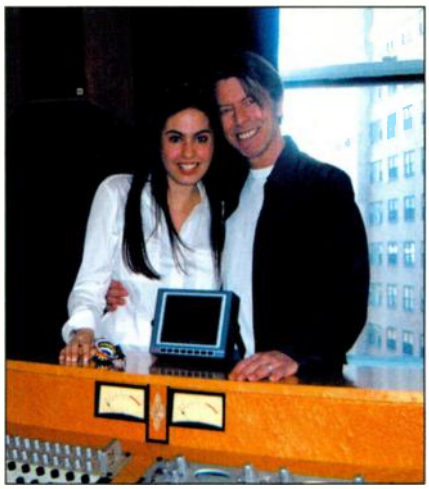
Is it important for a mastering engineer to experience and understand the nuts-and-bolts aspects of studio recording and mixing?

Absolutely. I find it essential to have a strong knowledge of the entire record-making process. Furthermore, it's important to have not only a strong technical understanding, but also an insight into the creative roles of the artist and producer. In my work, I'm only successful if I help give an album its own unique voice and/or distinctive sound. Sometimes, this means getting into the nuts and bolts of recording; other times, it means investigating the artist's aesthetic in order to gain a more intuitive sense of what is necessary. It's a dynamic balance between the technical and creative, and the two sides influence each other significantly in the mastering process.

Are there other prerequisites that you feel are essential to a mastering career, such as physics courses, audio design and testing, and electrical engineering?

From a technical perspective, there are definitely helpful prerequisites. For example, as an engineer working in any studio environment, it's incredibly useful to know how to solder, though that's not exactly an essential skill for mastering specifically. Really, there are two critical sides to professional mastering: the creative and the technical.

As for the technical aspects, there is no substitute for a solid background in both analog and digital theory. Also, proper hands-on tutelage by a mentor can really help define how to approach and develop your own artistic style.



TONY VISCONTI

Lazar, who mastered David Bowie's recent album *Heathen,* gets a hug from the Thin White Duke himself.

From the creative perspective, the most important element is to have an unwavering passion for what you do and a strong sense of integrity about the product you are making. Ultimately, mastering is not a software tool you can buy off the shelf or a class you can take, nor is it something that automatically rubs off on you just because you were in the same room with someone who was proficient at it. Rather, like all parts of the recording process, mastering is an art form that requires dedication, patience, and a keen ear, not to mention a highly developed sense of humor!

Are you involved with buying and upgrading the equipment at The Lodge? In these days of escalating sample rates, 405 CD burners, and multiple delivery formats, how do you stay current with evolving technical standards and new gear?

I am very involved in the equipment acquisitions for The Lodge. Staying ahead of the curve and understanding both vintage and new technologies is critical to delivering the best possible sound. Maintaining close affiliations with companies that I regard highly, such as Avalon Design, allows me to have an ear on the latest and greatest tools, as well as the opportunity to submit a wish list of design features for future products.

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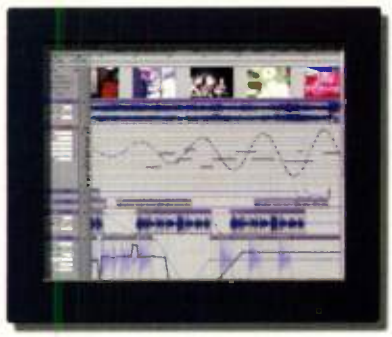
- Brian Smithers, Electronic Musician, February 2002



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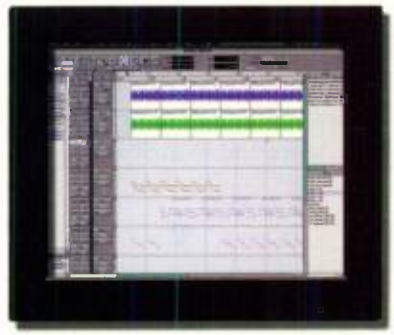

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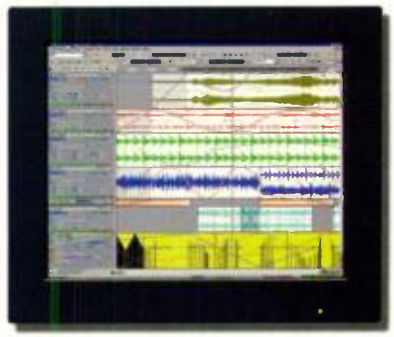

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Here are some of the innovative software developers who offer support for the US-428, with more apps added all the time. See the TASCAM web site for the latest info.

Ears, Passion, and Patience

We're constantly assessing new products and discovering how they can improve the service that we provide to our clients. Ultimately, though, it's not about how current you are; the newest software applications, technologies, and hardware typically offer welcome improvements, but it's still about how the gear sounds. We test all of our equipment the old-fashioned way, with our ears. If it doesn't pass muster, it doesn't stay at The Lodge.

What characterizes a really good basic mix, that is, a mix for which you would apply only the most minimal mastering processes?

It's purely subjective. How a mix sounds should be very much in keeping with the artist's intention. My clients need to be pleased for years to come with the work they've done, so I work with them to help enhance their vision without overasserting my own aesthetic decisions. Sometimes that means very minimal mastering, whereas other times it requires extensive surgery.

When it comes to how the record sounds, artists and producers usually trust my creative input. After all, one of the reasons that clients come to The Lodge is to get objective, third-party listeners. Given the diverse volume of work that flows through our consoles, our aesthetic opinions and expertise can typically add value to the mastering experience and to the final product.

▼

Mastering is not a software tool you can buy off the shelf.

In general, though, at least in my opinion, a really good basic mix should be wide, tall, deep, and true. A good mix makes use of the horizon line from the edge of the left speaker all the way through to the edge of the right speaker, and includes a full range of the frequency spectrum in order to achieve height and presence. It should create a sense of depth and dimension for the listener and respect the intended dynamics of the music.

DANIEL DOBERS

The Lodge's handsomely appointed foyer provides not only creature comforts, but also fun diversions such as foosball and a vintage 8-track recorder. To the right (not visible) is a comfy client lounge, complete with a fully stocked kitchen and a DVD theater.

What do you see as the primary causes of substandard recordings—those mixes that need a lot of remedial help at the mastering stage?

Good question. Substandard recordings are more about what is actually captured in the recording and not about the gear used to create it. Like the old saying goes, "garbage in, garbage out."

If you have a great engineer, having great gear is less of an advantage. In other words, what's the sense of having an awesome studio without knowing how to maximize its potential? If a mix reaches the mastering stage in poor condition, my main focus shifts towards trying to act as the last line of defense in realizing the artist's and producer's original vision.

For someone involved in home recording and independent music production, what are the most compelling reasons to hire a top-notch mastering facility?

Mastering is an unbelievably advantageous way to elevate the quality of your album without having to spend a fortune on recording time or expensive equipment.

Many mastering engineers have gone on record as being opposed to overcompression. But when the client demands it, there is often no choice but to go ahead and squash the daylights out of a master to achieve a "competitive" output level. Where do you stand on this issue, and how do you approach final compression versus the dynamic range set by the mixing engineer?

Making a great album or selling a lot of records is not about using technical gimmicks. It's about writing and producing great music that truly connects with people. Ultimately, I do the artist a disservice if I deliver something that compromises the creative integrity of the album.

However, there are circumstances when an artist demands extreme compression and aggressive limiting, and my philosophy dictates that I remain true to the artist's intent. Aesthetically, I usually prefer a more musical approach that doesn't obliterate a track's dynamics, texture, and flow. Of course, I can only offer my opinion. Artists who are

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Ears, Passion, and Patience

looking to compete merely by way of output levels should probably go back into the studio and work more on writing better music. Even on pop radio, great tracks still stand out for being great.

Under what circumstances do you advise running a digital mix through analog conversion and analog processing gear? Do you worry about resolution loss when doing D/A/D processing?

Mastering is about listening. The source media is not relevant—how the mix sounds is the issue. Just because a mix was done with digital equipment doesn't automatically mean it will sound thin, harsh, or "digital." However, if a digital mix, or any mix for that matter, seems brittle and harsh, sometimes running it through analog gear can lend a more organically pleasant sound. The natural harmonic distortion of tube equipment and/or recording a mix to analog tape can be extremely helpful in this area, and the combination is often stunning. A mix can acquire height, width, and depth that simply were not present in the original. As far as resolution goes, I am more concerned with the final sound of the master than I am about resolution loss in the process.

It is common these days for bigger studios to mix to a digital master as well as to ½-inch analog tape. Do you have any observations or preferences on this practice?

This is a terrific practice for many reasons. Here are a couple: One, safeties, safeties, safeties! And two, sometimes certain mixes achieve different things when recorded on different media. That goes for all source media—DAT, CD-R, 24-bit CD, CD-ROM, the original hard drive, analog tape, magneto-optical disk, or what have you. CD-Rs can even sound different in different recorders or burners.

Though the fact that different media and recorders have inherently different sounds may be cause for alarm, I try to remind my clients that they can use that diversity to their advantage. Printing mixes to a multitude of media affords you more choices later on in mastering.

Some mastering houses will test and audition different brands or batches of CD-Rs used for final master delivery. Do you find there is a need to do this or that there is a significant audible difference in digital media? For example, do you hear differences between various CD-R brands, gold versus silver CD-Rs, DAT versus CD-R versus PCM-1630, and so on?

We audition all the media that we use, and we do have preferred brands. I find it is very important to do this, because whether you are creating the master used for production or a reference for

THE LODGE'S GEAR LIST

Ever wonder about what gear a first-rate mastering facility has on hand that you probably won't find at your local mastering shop? In addition to the equipment listed below, The Lodge boasts a range of vintage gear including various microphones, guitars, keyboards, drum machines, synthesizers, amplifiers, and effects units.

ANALOG CONSOLE
Muth Audio Design Monitoring Console

ANALOG PLAYBACK
Ampex ATR-102 1-inch and ½-inch analog tape recorder
Dolby SR/A Model 363 Noise Reduction
Studer A80 RC ½-inch and ¼-inch analog tape recorder

ANALOG PROCESSING
Avalon Design AD2044 Opto-Compressor
Avalon Design AD2055 Equalizer
Avalon Design AD2077 Mastering Equalizer
Avalon Design VT747SP Vacuum-Tube Compressor
GML 9500 Mastering Equalizer
Pultec EQP1-A3 Program Equalizers
Sontec MES-430 Mastering Equalizer
Tube-Tech SMC 2A Stereo Multiband Compressor

COMPUTERS
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Apple Power Mac G3/300 MHz
Apple Power Mac G3/500 MHz
Apple Power Mac G4/133 MHz
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Apple Power Mac Globe iMac G4/800 MHz
Apple Power Mac iMac G3/400 MHz
Apple Titanium Powerbook G4/800 MHz

CONVERTERS
Apogee AD-8000 SE multichannel A/D/A
dB Technologies AD122-96 MKII A/D
dB Technologies DA924 D/A
Prism Sound AD-124 24/20/16-bit A/D
Prism Sound DA-1 24/20/16-bit D/A
Studer D19 MicValve A/D

DIGITAL PLAYBACK
Alesis Masterlink ML-9600
DigidesignPro Tools|24 Mixplus with full plug-in complement
Digidesign Pro Tools 888|24 I/O
Digidesign Pro Tools Universal Slave Driver
Emagic Logic Platinum
Panasonic SV-3700 DAT machine
Panasonic SV-3800 DAT machine
Rotel RCD-955AX CD player
Sony CDP500 CD player
Sony CDP-XE500 CD player
Sony DVP-S7700 DVD player
Sony R-500 DAT machine
Tascam DA-88 digital multitrack recorder
Tascam IF-88 S/PDIF to AES converter
Tascam SY-88 sync card

DIGITAL PROCESSING
TC Electronic M5000 dual engine with MD2 software
TC Electronic System 6000 ICON Remote

a client, as a mastering engineer you must be responsible for maintaining only the highest level of quality. In my opinion, nothing less is acceptable.

I absolutely do hear differences between the many different media choices, and when it comes to creating references and masters it can be unnerving. However, at The Lodge we are committed to delivering the best product available, even if that means going above and beyond the quality-control practices that other studios may have in place.

Tell me a bit about the monitors that you use at The Lodge.

The Lodge was designed to give the listener as many monitoring choices as possible. The entire facility is wired for playback, so while I am working on the Genelecs and the Duntechs in my mastering suite, if the client prefers to listen in an audiophile living-room/home-theater-type environment furnished with an array of speaker choices, that option is right down the hall.

DANIEL DOBER

Monitors in The Lodge's main mastering suite include Genelec 1031As (near-fields) and Duntech PCL-5s (soffit mounted). The room overlooks the corner of Broadway and Astor Place in New York City—"crossroads of the universe," quips Lazar.

I would imagine that a lot of the records you master are eventually heard on the radio and over inexpensive boom-box, bookshelf, or car-stereo speakers. Do you have any special tricks that you can share about making mixes translate well on small monitors?

TC Electronic System 6000 Mainframe 6000 quad engine with MD3 software
Weiss DS1 digital compressor/limiter/de-esser
Z-Systems z-CL6 6-Channel Digital Compressor
Z-Systems z-Q1 Stereo Digital Parametric Equalizer
Z-Systems z-Q6 6-Channel Digital Parametric Equalizer

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McIntosh MC 126 6-Channel Preamplifier
Sony DVP-S9000es SACD/DVD/CD player
Sony PFM-510A2WU flat-panel plasma screen
Sony PlayStation2
Vienna Acoustics Beethoven (front); Maestro (center); Waltz (rear)

METERING

API 561 vintage VU meters
DK Audio MSD600 multichannel display
Dorrough 40-C2 loudness monitors

MONITORING

Duntech PCL-3
Duntech PCL-5
Energy Pro 22
Genelec 1031A
Genelec 1094 subwoofer
Klipsch Heresy
ProAc Studio 100
Thiel CS 1.5
Yamaha NS-10M

ADDITIONAL EQUIPMENT

Aardvark Aardsync II with 96k expansion
Apogee UV-1000 CD encoder (UV22/Nova)
Avalon Design AD2022 preamplifier
Avalon Design VT737 tube mic pre/compressor/EQ/DI
Coleman Audio MS2 VU monitor switcher
Denon DP-DJ101 turntable
Equi=Tech Balanced Power System
Exabyte Eliant drive
LaCie DLT drive
Martin Sound Multimax monitor controller
MOTU MIDI Timepiece
Rorke Data Exabyte drive
Sony CDU-920 CD recorder
Sony CDW 900E professional CD burner
Sony DTA-2000 tape analyzer
Sony DMR 4000 digital ¾-inch recorder
Sony PCM 1630 processor
Tascam 122MKIII cassette deck
Z-Systems z-64.64 digital audio matrix switcher
Z-Systems z-8.8 digital audio matrix switcher

Ears, Passion, and Patience

I work to make things so that they'll translate the best possible way in every environment. Knowing how something will sound on the most high-end audiophile setup imaginable. It's imperative to keep the audience in mind during the process; you want to make the mix so it will be best for everyone and not aimed solely at one part of the population.

The trick is to know what all of these different speakers and environments sound like. Take your mixes and audition them in as many places as you can in order to get an idea of where they stand. I recommend that clients take their mixes to local stores that sell a variety of stereo equipment. That way they can audition on a bunch of different systems while remaining in the same listening environment.

As far as making mixes translate well on small monitors, I try to achieve the most low end that I can without using up too much of the energy needed for strong presence, decisive punch, and natural-sounding polish. Another thing to keep in mind is that low frequencies eat up a tremendous amount of energy. Taking the time to control the space in which those frequencies reside can yield a mix that translates better. Also, with more attention to bass management, you will find it easier to make mixes that are perceived as louder.

In my work, doing studio recording and some mastering, I find that gaining the client's trust is a very important part of the process. Getting musicians and producers to support your decisions and pay attention to subtle sonic details can present additional challenges. Is there a psychological aspect to what you do?

Without a doubt! Gaining trust in a creative environment is about making sure the artist knows that you understand their vision and have their creative best interests in mind. My first priority is always to help the artist achieve this vision. Obviously, then, communication is the most critical part of my job. I look to achieve an honest and open dialogue so that my clients feel comfortable discussing their artistic needs.

I remember when I was first apprenticing in the studio, I was horrified when an engineer showed me two colored lights on his console that were merely connected to a toggle switch. He told me that he would ask the clients whether they preferred the "blue-light EQ" or the "red-light EQ." Obviously, the lights were not linked to any EQ whatsoever, and I was thoroughly disgusted with the whole thing. There is a confidence there that shouldn't be broken or abused. Making music should be more of a sacred practice.

How do you deal with clients who really don't want to change much about their mixes, or

those who can't hear the differences in what you are doing?

I am pretty patient when it comes to clients. Many musicians and producers come into the studio with different levels of appreciation and understanding of the mastering process. I spend whatever time is necessary to educate and help them become better, more critical listeners to their own work. I try to help artists engage their music from a different sonic perspective and improve the keenness of their ears. Most of the time, this helps makes the path clearer.

How about some dos and don'ts for mixing and premastering in the personal studio?

If you feel the need to premaster your mixes, consult with your mastering engineer first. If my client brings a premastered version, I also ask them to supply me with the final, unprocessed mix. It really depends on who is doing the premastering. A lot of mixes are ruined by excessive limiting and gain manipulation. Unfortunately, that damage cannot be undone.

Do you have any tips for mastering compilations, where the source material comes from every imaginable type of studio and format?

It can be a lot of fun cracking the code of what will eventually work for the album as a whole. Being able to assess all of the source materials and how they will work together is an interesting challenge. For example, when working with Putumayo World Music and their compilations, the range can be very broad. One source could have been commercially mastered five years ago, and the next could be a field recording. It's very rewarding to find the common ground where disparate mixes will reside.

Do you have any comments on your experience within this male-dominated industry?

As far as my relationship to this industry, I think of myself first and foremost as a mastering engineer. Obviously it's a multifaceted question, but great work doesn't have a gender. Besides, from where I sit, surrounded by some really talented female engineers, the world doesn't look so one-sided!

Are you still learning?

I'm always learning. I think it's the same old story of "the more I live, the less I'm sure of." After ten years in the business, there are only two things I know for sure: one, be flexible, because nothing ever turns out the way you plan it; and two, you can't fake it—you either have passion or you don't. So, do what you love and love what you do!

Myles Boisen *is a guitarist, producer, composer, and head engineer and instructor at Guerrilla Recording and The Headless Buddha Mastering Lab in Oakland, California. You can reach him at mylesaudio@aol.com.*

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In 1992, then–managing editor Steve O and associate publisher Carrie Anderson dreamed up the Editors' Choice Awards. We were convinced that we had a good idea; we were less certain that our bosses would agree. Indeed, publisher Peter Hirschfeld initially feared that companies who didn't win would be infuriated, but we convinced him that if the awards were carefully researched and honestly selected, the manufacturers would respect the awards and the spirit in which they were given. Editor Bob O'Donnell agreed, and away we went. The first set of awards was announced in the December 1992 issue; after that, we shifted the annual awards to our January issue, where they have become an honored tradition. ❧ This year, we have 31 categories and 33 winners. (We had two ties we were unable to resolve.) The number of awards varies slightly each year because we add new categories and drop old ones, reflecting the creation of new product types and the presence or absence of outstanding candidates in existing categories. For example, this year we added a DSP Cards category because of hot new cards that we felt were especially noteworthy. The Monitor Speakers category is on sabbatical, while MIDI Keyboard Controllers appear for the first time since 1995. Some categories have changed fundamentally: Voice Processor used to mean a channel strip for mics, combining a mic preamp, EQ, and compressor; now the term indicates a vocal-harmony processor and/or pitch corrector. ❧ On the other hand, the way we select the winners has remained constant. All award-winning products have been field-tested by our editors and a select group of top authors. We also solicited opinions from the editors of sister publications *Mix*, *Onstage*, and *Remix*. The final selections were made by our technical editors: Steve O, Marty Cutler, Brian Knave, Dennis Miller, Gino Robair, David Rubin, and Geary Yelton. All award-winning products either have already been reviewed in **EM** or are far enough along in review tests that we feel confident about our conclusions (see the sidebar "The Award Winners in Review"). ❧ To be eligible, the products must have shipped between October 1, 2001, and October 1, 2002, when we prepare our January issue. We allow some slack for products that shipped so close to last year's deadline that it was not possible for us to test them in time for the 2002 awards. We do not allow such slack if we believe a manufacturer could have supplied a review unit in time for last year but intentionally delayed sending it. ❧ Keep in mind that these are our picks among the new products we have actually tested; we cannot consider the many products we never got to check out, and we do not consider older products. We give an award to a software upgrade only if we think it offers major and significant improvements over the previous version. ❧ And now, please join us in congratulating the winners of the 11th annual **EM** Editors' Choice awards!

Let us all sing the praises of our favorite new products of the past year.

By the **EM** Staff

Ancillary Hardware

LITTLE LABS

PCP Instrument Distro 3.0 ($950)

For more than a decade, Little Labs has been quietly creating a collection of well-designed tools for professional recording engineers. The

PCP Instrument Distro 3.0 signal splitter and router is a master of many trades and could easily be an integral part of a personal studio that tracks live instruments.

To begin with, the PCP Instrument Distro allows you to send a high-impedance signal to three separate destinations without a loss in audio quality or sound coloration. If you ever want to send a guitar signal to three amplifiers and record them simultaneously, the half-rack PCP Instrument Distro will help you get the job done.

However, it's not just for guitars, basses, and keyboards. For instance, you can feed the PCP Instrument Distro a low-impedance signal—such as a previously recorded track—and route it to some of your favorite stompboxes. Each output has its own trim control, phase switch, and ground lift. Quarter-inch inputs and a matrix of controls are readily available on the front panel.

The PCP Instrument Distro can also be used as a line driver, helping you maintain the timbral quality of your instrument over long cable distances. To top it off, you can use the unit as an active DI, so you can interface any instrument with your pro-level gear. Its range of applications make it a clear winner in this category.

Ancillary Software

SOUND QUEST

Infinity 2.05 (Win; $399)

With the release of Infinity 2.0, Sound Quest took what used to be a very fancy toolkit for assembling MIDI plug-in effects and self-playing devices and made it a robust construction set for building MIDI *and* audio effects and processes. In addition, you can now create your own soft synths and use them in any DirectX or VST host. That makes Infinity an excellent programming environment for anyone interested in expanding his or her desktop arsenal.

Infinity has enough audio modules to keep you busy for a long time. String together any number of oscillators, filters, and delays to build a synth to your specs. Take advantage of the Sub-Patch and macro options to make your instruments more efficient, and add transformers or converters to shape the signal as it moves through the pipeline. Then experiment with a wide range of math functions if, for example, you want the pitch of a sample to be lowered as you send it ascending notes from a MIDI controller. The possibilities are endless.

If watching the sidebands produced by frequency-modulation rise and fall is your game, just add an Audio Display Object to your FM patch; be sure to use an Interface object so your patch can receive data from a VST or DirectX host. Also feel free to roll your existing VST and DirectX plug-ins into new Infinity patches to create "super" effects or instruments. When you're done, dress up your instrument or effect with graphic elements to suit your needs, then send it out to the world over Sound Quest's Web site.

Unlike many small companies these days, Sound Quest supplies both physical media and a printed manual with its software. Call us old-fashioned, but we love to have a real manual for those moments when we have to tear ourselves away from the computer.

We're already seeing a number of great-sounding and elegant user-created Infinity instruments, such as Luigi Felici's The Rocking lead (an electric-guitar emulation) and WilliamK's daDashJuno. Both are available at Dash Synthesis (www.dashsynthesis.com). But whether you consider yourself a tweaker or not, you'll enjoy playing with the built-in synths, sequencers, and effects processors included with Infinity's vast toolkit.

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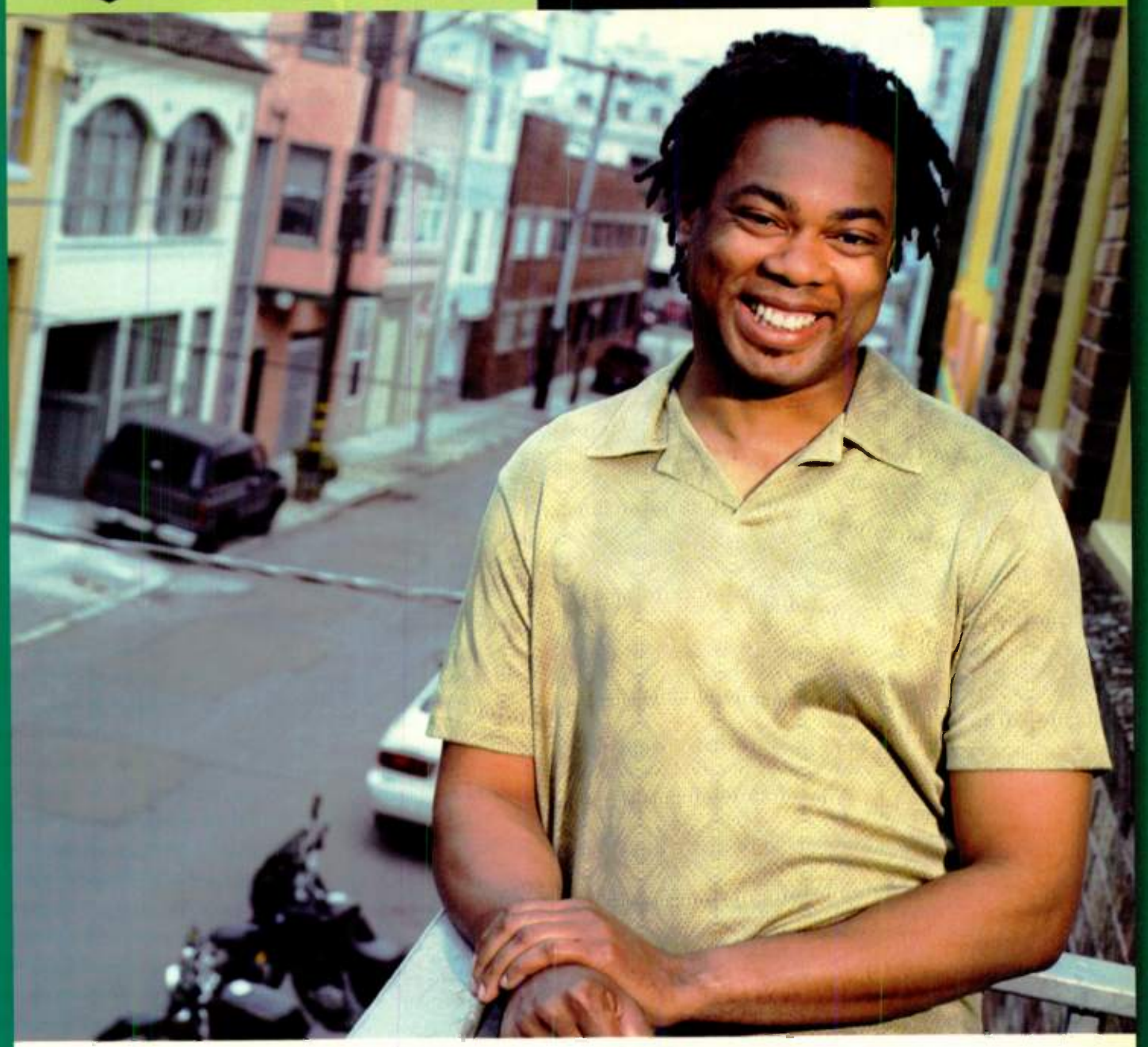

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SYNTRILLIUM
Cool Edit Pro 2.0 (Win; $249)

The marketplace for multitrack audio programs has always been a cutthroat arena where companies play feature-set leapfrog, trying to stay one step ahead of the competition. With several strong contenders for this year's award, the

voting, as expected, was divided. However, when we took a close look at the cost-benefit ratios offered by the programs, one product really stood out: Cool Edit Pro 2.0.

For less than $250, Cool Edit Pro 2.0 offers desktop musicians a gateway into the world of professional-level multitrack editing. And in spite of its modest price tag, the software wraps its 32-bit processing power in a polished, user-friendly environment that sports a new hierarchical Organizer section, a new customizable user interface, a long list of useful keyboard shortcuts, and multiple undo levels.

With version 2.0, Cool Edit Pro greatly expands its flexibility. The program supports 24-bit, 192 kHz recording on as many as 128 audio tracks with real-time EQ on each track and buses for track grouping. The program fully supports DirectX plug-ins and includes more than 45 DSP effects, ranging from the practical (reverb, limiter, noise reduction) to the offbeat ("brainwave synchronizer"). Cool Edit Pro now supports more than 20 file formats, including MP3, and the program's CD-ripping feature and its new CD-burning plug-in let you to take a project from start to finish.

Other noteworthy additions include the ability to import and play back MIDI files, view and sync to video (AVI) files, and have your mix serve as either a master or slave when working with SMPTE time code. Remixers and loopmeisters will appreciate Cool Edit Pro's extensive new looping capabilities. The new Cool Edit Loop (CEL) file format stores tempo, beat, and key information. Just insert CEL files into your multitrack mix, and the program handles the tempo- and key-matching for you. You can even perform beat slicing and a variety of other loop-manipulation tricks. Best of all, Syntrillium offers more than 2,000 free, downloadable CEL files in 15 different styles.

Cool Edit Pro's list of features and effects is too long to cover in this short space, but many thoughtful touches, such as the built-in metronome, add value to the program. In fact, *value* is the operative word in this case. Cool Edit Pro 2.0 competes well with the other power-hitters in this category, but it does so without completely flattening your wallet. We think that deserves an award.

DAW Control Surface/Interface

EVENT ELECTRONICS
EZbus ($749)

Each year we see a product that almost defies categorization because a manufacturer has assembled a variety of technologies into a single device. Event's EZbus is a great example, combining an audio and MIDI interface, a control surface, and a digital mixer into such a small space that there is sure to be room left on your desktop. To sweeten the deal, the EZbus does all this for a very reasonable price.

As a digital mixer, the EZbus begins with 16 analog inputs: two phantom-powered mic/line inputs and four groups of three summed TRS inputs. Although you will have to do some synth programming to balance each of the three inputs per channel strip, it's a small sacrifice in return for the mixer's diminutive footprint.

Once your signal is flowing into the EZbus, you can use the onboard EQ and dynamics processing on each channel. At the other end, three pairs of balanced ¼-inch outputs give you plenty of routing flexibility. Across the board, the signal goes through 24-bit, 96 kHz converters.

Entering the EZbus from the digital domain is also convenient, because the device offers S/PDIF and ADAT Lightpipe I/O and a USB port. Connectivity is further enhanced by two

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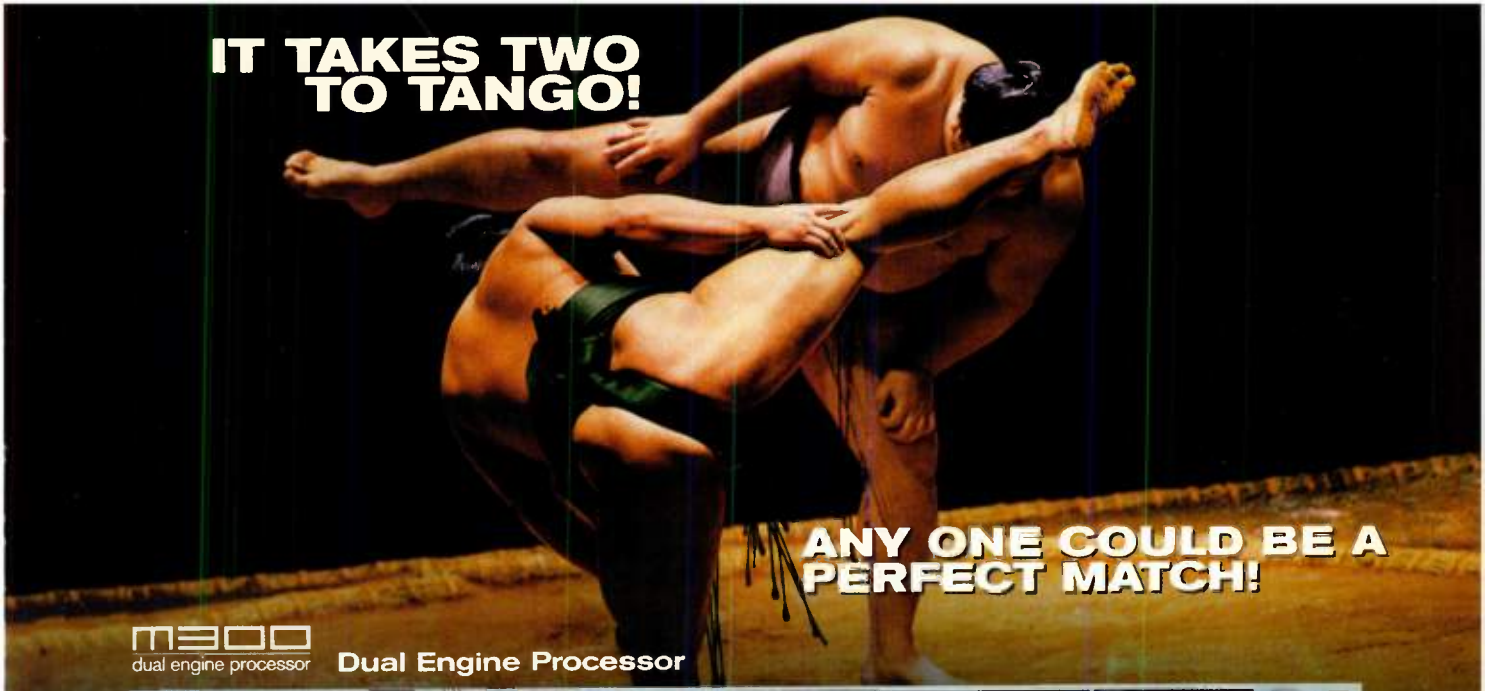

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pairs of MIDI ins and outs and a word-clock output.

When you are ready to use your DAW or favorite software synth, you can use the EZbus as a control surface. It offers nine faders, transport controls, a data wheel, and plenty of virtual buttons, many of which are user assignable. Controller profiles are available for products from BIAS, Cakewalk, Digidesign, Emagic, IK Multimedia, MOTU, Native Instruments, Propellerhead, Steinberg, and Syntrillium. If your favorite software isn't supported yet, use the EZbus's Profile Editor to adapt one of the maps to your needs.

In the desktop studio where space is at a premium, a device that can handle an assortment of tasks while keeping a low profile is of great value. So much value at a bargain price makes for a very compelling product.

Digital Audio Sequencer

STEINBERG
Cubase SX (Win; $799.99)

Steinberg's popular Cubase sequencer may turn out to be the last high-end digital audio sequencer to be offered in nearly identical versions for the Mac and PC. The program's latest incarnation, Cubase SX, sports a jazzy new user interface and supports Windows XP and Mac OS X. But this is not your typical update; according to Steinberg, it's practically a whole new program. At this writing, the Mac version of SX had just been released, so we've given the award based on the Windows version alone.

The Cubase SX audio engine is built from the same all-new code base as Steinberg's flagship Nuendo application, which enables Cubase SX to handle six channels of surround-sound mixing in a variety of formats. The new-and-improved interface does away with Songs and Arrangements; a new Project window replaces the old Arrange window and offers real-time drag-and-drop placement of audio, video, and MIDI parts.

The Track Inspector has also been significantly improved; it now lets you insert effects and adjust pan, volume, and aux sends without opening the mixer. Plug-in effects can be used in real time, as before, but they can also be applied offline. Cubase SX introduces a powerful new unlimited-Undo feature with a full edit history. A separate Offline Process history lets you remove, change, or replace applied processing from earlier edits without changing the edits themselves.

Cubase SX boasts a new 32-bit floating-point "adaptive" mixer that integrates audio and MIDI tracks and lets you individually size the channel strips. It supports 5.1-surround mixing and panning as well as sample-accurate automation of all parameters.

Another innovative feature in Cubase SX is its full support for Steinberg's new VST System Link. VST System Link lets you network two or more computers (including mixed platforms) to distribute the processor load from different tasks in complex projects. For example, you can run all your VST instruments on one computer and your audio tracks on another. (For more on VST System Link, see "Tech Page: The Missing Link" in the September 2002 issue of EM.)

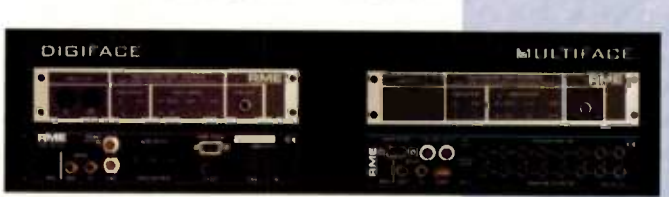
Obviously, Cubase SX is more than just another pretty face. It's deeper, much more powerful, and better designed than any of its Cubase progenitors. We were favorably impressed with the new look and feel of the program, not to mention all of the changes under the hood. Steinberg has introduced a genuine winner.

Digital Audio Workstation/Audio Interface

RME
Hammerfall DSP (PCI $315; CardBus $355; Digiface $650; Multiface $860)

The market is flooded with top-quality audio interfaces, and this year's competitors reflect that fact. From high-end, card-based hardware-and-software combos costing thousands of dollars to external plug-and-play USB and FireWire boxes, there's something for everyone. Amid all the jostling for attention, however, RME stands out as a winner this year for offering a moderately priced, have-it-your-way audio system with unparalleled connectivity.

Based on the popular Project Hammerfall



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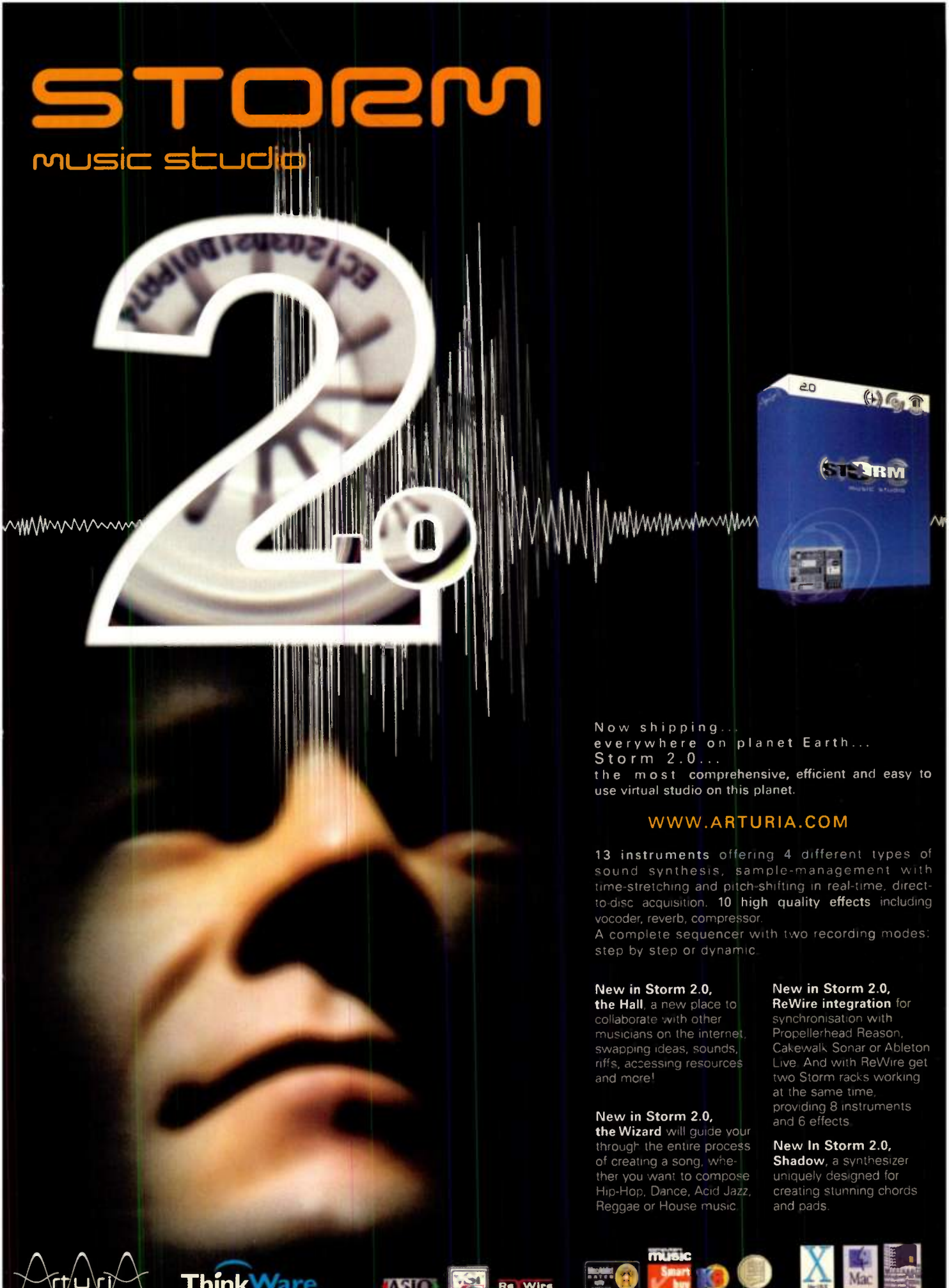

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New in Storm 2.0, the Hall, a new place to collaborate with other musicians on the internet, swapping ideas, sounds, riffs, accessing resources and more!

New in Storm 2.0, the Wizard will guide your through the entire process of creating a song, whether you want to compose Hip-Hop, Dance, Acid Jazz, Reggae or House music.

New in Storm 2.0, ReWire integration for synchronisation with Propellerhead Reason, Cakewalk Sonar or Ableton Live. And with ReWire get two Storm racks working at the same time, providing 8 instruments and 6 effects.

New In Storm 2.0, Shadow, a synthesizer uniquely designed for creating stunning chords and pads.

Arturia ThinkWare ASIO VSTi ReWire Mac

system, the new and improved Hammerfall DSP system offers great versatility through its modular design. You can choose from two types of computer cards—PCI or CardBus—and connect them (with a standard FireWire cable) to either of two half-rackspace breakout boxes. The 32-bit Busmaster PCI card works with desktop Macs and PCs, and the CardBus card provides the same capabilities to laptop users. That should be welcome news to traveling musicians who have been frustrated by the bandwidth limitations of USB interfaces.

The two breakout boxes are stuffed to the gills with inputs and outputs. The all-digital Digiface starts with a 2-In/2-Out, 32-channel MIDI interface and adds three optical ADAT I/O pairs, ADAT-sync, stereo S/PDIF, and word-clock I/O. The front-panel headphone jack can also serve as a stereo analog output jack. The accompanying TotalMix software includes an unbelievable 1,456-channel virtual mixer with 40-bit internal resolution!

The analog/digital Multiface sports a 1-In/1-Out MIDI interface, one optical ADAT I/O pair, and the same ADAT-sync, word-clock, and S/PDIF I/O found in the Digiface. A front-panel headphone jack is also provided. To fill the remaining back-panel space, the Multiface deftly squeezes in eight analog inputs and outputs with 24-bit, 96 kHz converters. The TotalMix software offers a still-amazing 720-channel mixer.

Either of the two Hammerfall DSP interfaces would be a formidable centerpiece for a computer-based studio, and with any combination of cards and interfaces, RME claims latencies as low as 1.5 ms (depending on your CPU). If you have both a desktop and a laptop computer, you can buy the PCI and the CardBus cards, and they can share a Digiface or Multiface to keep costs down.

However you set it up, you'll get solid ASIO, MME, and GSIF support in a system that can't be beat for versatility and flexibility. That's especially exciting for laptop-based traveling musicians, who can now assemble a compact, rugged, high-resolution multitrack recording system with pro-level specs all the way.

Direct-Injection Box, Tube

SUMMIT AUDIO
TD-100 ($495)
VALVOTRONICS
Tube Amplified Direct Box ($400)

Two very different but equally outstanding tube DI boxes came across our desks—that's mixing desks—this past year: the Summit Audio TD-100 Tube Direct Instrument Preamp and the Valvotronics Tube Amplified Direct Box. Each unit received the highest praise, both from the

reviewer and everyone else who got a chance to try it out. Each provides a distinctive feature set and performs beautifully in a range of applications. Given how awed we were by both units, choosing a favorite proved impossible, so we called it a tie.

The Summit Audio TD-100 is a winner for a number of reasons, not least of which is the fact that Summit found a way to bring its exalted name—a de facto mark of audio quality—within reach of the personal studio. The half-rack TD-100 is a hybrid device employing a vacuum tube in the signal path and a discrete solid-state output amplifier. Several uncommon but useful features set it apart from the pack, most notably a continuously variable impedance control that lets you adjust how the unit affects pickup loading. Variable from 10 kΩ to 2 MΩ, this handy front-panel control allows for subtle to drastic tonal modifications on direct-injected electric guitars and basses. Other front-panel features include a polarity-reverse and a ground-lift switch and a ¼-inch, high-impedance direct output for connection to a stompbox or amplifier.

One thing that makes the TD-100 so versatile is its array of outputs: in addition to the unbalanced ¼-inch direct out, you also get a balanced ¼-inch line-level output, a mic-level XLR output, and even a ⅛-inch headphone out to accommodate wee-hour visits from the Muse. In addition to the obvious studio applications, you could also get great mileage from the TD-100 onstage, by, for example, feeding your tube-treated tone to the house via the XLR mic output while sending signal to your guitar or bass amp from the unit's direct out (which is unaffected by the main signal path).

Needless to say, we were thrilled with the sound of the TD-100. It was clean, airy, and detailed on direct electric guitar, and on electric bass it compared favorably to boutique and vintage tube DIs costing twice the money. Our reviewer was also impressed by the vintage punch it added to an electric piano patch.

The Valvotronics Tube Amplified Direct Box is one of those rare devices EM editors love to discover: lovingly hand built, one at a time, in a garage somewhere, by a lone designer with a passion for superior audio, a

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* Soundset includes samples from the following classic keyboards: Hammond B-3, Wurlitzer EP, Fender Rhodes, Hohner Clavinet, Farfisa, Mellotron, Moogs, Prophets, Oberheim OBX, Jupiter, Juno, 808, 909, ARPs, DX7, CP70, Matrix, SH101, TB303, E-MU Modular, Fairlight, and many more.

$519 Street price based on E-MU's minimum advertised price

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E-MU

pining for a particular (and unavailable) sound, and the know-how and industry to make that sound a reality. An all-tube unit with a custom-wound transformer output, the Valvotronics is a beast of a box with a hot output and attitude to spare, both visually and sonically.

Unusual features include a Bass Tilt switch that engages a 6 dB-per-octave low-pass filter with a corner frequency at 500 Hz, great for producing pillowy electric-bass tracks devoid of high frequencies (think reggae); a continuously variable, defeatable passive filter that provides up to 20 dB of bell-curve cut (centered at 7.5 kHz) with a bandwidth of roughly 1.25 octaves (great for diminishing pick noise); and a continuously variable attenuator knob that provides up to 6 dB of level cut. The unit provides three unbalanced ¼-inch TS jacks: a high-impedance instrument input, an unbuffered Thru jack wired in parallel with the input jack to provide a mult you can route to your guitar amp, and a buffered jack for connection to a tuner. The output is on a balanced, low-impedance XLR jack, and there's a Pin 1 Lift switch in case you need to break the signal ground.

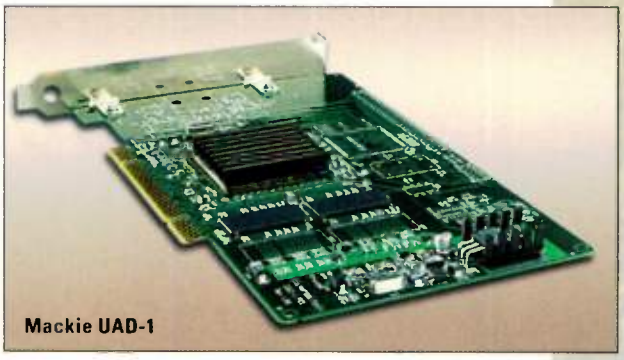
"Phenomenal" is the word our reviewer used to describe the sound of the Valvotronics DI; he proclaimed it "easily the biggest-sounding DI I've heard on electric-bass guitar, dishing out insane amounts of rich tube saturation and corpulent bass frequencies." Though bass seems to be the unit's primary raison d'être, we also got wonderful results running electronic keyboards through the Valvotronics, and electric guitars fared nicely, too. If you're looking for a versatile and beefy tube DI with a sound and look all its own, we suspect you'll be just as knocked out by the Valvotronics Tube Amplified Direct Box as we were.

DSP Card

MACKIE DESIGNS
UAD-1 Powered Plug-Ins 2.2.2 (Mac/Win; $995)
TC WORKS
PowerCore 1.5 (Mac/Win; $1,299)

Despite amazing increases in computer CPU speed in recent years, audio software's insatiable appetite for CPU cycles continues to strain native hardware resources. Today's power-hungry electronic musicians depend on more simultaneous plug-ins—and many of the latest plug-ins require more processing power—than ever before.

To alleviate the load, two manufacturers have developed digital-signal-processing (DSP) acceleration boards bundled with an impressive assortment of plug-ins. Although the TC PowerCore and UAD-1 Powered Plug-Ins might seem expensive at first glance, first-rate plug-ins make either product an attractive value. Both include MAS plug-ins that work with MOTU Digital Performer on the Macintosh and VST plug-ins that work with VST hosts on Macs and PCs alike. Both can handle up to 24-bit, 96 kHz audio. However, the types of plug-ins each card can handle are quite different.


Mackie UAD-1

Plug-ins must be written to run on a particular card; you can't run a native VST plug-in on either one, and the UAD-1 and PowerCore formats are mutually incompatible. Nonetheless, both cards are indispensable tools for computer-based recording.

The TC Works PowerCore contains a Motorola PowerPC and four Motorola 56362 digital signal processors on a full-length PCI card. It comes bundled with TC Tools, a collection of professional-quality dynamics and effects plug-ins, as well as a virtual monophonic synthesizer. Plug-ins run the gamut from TC Work's popular MegaReverb and EQsat to MasterX3, a three-band compressor, limiter, and expander that emulates the TC Electronic Finalizer. Third-party plug-ins are available from Sony, D-Sound, and Waldorf, and several others are forthcoming.

UAD-1 Powered Plug-Ins, developed by Universal Audio and distributed by Mackie Designs, combines a suite of proprietary plug-ins with a 7-inch PCI card that employs a single, proprietary DSP chip. Some plug-ins emulate specific studio hardware, such as the Universal Audio 1176LN and Teletronic LA-2A compressors and the Pultec EQP-1A equalizer. Other notable plug-ins are Nigel, which simulates guitar amps, cabinets, and effects, and Kind of Loud's RealVerb Pro, which has a graphic interface that simulates the physical characteristics of acoustic spaces built of various real-world materials.

In the end, we're dealing with two equally good DSP cards that work with very different sets of plug-ins. If you want emulations of classic signal processors, the UAD-1 has the edge. However, the PowerCore currently has more third party support. You pay your money and you take your

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Why is that important?
Light and dark, hot and cold, loud and quiet! These are examples of the contrasts found in nature.
A low noise recording will give your work it's dynamics. It will give you the impact you dream of.
Adding noise from any device, especially at the source, only degrades your performance.
The New **RØDE NT1-A** has a self-noise of **only 5dBA!**
No other studio microphone in its class, or indeed costing many times more can claim this!

LOW NOISE IS ONLY HALF THE STORY

1) Multi award winning, and the world's biggest selling studio microphone, the NT1 is now a legend. The New **NT1-A** continues this tradition while improving specifications and tonal qualities.

2) **Using cutting edge technology** for the electronics, RØDE has implemented a computer controlled manufacturing line. Unlike many 'leading brands' all electronic boards are made without 'human hands' assuring high specifications, tight tolerances and unsurpassed consistency.

3) **Built to last** with a new computer controlled machining process. The body is then satin nickel-plated. The NT1-A is designed to last you a lifetime.

4) **No PAD or Filters.** Some microphone manufacturers include these in their budget products, but at what cost?

The NT1-A can be used with very high sound pressure levels without perceptible distortion. Most people never use a high pass filter on their microphones. Why pay for features you don't want or need at the cost of what is really important, true performance!

5) **Complete solution:** The NT1-A comes complete with a dedicated shock mount and zip pouch. No optional extras to buy.

The new NT1-A, a clear winner.

35 years

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choice; either way, you'll get what you paid for and then some.

Effects Processor, Analog

METASONIX
TM-2 ($399)

Few analog effects devices on the market make as big a statement as those by Metasonix, and the TM-2 Tube Bandpass Filter VCA is no exception. Like the company's TS-21 Hellfire Modulator (a 2002 Editors' Choice Award winner), the rugged, stompbox-size TM-2 was designed to take advantage of the entire operating range of each of its

tubes. However, this processor was designed with guitarists *and* synthesists in mind: it can be used on the floor or a tabletop; be mounted vertically in a 5U Moog-style synth cabinet for use with Synthesis Technology/MOTM and Synthesizers.com modules; or be mounted horizontally in a 3U Euro subrack to work with Analogue Solutions, Analogue Systems, and Doepfer gear.

If it's tube coloration you want, you've come to the right place. The TM-2 is perfect for rounding off the edges of harsh synth signals or fattening up drum machines. The device incorporates a trio of pentode tubes: the first pair act as parallel bandpass filters tuned two octaves apart (80 to 200 Hz and 300 Hz to 1 kHz, respectively), and the third tube is used as a VCA. As with other Metasonix products, you have to set the controls slowly on the TM-2 if you want to hear everything the tubes can do.

The TM-2 gives you voltage control over the filter frequency and the VCA. That means you can easily interface the device with vintage and contemporary analog synths. In addition, you can plug an expression pedal in to the Filter CV input and create wah-wah effects. But unlike your run-of-the-mill wah, the TM-2 lets you set the filter frequency: set it high enough, and the filter will resonate when the pedal is fully forward. Put a distortion box before the TM-2, and you get a wah-wah that screams!

If you think you've heard everything a vacuum tube can do, be prepared for a surprise. The TM-2 is the latest winner from a company that is successfully subverting the dominant digital paradigm.

Effects Processor, Digital (hardware, over $1,000)

KURZWEIL
KSP8 ($2,999)

Ready to process your tracks for mixdown? The 8-channel KSP8 effects processor is loaded with high-quality effects and extensive programmability, allowing you to independently process each channel of a 5.1 mix and a stereo mix, among many other applications. Kurzweil pulled out all the stops on this one.

Building on the KDFX signal processor in its flagship K2600 synthesizer, Kurzweil put 249 effects algorithms in the KSP8 that allow it to create more than 600 effects. Many of these are multichannel effects, including surround reverbs, and the KSP8 lets you run mono, stereo, and surround effects simultaneously. You can submix the effects buses internally or send them to the outputs. In addition, each channel has a dedicated multiband EQ and multichannel panner.

The KSP8 is professional all the way and offers four balanced analog inputs and outputs and two channels of AES/EBU digital I/O right out of the box. Expansion cards allow you to add four more analog channels or eight more digital channels in your choice of AES/EBU, ADAT Lightpipe, TDIF, or Kurzweil's KDS format. Fully loaded, the KSP8 lets you process eight channels of audio with as many as 14 inputs from which to choose.

Every editable parameter in the KSP8 can be controlled by MIDI, and you can use envelope generators, LFOs, or user-programmable control sources for modulation. Imagine using an LFO to slowly pan several sounds around the surround space independently. As many as 36 LFOs and 36 envelope generators can be used for modulation, which should satisfy just about any craving.

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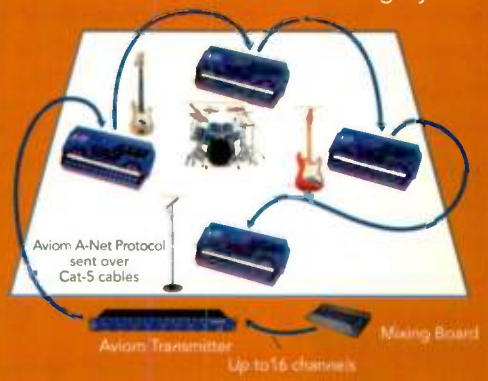

AVIOM
To Each His Own

The KSP8 also excels in everyday processing jobs. With its generous I/O, flexible routing, MIDI control, and hands-on editing capabilities, the KSP8 can handle an entire mix. Anyone serious about their effects processing should take a serious look at the KSP8.

Effects Processor, Digital (hardware, under $1,000)

ROGER LINN DESIGN
AdrenaLinn ($395)

The AdrenaLinn is one of those products that makes you wonder why someone didn't think of this sooner. Roger Linn Design has cleverly combined a sequencer-controlled filter, an amp modeler, a drum machine, and a collection of effects into one device. The components of the AdrenaLinn all sound great on their own, but together they're amazing.

The filter is controlled by a programmable 32-step sequencer, which works wonders on just about anything you put through it: guitars, keyboards, even vocals. You have your choice of a 2- or 4-pole lowpass filter, and you can set modulation and envelope-triggering parameters for each step. An LFO is included if you want to animate your sounds with filter sweeps or stereo panning. You can also use the AdrenaLinn as an envelope filter if you're in a funky mood.

Because Roger Linn made his name with drum machines, you would expect the AdrenaLinn to deliver in the this department. You can build your patterns using any of the nine great-sounding kick drums, snare drums, and hi-hats, not to mention toms and assorted percussion. Once your pattern is happening, you can route the drum mix through the filter, effects, and amp models.

The stellar collection of amp models completes the scene. You have your pick of a variety of Fender and Marshall amps, as well as examples of other vintage (Vox and Mesa/Boogie) and boutique (Matchless and Soldano) amp varieties. The AdrenaLinn includes a host of modulation and time-based effects that can be combined to create still more effects. Because the AdrenaLinn has MIDI I/O, you can sync effects from an external source or use Emagic's SoundDiver if you're in a tweaky mood.

Technical details aside, the AdrenaLinn is extremely addictive and playing with it is a whole lot of fun. It covers a wide range of sonic territory, from the subtle to the completely whacked out, and the deeper you dive into it, the more you'll discover. Considering it costs less than $400, you'll want more than one.

Loop Sequencer/Editor

ABLETON
Live 1.5 (Mac/Win; $300)

Few products have caught on or generated a buzz more quickly than Ableton's loop sequencer, Live. More than just a construction tool for sample loops, Live is a musical instrument that holds tremendous potential for the performing musician. DJs, video jockeys, and even bands around the world are using Live in concert settings, and no wonder: absolutely every parameter it offers can be updated in real time.

Live offers two main working areas. First is the Arranger, which is a track interface on which you drop and arrange Clips (loops or other samples). You can move Clips around, change loop start or end points, and add and tweak effects while playing back, and you can have any number of Clips on the same track, even if they have different sampling rates and bit resolutions. Audio is read directly from the hard drive, so there's no limit on the length of the files you can use in a project.

The second work area, called the Session, is more of a mixing environment and offers controls for send levels, gain, pan position, and audio routing. You can record audio from an external

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AUDIO POST

The Restoration Bundle was an instant hit at our studio. We see and hear a lot of audio destined for DVD that requires intensive care before we can mix it with MPEG2 video. X-Noise and X-Hum are in daily use here because they save audio from the ravages of location video shoots. They're the best we've found for our work. **-KK Profit Producer/Engineer/Journalist**

MUSIC PRODUCTION

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-Wendy Carlos (composer and synthesist: Switched-On Bach, Sonic Seasonings, Clockwork Orange, The Shining, Tron, Tales of Heaven and Hell)

FILM & TELEVISION

The interface is highly intuitive, allowing me to achieve beautiful results on a very short learning curve. X-click has become a staple for optical track restoration. We have used most, if not all, of the Restoration package on "Shot in the Dark", "The Misfits", "Pink Panther Strikes Again", "The Alamo", "Paths of Glory", and "The Killing". For optical, vinyl, and magnetic cleanup and restoration I have not seen a more a powerful tool. The Restoration package, along with other Waves tools we achieve the best possible final results."

- Brian Slack, Chief Engineer and Technologist, Widget Post Production

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source directly into the Session, or you can bounce down multiple existing tracks and immediately use the bounced audio in the current project. The Session also gives you access to the Clip Pool, where you collect all the samples you're going to use in a project and assign the MIDI notes that you want to trigger the samples.

Live includes a number of internal plug-ins and can also serve as a VST host. Among the included plug-ins are Grain Delay, which has controls for altering the Spray, Pitch, Frequency, Random Pitch, and Feedback parameters of the granulation process. You can adjust values by typing or scrolling with the mouse in a text-entry box or by dragging your mouse around a graphic interface. For hands-free control, you can also draw automation data directly on a track.

Among the many other new features in Live 1.5 (a free upgrade for 1.0 users) are full ReWire (master and slave) support, more robust handling of MIDI Control Change messages, a new internal reverb effect, and overall optimizations. All of these make Live 1.5 even better for the performing musician. But lest we forget, Live has tremendous potential as a production tool as well. This combination makes it the overwhelming winner in this year's loop-sequencer category.

Microphone (over $1,000)

ROYER LABS
R-122 ($1,695)

Royer Labs has breathed new life into ribbon mics, updating the technology to overcome liabilities that had long plagued traditional ribbon designs—low output, high self-noise, nominal high-frequency response, and inability to handle high SPLs, among others. The R-121, which won a 2000 Editors' Choice Award, not only delighted old-timers and vintage buffs who lamented the decline of ribbon mics, it also introduced new generations to the benefits of recording with them.

Now Royer has made yet another technological leap: the R-122 is the world's first active ribbon mic. The design is so novel that the R-122 even got votes in our "Most Innovative Product" category. Unlike a standard condenser microphone, which uses phantom power to electrically charge a diaphragm and backplate, the R-122 uses phantom power to provide impedance matching and allow for increased gain. (Impedance mismatching and insufficient gain are two problems inherent to traditional-design ribbon mics.) Before the R-122, ribbon users seeking optimum results had to use high-quality, high-gain (read "expensive") mic preamps, preferably with high impedance (or a variable-impedance control—a rarity), especially when recording quiet sound sources. The impedance issue was particularly troublesome: an impedance mismatch "loads" a ribbon improperly, resulting in loss of low end, diminished body, lowered sensitivity, and overall compromised performance.

By designing the mic to receive external power, Royer Labs was able to give the R-122 a fully balanced, discrete head-amplifier system that utilizes ultra-low-noise FETs, providing a perfect load on the ribbon element at all times. The result is a high-output, low-noise ribbon mic that doesn't require a high-gain or "ribbon-friendly" preamp and allows for long cable runs with minimal signal loss. In short, the R-122 embodies the most significant improvement to ribbon-mic technology in 50 years.

Of course, it takes more than technological innovation to make a superior product. The R-122 employs the same ribbon element found in the R-121 but has a flatter, smoother response overall, with sweeter highs and a bit less upper-midrange bite. Like the R-121, the R-122 exhibits excellent off-axis rejection, and our reviewer loved it on a range of instruments, including strings, saxes, woodwinds, flutes, brass, percussion, and especially electric-guitar cabinets. But the critical achievements are the mic's low noise and high output, which together significantly increase its versatility and usability.

Microphone (under $1,000)

BLUE
Baby Bottle ($649)

The past year was exceptional for microphone lovers. We were especially impressed by several affordable new large-diaphragm condensers, notably the Audix SCX-25 and the Audio-Technica AT4040. CAD, too, wowed us with a remarkably affordable new tube mic, the M9. But in the end, the mic that had all of us salivating was the Baby Bottle—yet another Class A class act from the folks at Blue Microphones. Remarkably, this is the fourth year in a row the company has snagged an EM Editors' Choice award.

Blue's least-expensive microphone to date, the Baby Bottle breaks rank with the budget-microphone paradigm on several fronts, most notably sound. As our reviewer put it, the Baby Bottle

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"doesn't give you what isn't there." Rather than crispy highs, scooped mids, and bumped-up lows—a curve that characterizes the majority of

inexpensive condenser mics we've heard in the past few years—the Baby Bottle offers a more honest, unaffected sound: the response is basically flat, with a slight bump around 2 kHz, and highs and lows that start rolling off smoothly at 12 kHz and 80 Hz, respectively. The result is a rich, detailed midrange and overall warm, full sound. The Baby Bottle also exhibits excellent transient response—not surprising, given its pedigree—allowing for a sense of depth and dimensionality conjured only by the finest of transducers.

Like all Blue mics, the cardioid-pattern, solid-state Baby Bottle is minimalist in design, distinctive in appearance, and constructed only from the highest-grade components. Its Class A discrete electronics and transformerless output achieve incredibly low self-noise (5.5 dBA!), high sensitivity, and a superhot output, making the mic well suited to the peculiarities of the personal studio. We loved the Baby Bottle on a range of instruments, including vocals and voices (broadcast), electric guitars (including bass), percussion, and piano, and found it particularly effective for softening potentially strident sources such as harmonica, strings, and wind instruments.

Though the Baby Bottle's sonic bent might not lead us to recommend it for someone looking to acquire their first or only large-diaphragm condenser, we feel strongly that this mic fills a gaping hole, both in terms of frequency response and price, and as such is a terrific pick for extending the tonal palette of your microphone cabinet without breaking the bank.

MIDI Keyboard Controller

M-AUDIO
Oxygen 8 ($179)

With the emergence of USB as a conduit for MIDI, the plethora of USB-enabled MIDI keyboards is a welcome development for the desktop musician. The M-Audio Oxygen 8 is particularly versatile because it can draw power from the included AC adapter, pull phantom power from its USB connector, or run on six AA batteries, making it useful in the studio or in the field. The keyboard's MIDI Out port also lets you use the Oxygen 8 as a MIDI controller without a USB connector.

The solidly built Oxygen 8 packs a pitch-bend wheel, an assignable mod wheel, a programmable slider, and eight assignable knobs into a chunk of real estate that you can fit in a briefcase. The instrument provides octave-shift buttons, which help compensate for its limited 25-key span. Every knob can have a different Control Change message and can send on a different MIDI channel, an extremely handy feature if you need to tweak multiple instruments. Our reviewer found an undocumented trick that gives you access to a total of 40 knob assignments. The Oxygen 8 retains your assignments when powered down.

The Oxygen 8 can go well beyond managing software synths. You can easily configure the unit to manage effects devices, MIDI-enabled mixers, loop-sequencing software, and plug-ins.

Here at EM, we're suckers for devices that dish up versatility in small and portable containers.

With its diminutive form, solid construction, extensive control capabilities, and flat-out bang for the buck, M-Audio's Oxygen 8 was an easy winner.

Mixing Console

BEHRINGER
DDX3216 ($1,999)

Behringer got our attention in a big way this past year with the DDX3216, a fully automated,

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32-channel, 16-bus, 24-bit digital-mixing console. The DDX3216 offers one of the more comprehensive and user-friendly feature sets we've seen in a compact digital mixer, yet at a price so low we could hardly contain our wonder. Clearly, Behringer did its homework before stepping out with the DDX3216.

The DDX3216 is very clean and quiet, and our reviewer was impressed that it sounded as good as or better than digital mixers costing two and three times as much. In addition to its potential 32 inputs, 20 outputs, 16 internal buses, and 8 aux sends, the DDX3216 provides parametric EQ, a sweepable highpass filter, dynamics processors, and phase inversion on every channel; channel delay on all analog inputs; full dynamic and snapshot automation; four effects processors; 100 mm motorized faders; and two levels of Undo.

Equally bounteous is the DDX3216's I/O. On the analog side you get 12 XLR mic inputs, 4 ¼-inch line inputs, 12 inserts, 2 balanced XLR main outputs, 4 balanced ¼-inch TRS outputs (switchable), and 2 balanced ¼-inch TRS outputs. Other ports include word-clock in and out, a SMPTE input, an RS232 serial port, a PC Card slot for storing settings and mixes, and MIDI In, Out, and Thru. Digital I/O is S/PDIF on a pair of RCA connectors. For the two rear-panel card slots, Behringer offers three optional digital I/O cards: 16-channel ADAT, 16-channel TDIF, and 8-channel AES/EBU. You can assign these inputs and outputs in blocks of eight, mixing and matching to suit your needs.

We were delighted by the intuitive layout of the DDX3216's user interface, which is similar enough to other digital mixers that experienced users can dig right in. Lighted, multifunction rotary knobs on all channels help make for an analog feel, and 16-segment LED meters beside each fader provide easy signal monitoring. The unit's LCD screen is small, but the menus are well organized and the graphics clear, and screen navigation is a breeze thanks to dedicated knobs and buttons. We were also very impressed by the DDX's motorized faders, which are quieter than most we've used and feel as good as those on many higher-end digital mixers. Still another thing that turned our heads was the high quality of the unit's onboard effects, which include reverbs, delays, delay modulation, pitch shifting, ring modulation, an enhancer, and an autofilter.

No matter what your application, the versatile DDX3216 likely has you covered, and at a very impressive price. When it comes to small-format digital mixers, we aren't aware of a better value.

Modular Hard-Disk Recorder

ALESIS
ADAT HD24 ($2,499)

Alesis has plenty of experience when it comes to designing and building digital audio recorders. The Alesis ADAT modular digital multitrack tape deck has long been a staple of personal studios, but in recent years, low-cost, high-quality modular hard-disk recorders, portable digital studios, and computer-based DAWs have stolen its thunder. Heeding the old saying "If you can't beat 'em, join 'em," Alesis introduced its first multitrack hard-disk recorder, the ADAT HD24. The HD24 offers all the advantages of random-access recording, including cut-and-paste editing with 99 levels of Undo.

The HD24 is superior to its tape-based predecessors in every way, but we certainly didn't give it an award for outperforming 10-year-old technology. Alesis comes out a winner because when compared to the other M-HDRs we've seen in the past year, the HD24's cost-to-feature ratio is outstanding. It records 24 tracks, supports 24-bit recording at 44.1 and 48 kHz, and records 12 tracks from digital sources at 96 kHz. The HD24 comes standard with 24 channels of analog audio I/O over ¼-inch TRS jacks and 24 channels of digital audio I/O over Lightpipe. A built-in 10Base-T Ethernet port lets you network the HD24 with computers, so you can exchange audio files with your favorite audio sequencer. Two removable drive caddies make it easy to swap IDE hard disks.

Again, that's all standard equipment, not a set of pricey options. This baby is ready to record straight out of the box. But several options are available, including the EC2 96 kHz analog I/O board ($1,249) and the FirePort ($249) for connecting the HD24's hard disks on caddies to your computer's FireWire port.

Operating the HD24 is remarkably similar to using earlier ADATs, so it's familiar territory to a whole generation of digital-tape jockeys. Word

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clock, MIDI Time Code, and MIDI Machine Control are all supported, and solid construction ensures that the HD24 is built to last.

When you get down to the bottom line, where else can you find 24 tracks of good-sounding 24-bit recording, 24 quality A/D/A converters, and room for two removable hard drives in a box that weighs 20 pounds and costs less than $2,500? With its wealth of thoughtful features and its excellent value, the Alesis ADAT HD24 is simply hard to beat.

Most Innovative Product

C-MEXX
MIR ($399)

Hardware MIDI control devices are in plentiful supply these days. Some dedicate functions to specific software or hardware, and most are designed to sit on your desktop. Few, if any, are equally at home in the studio and on the stage. In contrast, the C-Mexx MIR can go anywhere, and it can control just about anything with MIDI jacks, including DAWs, mixers, effects, lights, and a MIDI-equipped coffee maker if you have one.

The palm-size MIR sports five buttons and two rotary encoders that also serve as buttons. Its Analog button is really an additional encoder. If you run out of digits, you can opt for the company's Live Paq ($195), which replaces the Analog knob with a foot controller and a couple of footswitches. To make the MIR stage-ready, you can add Live Base ($75), a kit for mounting the MIR on a mic stand.

The MIR's small size belies its excellent control capabilities; if its complement of knobs and buttons isn't enough for you, you can assign a button to access other control banks. The MIR holds banks in nonvolatile RAM.

Any MIDI message is fair game for the MIR's arsenal, from System Exclusive to entire sequences stored in SMF format. C-Mexx even offers Starlight ($545), a DMX adapter for controlling stage lights with MIDI. The manufacturer offers scads of downloadable control templates for products ranging from Yamaha's venerable DX7 to Sequential Circuits synths to Steinberg Nuendo.

The MIR Edit software (Mac/Win) comes with the unit and allows you to program your own control assignments. You aren't restricted to linear control of your data either; MIR Edit lets you scale and apply curves to your encoder data, including sine, cosine, and square shapes. You can also offset or invert data.

With all of the control options the MIR presents, it's good to know that the unit possesses a big and bright display. Moreover, you can set up user-friendly names for parameters under control rather than attempting to decipher arcane names or bank and program numbers for your assignments.

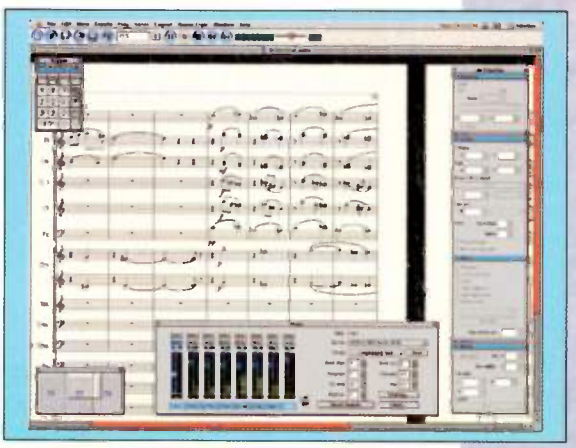
The MIR is adaptable, flexible, and simple to use, and if your device isn't supported, you can roll your own controllers. The gadget is already inspiring a host of user groups and third-party developers. If you'd like to break loose from the desktop controller paradigm, be sure to check out the MIR's innovative approach.

Notation/Music Scanning

SIBELIUS SOFTWARE
Sibelius 2 (Mac/Win; $599)

In spite of stiff competition from MakeMusic (formerly Coda) Finale, Sibelius 2's recent upgrade really impressed us with its long list of new features and enhancements. In addition, Sibelius got the jump on Finale when it became one of the first music programs to be fully Carbonized for Mac OS X. (It supports Windows XP on the PC side.)

The program's new Aqua-style user interface is bright and friendly. A new Properties window (with pop-out panels) offers direct access to layout parameters, and a new Mixer window provides control over playback levels. If you hate using the mouse, you'll especially love the program's expanded list of keyboard shortcuts.



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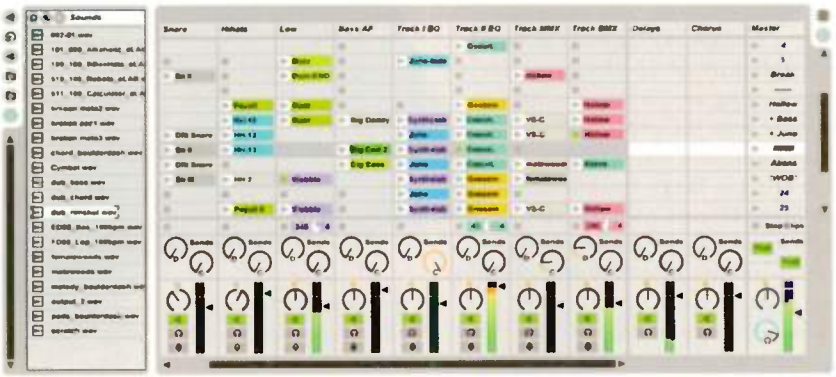
Real Time Audition

Audition audio clips along with your music in Reason, Logic, Nuendo, Cubase, and Digital Performer. Audition via headphones before dropping the clip into the mix.



Real Time Quantizing

Playback, record, and loop audio clips, at the same time. Live's unique Real Time Quantization keeps it all sync'd and in time, all of the time.

Connect Yourself

Connect via multi-channel soundcards, ASIO, Direct X, Mac OS 9.x, Mac OSX, ReWire (master and slave), and VST.

Real Time Effects

Drag and drop effects without stopping the music. Chain Live's built-in high-impact FX (including one of the finest reverbs you'll ever hear) and VST plug-ins in each track, the master and up to four send channels.

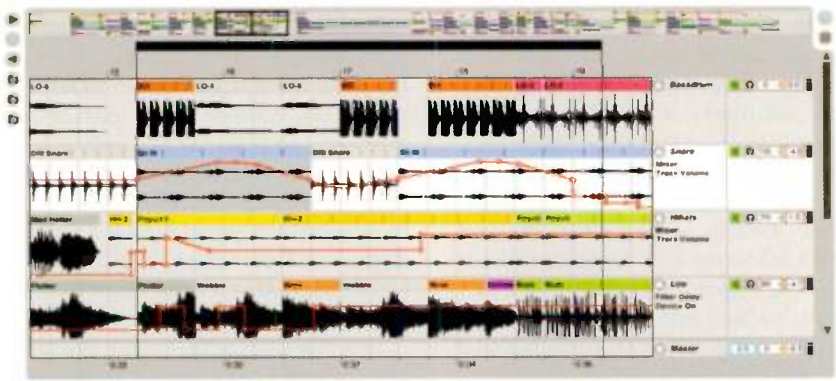
Real Time control

All mixer and FX parameters can be fully automated and operated using any MIDI controller.

live. sequencing instrument

Time Warping

Bring together audio from any source. All clips will automatically play with the project tempo—even long pieces with tempo changes. You can even scale the tempo of each clip relative to the project tempo, and it always stays in sync.



Say goodbye to your hardware sampler

With Live your hard disk size determines how many samples you can access in Real Time. Launch samples of any size via mouse, QWERTY or MIDI keyboard. Count on flawless performance since everything streams direct from disk.

Launch Modes

Not all clips are played equally, so Live offers more launch modes than any other software. Trigger, Gate, Toggle, Repeat, and Loop. Tell your clip when to start and stop, to play once, to play forever, to stutter, and more.

Live records it all

Live records all your actions, including all automation of the mixer and FX, and displays them in a classic timeline arranger. Everything can be post-edited in detail later.

Tweak with a Capital T

You've never heard audio get so stretched and turned inside out and still play in time. Until Live.

"Every now and then a program redefines what music is all about - like Sound Designer, Acid or Reason. Live is that kind of program. Its ability to record your performance for later editing bridges the gap between stage and studio." **Craig Anderton**

Winner of Electronic Musician Magazine's "Editor's Choice Award"

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live sequencing instrument

start playing.

The playback capabilities in Sibelius 2 are quite extensive. The program recognizes tempo markings, repeat signs, pedal indications, and crescendos and properly performs glissandi, tremolos, trills, and many other symbols. The same applies to guitar tablature and markings such as bends. You can even apply any of 16 rhythmic feels (from reggae and swing to Viennese waltz) to better approximate how the piece will sound when actually performed in the proper style. And that's not all: for large ensembles, Sibelius's SoundStage feature uses panning, reverb, and volume settings to automatically position the instruments in a 3-D sound field that simulates a concert stage.

Sibelius 2's powerful new Arrange feature can take a piano piece and automatically expand it into a full score with typical instrumentation and doublings. You can choose from more than 130 customizable arranging and orchestration styles, including band, choir, and jazz quintet. You can also "explode" notes from chords onto separate staves or create keyboard reductions.

If you write music for film or TV, you'll really appreciate Sibelius 2's new time-code features. You can now display the time-code position above each bar line, and the playback display can show elapsed time in SMPTE format. Sibelius automatically displays the score's total duration and updates the display as you add or subtract notes.

Sibelius 2 includes more than 300 instruments, 130 manuscript templates, a 10,000-level Undo command, a new Inkpen2 handwritten-style font, a 500-page hard-copy manual, and 37 "plug-ins" to clean up scores and perform other helpful tasks. Sibelius can even import Finale scores, and the included PhotoScore Lite 2 software adds powerful scanning capabilities. With so many amazing features packed into such a great-looking, user-friendly workspace, it's easy to see why Sibelius 2 deserves this year's award.

Portable Digital Studio

YAMAHA
AW2816 ($2,400)

The past year brought several good new portable digital studios, although, to be honest, there were fewer killer candidates than in the year before. Many of this year's contenders were miniature, low-cost recorders with reduced feature sets, but our big winner was not among them. Instead, the Yamaha AW2816 follows in the footsteps of a conventional PDS, Yamaha's AW4416. The new unit stands out not because of its small size or its track count; rather, it succeeds thanks to its flexibility, versatility, and attractive expansion possibilities.

The AW2816 offers four times the audio-processing power of the AW4416, along with improved effects and useful expansion options. The recorder offers eight simultaneous recording tracks and 16-track playback, with 4-band parametric EQ and dynamics processing on each channel. You can choose 24- or 16-bit recording with sampling rates of 48 or 44.1 kHz.

The unit holds a hefty library of effects-processing presets. Many effects are tailored to specific applications such as processing snares or recording guitars, and there's plenty of room to add your own. The two multi-effects processors offer reverb, delay, distortion, filters, and more.

Parameter changes and all fader movement send MIDI Control Change messages, providing dynamic MIDI automation when used with a sequencer. Because most controls can send MIDI messages, you can use the unit as a MIDI control surface. Among the templates you can download from Yamaha's AW2816 Web site are MIDI remote-control templates for a goodly number of digital audio sequencing programs and controller setups for a number of hardware and soft synths.

The AW2816 offers nine motorized 60 mm faders and scene-based automation with 96 scenes to capture your moves, and you get a healthy array of analog and digital I/O. But it's the unit's expandability that distinguishes it from other portable digital studios at its price point. The rear of the unit holds a slot for adding one of Yamaha's YGDAI cards, letting you expand the analog I/O or add a Waves Y56K card to expand the unit's DSP capabilities. The unit offers plenty more, such as Red Book audio import and WAV file import and export. You can see why the AW2816 made it to the top of our list.

Sample Player (software)

PLUGSOUND
Drums & Percs (Mac/Win; $100)

Electronic musicians who aren't drummers have a long history of creating their own percussion parts using drum machines, samplers, and synth

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workstations. But it's not so easy choosing a product that offers good sound, flexibility, ease of use, and solid programming power, all for a very good price. Plugsound, however, provides exactly that with Drums & Percs, a drum-sample plug-in for VST, MAS, and RTAS.

Drums & Percs sounds great, especially its electronic percussion sounds, and its features give you the power you to elicit some incredibly expressive and musical drum programming, assuming your chops are up to the task. Because Plugsound has done the sampling and mapping for you, you can load a program, select your drum kit, and make music, just that fast. What a concept!

The software flexes its power in the form of multilayered samples that crossfade smoothly and naturally. For instance, the cymbals ring beautifully, with none of the wobbly timbral artifacts that you get from overly truncated and looped cymbals.

Drums & Percs offers fully mapped drum kits with Velocity-switched samples, but you also get single-instrument-type layouts (such as snares) with an extensive collection of variations and articulations mapped across the keyboard. The sound set includes acoustic and electronic instruments, as well as a nice assortment of hand-percussion instruments, such as congas, djembe, bongos, shakers, triangle, tambourine, castanets, wind chimes, and darbuka. Some of these are also multisampled, Velocity-switched instruments.

If you tire of the software's 5,500 samples, you'll find a surprisingly flexible synth engine under the program's hood, which provides a healthy degree of sonic variety. Because each Plugsound sample voice is governed by its own synth engine, you can tweak pitch, envelope, filter, or amplitude settings for each instrument. Plugsound instruments support MIDI Control Change messages, so you can tweak filter resonance and cutoff (for instance) on the fly while recording changes into your sequencer.

The user interface is simple and scalable. You can choose Basic or Expert mode; each offers more controls than you would find on the average drum machine. Apart from filter settings, you can adjust instrument tuning, LFO rate and depth, envelope attack rate, release time, and more. The screen also has sensitivity controls that let you scale instrument response to Velocity.

All this power does have its price, but in this case, it's not the list price. Drums & Percs puts heavy demands on your CPU, so if you don't have a fast processor, you aren't going to be as happy as we were. But it's affordable, flexible, and simple, and it sounds great. It's time to stop squinting at keymaps and start drumming.

Sampler (software)

NATIVE INSTRUMENTS
Kontakt (Mac/Win; $399)

Software samplers are common these days, but you'll find more than just run-of-the-mill features in Native Instruments Kontakt. Drawing on technology used in the company's Reaktor, Kontakt provides ways to process samples that you won't find in even the most advanced hardware samplers and a sophisticated modulation matrix that allows you to animate every parameter of a patch.

Creating a new patch doesn't get any easier: just double-click on a sample in the Browser window that appears at the left of the main screen, and a new Instrument will appear in the Rack at the right. In the Rack, pick which of the three basic sampling algorithms will be at the core of your patch: Sampler, Tone Machine, or Time Machine.

The Sampler algorithm is a basic pitch-shifting process; the other two give you far more options for creative control. In the Tone Machine, for example, you can modify the formant characteristics of your sound without changing its pitch. Put that parameter under the control of a mod source, such as the Step Modulator, and you can draw patterns of up to 32 steps, each

I'M BIASED

David Torn aka splattercell
Guitarist/Texturalist/Producer

Collaborators include: david bowie • ryuichi sakamoto • carter burwell • kd lang • david sylvian • cliff martinez • me'shell ndegéocello • chute • page hamilton • b.l.u.e.

Soundtrack work includes: traffic • a knight's tale • three kings • heist • the velvet goldmine • simone

Photographed by Karjean Ng at the studio of film composer Carter Burwell, New York City

David Torn is a genuine musician's musician — one of the most respected of our time.

Whether working with David Bowie on his latest album, or creating trademark textural soundscapes for *Traffic* and other blockbuster movies, or crafting a new splattercell CD, David's aesthetic for raw sonic exploration goes far beyond a conventional approach to music, let alone guitar. And to help him make his discoveries, David turns to BIAS software.

As he puts it, "I'm not much interested in what's been done before, especially when it comes to my own work. I need to keep uncovering new ground — and I love how BIAS products help me do that so intuitively, with critical speed & stability. Like my guitar, they feel like they were built just for me, letting me create a vocabulary for the language of my music."

It only makes sense that BIAS software is an integral part of David's creative process. After all, we share a common focus: the intersection of technology and art, where creativity flows on a path of least resistance. And it's from this place we create tools to help *you* define your own unique vocabulary.

Ambitious? Idealistic? Perhaps. Unless, of course, like David, you also happen to be biased.

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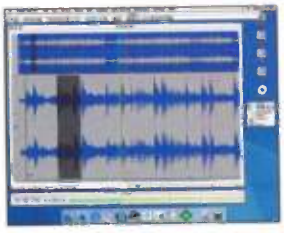

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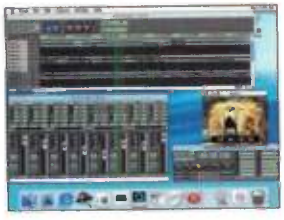

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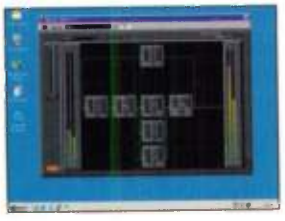

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WRH

with its own amplitude (amount) value, that will control the formant transposition level.

Like the Tone Machine, the Time Machine uses granular resynthesis as its basic operating principle and offers, among other things, a real-time time-stretching function that can be nearly free of artifacts or as nasty as you want. Just adjust its Smooth and Grain parameters to suit your taste.

It's easy to assign MIDI Control Change messages for real-time or automated control of any Instrument parameter, and a graphic overview of the structure of your patch, complete with one-click access to any element, is also on hand.

Kontakt has a few interface issues that we'd like to see addressed: you can only use one of three default sizes for its working window, which often makes reading text somewhat difficult, and there's no way to change its basic color scheme, which could use a bit more contrast among the elements. We also wish that you could record directly to disk when using the standalone version, but that's easy enough to do when using Kontakt as a VST or DirectX plug-in, which also allows you to run multiple instances of the sampler.

By the time you read this, Kontakt should be able to read samples directly from the hard drive. That feature will help keep this award winner at the top of its class for a good time to come.

Signal-Processing Plug-ins (bundles)

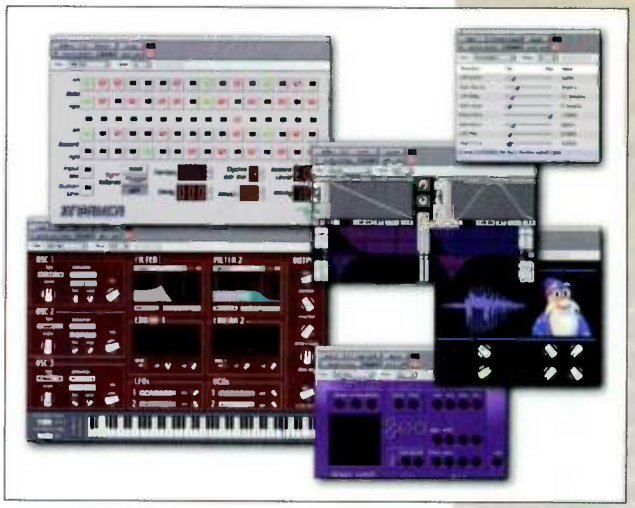
CYCLING '74

Pluggo 3.0 (Mac; $199)

We've always been big fans of Cycling '74's Pluggo, but version 3 really took us by surprise. Not only are there more than 100 effects plug-ins, many of which are either new or redesigned, but the release includes 19 new soft synths and significant enhancements to the user interface. And, if you own Cycling '74's Max/MSP, you can now make your own Pluggo plug-ins and distribute them to other users. Will the plug-ins never end?

Pluggo's offerings fall into a number of categories. There are reverbs, filters, delays, and distortion effects for starters. If you like to splice and dice your samples, then the large number of granulation tools will keep you busy. Get to know the inside of your sounds with spectral effects, such as the Convolver and Spectral Filter, and build your own color organs with the Visual Display group. Add to that a number of "utilities," such as the audio-routing and modulation tools, and you've got a plug-in workstation that can serve all your needs.

Pluggo 3 works with VST, RTAS, and MAS hosts. What's more, it adds features to your existing non-Pluggo plug-ins that they didn't have previously, such as the ability to randomize or modulate their parameters. You'll also appreciate having sample-accurate control over your plug-ins, which allows you to, for example, sync their



tempo to an external audio control source acting as an LFO.

We have no idea how the folks at Cycling '74 keep coming up with so many new and unique audio-processing tools, but, as far as we're concerned, the more the merrier. Plug it in and turn it on!

Signal-Processing Plug-ins (individual)

IK MULTIMEDIA

AmpliTube (Mac/Win; $399)

At a time when guitar-amp modeling is all the rage, one software product stands out from the crowd. AmpliTube, from Italian software developer IK Multimedia, is a VST and RTAS plug-in that brings a virtual guitar amplifier, speakers, and guitar-oriented effects to your computer.

AmpliTube is organized in three onscreen control panels: the Amp Module, the Stomp Module, and the Post FX Module. Ample onscreen controls let you precisely tailor your sound. The plug-in realistically emulates seven different preamps, four power amps, and nine speaker cabinets. Models range from British crunch to vintage clean. In its quest to replicate a guitarist's complete studio rig, AmpliTube also models tremolo and spring reverb, five different EQ

Yeah...we do DAWs

TASCAM DM-24 v2.0: Now with HUI™ emulation and much more.

With its new version 2.0 software, **TASCAM's DM-24** becomes more than just an incredibly powerful digital mixing console. It adds control surface capabilities for software DAWs like Pro Tools®, Digital Performer™ and Nuendo® via HUI emulation, with external control of levels, mutes, pans, track arming and aux sends, in addition to standard MIDI control of DAWs like Cubase®, Logic™ and Sonar™.

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Version 2.0 adds over 20 exciting new features to the DM-24, including 60 inputs at mixdown, new 5.1 surround panning, nearly unlimited signal routing, and much more. For all the info on the world's most powerful small-format console, visit your TASCAM dealer or **www.tascam.com**.

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Dynamic- and condenser-mic modeling let you customize your electric-guitar sound even further. Virtual preamps, power amps, EQs, cabinets, microphones, and effects can be freely mixed and matched into well over a thousand combinations. Dozens of presets are included, and every month, you can download new ones from the AmpliTube Web site (www.amplitube.com).

AmpliTube drastically reduces a guitarist's setup time and guarantees consistency from one recording session to the next. The promise of AmpliTube means no more lugging your amp, speakers, and effects from studio to studio. AmpliTube reduces the size of your onstage rig to a laptop computer routed through the house monitors. For the computer-based recordist, AmpliTube is **EM**'s choice for putting yet another element of the virtual recording studio on your desktop.

Signal-Processing Software (standalone)

CDP

Composers Desktop Project 4.5
(Win; $184)

Sometimes the most interesting software comes from the most obscure sources. Composers Desktop Project (CDP) is the effort of a small group of independent British composers and programmers and has its roots back in the mid-1980s. The system is a collection of hundreds of sound-generating and sound-processing routines that cover most every technique you can think of and many that you could never have imagined.

CDP's offerings fall into two main categories. One set operates directly on WAV files and allows you to modify sounds in numerous ways. Colorful and exotic names, such as Scramble, Zig-Zag, Drunk, Shred, and Motifs, suggest some of the more unusual processes you will find. All of the

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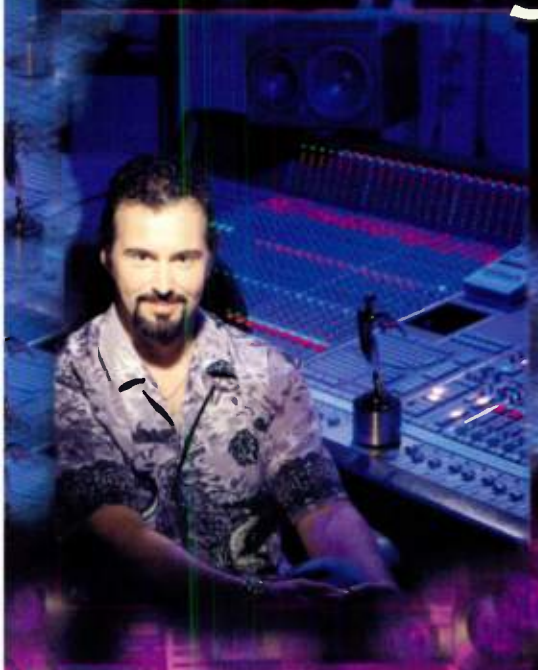

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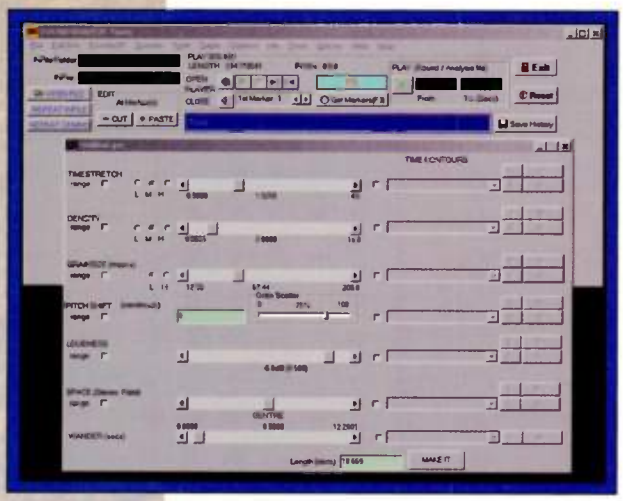
processes are nondestructive, so be sure you have a large hard drive on hand to save the numerous great-sounding files you'll come up with.



The second set of routines uses analysis and resynthesis as its main modus operandi and operates on the analysis of a sound's spectrum, which you create using the included Phase Vocoder analysis tool. Once you have a file analyzed, you can perform a vast range of modifications on it, such as time-stretching it without changing its pitch, freezing the sound on a single analysis frame, altering the amplitude envelopes of the sound's partials using LFOs or other types of functions, and morphing between the spectra of two different sounds.

Because all of the processes run as individual command-line routines, getting a handle on the tremendous range of options can be daunting. But there are several graphic interfaces for the system, including Sound Shaper by Robert Fraser and Sound Loom by CDP developer Trevor Wishart, that can serve as command central. These interfaces collect all the routines into a unified front-end and allow you to set parameters, save presets, view and edit your audio files, and more. CDP's low cost and excellent documentation, coupled with its enormous feature set, make it a winner in our book.

Sound Module (digital)

CLAVIA
Nord Rack 3 ($2,499)

What's fat, rackmountable, and red all over? Although we loved the Access Virus C, E-mu Proteus 2500, and Elektron Machinedrum SPS-1, the Nord Rack 3 is our pick for most desirable sound module. Even in the face of such stiff competition, the Rack 3's awesome sound, impressive feature set, and real-time programming depth bowled us over.

The Rack 3—a rackmount version of the Nord Lead 3—is a direct descendent of the very first analog-modeling synthesizer, which was introduced by Clavia in 1995. By harnessing its increased DSP power, the latest model combines two- and four-operator FM synthesis with analog modeling in a technology that Clavia calls Advanced Subtractive. With 24-note polyphony, a sophisticated arpeggiator, and the ability to simultaneously morph as many as 26 parameters in real time, the Rack 3 is a live-performance powerhouse.

The Rack 3 adds a 32-character LCD to the Rack 2's 3-digit LED display. Instead of 100 Programs and 100 Performances, the Rack 3 has enough locations for 1,024 Programs and 256 Performances. The onboard sounds are rich, complex, and versatile, offering a tremendous palette of virtual analog and FM timbres, even without onboard effects processing. Other enhancements include polyphonic glide and new creative capabilities in the dual-multimode-filter section.

The Rack 3's most exceptional advantage is real-time control. You can tweak almost any parameter by simply pressing a button or turning a knob to alter sounds either subtly or radically. On the front panel, dozens of infinite rotary encoders and buttons are accompanied by enough red and green indicator LEDs to light up a Christmas tree. All told, the Nord Rack 3 is a

synthesizer that will carry you well into the new year—and the next decade.

Synthesizer (analog)

ANALOGUE SOLUTIONS
Vostok ($2,599)

Despite the easy availability of hardware and software digital synths, analog instruments remain popular. The field is dominated by small, dedicated companies providing unique instruments for discriminating tastes. This year, one such company, England's Analogue Solutions, came up with an instrument that provides the modularity analog synthesists love in a compact and portable instrument.

The Vostok combines a wealth of modules in a single suitcase: two voltage-controlled analog

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fodder, but make no mistake: Kantos is no mere vehicle for sample-playback.

The synth's Timbral Articulator derives information in real time from the audio signal's dynamics, harmonic content, and formants to reshape the sonic characteristics of the oscillator wavetables. You can limit or scale the effect of the audio signal's parameters and adjust the amount of the original audio going directly to the output. If that isn't enough, you can deploy multimode resonant filters—one for each oscillator.

If you need a more traditional synthesizer approach, Kantos offers a formidable modulation matrix, including two LFOs and two ADSR envelope generators: one is for amplitude, and one is an assignable EG. Nonetheless, for all of its architectural depth and flexibility, using the synth is a relatively intuitive process.

A spooky and beautiful user interface laden with biomechanical overtones controls the

synth's powerful engine. Artistic considerations aside, the interface provides excellent visual feedback of signal flow and synthesis parameters.

The software excels as a sound-design tool, producing unique and often jaw-dropping hybrids of organic and synthetic sounds. If you're looking for fresh adventures in synthesis and sound design, you owe yourself a look at Kantos.

Synthesizer Workstation (software, standalone)

PROPELLERHEAD SOFTWARE
Reason 2.0 (Mac/Win; $399)

When Propellerhead Software introduced Reason, we were so impressed with the program's power and flexibility that we gave it a 2002 Editors' Choice Award. We were amazed that for less than the cost of a typical General MIDI sound module, Reason could provide an expandable virtual rack stuffed with synthesizers, samplers, drum machines, mixers, effects processors, patch bays, and a whole lot more. The software even included a built-in sequencer and a great library of sounds.

A year later, the second generation of Reason

THE AWARD WINNERS IN REVIEW

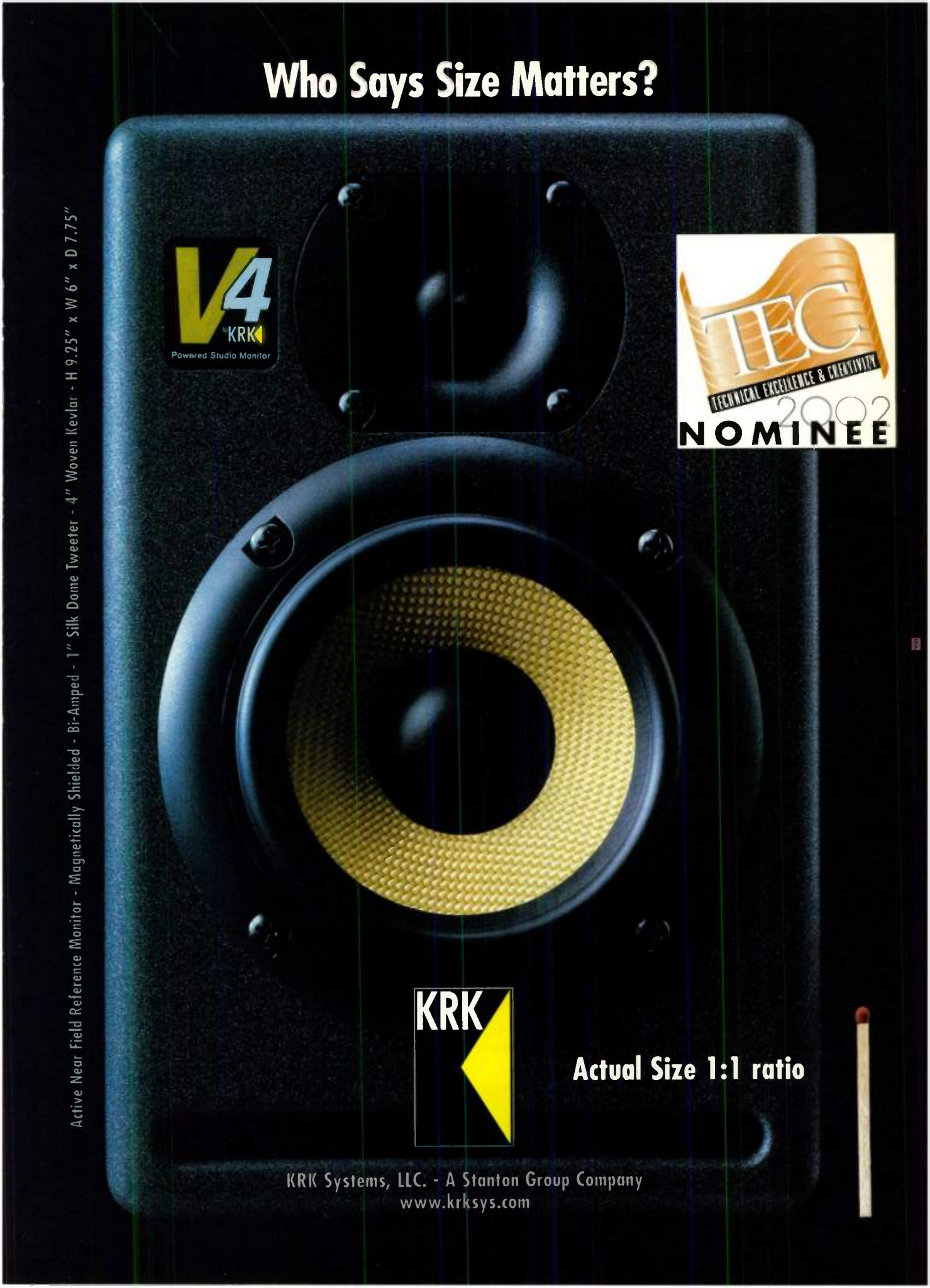
All of our award winners have been reviewed in our pages or soon will be. For products with reviews still in progress, we have completed enough tests to feel confident about our conclusions; most of these reviews will be published in the next two issues, though a few might be published a bit later.

An article title enclosed in quotes indicates that the product was covered in a feature rather than in a review. All other entries indicate reviews of the award-winning version except in the case of Ableton Live.

All published articles are available for download from the **EM** Web site at www.emusician.com.

Ableton Live 1.1	June 2002
Alesis ADAT HD24	July 2002
Analogue Solutions Vostok	In progress
Antares Kantos 1.0	In progress
Behringer DDX3216	October 2002
Blue Baby Bottle	June 2002
CDP Composers Desktop Project 4.5	December 2002
Clavia Nord Rack 3, "Analog Supermodels"	August 2002
C-Mexx MIR	June 2002
Cycling '74 Pluggo 3.0	January 2003
Event Electronics EZbus	September 2002
IK Multimedia AmpliTube	In progress
Korg Triton Studio	November 2002
Kurzweil KSP8	In progress
Little Labs PCP Instrument Distro 3.0	March 2002
Mackie Designs UAD-1 Powered Plug-Ins 2.2.2	November 2002
M-Audio Oxygen 8, "Surfin' USB"	September 2002
Metasonix TM-2	In progress
Native Instruments Kontakt	In progress
Plugsound Drums & Percs	In progress
Propellerhead Software Reason 2.0	In progress
RME Hammerfall DSP	April 2002
Roger Linn Design AdrenaLinn	August 2002
Royer Labs R-122	January 2003
Sibelius Software Sibelius 2	In progress
Sound Quest Infinity 2.05	August 2002
Steinberg Cubase SX	In progress
Summit Audio TD-100 Tube Direct Instrument Preamp	April 2002
Syntrillium Cool Edit Pro 2.0	December 2002
TC-Helicon VoicePrismPlus	September 2002
TC Works PowerCore 1.5	April 2002
Valvotronics Tube Amplified Direct Box	November 2002
Yamaha AW2816	In progress

Who Says Size Matters?



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arrived, and once again it really knocked our socks off. Especially on the Mac platform, Reason has made significant gains. It is now completely

compatible with Mac OS X, with full support for Core Audio and CoreMIDI, obviating the need for OMS and ASIO extensions. And Reason's already low latency can drop to less than a millisecond under OS X. Moreover, Reason's support for multiprocessing in the new Macs enables it to run audio on one processor while running graphics on the other, yielding even more power and better efficiency.

Speaking of efficiency, Reason's main sequencer (which has several new tools) can now be detached from the rack. If you're running a dual-monitor system, you can view the sequencer on one screen while setting up your rack on the other screen.

The most exciting additions to Reason 2.0, however, are the two powerful new virtual instruments. The Malström Graintable Synthesizer is a novel two-oscillator/two-filter software synth that creates its unique sounds through "graintable" technology, a cross between granular and wavetable synthesis.

The other new instrument is the 32-bit NN-XT, a much more advanced sampler module than Reason's original NN-19. For more realistic re-creations of acoustic instruments, the NN-XT includes a function that randomly switches between alternate samples when a note is repeated, so the same sample isn't triggered twice in a row. The NN-XT also supports Velocity switching and crossfading and provides two tempo-syncable LFOs (as do all of Reason's updated instruments), along with filter and envelope controls. To top things off, Reason 2.0 includes a completely new high-quality orchestral sample library replete with brass, woodwinds, strings, and much more.

Reason's impressive collection of synths, samplers, ReCycle loop players, mixers, effects, and other goodies makes it the ultimate one-stop music-production workstation. With its newly redesigned colorful 3-D interface and its greatly expanded feature set, Reason is clearly a winner once again.

Voice Processor

TC-HELICON

VoicePrismPlus ($1,598)

A significant upgrade to the VoicePrism, which was introduced in 2001, the VoicePrismPlus offers the same microphone preamp, dynamics processing, effects processing, and four-part harmonization. The "Plus" is TC-Helicon's patented voice-modeling technology, and it's a big plus indeed. For years, physical modeling has been applied to synthesizing complex instrumental voices but only rarely to the human voice, and never to this extent in a high-profile commercial product.

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Other new features of VoicePrismPlus include AES/EBU I/O, 24-bit A/D/A converters, better compression and EQ, and an expanded effects selection. Owners of the original VoicePrism can upgrade to the Plus by adding the VoiceCraft card ($599). TC-Helicon has practically accomplished a miracle in advancing the state of audio technology, and we are happy to acknowledge the company's contributions by bestowing an Editors' Choice Award upon the VoicePrismPlus.

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DO IT DIY YOURSELF

The Art of the Creative Short Circuit

Illustration by Laura Williams

A Beginner's Guide to Circuit Bending

By Qubais Reed Ghazala

Not that long ago, a short circuit in audio electronics was considered to be only one thing: destructive. But nowadays, an audio short can function as a constructive as well as a creative element.

The creative short circuit, or the technique that I call circuit bending, is a form of hardware hacking or modding, but with two important differences. First, whereas hackers usually know something about electronics, you don't need any real knowledge of electronics to circuit-bend. Second, while most people hack an instrument with a particular goal in mind—such as increased frequency range or cleaner outputs—the circuit bender works improvisationally and has no idea where the trail will lead.

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The Art of the Creative Short Circuit

In circuit bending, the instrument shapes itself by telling the bender what it can do. In this way, circuit bending has turned the electronic circuit into an immediate "canvas"; a circuit is accessible at that moment to everyone for the creative act. No theoretical knowledge is required, and on the first occurrence of experimentation a one-of-a-kind instrument is created.

SHORT YOUR OWN

Before I go into detail about how to build an Incantor, which is my design for bending a Speak & Spell, a Speak & Read, or a Speak & Math toy, I will begin with a general primer on circuit bending. Circuit-bent instruments can sound like just about anything, real or unreal. To hear what a typical Incantor sounds like, check EM WEB CLIPS out the audio examples online.

Circuit-bent instruments can retain their original voices, especially if the bender makes only modest adjustments in timbre or envelope. It is the deep end of circuit bending, however, that most people find enticing. Many circuit-bent instruments produce fascinating aleatoric music under the "clear illogic" of circuit bending. Here we seek to embrace, rather than tame, the chaos.

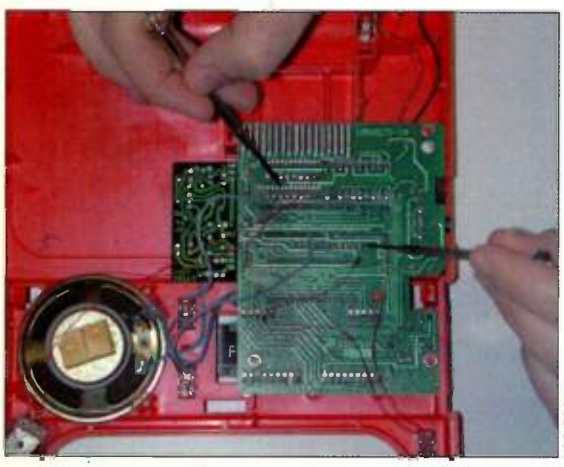
CAUTION BEFORE YOU BEND

Although circuit bending is simple, it is a try-at-your-own-risk endeavor. Never attempt the following procedures on anything that is plugged in to an electrical outlet—not even through a wall wart. You want no relationship whatsoever with the power mains, secondary coil or not. Transformers can fry and shunt, and wall-wart electronics are often shoddy. Circuit bending is only for battery-powered circuits of 6V or less.

Never bend a circuit that you'll miss if it fries. Bending is more for the abandoned circuit—like the sound toys that you see in thrift shops—than it is for your vintage stompbox from the '60s. Anyone can destroy a circuit in a moment with the wrong connection. But don't let that stop you; it's more likely the result will be unusual audio artifacts.

Soldering is an important aspect of circuit bending and is fairly easy to learn. For this article, I will assume that your soldering skills are such that you can make quick and precise connections. Quick, because some components can be damaged by the heat of excess soldering, especially since the bender may at times find it necessary to solder directly to integrated circuit (IC) pins leading to delicate electronics inside the IC. Precise, because, as in the example of IC pins, clearances can be minimal. The danger is that you may create an inadvertent "solder bridge" between IC pins (or other tightly spaced metals, such as printed circuit traces, component leads, and so on) that were not meant to be soldered.

Practice soldering until you feel comfortable, quick, and precise. In addition, practice safe soldering. Vent smoke away from you, wash your hands thoroughly after soldering to remove lead residues, and wear safety glasses.



ROB FORLIN

FIG. 1: For body-contact circuit bending, hold the screwdrivers in your hands as you search for places to put contacts. In this photo, switches have already been connected to the circuit board.

ROB FORLIN

FIG. 2: This example of the Incantor, built from a Speak & Spell, has three switches (upper middle and upper right), one potentiometer (upper left), and a reset switch (lower right).

If you're new to the field, I recommend that you read an electronics book geared toward beginners. Forrest M. Mims's books *Getting Started in Electronics* and the *Forrest Mims Engineer's Notebook* (both available at Radio Shack, among other places) are good to begin with. These guides explain useful terms and cover how various components—switches, potentiometers, resistors, capacitors, and LEDs—operate. The books also cover the basics of circuit construction and lead into more advanced subjects.

GENERAL BENDING

Begin by finding some good-sounding battery-powered musical toys, such as keyboards or talking games. You'll find these clogging the isles of many second-hand stores, as well as at flea markets and garage sales. Bring a supply of batteries when you shop—four each of AA, C, and D sizes—so you can try the devices before you buy them.

Open the toy you've selected in order to expose its circuit, but keep the batteries in place. At each end of an alligator-clip test lead, clip a small metal jeweler's screwdriver (see the sidebar "Circuit-Bending Toolkit"). While the circuit is making a noise, and with your safety glasses on, press one of the

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screwdriver tips to a circuit trace (see the sidebar "Circuit Precautions"). With the other screwdriver tip, touch the various traces while listening for interesting changes in sound. Every time you find an interesting sound, use a marker to note the connections on the board.

Search the board in this way until all possible connections have been tried. Once you're finished, move the stationary tip to another trace and start again. Repeat this procedure until you have searched the entire circuit. Once you have fully explored the circuit and marked the board, you can implement your newly discovered connections using any of the following parts.

Direct wiring/switches. Between each pair of points, solder a wire with a toggle switch in the middle. Next, mount the switch on the case somewhere. Use the simple mini toggle switch known as Single Pole, Single Throw (SPST).

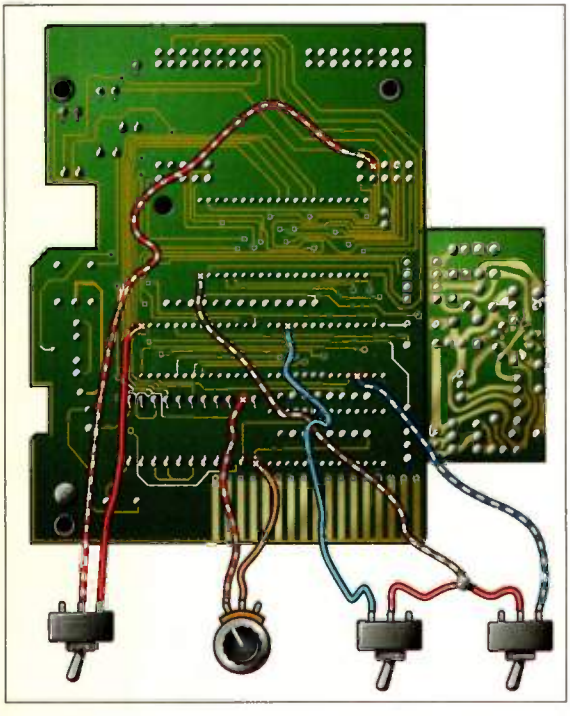

FIG. 3: Here is a typical Speak & Spell circuit board, showing where to connect three toggle switches and a potentiometer. You can use this as a guide if your circuit doesn't match this one exactly.

CIRCUIT PRECAUTIONS

Besides protecting yourself and the components that you add to the circuit, there are precautions you can take that will protect the circuit itself. While exploring the circuit with the test lead, make the connection very briefly at first. Always exercise caution while near the power supply. Voltages here are often higher than elsewhere on the board and can zap a chip if jumped to a pin "downstream." Forget about that connection if you witness:

1. Any kind of a spark
2. Dimming of electronic displays or lights
3. A pop or hum from the speaker
4. A decrease in volume or a stop in sound
5. Any component (including batteries) warming up

Potentiometer. Add a potentiometer (variable resistor) to the new circuit. That will allow you to adjust the effect in interesting ways. Potentiometers, like nonadjustable common resistors, come in a variety of values and are measured in ohms of resistance. Experiment with different values to learn about their effects.

Potentiometers usually have three soldering points or lugs. Solder your two wires so that one connects to the middle lug and the other to one of the outside lugs. (Which outside lug you choose determines whether you turn the dial clockwise or counterclockwise to initiate the effect. You may need to experiment.)

Capacitors. Try adding capacitors to obtain timbre changes and pulsing effects. But be aware that larger electrolytic capacitors can hold a charge and zap you. Even though you will rarely see these capacitors in the typical instruments you'll bend, you should read up on the subject of capacitors if you're not familiar with them.

Photo resistors. These are light-sensitive cells that have two wire leads. They convert light into electrical resistance and have the same effect on a circuit as a potentiometer. But instead of turning a dial to vary the resistance, you vary the amount of light reaching the photo resistor.

LEDs. In circuit bending, light-emitting diodes (LEDs) are usually used as low-voltage light sources. You may find that an LED will glow or pulse when placed between circuit points. This can serve as a function indicator. For example, an LED wired to the speaker leads may indicate the envelope of the sound by flashing with the intensity of the sound waves. LEDs may also affect the sound of the circuit, depending on where they are connected.

LEDs are "polarized" components; if they don't glow when connected between promising points on a circuit, try reversing the leads. If they still don't glow, there is not enough power available to activate them.

CAUTION: with your goggles on, test an LED's connections very briefly at first. Overpowered LEDs will glow too bright or off-color at first, and may then finally shatter.

Body contacts. Body contact is an interesting part of circuit bending but by no means crucial. Among the countless designers who have used body contact with electronic circuitry are Michel Waisvisz with his Crackle Boxes and Donald Buchla with his capacitance keyboards.

Although I've used the body-contact system on these low-voltage circuits for 35 years without noticeable harm, I'm not about to tell you that it is without risk. (I have been assured by experts that the voltage levels involved are nothing to be concerned about; the

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The Art of the Creative Short Circuit

flow is minimal and external/dermal.) If, however, the body-contact system scares you, don't do it.

Body contacts are simply metal contacts, such as drawer knobs or finials (threaded brass balls that attach to light fixtures), that are wired to the pair of circuit-bending points. Each of the two circuit points goes to its own body contact. Nothing is wired between them: no switches, no potentiometers, and no sensors. These contacts, when mounted on the instrument's case, are meant to be bridged by the player's body, making him or her a variable human resistor. Vibrato and tremolo are easy to achieve using body contacts, but you might also find contacts that will affect tone and sound and/or sequence triggering.

Before you begin, search the entire circuit with a volt-ohm meter. If you find areas that are more than 6V, avoid them in your body-contact searches. If you ever feel the electricity of a body contact, abandon it or find an alternative.

After verifying a low-voltage board with your volt-ohm meter, search the circuit as before. This time, however, hold a screwdriver in each hand instead of using the alligator-clip test lead (see Fig. 1). While listening for changes in the sound, mark the responsive connections for body contacts. Next, wire a metal object to each point and attach them to the case. By touching these contacts, the player changes the sound and becomes an integral part of the circuit.

Q. R. GHAZALA

The author's Photon Clarinet includes a pair of external controllers.

Again, it must be stressed that you should attempt the body-contact method only with battery-operated audio devices that use 6V or less. Never attempt this procedure using a device that is plugged in to an AC wall outlet.

Reset switch. Whether it's your PC or a Speak & Spell, systems crash. In order to reset a bent circuit, install a "normally closed" (NC) push-button switch to interrupt the voltage supply from the battery compartment. Begin by searching for a battery wire to clip. If you cannot locate one, you will have to study the circuit and find a power-supply trace on the board to cut. Next, solder the switch with a wire to each side of the cut trace.

To find an easier soldering point for the wire, follow the trace to the next component or scrape the trace clean on either side of the cut and melt a small blob of solder onto the trace. Then, solder the wires to those blobs. Be sure to mount the switch in a place where you won't hit it accidentally.

Line outputs. Line outputs are important if you want to experience the full potential of an instrument's frequency range (which often far exceeds

CIRCUIT-BENDING TOOLKIT

- Low-wattage (30W or less) soldering iron, with a very narrow tip (perhaps filed down for fine work). This type of iron is inexpensive and can be found in electronics stores. A soldering station, with a cleaning sponge and resting cradle for the iron, costs a bit more but is well worth the additional expense. The more expensive soldering irons usually have an assortment of tips available, including one with a smaller diameter (around 1/16-inch) that is useful for circuit bending.
- Thin rosin-core solder.
- Small hobby drill (such as the Dremel) for creating holes for mounting switches and other components. Use the 1/8-inch drill bit for the pilot holes and the ball-shaped burr bit to bring the hole up to the correct size for the component being mounted.
- Jeweler's screwdrivers. A set of small, all-metal, noninsulated screwdrivers—slotted and Phillips head.
- Set of miniature crescent wrenches (such as Craftsman from Sears) for fastening all panel-mounted controls.
- Wire clippers (small).
- Wire stripper (small) capable of stripping wire as thin as 25 to 30 gauge.
- Test leads. Insulated wire terminated at each end with an alligator clip.
- Tapered hand bore (optional). This is a hand tool used to ream out holes to the correct size. This tool will increase the 1/8-inch pilot holes to the exact size for unusual components or those too large for a Dremel burr bit, such as a 1/4-inch-diameter pilot-lamp housing.
- Resistance substitution wheel (optional), containing assorted resistors of increasing values, which are selected by the turning of a dial. The device is clipped into a live circuit using two leads so that the selected resistor's effect on the circuit can be heard. That will help determine the correct resistance or resistance range needed at a circuit point so that a resistor or potentiometer of the correct value can be soldered into place.

A custom circuit-bending console can be built in the form of an elaborate substitution box. Such a box may contain selectable components (selected with multiposition rotary switches) to run the circuit-bending paths through, including resistors, capacitors, potentiometers, sensors, and LEDs. Like a resistance substitution wheel, a circuit-bending console would be another two-lead device that could be clipped between two circuit points and adjusted to observe audio changes within the operating circuit.

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The Art of the Creative Short Circuit

the capability of the built-in speaker). Adding a line output also opens the unit up to external signal processing.

A suitable line output can usually be derived from the wires going to the speaker. Simply mount the output jack of choice on the case and solder new wires to it that come from the speaker terminals. Then, plug the instrument in to a small amp to check the output level.

Slowly turn the amp up. If the signal is too hot, add a trim pot to one of the wires going to the new jack you installed and adjust it accordingly (1 MΩ will probably work).

Replacing components. In addition to creating new circuit paths, you can replace the components on a circuit with ones of a different style or value. For example, a standard resistor on a circuit board can often be replaced with a potentiometer or a photo cell (both are variable resistors). If the component is a resistor that sets the pitch of a voice (which is common), that voice now becomes tunable, allowing you to change frequency with the turn of a dial or the shifting of light. Similarly, you can replace a potentiometer with a photo cell. Motion sensors—such as mercury, boxed ball, and tilt switches—can be wired into small devices for dance or gesture-driven instruments.

To address space limitations when mounting new controls, completely remove the circuitry from its original housing and install it in a new enclosure. Or, construct a remote-control panel to hold the new switches and dials and connect it to the original circuit by means of a braided or ribbon cable.

For those situations in which there is limited space in which to solder—as with short component leads and IC pins—study the circuit to see if the area you wish to solder to is connected to a trace on the board that's easy to get to. A

O. R. GHAZALA

This highly customized Incantor was built from a Speak & Read. Notice the metal body contacts below the speaker.

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resistor lead within a circuit that is hard to get to, for example, might connect with a printed circuit trace that emerges, with full access, on the other side of the board. Soldering to a trace that connects to the desired component elsewhere is the same as soldering to the component lead itself. This technique can be a real problem-solver for tight spaces.

Many additional components can be wired into the path of the pairs of circuit-bending points. But the above will get you started on your way to discovering hundreds of possibilities as well as toward understanding wider concepts.

TEST BEFORE YOU SOLDER

You can use a modified test-lead system to quickly test the various components between the pairs of contact points. Such a system consists of the two screwdrivers as before, two alligator-clip test leads instead of one, and the component to be tested (potentiometer, photo cell, LED, and so on).

Clip a screwdriver at one end of each test lead. Next, between the empty ends of each test lead, clip the component to be tested. The screwdrivers again serve as probes with which to search the circuit, but now you are sending the signal through the component that is clipped between the two leads.

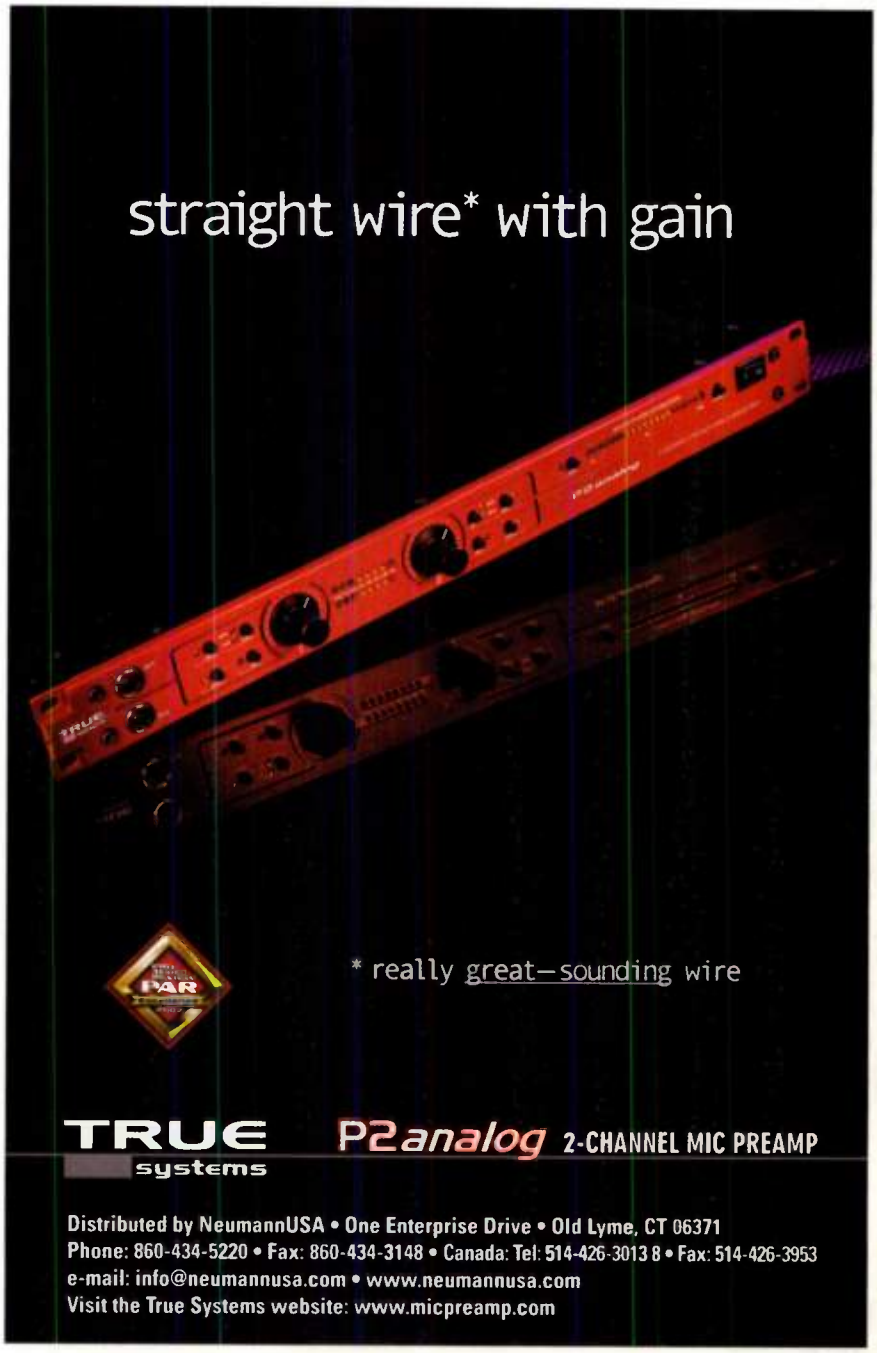
The wiring procedure begins when you determine how many pairs of connections you have, the types of components you want, and how many you'll need. Then, you can decide how and where they will be mounted on the device's case. (Remember to check for clearances so that the backs of the new switches don't hit internal parts when the unit is reassembled). Next, drill the holes, mount the switches, and solder the pairs of circuit-bending connections through their respective switches.

ADVERSE EFFECTS

Your new circuit paths may have no adverse effect upon a circuit when they

Q. R. GHAZALA

The author added a number of recognizable features to this example of a Morphium.



are switched on by themselves. Problems may occur, however, when some of the paths are used simultaneously. For example, the volume may decrease or drop out altogether when two or more switches are on.

Be aware of such switching combinations; avoid them or modify the wiring behind them by finding another pair of points to wire one of the switches to. Retest the device. Feel the ICs, resistors, and other components on the circuit board as you test the connections. If you make a connection that causes a component to become unusually hot (some components warm up a bit normally), it's a good idea to avoid that connection. Good circuit-bending connections create unusual audio behavior without taxing the circuit or draining power, and without destroying the electronics.

There is no way to experience all the switching combinations as the new wiring is being charted on the circuit board. Not until the instrument is complete can the designer fully explore it, because it is not until then that all of the connections and new controls are in place and can finally be combined. At that point, the instrument reveals itself in ways not evident during the initial, one-effect-at-a-time discovery process. This is a wonderful moment.

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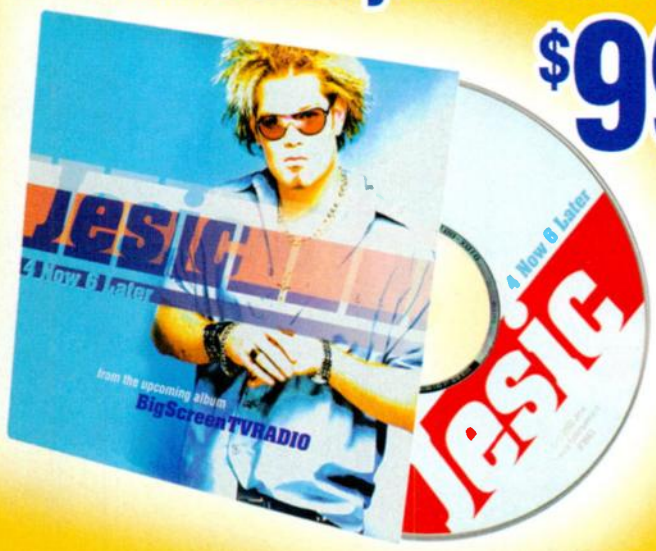

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INCANTOR ENCOUNTER

The Incantor streams shattered phonemes, bridged with unusual tones and noises, that combine with recognizable words as the speech synthesizer's linear predictive coding lattice is rearranged by the creative short circuit (see **Fig. 2**). It is possible to set loops on an Incantor. That provides a means of control within the chaos and allows you to divide the abstractions into approachable measures. I also add a master pitch control so that the sounds can be clocked *very* slowly.

You can induce a real-time vibrato using body contacts. Those usually take the form of small metal balls wired directly to circuit points. When you touch the contact points, changes occur within the circuit that might adjust pitch, volume, or timbre or initiate other circuit activity such as triggering a voice or incrementing a loop.

You should become familiar with how the Speak & Spell works before you begin to bend it (see the sidebar "Parts for the Incantor"). There were many different circuit boards in the Speak & Spell over its manufacturing run (see **Fig. 3**). While the instructions here show one of the most common boards, yours might not match. Just dive in with the general bending advice provided earlier and use Fig. 3 as only a very general guide. (You can e-mail me directly with questions if your board doesn't match the one presented here or if you want to inquire about a prebuilt Incantor.)

After removing the batteries, remove

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DESKTOP MUSICIAN

Has OS X Joined the Band?

In the world of OS X, the audio community is still rounding the bend.

By Daniel Keller

Most desktop musicians are accustomed to hype. We're inundated with a generous Minimum Daily Requirement of it, and we frequently dish it up ourselves. But even in today's jaded marketplace, when Apple paraded out OS X to its eager fans in March 2001, the excitement was palpable. OS X was hailed as possibly the most significant development in Apple history since the Macintosh itself. The new operating system boasted the bedrock stability of a Unix code base with core-level multimedia integration, while still maintaining the smiling mug and useful simplicity of a Mac. As described by Apple, OS X would change the face of Mac computing practically overnight.

So here we are, more than a year and a half later, and only a handful of audio applications have placed both feet firmly on the good ship OS X. Hardware drivers and plug-ins also remain a crapshoot. While the rest of the Mac world has been moving to OS X with only minor hiccups, most audio-related companies have lagged far behind. What's the holdup? The answer, as you might expect, depends on whom you ask.

FIG. 1: As soon as multichannel audio support was fully functional in OS X, BIAS released Deck in an OS X–compatible version.

HOW DID WE GET HERE?

The Mac, for all its renown as a media-production platform, was not originally created with that intent, any more than Wintel machines were. The Mac's Sound Manager audio protocol was woefully limited, and its provision for handling MIDI and plug-in DSP was pretty much nonexistent. But the Mac's architecture was very accommodating to third-party add-ons for audio, MIDI, and other media-creation functions,

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and over the years, a number of innovative technologies have been developed to work that magic within the Mac operating system.

Unfortunately, the various entities creating those technologies have, for the most part, done so independently (and competitively), with precious little leadership or direction from Apple. The result is a laundry list of occasionally compatible formats and protocols for audio, MIDI, and plug-ins: OMS, FreeMIDI, DAE, Direct I/O, ASIO, EASI, MAS, TDM, RTAS, and more. And attached to each of those "standards" is a structure of products and a base of users built up over many years (and representing a lot of cash).

RIGHT TURN

Enter OS X. Much more than just a handful of tweaks or a new coat of paint, OS X is a major paradigm shift for the Mac. It promises to integrate multichannel audio and MIDI at core level, reducing latencies to single digits. (Note that I said "promises." More on that in a moment.) In fact, it's fair to say that OS X has the potential to outperform all other operating systems, without any third-party extensions (see the sidebar "Speed Demon"). By integrating all aspects of multimedia at the core level, Apple's goal is to drive this ubiquitous functionality from the application layer down to the system layer. That has the potential to create what should have existed all along—a true single standard for all Mac media functions to be built upon.

▼ Hopefully, we're nearing the end of a protracted transition that has been tough on everyone.

A move in that direction, however, places the future of many of the existing formats and protocols in question by potentially eliminating the need for third-party extensions. Developers are faced with the difficult choice of either abandoning their hard-earned protocols in favor of direct integration or somehow merging their technologies to run within, alongside, or on top of OS X. It's not a simple task either way. Even veteran Mac programmers have said that it has taken them several weeks just to get their heads around OS X. That's a lot of time to devote to engineering resources before the task of adapting products even begins.

Hardware-based systems such as Digidesign's Pro Tools have an even more difficult task: many developers have found that writing hardware drivers for OS X is considerably more complex than for OS 9. And plug-ins raise a new set of issues. As manufacturers create native OS X versions, users will (justifiably) gripe about having to repurchase what they already own.

IS IT SOUP YET?

The biggest hurdle in getting audio developers on board has arguably been the development pace of OS X itself. While OS X promises a lot, much of that has until recently been just that—promises. The original release had no real support for multichannel audio; that was gradually implemented over several updates. CoreMIDI support was similarly crippled; although the infrastructure was there, there were no access hooks for programmers. Not until the release of version 10.2 (Jaguar) has much of this support been fully implemented. According to several developers, the main reason for the delay in building OS X support was that the operating system wasn't fully baked yet.

At the time of this writing, Jaguar has just begun shipping, so it's too soon to tell if the new version will resolve all the open issues. The superiority of CoreMIDI over the present options is generally agreed upon. But although Apple feels that Core Audio should universally replace applications' audio engines, not all development partners agree. Hopefully, many third-party protocols will continue to coexist peacefully.

The issue of plug-in standards is similarly unresolved. Though some plug-ins have been Carbonized to function in OS X, for the time being there are few native Core Audio plug-ins other than a dozen or so bundled in Apple's OS. Audio Unit (OS X's native plug-in format) is reported to be fully implemented in version 10.2, but again, until now no shipping OS has supported it.

FIG. 2: MOTU's popular Digital Performer will appear in an OS X version (shown here) now that the program's much anticipated 3.1 update has been released.

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A number of smaller issues also remain. For example, many users have reported having problems with transferring large (1 GB or more) files to and from external FireWire drives; others have encountered audio problems within iMovie. While neither issue is directly related to writing audio software, many developers have pointed out that Apple's slowness in resolving loose ends doesn't help to inspire their confidence.

In Apple's defense, there has never been, and probably never will be, any operating system with a flawless version 1.0 release. The sheer magnitude of this project makes some stumbling inevitable. Nevertheless, a number of audio and media developers and their users have been understandably vocal in criticizing Apple's pace on this issue. At least in the audio world, the full potential of OS X still has yet to be realized or proven. For all its zeal in wanting Mac users to adopt OS X, Apple has been a major obstacle in getting it done.

THINKING LOGICALLY

Anyone who has followed Apple's history knows that the company is famous for surprises and sudden changes of direction. As if the whole OS X transition weren't interesting enough already, on July 1, 2002, Apple redrew the maps with its surprise purchase of Emagic. The venerable creator of Logic Audio has been an industry leader since the Neanderthal days of MIDI, and Logic has always been among the top choices for audio professionals.

Apple's purchase of Emagic has potentially far-reaching consequences for Mac- and PC-based musicians. The most visible and immediate results are on the Windows side; Apple has dropped Logic PC, leaving many Logic users stranded and removing a major innovator, competitor, and motivator from the ranks of Windows audio.

In the Mac world, the future is far from certain whether you use Logic or not. What will be the long-range effect of Apple's move from host-hardware manufacturer to direct competitor? How will Apple's relationships to software rivals such as Steinberg and BIAS fare over time now that the developers of Logic have the inside track on Apple's plans? What about hardware developers? How will Apple's handling (and probably integrating) of Emagic hardware affect companies such as MOTU and Digidesign?

Even for Logic users, nothing is guaranteed. In the short term, Logic's audio engine will be a great complement to everything from iTunes to Final Cut Pro. But how will being a part of Apple affect future development? Certainly there's enormous potential for Apple to take a leading role in the development of operating-systems media technologies, and that would be an industry first. We'll just have to wait and see whether Apple gives the new "iLogic" division the resources and autonomy to be a driving force or whether it waters it down to a consumer-grade shadow of its former self. (For more on Apple's purchase of Emagic, see "First Take: Big Mac Attack!" in the September 2002 issue.)

MAYBE SOMEDAY

Hopefully, we're nearing the end of a protracted transition that has been tough on everyone. Apple has developed an operating system capable of transforming the Mac into a far more powerful multimedia machine—something even Apple admits should have happened 15 years ago. Assuming Jaguar has all the pieces finally in place, it's likely we'll finally see the migration begin to accelerate. (Of course, Apple's stated intention to make all pre-X operating systems obsolete in the not-too-distant future tends to wield some leverage.)

Developers, for their part, have been in the unenviable position of having to essentially start over. Much of what they've created for the Mac of the past—enormous amounts of work and expensive research—simply won't work under OS X. For all intents and purposes, they are now writing for a brand-new machine that handles tasks in a completely different manner. Entire code bases have had to be scrapped and rewritten.

Meanwhile, most users are still watching the dust settle. Mac users of graphics and other applications have largely made the jump already, but for desktop musicians and Mac-based studio owners, the passage is as agonizing as

FIG. 3: Steinberg is introducing OS X versions of Nuendo as well as Cubase SX (shown here).

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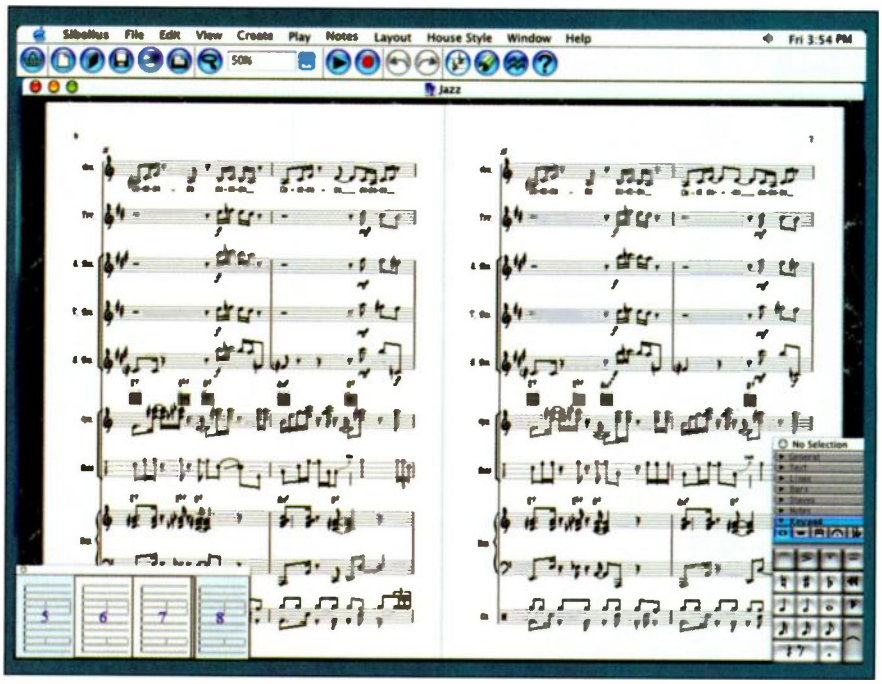

FIG. 4: Sibelius Software's Sibelius 2 was one of the first notation programs to support OS X.

watching slugs race. We run OS X on partitioned drives, going back to OS 9.*x* for the stuff we still can't do in OS X. Nonetheless, things are slowly changing. As of this writing, Propellerhead's Reason, Ableton's Live, BIAS Deck, and a handful of other applications run under OS X; by the time you read this there will be many others.

STATE OF THE STATE

I got in touch with several of the major players in the world of Mac audio in order to get an update on where they are with OS X.

BIAS was one of the first companies to support OS X, with the 3.0 release of Peak, its 2-track mastering program. Once multichannel audio support was fully functional under OS X, BIAS was again among the first to update its software (see **Fig. 1**). Version 3.5 of BIAS Deck supports Core Audio as well as ASIO and Sound Manager. It also supports VST plug-ins, including Carbonized versions. Vbox, BIAS's multieffects control environment, is also OS X compatible.

MOTU has announced an OS X version of Digital Performer, slated to ship by the end of 2002 (see **Fig. 2**). While it's a fair bet that this new version of Digital Performer will do away with FreeMIDI, it's likely that MOTU's MAS protocol will continue for audio and plug-ins. MOTU has also announced OS X support for its 828 FireWire interface, as well as its Clockworks control-panel software for MIDI interfaces.

Digidesign has had what is arguably one of the biggest tasks because it provides a truly integrated hardware-software system. At the October 2002 AES show in Los Angeles, the company demonstrated its newly redesigned OS X–compatible Pro Tools 6.0. The new version is slated to ship by January 2003. Pro Tools 6.0 will still be based on Digidesign's DAE, but of course CoreMIDI will replace the very dated OMS. RTAS and TDM plug-in protocols will also remain a part of the Pro Tools feature set. There's been no word yet on whether there will be an OS X version of Pro Tools Free.

The Mac version of Steinberg's Cubase SX (see **Fig. 3**) now supports OS X; Nuendo is scheduled to follow shortly. Steinberg will continue its ASIO protocol for audio, as well as its VST format for instruments and plug-ins. The company is also writing OS X drivers for its hardware products.

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also reported various stages of development. Propellerhead released Reason 2.0 with OS X support early in 2002; no word yet on ReCycle or ReBirth. Ableton, also an early adopter, already has an OS X version of Live.

BitHeadz was another company quick to support OS X, with the release of Unity Session 3.0 in January 2002. Unity AS (formerly Retro) has also been updated, as have some Unity modules. Phrazer 2.0 will also support OS X. Native Instruments has not yet made an official announcement of its OS X support, though it's likely that updates of Traktor and Kontakt will be available by the time you read this. U&I Software is in the process of porting its full product line and will release OS X–native versions of MetaSynth, VTrack, and ArtMatic Pro.

Rocket Network has announced full OS X compatibility for its products. Although Rocket's technology is not directly dependent on OS X's audio implementation, there's considerable interdependence on individual audio manufacturers as they migrate their applications. Interestingly, a good bit of attention is being given to Rocket's potential for transferring audio data between OS 9 and OS X, much as it has been used between Mac and Windows applications.

Waves is working on OS X versions of its entire product line. In addition to providing Core Audio support, the company will continue to support all third-party protocols, including TDM, RTAS, MAS, and VST. Cycling '74 is working on an OS X version of Max 4.0/MSP 2.0. Kind of Loud and DUY have no information available yet, but Arboretum has announced upcoming OS X support for its Hyperprism and Ray Gun plug-ins and is introducing Montage, a new OS X multimedia development application. Spectrasonics expects to have an OS X version of Stylus, its vinyl-groove-module plug-in, by January 2003.

Sibelius Software has already released an OS X compatible version of its Sibelius 2 notation program (see **Fig. 4**). MakeMusic's Finale 2004, scheduled for summer 2003 release, will be a native OS X application. PG Music has no immediate plans for an OS X version of its popular Band-in-a-Box software; its upcoming release will run in Classic mode.

TC Works has already released OS X versions of its Spark product line. Updated TDM and VST/MAS versions of its plug-in line should soon be available, as should drivers for its PowerCore DSP unit.

As for hardware, RME has released OS X drivers for its Hammerfall card; M-Audio has done the same for most of its product line. As noted earlier, MOTU has released OS X drivers, and it should surprise no one that Emagic was among the first to release OS X drivers, for its EMI 216. Event reports that its EZbus is fully OS X native. Apogee has drivers for its Mini-Me USB preamp, as does Tascam for its US-428 and US-224 USB interfaces.

SPEED DEMON

The Peabody Institute, in a report titled *Audio Latency Measurements of Desktop Operating Systems* (by Karl MacMillan, Michael Droettboom, and Ichiro Fujinaga; August 2001), cited OS X's Core Audio as being one of only four systems registering throughput latencies of less than 2.9 ms. (The other three systems hitting that milestone were all Pentium III/933 MHz machines, one running Windows 2000 with ASIO and two running versions of Linux with a third-party software patch.) The OS X system was the only one capable of achieving those extremely low latencies with no add-on hardware or third-party extensions.

Daniel Keller *is an engineer and producer living in Southern California. His work in digital multitracking and computer audio has included second-story gravity tests on a number of systems.*

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Meter Matters

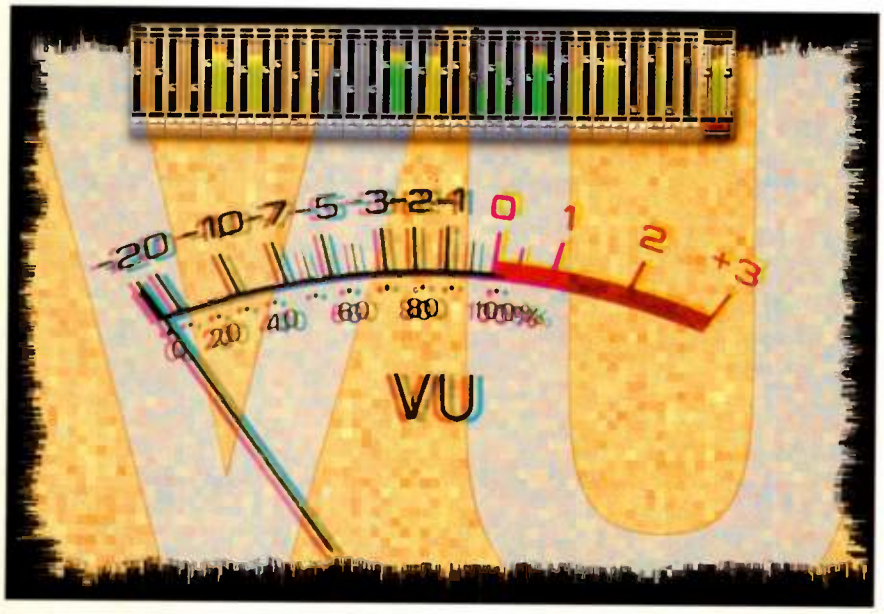
Those lights and needles aren't there just to impress the client.

By Brian Smithers

Every good engineer knows that proper level management is critical to making good recordings, and that the ultimate weapon against setting improper levels is a pair of well-trained ears. Meters, whether in the form of old-school bouncing needles or colorful ladders of LEDs, are important visual aids that help quantify what the ears are hearing.

Meters show up on almost every type of audio device, from preamps to consoles and from recorders to software. Generally speaking, they show us the current level of input or output signal relative to some reference point to help us find that sweet spot between the lower (noise floor) and upper (overload) limitations of a device.

To make the best use of your meters, it's important to understand exactly what they're telling you. To that end, I'll discuss the different types of meters you may encounter, what they really show, and how things change between analog and digital environments.



DMITRY PANICH

IN MY VU

The classic needle-based *VU meter* was introduced more than 60 years ago, in part as a visual reference for radio announcers to check that their speaking volume hovered at the optimum level for broadcast (see Fig. 1). VU stands for *volume unit*, and a level of 0 VU is calibrated to correspond to a specific input or output voltage.

The physical response of the needle, or its *ballistics*, is deliberately slow, yielding a relatively stable display of the current overall level rather than bouncing rapidly with changing volumes. As a result, a VU meter is a decent indicator of a sound's *average loudness*. In other words, the needle doesn't react quickly enough to capture the exact level of

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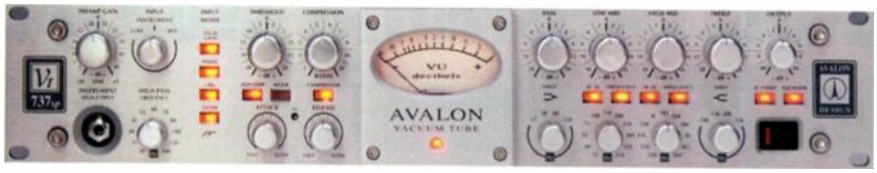

FIG. 1: The classic VU meter, shown here on an Avalon VT-737sp compressor, is a specialized voltmeter with a needle indicating audio levels relative to 0 VU, a reference indicating the optimum level.

an instrument's hard attacks or the short gaps between notes. Instead, it settles on the level of the sustained parts of a sound, which is (roughly speaking) the part that our ears perceive as the sound's actual loudness.

That's useful for balancing the levels of different sounds, but it's of little use for ensuring that signals don't distort at their loudest peaks. As a result, VU meters always have a certain amount of *headroom* built in. Headroom is defined as the difference between the optimum level and maximum level (the point above which distortion occurs).

As an example of how this all fits together, let's look at how to use the VU meter on an analog recorder. Quite simply, you raise or lower the output level of the device feeding the recorder (a console or a preamp, perhaps) so that the recorder's input VU meter hovers at 0 VU during the loud portions of the music. If the meter occasionally bounces 2 to 3 dB higher during the loudest portions, not to worry—that's part of what the headroom is there for. The rest of the headroom is there because if the average level of the music reaches +3 dB, the peaks (the parts the VU meter is too slow to measure) are reaching several decibels higher than that, and we don't want them to distort.

The amount of headroom that you have to work with varies with the device and the circumstance. For example, in broadcast situations it's desirable to compress a signal so that average level is closer to maximum level, but in classical recording the difference between the average and maximum levels can be quite large.

MY INTEREST IS PEAKED

To keep closer track of peak levels, the *peak meter* was introduced (see **Fig. 2**). A peak meter reacts much more quickly than a VU meter, allowing it to track a signal's brief excursions above the average level. That gives an engineer the ability to know precisely how much headroom is being used.

For most signals, though, peak meters give little or no indication of the perceived loudness a VU meter shows so well. For organ sounds, in which the tone starts at a certain amplitude

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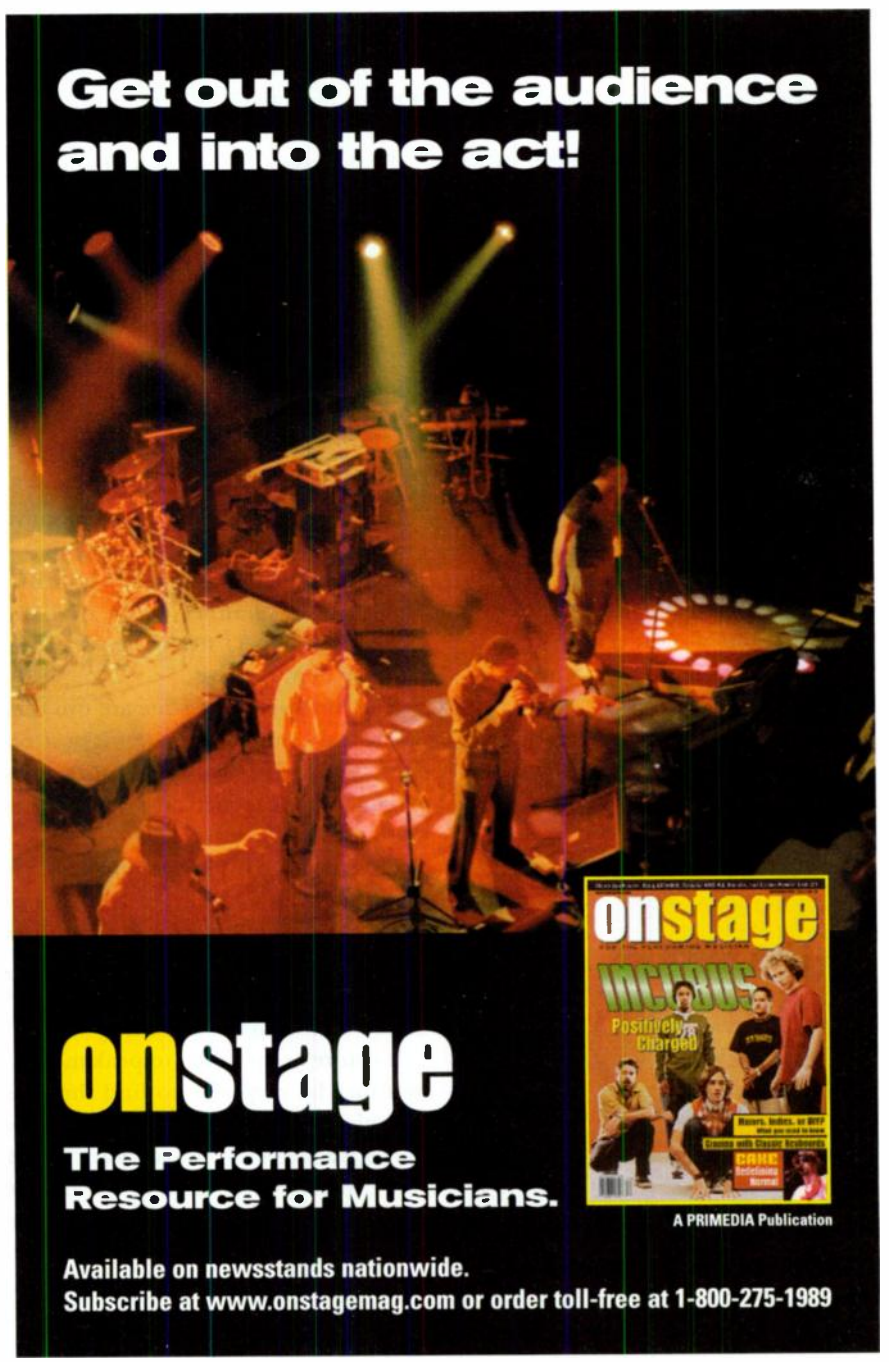
and maintains that amplitude until the tone ends, peak and average levels are the same. For percussive tones such as a piano or Clavinet, however, the brief but powerful attack is much louder than the sustain, producing a wide discrepancy between average level and peak level. (That's why *normalization*, which automatically raises the level of tracks so that their highest peaks are at maximum, often results in one track sounding much louder than another.)

Peak meters are typically rows of green, yellow, and red LEDs. The colors mean slightly different things on digital equipment than on analog equipment, but the red indicator is always the maximum level and the yellow LEDs—like an amber traffic light—warn of the approaching red.

Peak meters are particularly important in digital audio, because the onset of distortion is so immediate and harsh. For example, when digital clipping occurs meters actually run out of numbers to describe a peak that is too high. The result is an ugly-sounding "flat-top" waveform. Using a peak meter to keep a close watch on peak levels in digital gear is standard practice. (Analog distortion, by contrast, can be relatively minor, so that if a peak exceeds maximum level only slightly the distortion will probably be inoffensive.)

As a constant reminder of the absolute nature of this ceiling, we ordinarily measure digital levels downward from maximum. The highest level, or *full scale*, is designated as 0, and all other levels are measured as so many decibels below full scale *(dBFS)*.

FIG. 2: Peak meters are found in analog and digital devices and generally use ladders of green, yellow, and red LEDs to indicate normal, high, and maximum levels, respectively.



I'M SEEING RED

Although it's good practice to avoid tripping the red 0 dBFS indicator on your peak meter, seeing red doesn't necessarily mean a take is ruined. Remember, full scale refers to the highest number that our digital system can assign to a voltage, and hitting that number for one sample just means we've made maximum use of our system's dynamic range. Two or three samples at full scale, however, means that the voltage must have exceeded 0 dBFS for a short time and that the signal has been clipped.

That's why digital peak meters often have an *overs* indicator, which lights to show that a certain number of samples in a row have reached 0 dBFS. Sometimes the overs indicator is actually a counter, while other times the number of samples that constitute an over is arbitrarily set by the manufacturer. There is no real industry standard, so check your documentation or contact the manufacturer if you want to know how your meters are calibrated.

Ultimately, of course, your ears are the best judge of whether a recording has been ruined by clipping. Depending on the program material, you may find that several full-scale samples in a row exhibit no audible distortion. That doesn't mean it's a good idea, though—it just means you got away with it!

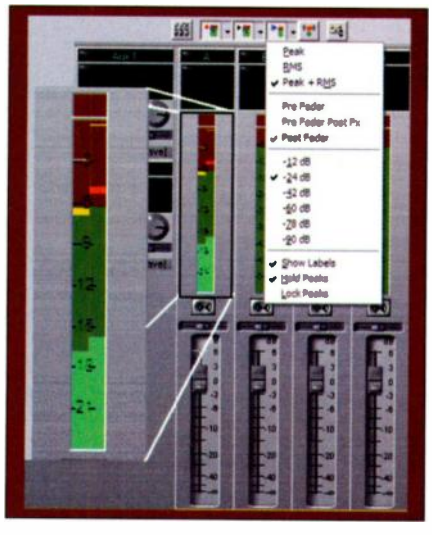


FIG. 3: This meter display from Cakewalk Sonar 1.3 combines average (RMS) metering with peak metering and includes a peak-hold function.

I WANT IT ALL!

So VU-style average-level metering is useful for making musical judgments about the loudness of a signal, and peak metering is a necessity for ensuring distortion-free digital recording and processing. At the dawn of the 21st century, do we really need to sacrifice one for the other?

Heck, no! Meters are now increasingly being designed (especially in software) to allow the engineer to choose which kind of metering is appropriate. Often, both types of metering can be displayed simultaneously.

Fig. 3 shows how this is implemented in Cakewalk Sonar 1.3. The drop-down menu allows the user to choose Peak metering, RMS metering, or both. RMS stands for *root mean square,* a method of averaging values that yields a truer representation of perceived loudness than does the good old VU meter.

In Fig. 3, the solid green bars at the lower end of the scale indicate RMS levels hovering at around –16 dBFS. The short yellow and red bars above indicate the current peak levels of –7 dBFS in the left channel and –5 dBFS in the right channel. Note that the peaks are 10 to 11 dB higher than the average (RMS) levels.

Near the top of the scale are two thin white bars indicating the highest recent peaks. This *peak hold* function is common in peak meters and usually retains its value for from one to three seconds. Sometimes "infinite" peak hold is available to retain peak levels until they are reset manually. Because the values in Fig. 3 are at –0.5 dBFS and –3 dBFS, we had better hope that represents the loudest point in the recording session!

If you're accustomed to peak meters, you may be surprised to find that the perceived loudness (as represented by the RMS level) is more than 15 dB lower than the peak value at the loudest part of the recording. This particular example is of a collegiate symphonic band playing a particularly dynamic and percussive piece and is representative of the sort of peak-to-average differences that one often finds in large classical ensembles.

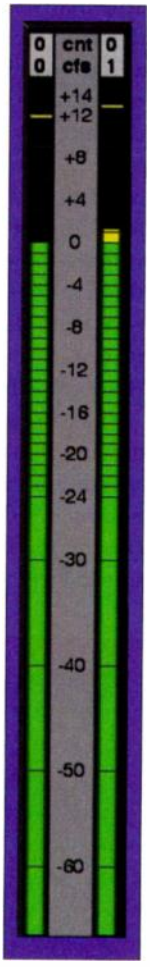


FIG. 4: Here, the K System K-14 meter is shown as implemented in Metric Halo Labs Spectrafoo. Note that full scale is labeled +14 dB, indicating 14 dB of headroom.

Compare that with what would happen if we recorded a pipe organ and set levels to peak near 0 dBFS. Because the peak-to-average differences are virtually nil with an organ, the perceived loudness of the organ recording would be more than 15 dB louder than the symphonic band recording—a result that would be extremely unnatural sounding. Therefore, having both peak and VU- or RMS-style meters and knowing how to use them is clearly essential to making great recordings.

THE CASE FOR K

A great example of peak and average metering living together in harmony can be seen in mastering engineer Bob Katz's proposed K System. The K System, as detailed on Katz's Digital Domain Web site (www.digido.com), integrates metering, monitor calibration, and standardized level practices, but here we'll look at just the meters.

K System meters feature solid bars to indicate RMS average levels, with lines or dots above to indicate instantaneous peak levels (see **Fig. 4**). Peak-hold indicators can be set to 10-second hold or infinite hold, and an overs counter is recommended.

So far that sounds similar to the Cakewalk Sonar meters discussed earlier, but the K System meters don't count down from 0 dBFS. Instead, the 0 dB point is set 20, 14, or 12 dB below full scale, reflecting the VU meter-style practice of setting levels by perceived loudness

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Area(s) of interest: ☐Guitar ☐Bass ☐Keyboard ☐Drums ☐Studio (recording) ☐Stage (PA, lights, etc.) ☐DJ

SOURCE CODE: EMCA

WRH

instead of by peak. Full scale is designated +20, +14, or +12 dB. These three variations, called K-20, K-14, and K-12, respectively, reflect different amounts of headroom and are intended for different applications.

K-20 metering accommodates the demands of very dynamic music, such as symphony orchestras, audiophile recordings, and film sound. More compressed styles such as pop, rock, and R&B use the K-14 scale, and the K-12 scale is reserved for broadcast production.

Consider the ramifications of the K System for recording the symphonic band and pipe organ mentioned previously. For the band, setting levels to hover around 0 dB on the K-20 meters when the band is playing forte (full, but not maximum, volume) would leave enough headroom for the 15 to 16 dB difference between average and peak levels with a small cushion before clipping. Setting the organ's forte levels to 0 dB would appear at first glance to "waste" some dynamic range, but it would result in a level that compares naturally to the band recording.

I'D LIKE TO METER

Meter design and implementation is remarkably inconsistent. Even though the characteristics of VU and peak meters are well defined, it's hard to know whether your meters conform to those specifications precisely. The only defense is to learn how your meters respond and to compare what you see with what you hear. Find out whether your meters offer more than one type of display and how many overs set off an alarm.

If you have access to peak and average metering, use them both. If you have only one, use your ears and your good sense to extrapolate the information that your meter isn't providing. Armed with the knowledge of what your meters are telling you, you'll be able to manage your levels sensibly.

Brian Smithers *is a musician, engineer, and educator in Orlando, Florida. He teaches Audio Workstations at Full Sail Real World Education.*

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"Two Publishers Fought Over My Music Because I Joined TAXI"

Bill Gordon – TAXI Member

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As a result of my membership, I signed a deal with a boutique publisher that got me my first placements in TV and film.

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While nobody threw any actual punches, it was incredible having two great companies slugging it out over my songs. A musician's dream-come-true.

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First, I want to tell you the ironic part – I almost didn't join TAXI. I thought it sounded too good to be true. Man, was I wrong!

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I can unequivocally say that the people at TAXI are the most informed, honest, honorable, helpful and loyal folks I have ever known in the music business. They never make a promise they can't deliver on, and they do it all at a reasonable price.

Then there's TAXI's private convention which is FREE to members and their guests. The Road Rally isn't just the icing – it's a whole other "cake." It gives me a deeper understanding of the music business, a bunch of great new contacts, and a jolt of inspiration.

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ROYER LABS

R-122

A ribbon microphone for the 21st century.

By Myles Boisen

Don't be surprised if you experience a flash of déjà vu when you see the R-122 phantom-powered ribbon microphone. Its look and design are inherited from the Royer R-121, an EM Editors' Choice winner in 2000. (For more specifics on the R-121 and an interesting historical sidebar on ribbon mics in general, take a look at my review in the May 1999 issue.)

Like the R-121, the R-122 uses a 2.5µ ribbon with a conventional bidirectional or figure-8 characteristic. Adjacent to the microphone's side-address grille, vertical fins indicate the pickup pattern's off-axis areas (null points), located at 90 degrees and 270 degrees relative to the front of the ribbon (see Fig. 1). Also like the R-121, the R-122 comes in a burnished satin nickel or matte-black chrome finish, carries a lifetime warranty for the original owner, and is housed in an attractive cherrywood box. The R-122 is longer and heavier than its predecessor, but the most crucial differences are inside.

FIG. 1: Closely resembling the Royer R-121, the groundbreaking R-122 is the first phantom-powered ribbon microphone.

AUDIO ACTIVITY

The Royer R-122's active circuitry (a phantom-powered FET amplifier stage coupled with a compact transformer)

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If I could only take one DSP effects box with me to the moon, it would have to be the Kurzweil KSP8."
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R-122 Specifications

Acoustic Operating Principle	electrodynamic pressure gradient with active electronics
Element	2.5µ aluminum ribbon
Polar Pattern	symmetrical figure-8
Frequency Response	30 Hz–15 kHz (±3 dB)
Sensitivity	–39 dB (1 V/Pa ±1 dB)
Self-Noise	< 20 dB
Maximum Sound-Pressure Level	> 135 dB
Power	48V phantom
Dimensions	8.12" (L) × 1.00" (D)
Weight	0.68 lb.

probably represents the most significant improvement to ribbon-mic technology in 50 years. Older ribbon designs require a mic preamp with ideal impedance specs, low noise, and lots of gain to deliver optimum sound. A classic RCA ribbon mic, for example, can sound stunning through a vintage tube preamp. Because of the way the ribbon element is loaded by the preamp, however, such a mic might sound flat or noisy when connected to an average mixing console. The R-122's circuitry solves that problem and adds a gain increase of approximately 15 dB, making it comparable to modern condenser mics in terms of output level.

According to Royer's Rick Perrotta, the heart of the active ribbon-mic system is a custom toroidal transformer that took a year of research to perfect. The transformer's high turns ratio is responsible for the aforementioned gain, but at the transformer stage, the impedance is too high to be usable. Consequently, the transformer's secondary windings connect to a pair of very-high-impedance, ultra-low-noise FETs, which in turn feed bipolar emitter followers to provide the necessary low-impedance output for a mic preamp. Because the active solid-state electronics act solely as impedance converters and don't perform any amplifying function per se, self-noise is extremely low.

FASCINATIN' RIBBON

When I'm miking stringed instruments, saxes, clarinets, brass, and electric guitar, a ribbon mic is usually my first choice. During a month of jazz and original music sessions at Guerrilla Recording, I had a constant influx of those

instruments to record. As soon as I brought the faders up on a pair of Royer R-122s—miking tenor sax and trombone for the jazzy local combo Married Couple—I knew the mics would stay up on stands for many days to come.

On saxophone, routed through a Universal Audio 2-610 tube preamp, the Royer ribbon immediately sounded warm and smooth, but a bit too heavy on the low end. The figure-8 pickup pattern of the R-122 and most ribbon mics produces a disproportionate amount of bass response due to an exaggerated proximity effect. Moving the mic up and a few inches back from my customary close-miking position made for an airy, classic jazz timbre. In the mix, a slight boost of the high-end shelving EQ was all I needed to get the tenor to sit perfectly for both ensemble and solo lines.

For Married Couple's trombonist Rob Ewing, my scribbled session note read simply, "Perfection." Through a transformerless solid-state Sytek preamp, the trombone sound was solidly etched and exhibited no problems with murkiness or raspy high end.

During the review period, acclaimed English trombonist Gail Brand also visited the studio and put the R-122 through its paces on a variety of improvised pieces with techniques ranging from delicate harmonics to blaring pedal tones. In an array of solo, duo, and overdubbed settings, the Royer always sounded gorgeous, full, and well defined through a Grace 101 solid-state preamp.

Brand characterized the Royer R-122 as possessing "true-to-life sound, clear and warm" and was impressed by the way the mic handled forceful playing as well as tiny detailed sounds. She missed a little of the horn's brightness through the R-122 but didn't think it enough of a problem to warrant a mic change. For her live-to-DAT sessions, I thought the mic's top end was very complementary. However, on overdubbed and denser pieces, I often found myself reaching for a bit of high-shelving EQ to compensate for the ribbon mic's close placement.

On other horn-based sessions with the

PRODUCT SUMMARY

Royer Labs
R-122
active ribbon microphone
$1,695

AUDIO QUALITY	4.5
VALUE	4.0

RATING PRODUCTS FROM 1 TO 5

PROS: High output increases versatility. Active electronics reduce negative effects of preamp loading. Excellent off-axis rejection. Low self-noise. Consistent stereo matching. Rugged construction. Lifetime warranty.

CONS: Figure-8 pattern produces significant proximity effect.

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band Dropsy, the R-122 was every bit as satisfying as a vintage RCA 77-DX on baritone sax, and it proved its worth on trombone and trumpet. Again, the active ribbon delivered full, warm lows and incisive highs on the horn section with a minimum of repositioning or mix EQ.

On an overdubbed bongo track, I felt the mic wasn't delivering enough attack, and so I used a trick that helps bring out highs with the R-121 and the R-122. Because the ribbon has less proximity effect at the rear, I simply turned the mic around 180 degrees and reversed the polarity at the preamp. Magically, with the help of some high-end boost, the drum popped out of the rhythm track.

The R-121 has long been my mic of choice for rock, blues, and jazz guitar, and Dropsy provided a chance to try out the R-122 on electric guitar. The R-122 performed well, though with so much gain that I had to place the mic at a greater distance from the guitar amp than usual to avoid clipping the preamp.

HOT SHOT

Because the R-122's output level is roughly equivalent to that of a condenser mic, it can get a bit too hot on some sources. For recording a live blues festival at Moe's Alley in Santa Cruz, California, I positioned the R-122 on a cranked-up harmonica amp that was to be used by a parade of performers throughout the night. I was using a Universal Audio 2-610 tube preamp, and to keep from distorting its input, the mic had to be placed about a foot back from the amp.

Normally, doing that would invite major problems with onstage leakage, as the center-stage drum kit was only about five feet away. But to my amazement, I found that aiming the null side of the Royer's figure-8 pickup pattern at the pounding percussionist—using the mic's distinctive side fins as visual aids—effectively cancelled most of the ambient drum and amp sound. The R-122's ample low end still provided a rich and commanding harmonica tone at that distance, and the mic's rugged build quality allayed any concerns about using a studio ribbon mic in a high-traffic, live-sound situation.

Much to my surprise, the Royer's sharp side rejection also allowed me to record the Tin Hat Trio's violinist, Carla Kihlstedt, in the same room as a full drum kit. As long as the drums were below rock volume and Kihlstedt remained within a foot of the carefully aimed R-122, I got the discrete violin track I needed, and the ensemble got the physical closeness they requested, without baffling.

In that setting, even when the drummer got excited, low-end leakage from the kick and toms was rarely a problem. However, loud off-axis snare and cymbal sounds quickly became boxy and overwhelming, prompting me to isolate the violin in a booth for recording rock numbers. Kihlstedt was very enthusiastic about the Royer's smooth tone on violin and viola. When I recorded her lead vocals using the

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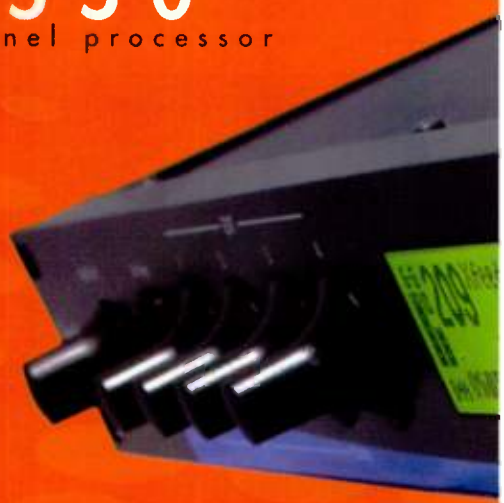

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active ribbon mic, her soft, breathy singing voice came across well, too.

Another interesting use for figure-8 pattern mics is on folksingers, who often need to track vocals and acoustic guitar at the same time. Songwriter Jason Miller provided the chance to try the R-122 on his Gibson acoustic. After fiddling with EQ and placement (including turning the mic around 180 degrees to reduce its substantial proximity effect), we got a resonant and clear tone that pleased us both.

The R-122's timbre was perfect for a mellow fingerpicking part, and the mic's extra gain was a major advantage. Once more, the mic's off-axis rejection was amazing. When the side of the mic was aimed at Miller's mouth, there was hardly any vocal bleed at the guitar mic and none of the phase-shift coloration that often plagues that kind of recording. For a percussive strumming part, the Royer was suitably chunky and not harsh at all, even with a big cut in the low-end EQ to reduce thumps and boominess. For rhythm overdubs and for pop music, I'd still prefer the shimmering highs of a small-diaphragm condenser, but the Royer's performance was ear-opening.

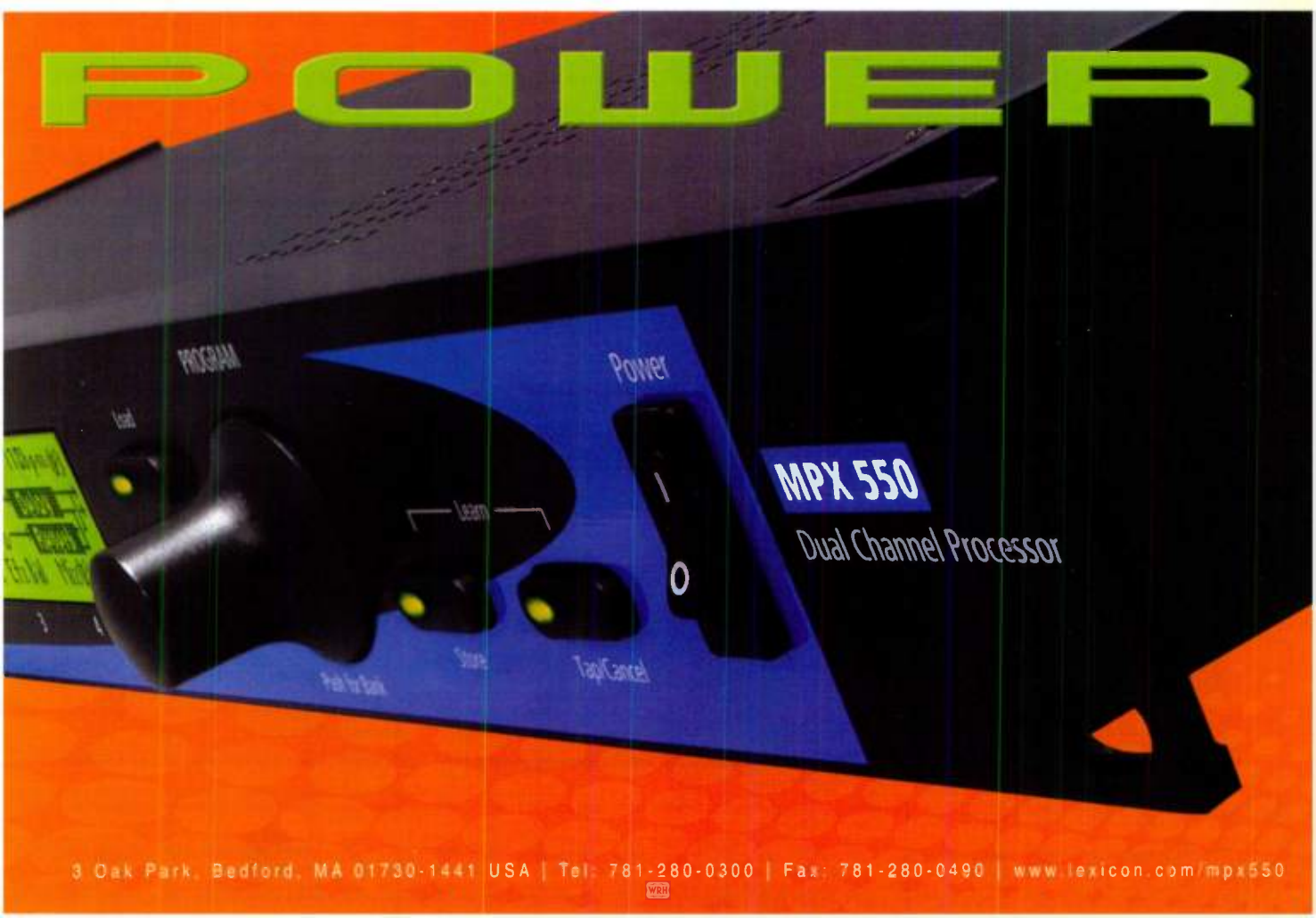
I also used the Royer on clarinets, on flute, and as a room mic on drums with uniformly excellent results. Rock engineer Bart Thurber was knocked out by the R-122's superb tone on a variety of guitar tracks. Thurber confirmed my observation about the mic's superb off-axis rejection and, despite some grappling with its hefty gain, opined that it could become "the new standard for electric-guitar recording."

In listening tests, the pair of R-122s proved very closely matched to each other and to my R-121. When positioned side-by-side as ambient drum-room mics, the only difference I could discern between the traditional and active models was a slightly sweeter high-end response on the R-122, contrasted with a bit more upper-midrange bite in the R-121.

BLUE-RIBBON WINNER

Other than a caveat on the increased potential for preamp overload (which is a new challenge for ribbon-mic users, and certainly not a disadvantage), I found nothing to fault and much to love about Royer's active ribbon transducer. For those of us who have spent years struggling to use ribbon mics on quiet violins, on fingerpicked guitar, or as room microphones, the R-122's active electronics are a godsend.

The R-122's cost will undoubtedly be hard to swallow for some EM readers, but it's justifiable when you consider that the R-122 doesn't require a high-gain or "ribbon-friendly" preamp. The R-122's high output, low noise, and rugged construction make vintage ribbon mics seem old-fashioned, and they cost about the same. As a reviewer and as a recordist, I am thrilled at what Royer has done to bring the ribbon mic into the 21st century.



MAKEMUSIC

FINALE 2003 (MAC/WIN)

Still at the head of the table in the world of notation software.

By Rob Shrock

Having experienced many years of unflagging popularity, Finale remains an industry standard in the realm of notation software. Not content simply to rest on its laurels, MakeMusic, Inc. (formerly Coda Music Technology) has continued to update Finale with new tools and refinements on an almost yearly basis.

EM reviewed Finale 2000 in the February 2000 issue, and since then, Finale 2001 and 2002 have introduced several new features. Finale 2003 continues the pattern with even more goodies. Any attempt to cover all the features of Finale 2003 would be overwhelming; however, a basic overview is in order.

SCORING BIG

Reshapable floating tool palettes provide access to various menus, submenus, and dialog boxes specific to each of Finale's dozens of tools (see **Fig. 1**). For instance, the Simple Entry tool lets you add notes with specific durations by clicking directly on a staff, the Mass Edit tool lets you edit sections of a score, and the Chord tool allows you to create, move, or delete chord symbols.

When you click on a tool, an information box under the title bar conveniently displays the name and function of the selected tool. That comes in handy if you're not good at quickly memorizing icons. As different tools are selected, the menus in the title bar change, offering related submenus and commands. You can view and edit your scores in Scroll view or Page view; measures and page numbers are displayed at the bottom of the screen, providing easy navigation.

A Finale score can have an unlimited number of staves. Each staff can have as many as four independent layers, and each layer can have two different voices. (Each layer and voice can have an unlimited number of notes.) Layers can be used to define independent lines sharing a staff with different stem directions, such as Flute I and Flute II. Piano music typically uses different layers and stem directions to indicate the proper separation of melodic and harmonic content within a single staff. Because specific colors can also be assigned to just about anything in Finale 2003, you can apply different colors to different layers for easier onscreen identification while working on a score (see **Fig. 2**). An unlimited Undo command lets you retrace your steps if you get into trouble.

Minimum System Requirements

Finale 2003

MAC: Power Mac; 64 MB RAM (128 MB recommended); OS 8.6

PC: Pentium; 64 MB RAM (128 MB recommended); Windows 98/ME/NT/XP/2000

The speed with which you can get notes into Finale has always been one of the program's strongest assets. Simple Note Entry mode lets you use the mouse to select note values and other symbols from palettes and insert them directly into the score. User-definable keystrokes called MetaTools speed up this technique by allowing you to use the computer's number keys to determine note values as you click in the score. (Although I find this technique a tedious way to work, one producer I know is a whiz with this method. He can bang out a whole piano/vocal/rhythm chart while sitting on a plane, and I'm not talking about Los Angeles to Sydney.)

Speedy Note Entry mode is my preferred method. It lets you use a MIDI instrument and the computer keyboard in tandem to input notes in step time, using the same MetaTools described above. A new MIDI Modifier feature even lets you assign a group of keys on your MIDI keyboard to set the durations when entering notes, navigate the score, tie notes, or perform various other functions.

An equally fast way to input notes is with the HyperScribe method. It allows real-time input with a metronome click

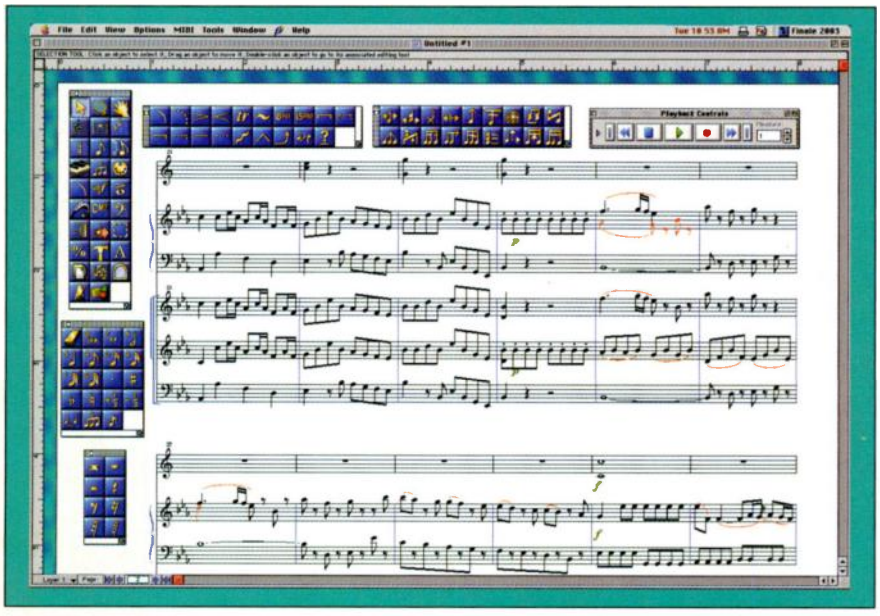


FIG. 1: Finale's multiple floating tool palettes can easily be reshaped, and they can now appear in one of several style-and-color combinations. The Tool icons are also a bit larger than they were in previous versions.

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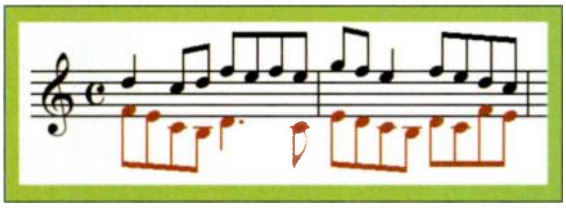

FIG. 2: In this example, two separate layers share the same staff—a typical configuration in brass, woodwind, or string parts. Layer 1 is set for stems up; Layer 2 has stems down. Different colors help to differentiate the layers.

or by tapping the tempo. With the tap-tempo approach, a designated note number (say, the lowest note on the keyboard) or a MIDI controller (such as the sustain pedal) is assigned to advance the beat by a user-defined note division. That lets you play a part more or less in time while tapping along with the beat. However, it also allows the added flexibility of speeding up or slowing down without losing the proper placement of notes within a measure, which is not possible when inputting notes in real time to a fixed click. The HyperScribe Tool also lets you rebar a rubato performance.

Finale can import music as a Standard MIDI File and generates the appropriate staves from the sequencer track list. Hard-copy scores can also be scanned and imported (as TIFF files) into Finale using the program's built-in SmartScore Lite software from Musitek. In addition to SmartScore files, Finale 2003 can open Musitek PianoScan files as well as older scores in Gvox (Passport) Encore format.

Finale's MicNotator feature lets you use a microphone for inputting notes. (MakeMusic offers an affordable mic that clips onto your shirt or a brass instrument.) MicNotator offers a possible alternative if you're not inclined toward using a MIDI keyboard for note entry. You can also use a MIDI guitar to enter notes directly into tablature; Finale recognizes which strings are being played and then assigns the notes appropriately.

Most Finale users quickly gravitate to a particular note-entry method, but it's also a good idea to become comfortable with the other techniques. Each method of note entry has its particular strengths; applying a combination of techniques is the best way to promote accuracy and speed in most notation situations.

Once the notes are in the score, Finale offers myriad parameters for adding expressions, articulations, chords, lyrics, and other graphic elements to the score. It also provides extensive parameters for part extraction and page layout, which have been covered in past reviews.

WHAT'S NEW

Finale's user interface continues to improve, and you can now choose from ten tool-palette "looks." (The traditional look is still available if you're not fond of change.) I especially like the Cool Black look.

With the Selection tool chosen, clicking on a clef, key signature, or time signature now automatically opens that tool's dialog box. The Mass Mover tool has become the Mass Edit tool, and the locations of various tools and commands throughout Finale have been changed to provide more logical function groupings.

Smart Shapes have been refined in Finale 2003. Symbols such as crescendos, slurs, and glissandi sport additional handles so that you can position them more precisely. Slurs are particularly improved with five handles for shaping the contour of the slur, and slurs now automatically adjust to accommodate changes to the notes in the phrase and to avoid stems.

A new feature called SmartFind and Paint lets you apply articulations (as well as expressions and hairpins) from one phrase to other phrases with similar rhythms. For example, you could apply the slurs, staccato marks, and trills in the First Trumpet part to all instances of the same rhythmic phrasing even if the actual notes are different. In other words, you could quickly add the

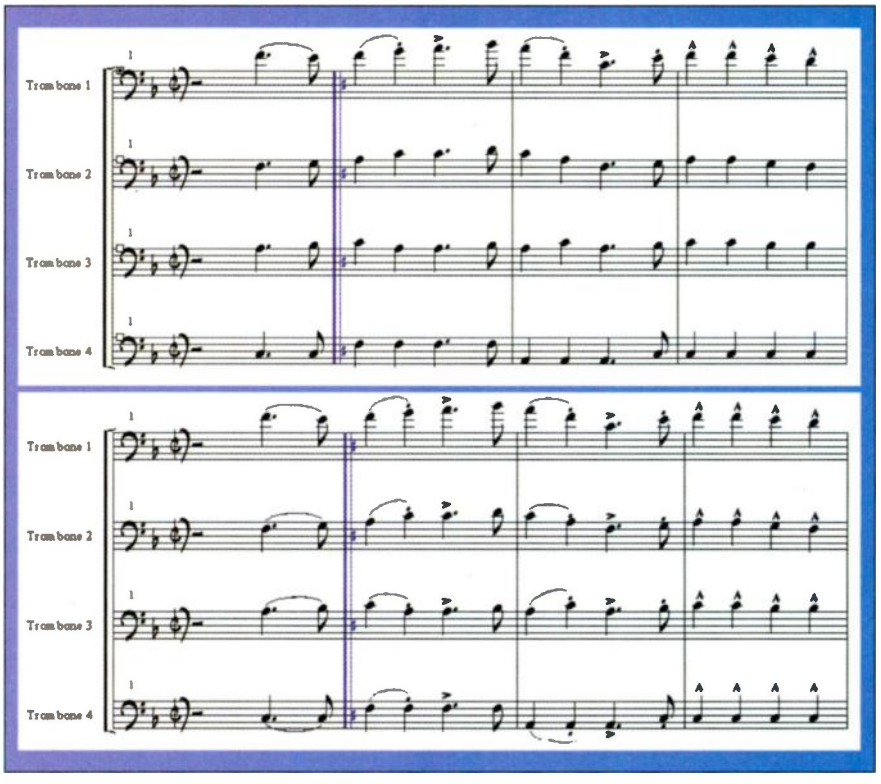

FIG. 3: Finale's SmartFind and Paint feature lets you quickly duplicate markings for similar parts. In the upper staff, the First Trombone part has been phrased using articulations and Smart Shapes. In the bottom staff, Finale has automatically marked the Second, Third, and Fourth Trombones with the same slurs and articulations even though the notes are different.

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TASCAM

POCKETSTUDIO 5

Who says you can't take it with you?

By Steve Broderson

As Zoom and Korg launched their digital ministudio recorders, one manufacturer remained notably absent from the marketplace. At long last Tascam, the company that introduced the Portastudio in the 1970s, is entering the fray with its Pocketstudio 5 digital audio recorder.

The Pocketstudio 5 is a 4-track recorder featuring a 64-note polyphonic General MIDI (GM) tone generator, five simultaneous effects processors, and the ability to play and record in the MP3 audio format. The Pocketstudio 5 uses Compact Flash memory, and a 32 MB card is included; currently, the maximum size that it accepts is 128 MB. It also provides a USB port for shuffling data to and from a computer. The USB interface expands the unit's potential as a songwriting and song-sharing tool by allowing the Pocketstudio 5 to load standard MP3 audio files and Standard MIDI Files (SMFs) for use as backing tracks.

FIG. 1: A bit large to fit into most pockets, the Pocketstudio 5 is a 4-track audio recorder with an onboard tone generator, rhythm tracks, and effects.

CONTROL TOP

At 5.5 inches wide by 8.5 inches tall, the Pocketstudio 5 stretches the definition of "pocket-size" (see Fig. 1). However, it feels more substantial and fits in your hands more ergonomically than it would if it were smaller. And judging from my experience with competing units, more weight means less sliding around when a guitar cable is attached.

The topside control surface features a backlit LCD screen for text-based menus and settings. It's not very exciting, but the letters are large enough to be easy to read. The LCD also shows recording input levels as well as track and master playback levels. Below and to the right of the display is a cluster of navigational controls that gives your right thumb a lot to play with. The large data wheel, which has an Enter/Yes button in the middle, lets you quickly dial in values for menu settings. Around the wheel are the Function (F.), Menu, and Exit buttons for quickly entering and exiting menu screens. Just below is a four-direction cursor pad for moving to items in menu lists.

Except for the data wheel and channel faders, all the Pocketstudio's buttons are rubberized for a nice tactile feel, and most illuminate to reflect their status. The well-designed control surface makes finding your way around very easy and intuitive.

Standard transport controls are provided, along with a Mark button to set as many as eight locate points per song. One absent feature is a cue function (the ability to hear tracks as you fast-forward through them). Pressing and releasing F Fwd takes you to either the next Mark or In/Out position or to the end of the song if no points are set; the same is true for Rew.

Each track has its own fader, as do the tone generator and master output. Recording-status indicator buttons above each track flash when the track is in Record Ready mode; when you press one, the track is routed to one side of either stereo pair. Just above those are dedicated locator buttons (labeled In, Out, Repeat, and Auto Punch) for sectioning off pieces of audio. Also on the control panel are the Effects button, for jumping immediately to the effects menus, and the MP3 button, for mixing down or playing back songs in that popular audio format.

INSIDE OUT

The Pocketstudio 5's main audio inputs are two unbalanced ¼-inch jacks, each with a trim pot and an overload indicator LED, and a line-level stereo minijack (see Fig. 2). Both ¼-inch inputs have an attenuating switch to handle line levels as well as either mic or guitar. The inputs also have a gate with adjustable sensitivity for cutting out excess input noise. Audio outputs are limited to two stereo minijacks: a headphone out (with volume pot) and a –10 dBV line out. The Pocketstudio is packaged with a lightweight pair of headphones that have a hands-free microphone grafted on.

The Pocketstudio 5 is the only ministudio recorder I've seen with a MIDI In port. The unit doesn't record MIDI data (it's playback only) or sync to MIDI Clock or time code, but the input comes in handy for triggering the tone generator from a keyboard or other MIDI controller. During my test, I encountered one instance of stuck MIDI notes, a problem for which the unit offers no solution other than turning it off and back on again. The Pocketstudio 5 is powered by an adapter (which is included) or six AA batteries (not included).

Next to the power jack is the USB port. The recorder will interface with most Macs or PCs that are USB-equipped,

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MORE CORE.

PLUG AND PLAY

I slid one ¼-inch input's switch to the Guitar setting and adjusted the input level, but I had to turn it almost all the way up to get a decent level. You can view the level meters at one of four settings: Long & Fat, Short & Fat, Long & Slim, and Short & Slim. The Pocketstudio has a built-in tuner, so I made sure my acoustic guitar was tuned to A 440 before continuing. The tuner works only on the ¼-inch input and not on the built-in mic. (It's a good thing my guitar has a pickup!)

The Pocketstudio 5 has a surprising number of effects processors: one for acoustic and electric guitars (including bass), another for vocals and drums, two effects for the GM tone generator, and an overall reverb for the master bus. That's five effects processors, and they all work simultaneously.

I tried using the built-in mic for the acoustic guitar, but it sounded papery and lacks a gain control. The user guide recommends using an outboard mic for anything except guide tracks, so I used a Røde NT1 through an A.R.T. Tube PAC preamp/compressor. Two-band EQ with selectable frequency is available on each input and on each track. I rolled off a little bass for the acoustic's input and sent a bit of the track to the master reverb—nice! The preset effects are tweakable and for the most part, they're very usable. The reverbs are done nicely, although the amp models could do with additional cabinet sound, and more compression options would be nice for the Vocals bank. Recording and punching in with Auto Punch was straightforward, and soon I had three tracks of guitars.

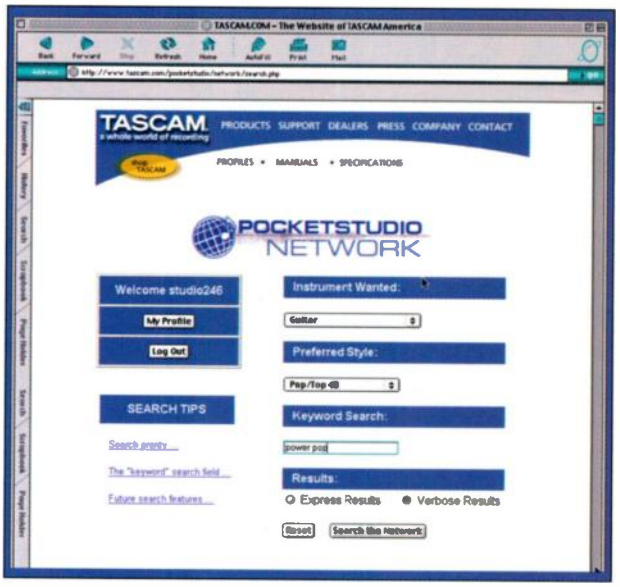

FIG. 3: Tascam's Pocketstudio Network allows you to search for and collaborate with musicians around the world by swapping tracks and song files over the Internet.

BOUNCE TO THE OUNCE

Changing the recording mode from Tracking to Bouncing made it a breeze to bounce tracks 1 through 3 down to 3 and 4. The Pocketstudio 5 has two bounce modes. One (Bounce+) lets you add signals from the inputs as you bounce, and the other (Bouncing) is strictly internal. After bouncing down the tracks, I filled tracks 1 and 2 with silence (the unit has no track-erase feature) and used Card Optimize to delete the leftover and redundant edit data. That step saved 11 MB of space on my card.

I was ready to record on tracks 1 and 2 again, but I discovered a shortcoming: the Pocketstudio 5 has no virtual tracks—those handy holding spaces for alternate takes. That means you'd better like your bounce, because once you record over the original takes, you're stuck with it. The only alternative is to save a copy of your song to a computer before you bounce it. Tascam suggests that virtual tracks might be included in a future system software upgrade, but for now, a prebounce save is your only option.

FIG. 2: Various ports are positioned on Pocketstudio 5's side panels. On the front are audio inputs and outputs. On the rear are MIDI In, USB, and AC-adapter ports. Selector switches and the Compact Flash port are on the unit's right-side panel.

VOCAL EASE

For vocals, I decided to try the included headset microphone, which the manual suggests because of the built-in condenser mic's lower quality. Regrettably, the headset mic wasn't much better. Swinging the mic way off-axis was the only way to subdue the frequent pops and distortion that occurred whenever I sang (though the Overload LED never blinked). As far as I could tell, a compressor wasn't available in any vocal preset. In fact, the vocal presets were heavy on gimmicky effects like distortion and lo-fi processing. The

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DeEss preset tamed some of the hiss, but my results were still a bit thin.

For my harmony vocal, I used the Chorist preset (a chorus and short delay). For comparison, I retracked the vocals with my mic-and-preamp combination and, not surprisingly, got much more presence, warmth, and detail. I reminded myself that the included mic was mainly for getting ideas down quickly. If you're doing final tracks or exchanging tracks with other musicians, you'll want to use the best mic you can get your hands on.

COMMENCE MIXDOWN

The Pocketstudio 5 records its audio in a proprietary version of the MP3 algorithm, so you can't save individual tracks as MP3s (unless you do separate mixdowns for each). When it's time for final mixes, though, the Pocketstudio generates standard MP3 files that any computer can read. Pocketstudio can also play any standard MP3 file as long as it's encoded at 128 kbps.

Because the files are in a standard format and therefore swappable, Tascam has created a music exchange space on its Web site (www.tascam.com/pocketstudio/network). There you can share information about yourself and your music, and by swapping your song files, you can collaborate with players around the world (see Fig. 3).

The process of mixing down is a simple matter of switching to MP3 mode (with a dedicated button) and punching Play/Record. You can then make fader adjustments on the fly, but there's no track muting, and you can't adjust effects during mixdown. I did two mixdowns of a quickly written tune ("You Went Bad") to compare the vocal mic sounds.

EM WEB CLIPS

For the type of work I'm doing, internally mixing down to a ready-to-e-mail format is a big time-saver. Still, I really missed the mastering or sweetening effects (usually a compressor, EQ, and gain-boost combination) I've used in similar devices. Tracks recorded on small units such as the Pocketstudio, which compress audio data, can usually benefit from a little extra punch at mixdown. Fortunately, you can load your final MP3 mix into a new song and then change its level, EQ, and so on.

STUDIO IN YOUR POCKET?

The Pocketstudio 5 is a capable and easy-to-use unit. Its effects are plentiful, and its tone generator lets you create many more than four tracks of music without any additional outboard equipment (within the aforementioned limitations). Depending on your songwriting style, you'll probably find the preset arrangements either helpful or annoying.

The Pocketstudio 5 offers some flexibility that its competitors lack, as well as room for growth with software updates. Its weaknesses are in its recording of acoustic sound sources (voice in particular) using the included microphones and its lack of virtual tracks. If you want a single piece of portable gear to write, record, and swap song ideas, the Pocketstudio 5 is a good choice for the money.

Steve Broderson *creates original music for broadcast (www.studio246.com) and teaches audio at Asbury College in Wilmore, Kentucky.*

PRODUCT SUMMARY

Tascam
Pocketstudio 5
portable digital studio
$499

FEATURES	3.0
EASE OF USE	4.0
AUDIO QUALITY	3.0
VALUE	3.5

RATING PRODUCTS FROM 1 TO 5

PROS: Easy to use and navigate. Onboard GM sounds. Five effects processors. USB port. Quickly creates MP3 mixes.

CONS: Audio in compressed data format. No virtual tracks. No vocal compression or dedicated mastering effects. Disappointing microphone quality.

Manufacturer
Tascam
tel. (323) 726-0303
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LFOs, ADSR envelopes for the filter and amp, an overdrive-distortion output stage, and provisions for frequency, pulse-width, and ring modulation. Wasp can produce all the usual analog lead, bass, and polysynth sounds.

WaveDream is another three-oscillator synth, but it uses wavetables as its sound source. Several wavetables are provided, and you can also create your own as simple text files. WaveDream features a multimode resonant filter and three LFOs that, between them, can modulate virtually every WaveDream parameter, including wavetable position. WaveDream is well suited for ambient and pad sounds and features a Double Dose mode that uses separate voices for the left and right stereo channels with optional detuning for rich six-oscillator textures.

Two drum synths round out the built-in collection. Tomcat is designed for kick and tom sounds. It has two oscillator-filter-amp sections, and each oscillator has a decay envelope for controlling pitch. XR-909 is a 10-track model of an analog drum machine. Eight of the tracks are dedicated to standard drum sounds, and two allow you to load your own samples. XR-909 comes in two models: the Stereo model mixes the 10 sounds to a stereo image, and the 10xMono model provides separate channel strips in the Mixer for each drum sound. That means you can have individual insert effects and separate send amounts to global effects for each sound, making XR-909 a very flexible instrument.

▼ Automation on the pattern or song level is a piece of cake in Orion.

When you can't synthesize your way to loop heaven, you can drop in Orion's two sample-based generators: Sampler and Drums. Sampler is primarily designed for playing individual samples and loops, although it will import sample maps in SoundFont 2.0 and Kurzweil formats. (You can't build your own sample maps in the Basic and Pro versions.) Its special features include a sidechain function (which is undocumented) for frequency modulating the sound by another generator's output and a built-in beat slicer for slicing up loops and generating pattern-sequencer patterns matching the slices. The beat slicer, called Groove View, is a welcome addition that makes it unnecessary to go to third-party software to regroove your beat loops (see **Fig. 2**). Oddly, however, although you can adjust the detected slice points, Groove View will not automatically regenerate a matching pattern sequence for you.

Drums is a 12-track drum-sample player. It has a limited number of controls, but it features automatic sample-reversing and time-stretching. The time-stretching is "classic style," altering the loop time by changing the playback speed and, therefore, the pitch. Both Sampler and Drums come in Stereo and xMono models, which provide separate Mixer channel strips for two and four outputs, respectively.

Orion comes with a nice complement of effects processors divided into five categories: Delay/Echo, Reverb, Dynamics, Filter, and Misc. Like the synths, most are not out of the ordinary but will get the job done. (Platinum has a more complete set of effects and also provides more parameters for each.) Especially notable are the four effects—Compressor, Trance Gate, SC Filter, and SC RingMod—that provide sidechain inputs for modifying their effect according to the output of another generator. Of course, everything in your kit of VST and DirectX effects is also available.

Orion effects can be used in three ways. They can be inserted into any generator's channel strip in the Mixer, assigned to any of four send buses, and inserted into any of four slots in the Master Output section. Plug-in management is flexible and easy, and once a plug-in has been instantiated, it's no problem to move it from one location (for example, an insert or a bus) to another.

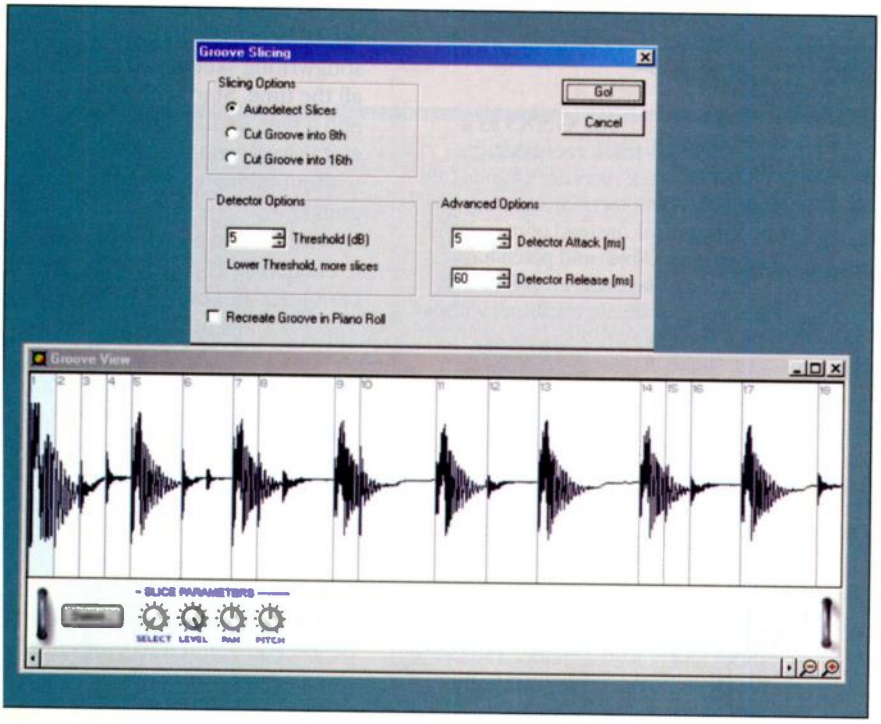

FIG. 2: Orion Pro's beat-slicing features are accessed through the Groove View (bottom) and the Groove Slicing window (top). Groove View can slice up a loop by detecting attack transients or at eighth- or 16th-note intervals. It will optionally generate a matching note-sequence for sequencing the slices.

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STEPPING UP TO THE PLATE

Each Orion generator (including MidiOut, but excluding AudioTrack) has a built-in pattern sequencer that can hold as many as 64 patterns (8 banks of 8 patterns). Each pattern can have 999 steps, and a step can be anything from a whole note to a 64th note. The number of steps and the step size apply to all patterns for a given generator, but can vary from generator to generator. Pattern-sequencer features differ slightly to accommodate the specific generator, but their basic operation is the same.

Each pattern sequencer has a piano-roll editor (see the bottom-left of Fig. 3) where notes can be entered with the mouse or in real-time using MIDI. (Unfortunately, there is no step-entry using MIDI.) A pencil tool makes it easy to enter, delete, move, and change the length of individual notes, and a lasso tool allows you to move and copy selections of notes. When the piano-roll editor was sized to fill the screen, I found the lasso tool almost unusable because for some reason, its screen-refresh rate was agonizingly slow on my machine. (The manufacturer claims that this is a very rare problem that has been noted by only a small number of users.) The drum-oriented synths also feature button-style entry for 16-step patterns. (Drum patterns that are entered using the buttons are always mirrored in the piano-roll editor.)

The piano-roll editors have a controller lane along the bottom that can be hidden or set to display Velocity or any generator parameter. Controller-lane events can be entered with the mouse or recorded in real time. Virtually any Mixer or generator parameter can be assigned to a MIDI controller by means of a flexible MIDI-learn function. As a consequence, control automation can be recorded in real time either by mousing the onscreen controls or using MIDI.

Each generator also has its own arpeggiator. The arpeggiators are very flexible, allowing for five predefined note-direction options as well as a user-definable option (which is undocumented). Timing from quarter to 128th notes is provided, the arpeggio can be extended over five octaves, and individual quarter-note positions can be toggled on and off. The arpeggiator includes a chord maker that will cycle through a maximum of eight chords, with each chord lasting the length of a full pattern. When both the arpeggiator and the chord maker are turned on, the chord is arpeggiated. Conveniently, the arpeggio (but not the chord-maker) output can be rendered to the piano-roll editor for further modification.

Orion's song sequencer, which is called the Song Playlist, has a track for each generator (see the top of Fig. 3). You create a song by activating patterns at various time positions on the tracks. The patterns do not have to be quantized to bar divisions, and when you insert a pattern, its length is automatically accounted for. The Song Playlist offers the same pencil and lasso tools as the pattern sequencers. Song creation is very easy except that changing the pattern number is a bit touchy, and the large, four-way cursor icon obscures the pattern number as it changes. A separate Tempo Editor allows you to easily draw in song-tempo changes. In Fig. 3, you can see the Song Playlist, the Tempo Editor, and the Bazzline pattern for the MP3 file Ritard, which is available at the EM Web site. The song was made entirely with Orion synthesizers and effects.

Orion allows you to automate any parameter on both the song and pattern level. You open controller lanes for specific controls by right-clicking the onscreen knobs and selecting whether to edit song or pattern events. As with the pattern sequencers, control changes can be moused in or recorded in real time using the onscreen controls or MIDI. In short, automation on the pattern or song level is a piece of cake in Orion.

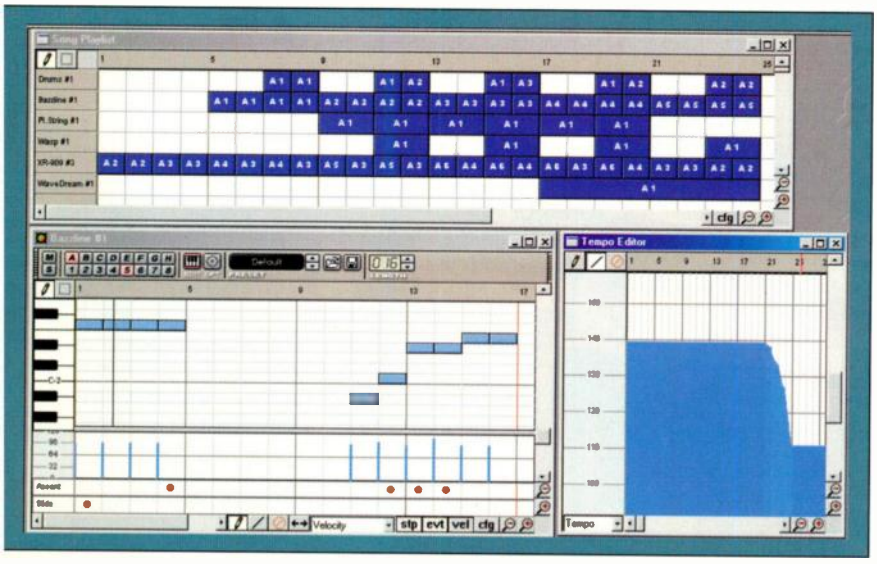

FIG. 3: An Orion Pro song consists of a Song Playlist (top), which is used to sequence individual pattern sequences (an example sequence appears at bottom-left). Global tempo changes are made in the Tempo Editor (bottom-right).

MORE IN STORE

Orion has a number of nice features that I don't have space to cover in detail. A Groove Templatizer allows you to apply swing and shuffle grooves to your patterns. A number of templates are provided, and you can also create your own. Automatic pattern-editing options include humanize, quantize, transpose, and scale Velocity. You can import and export standard MIDI files, and you can save your songs bundled with all used sample files. Finally, there is unlimited Undo/Redo.

Orion's weakest point is probably its documentation. All documentation is contained in the help file, and some

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PRODUCT SUMMARY

Synapse Audio Software

Orion Pro 3.03 (Win)
software synth workstation
$49 Basic (download)
$99 Pro (download)
$199 Platinum (CD-ROM)

FEATURES	4.0
EASE OF USE	3.5
DOCUMENTATION	2.5
VALUE	3.5

RATING PRODUCTS FROM 1 TO 5

PROS: Robust sequencer implementation. Full complement of basic synths and effects. Total automation with MIDI control and recording.

CONS: Weak documentation. Data entry and selection touchy in some cases. Few synth presets.

Manufacturer

Synapse Audio Software
e-mail info@synapse-audio.com
Web www.synapse-audio.com

features are simply not documented or are explained in so little detail that you're left with no idea how to actually implement them. On top of that, no presets are supplied for many of the generators with only a minimal selection for the rest. (The Platinum CD contains a large collection of presets and samples.) These are not unusual problems for a small company with an evolving product, and the situation may significantly improve in the future. In any case, the beginners' tutorial and supplied example songs are enough to get you going.

Overall, Orion is a very nice software synth workstation suitable for making loops as well as entire songs. It has a few quirks to work around, and you'll definitely want to complement its generators and effects with your own plug-ins. At $99, the Pro version is priced in line with the competition and clearly has some standout features.

Len Sasso *can be contacted through his Web site at www.swiftkick.com.*

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CYCLING '74

PLUGGO 3.0.2 (MAC)

An already great deal gets even better.

By Doug Geers

Since its release in 1999, Cycling '74's Pluggo has become a popular tool in music recording and production studios around the world. This is due in large part to its combination of affordability, versatility, and seemingly endless potential for future expansion. In a nutshell, the program is a collection of audio-effects plug-ins, such as reverbs, granulators, filters, delays, and distortion modules, for use with various Mac host applications. Called "the never-ending plug-in" by its authors, Pluggo comes with more than 100 plug-ins, and users can add more as they become available from Cycling '74 and from other Pluggo users.

The newest release of Pluggo, version 3.0.2, offers several major additions, which I'll focus on here (see the October 1999 **EM** for a more detailed overview). These stake out new territory in the sound-processing universe and help solidify the software's reputation as the greatest deal around for Mac-based plug-in users.

Minimum System Requirements

Pluggo 3.0.2

Power Mac 604/150 MHz; 64 MB RAM; Mac OS 8.6; VST, VST2, MAS, or RTAS plug-in host

MUSIC FOR THE MASSES

First and foremost, Pluggo now supports RTAS, MAS, VST, and VST2 plug-in formats. Pluggo 3.0.2 can therefore be used with a long list of programs, including Pro Tools (version 5.1 or higher), Logic, Cubase, Digital Performer, Peak, Live, Spark, and Max/MSP. Moreover, setting up Pluggo in any of those hosts is wonderfully easy, in part because of the *Getting Started with Pluggo* manual. The manual gives you a thorough but easy-to-complete step-by-step configuration guide for each of the programs listed above and helps users get up and running with minimal hassle.

I experimented with Pluggo 3.0.2 within several hosts, including Digital Performer, Peak, and Max/MSP, and in each environment, it was responsive and stable. Some problems have been reported, however, when running Pluggo 3.0.2 from within Logic. For example, crashes have occurred when loading Pluggo presets or new plug-ins while playing a sequence. Cycling '74 informed me that it has identified the bug that caused the problem and claims that it will be fixed by the time you read this.

FIG. 1: Like other Pluggo 3.0.2 plug-ins, Chorus X2 offers a choice of a graphic or a text-based user interface.

PLUG-INS APLENTY

In addition to Pluggo 3.0.2's support for more formats, many other things about it have changed since it was last reviewed in **EM**. Most noticeable are its 114 plug-ins—that's an increase of more than 50 percent from the original 74. Comprising the 114 are all the original Pluggo plug-ins, most of the "Pluggo-the-Month" plug-ins from the Cycling '74 Web site, and many others created just for this release. The new plug-in effects run the gamut and include delays (TapNet), flange (Jet), chorus (Chorus X2), distortion (HF Ring Mod), dynamics (Limi), filters (WasteBand), granulizers (Squirrel Parade), modulators (Knave Stories, M2M), and more. All work with the recently released version of Cycling '74's Max 4.0/MSP 2.0 programming environment.

At their best, Pluggo plug-ins have unexpected control parameters that users will find very helpful. TapNet, for example, is a four-tap delay line that allows any of the taps to feed back to any other, as well as to itself. Furthermore, every tap has a modulator attached for creating chorus and pitch-shifting effects. Needless to say, this complex system can create some amazing sounds! Happily, TapNet also gives you three possible user interfaces, each providing a different amount of parameter detail.

Two other highlights among the new plug-ins are Chorus X2 and WasteBand. Chorus X2 is a stereo chorus effect that divides the signal into two frequency

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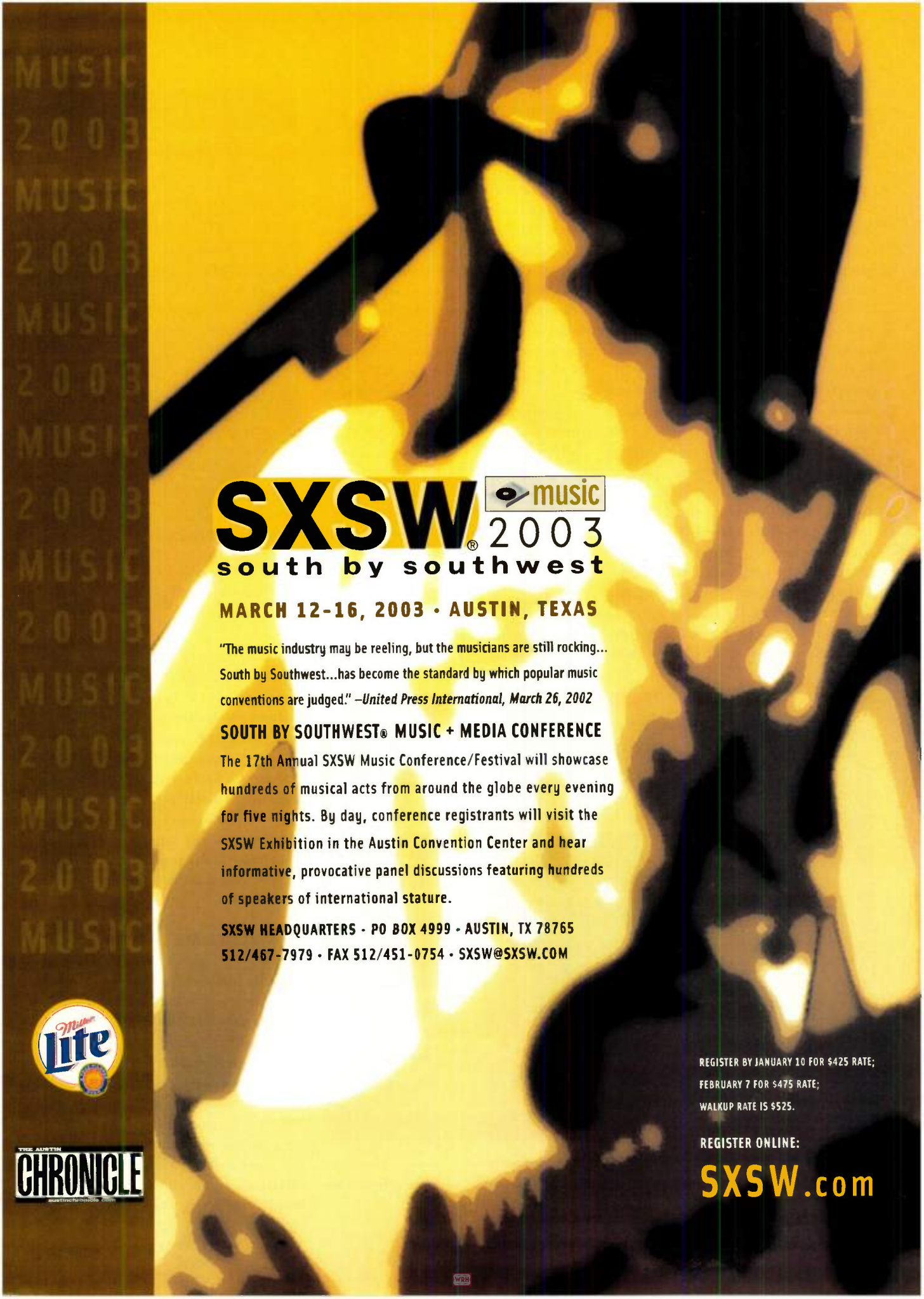
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bands that can be processed independently (see Fig. 1). WasteBand takes a similar approach to distortion and offers three frequency bands per channel, each of which can be muted, passed, or distorted.

Given the potential confusion of trying to remember the function and operation of such a large number of plug-ins, the "dictionary" that comes with Pluggo, called the *Pluggo Plug-in Reference Guide*, is quite useful. The Guide lists all of the plug-ins alphabetically and describes what each one does. It also shows a picture of each plug-in's interface, explains what each control on the interface affects, and gives hints about how it might be configured. More importantly, the guide contains a table of contents that lists the plug-ins by category—reverbs, delays, and so forth—for quick searches and comparison of particular effects. Finally, the guide has another, longer index that lists all of the plug-ins' presets alphabetically by name, from (In a) Big Country to Zzzzz. That is a nice touch, because shopping for an effect by preset name rather than by plug-in name can be an aid to inspiration. I found working with this list to be both productive and amusing, and I heartily recommend it.

SEA OF SYNTHS

The real wow factor of Pluggo 3.0.2 is the set of 19 new software synthesizers, dubbed "the Virtual Instruments." You can perform on these synths either by using live MIDI input or by controlling them with MIDI data sent from a host application. The wide range of synths Pluggo provides includes Additive Heaven (additive synthesis), Xmod Synth (analog-style modular synthesis), Fm 4-op (FM synthesis), Sampled Drums (eight channels of sampled drums), Laverne (two-oscillator subtractive synthesis), and Rye (granular synthesis). While playing with all of these instruments, I was especially impressed by the number and variety of analog-synth emulators (see Fig. 2).

The Virtual Instruments operate fairly easily, but their setups vary slightly for different host applications. In Digital Performer and Pro Tools, for instance, a Virtual Instrument is inserted into a blank audio track. But in other programs, such as Logic Audio and Cubase, you must place the Instrument on a specifically configured track, such as Logic's Audio Instrument track and Cubase's VST Instrument track, and then assign a MIDI track to play it. Beyond that, Pluggo's soft instruments function like any other soft synth and will appear in the pop-up menu of available outputs for the MIDI track you've designated.

PRODUCT SUMMARY

Cycling '74
Pluggo 3.0.2
effects plug-in bundle
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upgrade from 2.1 $99

FEATURES	5.0
EASE OF USE	4.5
QUALITY OF SOUNDS	5.0
VALUE	5.0

RATING PRODUCTS FROM 1 TO 5

PROS: A treasure trove of plug-ins at a dirt-cheap price. Some plug-ins act as modulators to control others. Works with VST, VST2, MAS, and RTAS. Users can create their own plug-ins using Max/MSP.

CONS: Mac only. Not OS X native. Pro Tools Free not supported.

Manufacturer
Cycling '74
e-mail info@cycling74.com
Web www.cycling74.com

MODULATE ME

Speaking of plug-in control, a new modulation plug-in has been added to Pluggo's arsenal. This remarkable new entry is called M2M (MIDI to Modulator) and turns real-time MIDI-performance information into control data for other plug-ins. M2M allows you to do very cool things such as using a Mod Wheel to control a delay line's feedback setting. Among other tricks, M2M lets you constrain and scale incoming MIDI values, which can be extremely helpful when you want to experiment

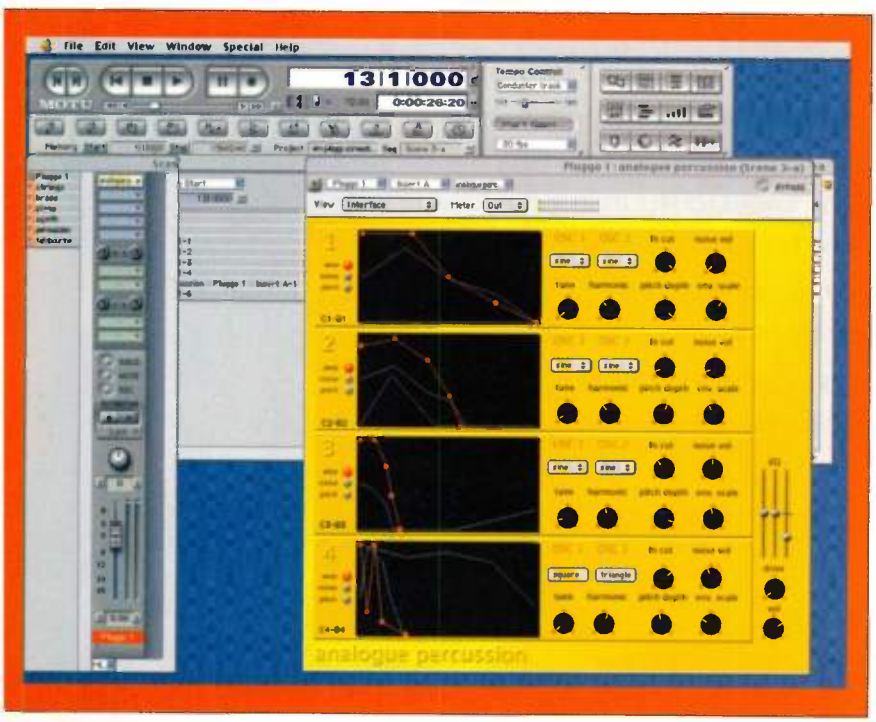

FIG. 2: Among the new soft synths in Pluggo 3.0.2 is Analogue Percussion, a four-voice percussion synthesizer. Graphic envelope generators that can be updated in real time are available for three of the synth's parameters.

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PLUGGING IN TO PLUGGO

Several valuable Pluggo-related resources are available on the Internet. Two of the most useful and active are described below.

www.pluggo.com
This site contains several additional free Pluggo plug-ins created by Pluggo users, including the wonderful Percolate collection of synths and processors by R. Luke DuBois and Dan Trueman. The site also contains the Pluggo Developer's Guide, which offers instructions on how to create Pluggo plug-ins, and Plug-in Confidential, a tutorial by Gregory Taylor describing how he made his first Pluggo plug-in, as well as all of the patches that went into it. You'll also find examples of the patches used to create the Pluggo plug-ins Rye and Walkie-Talkie, by jhno and Richard Dudas, respectively.

creativesynth.com/tutorials/004_SynthBuildingMSP/sbm_index.html
This site contains "Synth-Building with Max/MSP" by Darwin Grosse, a set of eight tutorials on building virtual synths.

within a specific range of a plug-in's settings.

Pluggo 3.0.2 also has added support for synchronization when you run Pluggo and non-Pluggo plug-ins simultaneously—something that many desktop musicians do. For VST2 and MAS host applications, many Pluggo plug-ins can sync directly to the sequencer's tempo; just set the Synchronization pop-up-menu parameter on the plug-in to Host. That is a very handy capability and allows you to change your sequencer's tempo without worrying about resetting Pluggo parameters or using a click track. For other (older) Pluggo plug-ins or VST or RTAS plug-ins, you can use the PluggoSync to accomplish the same thing.

For those who want to build their own Pluggo plug-ins using Max/MSP, two changes in Pluggo 3.0.2 are especially welcome. The first is Pluggo's enhanced audio-DSP engine, which has been updated to have all the functionality of Max 4 and MSP 2. That gives plug-in developers several added audio-processing tools, including better handling of polyphony (using the poly~ object) and much easier FFT analysis and resynthesis (using the pfft~ object). (See the sidebar "Plugging In to Pluggo" for more resources on this topic; also take a look at the sidebar "Roll Your Own" in the October 1999 issue's Pluggo review for an introduction to building Pluggo plug-ins).

Another boon for plug-in developers and other users is the Pluggo Runtime Installer, which should be available by the time you read this. This program allows anyone with a supported host program to use plug-ins created in Pluggo. The Pluggo Runtime Installer enables musicians and developers with offbeat ideas to invent new plug-ins and distribute them to a potentially worldwide audience, which is a very exciting proposition.

YOU GOTTA BELIEVE

Pluggo 3.0.2 combines easy setup and use with a seemingly inexhaustible wealth of ways to manipulate sounds, including open-ended expandability. From common delay effects to insane granulations, it offers a wide array of creative plug-in effects that have something for just about every type of desktop musician. At $199 for more than 100 synths and effects, it's an excellent bargain.

Given that many single plug-ins cost $100 or more, you may be thinking that Pluggo is too good to be true. My advice is to just try it. You can download a free demo version from the Cycling '74 Web site that is totally functional but outputs a five-second beep every minute until an authorization code is given.

Plug-in users of the world, unite! Pluggo 3.0.2 has something for all of us, at a price that can't be beat.

Doug Geers, *a composer who enjoys creating and performing music with computers whenever possible, teaches at the University of Minnesota, Minneapolis.*

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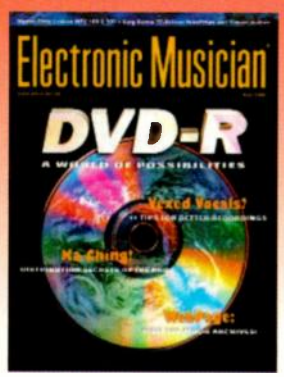

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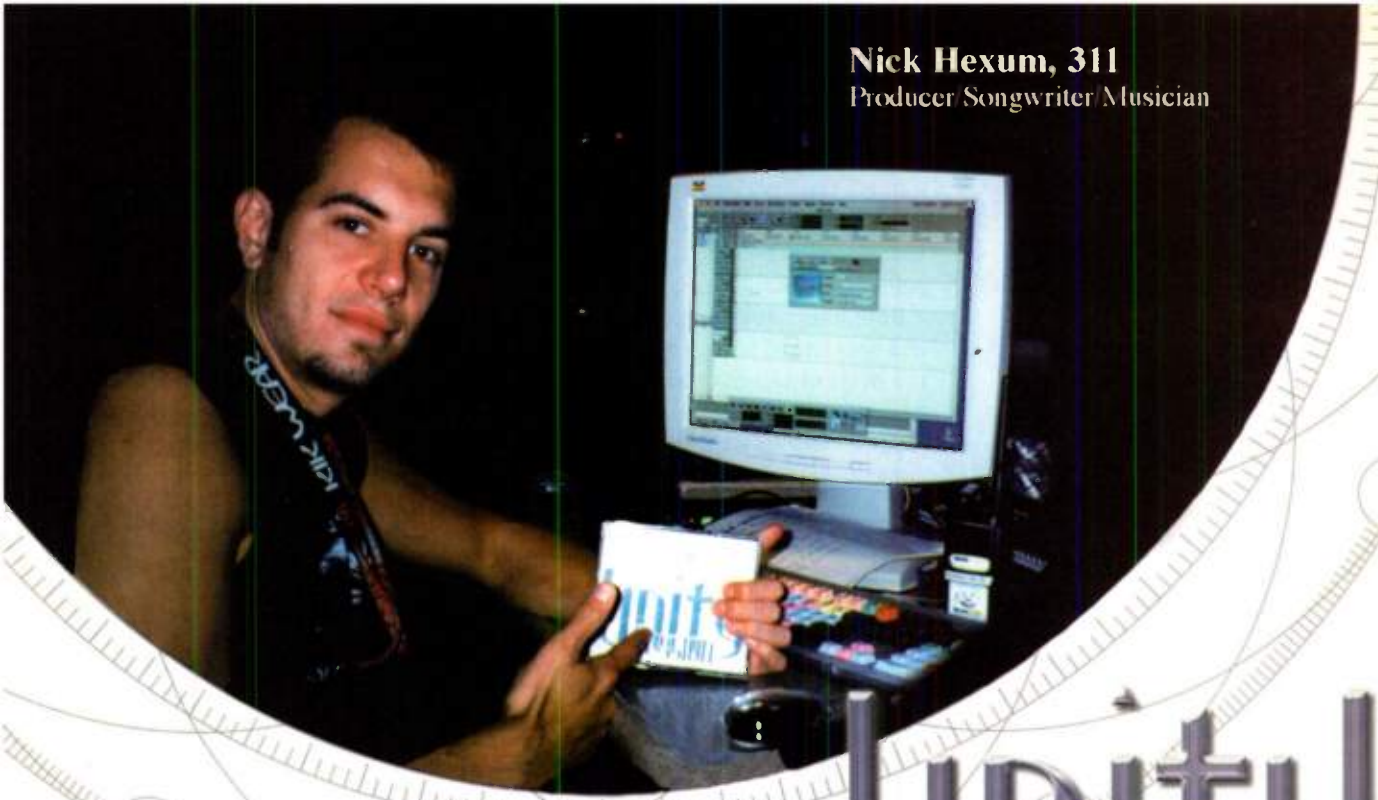

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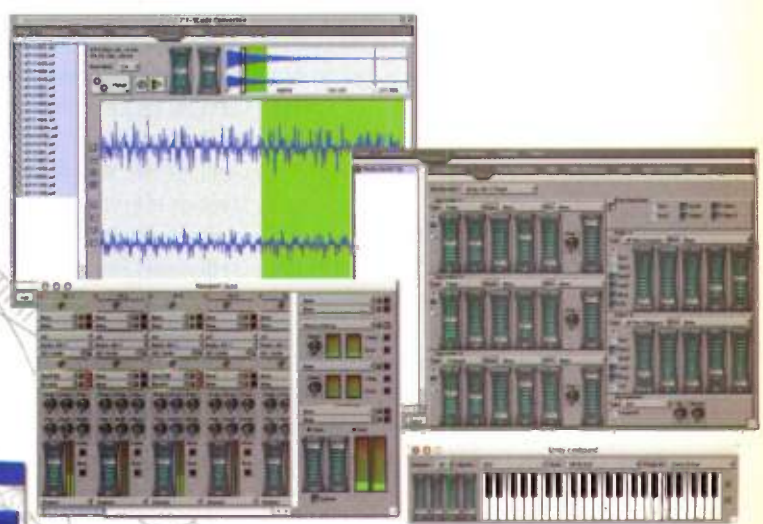

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Quick Picks

ANALOGUE SOLUTIONS

Phobos Filtered Coffee

By Mike Peake

Analogue Solutions has upped the ante in the stompbox filter wars by introducing the Phobos Filtered Coffee ($325). The feature-packed single-rackspace unit is an accurate-sounding analog emulation of the filter section from the venerable Korg MS-20 synthesizer.

The Filtered Coffee is housed in a plastic case, and its sturdy metal front panel is tightly packed with controls. The unit's 15 knobs have a rubberized coating that makes them easy to grasp and tweak. All the switches and pots are solidly mounted and have no wiggle or play. Some knobs also operate as switches when you pull them, allowing you to invert control voltage (CV) sources.

Fourteen ¼-inch jacks provide three audio inputs, three audio outputs, six CV inputs, and two CV outputs. By providing the means to route outputs to inputs, the rear panel permits the sort of flexibility you would expect in a modular synthesizer. The CV inputs allow you to manipulate audio signals using expression pedals and external control sources such as analog synth modules. A 15 VAC wall-wart adapter is included.

Grounds for Examination

A lowpass and a highpass filter are at the heart of the Filtered Coffee. When you insert a signal into the line-level Signal In jack, it's routed to both filters. Fortunately, a Signal In Thru jack lets you reroute the main audio input to the lowpass filter or voltage-controlled amplifier (VCA). Alternatively, you can insert a signal directly into the lowpass and VCA audio inputs. (The Signal In Thru and CV outputs are also useful if you're processing in stereo with a pair of units.)

Both filters sound quiet and musical, and both let you turn up the resonance to the point of self-oscillation. The Cutoff controls for both filters have limited ranges; consequently, sweeping the frequency above audibility requires the use of a modulation source. Lamentably, you can't modulate the highpass filter below its minimum cutoff of about 140 Hz, which means that any deep bass in your source will be attenuated, regardless of the cutoff and modulation settings. That also means you can't set the highpass filter's frequency low enough to boost bass drums and deep bass lines with high resonance settings. However, you can simply bypass the highpass filter by patching audio directly to the lowpass filter, but that's just not as interesting as using two filters simultaneously.

Percolating

The Filtered Coffee contains an envelope follower that tracks any audio input's changes in level. Two triangle-wave LFOs provide internal modulation sources. All external CV inputs are summed with the internal modulation paths.

I appreciated the inclusion of multiple modulation sources with individual attenuation and inversion controls. Each filter has two three-position switches for selecting two modulation sources, CV1 and CV2. The first switch toggles between LFO1 and Pedal, and the second toggles between the envelope follower and LFO2; each switch's center position turns modulation off. You can attenuate modulation depth with the CV1 and CV2 Level knobs.

Pulling out a CV Level pot inverts a modulation source's signal. If you select LFO2 on both filters and invert the signal from one, you can create a cyclic bandpass response with a fluctuating width. Then, to punch things up even further, you can add pedal modulation to one filter and LFO1 modulation to the other. You can also apply LFO modulation to the VCA for tremolo effects.

A Fine Cuppa Joe!

Although it is more expensive than some standalone filters, the Filtered Coffee is a useful tool for creating satisfying musical effects without the need for any additional gear. It adds plenty of analog character and motion to almost any type of source material. Effects such as audio-rate FM, for example, impart a wonderfully gritty character to your sounds. The unit's manipulation and mangling of audio can be simple or drastic, and its capabilities should provide you with plenty of new ideas and unusual results. If you're searching for a means to spice up your sound, be sure to check out the Phobos Filtered Coffee.

Overall EM Rating (1 through 5): 3.5

Analogue Solutions/SweetNoise (distributor); tel. (818) 980-6983; e-mail info@analoguesolutions.com; Web www.analoguesolutions.com

The Phobos Filtered Coffee, from British synth-builder Analogue Solutions, was designed to emulate the Korg MS-20's filters, amplifiers, and envelope generator.

APPLIED ACOUSTICS SYSTEMS

Lounge Lizard EP-1 (Mac/Win)

By Brian Smithers

The venerable Fender Rhodes electric piano came in two varieties: a Stage model with removable legs (for ease of lugging) and a Suitcase model with its own amp and speaker system (which was not easy to lug, as I can attest). The latest incarnation of the Rhodes is a virtual instrument from Applied Acoustics Systems called Lounge Lizard EP-1 ($199). Using the physical-modeling synthesis engine of Applied Acoustics' Tassman, Lounge Lizard recreates the classic sounds of electromechanical pianos such as the Rhodes and the Wurlitzer.

No matter which hardware and software you use, Lounge Lizard has you covered. It supports Windows 98, ME, 2000, and XP, as well as Mac OS 9. It also runs the gamut of drivers and plug-in formats: ASIO,

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With a brushed-metal facade and retro knobs and switches, Lounge Lizard's interface reveals its Tassman lineage. It offers MIDI control over virtually every parameter.

DirectX, DXi, EASI, MME, VST, WDM, DirectConnect, MAS, and FreeMIDI. Its stated minimum system requirements are a Pentium III/500 MHz or a G3 processor and 32 MB of RAM for either platform, but I recommend a seriously beefy computer with a low-latency audio interface. My Celeron 1 GHz notebook wasn't able to run multiple copies of Lounge Lizard despite its half-gigabyte of RAM. One instance at a time was wonderfully snappy and responsive, though, thanks to the extremely efficient drivers of my audio interface.

Playing the Field

I used Lounge Lizard in standalone mode and with both Cakewalk Sonar XL 2.0 and Steinberg Cubase VST/32 5.0. In standalone mode, you control the sample buffer (and therefore the latency) within the program's preferences, but in VST or DXi mode, the latency depends on the host program's buffer settings. If your performance is inadequate, you can lower the polyphony, thereby easing the burden on the processor.

Once you have the performance settings dialed in to your satisfaction, operating Lounge Lizard is a piece of cake, and the sound is just as sweet. Along the bottom of the main window are two banks of four switches that call up Presets. The first bank is hardwired to factory Presets, and the second bank opens user Presets. A Variation switch toggles to a different set of Presets, allowing clean and dirty variations of each Preset, for example.

My only major beef with Lounge Lizard is that you must use the Open menu command and go through a standard file dialog to call up Presets other than those assigned to the eight switches. In an ideal world, all soft synths would display a cascading menu of Presets when you click on the appropriate button. Applied Acoustics says that it is working on an improved method.

Every switch and knob on Lounge Lizard's front panel can be controlled by MIDI messages. Most are already mapped to controllers, but you can use MIDI Learn mode to assign any knob or switch to the next Control Change (CC) message it receives; either select the control and choose Learn from the Edit menu, or simply right-click on

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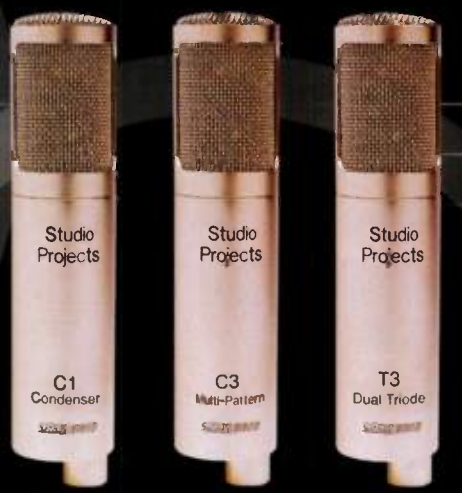

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the control. Assigning controllers that way allows you to turn effects on and off and to manipulate parameters, such as the stiffness of the mallet, that mold the instrument's sound and response as you play. Unfortunately, though, you can't use MIDI messages to change Presets.

Sonic Chameleon

To gauge the accuracy of the Lizard's Rhodes emulation, I put on a Joe Sample album and spent a couple hours trying to match the sound of his instrument. It took very little effort to tweak some of the Presets into a good likeness of the real deal. The stock Rhodes Presets lacked some of the "bark" that I expected on accented notes, but by raising the degree to which mallet force tracks Velocity, I was able to fix that.

Lounge Lizard includes numerous variations on Rhodes Suitcase and Stage models as well as excellent Wurlitzer emulations. A variety of experimental Presets is included, and still more are available online. Four vintage effects (wah, phaser, tremolo, and delay) are integrated. All hark back to the effects that electric-piano players often used. The tremolo even does the beautiful left-to-right stereo effect that was built into the Rhodes Suitcase model.

Aside from its patch-loading procedure, the only thing I'd change about Lounge Lizard EP-1 is its name, but that probably has more to do with my early gig experiences than anything else. It's a great little virtual instrument, providing satisfyingly realistic emulations of vintage electric pianos without all the weightlifting and maintenance issues.

Overall EM Rating (1 through 5): 4

Applied Acoustics Systems; tel. (888) 441-8277 or (514) 871-4963; e-mail info@applied-acoustics.com; Web www.applied-acoustics.com.

DANELECTRO

DSR-1 Spring King

By Brian Knave

As a harp player who admits to being something of a spring-reverb fanatic—I own not only a reissue '63 Fender Tube Reverb tank, but also a Demeter RV-1 Real Reverb, not to mention the various tanks built in to tube amps in my collection—I was excited to get my hands on the new Danelectro DSR-1 Spring King ($199). This hefty spring-reverb unit, though it is more than twice the size of your average stompbox, is quite portable, at least compared to the aforementioned Fender tank I regularly lug around. You should note that the Spring King is not a digital "emulator"—this is the real deal, with actual springs inside (albeit short ones).

Kickin' It

The Spring King has a sturdy, two-piece steel chassis, lacquered yellow on top and chocolate brown on the bottom and sides. Four big nonskid rubber feet are attached securely to the bottom with screws and washers. Also located on the bottom panel, behind a removable plastic door, is the 9V-battery compartment.

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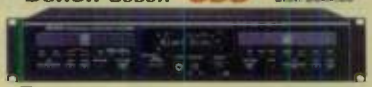
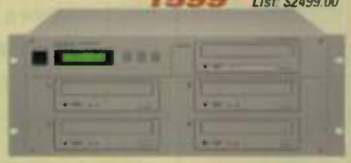


Tascam CD-1X4CD DUPLICATOR $1599.00 List: $2499.00



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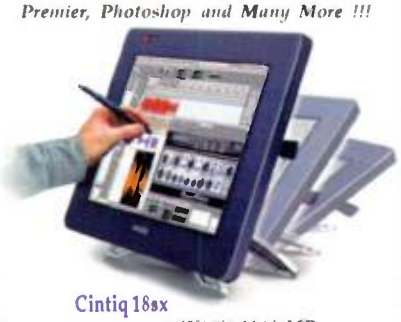

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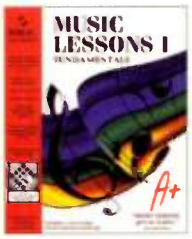

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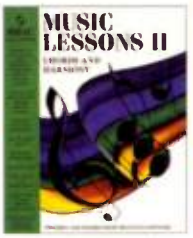

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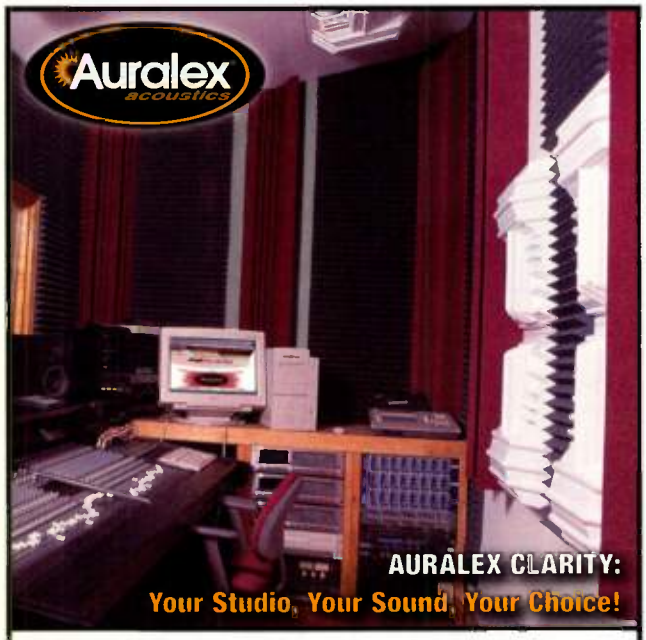

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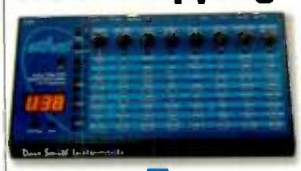

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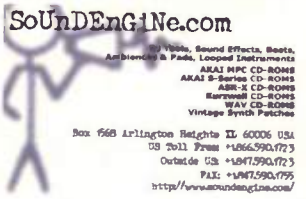

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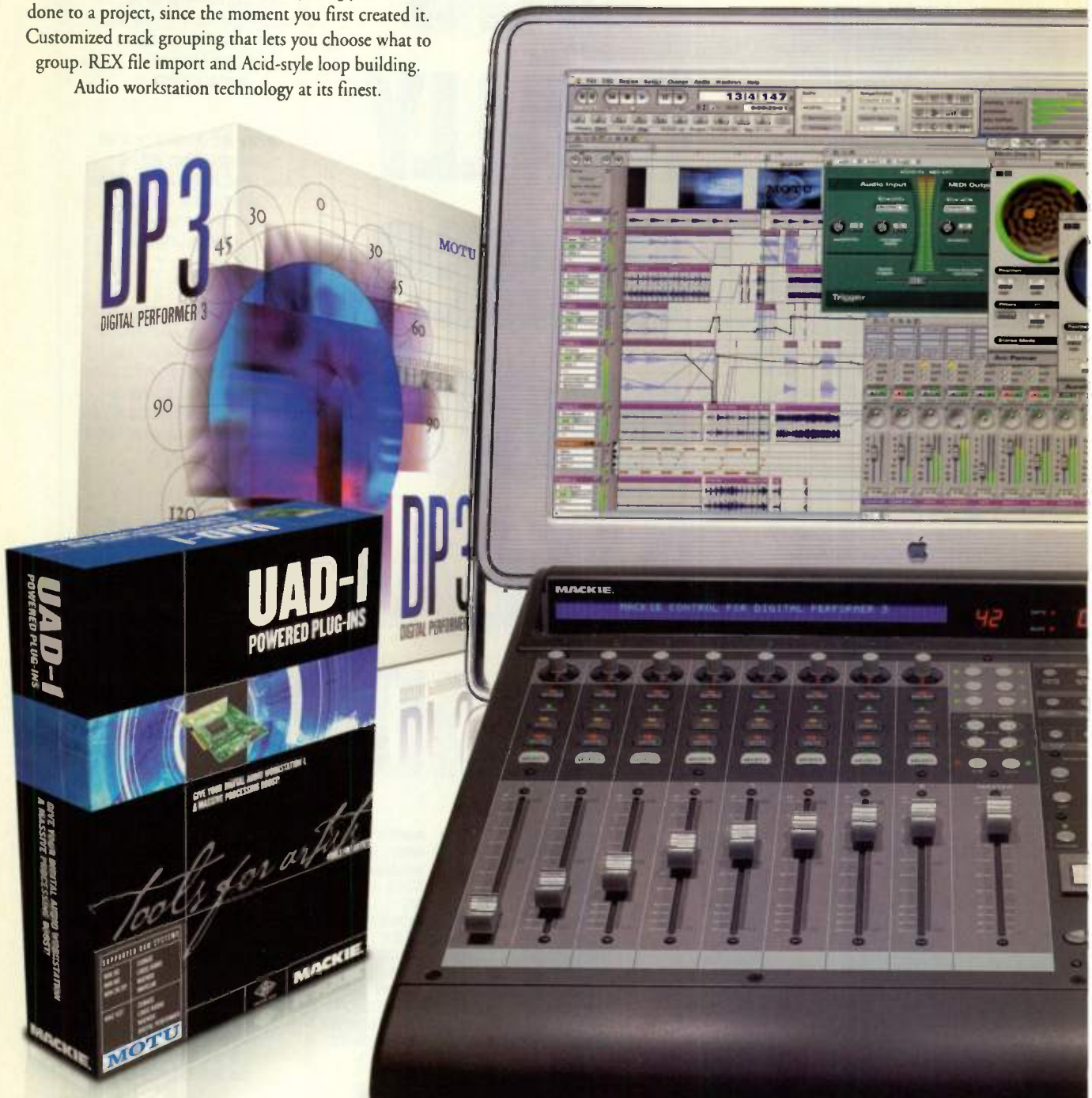

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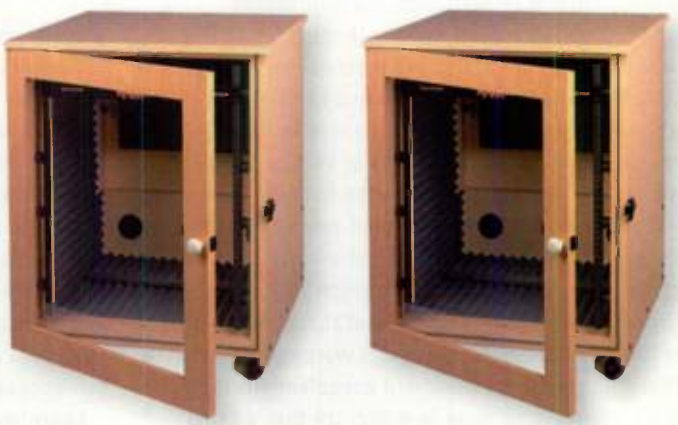

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The Wheel Is Turning (and You Can't Slow It Down)

It is a known fact that one of the only constants we know in this life is change. Whether you deal with it well or poorly, change will occur. And the ways in which change comes about are as interesting as how one deals with it.

Change can come in a brutally sudden and unexpected way or it can be so subtle that only upon retrospection do you realize that it occurred. You might see it coming, which is the ever-popular "handwriting on the wall" effect, or you might deliberately plan it and cause it to happen.

One of the most interesting harbingers is when events unfold in a way that gives the impression that *somebody* has scripted the whole thing, or, at the least, set in motion an elaborate mechanism. Things seem to fall into place like the cards in a hand of poker.

In fact, this previous manifestation is how I started my career in audio. Having done stints at Berklee College of Music and the tiny but mighty Boston School of Electronic Music, I was playing in a band and supporting myself working the graveyard shift at a copy store in Harvard Square, staring at a copier's green light all night long. The store had a lot of turnover and absenteeism. (It was staffed mostly by college students working for extra cash.) For some reason, I was more conscientious than most, even showing up once in a blizzard that was so bad that they'd already closed the store.

One day I called in 12 hours before my shift to tell my boss that I wouldn't be able to come in that night. When I called in the next day, they'd fired me. No big loss. I got out the classifieds and spotted an ad for assemblers needed at a young company called Lexicon. Having built an Aries modular synthesizer from a kit, my soldering skills were good enough to impress them, and I got the job—and started the same week that the groundbreaking Lexicon PrimeTime digital delay and 224 digital reverb were released. I've been working in pro audio ever since.

Anyone who has played in more than a few bands knows about the "handwriting on the wall" feeling, whether it's sensing that you and your band are going in different directions or that a particular player is not going to work out.

Using another example from my life to demonstrate the "planned change" scenario, I have in the past couple of years been redirecting more of my musical energies from playing drums to playing vibes and electronic mallets. My reason for switching, which was based on a long-building frustration at the drummer's lot, came to a head in a conversation with an audience member at a gig. She revealed that, despite having watched my band for the whole set, she hadn't even realized that I was playing among them. The stage wasn't *that* crowded.

I was faced with the realization that, after playing drums for decades, the audience literally didn't even know I was there. Time for a change.

In the next band I joined, I played a synth with a MIDI mallet controller. Once that band broke up, I worked up a repertoire and started playing open houses on solo vibes and vocals, doing primarily folk music. That is something people are definitely not accustomed to seeing, and I no longer escape the audience's notice. Of course, this change is still in progress but something does seem to be happening.

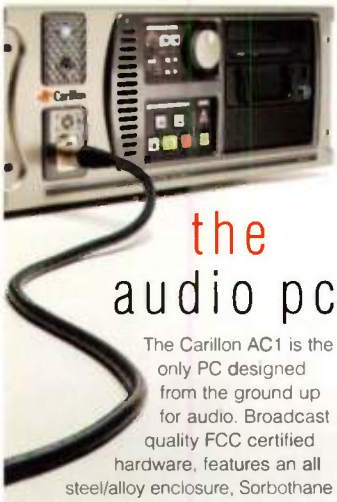
Learning to anticipate change is a powerful asset, and learning to roll with the changes, whether expected or not, is even more powerful. Although it may sometimes be possible to fight a particular change, fighting the idea of change is more futile than fighting the coming of the tides.

You can't count on clearly seeing the shape of change; you can't even count on understanding it when it arrives or has passed. The Jefferson Airplane put it succinctly in the song "Crown of Creation": "Life is change; how it differs from the rocks."

We welcome your feedback. E-mail us at emeditorial@primediabusiness.com.

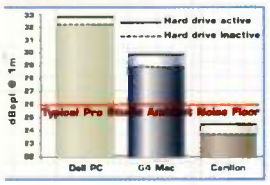
STEVE CURL

NEW www.emusician.com



the audio pc

The Carillon AC1 is the only PC designed from the ground up for audio. Broadcast quality FCC certified hardware, features an all steel/alloy enclosure, Sorbothane vibration damping & the very best components including our own Ultramute PSU. Ultra low noise performance & a host of audio specific features, like front panel patching and inexpensive 'real controllers', have earned praise from journalists & name professionals alike.



"The Carillon AC-1 is silent, robust and portable. I can keep it switched on in the control room without even thinking about fan noise."

Mike Hedges *Producer: U2, Phil Collins, Manics, Travis etc.*

"The AC-1 is really fast and it doesn't crash. It's also extremely quiet. I'm now using it for all my DSP work"

Chis Nutall *Sound Designer: AIR Studios (with Tim Vine-Lott)*

"The Carillon computer rocks! The hardware is beautifully designed and barely audible. It's also really well optimized - Nuendo runs like a dream"

Chuck Ainley *Producer: Mark Knopfler, Lyle Lovett etc.*

SX PRO RECORDIST
Carillon solution

steinberg Aardvark

- 24bit AARDVARK Q10 audio interface
- 8 microphone preamps, 4 with phantom power
- 2 Hi-Z guitar inputs
- 3 MIDI ports with LTB MIDI timing protocol
- CUBASE SX Professional recording software
- Integrated multitrack recording, editing and mixing
- Built in VSTi software instruments

Sound Quality and Ease of Use are key factors for live recording. The SX Pro Recordist fulfils both requirements with distinction. That's 8 microphones direct into the computer with no fuss, no hardware mixer, no complicated routings and very little cabling. The 8 mics can be simultaneously recorded onto separate tracks in Cubase SX for state of the art mixing and editing. You can then add further groups of 8 tracks, depending on the power of your "Core System'. Record an entire band, a properly mic'd drum kit, even a choir or a string or brass section, quickly and easily.

SYSTEMS FROM
$2899
Lease packages from $99 per month

Standard with this system:

how System specific set-up, manuals, tutorials & help

fix Our own one-stop online remote control tech support

Loopstation sound source & search engine with over 5000 pro samples

Custom set of Software specific, short-cut command key caps.

Steinberg Wavelab Lite edits, masters + Clean CD burning etc.

Our true "turnkey" solutions include manuals, tutorials & help written for each system as an entity. Expertly optimized and configured, they're

TOTAL SYSTEM INTEGRATION

ready to run so you can focus on making music. Reviewing the VST Songwriter, *SOS magazine* said "I had absolutely no operational problems during the course of my review"

Cubase SL Foundation System	$1799	ProTools 002/001 Systems	FROM $2199
Cubase SL Kontakt	$1999	ProTools HD Workstations	FROM $11499
Cubase SX Pro Recordist	$2899	Nuendo Workstation	$3799
Reason Breakstation	$1799	UltraSampler (Gigastudio)	$2399

Cubase SX | 002 | PRO TOOLS HD | SONAR | NUENDO | Sibelius | HALION | N I | TASCAM GIGASTUDIO

Sonar Foundation System	$1749	Core Systems from	$1199
Sonar Songwriter	$1799	Configure custom systems online with:	Carillon system builder
Sonar Project Studio	$1999		

Please visit **www.carillonusa.com** for full specifications

SOUNDCHASER STOP PRESS

As of October 25th, Sound Chaser has ceased normal business. Carillon and Soundchaser have reached an agreement whereby Carillon will be the exclusive source of Soundchaser's most successful configurations, most notably the GigaDAW TK1. All systems will be revised and optimized for Carillon's AC-1 hardware and include Carillon's own 'Fix' remote support and system specific 'How' & 'Help'.

Soundchaser CEO Paul Erlandson said "We are confident that Carillon will provide excellent service and high quality products for all of your DAW and audio needs".

WRH

Carillon
866-4CARILLON
(866-422-7455) email: info@carillonusa.com
To order online and for full details on all of our systems, features and Pro Users visit us at
www.carillonusa.com
Specification and prices subject to change without notice
Patent Application Nos US 09/909,130 CE 01306246.8 GB 0018000.0

High Definition Audio Redefined

Does high definition audio need to break your bank account? **Not anymore.**

Is the new MOTU HD192 system affordable? **Absolutely.**

Does the HD192 cost more than the MOTU 1296? **No.** The new HD192 offers more and costs less.

Are the HD192's A/D converters the same as another popular 192kHz audio interface? **Indeed.**

Does the HD192's dynamic range exceed 120dB? **Yes.**

Is this a theoretical number? **No.** It's a real-world measurement.

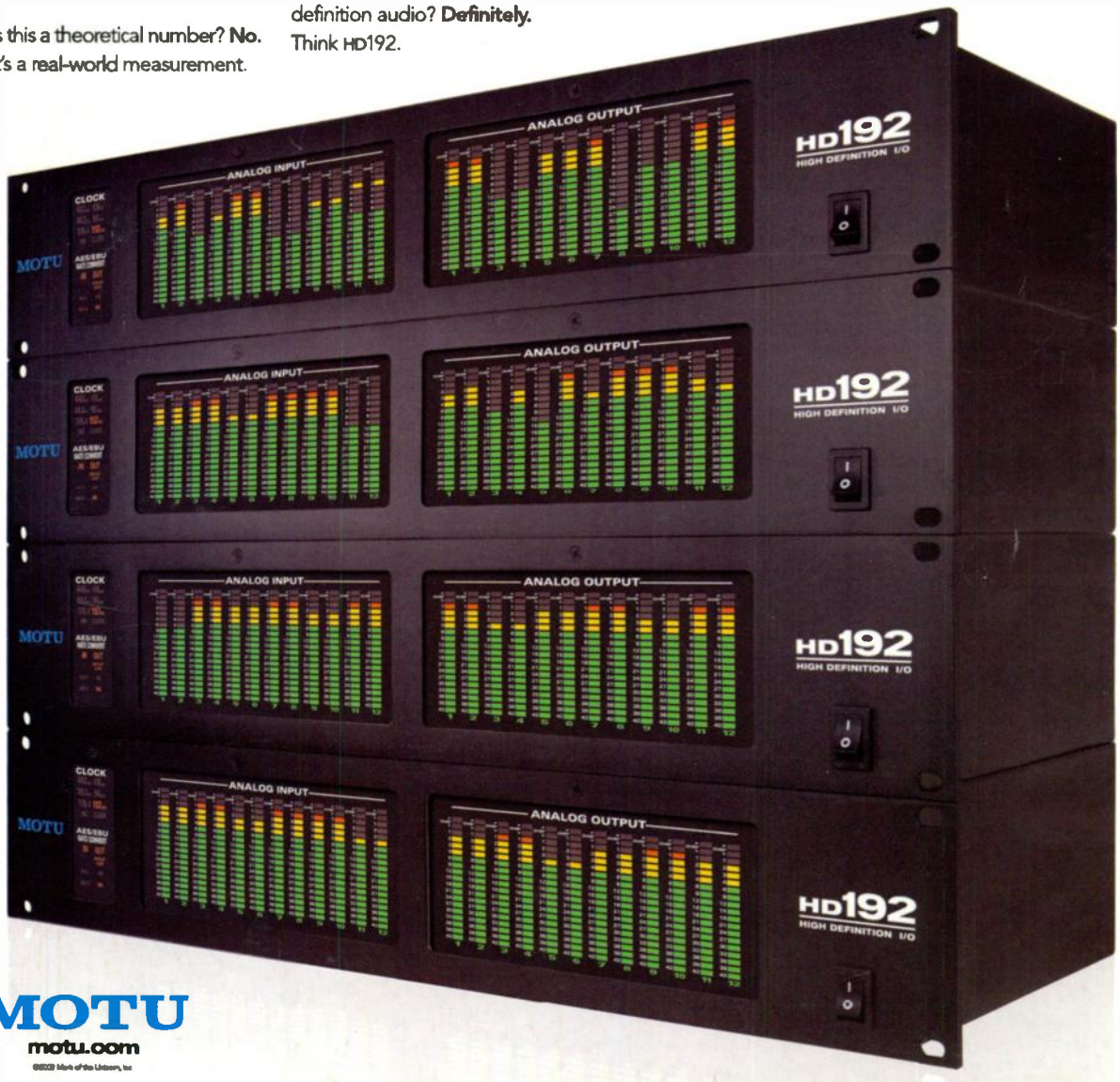
Does the HD192 core system include MOTU's powerful new PCI–424 card with CueMix DSP™ monitoring? **Yes.**

Will I hear host buffer latency (delay) when monitoring live inputs? **No!** CueMix DSP eliminates monitoring latency.

Is CueMix DSP flexible? **Yes.** It's a DSP-driven digital mix matrix that you control with our redesigned, intuitive CueMix Console software (included).

Is it time to reconsider high definition audio? **Definitely.** Think HD192.

- **12 XLR analog ins/outs** — transfer 12 channels into or out of your computer at 192 kHz.
- **Expansion** — connect up to four HD192's for 48 analog inputs and outputs.
- **Extension** — mix and match with any MOTU PCI audio interface (2408mk3, 24I/O, 2408mkII, 2408, 1296, etc.)
- **PCI-424 card** — connect four interfaces and monitor live inputs with zero host buffer latency via CueMix DSP.
- **On-board SMPTE sync** — resolve the HD192 directly to time code with fast lock-up and sub-frame accuracy.
- **Digital I/O** — AES/EBU with sample rate conversion.
- **Compatibility** — works with all audio software for Mac and Windows 98SE/Me/2000/XP.
- **Available** as a core system (with PCI card & Macintosh AudioDesk software) or as a PCI-424 expansion I/O.



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