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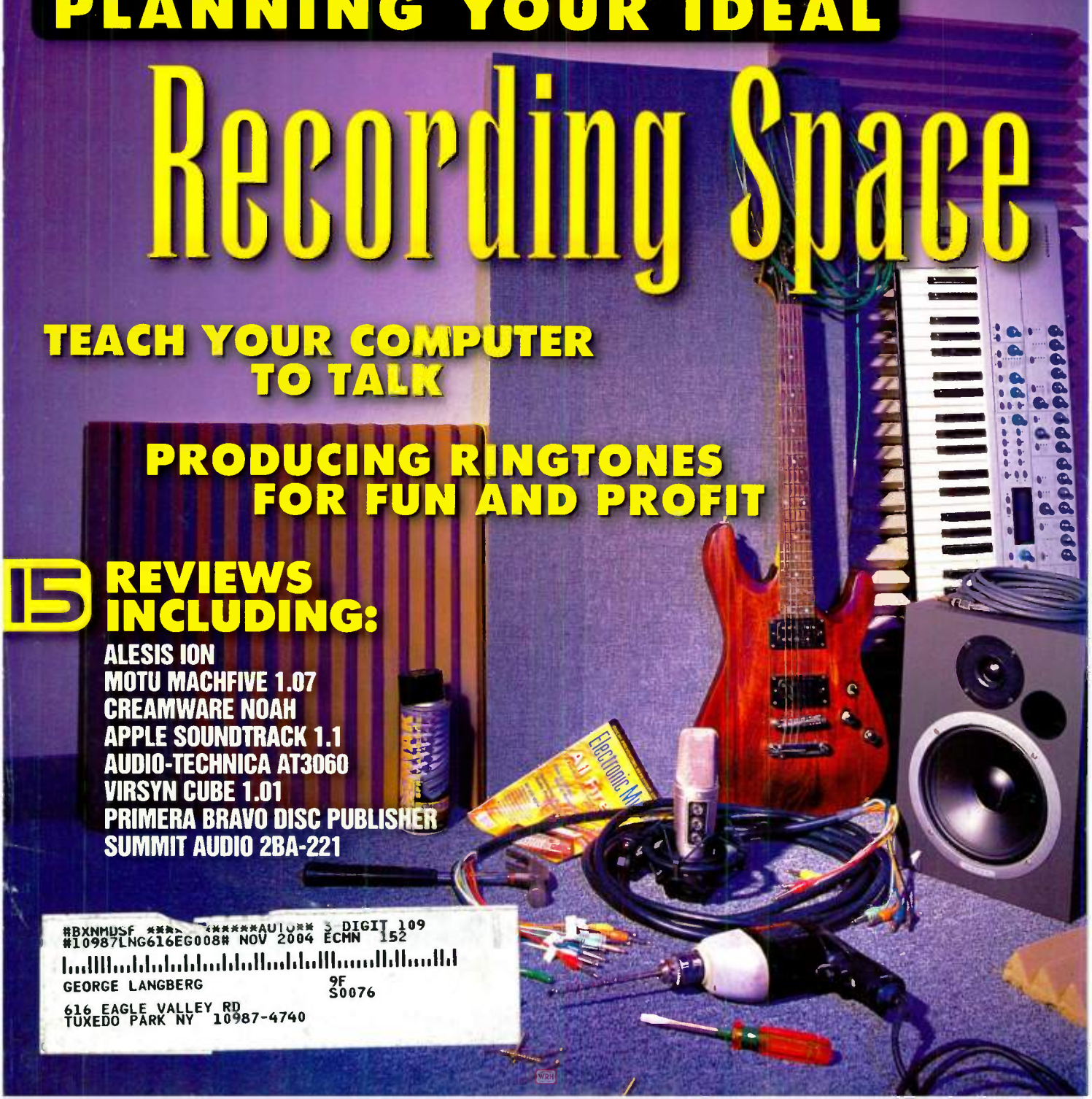
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## FEATURES

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Speech synthesis remains one of the final frontiers in synthesis research. Fortunately, many of the latest techniques for making computers talk are available to the desktop musician. We bring you the current trends in speech synthesis and cover the tools you need to give your computer the gift of gab.

*By Len Sasso*

### 40 COVER STORY: PLANNING YOUR IDEAL RECORDING SPACE

Moving is a stressful experience, but all the more so when your recording studio is going with you. Even if you aren't moving, you might be ready to redesign your existing studio. Careful planning and our expert advice can make the process as painless as possible.

*By Larry the O*

### 66 PRODUCTION VALUES: RECORDING BY INSTINCT

Pearl Jam drummer Matt Cameron and Monster Magnet founder John McBain are the producers, engineers, and primary musicians for the psychedelic rock project the Wellwater Conspiracy. Self-taught as engineers—they both cut their teeth on 4-track cassette recorders in the predigital days—the two are not afraid to use unconventional techniques to pursue their recording goals.

*By Mike Levine*



Cover photography by Anthony Pidgeon



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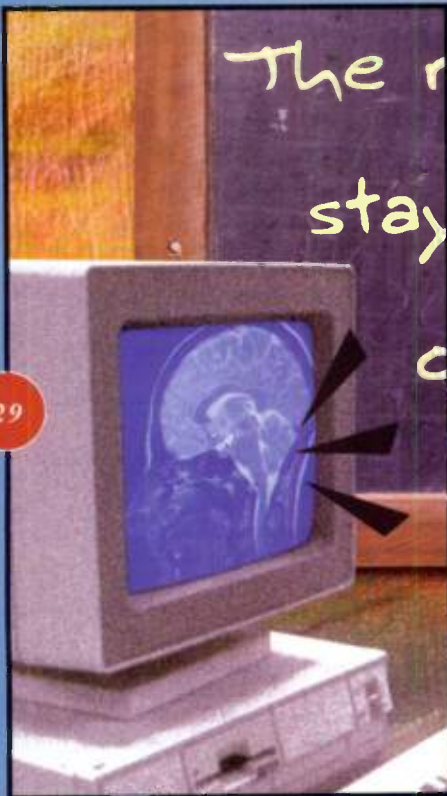
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## Starting Over

**G**iven how many hours you spend in your recording studio, it's worth the time and the thought—and a few extra dollars—to make it a space you enjoy working in. After all, there's more to designing a studio than just choosing its equipment.

Whether you are moving to a new place or gutting and completely redesigning your existing studio, the design considerations are mostly the same. So start the process by imagining that you have just moved into a new space and are planning the studio layout from scratch. That's what contributing editor Larry the O did when researching this month's cover story, "Planning Your Ideal Recording Space" (see p. 40).

In his article, Larry discusses how to plan the various parts of your studio redesign. In this editorial, I want to offer an overall philosophy for your studio-design process that complements Larry's approach. (I presented this information in more depth in "Holistic Studio Design," published in the 1999 *Personal Studio Buyer's Guide*, which newer *EM* readers probably missed.)

In my view, the key to the design process is to think of your studio as a single, integrated instrument. To design it properly, you should analyze your needs and plan how the elements will integrate into a functional unit before you install anything or buy additional gear. Think of your studio as a holistic system that has a structure: an organized arrangement of parts. Each part has a function and occupies a "status"—power supply, acoustic conditioning, controller, effects processor, sound source, and so on. Pay special attention to the relationships between the parts.

Having defined your objectives, you should analyze your production methods so you can identify how you like to work. Based on your objectives and working style, consider which functions are necessary to achieve your goals. For instance, are you using only electronic sound sources or will you record acoustic instruments and vocals, including guest artists? Do you like to use a lot of outboard hardware (implying a need for cables, patch bays, and AC power distribution) or mostly software?

Next, decide whether your system will remain static (other than adding software) or dynamic (with gear coming and going). If dynamic, you not only need to allow physical space for new gear, you also should figure out convenient and sufficient AC power and preconfigured audio and MIDI patch bays for quick and easy connections. Compatibility and connectivity are major issues, even in a static studio. But they are paramount in our holistic design, so pay special attention to them.

Studio security also should be part of your plan, and Michael Cooper offers some eminently practical security advice in "Working Musician: Don't Get Ripped Off!" on p. 96.

Perhaps these ideas seem obvious, but I have visited many personal studios and have often been dismayed by flaws that clearly reflected poor planning and a lack of integration. The next time I visit your studio, though, I am confident I'll see a well-integrated facility reflecting a holistic design.



ANTHONY PIDGEON

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# *K2661 Evolution of a Species*



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\* Note: Sample RAM is standard with models sold in the USA only.

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## WE DESERVED THAT

**T**he last sentence in Scott Wilkinson's December 2003 "Tech Page" column ("Diamonds Are a Chip's Best Friend") regarding diamond microchips had me scratching my head: "I wouldn't recommend giving one to your fiancée instead of an engagement ring." Then I realized that Scott thinks that **EM's** readers are all guys.

Wendy DeWitt  
Wette Music

## OZONE DEPLETION

**I**n your Quick Pick review of the M-Audio Ozone (December 2003), you gave the Ozone an overall rating of 2 out of 5, dinging it on its documentation and its use of a wall-wart adapter.

That is silly. Using a wall wart is inconvenient, but M-Audio needed to use one to power everything in the unit, and I wouldn't want to sacrifice on sound or features. Besides, I always need external power where I record anyway, as my laptop eats up a fair amount of battery power. As for the documentation lacking a warning to install the Ozone on the USB port where you always intend to use it—come on, this is common sense. Haven't you ever installed a USB printer?

The Ozone has cool features and sounds great. When my first Ozone was stolen, I went out and bought another one. That's my rating system!

George Putnam  
New Orleans, Louisiana

Author David Battino replies: George—On **EM's** 1-to-5 scale, a rating of 3 means "solid." Most products should get a 3. If a product sounds good but not stellar, for example, it gets a 3 for audio quality. If the sound is not quite as good as **EM** would expect for the price, it gets a 2.5 or lower. If it is better than average for the price—meaning today's average product in its class—it gets a 3.5.

At the time I wrote the review, I knew of two other compact USB audio-MIDI keyboards. Neither required a wall wart and both had more extensive MIDI features than the Ozone. As I said in the review, Windows' treacherous USB implementation isn't M-Audio's fault, but I do think the company bears responsibility for not mentioning potential problems, particularly with a product targeted at a new audience.

Several other factors convinced me to downgrade the Ozone. The first unit I received wouldn't power up, and the second had intermittent hiss in one output. The labels above the keys are so misaligned that they were sometimes in the cracks. The audio knobs are butted confusingly against the MIDI-controller knobs. The jacks are labeled in nearly unreadable silver-on-silver type. The toggle switches are only 1/8-inch wide. There is no master output-level control. The outputs produced some of the loudest speaker thumps I've heard. (Savvy electronic musicians know to turn down the amp before power-cycling audio gear, and omitting the muting circuitry allowed M-Audio to get better audio quality, but again, neither point is mentioned in the manual.) And the Ozone

wouldn't play audio reliably on my Windows laptop unless the latency was set to High. When it was set to Very Low, it consistently crashed the computer. High latency for the Ozone is still acceptably short, but I stand by my rating. And remember, a Value rating of 2 isn't bad; it means there are better options for the price.

## LEGACY OF SUPPORT

**I** enjoyed reading the November 2003 "Desktop Musician" column on the Windows XP operating system, "XP and Audio" by Daniel Keller. Unfortunately, the article said nothing about running legacy software in XP Compatibility mode.

I have been running Windows 98SE for some time, and I hesitate to change to XP because I don't know whether my software programs will run properly on XP. I understand that XP's Compatibility mode is able to run some older programs, but has anyone tested it out on popular audio programs? Is there a list of Windows 98 compatible software that will run on XP?

Mark Pereira  
via e-mail

Author Daniel Keller replies: Mark—Many older versions of audio applications will run just fine under XP's Compatibility mode. That said, if you decide to go that route, you'll have to keep in mind that you'll probably be doing so for a limited time. As more users migrate to XP, software manufacturers will gradually phase out support for these legacy programs. For example, Steinberg offers limited support for earlier versions of Cubase (pre-5.0), and Cakewalk's support for its older programs is similarly limited. This is largely because supporting



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and writing programs for older versions of Windows was problematic.

While Microsoft's Windows 9x OS remains a current product, Microsoft places a priority on supporting its more recent operating systems, with all new computers sporting Windows XP. While no official policy has been announced, support for Windows 9x will probably go the way of earlier Microsoft operating systems like Windows 3.1 and MS-DOS.

Changing and updating your computer audio system is rarely 100 percent issue-free, and it's understandable that many users prefer to subscribe to the "if it ain't broke" philosophy. Those users, however, will find it increasingly more difficult to find support.

### ELECTRET COMPANY

I just read Joseph Lemmer's letter ("Letters: Don't Believe the Hype," December 2003), and I must say that I agree with him. There is no longer anything inherently inferior about electret mics compared with true condensers.

Previously, electrets had heavier diaphragm assemblies due to weighty prepolarized material deposited on the diaphragms. However, modern electrets have gotten around the weight issue so that transient response is now just as good as that which true condensers exhibit. As an example, I consider B&K (now DPA) Series 4000 mics to be the best overall small-diaphragm condenser microphones on the planet (due in particular to their superb transient response and phase coherency), and these mics are, in fact, electret condensers.

Just because there are many inferior electret condensers on the market doesn't mean that electret condensers are, as a class, an inferior type of mic. It appears that the electrets that EM author Richard Alan Salz has experienced were largely poorly designed. It's a big (and erroneous) leap to infer that, all other things being equal, electrets are inferior to true condensers.

**Michael Cooper**  
Michael Cooper Recording  
Sisters, Oregon

### DO YOUR HOMEWORK

This is in response to the November 2003 "Final Mix" column, "Now's the Time." As a producer and the owner of a project studio, I understand Larry the O's plight. Many colleagues ask me, "Should I get the new version of Extreme AudioLooper 7000?" Or, "What about that plug-in?" I always reply with: "Stop! Does your system have enough hard-drive space and memory for it? Do you have the right operating system version? Does your software support that driver?"

My advice to consumers is simple: (1) control your gear lust, (2) research everything before you buy, (3) never upgrade until your desired version has been available for a few months, (4) version 2 will always outshine version 1, (5) any version labeled x.00 is just a beta version, and (6) any version labeled x.01 or higher is desirable, because the manufacturer has patched the most common bugs.

I use MOTU's Digital Performer 3.11

on a 500 MHz iMac. I've wanted to buy a new computer for more than a year, but the problems with new operating systems and my desired programs needing a certain upgrade have stopped me each time. My computer can handle 30 tracks of 44.1 kHz/16-bit audio, and that's all I need. (I'm a rap producer.) Anytime I need more voices, I simply do submixes. If I need 24-bit audio, I just switch to it.

If people actually learned the full potential of their current programs, they wouldn't be so quick to upgrade.

**Raushan**  
Nashville, Tennessee

*Raushan—I agree with many of your comments but point 5 is incorrect as stated, and point 6 is often true but not always. Each company uses its own labeling system, but there are common conventions; following those conventions, versions x.0 and x.00 are the same. Anytime you see only zeroes after the dot, that usually indicates the first commercial release of a major upgrade.*

*Beta versions are rarely sold to the public, although some companies do conduct public tests using free beta copies. Betas are often indicated with a lowercase letter (usually b), so if you are a beta tester, you might see a beta labeled x.01b. As for point 6, x.01 does often indicate a bug fix, but some companies use it to indicate a minor feature addition instead.—Steve O*

### ERROR LOG

January 2004, "Cover story: 2004 Editors' Choice Awards," p. 62. In the manufacturer contact sidebar, "The Winning Manufacturers," one winning manufacturer was inadvertently omitted: Mark of the Unicorn (MOTU); tel. (617) 576-2760; e-mail [info@motu.com](mailto:info@motu.com); Web [www.motu.com](http://www.motu.com).

### WE WELCOME YOUR FEEDBACK.

Address correspondence and e-mail to "Letters," Electronic Musician, 6400 Hollis Street, Suite 12, Emeryville, CA, 94608, or [emeditorial@primediabusiness.com](mailto:emeditorial@primediabusiness.com). Published letters may be edited for space and clarity.

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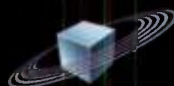
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## DOWNLOAD OF THE MONTH ▲ ▲ ▲ ▲

### ▶ AUDIO HIJACK 2.0.2 AND PRO 1.2.6, WIRETAP 1.0.0

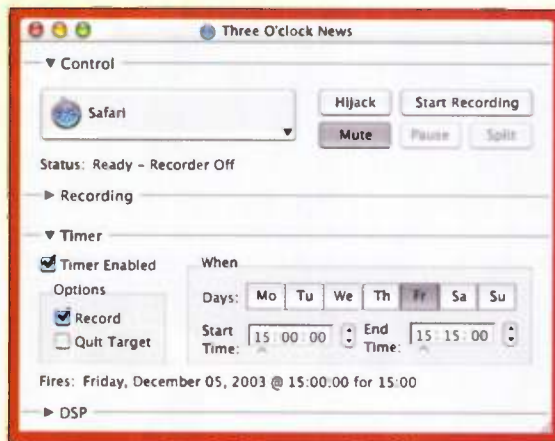
**A**udio Hijack (\$16), Audio Hijack Pro (\$30), and WireTap (freeware) are Mac OS X utilities for recording the audio output of applications that do not have built-in recorders, such as stand-alone synths, audio-file players, and plug-in hosts. They can also capture internet news and music broadcasts, and Audio Hijack and Audio Hijack Pro can capture your computer's audio input.

WireTap captures all audio appearing at the output of the Mac's built-in audio controller. To use WireTap to record the output of another software application, that application's audio must be routed accordingly. Once recording is started, all audio from all applications, including system sounds, is recorded. You can set WireTap's preferences to save recorded files in a location of your choice, to open the recorded audio file in any application, and to automatically compress the audio in a number of common formats, though not MP3 or AAC (m4a).

Audio Hijack, on the other hand, intercepts the audio output of a single application, applies any effects processing you choose, and routes its output to the audio port specified by the hijacked application. While an application is hijacked, its audio can be recorded to your hard drive, compressed in MP3 or AAC format, and automatically added to your iTunes library. Audio Hijack has a built-in 10-band

graphic equalizer with gain, pan, and exciter controls. Audio Hijack Pro offers advanced features, including a collection of 15 DSP plug-ins, support for VST and Audio Unit effects, and the ability to pause and resume recording.

Both Audio Hijack programs have a timer feature (see Fig. 1) that's useful for



**FIG. 1:** Audio Hijack's timer-recording feature allows you to set a date and time to start recording the hijacked source, as well as the duration of the recording.

capturing internet streams and live audio input. You can download WireTap from the Ambrosia Software Web site ([www.ambrosiasw.com/utilities/freebies](http://www.ambrosiasw.com/utilities/freebies)) and Audio Hijack and Audio Hijack Pro from Rogue Amoeba's Web site ([www.rogueamoeba.com](http://www.rogueamoeba.com)).

—Len Sasso

### ▼ CYCLING '74 RADIAL

**C**ycling '74 is shipping version 1.1 of its loop-based composition and performance software, Radial (Mac; boxed, \$199; download, \$189; upgrade, free). Radial goes beyond manipulating the tempo and pitch of multiple loops, providing a



unique user interface designed specifically for playing live. Enhancements to version 1.1 include Mac OS X compatibility, improved sync capabilities, and a convenient file-grouping mechanism. (Radial 1.0 is still available for Mac OS 8 and 9 users.)

In Radial, circular displays represent Loop Channels. Each one has a multimode filter and independent time and pitch scaling. Operating Radial is simple: drop a loop onto one of the channels, tweak its parameters, sculpt it with filters and DSP effects, and control playback in real time. You can manipulate virtually every aspect of the system using MIDI, a control surface,

or the Macintosh's keyboard and mouse.

Radial 1.1 offers full VST support and includes 13 Pluggo plug-ins for delay, distortion, reverb, filtering, and other effects. It reads AIFF, WAV, and MP3 files and supports multichannel audio input and output, matrix audio routing, tap tempo, and external synchronization. The installation disc includes nearly 500 MB of loops in a variety of styles, most of them created especially for use with Radial by developers such as Chris Randall, DJ Safety Scissors, Darwin Grosse, Gregory Taylor, and jhno. If you download the software, you can order the loop CD separately (\$10). Radial 1.1 requires at least a G3/300 MHz, Mac OS X 10.2, and 128 MB of RAM. A fully functional 30-day demo is available for download. Cycling '74; tel. (415) 974-1818; e-mail [info@cycling74.com](mailto:info@cycling74.com); Web [www.cycling74.com](http://www.cycling74.com).

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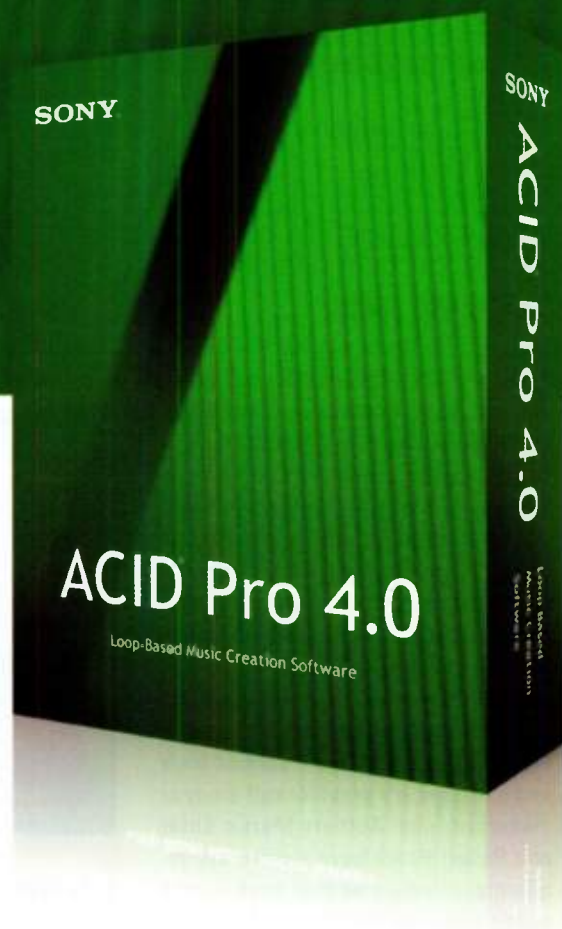
- A streamlined, efficient workspace
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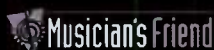
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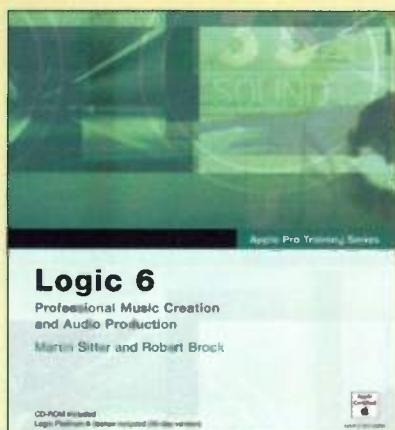
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# SONY



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### ▲ PEACHPIT PRESS

Part of the Apple Pro Training Series, *Logic 6: Professional Music Creation and Audio Production* (\$44.99) is a textbook and an in-depth tutorial. You begin by getting to know Emagic Logic 6's user interface and progress to mixing sessions in 5.1 surround sound. In between, you'll learn how to customize Logic Environments, import and record audio and MIDI tracks, and use instrument and effects plug-ins.

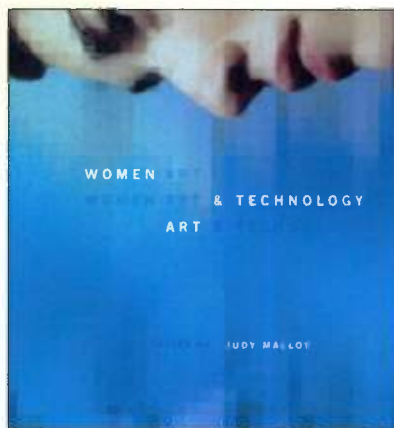
The book emphasizes hands-on applications and learning by actually assembling music using Logic's various tools and windows. It's great for self-study or classroom use. Authors Martin Sitter and Robert Brock have divided the sequential tutorials so that each lesson builds upon the others. The beginning of each chapter specifies what you will need, what you will learn, and how long each lesson should take. When you finish the book, you can qualify for official certification by taking an exam at an Apple Authorized Training Center.

Included with the book is a CD-ROM with all the audio files, MIDI sequences, and other materials you'll use during the lessons. The disc also contains a full installation of Logic Platinum 6.1. After installing the software, you can request a hardware key with a 30-day license from the publisher at no extra charge.

Peachpit Press; tel. (800) 283-9444 or (510) 524-2178; Web [www.peachpit.com](http://www.peachpit.com).

### ▼ MIT PRESS

Although women have long been involved in creative pursuits using machines, *Women, Art, and Technology* (\$39.95) is the first book to focus exclusively on their historical contributions. The 571-page book is an anthology of writings by musicians, poets, critical theorists, engineers, computer scientists, videographers, choreographers, graphic artists, and interactive installation designers. Some chapters are classic white papers, and some were written especially for the book. It was compiled by



Judy Malloy, editor of "NYFA Current," an online publication of the New York Foundation for the Arts ([www.nyfa.org](http://www.nyfa.org)).

*Women, Art, and Technology* is the result of a project sponsored by the Leonardo series of scholarly publications. The project originated in 1993 to encourage women artists of all ages to write about their work, and thus provide historical and personal perspective on the ongoing intersection of art and technology.

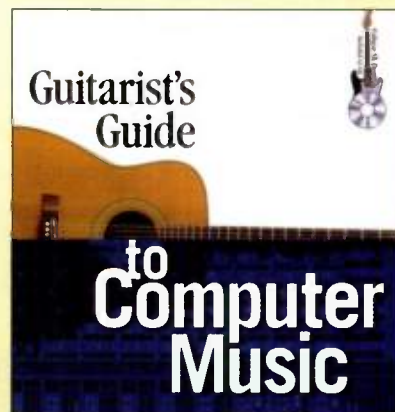
Perhaps most fascinating are the book's multifaceted observations about the symbiotic relationship of media such as modern dance, sound, video, and com-

puter programming. MIT Press; tel. (800) 405-1619; e-mail [mitpress-orders@mit.edu](mailto:mitpress-orders@mit.edu); Web <http://mitpress.mit.edu>.

### ▼ MUSKA & LIPMAN PUBLISHING

Almost anyone making the move from analog recording with a portable multitrack to digital recording with a Windows-based PC can learn something from *Guitarist's Guide to Computer Music* (\$24.99). Robin Vincent, author and Carillon Audio Systems' technical director, recounts his journey from being a Porta-Studio jockey to mastering all manner of computer-based recording tools, from sequencers and amp modelers to virtual drum machines and audio interfaces.

A bundled CD-ROM provides free-ware, shareware, and demo versions of all the software that Vincent discusses. The heart of his virtual studio is Steinberg Cubase SX, which he explores in some depth over the course of the book. He explains VST effects and virtual instruments and explores how to use loops in Sony Acid and Cubase. He looks at control surfaces, keyboards, and other useful hardware (but, surprisingly, he never mentions MIDI guitars). The book is lavishly illustrated with plenty of screen shots and photos of desktop music equipment. Muska & Lipman Publishing/Course Technology; tel. (888) 270-9300; e-mail [ct.retail@thomson.com](mailto:ct.retail@thomson.com); Web [www.courseptr.com](http://www.courseptr.com).





The Emagic logo, featuring the word "emagic" in a blue sans-serif font with a stylized blue swoosh above the "i".

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Newman, Emagic's Logic and Fox's Newman Stage have worked brilliantly together. It's absolutely amazing how powerful and indispensable Logic is for the modern film composer." With a comprehensively-equipped internal mixer including over 50 plug-ins, professional real-time notation editing, and MIDI functionality that's second to none, Logic 6 for Macintosh meets this challenge with ease. And the best thing is that Logic can fit handily into your recording studio, too. Technology with soul.



www.emagic.de



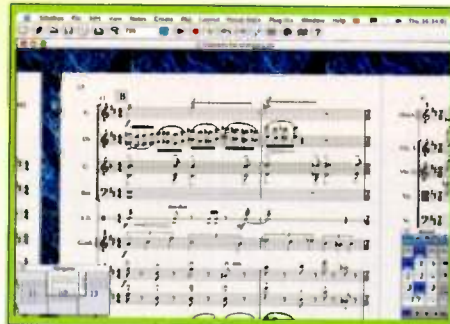
## REV UP ▲▲▲▲

### ▼ ABLETON LIVE 3

Ableton has begun shipping Live 3 (Mac/Win, \$399; downloaded upgrade, \$69; boxed upgrade, \$99), the latest version of its interactive audio sequencer. Live 3 lets you modify individual notes or specific portions within your audio samples to produce new variations. The Clip Envelopes feature lets you automate real-time changes in pitch, loudness, panning, and effects, and you can scramble beats with the new Sample Offset envelope. You can even play individual Clips across a range of MIDI notes and hear them respond to Velocity.

This is the first version of Live to support multitrack audio recording with punch-in and punch-out capabilities. Live 3 can play clips from RAM or directly from disk. The expanded effects section

includes five resonant filters in parallel, a 3-band EQ, and stereo width, phase, and gain controls. Minimum system requirements for the Mac are a G3/233 MHz, 256 MB of RAM, and Mac OS 9.2 or OS X 10.1.5. PC users need at least a Pentium II/400 MHz, 128 MB of RAM, and Windows 98, 2000, or XP. M-Audio (distributor); tel. (800) 969-6434 or (626) 445-2842; e-mail [info@m-audio.com](mailto:info@m-audio.com); Web [www.ableton.com](http://www.ableton.com).



### ▶ SIBELIUS SOFTWARE SIBELIUS 3

Sibelius Software is shipping version 3 of its flagship product, Sibelius (Mac/Win, \$599; education edition, \$329; upgrades, \$119 to \$189), which includes more than 170 new features and 30 new plug-ins. It is bundled with Kontakt Player Silver, developed in collaboration with Native Instruments, for real-time playback using 20 sampled instruments. Numerous user-interface enhancements and the ability to save compositions as audio tracks are among Sibelius 3's other significant features.

The new automatic page-break function places page turns in convenient locations for extracted parts and updates them if the score is modified. The Focus on Staves

feature lets you view an entire score or individual parts while keeping them linked, so that editing one updates the other. The Scales and Arpeggios plug-in helps educators create student exercises quickly, and advanced features are easily disabled for simplified use. Version 3 also has 18 new Jazz Arrange styles, improved SMF importing, MIDI overdubbing, backward compatibility with version 2, and support for CoreAudio SoundFonts in Mac OS X.

To use Sibelius 3 with Kontakt Player Silver, PC users will need at least a Pentium III/700 MHz, 196 MB of RAM, and Windows 98, 2000, ME, or XP. For the Mac, you'll need a minimum G3/500 MHz and 128 MB of RAM with Mac OS 9.1 or 256 MB of RAM with Mac OS X 10.2. Sibelius Software, Ltd.; tel. (925) 280-0600; e-mail [info@sibelius.com](mailto:info@sibelius.com); Web [www.sibelius.com](http://www.sibelius.com).



### ▶ OPEN LABS OPENSTUDIO OMX 64

Offering an all-in-one turnkey solution for digital audio recording and synthesis, Open Labs has begun shipping the OpenStudio OMX 64 (\$3,095 and up), a Windows-based computer system. The OMX 64 bundles the computer, software, and I/O interfaces in a 4U chassis with a single or dual AMD Opteron 64-bit processor running at 1.4 or 2.0 GHz. The computer has a removable 80 GB hard drive, a CD-RW drive, full-size PCI slots, and an internal uninterruptible power supply. It also comes with a wireless keyboard, mouse, and re-

mote control. The OMX 64's PCI audio card handles 24-bit, 96 kHz audio with 8 analog ins, 8 analog outs, and stereo S/PDIF I/O, as well as word-clock I/O and two XLR inputs with mic preamps. The rear panel also includes two MIDI Outs, one MIDI In, and one MIDI Thru. Six recessed USB ports and a 10/100T Ethernet port are provided. Options include a FireWire PCI card, ADAT Lightpipe I/O, and the Controller One (\$850), a 15-inch color LCD touchscreen.

The OMX 64's comprehensive software bundle includes a pre-

configured version of Windows XP Professional, Tascam GigaStudio 32, Synapse Orion Pro, IK Multimedia SampleTank LE, Sonic Reality Sonic Synth, and a library of soundware. Open Labs; tel. (512) 444-4666; e-mail [info@openlabs.com](mailto:info@openlabs.com); Web [www.openlabs.com](http://www.openlabs.com).





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## Charming the CobraNet

In most modern recording studios, audio is recorded and processed primarily in the digital domain. And even though many of these functions are now performed within a single computer, the use of multiple computers and other outboard equipment is often inevitable. In that case, audio is commonly transported from one device to another in any of several different forms, including S/PDIF, AES/EBU, Lightpipe, and analog.

Commercial studios and large, live venues have addressed the problem of audio transport by using networks to carry digital audio between multiple devices, but those systems are generally very expensive. However, one such system will soon become available for smaller studios that have more modest budgets. Developed by Peak Audio ([www.peakaudio.com](http://www.peakaudio.com)) for large commercial installations, CobraNet has now been implemented on a single, inexpensive microprocessor chip by Cirrus Logic (see Fig. 1), which acquired Peak Audio in 2001.

CobraNet uses Fast (100 Mbps) or Gigabit (1 Gbps) Ethernet to carry uncompressed digital audio between devices on the network. Audio can easily coexist with other data on the network, making it ideal for studios that already have an Ethernet network for high-speed Internet access and other types of data sharing.

Ethernet is designed to carry "bursty" traffic, not continuously streaming audio. On the other hand, Ethernet is the most widely used LAN in the world, which provides a preinstalled infrastructure on which to base an audio network. So Peak Audio decided to create an isochronous protocol that divides the streaming audio data into time-stamped packets and guarantees a certain level of network performance in terms of available bandwidth, latency, and jitter.

As a result, CobraNet supports three well-defined latency settings: 5.33, 2.66, and 1.33 ms. These are the available isochronous cycle peri-

*A commercial  
digital audio  
network comes  
home.*

ods, which define the time required to buffer the streaming data into packets; shorter latency settings mean fewer audio channels can be transmitted at a time.

CobraNet can accommodate audio sampled at 48 or 96 kHz with a resolution of 16, 20, or 24 bits. The packets that carry audio data are called bundles, each of which can accommodate up to eight channels. A single 100 Mbps link can transport up to eight bundles (64 channels) of 48 kHz, 20-bit data in each direction for

a total of 128 channels. As you might imagine, being ten times faster, Gigabit Ethernet can support up to 1,280 channels of 48 kHz, 20-bit data. Bundles can be multicast (from one source to many receivers) or unicast (from one source to a single receiver).

One of the devices on the network, called the conductor, controls the system timing by sending a master clock signal. This role can be filled by any device on the network; if the current conductor is switched off or disconnected, another device on the network can take over within milliseconds. Clock accuracy is  $\pm 0.25$  sample period (5  $\mu$ s at 48 kHz), and cycle-to-cycle clock variation is maintained at less than 1 ns. The bottom line here is that the system exhibits very low jitter.

Current CobraNet licensees include many familiar names, such as JBL, Mackie, Crown, Peavey, dbx, QSC, Rane, DigiTech, Shure, Soundcraft, Symetrix, and Yamaha. Many of these companies are working on CobraNet de-

vices for smaller studios, including mixers, DSP boxes, amplifiers, and powered speakers; we should see the initial fruits of that labor at Summer NAMM 2004. Not only will CobraNet carry digital audio to and from these devices on a single cable, it will also allow you to control and monitor them from your computer, which should simplify and integrate the operation of your studio. What more could you ask of a newly available technology? ●

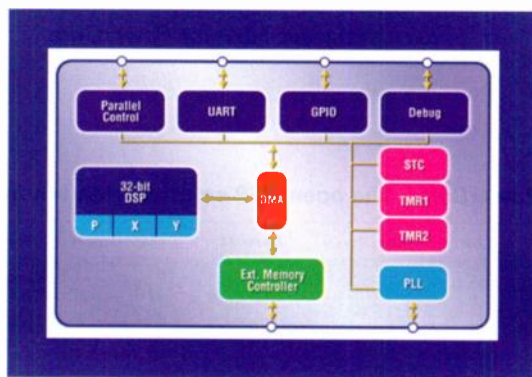


FIG. 1: The CS18101 microprocessor includes all the functional modules needed to add CobraNet to digital audio devices.

COURTESY CIRRUS LOGIC



# How can *every* **MUSIC RETAILER** guarantee the **lowest price?**

**>> THEY CAN'T — SINCE WE ALL SELL MUSIC GEAR AT THE SAME LOW PRICES, THAT "GUARANTEE" IS MEANINGLESS.**

We're going to let you in on a little secret — low price guarantees are generally either nothing but marketing hype or backed with so much fine print that you need a law degree to figure them out. It's no wonder; otherwise, you could literally pit one dealer against another until they were paying YOU to take a piece of gear off their hands!

The fact of the matter is that all the major music technology retailers, including Sweetwater, get the same great deals and charge the same low prices, so other companies will gladly agree to match a price that is within pennies of their normal price anyway.

**So if there's no difference in price, why talk about it so much?** Other retailers make such a big deal about price because that's all they have to offer. Sweetwater has become the leading music technology retailer because in addition to great prices, we offer much, much more.

- > An award winning, expert sales staff with more combined music technology experience than any retailer, period.
- > Millions of dollars of music technology equipment, in stock and ready to ship to you!
- > The best tech support staff in the business, able to help integrate gear from hundreds of manufacturers.
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## Between the Lines

Most of my music is a struggle to reconcile heady, electronic music and popular music," says Brad Derrick of Washington, DC, band Plink. Derrick, a drummer and sound designer, formed Plink with longtime collaborator Scott Evans and vocalist Kate Cronin. Plink's debut album, *The Sleeping Lines* (Wordclock Records, 2003), offers ambient electronic pop-rock compositions with home-spun sonic landscapes.

Derrick's and Evans's PC-based personal studios are located 100 miles apart, so they exchanged MIDI, WAV, and MP3 files on an FTP server. "We have a machine at a big ISP, so we have as much space as we need," says Evans, a computer programmer by day. "But it just takes enough disk space to temporarily hold the files before the other guy downloads them. We create hundreds or thousands of files for every song. With each file we had a naming convention that specified the bar lines included—for example, 'melodyWidget\_032-048.wav.'"

They began by creating a library of drum loops, sometimes using found objects as drums. "In my basement we made up all these wacky drum kits with cardboard boxes and paint buckets—stuff like that—and miked them in all kinds of ways," says Evans. "For example, we attached Brad's kick drum pedal to a big cardboard box and miked it with a [Shure] KSM32 capsule barely inside the box, and a broken Radio Shack PZM inside the box. It sounded very cool."

Evans sculpted drum parts using a handful of tools, including Syntrillium Cool Edit Pro (now Adobe Audition), Zero-X Beat Creator, and Bram Bos's Tuareg.

"Brad played the 'Mary Antonita' drum part," Evans says, "but I used Tuareg to change its tempo, distort it, swap a few drum hits, and add a nice delay. I also reinforced the loop with some electronic drum sounds."

*Plink perfects*

*long-distance*

*collaboration to*

*complete an album.*



Derrick used Ross Bencina's AudioMulch modular soft synth and Cool Edit Pro to create his own "bizarre" instrument sets. "I'll create a sound-design algorithm and then spit out three or four octaves' worth of notes from it." Although hardware synths appear on *The Sleeping Lines*, software instruments such as Dr. SynC's SynC Modular figure more prominently.

Evans recorded all of Cronin's vocal tracks in his living room using an Oktava MC319 large-diaphragm condenser mic and a mic preamp on a Speck M72 mixing console. "I sat at the computer, she stood right next to me, and we both wore headphones," Evans says. "I had to throw packing blankets over the computer to control fan noise. I happened to live half a mile from a hospital, so there were helicopters flying over and ambulances driving by. There was no getting around it." Evans processed Cronin's

vocals with Waves Renaissance plug-ins.

Evans and Derrick brought in guest musicians to play cello and violin, building ensemble parts using overdubbed individual performances. "In hindsight, that wasn't a great idea," Evans says. "Even though our players had previous takes in their headphone mix, we ended up with a lot of pitch problems when I mixed the overdubbed parts together. I guess most string players aren't used to headphones. In the end we

got great results, but next time we'll bring in an actual ensemble."

"The craft of digital audio is that you can always go back and muck with it some more," says Derrick. "I would still be playing with Kate's vocals today if somebody hadn't yanked me away from my computer. You can never be satisfied; you just have to know when to say when." ●

For more information, contact Wordclock Records; P.O. Box 3266, Merrifield, Virginia, 22116; tel. (703) 966-1662; e-mail [info@wordclock.com](mailto:info@wordclock.com); Web [www.rainlikely.com](http://www.rainlikely.com) or [www.wordclock.com](http://www.wordclock.com).



CHRIS MANN

*The Sleeping Lines/Plink*





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# Voices from the Machine



LAURA WILLIAMS

**Speech  
synthesis  
gives your  
computer the  
gift of gab.**

**T**he most famous talking computer of all time, the HAL 9000 from Arthur C. Clark and Stanley Kubrick's 1968 film *2001: A Space Odyssey*, spoke perfect English. And when it was lobotomized for being a bit too human, it went out singing "Daisy Bell." Clark's inspiration for that scene was the first song performed with computer-synthesized speech, realized by Max Mathews at Bell Labs in 1961.

Speech synthesis has come a long way since then; your car, computer, and cell phone routinely speak with synthetic tongue. But, as those examples suggest, speech synthesis does not yet approach the fluency of the HAL 9000. In this article, I'll look at the most common approaches to speech synthesis and suggest a few tools for mak-

ing your computer speak and sing in your own words.

## **THE PAST TENSE**

While speech synthesis may seem very 21st century, the first attempts at synthesized speech predate the computer and even the use of electricity. In the late 18th century, attempts were underway to build mechanical speaking machines. The idea was to model the human vocal tract with devices—bellows for air, reeds for vocal chords, and a mouth cavity molded out of rubber with holes for nostrils—that could be manipulated to produce words and short sentences. The modern equivalent, known as *physical modeling*, employs mathematical emulations of the vocal tract in much the same way.

**By Len Sasso**

# Voices from the Machine

The first mechanical speaking machine was built by Wolfgang von Kempelen in 1791. However, it wasn't until the early 20th century that new approaches evolved: the telephonic transmission of speech spurred research into ways to reduce bandwidth while maintaining intelligibility. The result was Homer Dudley's Vocoder (VOiCe Operated recorDER), which analyzed incoming speech using bandpass filters and used the resulting time-variant band-level information to filter a synthetic sound source (in this case, a pulse-wave oscillator) with a matching bank of bandpass filters. The Vocoder has, of course, had a significant impact on modern electronic music. Dudley used similar technology to build a keyboard-controlled speech synthesizer, the Voder, which, though nearly impossible to play, was a huge hit at the 1939 World's Fair.

A completely different electro-mechanical approach to speech synthesis, called Pattern Playback, was developed in the 1950s by Frank Cooper at Haskins Labs. Light was passed through a spectrogram (more on that later) to control the intensity of 50 sine-wave partials. He used spectrograms of recorded speech as well as hand-painted

ones to produce monotonous, but very intelligible, speech. The software application MetaSynth (Mac), from U&I Software, allows you to implement a similar process on your desktop.

## WORD FOR WORD

All modern speech-synthesis research and implementation is, naturally, done with the aid of computers. For a compendious view of the history of the field, visit the Web site of the Smithsonian Speech Synthesis History Project (see the sidebar "Speech Synthesis Research"). While most research is still carried out at commercial and academic institutions, the results are readily available to and have many applications for desktop musicians.

Probably the first idea that comes to mind when you think about how to make your computer talk is to record a bunch of words as audio samples and string them together into sentences. This is not a particularly satisfactory approach, because a sentence is much more complex than a sequence of words: the whole is more than the sum of the parts. You can quickly convince yourself of that by trying it in either direction; record some words and try to make a sentence, or record a sentence and try to cut it up into words. Words in sentences tend to be shorter and to blend together. Furthermore, elements that evolve over the course of a sentence such as rhythm, pitch, loudness (emphasis), and syllable length—features which, taken together, are referred to as *prosody*—are key ingredients of natural-sounding speech. As it turns out, words are the wrong building blocks.

Current linguistic theory holds that about 41 discrete sounds, called *phonemes*, cover all the sounds used in ordinary spoken English. Linguists typically divide phonemes into categories, as vowels (17), consonants (7), fricatives (9), plosives (6), and affricates (2). Notice that the number of phonemes in the vowel and consonant categories do not correspond to the written alphabet, in which *a, e, i, o, u*, and sometimes *y* and *w* are called vowels and everything else is called a consonant. Phonetically, there are many more vowel sounds (*i* as in *bit* versus *i* as in *bite*, for example) and the sounds not classified as vowels are categorized according to how they are produced (for example, *m, s, p*, and *j* are categorized as consonant, fricative, plosive, and affricate, respectively).

In practice, text-to-speech systems use elements called *diphones* (the end of one phoneme spliced to the beginning of another), *triphones* (diphones with a phoneme in the middle), and *allophones* (slight variations of a single phoneme) instead of simple phonemes. That greatly enlarges the database of basic sounds in the interest of producing more natural-sounding speech. But in the end, it's the art of designing and programming the rules that counts. For example, consider the different soundings of the word *record* in the sentence "Let's record a record." The MP3 example Record (see Web Clip 1) pushes that sentence through four online text-to-speech converters, from the University of Twente, Netherlands; the Center for Spoken Language Understanding; Bell Labs/Lucent (whose converter is no longer available online); and AT&T (see the sidebar "Online and on Your Desktop").

Synthesizing speech by means of rules for concatenating (stringing together) basic elements has many practical uses,

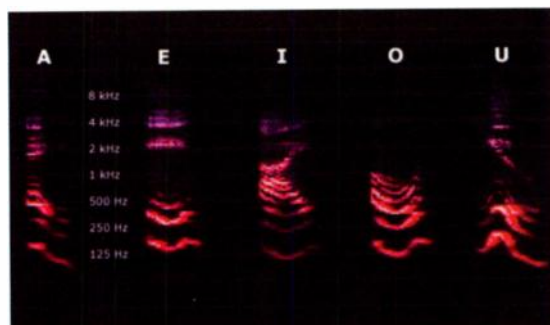


FIG. 2: Spectrograms of the common vowels *a, e, i, o, and u* spoken by a man.

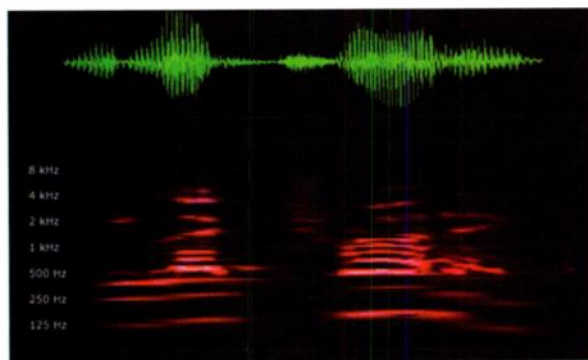


FIG. 1: The spoken word *electronic* in a typical sample-editor format (top) and as a spectrogram (bottom). In both cases, time flows horizontally. In the sample-editor view, sound level is measured vertically, whereas in the spectrogram view, frequency is measured vertically. In the latter case, color and intensity indicate level.



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# How I spent \$1.2 million...

## CONFIDENCE AND CASH

The financial and emotional investment in the NT2000 has been high.

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This is not just another mic, its a WORLD FIRST!

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While RØDE can rightly claim to be pioneers in the modern microphone category, the NT2000 is destined to change how the industry views all studio microphones, regardless of category.

## STARTING WITH THE HEART

The heart of the NT2000 is the Australian designed and manufactured HF1 capsule. Named in honor of my late father, Australian audio engineering legend, Henry Freedman.

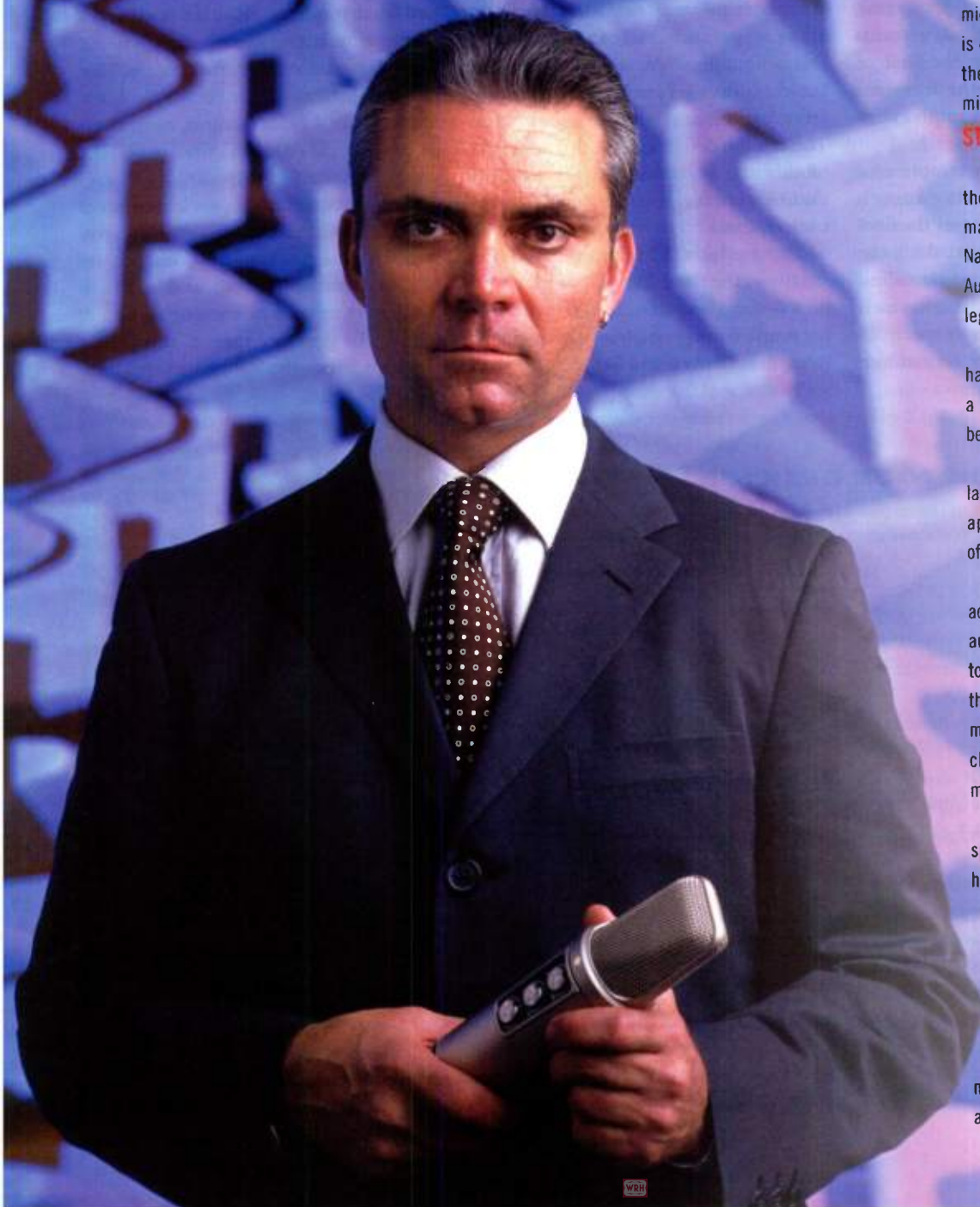
These 1" transducers are hand assembled in the fashion of a fine Swiss watch using the best components money can buy.

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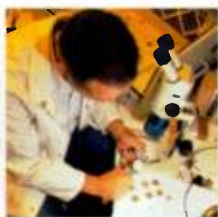
Once processed the acoustic back plates are polished flat to within one thousandths of a millimeter then cleaned in custom made ultrasonic baths.

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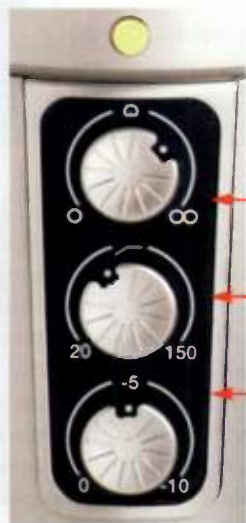
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A superb transducer must be complemented by the best electronics. To ensure transparency and the highest fidelity, my brief to our engineers was, "I demand nothing!" RØDE's electronics designers set about designing a circuit that coupled the HF1 capsule in such a way as to add nothing. To pass the output of the capsule without coloration or distortion. I believe we have achieved that aim.

### A WORLD FIRST IN TOTAL CONTROL

The NT2000 is the world first superlative class 48 V FET microphone to have totally variable polar response, totally variable pad and totally variable filter all incorporated within the body of the microphone.

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All this information is meaningless unless it delivers the promise. In the end it's all about the sound, I am putting my reputation on the line here.

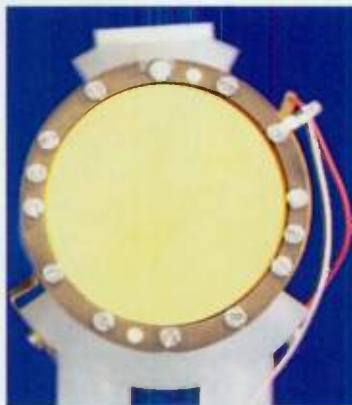
I am saying without fear of contradiction, the NT2000 is the best sounding and most versatile 1" FET studio microphone on the world market today, regardless of cost.

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**Peter Freedman**  
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RØDE MICROPHONES  
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**RØDE**  
MICROPHONES



# Voices from the Machine

50 ms) that are equally spaced. To avoid audible clicks, each grain has a fade-in/fade-out envelope. In such a system, pitch is controlled by the grain spacing, and the spectrum of the wave used in the grain acts something like a formant filter. FOF (*fonctions d'onde formantique*), developed by Xavier Rodet at IRCAM, and VOSIM (VOICE SIMulation), developed by Werner Kaegi at the University of Utrecht, are different implementations of that technique. The adventurous can experiment with these methods in Csound, Cycling '74 Max/MSP, IRCAM's jMax, and other DIY applications.

To come full circle, physical modeling, the mechanical version of which dates from the late 1700s, is an active

area of computer-generated speech. An example is Perry Cook's Singing Physical Articulatory Synthesis Model (SPASM) developed at Stanford's CCRMA lab, which uses waveguide physical modeling to synthesize singing. Developed on NeXT computers, the system appears not to have matriculated to other systems, but the singing examples on his Web page (listed in the sidebar "Speech Synthesis Research") are worth a listen.

## TRY THIS AT HOME

You don't have to go very far to play with speech synthesis. The sidebar "Online and on Your Desktop" contains links to sources of speech-synthesis software as well as Web sites that will convert text to speech.

If you're a Mac user, you already have such a system on your desktop. Open

## RECOMMENDED LISTENING

These recordings offer excellent examples of the musical uses of speech synthesis.

Charles Dodge, *Any Resemblance Is Purely Coincidental* (New Albion, 1994)

Paul Lansky, *Fantasies & Tableaux* (CRI, 1994)

Various Artists, *CDCM Computer Music Series, Vol. 5* (Centaur, 1993)

SimpleText (TextEdit in OS X), type something, and select Speak All from the Sound menu. All recent Mac operating systems contain a speech synthesizer controlled by the Speech Manager Control Panel.

Although true speech synthesis may be beyond the limits of your studio and patience, you can make use of the techniques described here to create speech-like sounds and add an organic flavor to your music. The most readily available

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If you're bored with the current approach to House, this disc will surely get your full attention. We're sure that this disc will seriously challenge your vision of house music's past, present and future with screaming construction kits, loops, beats, samples, percussion and more! "If you're into deep, jazzy and soulful house then this is definitely the collection for you!" 10 out of 10 - *Future Music*



## Off the Hook 2

\$99<sup>95</sup>  
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(Includes Audio CDs & Acidized WAV CD-ROMs)

After thousands of requests for a sequel, Big Fish's own smooth, soul brother producer Anthony Myers is back with his posse & has produced a package that rivals even Volume 1! Nasty R&B construction kits, beats, hits, sounds, keys, guitar, bass, percussion, await your skills and your music. "The quality of the included samples is probably the best of all products on the market..." - *Interface Magazine*



## Smokers Delight

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Smokers Delight is brand new from e-Lab... this joint is cold packed with lounjin MPC & turntable loops and phrases, loads of funky & dubby basses, jazzy horns & flutes, mellow guitars, vintage wurlitzers & rhodes, hip hop beats & cracklin' breaks. Possibly all you need to create that weed smokin, head-spinning, chill-out monster you always dreamed of. All this is sittin' in audio, WAV and REX2 giving you all the necessary tools to build the massively perfect mix!



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Grab your enrollment form and get to admissions, because classes are filling up fast! *F.U.* is all about funk, and the professors here smell nasty! We're offering specialized courses in live, funk drumming here. No basses, no guitars, just the funkier skins. Professors are session pros, they're snap on, give you tons of variation, different kits, fills, & hot, dripping funk. Elevate your career and get the degree you've always wanted.



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Reminiscent of 70's soul music combined with new millennium Hip Hop, Jazz & R&B, Neo-Soul has been conquering clubs the world over. Veteran producers, songwriters & artists heat up this simmering cauldron of construction kits, oozing Hip Hop & R&B at an ethereal level & celebrating soul music's resurgence. Enhance your library with just the right amount of sweat, longing and passion.

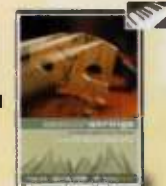


## L.A. Riot 5

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Formats: Audio or EXS24/HALion/Giga/Acid CD-ROM

Just when you thought it was all over, the L.A. Riot producers have come back for an encore! These 4 CDs bump out more construction kits, drumloops, brand new bomb banks, scads of vocals, guitar licks, scratches, bass lines, FX and so much more, you gotta get on it quick!



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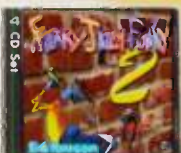


## Dirt Keeps the Funk

\$99<sup>95</sup>  
Audio/WAV/REX

(Includes Audio CD & WAV/REX CD-ROM)

The mothership has landed! Inspired by Parliament, Funkadelic and other P-funk pioneers, the live played loops and grooves on this unique CD are sure to shake any booty. *Dirt Keeps The Funk* is jam-packed with bubbling, Bootsyfific bass guitar lines, laid-back drum beats, wah-wah rhythm guitars, go-go style percussion and psychedelic synth riffs, all waiting to tear the roof off your sampler. P!Funk



## Freaky Jazzy Funky 2

\$99<sup>95</sup>  
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(Includes Audio CDs & WAV/REX CD-ROMs)

Rich Mendelson is back with more of his signature style in *Freaky Jazzy Funky 2*. *FJF2* boasts even more live funk like you've never heard before. Pumped full of construction kits, this set is laid down by top studio pros and full of live drums, poppin' and slappin' funky bass, wah guitar, nasty horns, sexy vocals, flutes, percussion and a boatload more to fit all your funk'n' needs.



## Cut'n it Up 3

\$99<sup>95</sup>  
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(Includes Audio CDs & Acidized WAV CD-ROMs)

The wait is over. Critically acclaimed, highly decorated, award-winning producer John Tejada is back with more of his signature Hip Hop. *Cut'n it Up 3* has deep pockets full of sounds nobody's got: construction kits, beats, basslines, synths, guitars, FX, brass, kicks, snares, scratches & more. Pick up this luscious pack of turntable Hip Hop & R&B, that will surely add the flavor of authentic "off the record" feel.



## The Hybridizer

\$99<sup>95</sup>  
Audio/WAV/Acid

(Includes Audio CDs & Acidized WAV CD-ROMs)

*The Hybridizer* shatters through your soul with a slicing blast of pure, electronica vitriol. Fuzz-laden basses, piercing sub-sonic beats, frenzied melodic distortions, out-of-the-asylum FX with bruising synthetic fragments. It will strike you senseless with incessant hooks; the methodic menace of these tracks will grab a hold of your cranium, blow apart your soundtracks & launch your media projects to new levels.

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# Voices from the Machine

technique is *formant filtering*, which can be accomplished in a variety of ways. If you have a synth with a built-in formant filter, you can simply use that. If you have a synth with enough modularity to allow

you to apply three bandpass filters in parallel, you can use that, though it takes a little more effort to morph between vowels. If neither of those alternatives is available to you, but you do have a multi-band EQ among your DSP effects, you can use that to process a synth's output or a prerecorded audio clip. As a last resort, you can use three bandpass-filter DSP plug-ins on separate effects buses.

You can use vowel-formant filtering to add a speechlike quality to any harmoni-

cally rich source, but a narrow pulse wave or sawtooth oscillator is a good starting point for setting up the band frequencies. The trick is to automate the morphing between vowel formants. If in your setup you can assign MIDI controllers to the filter frequencies and use the same controller with different amounts and polarity, a MIDI Mod Wheel makes a good source for real-time morphing. That doesn't let you move between specific vowel formants as shown in Fig. 2 and Fig. 4, but it will add a vocal-like quality.

Another option is to use a multirow step sequencer—using one row for each bandpass frequency—which allows you to move between specific vowel formants. If you can set up your step sequencer to trigger one pass of the sequence when a MIDI note is played and to select steps at random, try those alternatives. The MP3 file Duet (see **Web Clip 4**) is an example of that technique. If you're using a multi-band EQ or individual bandpass filter plug-ins to process recorded audio clips, use your audio sequencer's automation for formant morphing.

You can also use a vocoder in non-standard ways to add a vocal quality to your synth patches or audio clips. Instead of using speech as the control source for the vocoder's filter banks, use a morphing vowel audio clip or control the vocoder bands with sequenced automation or MIDI controllers.

If you have a synth or DSP effect that features granular processing, individual vowel sounds make good source material for granulation. Modulation grain parameters such as grain size, pitch, and distribution provide a broad range of vocal-like sounds.

## VOICE OVER

Though a computer as sophisticated as the HAL 9000 is still over the horizon, many of the techniques used in modern speech synthesis are available for desktop musicians today. These techniques are good for more than simply novelty effects; they can significantly expand your musical palette. **EMWEB**

Len Sasso can be contacted through his Web site at [www.swiftkick.com](http://www.swiftkick.com). Thanks to Dennis Miller for help in researching this article.

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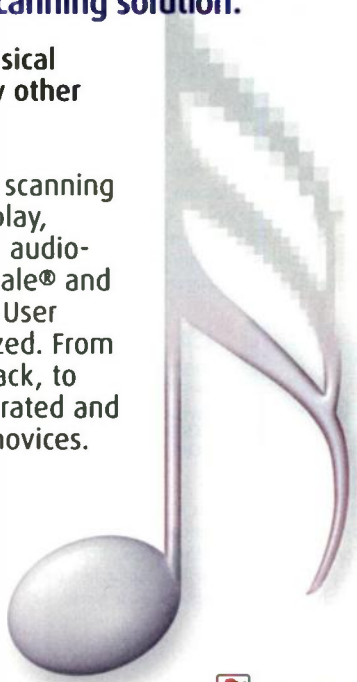
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# Planning Your Ideal Recording Space

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**R**elocating is a major physical, emotional, and financial undertaking that every person faces at some point. If part of your world is a recording studio, you have more to consider when moving than most people do. Relocating your studio isn't a big deal if you have little more than a portable digital audio workstation (DAW) and a pair of small speakers (that's why many musicians on the road carry such systems). For anyone with more gear than that, though, it is a very big deal.

Everything changes: the old studio you knew goes away, and a new one rises up. Between those two points lies a crucial transition process, the success of which could have a powerful effect on your musical and audio experiences for years. Relocating your studio correctly is worth the added time and effort.

This article comes out of many studio moves and redesigns that I've done myself or that I've participated in. I learned a lot of lessons the hard way and saved myself trouble many times, too. Perhaps I can save you some now.

## LOOK AT THE MAP

When moving your studio, you must address many considerations. Most are the same as when you're building a studio from scratch, but hopefully to a lesser degree: they consist of logistics, acoustics, electricity, ergonomics, and

so forth. That's a lot of ground to cover, but what distinguishes relocating a studio from building one is legacy.

The most significant legacies are your existing hardware and software, and another is the physical layout of your old facility. You will transport some legacies to your new studio unaltered, while others will change anywhere from slightly to radically. The downtime you experience while you're moving could be a rare opportunity for you to make significant changes.

The most effective way to move a studio is to establish what studio design and building technique you will use, determine what legacies exist and how you will handle them, and practice good packing and moving skills.

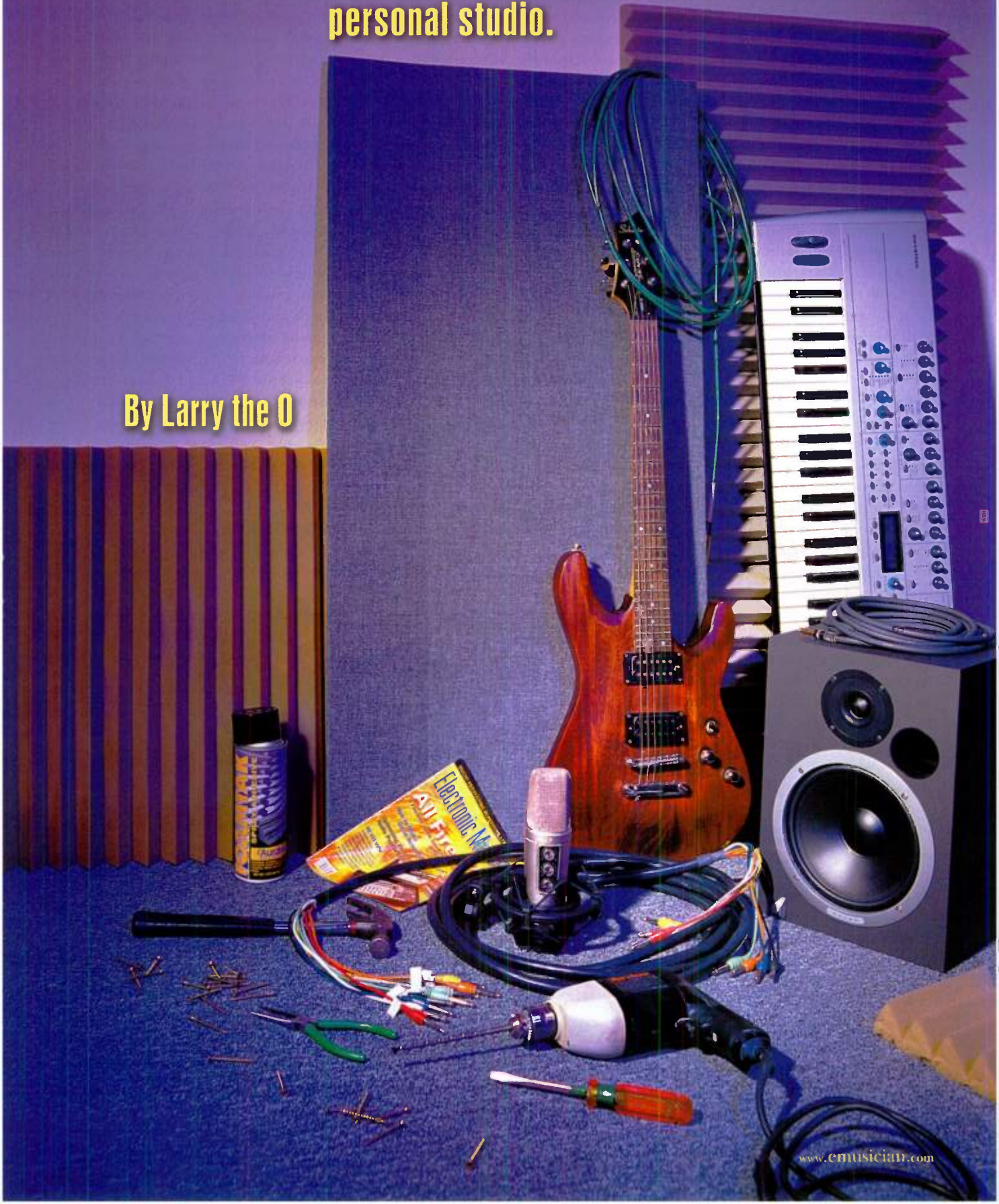
The first principle is that a smooth move depends on careful planning. It's impossible to overstate the importance of planning for a studio transition, and you can't plan your relocation in too much detail (see the sidebar "The Yellow Brick Road"). Planning for a studio move or redesign is incredibly time-consuming. You have no choice but to put in the hours, either before your move or afterward, when you're troubleshooting in the middle of sessions. Most of your transition from a working old studio to a working new one will involve labor for your analytical left brain, though right-brain leaps will certainly come in handy at times.

Anthony Pidgeon



# Conquer the challenges of redesigning your personal studio.

By Larry the O







## LOOK FORWARD

Any studio-design process should be application-driven, but circumstances often define contextual ground rules that you must factor in to your planning. Ask yourself key questions such as, how quickly does your new studio need to be up and running? Will you own the building or otherwise have the ability to make major modifications, or is it a rented space where serious alterations are out of the question? How long do you expect to be in the space? Will you be doing the same kind of audio work or taking on new directions?

How soon your studio needs to be operating after the move can determine how much change can be tolerated in the process of building your new studio. And if you are planning to do another kind of work—moving into sound design, for example, when you previously did only music—your functional needs may change, and your task may be closer to a complete redesign than just moving your old setup.

If you will be moving near the start of or during a project, your most effective strategy for getting back online quickly will be to transport your studio as is—lock, stock, and patch bay—to the new location and set it up exactly as it was. If it worked where it was originally, you know that any problems showing up in the new place are due to something that was changed in the move rather than being fundamental to the studio's functional design.

With thorough planning and orchestration of the process, you can make radical changes in your studio, but only if you can afford some downtime. Are you moving soon? Now is the time to take a long, hard look at what continues to serve you in your present studio and what is no longer of use.

Many personal-studio owners are moving production entirely into their computers (see Fig. 1). Perhaps it's time to sell off a bunch of outboard synths, signal

processors, and even your mixer, and beef up your DAW to handle everything. Such a change could make your move much easier by reducing the amount of hardware you'll have to set up, but it will involve more software configuration and troubleshooting, which might take as much time if not more. On the other hand, adding surround production to your new studio means having to deal with significant hardware issues—not only speaker placement (though that's enough), but additional acoustical issues, monitor control, and cable runs.

Deciding well before the move what equipment changes you want is crucial to effectively planning the new studio. Failure to make such decisions almost guarantees a kludge when you have to find a place for gear you hadn't factored into your new layout. It's not enough to know what equipment you'll be adding or changing; you must also know how it will be housed, what the furniture will look like, and what cable and AC power needs will be introduced. Without complete information, you won't properly understand your studio's footprint when you get into the new space.

If you can make real modifications to the building or space, you can consider

a whole raft of solutions that you would need to finesse in a typical rental situation. Adding or removing walls, cutting holes for cable runs or ventilation, or even mounting diffusers or bass traps aren't considerations for most apartment dwellers. For them, lesser solutions and resourcefulness will be the way. Whereas a home owner could install solid-wood quadratic diffusers, for instance, renters should probably stick to lightweight plastic or foam models.

Unless you have a job that requires it, don't plan extensive physical modifications to a place you won't be staying in for long. Any modifications you do make should be easy to remove and have the least possible impact on the building. I once moved into a house I knew I would not be staying in more than a couple of years; I therefore devised my overhaul so that when I moved again, I could tear down the studio, transport it, and quickly set it up again in approximately the same configuration. And when I did move to a new house, I was up and working within days of starting setup.

## LOOK BACK

When you relocate, improving your studio setup has a lot to do with how well



**FIG. 1:** Even if you transition from a hardware-based recording setup to one that's centered around a computer, you'll still need a certain amount of hardware.



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you understand its present strengths, weaknesses, and idiosyncrasies. What systems work well? What things are a royal pain? What limitations are imposed by your needs and equipment? Sometimes space constraints or other circumstances prevent you from keeping something that works well. Recognizing what works and why will give you insight into how to replicate or improve it in your new location. Weak spots in a studio are usually quite obvious, so heed those and try to improve on them in the upcoming round of studio building.

Question everything in a left-brain, analytical way; don't overlook an important change because you're so used to your currently less-than-optimal system that you simply accept it. If you're a composer working primarily from your keyboard, examine whether the keyboard is placed where you can see your computer monitor readily, hear everything clearly, and easily access all the necessary controls. If your most important work is mixing, look for ways to improve access to your mixer or control surface and outboard gear, to

make patching and routing easier, and to make your monitor setup more symmetrical.

Will you be recording with mics? Note what made the best recording spots in your old studio and why, how well sight lines worked out, and whether your headphone monitoring situation was adequate. Double-check all the basics for the kind of work you do and learn what you can from your history.

Every studio contains items that were placed in the only spot where they would fit. Sometimes that creates a situation that invites repetitive stress injuries or other ergonomic dysfunction. It is important to remedy such problems when you move.

Your new space will offer a fresh set of layout opportunities and limitations. If you analyze your present studio and identify serious problems its layout causes, you can make better equipment placement a high priority for the new studio.

## LOOK AROUND

After you've determined in detail what your priorities will be for a new studio, look at the physical space you'll be using and take stock of the layout. First try to notice obvious characteristics that might have a large impact. Is the new room significantly larger or smaller



MISS ANNE THROPE

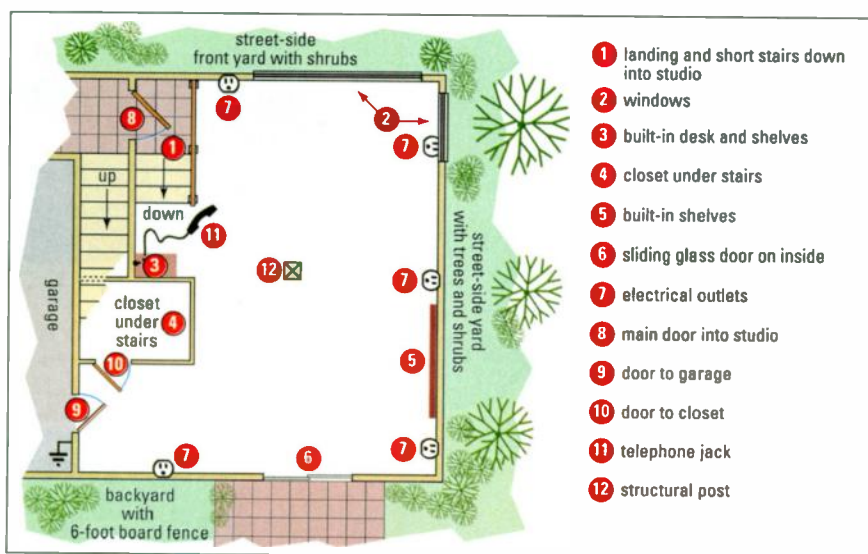
**FIG. 3: So that you can be sure your electrical work complies with building codes and is done as safely as possible, it's preferable to hire a licensed electrician rather than doing it yourself.**

than your current studio? What shape is the space? How high is the ceiling? (Is it all the same height?) How thick are the walls? Where are the windows?

Inspect the electrical service: note the number of outlets, their locations, and whether they are grounded outlets (or if—lucky you—they're hospital-type isolated-ground outlets). Determine the number and capacity of the circuits servicing the room. Finally, test each of the outlets. A standard outlet tester from the hardware store will tell you what need to know. It's amazing how many houses have improperly wired electrical service, which is dangerous to both equipment and people.

Look closely at ways in, out, and through the studio. Some equipment in my studio goes out for live performances or sessions in other studios. In one of my previous studios, one door led to the garage; not only did I have to always avoid blocking that door, but I also had to maintain sufficiently wide passage to move equipment in and out of it. I placed my drums, which were some of the largest items that went in and out, right next to the door.

What lies on the other side of each wall? How close are the neighbors and on which sides? If neighbors are close on one side but not on another, consider where your biggest noisemakers will go relative to the close side. In one studio, I faced the monitors away from the side closest to the neighbors, and the drums sat next to the garage, which acted as a sound buffer. When you look at doors and windows, also consider security.



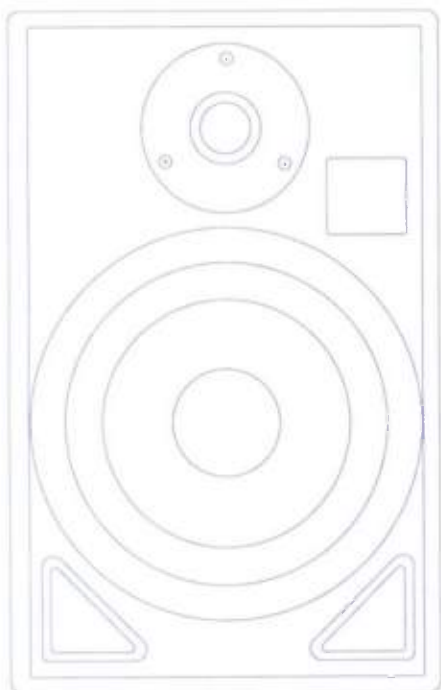
**FIG. 2: Visualize your new studio in operation, taking into account physical attributes such as the location of doors, windows, posts, closets, and electrical outlets, before you begin planning your equipment layout.**



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Should you put in an alarm system? If so, what doors or windows should trigger the alarm? Where might you want motion detectors?

I usually seal off windows and doors to reduce sound leakage in both directions. In one house, my studio had a sliding glass door to the outside. Because two other doors led into the studio, the glass door wasn't really needed and provided nothing but sound leakage and a security risk. Because I was renting the house, my solution couldn't be too extreme. A woodworker friend created a fairly heavy wooden box filled with foam. I attached it to the door frame using only four screws (though quite a few screws held the box together) and used weather stripping between the box and the frame to protect the paint around the glass and

provide a seal. I also mounted diffusers inside the studio. Thus, isolation was much improved. When I moved out, I removed the entire affair in less than a minute; the four screw holes that remained were easily filled.

## LOOK WITHIN

One of the toughest issues to deal with in a studio is ventilation. If you're renting, chances are you're stuck with the existing situation. However, if you can modify your space, examine how the ventilation is situated and consider what would improve it. Often the studio's location within the building will tell you something about typical temperatures in the room. If the room is in a basement, for example, the temperature will be more stable than if it's a room with lots of windows facing the afternoon sun.

Regardless of location, though, project studios often end up being warm because the measures required to isolate for sound usually make it difficult for air to get in or out. Filled with equipment and people, a studio with no airflow can get very warm indeed. Commercial studios spend tremendous amounts of money on high-capacity, low-velocity air conditioning. Such a solution is beyond most personal-studio budgets, but you might devise your own methods to imitate professional tactics such as placing insulation where the ducting turns in labyrinthine ductwork, which reduces sound transmission through the ventilation.

It's safer and often cheaper to do your own ventilation than your own electrical work, but a professional will likely do a better job. It is reasonable, however, to do some research, plan your ventilation system, and then hire a professional to at least look at your plans and your space and offer feedback.

Another point of infrastructural analysis should be storage. Storage is often



**FIG. 4:** You can maximize floor space by using an equipment rack on casters and leaving enough extra cable to roll it out when you need to access its connections.

overlooked because space is limited. You will need space, though, for empty boxes, product literature, documentation, supplies, unused or broken equipment, and media archives. You can break down your storage needs into three areas: storage for things you need close at hand (manuals for the gear you use most often, headphones, and so on), storage for items to which you need fairly easy but not immediate access (such as blank project media, cables and adapters, and microphones), and "cold" storage for items you rarely need.

You've probably provided storage space in your existing studio for close-at-hand items to save time and annoyance having to hunt for them. However, your intermediate and cold-storage spaces might be very different when you relocate. Cold storage can sometimes be off-site, but beware of spaces in which the temperature or humidity may vary. If you're storing empty boxes, you'll probably have no problem, but sensitive items such as archival media must be stored in a controlled environment if you ever want to use them again.

## PICTURE THIS

When you've made a thorough assessment of the new space's present state,

## THE YELLOW BRICK ROAD

You can break down the studio-transition process into the steps below, which I recommend doing in the following order whenever possible:

1. Consider your schedule (including impending sessions)
2. Understand your current studio
3. Assess the new space
4. Spec the new studio
5. Generate a setup plan (including documentation and procedure)
6. Generate a tear-down and packing plan for your old studio, based on your new studio setup
7. Make new hardware acquisitions or changes
8. Tear down your old studio
9. Pack up your old studio
10. Make infrastructural changes to the new studio
11. Move the studio
12. Set up the new studio
13. Test the new studio
14. Get back to work

Even with good planning, your schedule might not work out in this exact order. Still, you can come pretty close to this sequence of events, which should simplify the move. Note that almost half of these steps involve advance planning, before the move even takes place.



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your next step is to visualize it as an operational studio. I do this by actually standing in the (hopefully) empty room and visualizing my studio's major stations in the space before me. Although I later get more detailed with measurements and mock-ups, my initial visualization session usually leads to the basic plan I end up following.

Again, the room's physical features tend to push the layout in a certain direction (see Fig. 2). For example, a doorway that can't be blocked affects the placement of large objects. Unless the room is square, you must decide on the orientation of the studio and, most especially, your monitoring. I generally position a studio's contents lengthwise, with the most space behind me, for three reasons. First, it decreases audible reflection (slap) from the back wall. Second, it allows the most space for placement of surround speakers. And third, a lengthwise orientation places most of my equipment behind me and thus reduces many sources of asymmetrical lateral and front reflections.

## IT'S ELECTRIC

Electrical service will always be a factor in setting up a studio. If all the outlets in the room are on two walls, you must place the equipment requiring the most outlets along those walls; otherwise, you'll need extension cords to carry the power to where it's needed. If the outlets are ungrounded (which they almost always have been in my project studios), you will want to at least run a ground wire from the outlets to a ground point such as the breaker box or a cold-water pipe. While you are visualizing, try to identify the path the ground wire must take. And be warned that cold-water pipes are not reliable grounds; they might be plastic or, even if they're metal, have poor electrical connections between lengths of pipe, because the solder used for plumbing is not the same as solder used for electrical wiring.

Without a doubt, it is always best to hire a licensed electrician to do your electrical work, even though it may seem like a lot of money simply to run one wire. You don't want to take chances with wires in the breaker box, and you don't want to violate building codes (see Fig. 3).

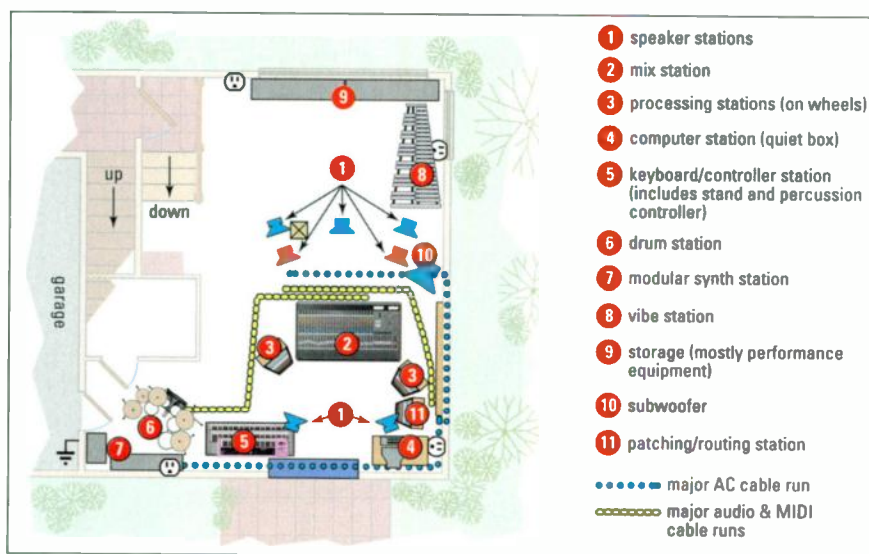


MISS ANNE THROPE

**FIG. 6:** If you own the building that houses your studio, you will have greater freedom to substantially alter its physical structure, which might include changing a room's shape to enhance its acoustical properties.

Studio grounding is a complex subject that involves managing a challenging relationship between safety ground and signal ground. The ground wire I'm referring to is to provide safety ground, and it's clearly the more important of the two. Hum and AC noise don't matter much if you're in the hospital from a bad electric shock. Once again, if you can make significant modifications, you have the option of doing the studio AC power right by constructing separate circuits and isolated-ground outlets with a star-grounding scheme that leads to a proper spike sunk into the earth. For that, you should definitely hire a licensed electrician, and preferably one with experience wiring recording studios.

Don't overlook what might be the most fundamental consideration for electrical service: how much power you need. Do the math to figure out how much current your studio will require, and make sure the electrical service will accommodate it. If it won't, make sure that more service can be added. In one studio, I was so close to the bone on electrical service that I blew the breaker whenever I cranked up one seldom-used but power-hungry piece of equipment. Because adding capacity was not an option, I had to run an extension cord to another room whenever I wanted to use that device.



**FIG. 5:** This diagram shows the room in Fig. 2 with all the equipment arranged in functional stations. The locations of instruments such as keyboards or vibes will depend largely on how often they will be used. Note that the drums are away from windows and near the garage door.

## MEET ME AT THE STATION

Your next step is to consider what needs to fit in your new studio. I break down a studio's layout into functional *stations*. Some examples are stations for mixing,





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visual and audio monitoring, outboard processing, patching and routing, a keyboard controller, other instruments, and a computer. I have several modular analog synths in my studio, so it has a modular-synth station, too.

For each station, there are three major considerations: ergonomics, connectivity, and footprint. Take my modular synth station, for example. It is not the station I use most frequently, but it consumes a lot of space. So to accommodate its size and its connections, I prefer to place it against a back wall or somewhere that isn't a prime location but is still close enough for cabling to be practical. The last time I moved, I really wanted to keep the cabling from my previous studio. I used a mic snake

(which I already had) and a handful of adapter cables to connect the modular synth's outputs to the snake's stage box. At the other end, I used adapters to plug the snake into patch bays. That was a simple, versatile, and robust solution, as a good mic snake is designed for heavy-use cable runs.

Note that cable-run paths and lengths are not the only aspects of connectivity to take into account; you must also consider how you will access the connections. Any station that has a substantial number of connections will require you to physically get in and deal with those connections at least occasionally and in some cases, regularly. Make sure your plans allow sufficient access.

In my studio, I need two or three feet of access behind my rack of patch bays



**FIG. 7:** When designing your new studio, you need to accommodate for audio lines, headphone feeds, and visual communication between the recording room and the control room (if they're separate).

and routers for the normal futzing around I have to do during projects. Because I never have studio spaces that allow me to leave the rack that far from the wall, though, I make sure I have enough service loop (extra cable) and clearance in front of the rack to roll it out when I need to (see Fig. 4).

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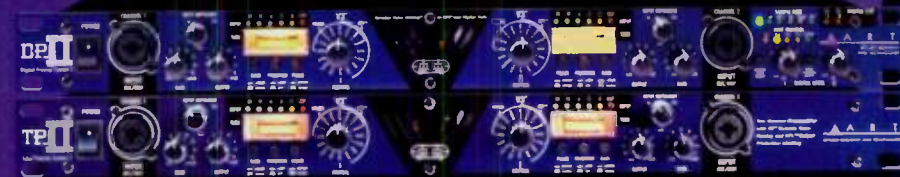


# TUBE VERSATILITY

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Based on the success of our award-winning TPS and DPS preamp systems, the TPS II™ and DPS II™ feature our Improved V3™ Technology (Variable Valve Voicing), which delivers a complete range of newly enhanced presets designed to compliment every microphone, musical instrument and direct signal you process. ART Engineers have improved key feature sets on these units that exceeds that of units costing much more.



Both the TPS II and DPS II also feature variable input impedance, LED input meters, automatic mic/instrument switching, DPL™ (Output Protection Limiting) and more tube warmth than their predecessors. These newly enhanced preamps can accept +20dB peaks while maintaining over 120dB dynamic range and incredibly low distortion. The DPS II includes a versatile insert loop on each channel which provides access for additional signal processing or direct access to our high quality A/D converter. Separate gain controls on analog and digital outputs allow you to optimize the unit for simultaneous applications. Digital outputs include S/PDIF, TOSLINK or ADAT (front panel selectable).

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Out of the box, these preamps are ideal for any studio environment or live sound rig. Housed in a single rack space design, for musicians and engineers alike, there is a multitude of uses for the TPS II and DPS II. Use your TPS II or DPS II for any front end signal processing to smooth out your tones and control levels to your outboard devices. Now that's versatile!

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If you have stations for acoustic instruments, such as a piano (I have a vibraphone in my personal studio), one very important consideration is finding the locations that are best for them acoustically. My vibes live in a space that's convenient for practicing, but for recording, I move them to a spot with better acoustics. If you have a piano in your studio, that approach might not be an option, and the piano's location might dictate your studio's layout.

After you've figured out what needs to fit, your next step is to measure existing stations and estimate the footprint of any new stations you plan to add. My approach is to go into a two-dimensional drawing program, draw a scale representation of the room, and make and

label objects proportioned to represent the stations in the studio. Then the game becomes a cross between chess and a jigsaw puzzle as I shuffle the stations around onscreen, looking at each possible arrangement and evaluating its desirability in terms of ergonomics, connectivity, and footprint for each station (see **Fig. 5**). In general, the more you bring from your previous studio, the faster everything will fall into place, because many of the problems you'll encounter in the new space are the same as problems you faced and solved in previous rooms.

#### WIRE YOU THAT WAY

My project studio, Toys in the Attic, has a lot of outboard processors that produce sounds I have yet to get from plug-ins and software tools. It also houses a digital mixer. Consequently, I have a lot of cabling, which is a primary consideration whenever I relocate.

Given what it would cost to replace

some or all of the cabling, I prefer to keep what I have. Cable length, then, imposes obvious limits. I have my DAW interface in a rack that must sit within several feet of my computer's soundproof enclosure. Accepting my cable-length limitations severely restricts where I can place my mixer, my patch bay and routing rack, and my computer enclosure.

Because my studio has so much outboard gear, I spend a lot of time planning cable runs—their lengths, paths, labeling, bundling, and protection from foot traffic. Make sure your cable runs are identified and measured well in advance. I use a database to keep track of every cable and every connector on every device.

If you're moving into surround production, you face additional restrictions. Few things will limit your studio-layout options like adding surround monitoring, because it involves placing monitors all around the room in what ought to be a symmetrical configuration.

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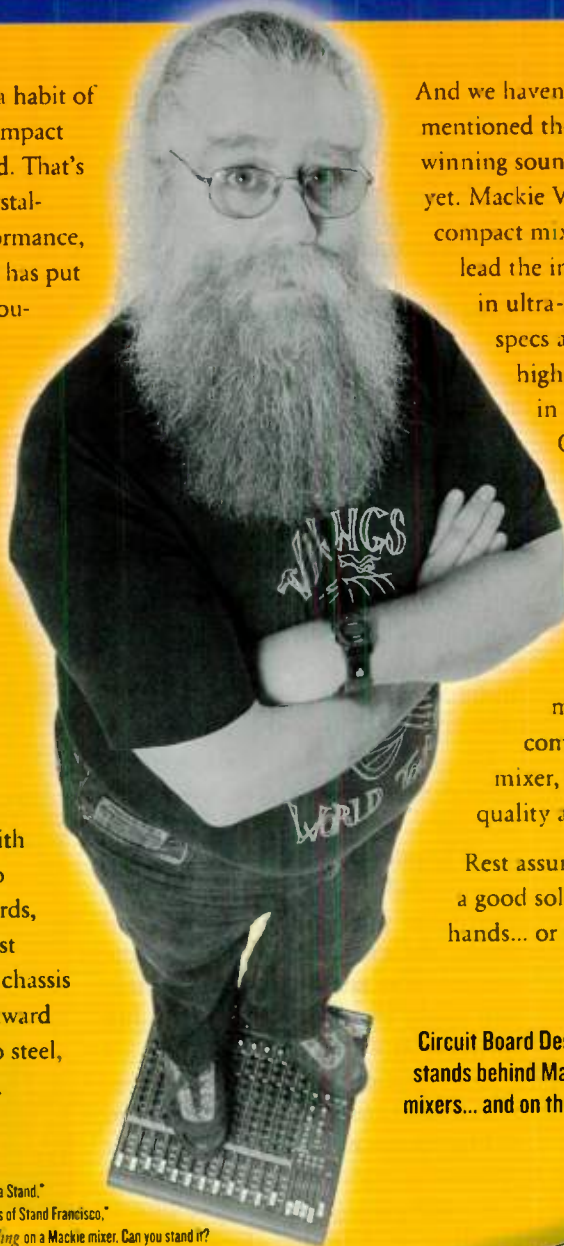


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\* After considering a number of headlines including "Take a Stand," "Stand and Deliver," "Get Up, Stand Up," and "The Streets of San Francisco," we went with the above. The point is that Mike is actually *standing* on a Mackie mixer. Can you stand it?



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## RIPPLE EFFECT

When relocating your studio, carefully think through the implications of any changes you plan to make. If you're buying a beefier new computer and adding a RAID array to lessen your reliance on outboard hardware, for example, you will eliminate and shrink some stations, but you'll need to isolate fan noise and provide sufficient ventilation for the equipment. You might also need a changed configuration of AC outlets or more power treatment, such as a voltage regulator or uninterruptible power supply (UPS).

If you will be making significant structural modifications such as adding layers of drywall, be aware of how that will affect the dimensions of the room (see Fig. 6). With thicker walls, narrow passages could become impassably tight.

So far I've focused on the control room, but you might want to put other available rooms into service as recording rooms. Before locking in your studio design, identify those spaces and what you'll need to make them functional (see Fig. 7). You will always need at least two lines running from such a space to the control room, for example—usually a microphone cable and a headphone feed. Plan for additional lines in case you ever want to use more than one microphone or you want send headphone mixes to two musicians. Consider whether you will simply run cables as they're needed or if you should route cabling through the walls to a connection panel in one or more rooms.

After you've identified your needs, surveyed the new space, and devised a layout that factors in changes you want to make, it's a good idea to double-check your design by imagining a typical session in detail, step by step, to make sure you've considered all the normal activities and built in enough flexibility to meet unusual needs.

You may ask, for example, what you will do if your new studio doesn't have

enough space to keep seldom-used equipment in the control room. If such equipment will be set up on demand, you might want to anticipate where you'll set it up and lay appropriate cables for connecting it. The cables can remain attached at the destination end (often a patch bay), with the source end properly labeled and coiled near where the equipment will be placed. You might take it one step further and install a box with various connectors for quickly hooking up the equipment you know about as well as other carry-in devices.

You should also anticipate ways you might expand your studio and how those changes will be accommodated. If you have a business plan that defines a growth path, knowing how you'll handle new additions is especially important. If you know what to expect, it is foolish not to plan for it now.

## ENVIRONMENTAL ENGINEERING

If you own your studio location and feel entirely confident of your plans, now is a good time to begin making serious modifications to the space. You may need to obtain permits, learn about building codes, consult contractors, and purchase materials. Starting the process as soon as possible can greatly reduce the time it takes to get the studio up and running after you've moved. However, be cautious, because making modifications prematurely can be disastrous if your plans change significantly.

Common improvements are installing acoustical isolation (more drywall, for example), interior acoustical treatment (bass trapping, absorption, and diffusion), ventilation, and AC power. You might also want to seal windows and doors, add a view window between the control room and the recording room, run cable through the walls, hang speakers, or mount video monitors.

Structural modifications can be involved and expensive, but they can also yield great rewards. If you just bought a house, you might hire an electrician to run a dedicated ground for the studio, install isolated-ground (hospital) outlets, add circuits sufficient in number and capacity for the studio, and balance the AC power load. Those efforts

can go a very long way in making your studio quieter and cleaner than might be possible if you were to use existing household wiring that's shared with a refrigerator and washing machine.

Whatever your circumstances, it is important to time modifications thoughtfully. Some must happen before you move anything in, others can be done as soon as you arrive, and some are best done after everything is set up. You'll probably want to take measures that affect acoustical isolation before moving in (see Fig. 8). Even if you do, you might need to adjust it after everything is in place.

Beyond making modifications, you should map out the setup procedure in detail, in terms of setup order, dependencies, and functional priorities (what needs to be working first). Those are additional planning tasks you need to document in detail and visualize in steps, and I will discuss those topics in more detail in the section on executing that setup.

## BACK AT THE RANCH

Tearing down and packing your existing studio requires organization. Again,



MISS ANNE THROPE

**FIG. 8:** Generally, the best time to make major modifications (such as installing acoustical treatment) is before you move your equipment into a new space.



# "I Switched"

**Who:** Francis Buckley

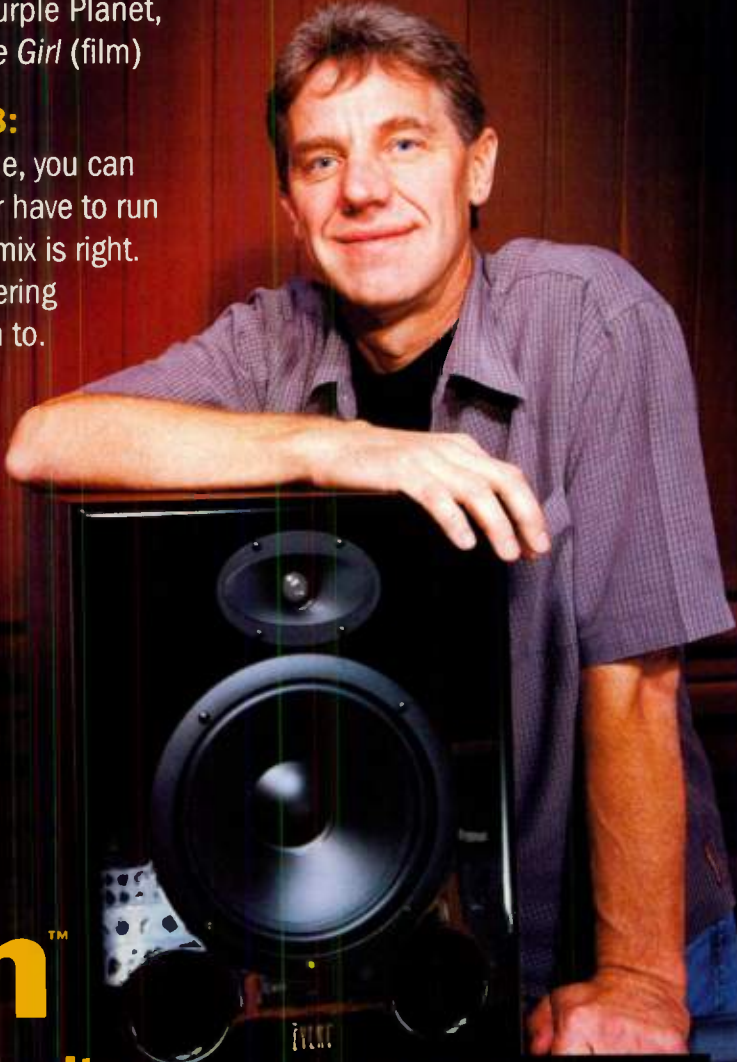
**Occupation:** Producer / engineer / indie label owner

**Honors:** Multiple Grammy awards, including "Album of the Year" and "Best Engineered Album;" multiple RIAA platinum and gold record awards; multiple Emmy and Golden Reel awards

**Clients:** Recording artists: Aerosmith, Alanis Morissette, Paula Abdul, LL Cool J, Quincy Jones, Wilson Phillips, and many others (including ones you haven't heard of . . . yet). Film and Television: *The Wedding Singer*, *Jungle Book*, *City of Angels*, *Spawn*, *Flashdance*, *Boomtown*, *Mad TV*, and many more.

**Current Projects:** Hootie and the Blowfish, Purple Planet, Smile Empty Soul, Noel Huntington, *The Goodbye Girl* (film)

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make plans by sitting in the studio and visualizing as you take notes. Plan the entire teardown and packing process, including scheduling, before you begin moving anything.

Two factors to consider are dependencies in the teardown (you can't pack A until you deal with B) and the setup order. Also consider schedule dependencies: which pieces you'll likely need right up until the move, and which pieces need to be immediately functional in the new studio (they're usually the same components). If you have recording sessions planned, you may have to work your teardown and setup schedules around them and the equipment they'll require (see Fig. 9).

Start with low-hanging fruit: things you can tear down and pack with the least effort and impact. When I move, my modular synths get packed first because they have few wired-in connections, they sit in the back of the room, they are large, and they're least likely to be needed up to the studio's last functional minute.

As you consider each item, make note of what you will need to properly pack it. If movers will be handling your equipment, you'll need to pack it differently than if you are handling everything yourself. And packing to go across the country is not the same as packing to move across town. A long-distance move requires more care in packing and in choosing your packing materials.

You can learn something by looking at factory packing materials and how they protect devices. Lighter items may simply have plastic or foam corners inside a standard cardboard box. Heavier items may have an additional inner box with standoffs of some sort to absorb shocks.

Using more materials does not always translate to more secure packing, but don't underestimate the treatment your equipment might endure on a long move. If you have equipment mounted in a good rack built for the road, for

instance, you might still want to use foam blocks wedged between each piece of equipment for rear support if it will be hauled cross-country.

As you plan, identify and note anything that you just can't trust to anyone else. You'll then know what you will need movers to deal with, which will be necessary for them to give an estimate. Knowing exactly what you need to move yourself will also tell you how many friends you should draft into bringing vehicles and strong backs to help with items you don't want movers to touch.

### CALL THE CABLE COMPANY

After I've set basic teardown and setup dates and priorities and I've identified the low-hanging fruit, I dive into what, in my studio, is the heart of the beast: cabling. Once again, I survey, visualize, and document like a demon to organize tearing down and packing cables.

Identify all cables whose purpose will be the same in the new studio as in the old. Ensure that they're labeled (at both ends) and documented. Then consider how much of the cabling setup it's practical to move intact. Because my studio was designed around the idea of moving it, I was able to pack most of my cable bundles and snakes as they were. After all my planning was done, I knew which bundles I had to separate from other bundles, which could stay as

they were, and which to break down into separate cables for packing.

My patch bay and routing rack has so many connections that it could have taken weeks to tear it down and rewire (see Fig. 10). I coiled and cable-tied most of the many bundles feeding it, placed the coiled bundles in an open box, and carefully transported the rack with the accompanying box of still-attached cables. Moving it was quite awkward and required four people, but the approach saved me a tremendous amount of time.

When you're finished scoping out teardown and setup, one task remains: figuring out the timing. Do not underestimate the importance of this step. Because of the demands of my day job and the amount of outboard components and cabling in my studio, it took two full weeks to completely tear it down and pack it. If you don't anticipate how long the process will take, you may find yourself in a panic as time runs out to vacate your old space. Similarly, you should calculate how long it should take you to reach minimum functionality in your new space, and how long after that to reach full core functionality. (Worry about advanced functionality later.)

### PACK YOUR BAGS

Your plan is complete, and now all that remains is to carry it out. In general, I recommend tearing down and packing



FIG. 9: If you have sessions booked, minor improvements such as finishing the trim might have to wait until later.



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D16XD





each item as a single gesture. If you try to tear everything down and then pack it all, you'll quickly have no room to move, much less pack. Whenever you have kept factory packaging, it's best to use that unless the device being packed requires extreme disassembly or some other major inconvenience.

Pack so that as many items as possible can be lifted and moved by one person. It is easy to pack so many items into a large box that it requires more than one person or a hand truck to move it, which means considerably more hassle at both ends. Some items will necessarily be heavy, but avoid unmanageably large loads when you can.

As you pack, mark each container and document its contents. I create general classifications (keyboards, computer, speakers, signal processing, and so on)

and then assign a sequential number for each item within each classification. I also sequentially number each item independent of the classifications. For instance, I'll have items (23) Keyboards 1, (24) Keyboards 2, and (25) Signal Processing 1. It is also helpful to indicate on the item the room it's intended for.

I document everything in a spreadsheet that lists each box's number, contents, classification, and number within the classification. I also write *Immediate* on the boxes that contain high priority items for setup, and I indicate their importance in the spreadsheet with a note or by using a bold font. Describing the contents in great detail will really help when you're trying to find something specific in the mess of boxes you'll have after you've moved.

Be sure that your equipment is adequately protected. I moved several of my racks intact, but wrapped each entirely in a layer of packing blankets and a layer of bubble wrap. Secure cables that are being transported without being disconnected. I like to label fragile items

with at least two levels of emphasis: Fragile and EXTREMELY FRAGILE!! The movers won't handle most items so labeled. Be paranoid: the equipment you're saving is your own.

If you are hiring movers, screen them carefully to ensure that they are conscientious and reasonably sensitive. Warn them that they'll be moving electronics and delicate items, and be sure they see all of it. My last time move was within the San Francisco Bay Area; I chose Cummings Movers (from Burlingame, California). They were excellent: punctual, fast, nice, and best of all, careful in their handling of everything.

## THE PROMISED LAND

Unbelievably, moving day arrives, though for me, it has always been several days. Moving my studio typically involves one day of help from the Friends Armada, a day of movers, and numerous solo trips in my car over the course of a week or so.

Moving tends to be chaotic, but to the degree possible, manage the placement of your studio gear when it arrives at its

## TEN TIPS TO HELP YOU HAVE A SUCCESSFUL MOVE

- 1. Don't underestimate** the importance of planning and the time it will require. Everything rides on it. The time you budget for planning should be directly proportionate to the physical complexity of your studio and the degree of modification you intend to make.
- 2. Plan to get help.** If the job is big, help could make a significant difference. If you're drafting volunteers from among your friends, it will be most efficient to organize the move for them beforehand. Minimize the amount of labor that will be required by documenting everything, by physically grouping all the items associated with a task, and especially by noting tasks that must be done in sequence. Also consider your friends' abilities; identify a number of light items for anyone with a bad back, for example.
- 3. Don't skimp on packing materials.** In my last move, I went through five boxes of bubble wrap, ten packets of plastic sheeting, ten packing blankets, and five rolls of duct tape. I had no breakage at all.
- 4. Take special care with small, important items.** Computer cables and adapters, and even your mouse, are critical to functionality. Pack such items together and make particular note in your packing list of their locations.
- 5. Take measurements.** You'll feel frustrated if you try to set up and discover that a cable is too short, but you'll feel like a complete idiot if moving day comes and some objects won't fit through a door, up or down stairs, or in the locations you had planned for them.
- 6. Don't skimp on the fudge factor.** Remember Murphy's Law and add

extra slack to everything you can. Expect the first few sessions in your new studio to be bumpy ones that will likely involve some troubleshooting and maybe even additional setup.

**7. Be thorough in your visualization.** Virtual walk-throughs are extremely valuable for anticipating problems, but only if you do them in fine detail. It is tempting to make them quick and high-level, but the devil is in the details.

**8. Take charge.** When you have movers or friends working for you, your most valuable role is not schlepping, but managing the process. Dedicate yourself to that role, because you're the only one who knows how and where everything is supposed to go. Don't feel guilty; you'll surely do your share of physical labor before all is said and done.

**9. Make to-do lists** before, during, and after your move. Many tasks will arise in the course of your planning and moving—so many that you're likely to forget half as soon as you've thought of them—so write everything down as it comes to mind. (As I write this, I'm looking at nine outlines dealing with things to do for my last studio move.)

**10. Make contingency plans.** No matter how organized you are, things can go awry. Recognize your absolute highest priorities, such as items you can move only with help, in case time runs short. Expect that not every friend who promises to help you will actually show up. Don't go crazy making contingency plans, but always identify the tasks that absolutely must get done and devise a backup plan in case something goes amiss.



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destination so that you have some idea of where things are. You can also ensure that things end up in or near the right room, that nothing gets stacked in ways it shouldn't, and that it's possible to navigate through the rooms and stacks. To give myself room to move within the studio, I usually place some of the smaller and lighter items in a separate room such as the garage.

As boxes are being brought in or immediately thereafter, turn them so you can see the identifying marks. Move key components near where they will be needed. Place large items such as racks and furniture at their respective stations while people are still there to help with anything that will be difficult for you to move by yourself.

Once everything is moved in, it's time to start setup. Find the pieces that need to be set up first, and then find the second round of items, including cabling. Clear the studio area as much as possible and then start unboxing and setting up.

## IT ALL CONNECTS

I begin setup by connecting AC power, one station at a time. Then I go through the stations in order of priority, doing the rest of the cabling one type at a time. After AC, I tackle analog audio. Although running audio cables so early can make it harder to maintain the necessary separation between cable runs, analog is usually the most problematic cable setup, so I prefer to do it when the least number of other cabling factors are in place. I connect each station's analog audio and then check for noise and hum problems. I might then proceed to the analog audio for another station, or I might continue with other cabling for the same station, depending on my setup priorities.

For several reasons, monitoring is the most important system to get up and running first. Once it's working, you can play music to make things more pleasant, but more importantly, this is

the best way to catch grounding or noise problems in your new studio. Set up your monitors, turn them on, and listen. Do you hear noise? Hum? No? Beautiful! That is a vital first step.

If you have a mixing console, that's the next station to set up, for much the same reason. With the console set up and connected to the monitors, power up and listen again for problems. For me, the problems usually start showing up when I begin connecting other equipment to the basic console and monitoring system.

The next thing to connect and check is your recording medium; you might have a DAW interface that requires a computer to be set up, too. If you use a standalone system or an analog tape recorder, you will be spared setting up the computer. After you connect your monitors, mixer, and primary signal sources, the rest of the setup order can be flexible according to your needs.

Shoot for audio functionality first. For devices such as sound modules, though, you might need to install MIDI or make other connections before you can test the audio. (Don't forget that many sound modules have demo sequences that come in very handy for testing their audio outputs.)

After you've installed each station's analog audio and rectified any problems, you can run digital audio cables, followed by networking, and digital control and interface cables, including MIDI. The goal in this procedure is to follow good guidelines for cable runs, maintain organization according to your documentation, and find as many problems as possible during setup. When properly executed, you can happily live with the job you've done for a long time. If you don't do it correctly now, you will need downtime later to redo the cabling.

If the verbiage I've already devoted to cabling has failed to make an impression, let me state explicitly that cabling is tremendously important, and you should be as immaculate as possible in every detail re-

lated to your studio's cabling. You will almost inevitably encounter problems. The more effort you put into keeping your cabling neat, however, the easier it will be to manage and troubleshoot over time.

You'll want to install as much of your existing equipment as possible before adding new equipment, but your individual circumstances may dictate that you incorporate some new items near the beginning of setup. If you're upgrading your DAW hardware, for instance, you will probably need to do that early because of the DAW's primacy in most modern project studios.

## DOWN THE RUNWAY

Once you have cabled your equipment, you will need to check every connection in a methodical way. Do not expect this to proceed smoothly; you will encounter problems of varying severity and may need to make purchases to fix some of them. Testing every connection is extremely time-consuming, though in the long run, it takes less time (and is less trouble) than troubleshooting in the middle of a session. I have had to spread the complete test sequence over as much as two weeks because I had to jump right into sessions in a new studio. Before starting, however, I tested everything I thought I'd need for the sessions, and a little more.

When you've established that your existing equipment is functioning properly, you can start introducing new pieces,

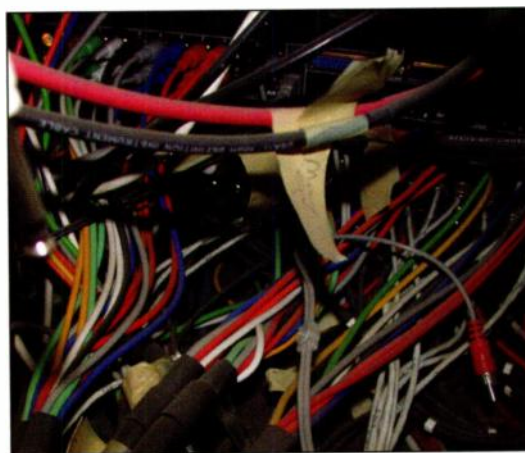


FIG. 10: For truly complex wiring, sometimes it saves time to move the entire patch bay with all its connections intact.

STEVE O



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An equally delectable dish for the digital DAW-user who desires to get rid of a traditional mixing desk and gain improved tracks with latency-free monitoring. We've doubled the feature-set for tantalizing sonic results.

- Focusrite TwinTrak Pro Channel Strip featuring Dual Class A Mic Pres and Instrument Level Inputs, unique "Scoop" EQs, Dual/Mono Compressor, Stereo Latency-free Monitoring, and available 24-bit/96 kHz A-D (additional cost)
- Bluebird Mic w/BirdNest & BirdCage (Pop/Shock) & Blueberry Cable

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#### Combo NUMBER 3 TRAKMASTER PAK

Our most value-oriented dish with mouth-watering features and a great price to match. Don't let the low price fool you, this flavorful combo packs a lot on its plate!



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SRP: \$1385 - SPECIAL BUNDLE PRICE: \$899

DANCING & MUSIC NIGHTLY WITH MODEL CITIZENS





hardware first, then software. Hardware problems are usually easier to isolate. After all, you can usually unplug hardware and know that it no longer has an impact, whereas software can be trickier to disable with the same degree of confidence. In fact, installing new software can easily be the most vexing part of the whole setup procedure.

Once the entire studio is set up, turn your attention to smaller (but no less important) concerns such as unpacking supplies. Locate items such as adapters and mic clips. Find a permanent home for everything, and put any boxes you want to keep in cold storage.

In the end, setup and testing can be as application-driven as planning. Here's an example: my first project

after one move was an album mix. I had little need for MIDI at the beginning of the mix, so I focused more on enabling audio and especially outboard processing, and I added MIDI when I was closer to needing it. I tested all of my DAW and mixer I/O and made sure I was getting signal into and out of my outboard processing, and later concerned myself with samplers and other gear that I wouldn't need for that particular mix.

As you bring the studio online and run the first few sessions, document the problems you encounter, whether they involve equipment that is not yet functioning correctly, something that needs to be added, or a system that needs to be worked out. Your efforts will result in a checklist that you can work your way through as time permits and circumstances demand. By the time you've begun diagnosing minor problems, you can consider your new studio functional and your move complete.

## EVERYTHING MUST GO

Moving is difficult and traumatic. The smaller and simpler your studio, the less this article concerns you (you lucky dog). Moving my studio has always been far more work than moving all my other possessions. Having done it a number of times now, I know that planning makes the difference between facing a challenging task and facing the seventh circle of hell.

Without adequate planning, a move will be chaos, and frustration will be the least of your worries. With good planning, tremendous effort is still required, but it is directed and purposeful. The result will be a relatively smooth, largely predictable transition that will get you from Studio A to Studio B with the least amount of tribulation.

*Larry the O has operated Toys in the Attic for 23 years in over half a dozen locations, providing professional music and sound-design services.*

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Steve Nathan, "Keyboardist of the Year," Music Row Magazine. (Faith Hill, Jewel, Billy Joel, Eagles, Queensryche...)



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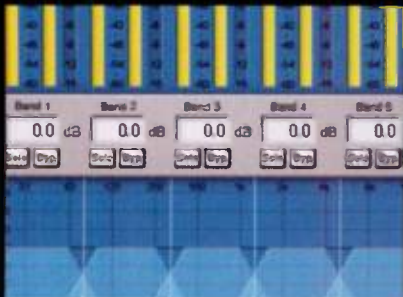
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Recreate popular guitar tones in Pro Tools with AmpliTube LE. With amp, cabinet, and effects controls, AmpliTube LE empowers you to easily craft your preferred guitar tone from physically modeled vintage and modern amps - all right within Pro Tools.



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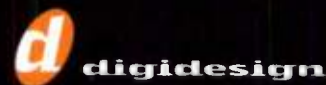
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Pulled from the superb T-RackS mastering plug-in suite, T-RackS EQ is perfect for adding that rich, warm tube sound to your Pro Tools tracks. T-RackS EQ offers six bands of analog-modeled parametric equalization, complete with high- and low-pass filters, all in an easy-to-use interface.

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# Recording by Instinct



KEVIN WESTENBERG

**Matt Cameron  
and John McBain  
value good  
feel over sonic  
perfection.**

**W**hen you think about the personal studios of successful musicians, it's easy to conjure up images of acoustically perfect spaces, decked to the rafters with the latest, greatest, and fanciest gear. But Space Studios—where Pearl Jam drummer Matt Cameron (formerly of Soundgarden) and John McBain (former Monster Magnet guitarist) produce and engineer the songs for their long-running psychedelic garage-rock project the *Wellwater Conspiracy*—would never be confused with a state-of-the-art facility.

The studio used to be a rehearsal and equipment-storage space for Soundgarden (whose former members, including Cameron, still own it), and at various times before that it was a Kentucky Fried Chicken outlet and a travel agency. Located in a run-down section of

Seattle, the studio has its share of sonic distractions, including traffic noise, RF interference, and even the occasional vagrant knocking at the door. And it's where Cameron and McBain (along with keyboardist Glenn Slater) recorded their most recent release, *Wellwater Conspiracy* (Transdreamer/Megaforce, 2003).

Cameron and McBain do have some pretty nice gear at the studio—including an Ampex MM1200 2-inch 24-track and Universal Audio LA-2A and 1176 dynamics processors—but you get the idea from talking to them that they're much more concerned with recording good-feeling tracks than achieving sonic perfection.

"When you listen to our records," says Cameron, "you can tell that we're certainly not graduates of Full Sail. We just kind of go for the vibe more than the audio accuracy."

**By Mike Levine**



# FOR OVER 30 YEARS LEXICON® HAS BEEN IN WORLD-CLASS RECORDING STUDIOS, NOW YOUR HOME CAN BE ONE OF THEM.

## WHOLE SYSTEM

Lexicon® has taken a whole-system approach to desktop recording. Omega Studio is an integrated computer recording system that includes the Omega 8x4x2 USB I/O mixer, Pro Tracks Plus 32-track recording software, BIAS® Deck™ 3.5 SE 64-track recording software and Pantheon™ world-class Lexicon reverb plug-in. Omega Studio contains all of the components necessary to transform your computer into a professional 24-bit recording studio.

## 8x4x2 USB I/O MIXER

Differentiating itself from standard computer I/O boxes, which are typically based on a patch-bay paradigm, the Omega 8x4x2 USB I/O mixer is based on a mixer paradigm and includes input, output and mixing functions that support a variety of tracking/monitoring applications while requiring no additional mixing hardware.

**PEAK INDICATORS:** Make sure nasty, distortion-causing peaks don't sneak into your recordings.

**LINE LEVELS:** Control the mix level of the professional quality line input to the mix bus.

**BUS ASSIGN:** Assign the mic and the line inputs in pairs to the 4 USB busses. Signals are converted to digital using ultra-transparent, very low noise 24-bit A/D converters.

**MONITOR MIX:** Omega's monitor mix control provides an easy way to balance your audio source and playback mix levels while recording. It allows for zero latency input monitoring.

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**MIC LEVELS:** Control the mix level of the high-end dbx mic pre to the mix bus.

**STEREO/MONO:** Select whether you monitor the inputs in mono or stereo.

**METERING:** Omega features a 2-channel, 4-segment assignable bargraph meter to monitor exact levels at the A/D converters. Other products that don't include hardware meters rely on application software metering that can miss clipping at the converters allowing distortion to sneak through without warning.

**S/PDIF ASSIGN:** Assign the S/PDIF input to USB channels 1 and 2.

**TRU-REFERENCE™ HEADPHONE AMP:** Omega's Tru-Reference™ headphone amplifier offers ultra-clear monitoring through its discrete design while delivering the power needed for all types of headphones.

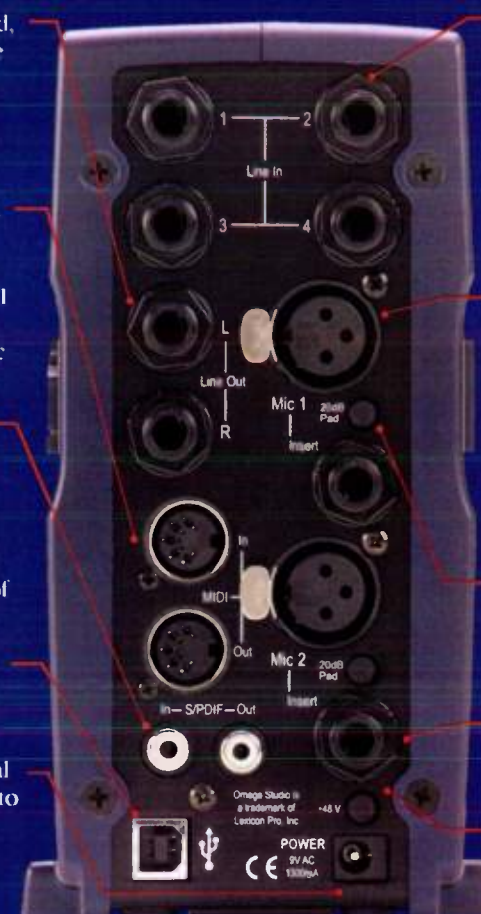
**LINE OUTPUTS:** RF filtered, TRS servo-balanced, active outputs are smart enough to know when they are connected to balanced or unbalanced equipment.

**MIDI IN/OUT:** Fully opto-isolated MIDI input ensures that there is no ground loop hum or MIDI talk-through noise. MIDI output has rock solid sync to USB frame rate.

**S/PDIF:** Direct digital transfers to or from your gear avoids unnecessary sonically degrading A/D and D/A conversions. An additional DAC allows zero latency monitoring of the S/PDIF source.

**USB:** Connect up to your computer with the included USB cable.

**POWER:** Omega's external power supply is superior to using the internal USB power provided by the computer, which is often noisy and insufficient for professional applications.



**LINE INPUTS:** RF filtered TRS active-balanced inputs accept either balanced or unbalanced signals. These inputs will accept a maximum input of +22dBu to allow interfacing to professional high-output level equipment.

**MIC PREAMPS:** Extremely low noise dbx® mic preamps allow you to get impeccable performance out of high-end studio condenser mics. Their performance still shines when using more common dynamic mics as well.

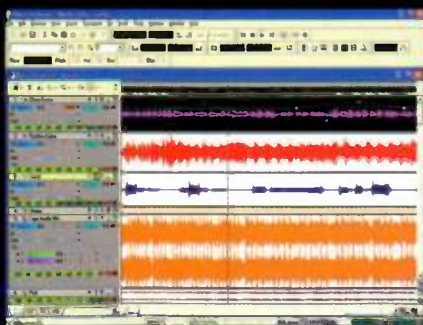
**-20dB PAD:** Reduces input gain by 20 dB to accommodate high-output microphones.

**TRS INSERTS:** Use your favorite outboard processor with the TRS insert points.

**+48V PHANTOM POWER:** All high-quality condenser mics require true +48V phantom power.

## Pro Tracks Plus™

Multi-Track PC Recording Software



Pro Tracks Plus is an easy-to-use, comprehensive 32-track recording suite that includes all the modules you need to track, edit, and mix your masterpiece.

- 32 24-bit stereo tracks
- Unlimited MIDI tracks and sequencer with powerful event editing
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- DXi soft synth support
- Track, edit, process, sequence and mix
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World Class Reverb Plug-In



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- 35 factory presets
- 6 reverb types
- 16 editable parameters per reverb type
- Mono and stereo operation
- Advanced yet easy-to-use interface
- Floating point DSP processing
- 16 and 24 bit compatible
- Efficient CPU utilization





## SPECIFICATIONS

### dbx® Microphone Inputs:

Input Impedance: 600 Ohms balanced  
Phantom Power: +48 Volt  
EIN: -120 dB A-weighted @ 50dB gain (150 Ohm source impedance)  
Maximum Input Level: +18 dBu  
THD+N: <.005%, 20 Hz - 20 kHz

### Insert Inputs:

Send Level (tip): +19 dBu maximum  
Maximum Return Level (ring): +19 dBu maximum

### Line Inputs:

Input Impedance: 20 kOhm balanced, 10 kOhm unbalanced  
Maximum Input Level: +22 dBu  
Frequency Response: +0, -0.2 dB 20 Hz - 20 kHz, ref. 1kHz  
THD+N: <.009% A/D, 20 Hz - 20 kHz

### Instrument Input:

Input Impedance: 1 MOhm unbalanced  
Maximum Input Level: +19 dBu  
Frequency Response: +0, -0.25 dB 20 Hz - 20 kHz, ref. 1 kHz

### Line Outputs:

Level: +19 dBu maximum  
Impedance: 110 Ohms  
Headphone Output: (1) 1/4" stereo jack  
100 mW per channel at 50 Ohms

### MIDI Interface:

Digital Audio Input: 5 pin DIN connectors for MIDI in and MIDI out  
Digital Audio Output: Coaxial RCA (S/PDIF format)  
Coaxial RCA (S/PDIF format)

### D/A and A/D Conversion

Sample Rate: 44.1 kHz or 48 kHz (determined by computer application)

### Dynamic Range:

A/D (24 Bit) 104 dB typical, A-weighted, 20 Hz - 20 kHz

### D/A (24 Bit)

109 dB typical, A-weighted, 20 Hz - 20 kHz

### Analog Path:

118 dB typical, A-weighted, 20 Hz - 20 kHz

### USB Type B Socket:

Version 1.1

### Power Requirements:

PS0913B adapter supplied

### Dimensions:

4.625"W x 7.25"H x 7.75" D (118mm x 184mm x 197mm)

### Weight:

2.65 lbs.

## PRO TRACKS PLUS™ REQUIREMENTS

Operating System: Windows® 2000/XP  
Processor Speed: 500MHz (1.2GHz recommended)  
RAM: 128MB RAM minimum (512MB recommended)  
Hard Disk Space: 100MB/full install  
Hard Disk Type: EIDE/Ultra DMA 7200RPM or better recommended

## DECK™ 3.5 SE REQUIREMENTS

Operating System: Mac® OS X version 10.2.8 or later  
Processor Speed: G4 Processor (450Mhz or faster)  
RAM: 128MB RAM minimum (512MB recommended)  
Hard Disk Space: 20MB  
Hard Disk Type: 18 ms hard drive (average seek time) or faster  
Additional Requirements: QuickTime™ 3.0 or later  
Manufacturer supplied product authorization code within 2 weeks of installation

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### **Omega 8x4x2 USB I/O mixer**

Differentiating itself from standard computer I/O boxes which are typically based on a patch-bay paradigm, the Omega 8x4x2 USB I/O mixer is based on a mixer paradigm and includes input, output and mixing functions that support a variety of tracking/monitoring applications while requiring no additional mixing hardware. The I/O mixer is packed with professional features such as ultra-transparent, high resolution A/D converters, extremely low-noise mic preamps with 48-volt phantom power and active balanced line level inputs. MIDI and S/PDIF ports allow connection to a variety of digital equipment.

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Pro Tracks Plus is an easy-to-use, comprehensive 32-track recording suite that includes all the modules you'll need to track, edit, process, sequence and mix your masterpiece. Not only does it include intuitive non-linear editing, plug-in support, and acidized looping features, it contains a full featured MIDI sequencer with outstanding event editing and powerful automation features as well as soft synth support.

### **BIAS® Deck™ 3.5 SE Mac Recording Software**

BIAS Deck 3.5 SE turns your Mac into a full-fledged recording studio. Easily record up to 64 tracks, with full CD quality and then edit your work instantly, while always being able to revert to your original recordings.

### **Pantheon™ Reverb Plug-in**

From the name synonymous with "world's best reverb", Lexicon brings you Pantheon. With 35 factory presets, 6 reverb types and a simple yet powerful user interface, Pantheon is an indispensable tool for your recording studio.



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# Recording by Instinct

The two started recording and engineering their own projects in the days when 4-track cassette machines were the main personal-studio recording option. "I came up on a Fostex 250, and John had a Ross 4x4," Cameron recalls. Even though they've long since shed their 4-tracks, they both say they were influenced heavily by the approach they learned from making music on those early machines.

Cameron and McBain first worked together in the early 1990s, on a project called Hater, which also included Soundgarden's Ben Shepherd. They began writing together and eventually released the first Wellwater record, *Declaration of Conformity* (which was recorded mainly on a 4-track cassette machine), back in 1997. The new CD is the band's fourth full-length effort, and it showcases Cameron and McBain's propensity for nonstandard production techniques such as hard-panned vocals, phase-shifted drum kits, and other psychedelic embellishments.

Cameron contributes lead vocals, drumming, rhythm guitar, and some bass parts to the new CD. McBain plays lead guitar and the majority of the bass, and Slater plays a variety of (mainly vintage) keyboards including a Mellotron, Minimoog, Rhodes, and Hammond B-3. I had a chance to talk with Cameron and McBain not long before the new CD was released.

## Do either of you guys have recording backgrounds?

**Cameron:** No, John and I pretty much taught ourselves with 4-tracks when they first came out—4-track cassettes in the late '80s.

## So your philosophy is basically just "do what sounds good"?

**Cameron:** Absolutely.

## Do you worry much about using proper recording techniques?

**McBain:** We're kind of casual about it, I guess, on the surface. But we don't want a bad sound going to tape. We don't take that scientific approach where we're pulling out the tape measures and measuring the distance from the mic to the center of the snare and all of that stuff. We just sort of do it by feel. We just kind of throw the mics up. Matt

knows where he wants the mics to go for his drums, and I know where I want them to go for my guitars. And usually we're right in that ballpark; we usually get something good. If we don't, we'll listen back and we'll hear it and we'll just retrack.

## And you have the luxury being in your own studio.

**McBain:** Exactly. That allows you to experiment like crazy.

## Tell me a bit about the history of the studio. Was Soundgarden the first band to use it?

**Cameron:** Yeah, when Soundgarden was together, we purchased the building in, I believe it was '95.

## Did Soundgarden do any recording there?

**Cameron:** No, we pretty much had it set up as a rehearsal space. And we stored all of our gear there. We had accumulated a lot of gear over the years. So it was basically like a big storage and rehearsal space.

## So it wasn't until you guys started your projects together that you turned it into a recording space?

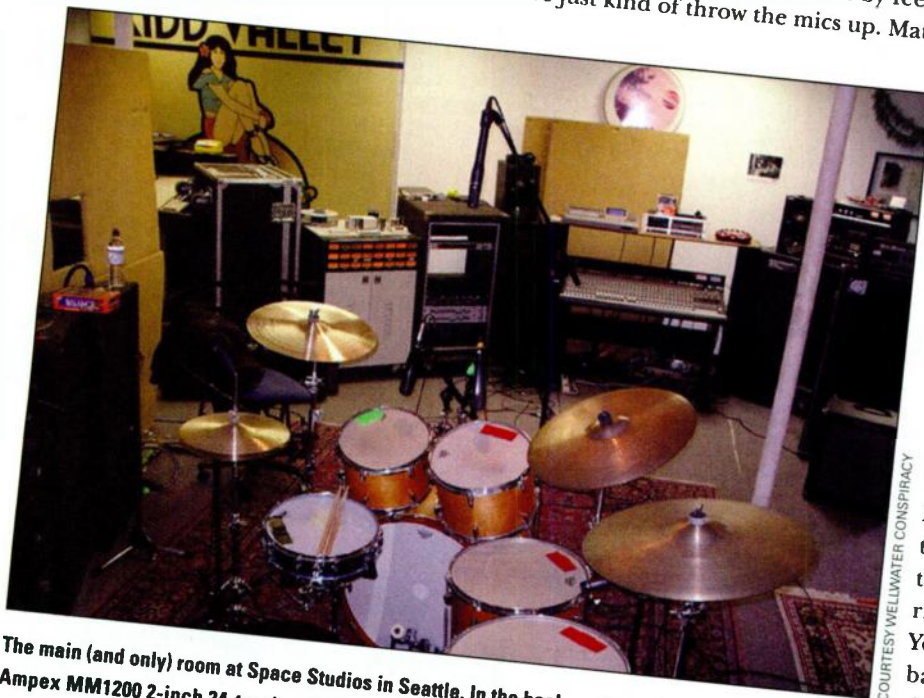
**Cameron:** Yeah. It's never been a professional, proper, setup recording environment. But I bought some selected pieces of recording equipment, and we took it from there. So we don't have a control room or anything like that. It's all in one room.

## Did you install any acoustic treatment?

**Cameron:** We put up some baffling where the drums are set up. It's kind of an okay live sound that we've been able to use over the years.

## I understand you have some problems with outside noise.

**McBain:** The studio is right on one of the main arteries connecting downtown Seattle to the outer boroughs. So right around rush hour it's just crazy. You get semis coming by and traffic backs up, and people start pressing their horns and it just gets crazy. And then we're surrounded by some radio towers.



COURTESY WELLWATER CONSPIRACY

The main (and only) room at Space Studios in Seattle. In the back on the left, you can see Cameron's Ampex MM1200 2-inch 24-track, which he and McBain used to track most of the new CD.



**Not the kind of buzz you're trying to create?**

**Cameron:** Not the atmospheric buzz, the real-life one.

**So you get RF?**

**McBain:** We get RF. And we've just recently installed some power conditioners upstairs and downstairs. Essentially the rule at the studio is: From 4:30 to 7:00 p.m., don't even bother.

**So your method of dealing with your sound problems is basically to just avoid them?**

**McBain:** [Laughs.] Exactly. At 4:30 we'll either call it a night, or go out to eat. Then we'll come back around 7:00, and usually the RF and the street noise have lessened. There's still no way to prevent the occasional crazy homeless guy from knocking on the door and trying to come in. But that's all part of where we're living right now.

**You did all the tracking for the new album at your studio, but not the mixing?**

**Cameron:** Correct. We tracked pretty much everything at Space, and I tracked some vocal parts here at my house on the ADAT, and just brought it down there. But everything else was done there [at Space].

**Where was the mix done?**

At a place called Avast, here in Seattle. Mixed by Adam Kasper.

**Did you do anything different on this record from a production standpoint?**

**McBain:** I think on the last record [*The Scroll and Its Combinations*, TVT, 2001] we were really focusing on getting the mix right and getting a certain sound overall. So we spent a lot of time on the actual mixing process. But for this one we wanted it a little bit looser; keep the rough edges on there.

**It definitely has a vibe to it.**

**McBain:** You can tell people are actually playing it; it's kind of a novelty.

**Since only three of you cut the whole CD, what was your process for recording basics?**

**Cameron:** I set up right by the tape machine, and reach up and hope for the best.

**Do you use a click?**


**Cameron:** A lot of times we'll track to a click track, because sometimes in our music, a guitar part will be the first thing to go down, or a keyboard part, or even a drum part. We normally like to have a guitar and drum part to start with, but there are times

when John or I will write a complete song and it requires a click track along with whatever instrument we're using at the time.

**So you'd play drums and John would play guitar to start with?**

**Cameron:** Yeah, there would be some occasions where either John or I would create rhythm tracks ourselves, playing guitar and bass and drums, but mostly on this one we tracked a guitar and


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# Recording by Instinct

drum track at the same time and built upon that.

**You don't find that playing rock music with a click is too constraining from a tempo and feel standpoint?**

**Cameron:** No. We've been doing it that way since day one. A lot of times John will put down a guitar track first, and on some occasions the drums go on last. I'm kind of used to doing it that way. We also track together.

**McBain:** Matt and I are of that 4-track generation, so we're used to playing to drum machines when we're doing our demos. I can sort of tune out the click in a certain way, and it's just there. And if I want to come back to it, I know where it is. But I don't sit down with the headphones on and just zero in on the click track and try to make it exact. You kind of learn how to play around the click track.

**Talk about the gear in the studio.**

**Cameron:** I have an Ampex MM1200

2-inch 24-track machine, and there's also a Quad/Eight board—the Ventura Model—that we use the mic pres from, into the Ampex. And I play back on a Mackie 32-8.

**So you just use the Quad/Eight for input?**

**Cameron:** Right. But there were occasions on this record when we did do some digital stuff. That was a Roland VS-1680. So we did some stuff on that and on ADAT.

**Why were you switching formats?**

**Cameron:** Well, basically the way we record is like any home recordist would, where we use pretty much what's available. Also John has access to an ADAT here, and I have one at my house, and there would be occasions where I'd work on stuff at home and then bring it in and either dump that on the 2-inch or the Roland.

**Is it a newer ADAT?**

**Cameron:** Yeah, it's a 20-bit [XT20 model].

**McBain:** The ADAT was a big jump for me.

**So you hadn't done anything digital at all before that?**



JEN GROVER

**Cameron divides his time between the Wellwater Conspiracy and his main gig as the drummer in Pearl Jam.**

**McBain:** No, I need tape. That was my thing, I have got to see tape moving. But we just threw some stuff down on this Roland [VS-1680], and I ended up being pretty impressed with it. Impressed enough that I went out and bought one.

**Overall do you prefer analog to digital?**

**Cameron:** It depends on the project and the type of end result you're going for. For a band, analog will always be best. But for a tightly produced rap track or some obvious pop type of track, computer stuff is great. I think that's the way to go.

**But for you, analog?**

**Cameron:** For this band I would say analog works.

**Yet some of the songs on the CD were tracked to digital. How come?**

**McBain:** About three quarters of the way through the recording process, the 2-inch machine broke down. [Laughs.] That's the way those things are. They're like old cars. You really have to keep on top of them. You have to keep tuning them and checking them and popping the hood.



COURTESY WELLWATER CONSPIRACY

**McBain and Cameron use this Mackie 32-8 console for playback, but for input they prefer the mic pres on an old Quad/Eight board (not pictured). Also shown here are a Roland VS-1680 and an Alesis XT-20 ADAT, which were used as supplemental multitracks on the new CD, and a Line 6 Pod.**



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# Recording by Instinct

**Did your 4-track background affect the way you work now on larger format machines?**

**Cameron:** I think so. It forces you to record economically; you always have to be bouncing tracks when 4-tracking. There's a certain art to that, where you need to make sure your instruments are balanced properly before you commit. And we had to do that a couple of times on the ADAT and on the VS-1680 [during the recording of the new CD]. There are a couple of bounces going on. I think that's the main thing I've taken away from 4-tracking.

**When you first got a larger-format machine, did you go crazy and record tons of tracks?**

**McBain:** Initially, yeah, it's hard not to record a guitar part eight times. And we did that a lot with our second record, *Brotherhood of Electric*; that's when we had the 24-track. On that one, yeah, we kind of did go crazy with the overdubbing. But I treat a 24-track like it's a big 4-track. You have to manually punch in, and we don't have the remote switch, so you have to kind of time it by holding that chord and then quickly reaching over and hitting the Record button. So it's just like a big 4-track to me. Definitely on the new one we've limited ourselves. My attitude going in was, "Well, I can probably get all these parts I need in two tracks. I'm just going to do that."

**The first Wellwater album, *Declaration of Conformity*, was recorded on a 4-track?**

**McBain:** A cassette 4-track. And then we dumped it to a ½-inch 8-track, an old Tascam 38. The music would go to 4-track, and then we'd dump it to ½-inch and put the vocals on it.

**So you'd have to do a lot of bouncing?**

**McBain:** There was bouncing, yeah. It's



Keyboardist Glenn Slater (between McBain, left, and Cameron) is the third member of the band, adding textures from a collection of vintage instruments.

funny, there was also a case with the first album where I gave Ben [Shepherd], who sang on the first album, a song that I wanted him to do that I had mixed down to two tracks of a 4-track cassette. So he had two tracks of instrumental. I said, "Here's the song. Go ahead and learn some vocals, and then we'll set up a time to go into the studio and we'll do the vocals on the 8-track."

But Ben recorded [his vocals] on the other two tracks of the cassette on his 4-track. He gave it to me and I said, "I wanted to mix it from the 8-track." But he said, "Well, these vocals are perfect." And I agreed. So I had to sit with the Tascam 38 on one side and his Yamaha 4-track on the other and manually sync up his vocals—fly them in manually to the ½-inch [machine], literally line by line, and it took me about three days to do it. Because I realized quickly that when you hit Play on the Yamaha, there was a pause. So I had to learn what that pause was and practice and practice, and then line by line I synced up his vocal to the ½-inch. There was no MIDI. I just played with the tape speed on the 4-track as I was going. If I felt him get-

ting a little ahead I'd slow him down between verses.

**Matt, I understand that you use an unconventional drum-miking approach when recording your drums; you don't use a lot of mics.**

**Cameron:** I would say we varied it a little bit on this record [*Wellwater Conspiracy*]. But drum miking normally consists—for me—of having a good kick and snare sound. I don't mind using a mono overhead at all. So instead of miking all the toms, we normally try to get a tom and overhead sound, which involves some mic placement stuff.

**What mics do you typically use?**

**Cameron:** We use an AKG D 112 on the kick, and then a Shure SM57—top only—on the snare. And then we have the Shure KSM44s for overheads, and if I do mic the toms, it'll normally be the Shure Beta 56.

**John, you do most of the lead guitar work?**

**McBain:** Yeah. Matt lays down some rhythm tracks here and there and has done a couple of leads. But for the most part, I'm the guitarist.



### Do you have a particular amp you use?

**McBain:** For everything on there, except one song, I use a 1970 Vox AC30.

### Do you close-mic it?

**McBain:** Close-miked with an SM57. I just turn the amp all the way up.

### So, for the most part, you guys weren't using super-high-end mics?

**McBain:** No.

### What did you use on the vocals?

**McBain:** The Shure KSM44, through one of the Universal Audio mic pres and a limiter. Matt got those reissues [LA-2A and 1176] from Universal Audio, and they're incredible. They color your sound in a certain way that's really nice. We like compressors that are transparent, but sometimes you need one that's got a definite spring to it.

### What other compressors do you use?

**McBain:** We both like to use the dbx

160, and I have the stereo version, the 162. That's normally what we use. But when we're mixing at a studio we'll use lots of stuff.

### Who plays the bass parts?

**Cameron:** John and I mixed it up. He plays most of the bass parts, and I play bass on about three or four cuts, but it's mostly John.

### How did you record the bass?

**McBain:** There were a couple of times when we ran it through a 4x12 Mesa/Boogie cabinet, and a Dual Rectifier, and we miked it. Just dirtied it up a little bit, ran it through a guitar amp. But for the most part all the bass was done direct through a Joemeek VC6 mic pre.

### Do you ever use Pro Tools?

**Cameron:** We used Pro Tools pretty much exclusively for editing this record. A couple of particular songs

were mixed into Pro Tools and edited. Just the real basic use of it. Not for tracking.

### Let's talk about the mixing a little bit. On the song "Galaxy 265," the vocals were all the way to one side. Were you trying to get a retro Beatles-stereo type effect?

**Cameron:** Yeah. The whole track is hard-panned. We decided to do that whole particular mix that way, and it seemed to fit the song pretty good. It's kind of an older-sounding song.

### It seemed as though there were some other songs that made use of unconventional panning techniques, like where the kick and snare weren't panned up the middle.

**Cameron:** Yeah, like the song "Rebirth," the kick and snare are hard-panned right and left, and there's a drum-machine pattern that's straight in the center. We like to mix it up that way.



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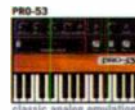
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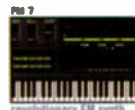
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# Recording by Instinct

**Talk about some of the effects you used on the mix.**

**McBain:** When we mixed at Avast, aside from all the really nice, juicy vintage gear that we had to work with, I also brought in my tube Echoplex, and that was always part of the effects chain. We were running drums through it, we were running vocals through it, guitars, reamping, and stuff like that. And we also used an old Mutron Bi-Phase. You can hear it on the beginning of a couple of songs. It's two mono Mutron phasers run together. You can pan them left and right.

**I heard some phase-shifting on the drum track. Was that the Mutron?**

**McBain:** Yeah, we ran the stereo drum mix through it. One phaser was set kind of fast, and one was a little slower. They're quiet. They're really well built and quiet.

**Clearly, you guys do not have any qualms about using unconventional techniques.**

**McBain:** No, not in the least. That's all part of all that time we had at the rehearsal studio to experiment. I'm certain that we could find a piece of high-tech gear that we could dial-in a similar sound on, but there's just something special about running it through the Mutron.

**Did you use much compression on the full mix?**

**McBain:** No, just on instruments here and there. On the drums, on the overdubs probably there was a little compression going on.

**Do you try to keep it to a minimum?**

**McBain:** Yes. We try to get the best possible sound onto tape at the very beginning. If you can accomplish that, most of the time you don't have to do anything with it.

## AN ANNOTATED WELLWATER DISCOGRAPHY

***Wellwater Conspiracy* (Transdreamer/Megaforce, 2003)**

Stripped down and rock ready. The '60s element returns with a vengeance along with a distinct "Kraut-Rock" vibe courtesy of Mr. Glenn Slater.

***The Scroll and Its Combinations* (TVT, 2001)**

Pop goes the Wellwater. Loads of coconspirators featured throughout (including Eddie Vedder). Our least "garage-y" album.

***Brotherhood of Electric: Operational Directives* (Time Bomb Recordings, 1999)**

Our most rock-centric record. We kind of went overboard with the overdubs on this one. Stylistically speaking, this one is all over the map.

***Declaration of Conformity* (Third Gear Records, 1997)**

Recorded on 4-track cassette. Contains all three Super Electro singles. The Japanese CD version features two bonus cuts: a cover of Syd Barrett's "Late Night" with Queens of the Stone Age's Josh Homme on second guitar and the Shocking Blue instrumental "Acka Raga" with Homme on bass.



—John McBain

**So you experiment a lot when you're doing your basic tracks?**

**McBain:** Yeah.

**Mostly with mic placement?**

**McBain:** Yes.

**Was there anything else about the production that was particularly different or unusual?**

**McBain:** The cool thing about this record is that it came out sounding just like it did when we recorded it. Going through the whole process of mixing it and mastering it, and then we had to remaster it, and then we had to remaster it again.

**What was the problem?**

**McBain:** Just a bit too much compression in the mastering stage. We recorded it, for the most part, to 2-inch tape, so there was tape compression. There's really no sense in compressing it at [the mastering stage].

**Cameron:** Right. We recorded everything hot onto tape. So we weren't really able to go too crazy in the compression department once we got to mastering. Because we added stereo bus compression on the mix.

**So the first mastering facility took the as-loud-as-possible approach, but you weren't happy with it?**

**McBain:** We thought we'd give it a shot and try some of that approach, but it didn't work for us.

**What didn't you like about it?**

**McBain:** It seemed to make things a lot smaller. The masters were louder. Those versions of the songs, those masters were louder, but they didn't have any depth. They were kind of two-dimensional.

**So the dynamics were lost?**

**McBain:** There were no dynamics. It was just flat, pushing right up against the speakers.

**So what did you do?**

**Cameron:** We just had to do it again and use a lot less compression. It came out great.

**Where was the remastering done?**

**McBain:** We did it at Hanzek Audio and got the best mastering guy in town [Chris Hanzek], and he helped us out a lot with it. By not doing things, he helped us a lot.



**Matt, you've done a lot of performing and a lot of recording. Which do you prefer?**

**Cameron:** Recording has always been the most fun aspect of what I do. It's what I cherish the most, because you're able to create that perfect performance and put it down for eternity.

**Talk about the differences in your approach when recording in a commercial studio and recording in your own setup.**

**Cameron:** When I'm in the [commercial] studio, I try to be really confident with my ideas and not waste any time, because time equals money when you get into a big place. There's a lot more pressure involved in that setting. But once you go in there, if you can be confident and get that performance down, then it's going to sound amazing. The great thing about doing home recording is there's no pressure. You can actually do some songwriting and work on whatever tickles your fancy and record it right then and there. I think you can use recording as a form of expression, as an art form.

**What advice would you give people who had their own studios?**

**McBain:** When you're recording, go with your instincts. And it seems like, as a rule, those initial tracks that you lay down are always the best ones. When you're recording on your own, it's that freedom of, "Well, I can just record it over and over and over again," that can be a problem. Go for those initial takes. The initial takes always sound the best. They might not be technically the best tracks, but the feeling is always there right at the start. And that's the 4-track thing again. It's like, "Oh, that's the one. There are some mistakes there, but you know what? It's got feeling, it's got something going for it. Don't over-analyze. That's something we don't do, we don't overanalyze, with everything, from the drums to the guitars to the vocals. There's going to be stuff on the records that a professional might deem a little shaky, and a little pitchy and maybe not necessary, but we go with it. We go with our instincts.

**Mike Levine is a senior editor at EM.**

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# Phone It In!

***Creating custom ringtones—new opportunities for desktop musicians.***

By Hayden Porter

**T**hanks to the audiocentric nature of cell phones, customizable ringtones have rapidly become one of the first commercially successful entertainment features for mobile devices. From a practical standpoint, a personalized ringtone lets you identify your ringing phone when you're in a

group of other cell-phone owners. And with a little preplanning, different ringtones can also be used to identify different callers. These benefits—along with the coolness factor of owning a custom ringtone—have fed the commercial success of the ringtone industry.

Customizable ringtones started to appear in 1998 and became a common feature in cell phones by early 2000. The early ringtone technology, however, supported only short monophonic melodies, so several companies and industry groups began developing new formats and technologies for playing back polyphonic ringtones and video-game audio on mobile devices. Polyphonic cell phones were starting to appear in Japan by 2000, and in Europe and North America slightly later.

There are currently many ringtone formats, and almost all are based on sequences rather than on actual audio recordings. That's because of the low 9.6 Kbps bit rate that is typically used for downloading data to phones. It takes less bandwidth (and is therefore less costly) for the end-user to download a small sequencer file that plays through a phone's built-in tone generator than it is to download an MP3 file of similar song length. (Some newer phone models are an exception;

LAURA WILLIAMS

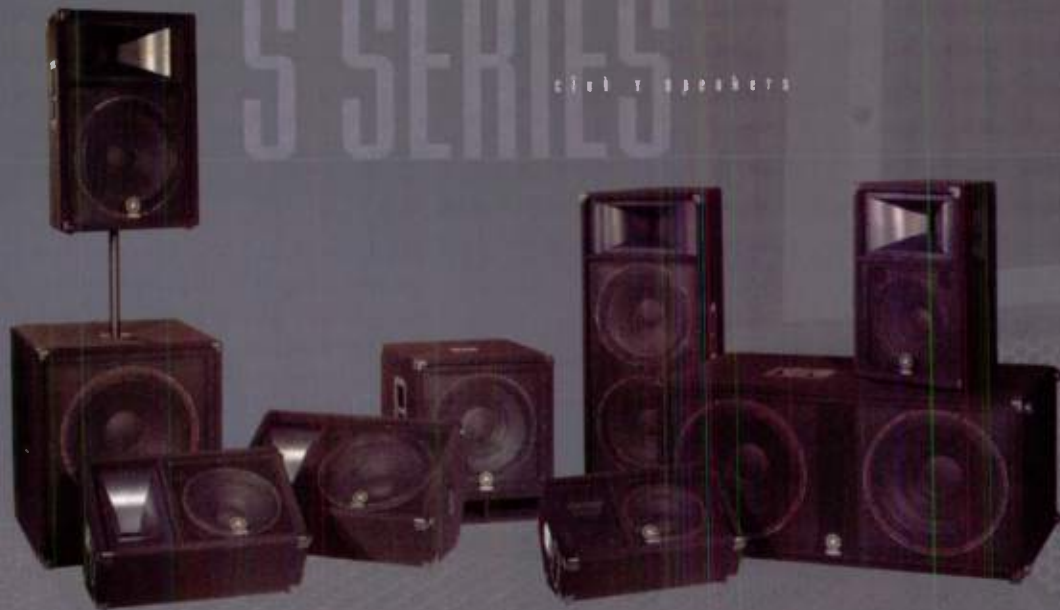


Sonic Network's GrooveFone technology lets you interactively create new song mixes on your cell phone and save them as ringtones.



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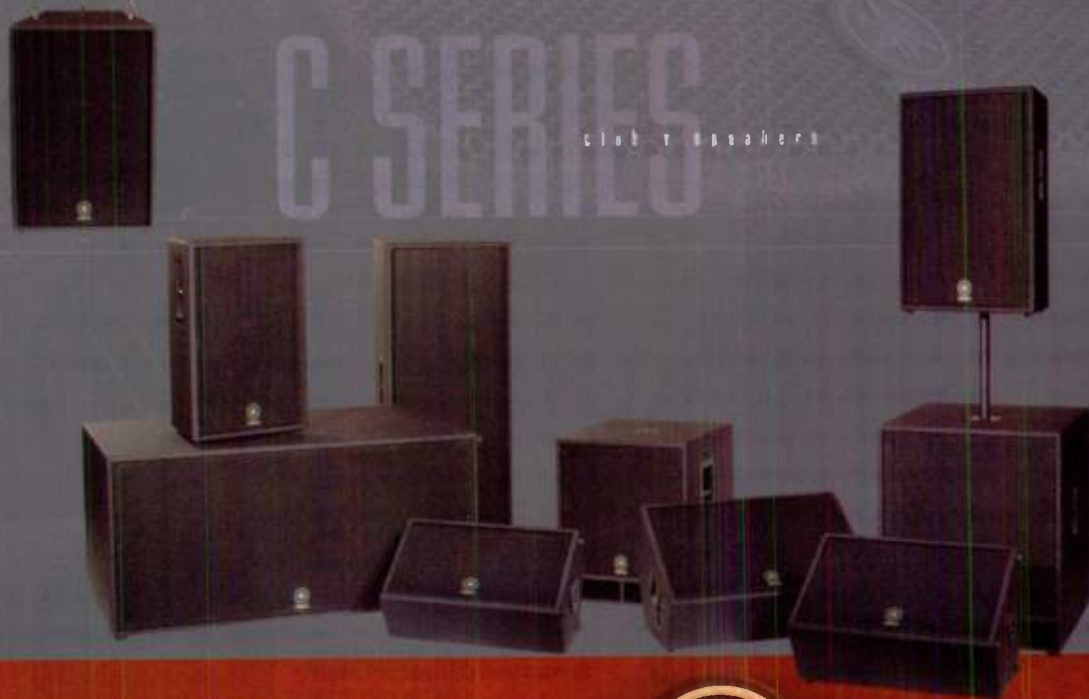
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used to represent a rest. Rhythmic durations range from 1 (a whole note) to 32 (a 32nd note). You can learn more about the RTX specification at [www.logomanager.co.uk/help/Edit/RTX.html](http://www.logomanager.co.uk/help/Edit/RTX.html).

**iMelody.** The iMelody format is also text based and offers additional features, such as individual note volumes, a wider range of rhythmic subdivisions, a wider range of octaves, and sharp/flat accidentals. Here's an example of a theme by Mozart written in iMelody format:

```
BEGIN: IMELODY
VERSION: 1.2
FORMAT: CLASS1.0
NAME: Melody1
COMPOSER: Mozart
BEAT: 120
STYLE: S1
VOLUME: V7
MELODY: &b2#c3V-c2*4g3d3V+#d1
r3d2e2:d1V+f2f3.
END: IMELODY
```

The melody section contains a sequence defining an event's volume, octave, accidental, note name, and duration in that order. Notes without specific octave or volume values inherit the default values, helping to reduce file size. Rhythmic values range from 0 (whole note) to 5 (32nd note). The following is the sequence rewritten with each event separated by a vertical line.

```
&b2 | #c3 | V-c2 | *4g3 | d3 | V+#d1 | r3 | d2
| e2: | d1 | V+f2 | f3
```

The first event plays a B-flat (the ampersand designates a flat) quarter note. The fourth event plays a G eighth note in octave 4; the asterisk (\*) designates a new octave. In the third event, V-

means decrease the volume by one value; the V+ in the 11th event increases the volume by one value. For more information on the iMelody format visit the iRDA Web site ([www.irda.org/standards/pubs/iMelody.pdf](http://www.irda.org/standards/pubs/iMelody.pdf)).

### KNOWING FORMATS HELPS

By now you are probably asking, "Do I really have to compose music in this cryptic format?" Fortunately, the answer is no. There are several applications that convert MIDI into different monophonic ringtone formats. However, by understanding these formats, you can manually edit the ringtone to add or edit data that was not included during conversion.

When you prepare monophonic ringtones, a vendor or network operator should provide the maximum character length of each ringtone format's sequence. You must optimize the sequence for each ringtone format according to the limits provided by the vendor or network operator.

### FROM MONO TO MIDI

The ringtone industry is now moving away from the cryptic and limiting monophonic ringtones toward MIDI-based polyphonic ringtones. Several companies, such as Beatnik, Faith, Tao, and Yamaha, license sophisticated synthesis technology to leading phone manufacturers. In addition to supporting MIDI playback through a General MIDI (GM) bank set, some newer phones also support "structured audio" formats that include both MIDI sequence data and custom sounds.

**SP-MIDI.** MIDI is the most widely supported polyphonic ringtone format.

### RINGTONE RETRIEVAL

You can audition a ringtone in a phone by manually entering monophonic song data using the phone's built-in ringtone composer or by transferring the ringtone file from a computer to your phone through an infrared light beam or through a USB or serial data cable.

You can send ringtones to other phones by attaching them to a message and sending the message to the other phone. You can also download ringtones into your phone from a Web site that is accessible to your phone's WAP (Wireless Application Protocol) browser.



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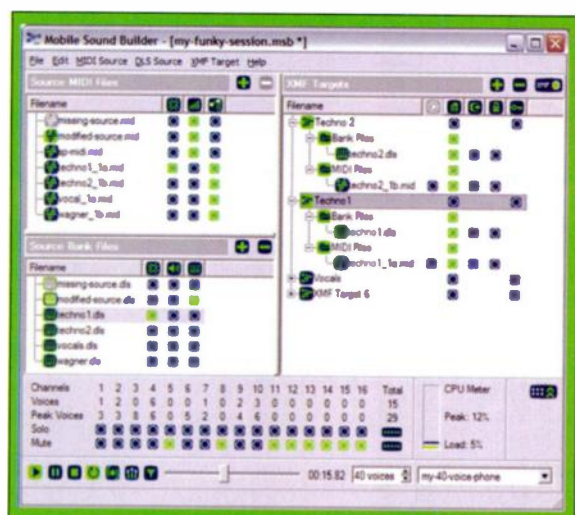


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**FIG. 1:** Beatnik Mobile Sound Builder shows peak voice usage for each channel of SP-MIDI and DSL patch management for XMF.

In most cases, phone manufacturers use a software synthesizer to play back MIDI files; each phone has a different CPU capacity and therefore a different level of polyphony. This presents a problem for the composer who is left wondering, "What happens to my ringtone if a given phone doesn't have enough polyphony to play it?"

The SP-MIDI (Scalable Polyphony MIDI) specification solves this problem by enabling the composer to create a single version of a song and set up rules so that a phone supporting 4-note polyphony, for example, could play up to four preselected musical parts from a 16-part song, while a more sophisticated phone might play all of the parts. The scalable aspect of SP-MIDI enables a composer to create a song that plays in a predictable way in a variety of polyphony-limited situations.

The MMA ratified the SP-MIDI specification in May 2002, and SP-MIDI-compatible phones appeared on the market in mid-2002. Currently, SP-MIDI is the most common polyphonic ringtone format for Europe. Polyphony support in current phones ranges from 4 to 24 notes.

Creating effective SP-MIDI compositions requires careful voice management. Overlapping notes, sustain-pedal controller data, and sounds with slow releases can unintentionally drain a channel's available polyphony. In that

case, a phone without sufficient polyphony would resort to note stealing, causing unpredictable note dropouts during playback. You must therefore analyze a composition carefully to avoid any hidden polyphony. For more detailed information, the complete SP-MIDI specification is available from the MIDI Manufacturers Association ([www.midi.org](http://www.midi.org)).

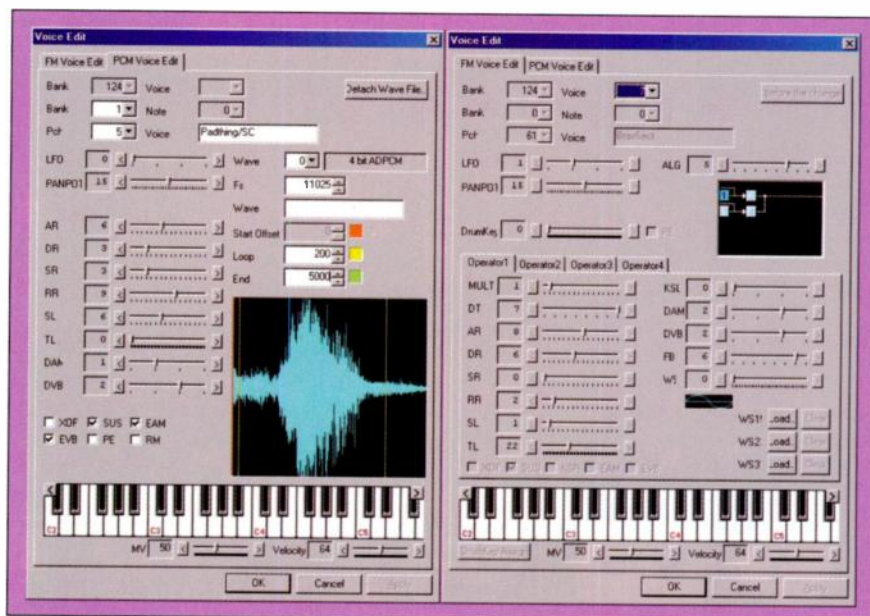
To create an SP-MIDI-compliant MIDI file, you can use an SP-MIDI-authoring application. One application for authoring SP-MIDI is Beatnik's Mobile Sound Builder (see Fig. 1), which can test a MIDI file under different polyphony limitations and audition the music with sounds similar to those in Nokia, Sony Ericsson, Siemens, Motorola, Samsung, and Danger phones. All of these manufacturers license their software synthesizer and sound banks from Beatnik Inc. The Mobile Sound Builder is available from the Beatnik Web site ([www.beatnik.com](http://www.beatnik.com)).

**XMF.** Another MMA standard rati-

fied in November 2001, XMF (Extensible Music Format) is a structured audio format combining both MIDI sequence data and custom wavetable sounds in DLS (Downloadable Sound) format. XMF supports encryption (to protect MIDI data), wavetable sample data, and copyright information. It also compresses the DLS bank by 25 to 50 percent, aiding in file-size reduction. XMF can play its own custom DLS sounds and GM sounds from the host synthesizer.

Because XMF is a nonproprietary format adopted by the MMA, it's likely to become another important mobile-audio format. To create XMF, you need a DLS editor for custom sound creation and software to merge MIDI and DLS. Currently, the only available XMF tool is Beatnik's Mobile Sound Builder.

**Beatnik RMF.** Beatnik's RMF (Rich Music Format) is a proprietary format that has many of the same features as XMF. In addition, RMF supports ADPCM 4:1 compression and MP3 compression of wavetable samples. However, only phones that support the Beatnik Audio Engine can play this format. Creating RMF files requires the Beatnik Editor, another commercial tool available from the Beatnik Web



**FIG. 2:** Yamaha's ATS-MA3 SMAF ringtone authoring tool includes a wavetable editor (left) and an FM tone editor (right).



# The meaning of live

## composition/sound design



"Live is the Holy Grail of loop manipulation software. It has totally changed how I work with loops and samples. I use it both as a performance instrument and as an arrangement tool in the studio. I can't imagine working without it."

**Charlie Clouser**—composer, "Fastlane"; keyboardist, Nine Inch Nails

## remixing



"Live is an essential tool to me for live remixing. For performance, it's unrivaled in its simplicity and versatility and lets me do whatever I want without ever hitting the Stop button."

**BT**—recording artist/remixer/composer; "Monster," "The Fast and the Furious"



## film scoring



"Live is one of the most useful products I've ever had in my studio. I used to waste so much time making loops fit in tempo and with each other. Now I rely on Live's fantastic time stretching feature every time."

**Klaus Badelt**—composer; "The Recruit", "Pirates of the Caribbean"

## live performance



"I need a program that can keep up with constant changes. I have been putting Live to the test for our performances and it has been 100% reliable."

**Cheche Alara**—musical director; American Idol Tour, Christina Aguilera, Pink

"Live's ability to change tempo and key, and edit audio on the fly has revolutionized the process for rehearsing and programming a major tour."

**Jason Halbert**—programmer; American Idol Tour: Kelly Clarkson, Clay Aiken

Live 3 from Ableton is so versatile that it means different things to different people. The common thread is that everyone who experiences Live immediately finds it invaluable as an inspiring creative tool that forever changes the way they make music. Live blurs the lines between composition, recording and live performance. Download your free demo today and experience the meaning of Live for yourself.

site. Phones supporting RMF and XMF became available in late 2003.

**Tao Intent.** The Tao Group licenses its Tao Intent software to a number of mobile device manufacturers. Unlike the other technologies described in this article, the Tao Intent platform marries a sophisticated audio engine with a complete multimedia system.

The Tao Intent Sound System (ISS) supports many standard formats including MIDI, SP-MIDI, and the new SKM format. This open format allows merging of MIDI and custom sampled sounds, together with *vector audio*.

Tao's vector audio is a text-based format that includes parameters for controlling software synthesizers, effects units, and music engines, such as the Koan generative music engine, allowing the generation of music or sound in real time. Tao is currently marketing the technology to deliver dynamic ringtones. These "live tones" sound musically and sonically different each time they play, allowing for subtle variety and a bit of novelty, without producing large files.

The Tao ISS content authoring tools are available from SSEYO ([www.sseyo.com](http://www.sseyo.com)), which is a subsidiary of Tao.

**Faith MFi.** Japan-based Faith's audio engine is the basis for several important ringtone formats. Faith developed a subformat of MIDI called compact MIDI (cMIDI), which reduces the range of allowed MIDI data, thereby decreasing a ringtone's file size.

In 1999, Faith proposed and developed MFi (Melody Format for i-mode), the first widespread polyphonic ringtone format, for the NTT DoCoMo i-mode network (currently the largest phone network in the world, with nearly 40 million subscribers). All phones that are branded for i-mode service can support the MFi format, which contains cMIDI and custom samples. The MFi format and related authoring software are owned by NTT DoCoMo, and information about its capabilities is available only to content providers licensed by NTT DoCoMo.

In 2000, Faith and Qualcomm jointly developed the CMX (Compact Media Extensions) format for Qual-

comm chip sets. CMX, a multimedia format for synchronized sound samples, MIDI, graphics, and text, can be used for phone ringtones, screen savers, or messaging. Authoring tools for CMX are available from Qualcomm's CMX division ([www.cdmatech.com/solutions/products/cmx.jsp](http://www.cdmatech.com/solutions/products/cmx.jsp)). CMX-capable phones are available in Japan and the United States and should become available for Europe in the near future.

**Yamaha SMAF.** SMAF (Synthetic Music Mobile Application Format) is an advanced structured audio format that is the most common polyphonic ringtone format in East Asia, with a growing market in Europe and the United States. The format combines FM synthesis data, MIDI, samples, wavetable synthesis data, and other media, such as graphics, into one convenient format.

Currently, Yamaha manufactures four SMAF-compatible chips. When developing SMAF content, it's important that you understand the capabilities of the chip in your target audience's phone. The MA-1 chip has a maximum polyphony of four notes and plays SMAF through a GM-compatible FM synthesizer that also supports custom FM sounds with two oscillators. SMAF files for MA-2 chips can have 16-note polyphony and play built-in FM sounds from the GM bank and a second bank of 128 sounds. MA-2-compatible SMAF files support custom FM sounds with up to four oscillators, and they can include WAV samples with 4:1 compression. The MA-3 chip includes all of the features of the MA-2 chip. It boasts 40-note polyphony and custom sounds using FM or wavetable synthesis. Yamaha's most recent and most sophisticated chip, the MA-5, adds support for analog synthesis and human-voice synthesis.

A sophisticated feature of

SMAF MA-2/3/5 chips is support for compressed audio samples and FM tones. FM synthesis is highly efficient for mobile devices, because a 4-oscillator FM patch occupies 30 bytes of memory. Consequently, you can add multiple custom FM sounds without a significant increase in file size. You can also include vocal or drum-loop samples with 4:1 compression to minimize ringtone file size.

Yamaha provides several free authoring applications from its Yamaha SMAF Global Web site along with a commercial professional-level hardware authoring system. The free tools support the conversion of type 0 Standard MIDI Files to SMAF files, the creation of custom FM sounds, and the inclusion of WAV samples (see Fig. 2).

The commercial hardware tool (model MMFMA3ASE) is a tone module with a software front end. The hardware provides all the necessary ins and outs: connection to a handset speaker for monitoring, LED indication, and line-out. The software has tools for voice editing, voice management, and MIDI-to-SMAF conversion

## RINGTONE RESTRICTIONS

When creating cell-phone ringtones, it's important to keep several technical limitations in mind to ensure the best possible results.

### 9.6 Kbps download bit rate

Cell phones use a much slower bit rate than the typical dial-up Internet connection. Consequently, ringtones should be as small as possible to facilitate rapid delivery to end-users.

### 10 to 60 KB network limit on ringtone file size

Phone network operators often limit the size of ringtone files to 10 to 60 KB—sometimes even less. Also, phones have a limited amount of storage space and may have a limit on the file size of a stored ringtone.

### 8 and 11 kHz sampling-rate output

Phones have limited digital-to-analog converter capability because of CPU constraints. Be sure to down-sample all sound files to these sampling rates for maximum delivery and playback efficiency.

### 300 to 3,000 Hz phone-speaker frequency range

Cell-phone speakers are quite small and have a limited bass response. To emulate the playback of a small piezo speaker, try making a recording of the ringtone using EQ to remove the frequencies outside this range.



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##### Support of Many Audio Formats (24-bit)

Logic 6 supports 24-bit audio and 24-bit MIDI. It also supports 16-bit and 8-bit audio and MIDI. It also supports 32-bit floating point audio and MIDI.

### EMAGIC

#### LOGIC 6 SERIES continued

##### Logic 6 Series continued

Logic 6 Series continued

##### Logic 6 Series continued

Logic 6 Series continued



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with WAV-sample inclusion and file/data size indicators. You can learn more about creating SMAF content from the Yamaha SMAF Global Web site ([www.smaf-yamaha.com](http://www.smaf-yamaha.com)).

**Sonic Network EAS.** Sonic Network, Inc. (maker of Sonic Implants sound libraries) has gone mobile with its Embedded Audio Synthesis (EAS) technology. The system supports digital audio content, DLS files, and MIDI and provides on-demand interactive

audio playback for mobile phones. The company's customizable EAS technology consists of a digital audio player, GM synthesizer with wavetable soundsets, and multimedia extensions for several ringtone formats, including GM, SP-MIDI, SMAF-MA2, and CMX.

Sonic Network also offers GrooveFone, an interactive musical program that lets you remix songs using the buttons on your cell phone. With GrooveFone you can change drum beats, bass

parts, harmonies, and melodies, and then save your song as a customized ringtone. You can find out more at [www.sonicfone.com](http://www.sonicfone.com).

### SMALLER IS BETTER

When adding custom audio samples to ringtones, be sure to minimize the file sizes. Many network operators have a limit of 10 to 60 KB for ringtones. With careful downsampling, waveform editing, and compression, it's possible to improve the quality of a ringtone with one or two custom samples while remaining within this limit. (For more information on ringtone technical limitations, see the sidebar "Ringtone Restrictions.")

There are also many aesthetic challenges for composing effective ringtones. For example, it's important to



**Creating effective  
SP-MIDI compositions  
requires careful voice  
management.**

choose sounds carefully, because not all sounds project well from inside a phone owner's purse or coat pocket. Another problem is that instrumental arrangements of pop songs can sound like canned background music, leaving the phone owner to wonder, "Is that my phone ringing, or is that background music playing in the store?"

The best way to avoid these problems is to test your ringtones through an actual phone in a variety of locations and situations. Many of the ringtone formats also support vibration and LED events, which are additional forms of alert. Including those events in your ringtone can work around some ringtone-audibility problems.

*Hayden Porter is a Web developer and musician specializing in sound for new media. He is also the editor of [Sonify.org](http://Sonify.org), focusing on Web and wireless audio.*



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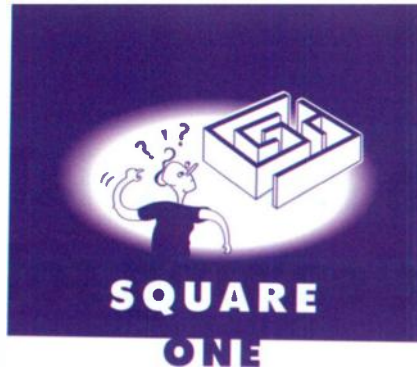
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# Get with the Interaction

*Turn your computer into a creative performance partner.*

By Mark Ballora

**T**here's a growing trend in the world of electronic-music performance. Next time you go to a show, chances are you'll see a laptop onstage, functioning as a performer. In *interactive* composition and performance, control of a piece includes a computer that has been programmed to sense significant musical features from a human performer and produce its own music in response.

Nothing about the idea is new—people have been writing and playing interactive works for more than 25 years. But the pioneers worked for institutions that could spend hundreds of thousands of dollars on specialized computer systems. Now that PCs are intertwined with everyday life, interactive music systems have trickled down to the proletarian sphere of individual musicians. In this column, I'll take a brief look at the evolution of interactive music systems and give an overview of some performance approaches that are commonly used. (See the sidebar “References and Recordings” for additional resources.)

## SOME RECENT HISTORY

By the end of the 1960s, Max Mathews, the father of computer music, was increasingly dissatisfied with the music that computers were producing. Music created from coded scores was dry and lifeless. In an effort to transmit *micromodulations*—the uncountable variations in embouchure, bow position, breath pressure, and so on, that give live music a dynamic dimension—Mathews began the pursuit of what he called the *intelligent machine* that would respond to performers' nuances. Conductor was an early

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# SONY

system that Mathews designed for Pierre Boulez, who was the musical director of the New York Philharmonic at the time. Boulez was enthusiastic about electronic elements in performance, but felt constrained by having to follow a tape. The Conductor system allowed electronic elements to be dynamically controlled by external devices such as joysticks and percussion instruments.

In 1977, composer Joel Chadabe snatched the first Synclavier off the production line and had it outfitted with special software that created melodies based on predefined parameters such as harmony and interval content. The Synclavier was interfaced with two modified theremins. One antenna controlled the tempo (note durations), while the other controlled relative volumes of four Synclavier voices (in effect, overall timbre). Chadabe wrote that performing with the

system was like having "a conversation with a clever friend." He could do things like cue clarinet sounds to play slowly; but since he did not know which pitches would play, the notes he heard then influenced his next control gesture.

Meanwhile, at Boulez's research brainchild, IRCAM, in Paris, work was under way on a digital signal-processing computer that was capable of any synthesis configuration as well as real-time audio processing. The 4X workstation was completed in the early 1980s and was like nothing the world had ever seen. Miller Puckette created a Macintosh-based interface for the 4X in which processes and controls were represented graphically. Patches could be created by drawing patch cords between modules, and processing algorithms could be switched on and off by various gates. He named the program Max in honor of Mathews.

Max was later ported to the NeXT personal computer, where it could be run with the help of peripheral hardware processors in a configuration called the ISPW (IRCAM Signal Processing Workstation). Though far more economical than the 4X, the ISPW remained a pricey hardware-software combination. Max was then released commercially as a kind of erector set for MIDI input, processing, and output and is now under active development by Cycling '74 (the sidebar "On the Web" provides URLs for all the developers mentioned in this article) for both the Mac and Windows computers. The tools for interactivity were now within the means of independent musicians.

## SAY WHAT?

So what is meant, exactly, by machine responses to a human player? Author-composer Robert Rowe classifies interactions into three broad categories. The first concerns the type of "listening" a computer is doing. The second describes the computer response types. The third describes the nature of the partnership between performer and computer.

As for listening, computers can listen *generally* or *specifically*. General listening means that the computer senses general characteristics such as register, loudness, or density. Specific listening can come in two forms. One, *score following*, involves moment-by-moment estimations of a performer's tempo. One commercial score follower is Smart Music, a practice aid for music students, by MakeMusic Inc. The program has accompaniments to standard repertoire for most solo instruments. A piece's accompaniment plays along with a soloist, whose tempo is tracked with a microphone. A less rigorous form of listening, *score orientation*, does make not continual tempo estimations but responds to selected highlights, such as a trigger from a pedal or a high note at a given pitch.

So much for listening. Now we can consider three forms of response. *Transformative* responses create variations on a performance. For example, Max can be configured to invert

## REFERENCES AND RECORDINGS

The following list includes books and magazine articles, as well as a number of recordings that capture the spirit of a live, interactive performance. Most of the recordings can be purchased online at [www.cdemusic.org](http://www.cdemusic.org).

### Books and Articles

*Composing Interactive Music*, by Todd Winkler (MIT Press, 1998)

*Electric Sound: The Past and Promise of Electronic Music*, by Joel Chadabe (Prentice Hall, 1997)

*Interactive Music Systems*, by Robert Rowe (MIT Press, 1993)

"Language Inventors on the Future of Music Software," *Computer Music Journal* 26 (4): Winter 2002

*Machine Musicianship*, by Robert Rowe (MIT Press, 2001)

*Trends in Gestural Control of Music*, Marcelo Wanderley and Marc Battier, editors (IRCAM, 2000)

### Recordings

Pierre Boulez, "Répons," from *Répons/Dialogue de l'ombre double* (Deutsche Grammophon, 1998)

Joel Chadabe, "Follow Me Softly" and Cort Lippe, "Music for Clarinet and ISPW" from

*The Composer in the Computer Age VII* (CDCM, 1997)

Agostino di Scipio, "5 Difference-Sensitive Circular Interactions"; Gerhard Eckel and Vincent Royer, "Traverse"; and Cort Lippe, "Music for Hi-Hat and Computer," from *ICMC 2000* (ICMA Recordings, 2000)

Tod Machover, "Bounce" from *Tod Machover* (Bridge Records, 1993)

Tod Machover, "Bug Mudra" from *Flora* (Bridge Records, 1990)

Roger Reynolds, *The Paris Pieces* (Neuma Records, 1995)

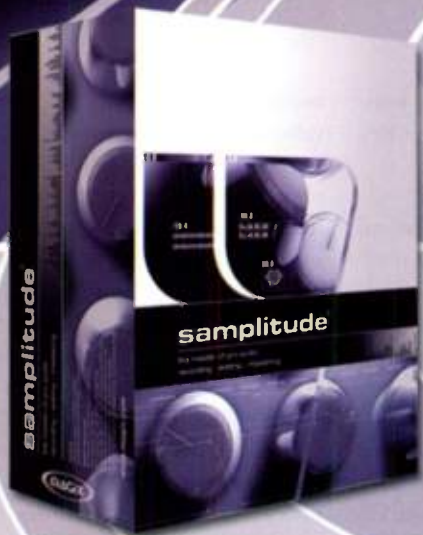
Jean Claude Risset, "Eight Sketches: Duet for One Pianist" from *Digital Rewind* (MIT Experimental Music Studio, 1998)

Robert Rowe, "Color and Velocity" from *Jade Nocturno* (Quindecim, 2001)

Robert Rowe, "Flood Gate" from *Cultures Electroniques 5: Bourges 1990 Laureats* (Mnemosyne, 1990)

Robert Rowe, "Shells" from *Tárogató* (Romeo Records, 2001)





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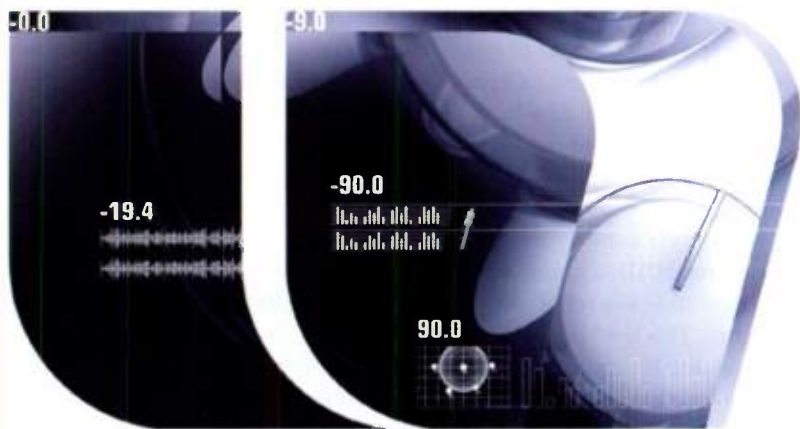
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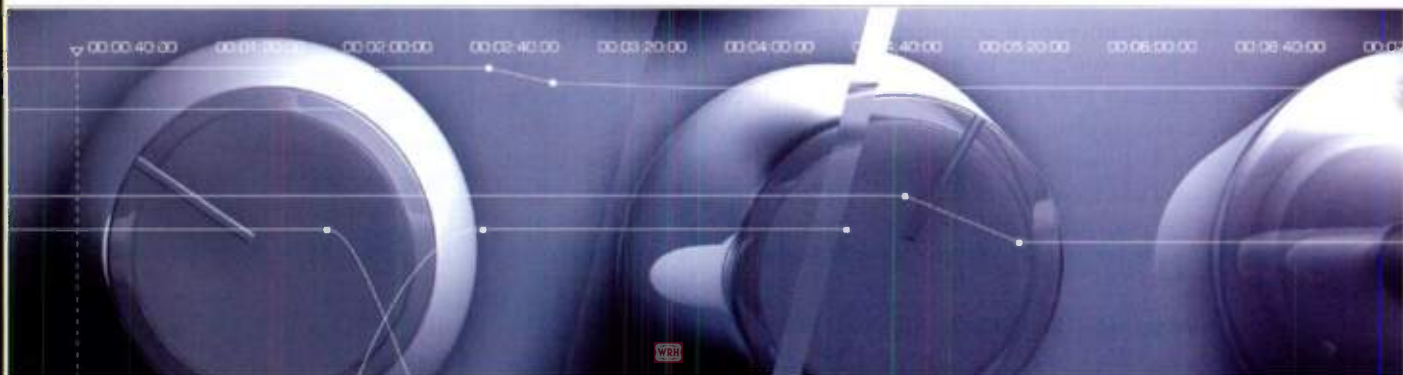
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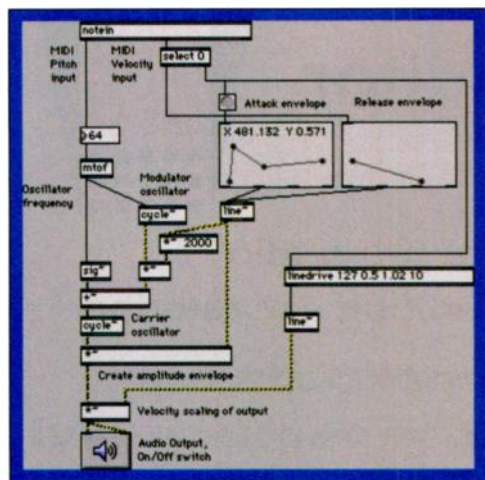


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**FIG. 1: Cycling '74's Max/MSP combines customized MIDI and audio processing. Plain black patch cords carry MIDI-based processes, while black-and-yellow-striped patch cords carry audio processes. This example creates simple FM synthesis.**

intervals, play a phrase backwards, transpose notes, arpeggiate chords, sense the current harmony and add a bass note, create chords from a melody, and more. *Generative* responses are based on material that the computer creates on its own, such as algorithmic creation of melodies from a library of pitches and rhythms (see "Game of Chance" in the November 2003 *EM* for more on algorithmic composition). *Sequenced* responses consist of stored musical passages that are kept on hand to be played when triggered. For example, in a score-oriented listening system, certain events in a score, such as a long, loud middle A, might trigger a preset melody. The performer might then create variations on the melody using a continuous-control pedal that changes the sequence's tempo or dynamics.

Finally, we can think of two roles the computer might play in a performance. In one, the computer extends the player's instrument, augmenting a solo performance with features such as filtering, effects, or pitch doubling. In the second, the computer creates another personality, so that it plays a kind of duet with a musician. Sophisticated implementations of duet partnering may rely on techniques of artificial intelligence to perform tasks such as defining phrase

beginnings and endings or sensing changes of scale, mode, or key.

## MESSAGE IN A CABLE

The previous examples described MIDI responses. MIDI is an effective vehicle for interaction, given its discrete, event-based format. Incoming events can be marked with *time stamps*, easily cataloged, and complemented by stored catalogs of algorithms or sequences. MIDI, however, provides an incomplete representation of a performance. Notably absent is any description of timbral variation. But an extension to Max called MSP adds the ISPW audio-processing modules to the environment, letting today's computer owners explore what was once only possible with the 4X, at less

than one one-hundredth of the cost.

While an audio-based system has the advantage of being more closely tied acoustically to a performance, it lacks many of the flexibilities of a MIDI-based system. Responses such as playing a phrase in reverse or inverting all pitches around a given note are easy to implement with MIDI's unambiguous event types, but much more difficult to perform with a stream of audio samples. Polyphony is another issue that is easy for MIDI: a chord is easily recognizable as a set of discrete pitches. This level of analysis is impossible for an acoustic signal, as no one has been able to create a program that can distinguish between simultaneous pitches and overtones of a fundamental pitch. Acoustic systems, then, are typically based on input from a monophonic instrument.

*Pitch trackers* can identify the fundamental of a monophonic instrument or signal. With a pitch-tracking module, a signal's frequency can be sent to an oscillator to control its pitch, or the signal may be transposed. Other audio-based applications could include using the volume of an acoustic signal to modify the index of a frequency-modulating

oscillator, or mapping MIDI controller values to audio processes such as reverb time, filter frequencies, or stereo placement. Analysis modules can do things like analyze incoming speech, separate noisy sibilants from periodic vowels, and process each differently.

OSC (Open Sound Control) is a protocol introduced by the Center for New Media and Audio Technologies (CNMAT) at the University of California at Berkeley in the late 1990s to enable real-time control of computer-synthesis processes from gestural devices. OSC does not include MIDI messages, but MIDI messages can easily be mapped into OSC, making OSC commands a superset of the MIDI protocol. OSC offers increased resolution and definition of gestures and synthesis parameters, as well as more accurate time control. It is transmitted over networks of computers, which means that it is well suited for broadcast performances of computers and performers interacting with each other from different places. The Gibson guitar company has also developed the MaGIC specification, which sends an electric guitar's acoustic signal over an Ethernet network, giving guitarists the opportunity to participate in these simulcast collaborations.

## ON THE WEB

### CNMAT

[cnmat.cnmat.berkeley.edu/OSC](http://cnmat.cnmat.berkeley.edu/OSC)

### Cycling '74 Max/MSP

[www.cycling74.com/products/maxmsp.html](http://www.cycling74.com/products/maxmsp.html)

### Gibson MaGIC

[www.gibsonmagic.com](http://www.gibsonmagic.com)

### IRCAM

[www.ircam.fr](http://www.ircam.fr)

### James McCartney

[www.audiosynth.com](http://www.audiosynth.com)

### MakeMusic Inc.

[www.makemusic.com](http://www.makemusic.com)

### Miller Puckette

<http://crca.ucsd.edu/~msp>

### MIT Hyperinstrument Project

[www.media.mit.edu/hyperins](http://www.media.mit.edu/hyperins)

### Symbolic Sound

[www.symbolicsound.com](http://www.symbolicsound.com)



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## SUBTLE MANIPULATIONS

Joel Chadabe probably chose the theremin for his original Synclavier system because that instrument is practically unparalleled in its sensitivity to micromodulations. Ironically, as the sound capabilities of electronic instruments have evolved, their player interfaces have become increasingly rudimentary. Interactive performances often feature experimental-instrument types that push the sensing envelope. Instruments like Don Buchla's Lightning allow movements in space to be translated into MIDI control signals.

Massachusetts Institute of Technology Media Lab composer Tod Machover heads the development of *hyperinstruments* that generate various control signals. The *conducting dataglove* translates a conductor's left-hand movements into controls by tracking the angle of each finger relative to the back of the hand, as well as the angle of the joints of each finger. *Hyperstrings* augment the capabilities of string instruments. One commission by cellist Yo-Yo Ma consisted of sensors that tracked bow angle, bow pressure, wrist angle, and left-hand finger positions. Data from the cello motions and an analysis of

the instrument's audio were fed into a computer that generated audio in response.

## GET WITH THE PROGRAM

Max/MSP is the software most commonly used in interactive music applications (see Fig. 1). Its graphical front end facilitates algorithm configuration, while the essential issues of event scheduling and input tracking are kept "under the hood." This allows users to focus on music rather than computer cycles. The Max environment has also spawned two offshoots. Pd ("pure data" or "public domain") is a version introduced by Miller Puckette that exists in the public domain. It is free, runs on virtually all hardware platforms, and is under continual development by a community of users. Yet another version, jMax, is written in Java and is available from IRCAM's Web site.

Other systems suited to interactivity include Symbolic Sound's Kyma system, an audio processor and sound-programming language for Macintosh and Windows. Like Max, it is visually oriented, but processing and synthesis modules are arranged on a timeline. Kyma includes pitch and amplitude

trackers, and it can be configured to wait for a specific event (such as a middle C) before, for example, running a script to generate notes (see Fig. 2).

James McCartney's SuperCollider, a free program for the Macintosh, is a text-based programming environment. Although the absence of a graphical interface makes SuperCollider harder to learn than some programs, it also permits a greater degree of efficiency and flexibility. For example, the number of active oscillators can be assigned to a variable. Changing the number of oscillators in a patch is simply a matter of changing the value assigned to that variable, rather than adding or removing objects and patch cords from the screen.

Kyma's developer, Carla Scaletti, has pointed out that these programs are *computer music languages*. Most commercial music software falls into the category of a *utility*, meaning programs that perform common, well-defined functions. It's true that many utilities are quite complex—your average digital audio sequencer is an example. But they cannot match the open-endedness and flexibility of general purpose languages that enable users to configure whatever synthesis and audio-processing algorithms they want, nor can they provide the same ability to tailor these processes to customized input and output routings. You can take all the features of your favorite commercial synths and combine them in one custom environment, provided you have the computer memory (and the patience!) to cobble them together. For those wanting individualized performance environments, computer music languages are the *only* way to fly.

## INTO THE FUTURE

Interactive music raises intriguing questions about musical intelligence, compositional methodology, and collaboration—questions that only become more intriguing as computing power advances. This is a pursuit likely to become an important current of 21st-century music.

Mark Ballora teaches music technology at Penn State University, where he spends most of his time interacting with computers.



FIG. 2: In Symbolic Sound's Kyma, processes are dragged onto a multitrack timeline. Processes such as waitForLowG (center-left, track 1) are used to tell the system when to start various tasks.



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IK MULTIMEDIA



# Don't Get Ripped Off!

*Protect yourself and your studio with these simple security measures.*

By Michael Cooper

**I**n the early 1990s, Eugene, Oregon, had four leading recording studios. During one infamous afternoon, that number was reduced to three.

A week earlier, two men had toured Triad Studio on the pretense of booking an album project. They returned the next week on the first scheduled session date, pulled guns on the owner/engineer, pushed him into an iso

booth, and nailed its door shut. They proceeded to rip out all of the equipment in the well-appointed control room (including a huge console), and then loaded the whole kit and caboodle into a moving van in broad daylight and drove off.

That was the end of Triad. Years of hard work building a dream suddenly evaporated in a nightmare.

The owner had a full-replacement-cost insurance policy on his gear, but he had overlooked one critical detail: a business-income loss provision. Some of the equipment was eventually recovered, and the insurance company paid the claim on the rest. However, the entire process took several months, during which time the lease payments on the studio's building crushed Triad's financial resources. A business-income loss provision would have paid the studio's owner enough money to keep him afloat until the conclusion of the claims process, enabling him to recover from his tragic loss.

Insurance matters aside, no one knows whether Triad's robbery could have been prevented. That said, you can take some specific steps to lessen the odds that this sort of thing will happen to you.

In the years since Triad's demise, I

MIKE CRUZ







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If you've ever dreamed of landing a major label deal and having a hit record, then you'll understand why we're so grateful.

We're from Columbia, South Carolina. It's not the kind of town where you meet A&R people, or have them come to your gigs. We knew we needed to do something to get our music heard by the right people. After carefully researching our options, we decided that TAXI was the best choice.

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TAXI sent our CD to several top A&R people, and the response was very positive. Piggy-backing on that, they sent our CD to more than 40 other high-level A&R people at companies like A&M, RCA, Warner Bros, Columbia, Interscope, Dreamworks, MCA, Arista, Virgin, Capitol, Atlantic, Elektra, Epic, Hollywood, Maverick, and many more.

All the sudden, we found ourselves in need of a music attorney. TAXI's president made one phone call and got us a meeting with one of the top music attorneys in the business.

He signed on to represent us, and with our attorney and TAXI spearheading the effort, we began to build a buzz. That lead to an industry showcase in Los Angeles with A&R people from more than a dozen labels in attendance.

Now, we're on our way to New York to do a round of showcases there.

Can TAXI do that for *every* member? That's up to you and

your music. If you're really, really good, TAXI can deliver.

Will we get a record deal? That's totally up to us and *our* music. But, because we joined TAXI, we're getting serious attention from people in the music business we had little chance of meeting on our own.

And TAXI has given us much more than just great opportunities and helpful feedback from their A&R staff. We've also learned a lot about the music business from their monthly newsletter, and had an incredible time at the Road Rally – TAXI's FREE convention for members and their guests.

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## • WORKING MUSICIAN

have developed a discreet method for screening potential clients. My studio has been cased by burglars three times (that I know of) over the past 20 years, but so far I've never been ripped off. I'll share with you some of my ideas for keeping your studio—and yourself—free from harm.

## LOCATION, LOCATION

Unless a prospective client has come to you through the recommendation of a friend or other word of mouth, he or she most likely got your telephone number through a listing or ad in a telephone directory or other publication. Because recording studios do not typically serve walk-in customers, there is absolutely no need to include your studio's street address in such listings. A telephone number usually suffices for contact information. If you feel the need to provide an address for mail inquiries, a P.O. box keeps your street location off printed media. Make anyone who wants to find your studio have to call you for that information, so that you know who's looking.

Most musicians will want to know if your studio is located a convenient driving distance away from them before considering it for their project. If your studio's general location is not obvious from your telephone number's area code and prefix, serious business prospects will call you to find out where you are located. Before I give out specific directions to my place, however, I want assurances that I or the police can find the person to whom I'm about to hand out directions. This can be discreetly and politely accomplished simply by making an excuse to call the inquirer back in five minutes. (Saying you're wrapping up a session or on the phone with another client are justifiable excuses.) If the inquirer can't or won't give me their phone number for a call back, I don't give them directions to my studio. It's that simple.

If the caller gives you a return phone number, don't immediately assume it's legit and start giving out detailed directions to your studio. It's important that you hang up and call back the prospective client *before* you give out



have to be able to remember their names, too! It never hurts to watch your neighbor's back, and a good turn is usually reciprocated.

### THE BEST INSURANCE

I already touched on the importance of adequate insurance coverage in the beginning of this article. The best way to get coverage that's right for you is to find a hard-working, knowledgeable insurance agent and ask lots of questions.

If they don't know and can't get you the answers, or if they're too busy to bother with a "high-maintenance" client such as yourself, move on and find someone who truly wants your business. Be sure also to read your insurance policy carefully after it arrives, to determine if there are any loopholes or lapses in important areas of coverage.

The very best insurance against burglary is an installed alarm system with professional 24/7 monitoring. How such

systems work and which configuration is right for you are subjects beyond the scope of this article. Again, shop around and ask a lot of questions. Whichever system you go with, however, it's important to remember one critical point: all 24/7 monitoring is accomplished using telephone lines. The greatest alarm system in the world becomes worthless if the telephone lines are cut. Therefore, it behooves you to turn the area surrounding your outside telephone box and connecting wires into Fort Knox. For the security of my own studio, I won't go into details here about how to accomplish this. But your security agent should be more than happy to provide




**The greatest alarm system in the world becomes worthless if the telephone lines are cut.**

you with ideas for protecting this Achilles' heel of all alarm systems.

A few common-sense measures will go a long way toward protecting your studio. A well-lit perimeter—possibly using motion sensors that trigger outdoor lights—with sparse vegetation make it difficult for burglars to go unnoticed while searching for an entry point into your studio. Oftentimes, the prominent placement of labels warning would-be intruders of an alarm system—positioned, for example, on vulnerable windows and sliding-glass doors—will be enough of a deterrent for burglars to move on to the next unprotected place. Finally, if your studio is in your home, entice a friend to house-sit while you're away on vacation. The best measures for countering rip-offs are preventative. Be smart, be safe.

EM contributing editor **Michael Cooper** is the owner of Michael Cooper Recording, located in Sisters, Oregon. Cooper's studio offers recording, mixing, and mastering services.

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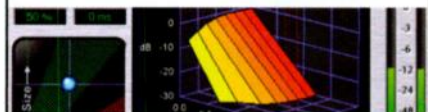
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## ● WORKING MUSICIAN

directions. It's all too easy for someone to cite a bogus phone number. If you call back and reach a pizza shop, for example, and nobody there has ever heard of the prospective client who moments ago claimed the shop's number as his own, chances are you've just been cased.

Try to get both the first and last names of the people who call you, and politely ask what city they live in. If you can obtain their name and home phone number, a quick perusal of the telephone directory will often reveal their address, assuming their number is listed. If the address is in a different city than the one they mentioned but is in an area covered by the same telephone directory, chances are good that you've just been cased by someone who flipped open the phone book and gave you a random name and number. They just weren't smart enough to anticipate you asking them for their general address as well. Follow up by calling the number they gave you to make sure it's their phone number or that the people who answer your call know that person.

### SHOP TALK

Casual conversation can reveal a lot about a person. A red flag goes up for me if the individual I'm talking to professes to have an extensive musical background but can't answer the most basic questions about, for example, the equipment they use.

This information needn't be extracted as if you're conducting an interrogation. I am genuinely interested in my clients' musical vision and gear, and most musicians are very eager to talk about their passion. By asking some friendly questions—either during the initial telephone contact or the subsequent studio tour—you can get a feel if the person you're dealing with is legit or not. For example, if a prospective client maintains they make their living producing rap acts in a small rural town in the middle of nowhere, be suspicious. I had this happen once. It's amazing how unprepared burglars can be when it comes to answering unanticipated questions about the very industry they wish to steal

from. Their off-the-cuff answers are often incredibly lame.

### TOUR DE FARCE

Most musicians will want to follow up their phone call to you with a tour of your studio, assuming you've piqued their interest. Keep in mind that thieves are mostly interested in small but pricey objects they can grab for a quick getaway. Accordingly, musicians touring your facility don't need to know where your microphone cabinet or locker is located. If you find yourself fielding persistent questions about such details, consider that a warning sign. Again, I speak from personal experience.

If you're getting a foreboding feeling from the folk who are touring your facility, start asking friendly questions that will either reinforce or dispel your suspicions. Where did they record their last project? Who was the engineer they worked with? Do they like to record to a metronome? Burglars will sometimes be caught completely off guard by such questions, and will give ridiculous and telling answers.

By the time a studio tour has ended, you'll probably have a strong feeling as to whether or not your guests have legitimate business interests in your studio. If alarm bells are ringing in your head, accompany your guests out to the studio's parking area and make some mental notes of vehicle description(s) and license-plate number(s). Don't worry if you can't remember everything. Whatever you can retain will be helpful later if the worst should happen and you're ripped off. It's also a good idea to alert the local police immediately if you think you've been cased. At least in my area, the police were happy to swing by my studio a little more often after it became obvious it had been cased. And they also offered some common-sense tips for protecting my studio from burglary (some of which I'll discuss momentarily).

Remember that there is safety in numbers. Get to know the owners of other studios in your area, and establish a common watch list of shady characters. Many burglars use the same aliases over and over; after all, they

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- Rugged 6.5-Inch shielded 100-Watt woofer and shielded 1-inch silk dome tweeter arranged in a symmetrical, vertical configuration with drivers mounted slightly forward to minimize reflections off of cabinet face.
- Bi-amped power module that delivers 115 watts (85 Watts of power to the woofer, 30-Watts to the tweeter) and generates less than .05% distortion at full power.
- Specialized tweeter overpower limiting and woofer over-excursion limiting protect speaker components.
- User selectable EQ filtering ensures more flat frequency response, regardless of speaker placement. Dipswitches on the back of the monitor allow the engineer to select overall tone shaping for the cabinet.
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- XLR & 1/4-inch TRS combi-jack balanced inputs are provided.

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- 150-watt Integrated power amplifier in a high density MDF cabinet loaded with a single 12-inch high performance speaker - ideal for any professional studio, project studio, or 5.1-surround mix station.
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- A pair of XLR & 1/4-inch TRS combi-jack balanced inputs, as well as RCA unbalanced inputs are provided.

## Easy to set up, easy to use.

The beauty of all active near-field monitors is the ease of use. Plug it in to the control room outputs of any mix desk, or to the audio output of any sound card, set the input levels and you're away. When it comes time to add the subwoofer, then it's as easy as literally plugging it in and turning it on. No crossover, no additional power amplifiers, no major re-wiring of your studio rack.

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# REVIEWS

## A L E S I S ION

*An affordable  
modeled-analog synth  
packed with  
voice-programming features.*

By Jim Aikin

In only a few short years, modeled-analog synths have shaken off their novelty status to become a mature technology. Europe has built up a dominant position in this field: the formidable reputations of Novation (the United Kingdom), Access (Germany), and Clavia (Sweden) have left even the Japanese giants scrambling. So it must have taken a bit of courage for an American manufacturer to dive into the modeled-analog shark tank.

But Alesis was undaunted. The company has been building keyboards for years, of course. It started with the popular QuadraSynth-series keyboards, which use sample playback. More recently, the Andromeda, a high-end *real* analog synth, has garnered plenty of attention (and an EM Editors' Choice Award). The Ion is another story entirely. Its under-\$1,000 price tag puts it in competition with the more affordable European synths, and its "analog" tones, like theirs, are generated using digital circuits.

The strength of the Ion is in the depth of its voice programming. I'm not aware of any other hardware synth in this price range that has three oscillators, dual multimode filters, and a fully functional modulation matrix. What's more, it just plain sounds great. Two compromises keep the price down: The Ion has only 8-note polyphony, and



FIG. 1: It may be shaped like a tombstone slab, but the beating heart of the Alesis Ion is a truly powerful synthesis engine.

104	Alesis Ion
116	Apple Computer Soundtrack 1.1 (Mac OS X)
126	VirSyn Cube 1.01 (Mac/Win)
132	Audio-Technica AT3060
136	MOTU MachFive 1.07 (Mac)
140	CreamWare Noah
148	Steinberg D'cota 1.0 (Mac/Win)
154	Quick Picks: Audix D6; BIAS SoundSoap 1.1 (Mac/Win); Evolution U-Control UC-33e (Mac/Win); Summit Audio 2BA-221; Primera Bravo Disc Publisher; Seven Woods Audio Ursa Major Space Station SST-206; Big Fish Audio LA Drum Sessions (Acidized WAV)



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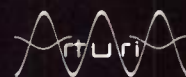
Loaded with more than 400 presets and built with Arturia's TAE® technology for emulating analog circuits, CS-80 V supports 32Bits/96kHz sample rate. Easy to use and inspiring, it opens new realms of sound creation.

"I just sold my Yamaha GX1 because I have a great replacement with Arturia's CS-80 V" says **Hans Zimmer**.



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its effects section is very minimal. True, the original Clavia Nord Lead sold very well with no effects to speak of. But that was then; this is now. If those limitations don't dampen your enthusiasm, keep reading, because the Ion has a lot to get excited about.

## IONING BOARD

On taking the Ion out of the box, my first impression was that the buttons on the panel are too small, as is the lettering beside the buttons and knobs. The knobs, at least, are large and solid feeling, with a nice-feeling rubberized surface. The steel chassis is slab shaped, not contoured into a wedge like most keyboards, and the boxy profile is emphasized by the cheap-looking red plastic end pieces (see Fig. 1).

Around back are main and aux audio outputs (both stereo), audio inputs (also stereo), a headphone jack, two pedal jacks, and standard MIDI connectors (see Fig. 2). The jacks are labeled along the edge of the top panel, a detail that too many manufacturers omit. The audio inputs can be used with the Ion's vocoder, or you can pass the external signal through its filter and effects. Again, these are not features you see in too many under-\$1,000 synthesizers.

The keyboard is only four octaves in length and does not sense Aftertouch, though it senses Release Velocity, which is not a feature you see every day. The action is so light that it feels a bit spongy. At first I didn't care for the action, but once I got used to it I didn't mind it at all. Octave up and down buttons on the panel expand the Ion's

total range to ten octaves, and having two mod wheels in addition to the pitch-bend wheel more than makes up for the lack of Aftertouch. The wheels, which are translucent, have the same nonslip surface as the knobs. When moved away from the zero position, they emit red light, the intensity of which increases as the wheel moves further away from zero.

The Ion is equipped with a hi-res LCD, below which are five navigation buttons. You don't see such a friendly interface on many keyboards in this price range. When the synth is powered up, the borders of the tiny buttons glow in either red or green, which makes it easier to keep track of what's going on. Practically every module has its own edit button, which brings up a menu containing anywhere from two to six pages of parameters. This system effectively minimizes the need for prowling around in submenus: no parameter is more than four or five button presses away.

With the parameters that have dedicated knobs, touching the knob immediately brings up the LCD page where the knob's parameter is displayed. This convenience feature becomes problematic, however, if a knob has "data incontinence," meaning it occasionally transmits a value even though you're not touching it. This was the case with the oscillator 2 pitch knob on the unit I had for review.

The knobs are free rotating, so they always start from the current value of the parameter when you move them: there's never a jump in the sound. That is definitely the right design for a synth

that's meant to be played. The only knob that pegs at the left and right extremes, appropriately, is the bright red master-volume knob.

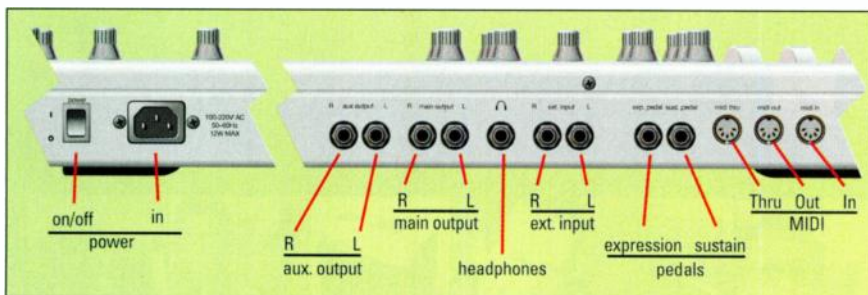
The Ion has four program-memory banks with 128 programs each. By default, one bank is user-programmable, and the other three are presets. A Global menu option allows you to disable the write protection of the other three banks for a total of 512 possible user locations. There's also a bank of 64 programmable multitimbral setups. The instrument is 4-part multitimbral, and individual parts within the multitimbral setups can be muted and unmuted in performance with one button press. Also included is an arpeggiator with a variety of rhythm presets.

## FACTORY SOUNDS

The sound set included in the Ion has all of the expected food groups—basses, leads, comps and pads, filter sweeps, assorted vintage-instrument simulations, electronic percussion, and special effects. At the top of each program bank are patches that use the arpeggiator. These run mostly to techno-style synth riffs, thudding kicks, and sizzling hats. In about half of the setups, two or three rhythmic programs are assigned to the left half of the keyboard with a pad or lead sound in the right hand. The rest are mostly "gig splits."

Gentle pads such as Dutch Choir and moody string-and-vocal timbres like Vindicarum and Rusty Strings are bound to be useful. Velocity Strings responds to light keyboard caresses with a slow attack and release, and to harder playing with a tighter envelope shape. The brassy TouchPhaseComp, SteelAndBrass, and J Brass are more aggressive, but Fast n Brassy and Owercomper are on the thin, tweezy side.

Some of my favorite patches, such as Laryngitis and the eerily unstable Howling Dogs, use the Ion's dual filters to create vocal-like formants. But for unpredictability, Bromide takes the cake: metallic noises skitter up and down the frequency spectrum, subsiding to a low rumble or rising to a screech at random, and sometimes responding to the

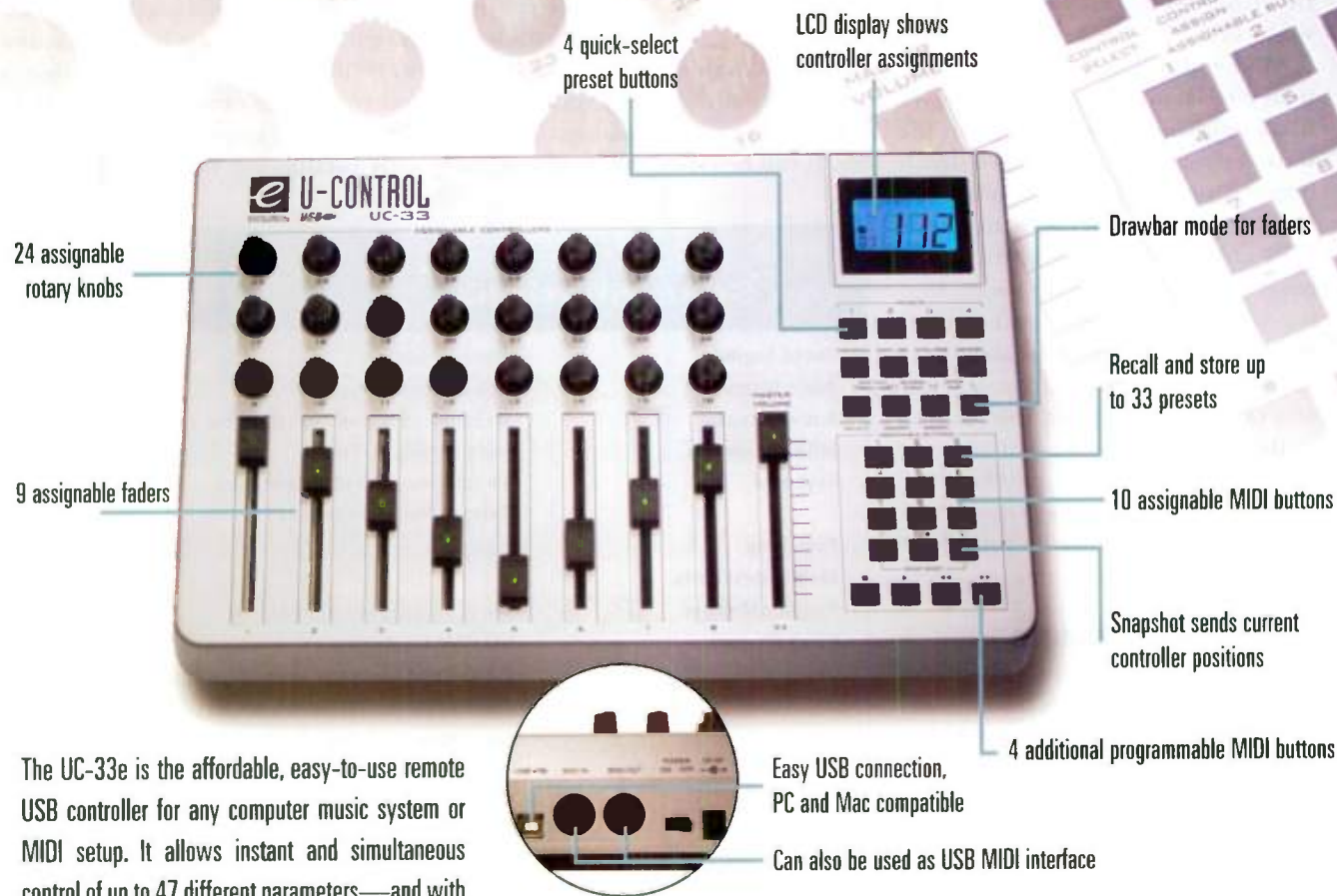


**FIG. 2:** The back panel of the Alesis Ion has a slew of connectors including an audio input for connecting an external source to the unit's vocoder, filter, or effects. A label identifying each jack appears on the top panel as well as the rear.

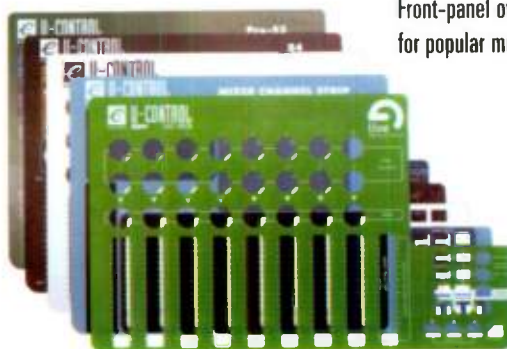


# Control Yourself

Your music hardware and software gives you all the instruments and recording capabilities you could dream of. But operating these fantastic tools with a mouse is like juggling with one hand tied behind your back. Whether you're a control freak or just tired of mousing around, the Evolution UC-33e lets you unleash the full potential of your music.



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Front-panel overlays for popular music software

mod wheels while at other times ignoring them entirely.

Many of the basses are wide open, filling up a lot of the frequency spectrum. In the raspy *Adrastea* and the snappy *Old Favorite*, this approach worked well, but patches such as *Cellar Bass*, *Parabola Bass*, and *Big Bass Pedal* are a little loose for my taste. *JacoInTheBox* is tight, and the filter responds well to *Velocity*. This patch would have benefited from a rich chorus effect, though, at least if the idea was to evoke *Jaco Pastorius*.

While unlikely to fool the connoisseur, the *Hammondish Stops On MW2* has a satisfying smoky flavor, and the second mod wheel does indeed switch between three different drawbar settings. *SynWurly* doesn't have the bite or honk of a real *Wurlitzer* electric piano, but it's warm and tubby. *ItsJamaicaMon* is a decent stab at a steel drum. *ArEm-Eye Piano* has a little of the sizzly buzz of the *RMI*, but both this patch and 60's *Organ* are rendered less realistic by the too enthusiastic use of filter envelopes. Classic synth patches like *Jump*, *Cars Sync*, *WontGetFooled*, and *Lucky PortaMW2* evoke hit records of yesteryear.

## VOICE PROGRAMMING

The range of sounds you can achieve with the *Ion* is simply vast. You could easily pay twice as much for a synth that doesn't have this level of programmability. A partial list of unexpectedly cool features would have to include two types of oscillator sync, oscillator waveshaping, loopable envelope generators, extremely flexible routings for both audio signals and modulation, and more than a dozen filter types. Without trying to cover every single feature, let's hit the highlights.

**Oscillators.** The three oscillators are functionally identical except for their front-panel layout and the FM and sync routings. Each has a choice of a sine, tri/saw, or pulse waveform, and all three waveforms can be deformed by waveshaping. In the case of the pulse wave, this produces pulse-width modulation. I wouldn't have minded if the thinnest possible pulse wave had been a

little thinner, but I'm willing to trade that for the shapable sine wave, which has a nice rounded tone that's quite distinct from a triangle wave.

Each oscillator has a dedicated knob for waveshaping, plus octave up and down buttons. Coarse- and fine-tuning for oscillators 2 and 3 is handled with a knob, but you have to delve into a menu to change the tuning of oscillator 1. That is because the panel space is taken up by an FM amount knob.

Three FM signal routings are provided: 2 into 1, 3 into 2 into 1 (stacked), and 3 and 2 both into 1 (parallel). The main limitation of this setup is that there's only one FM-amount parameter. It can be controlled by any modu-

lation source, however, so there are a lot of possibilities. Linear FM operates in the familiar *DX7* style, while exponential FM changes the fundamental pitch, producing thick, clangorous timbres. The ring modulator, which always uses oscillators 1 and 2 as inputs, also produces clangorous tones, but it has a gentler sound, as well as its own input to the prefilter mixer.

Two other details are worth noting: pitch-bend depth is separately programmable for each oscillator, a feature that works nicely in combination with the distortion effect, because it lets you add thickness to pitch bends. And you can choose whether to sync only oscillator 2 or both 2 and 3 to

## Ion Specifications

<b>Sound Engine</b>	modeled analog
<b>Audio Inputs</b>	(2) balanced 1/4" line level
<b>Audio Outputs</b>	(4) balanced 1/4" line level; (1) 1/4" stereo headphone
<b>MIDI Connectors</b>	(1) In, (1) Out, (1) Thru
<b>Keyboard</b>	49-note unweighted, Velocity and Release-Velocity sensitive
<b>Polyphony</b>	8 notes
<b>Multitimbral Parts</b>	4
<b>Program Memory</b>	384 ROM locations, 128 RAM
<b>Setup Memory</b>	512 RAM locations
<b>Oscillators</b>	(3): soft and hard sync, linear and exponential FM, ring modulation; (3) waveforms, all with waveshape modulation
<b>Additional Sound Sources</b>	noise (2 types), external audio input
<b>Filters</b>	(2) resonant multimode, configurable in series, parallel, or blend
<b>Envelope Generators</b>	(3) ADSR with slope time; loopable
<b>LFOs</b>	(2) with tempo sync, (4) waveforms in 0- and 90-degree phase-output versions, all available simultaneously; separate sample-and-hold with output smoothing and selectable input
<b>Effects</b>	voice effects: distortion (4 types) or dynamics (2 types); output effects: flanging (2 types), phasing (2 types), chorus, slapback echo, vocoder
<b>Arpeggiator</b>	(31) preset rhythms plus random, pattern-length control, (6) order modes, tempo multiplier
<b>Controllers</b>	(31) knobs, (3) left-hand wheels
<b>Pedal Inputs</b>	(1) sustain and (1) expression, both assignable in modulation matrix
<b>Dimensions</b>	31.0" (W) × 3.0" (H, incl. knobs) × 12.5" (D)
<b>Weight</b>	20 lb.



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oscillator 1. The soft-sync option produces thicker, more unstable tones than hard sync.

**Filters.** Each filter has its own cutoff, resonance, and envelope-amount knobs. Keyboard tracking is handled in the edit menu. Although Alesis cleverly avoided trademark issues by referring to various filter types as mg, ob, rp, tb, and jp, the references to Moog, Oberheim, ARP, and two vintage Roland models are not hard to decipher. The 2-pole ob filter is

available in lowpass, bandpass, or high-pass mode. In addition, there's an 8-pole lowpass, a 6-pole bandpass, a dual bandpass in which the bands are spaced an octave apart, three vocal-formant modes, two comb-filter modes, an adjustable-width bandpass, and a mode called Phase Warp, which connects eight all-pass filters in series.

The Ion has prefilter and postfilter mixers. In the prefilter mixer you can set the levels of the three oscillators,

## PRODUCT SUMMARY

### Alesis

Ion  
virtual-analog synthesizer  
\$999

FEATURES	4.0
EASE OF USE	4.5
AUDIO QUALITY	4.0
VALUE	4.5

#### RATING PRODUCTS FROM 1 TO 5

**PROS:** Extremely versatile voice architecture, including dual multimode filters, three loopable envelopes, and a modulation matrix. Thirty infinite-rotation knobs, three left-hand wheels. High-resolution LCD.

**CONS:** Weak effects section. Limited polyphony. Flimsy-feeling keyboard.

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the ring modulator, an external signal, and the noise generator. The last two share a level knob, but both inputs can be active at once. By diving into the Edit menu you can also pan each signal between the two filter inputs and adjust the amount of signal from filter 1 that's being sent to filter 2. In the post-filter mixer you can set the level and panning of each filter at the voice output, and do the same for a signal coming from the prefilter mixer. This unfiltered signal can come from any single oscillator, from the combined input to either filter, and so on.

When the output of filter 1 is turned down in the postfilter mixer and the 1-into-2 routing is turned up in the prefilter mixer, the two filters are in series. Yet at the same time, one oscillator might pass through both filters while another passes only through filter 2 and another reaches the output unfiltered. When you consider that each of the mixing parameters can be controlled in real time from any of a variety of modulation sources, it's hard to imagine any sort of filter configuration



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that's beyond the reach of the Ion.

**Envelopes and LFOs.** The Ion's three envelope generators are ADSRs with an added sustain-time parameter. When the latter is set to hold, a standard ADSR configuration results, but if sustain time has a finite value, the envelope will proceed through the decay and sustain segments and end up back at zero. The attack, decay, and release segments can all have their own choice of a positive-exponential, negative-exponential, or

linear shape. The Velocity-response amount is programmable within each envelope—no need to use up mod-matrix routings on it.

But that's only the start of the fun. Each envelope can either respond to or ignore the sustain pedal. And there are three loop modes, called Decay, Hold, and Zero. These interact in various ways with two other mode switches, the reset/legato switch and the release/freerun switch. For details, reading the

manual and experimenting are recommended. It's not difficult to set up an Ion patch that will play an eight-note plucked rhythm forever, even when the arpeggiator is not turned on.

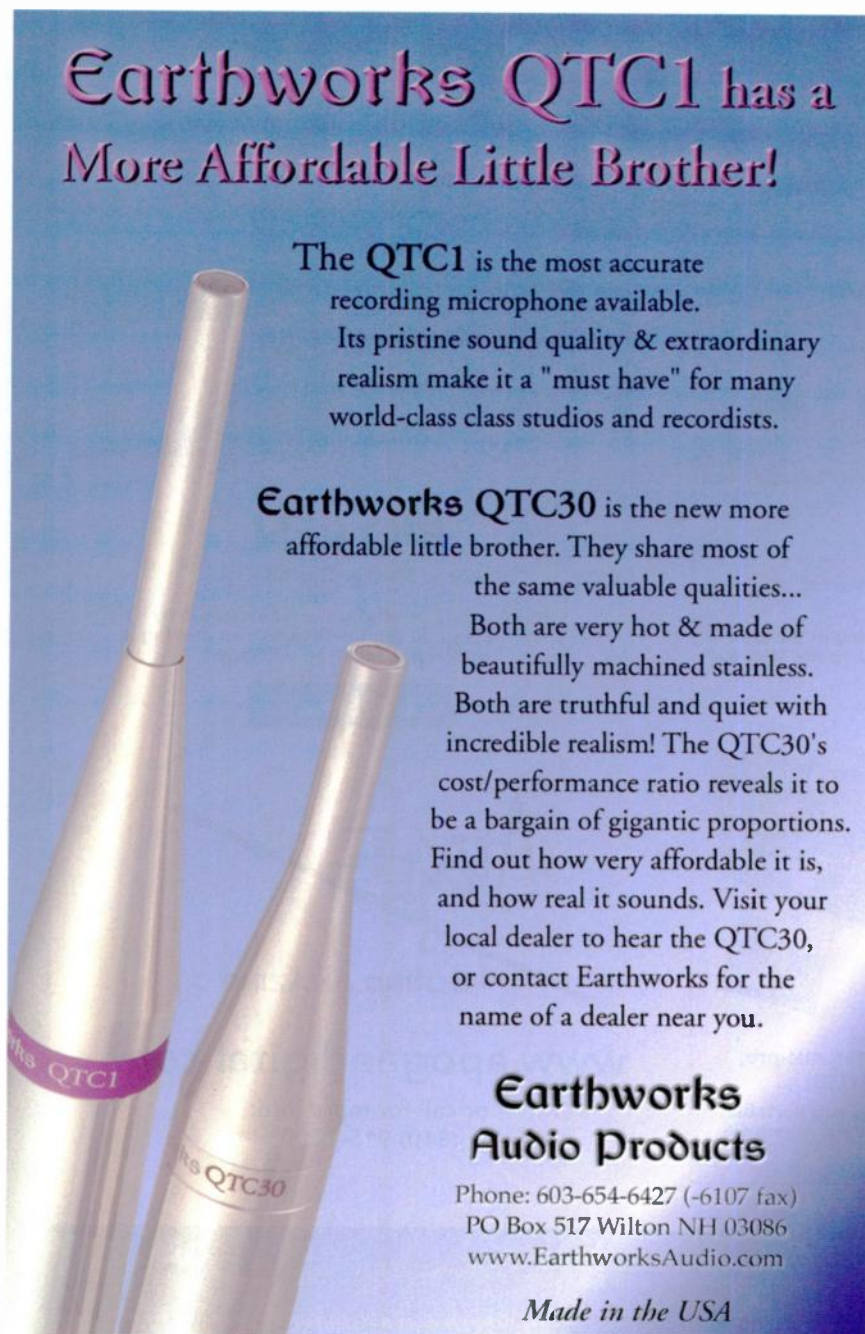
Though the three envelopes are identified as being for pitch/modulation, filter, and amplitude, all are available as general-purpose modulation sources. If necessary, you can assign one envelope to filter 1 cutoff and another to filter 2. The only limitation at this point is that the envelope-amount knob won't be reassigned for the filter that doesn't use the filter envelope.

The two LFOs have the usual parameters, including the ability to sync to an external clock. They have several retrigger modes, not just monophonic and polyphonic, and each of them has its own amplitude-control input, which uses mod wheel 1 as a source. Again, this eliminates the need to use up one of the 12 mod-matrix routings for this common type of modulation.

Far less usual—indeed, unique in an instrument in this price range—is the inclusion of a sample-and-hold processor that's entirely separate from the LFOs. It isn't limited to sampling noise, either: it can sample an LFO, an envelope, a wheel, incoming MIDI controller data, or various other things. In addition, the output can be either stepped or smoothed by some percentage.

**Modulation routings.** Using the Ion's 12 general-purpose modulation routings, you can modulate just about any parameter in the instrument (excluding switch values, such as Filter mode). More than 30 internal modulation sources are available, and it's noteworthy that all of the LFO waveforms are available simultaneously. MIDI Channel Pressure, Aftertouch, and Control Change types 1 through 119 can also be selected as sources.

The one thing I missed in this section of the instrument was the ability to modulate the depth of one routing from another routing, a useful feature found in the E-mu Proteus 2000 series. LFO and envelope-output amplitudes can be modulated, however, which helps overcome the limitation. Also, the time value of each segment of each



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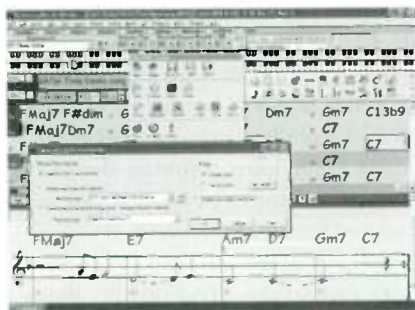
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envelope can be modulated individually, which adds a great deal of expressive control.

The modulation section of the Ion includes a tracking generator. This accepts most of the same inputs as the modulation routings and allows you to program a multisegment response curve, which can then be used as a modulation source. The tracking generator can define either 24 or 32 points, your choice. With some inputs, such as the mod wheel, half of the range will be wasted, because it responds to inputs whose value is below zero, but other inputs (such as the pitch wheel and the LFOs) can drop below zero, allowing the full tracking generator to be used. If you've ever wished for an LFO waveform with a little bump in it, the tracking generator will take care of you. It has many other uses as well, from nonlinear filter tracking of the keyboard to setting up mod-wheel movements that change the timbre in only one portion of the wheel's travel.

**Effects.** Given the no-compromise power of the Ion's voice architecture, its skimpy effects section comes as a bit of a surprise. The distortion/dynamics processor is polyphonic; that is, it's applied separately to each of the instrument's eight voices. The chorus/slapback effect is applied to the mixed output of all the voices, but it's stereo, not mono: you can pan one filter output hard left and the other hard right, and you'll hear the chosen effect on both signals.

The distortion/dynamics section has four distortion algorithms (tube overdrive, tube amp, distortion, and fuzz), as well as a compressor and a limiter. Because it's polyphonic, the distortion becomes noticeable mainly when two or three oscillators are detuned from one another. The drive level can be cranked up and the program-output level attenuated to compensate, but that's it for programming. An option to switch to monophonic operation would have been welcome.

The chorus section provides two phaser algorithms, two flangers, a chorus, and a slapback echo with a maximum delay time of 80 ms, which is extremely skimpy. The chorus isn't as



lush as I'd like, but the phaser and flanger sound crisp and lively when the regeneration is cranked up. In addition, there's a 40-band vocoder algorithm.

What's odd about this setup is that a vocoder is a fairly computation-intensive effect. If there's enough DSP for vocoding, you'd think there would be enough for a decent reverb. And given that the vocoder has 40 parallel bandpass filters, why is there no graphic or parametric EQ among the effects?

#### MIDI SPOKEN HERE

Because the Ion is always in multi-timbral mode, even if only one part of the multi is active, MIDI settings such as channel and local off are found not in the global area but in the part-edit pages. One advantage of this is that you can easily create a setup in which an external sequencer plays the Ion on one channel while a second channel is active only from the keyboard, neither

transmitting nor receiving MIDI data.

The Ion's knobs can be instructed to send MIDI, allowing you to record a knob-twiddling performance in a sequencer. Knob data is sent in the form of NRPN (Non-Registered Parameter Number) messages. This will make it impractical to edit your knob-sweeps in the sequencer. If you need to edit, a better method would be to reassign mod wheel 2 temporarily to an appropriate CC number and assign that CC number to the desired parameter in the modulation matrix.

While reviewing the Ion, I upgraded the firmware from 1.0 to 1.02 by downloading an SysEx file from the Alesis Web site and transmitting it to the Ion from Cakewalk Sonar. The process went without a hitch.

#### SUPERCHARGED ION

For younger musicians who are just getting started with synthesis, but who know they're going to be serious about

it, the Ion would be a terrific choice. No other hardware instrument in its price range has this amount of sound-programming power. I'm betting the Ion will also find a home in secondary-school and community-college sound labs. Teaching synthesis with this instrument would be downright fun for both instructors and students, because it will do so much.

The limited polyphony, the weak effects section, and the flimsy-feeling keyboard may discourage some professionals. For studio work, on the other hand, none of those factors is exactly a deal breaker. If you need a versatile tone module that can not only handle bass, pads, and special effects but encourages inspired sound design, the Ion is worth taking very seriously.

---

Jim Aikin is the author of *Power Tools for Synthesizer Programming* (Backbeat Books, 2004). You can visit him online at [www.musicwords.net](http://www.musicwords.net).

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# APPLE COMPUTER

## SOUNDTRACK 1.1 (MAC OS X)

*Loop-based music-production software that's powerful and user-friendly.*

By Mike Levine

With its purchase of Emagic, Apple became a major player in the Mac music-software market. Now comes the release of Soundtrack, its new loop-based music-production application.

Originally bundled with Apple's Final Cut Pro video-editing software, Soundtrack is now being offered as a stand-alone program. Although it was initially designed to help nonmusical creative types like video editors or Web designers produce inexpensive, royalty-free music tracks for their projects, it has plenty of utility for recording musicians, and is a surprisingly full-featured application for the money.

Soundtrack allows you to easily assemble compositions in a wide range of styles. The program offers automated mixing, high-quality Emagic plug-ins, tools for scoring to picture, the ability to export files in a number of formats, a 4 GB loop library, and much more.

When you open a loop in Soundtrack, the program automatically matches the loop's tempo to the master tempo you've set for your composition. It also detects a loop's key and sets it to match the key you've specified. As with many other loop sequencers, you can record audio directly into Soundtrack, which opens up the possibilities even further.

Unlike some similar applications, however, Soundtrack doesn't support MIDI or ReWire, so you can't sync it to an external device or to your sequencer. But it does let you export your creations, either as mixes or as separate tracks, so that you can open them in other audio programs.

### FIRST THINGS FIRST

Soundtrack comes on two discs. One is a CD-ROM containing the program itself, and the other is a DVD containing the 4 GB loop collection (which breaks down to over 4,000 individual

### Minimum System Requirements

#### Soundtrack 1.1

G4/500 MHz or dual 450 MHz or faster;  
384 MB RAM (512 MB recommended); Mac OS X 10.2.5 or later; QuickTime 6.1 or later; CD-ROM or DVD-ROM drive for Soundtrack installation; DVD-ROM drive for Apple Loops (optional) installation; 5 GB available disk space

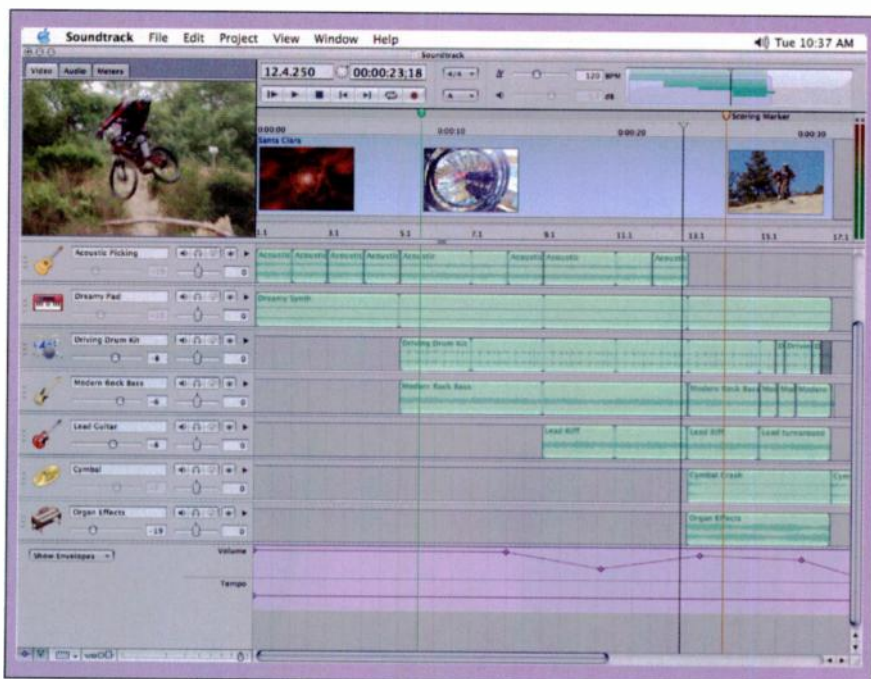
loops), giving you an instant library of considerable size to get started with. If your Mac isn't equipped with a DVD drive (as was the case with the G4/733 MHz I initially used to test the program), you'll have to find another way to get the loop content into your computer. (I networked my machine with another Mac that had a DVD drive and transferred the loops over that way.)

Soundtrack can handle up to 24-bit, 96 kHz audio, but it has pretty hefty processor requirements compared to a lot of digital audio software. It needs at least a 500 MHz G4 processor to run on a single processor machine (or 450 MHz on a G4 dual processor), which means that a lot of Macs currently in circulation won't be able to run it. Contrast that to Ableton Live—another loop sequencer that does similar time and pitch gymnastics—which can even run on a G3.

Soundtrack ran smoothly on my G4/733 MHz, although, as you would expect with any digital audio program, it slowed down when a lot of tracks with effects were open. When I later tested Soundtrack on a dual-processor G5/2 GHz, I noticed no slowdown in performance, even with a large number of tracks and effects open.

### SEEK AND YOU SHALL FIND

You do most of your work in Soundtrack in its main screen, which consists of two parts: the Media Manager and the Project Workspace (see Fig. 1). The Media Manager lets you find and audition loops and other media files, and you actually put your compositions together in the Project Workspace. These windows can be set to open separately or as one integrated screen.



Apple's Soundtrack software offers quick-and-easy loop-based music production with integrated video and high-quality audio and effects.



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One of the strengths of Soundtrack is its ability to organize and manage large libraries of audio files (both looping and one-shot) and allow for multiple types of searches. The program can import AIFF, QuickTime, WAV, and Acidized WAV files—which means Soundtrack users can take advantage of the many Acid loop libraries available. Soundtrack recognizes instrument and genre types from the file names of imported loops (as well as any metatags the loops contain) and uses that information to categorize them.

I tested out Soundtrack's importing capabilities in a couple of ways. First, I imported a disc of Acid loops into Soundtrack. The program successfully read the data from the CD and categorized the loops correctly.

I then tested Soundtrack's ability to handle an audio file with no embedded metadata. On an audio sampling CD, I found a loop of a country drum beat that featured a side stick. I ripped the track containing the loop and opened it in my 2-track editor. After tweaking its start and end points, I saved it as an AIFF file and named it "Country Side Stick." When I imported it into Soundtrack, the program automatically categorized it under both the Drum Kit and Country/Folk categories.

Apple has also introduced its own file format, called Apple Loops. An Apple Loop is actually an AIFF file with em-

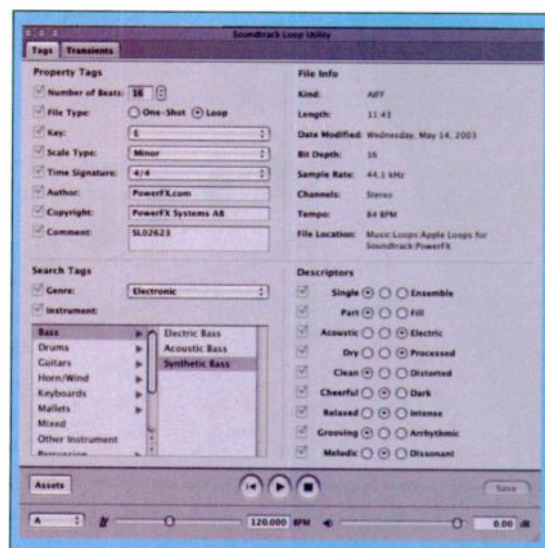
bedded metatags that characterize the loop by genre, intensity, instrument, and several other descriptors. That information makes searching for and organizing loops within Soundtrack a lot easier.

If you're importing your own loops, you can do a limited amount of editing on them in Soundtrack Loop Utility, an included standalone editor that you can open from within Soundtrack (see Fig. 2). It doesn't do waveform editing, but you can add descriptors, add or edit copyright information, designate the basic key and tempo, and adjust how Soundtrack interprets a loop's rhythmic transients.

## USER-FRIENDLY

One of Soundtrack's most impressive attributes is its incredibly friendly user interface. You can start making music within seconds of launching the program. The default view in the Media Manager's search window (called the Search Pane) is the Buttons view (see Fig. 3), which shows four rows of keyword buttons, each with an instrument type, mood, or other descriptive word.

Click on the Drum button, for in-



**FIG. 2:** Soundtrack Loop Utility, a companion application you can open within Soundtrack, lets you edit a loop's key, tempo, and other properties and add keywords for better categorization.

stance, and a list of drum loops appears in the Media Manager's Search Results area, which shows you the loop name, original tempo, original key, number of beats, and more. When you search for specific types of loops (you can also change views and search by instrument category, mood, and genre, or simply browse through standard directories) the appropriate files show up in the list.

When you've located a loop that you might want to use, click on it in the list, and it will start playing. If you like it, simply drag it over to a track in the Project Workspace (where it shows up as a waveform display) and hit play, and you're in business. You can drag it to any location along the horizontal Timeline, which shows you both bars:beats and hours:minutes:seconds. If you have the Snapping feature turned on, a loop that you drag in will automatically snap to the nearest beat (you can select the value, such as quarter note or eighth note), marker, or grid line. If Snapping is off you can place the loop anywhere.

Soundtrack automatically matches your loop to the master tempo and key of the song. But if you decide later in the project to change the tempo and key, no problem. You can adjust them to your heart's content using the controls in the upper right-hand corner of



**FIG. 1:** The Media Manager (left) and the Project Workspace (center and right) are the two main sections of Soundtrack; they can be displayed separately or together.



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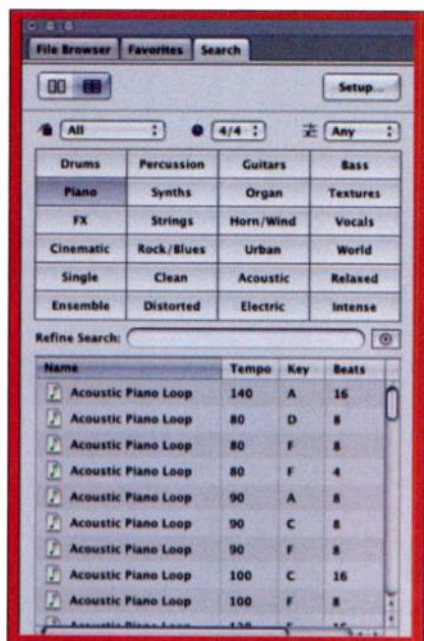
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**FIG. 3:** The Buttons View of the Media Manager is just one of several ways Soundtrack can display its loop library.

the Project Workspace. You can even automate master tempo and transposition with breakpoint-style editing (referred to in Soundtrack as Envelopes). However, the transpose and tempo adjustments don't work on audio that was recorded using Soundtrack's audio recording features, so make sure to settle on a key and tempo before you start overdubbing.

## BUILDING A SONG

Soundtrack offers a number of features designed to help you flesh out full arrangements. For instance, extending a loop beyond its original length is a snap. Simply hold the mouse over the right edge of the waveform display, click, and drag. It makes multiple copies and extends as far as you want. You can also copy a loop and paste it somewhere else in the song.

You can shorten a loop by dragging from its right edge, and you can change its Offset Point (where the loop starts) by Command-Option-dragging it from right to left. You can use Soundtrack's editing features (which also include commands for splitting and joining loops) to chop up a loop into small segments and rearrange it, although that

operation is a bit more cumbersome than it would be in a digital audio sequencer or 2-track editor.

By dragging various instrument loops into separate tracks, you can easily build grooves. You can then copy and paste sections from multiple tracks to construct an arrangement.

Although much of Soundtrack's interface is extremely intuitive, you will sometimes need to consult the included printed manual. It is well written and informative, but I was frustrated by its index, which is skimpy and not cross-referenced well.

## THEM CHANGES

The program's ability to change a loop's tempo is quite impressive. You can speed a loop up or slow it down considerably from its original tempo, without a noticeable difference in sound quality. Soundtrack's transposition capabilities aren't quite as seamless—I heard some artifacts and distortion when samples were transposed too far. However, that isn't surprising. Audio transposition is always harder to do convincingly. But as long as you keep it within a reasonable range, Soundtrack's transposition feature works quite well.

As with any loop sequencer, one of the problems with Soundtrack is that it's hard to put together compositions that feature anything but simple harmonic structures. Many of the loops vamp on a single chord or contain simple changes like I–IV or I–V. Trying to put together a rhythm track for a song that has a lot of changes is almost impossible using the included loops. How-

ever, you can do some harmonic adjustments using the Transpose feature.

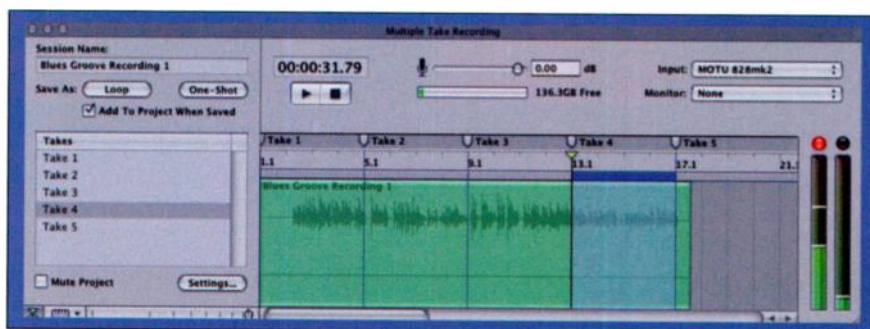
When you Control-click on a loop's waveform in the Project Workspace, you bring up a dialog box that lets you select a transpose value from –12 to +12 semitones. (This dialog box also gives you a number of other edit options including changing the Clip Speed, finding the loop in the Finder, and more.) I put together a 12-bar blues progression by taking bass, guitar, and piano parts that were vamping on the I chord and transposing them by +5 (to create a IV chord) and +7 (to create a V chord) at the appropriate points in the progression (see **Web Clip 1**).

For a simple transposition you do have some flexibility. However, if you want to put together something that's harmonically complex, you're going to be out of luck—unless you import your own loops that have the correct chord progressions—because you'll never be able to manipulate the loops to play all of those complex changes.

That said, it's astoundingly easy to assemble a great-sounding track in Soundtrack. I was able to put together a three-chorus, funky blues, replete with bass, piano, drums, and horn section, in about 15 minutes.

## THE SOUNDS OF APPLE

The quality of the 4 GB loop library that comes with Soundtrack is, by and large, very good. And unlike some other loop-production programs, Soundtrack's sound set isn't focused exclusively on electronic dance music. I estimate that slightly less than 20 percent of the loops that ship with the program are



**FIG. 4:** In the Multiple Take recording window, you can record numerous passes of a specified section and then choose among them.



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electronica; there's also a good selection of rock, funk, blues, folk, country, jazz, and world music. In addition, the collection provides an assortment of one-shot sound effects and some complete music beds.

The bulk of the included loops were licensed by Apple from PowerFX, although there are also some in the collection that were put together by musicians at Apple who worked on the project. The collection includes loops of rhythm-section instruments such as guitar (acoustic and electric, distorted and clean), bass (electric, upright, and synth), keyboards (solo pianos, synths, clavinet, organs), and drums (acoustic and electronic in a variety of styles).

I do wish that more of the drum loops had fills to supplement them. There are some fills, but not as many as I would have liked. When you're putting together a song-length drum track and you want it to sound like a live drummer, it's useful to have a variety of fills at your disposal.

Other loop types include ethnic percussion, vocals, accordions, banjos, mandolins, and flutes. For some reason, there are no solo sax loops included, but there are some killer R&B horn-section parts that can be easily manipulated within an arrangement.

## TRACK YOUR OWN

As mentioned, you can also record your own audio into Soundtrack to supple-

ment the looped tracks or to use as raw material to make your own loops. The program has two recording modes: Single Take and Multiple Take (see Fig. 4). As its name implies, Single Take lets you record one pass at a time. Multiple Take allows you to record as many passes as you want (disk space permitting, of course) over a looping section and then choose which one to include in your track.

One of the problems with the recording section is that Soundtrack has no click available. You have to do some work-arounds to get a count-in, such as sliding all of your tracks forward by one or two measures and adding a simple rhythmic loop at the beginning (there's a loop of a clave playing quarter notes that works well for that). Another problem with the recording feature is that you can't record a mono track. Everything automatically defaults to stereo. For recording vocals or instruments it would be nice to have the option to save disk space by recording in mono.

When doing the initial testing for this review using version 1.01, I discovered a bug that made it impossible to accurately sync recorded audio with the looped tracks. Strangely, the recordings played back consistently about 125 to 150 ms *before* the looped audio.

According to Apple, the problem was limited to single-processor machines (such as the G4/733 MHz I was using), although another EM reviewer experienced similar problems on a dual G5/2 GHz. When I later tested Soundtrack on a different dual-processor G5/2 GHz, however, I didn't experience any audio problems.



FIG. 6: Soundtrack comes with 19 plug-ins from Emagic's Logic Platinum, including PlatinumVerb, shown here.

Apple has fixed the sync problem in Soundtrack 1.1. I tested the update on both the G4/733 MHz and the dual G5/2 GHz, and the audio and loops synced perfectly every time. (Version 1.1 doesn't add any new user features, but it does offer what Apple terms as "general fixes as well as improvements in performance and linking of relocated project audio files.") If you have version 1.01 and a single-processor machine and you're experiencing sync problems, downloading the free update to version 1.1 from the Apple Web site will take care of them.

## PAINT THE PICTURE

Soundtrack has much to offer if you're scoring to picture. Since it was originally designed to go with Final Cut Pro, it has a lot of features that are quite helpful, especially in the early stages of a scoring project. You can easily import QuickTime movies into Soundtrack by dragging and dropping them into the Video Pane (see Fig. 5), which is located at the top of the Project Workspace. When a movie is opened, you see it in the video pane, and its audio track shows up with the others, allowing you to adjust volume and pan and add effects.

Soundtrack lets you set markers, which are useful for marking hit points on a video (or just to delineate verse, chorus, and so forth, in a song), and you can set the Snapping feature to snap to the markers. By zooming in on



FIG. 5: You can import QuickTime movies to Soundtrack by dragging them into the Video Pane. Once a movie has been opened, you can control the volume of its audio track.



the Project Workspace (and its grid lines), you increase the resolution at which you can manipulate loops. So in a scoring situation, you can zoom in far enough that each grid line represents another frame of video. That makes it easy to shift loops (especially sound effects) a frame at a time to tighten up hit points.

The diversity of the loop library lets you put lots of different flavors into your scores (see **Web Clip 2**). In addition, Soundtrack makes it easy to try out a variety of grooves at a bunch of different tempos in order to find a combination that works well with your picture. However, while the program supports a variety of time signatures, each composition can have only one.



**I was very impressed  
with the quality of the  
Emagic effects.**

Once you've created the music for your picture, you can save it along with the video as a QuickTime movie. Soundtrack also includes features for importing from and exporting to Final Cut Pro.

#### MIX AND MATCH

Soundtrack has many useful mixing features, too. Each track has its own sliders for volume and pan, and you access them right from the Project Workspace, so there's no need to switch to a separate mixer window. Breakpoint-style automation is available not only for volume, pan, and transpose on each channel, but for effects parameters as well.

You can add effects on individual tracks or the master bus, and their parameters can be automated. Soundtrack comes bundled with 19 effects from Emagic's Logic Platinum software, including PlatinumVerb (see **Fig. 6**), Sub Bass, Overdrive, Compressor, Distortion, and Bit Crusher. You also get 12 Apple Audio Unit effects, and you can install third-party Audio Unit plug-ins.

## M24 Universal Control Surface



The Mixed Logic M24 control surface is designed to integrate with your favorite digital audio software providing familiar hands-on control for the computer based audio production environment.

The M24 supports extensive in-depth automation with bank swapping and channel offsets to access additional channels. The M24 is the first control surface to feature complete equalizer, dynamics and auxiliary send control sections promoting control familiarity like a traditional analog console with all controls available at once for the selected channel.

The M24 is the first control surface to feature in-depth control of multiple plug-in effects at once, on a single channel or across multiple channels. For example, you could have several different plug-in equalizers across several channels and be able to jump from channel to channel using the channel select switches and all assigned equalizer controls would follow.

Extensive support available for a large number of manufacturers. Please visit the website for a current list of supported software and features.

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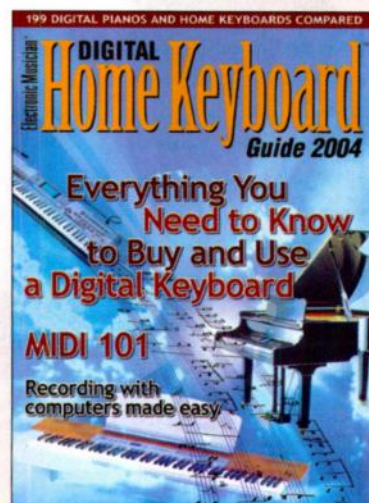
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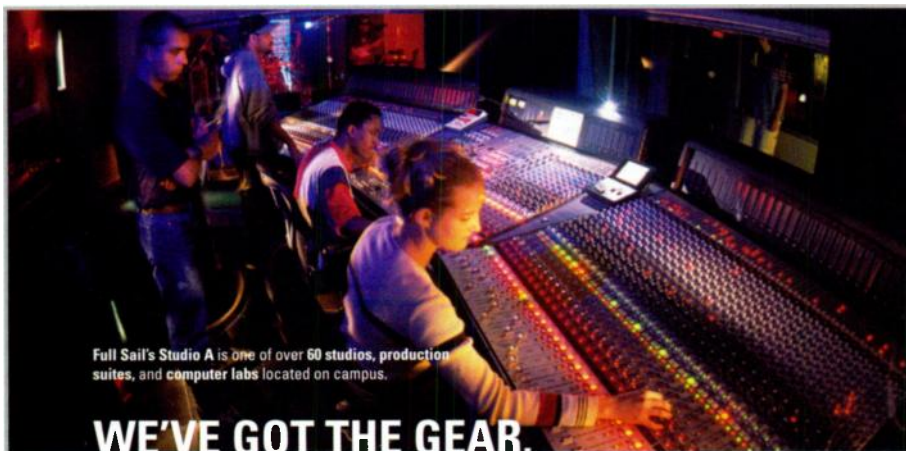


I was very impressed with the quality of the Emagic effects, all of which sounded excellent and were easy to use. The Apple effects were generally quite good too, although several offered only the most basic parameter control. A very small number of the included plug-ins—whether from Emagic or from Apple—offer presets, which is too bad. I invariably find it easier to use a preset as a starting point when setting up an effect.

## APPLE TRACKING

Considering its relatively modest price, Soundtrack is an impressive and deep program. It's extremely easy to use, offers a huge library of sounds, and features good-sounding effects and useful mixing and automation features.

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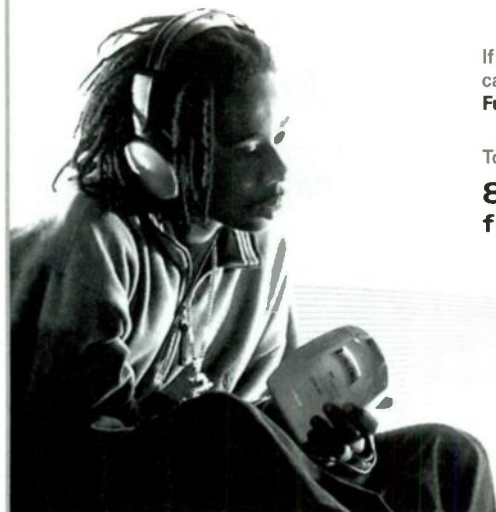
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## PRODUCT SUMMARY

**Apple**

Soundtrack 1.1

loop editor

\$299

FEATURES	3.5
EASE OF USE	4.5
QUALITY OF SOUNDS	4.0
VALUE	4.0

### RATING PRODUCTS FROM 1 TO 5


**PROS:** Good sound. Extensive included loop library. Easy to use. Useful for scoring to video. Easy to import loops from other formats. Excellent export options and search features. High-quality effects. Changes audio tempos flawlessly. Automation of volume, pan, transpose, tempo, and effects parameters. Competitively priced.

**CONS:** No MIDI or ReWire support. OS X only. Requires fast computer. DVD drive needed for loading loop library. Manual isn't well indexed. Not enough fills in included drum loops. No click or count-off options. Lack of presets for the effects. Doesn't support multiple time signatures in a single composition.

### Manufacturer

Apple Computer  
tel. (408) 996-1010  
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will find it useful for producing quick demos, as an arranging sketchpad (you can try out all kinds of instruments in your arrangements), and as a pre-production program for assembling loops into full-length tracks that can then be exported to a digital audio sequencer. Further, it's very handy for scoring to video, especially with its superb time-stretching features.

My wish list for future versions of Soundtrack would include more features in the recording section (includes click and count-off options), more drum fills in the included loops, a better indexed manual, more presets for the effects, and MIDI and ReWire capability. But as a whole, Soundtrack is a great program and an exciting alternative for those interested in loop-based music production on the Mac. 



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2nd & 3rd chair Trumpet Section  
1st through 3rd chair Trumpet Section

#### Trombones

1st chair Bass Trombone  
1st & 2nd chair Tenor Trombones  
1st through 3rd chair Trombone Section

#### Tuba

C Tuba  
Eb Tuba

### Articulation set includes:

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Flutter Tones  
Half Step Trills  
Whole Step Trills  
Staccato  
Double Tongue "ta"  
Double Tongue "ka"  
Muted Legato  
Muted Staccato  
Muted Flutter Tones  
Rips  
Sforzando  
Mute Sforzando  
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# VIRSYN

CUBE 1.01 (MAC/WIN)

*A software synth that  
is definitely  
not for squares.*

By Dennis Miller

**V**irSyn's Cube, a new additive-synthesis application with unique spectral-morphing capabilities, is distinctly outside of the box. Cube allows you to define the parameters of many dozens of partials and then manipulate those parameters using a variety of time-varying effects. The results can be fairly straightforward or like nothing you've heard before.

Cube's interface is both attractive and efficient (see Fig. 1). The large oval screen at the center of its main window is multifunctional and toggles between a display of partial parameters, effects, a setup screen, and morphing envelopes (I'll discuss each of those

shortly). Much of the rest of the window is dedicated to controls for the four sets of partial parameters that make up Cube's basic architecture. There's ample visual feedback as you move knobs and sliders, and you can change the color scheme by picking from a variety of skins. A large keyboard at the bottom of the screen is used to trigger notes and also shows what keys you've pressed if you're using an external controller.

Cube is 8-part multitimbral and runs standalone or as a VSTi. It also supports Audio Units under Mac OS X. Each part can have up to 32 notes of polyphony with a cap of 64 notes total, and the program comes with over 300 Presets (including a new set of Presets that appeared on the Web just as I was completing this review). The dedicated Setup screen lets you assign sounds to individual MIDI channels, and you can easily assign all eight parts to a single channel if you want. Each part can be routed to its own stereo output, and there's a dedicated Record button for capturing the program's output when Cube is in standalone mode.

I tested Cube on a dual-processor Pentium III/1 GHz running Windows 2000. The audio interface was a MOTU

## Minimum System Requirements

### Cube 1.01

**MAC:** G4/400 MHz (AltiVec required); 128 MB RAM; Mac OS 9 or Mac OS X 10.2

**PC:** Pentium III/600 MHz or Athlon XP/MP; 128 MB RAM; Windows 98/2000/ME/XP

2408mk3, and I used ASIO drivers exclusively. I also tested Cube on a Pentium 4/2.8 GHz laptop running Windows XP, with an Echo Indigo IO for audio in and out.

## FROM THE TOP

Additive synthesis is an ancient technology that was used in the earliest mechanical organs, but its modern implementation is based on the writings of French mathematician Jean-Baptiste Fourier. In the early 19th century, Fourier theorized that all periodic sounds are made up of sine-wave components with different frequencies and amplitudes that vary over time. Given enough sine waves and individual envelope generators to control the amplitudes of each, one could, in theory, synthesize any complex sound. More recent research has shown that it's valid to group higher partials into small sets and control their envelopes as a group.

Cube implements those theories in an efficient and musically useful way. Each of its voices consists of four sets of parameters that control up to 512 partials, and only the first 16 partials can be controlled individually. Beyond that, ever-higher partials are grouped into ever-larger collections.

A lot of control is available for each of the four parameter sets, which Cube calls Sound Sources and labels A, B, C, and D. For starters, the program provides separate displays to adjust each Sound Source's Partial, Attack, Decay, Pan, Filter, and Noise parameters (I'll cover those in a moment). Additional high-level controls allow you to adjust the rate and depth of each Source's pitch LFO, and you can detune each Source up or down by as



**FIG. 1:** The main screen in VirSyn's Cube contains a variety of work areas. At the center of this figure is a two-dimensional representation of the path of the morphing envelopes. The buttons along the top center of the screen are used to select one of the eight multitimbral parts.



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many as 48 semitones in half-step increments. (You can't, however, solo or mute a Source.) All knobs and sliders can be mapped to incoming MIDI controller messages.

Two other high-level controls, Ensemble and Spread, provide even more options. Ensemble adds a chorusing effect to a Source by applying an LFO to each partial. Ensembles have only one parameter, which is represented as a value from 0 through 100 with two-decimal-point accuracy. Like many of the controls, the Ensemble parameter is adjusted with a knob or by using various key combinations, and it's not very easy to configure the setting to any arbitrary value you might want. It would be nice if you could type in values. On the other hand, like other controls, the Ensemble setting can be adjusted for all four Sound Sources simultaneously by Control-dragging (or, on the Mac, Command- or Option-dragging) the knob. That is one of many nice editing shortcuts.

The Spread control is particularly useful. Because all of the partials are harmonic by default, you don't have the option to create inharmonic sounds such as bells. But using the Spread control, you can offset the ratios of the partials to the fundamental, opening up a vast range of timbres. However, as with other aspects of the program, Cube has only a single Spread control per Sound Source (also 0 through 100), so you don't have as much flexibility as you might like.

## TAKE A PART

Cube's core functions center around the six screens that are used to edit the parameter sets of each Sound Source. There are 31 collections of parameter settings that you can use as starting points. Among these are static waveforms (HiResoSaw and LoResoSaw), voice-prints (the vowels *a*, *e*, *i*, *o*, and *u* for both soprano and bass), and bowed and plucked strings.

To edit a Preset, press a Source's Edit button; this will give you access to a two-dimensional grid in which you can toggle from one to another of the six work areas (see Fig. 2). One of them, the Partials screen, is where you adjust the partials' amplitudes. It's easy to modify the amplitude value of a partial (or group of partials): just click and drag up or down, and you'll see the exact value (in decibels) for that harmonic. But here again, it would be nice to be able to type in an exact value and also to zoom in or out to get a higher-resolution display.

As I mentioned earlier, you can edit the first 16 partials individually. Partial groups are grouped in pairs from numbers 17 through 32, in fours from 33 through 64, in eights from 65 through 128, and so on. Although you can fine-tune the settings if you're so inclined, for the purposes of experimentation, I found it very useful (here and else-

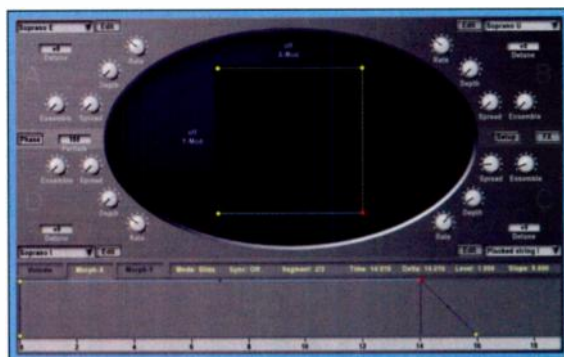
where) just to draw random, sweeping gestures with the mouse.

Next up are the Attack and the Decay screens. As their names imply, those control the amplitude envelopes of the various partials, and there's only a single attack and a single decay segment per grouping. Though that may seem rather limited, you can create far more complex envelopes by morphing between the four Sources, which is the key to creating time-varying sounds in Cube.

The Pan screen allows you to place each partial or partial group in the stereo field, and the Noise editor is used to add a random amount of modulation to each partial's frequency. In the final screen, you can apply a morphing resonant filter to the partials. This unique filter implementation is one of the most powerful I've ever seen.

Unlike a traditional filter, which, depending on its type, offers some combination of cutoff frequency, bandwidth, and center frequency, the filter in Cube is completely adaptable. That means you can draw your own transfer functions for the filter and thus configure its response curve. Rather than just use a 1-, 2-, or 4-pole filter, which would determine a simple attenuation curve, you can create an unlimited variety of resonant shapes that either model traditional instruments or voices or are like nothing on the planet—very nice indeed. There are also several keyboard shortcuts that let you draw complex shapes very quickly.

In addition to creating custom filters for each individual Source, you can add



**FIG. 3:** This figure shows a simple envelope that uses the parameters of all four Sound Sources. It's easy to draw complex curves that could create a sound using any of the Sources.



**FIG. 2:** Cube allows you to control the amplitudes of as many as 512 partials. Each of its four Sound Sources has its own parameters for the partials and for the major sound-processing functions.



# COMPOSER JEREMY SOULE

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3 Oboes for Ensembles  
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*morph points* that determine how the filtering effects will change over time. These points determine where the characteristics of one Source's filter will morph into those of another. Which Source's filter data is used at any given moment is determined by Cube's morphing envelopes.

## MORPHOLOGY

Cube provides morphing options that resemble the technique called *vector synthesis* used in some Korg synths, but the features go far beyond anything in a Korg implementation. Briefly put, Cube provides a two-dimensional grid on which you can determine how much the parameters of each Sound Source contribute to the sound as it evolves over time. The upper-left quadrant represents Source A, the upper-right is Source B, the lower-right is Source C, and the lower-left is Source D. In the configuration shown in Fig. 3, the sound would evolve gradually from Source A to B to C, sustain on C, and then continue to D upon the note's release. A diagonal line drawn from the upper-right to the lower-left quadrant would begin with the characteristics of B and morph to those of D, using additional data from the other two Sources along the way.

The duration of each segment is determined in the display at the bottom of the screen (see Fig. 3), and you can draw very complicated morphing paths that contain up to 64 segments. Moreover, Cube provides dozens of preset envelope shapes, many of which create highly rhythmic patterns that morph from one Source to the others and back again repeatedly. You can also save your own envelopes as presets and reuse them in other patches.

One simple use of the morphing technique would be to morph from the vowel sounds *a* to *o*, perhaps an octave higher. But it's just as easy to morph from a *u* to a bowed string or from a plucked string to a bell sound to white noise. Within the range of the available Sound Sources, the possibilities really are endless. And like nearly every other aspect of Cube, all changes you make—whether to the morph path or

the Sound Sources themselves—update in real time, even as a sound is playing back.

Cube's unique zooming feature is worth a mention. Click and hold the mouse in the lower-envelope area and drag up, and you can zoom the display to show just two-tenths of a second. Drag back down, and you can zoom the display to show 40 minutes on a single screen! Dragging right or left moves the display to show a different range of time. This method works very well overall and allows you to easily set the display to any region or amount of time you want.

## IN ACTION

As with most new tools I try, my first stop was to play with the Presets. In the case of Cube, that took a very long

▼  
**One could, in theory,  
synthesize any  
complex sound.**

time. Cube ships with seven banks of Presets, including pads; leads; keyboard, bass, and percussion sounds; and the CubeFactory bank, which loads by default. Banks contain as many as 64 sounds (the higher-numbered locations in some banks are empty), and you can have only one bank loaded at a time. It's easy to copy Presets and paste them into new or existing banks, and before long, I had two entirely new banks nearly filled with my own custom sounds (see **Web Clips 1** through **7**). Some were the result of using Cube's random-patch generator (shown as a slot-machine icon in the main interface's upper right), which creates useful patches more often than you might expect.

The sounds in the CubeFactory bank range from fairly straightforward offerings, such as RealCello, to highly rhythmic, looping sounds, such as JustWait, which could easily have come straight from a stint in a Korg Wavestation (a

number of sounds have that quality). Mixed with those are keyboard sounds (Celeste, Ambiano2, ClaviThroarty, and Organ9 Bars), basses (Bassinet, ORGANic Bass, and AKHOU Bass), leads (Morphogenic Lead, Trumpet Dance Lead, and Anna saw the Lead), and a whole lot more. The Presets range from elegant and evocative to just plain cheesy; which ones you'll find useful for your work depends entirely on what you're after. The bank clearly demonstrates Cube's enormous potential, including the power of its built-in effects, and probably offers something for everyone.

The other banks also have a great variety to offer. The Leads didn't contain much that interested me, and with a few exceptions, the Keys didn't knock me out either. The Sequence bank had some compelling sounds: Talking Crowd is nice and quirky, and JustWait Again is a repeating metallic sound that takes a few strange twists along its journey. Many of the other sounds got monotonous a bit too soon. But some combination of altering a few segments in the envelopes (often changing the duration of a segment in the middle of a long, repetitive section), adding a few more segments, and extending the envelope's total duration let me easily modify the Presets and create what I felt were more interesting patterns.

To my ear, the HGoHs bank (created by and named for Harry Gohs, the program's developer) is one of the most interesting of the bunch. This bank is available as a free download from VirSyn's Web site and contains only 29 Presets, but many of them sound great. Among my favorites are exotic vocal sounds like Let's Talk, WetBreath, and 'nother Talk; the slow, evolving timbre of IronPiano (which I like even better with all the Sources tuned down 12 semitones); NoizVoizModwheel, which morphs between a low growl and rich noise with the turn of the mod wheel; and FifthSense, which I prefer with a much longer attack segment on the Volume envelope.

The Presets are so easy to change that you can make something radically new with no more than a few mouse clicks.



## PRODUCT SUMMARY

### VirSyn

Cube 1.01  
software synthesizer  
\$249

FEATURES	4.5
EASE OF USE	4.0
QUALITY OF SOUNDS	4.5
VALUE	5.0

#### RATING PRODUCTS FROM 1 TO 5

**PROS:** Powerful real-time sound-creation options. Efficient and intuitive interface. Unique spectral-morphing functions. Patch-randomizing feature.

**CONS:** No Undo command. Does not prompt to save when quitting program. Manual not extensive enough.

#### Manufacturer

VirSyn Software Synthesizer  
e-mail [info@virsyn.com](mailto:info@virsyn.com)  
Web [www.virsyn.com](http://www.virsyn.com)

But among all the included Presets, you'll definitely find plenty that you can use right out of the box.

#### AFTER EFFECTS

As though there weren't enough sound-programming components on hand, Cube adds a respectable set of effects to the mix. Included are a Reverb, Delay, Flanger/Phaser/Chorus, and Distortion. Each effect has a variety of parameters, and the Reverb has no fewer than 24 presets. The delay time can be synced to MIDI tempo or the internal bpm value, and each part can have its own effects.

For even more sound-design options, a very useful arpeggiator offers settings for Range (1 to 8 octaves), Mode (Up, Down, Alt, or Rand), and Clock (a variety of rhythmic durations from whole note to 32nd-note triplet, plus five rhythmic variations). In standalone mode, the Clock values sync to the user-adjustable setting, which has a range of 40 to 300 bpm. When Cube is running as a plug-in, the host's tempo overrides Cube's internal tempo setting. Global High and Low EQ; a Bright control; and a Glide setting, which con-

trols the transition time between two successive notes (with a maximum setting of 91.1 seconds!), round out the main controls.

#### THE GOOD, THE BAD

Cube's documentation is minimal, to say the least. Though it is adequate to get you up and running, it provides only two brief usage tips and tricks. Additional tutorials (for example, on how to model various resonances with the filter) would be very helpful.

More serious are two rather glaring omissions in the software itself. First, Cube has no Undo command—enough said. Second, when you quit the program, it doesn't prompt you to save any changes you may have made. I've come to expect (and even rely) on these two very common features. It would also be great if you could solo a Sound Source while you're working on it. That would be especially useful when you first load a Preset, because it's impossible to know which Source is contributing what to the sound you're hearing. I found it necessary to change various parameters of the Sources to see what effect they had (if any), which helped me narrow down where the really important stuff was coming from. A solo (or mute) function would speed the process of figuring out how a particular Preset worked.

But beyond that, Cube is one of the deepest and most powerful tools I've come across in a long time. It has the potential to generate a tremendous range of sounds, and with a little effort, you can build spectra that resemble all manner of instrument models. On the other hand, if you're short of time, you can just try your luck with the randomizer.

I hope a library of user-contributed Presets will evolve along with a "Cubist" community. I also look forward to the appearance of more Sound Source Presets and the ability to make your own. Cube is an outstanding sound-design tool and a great platform for experimentation. Check out the demo at VirSyn's Web site and see  what it can do for you.

Dennis Miller is an associate editor of EM.

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# AUDIO-TECHNICA

AT3060

## *An affordably priced phantom-powered tube mic.*

By Myles Boisen

**A**udio-Technica has the distinction of being the first company to make a phantom-powered tube microphone for the personal-studio market. The fixed-cardioid AT3060 has the heft and quality feel of a premium instrument, but it isn't bulky like a vintage tube mic. This miniaturization is partly made possible by the small Raytheon tube at the heart of its ingenious design.

The AT3060's housing is all metal (nickel-plated brass) with a sturdy open-weave metal grille occupying roughly half of the microphone's 6¾-inch length (see Fig. 1). The enclosed diaphragm, which is over an inch in diameter, is

the largest used in an Audio-Technica product to date. Because it's phantom powered, the AT3060 connects to any standard XLR mic cable, and no external power supply or multipin connector cable is needed.

The absence of a separate power supply helps keep the cost down, as does the fact that the AT3060 doesn't come with a hardshell carrying case. However, it does come with a padded zipper bag to hold and protect the mic. Also included is a tough black plastic swiveling shockmount that looks like it's designed to stand up to years of professional use.

The mic fit snugly into the shockmount, so I had no reluctance about hanging it upside-down, which is standard for tube transducers. However, because this microphone body doesn't seem to heat up at all, even after hours of use, following the convention of inverting it to keep heat away from the diaphragm is not necessary.

### TO THE TEST

Because the manufacturer advertises the AT3060 as possessing a "warm classic tube sound," I began my tests by putting up the 3060 against one of my favorite tube mics, the Lawson L47 MP.

Although some might view testing the \$599 AT3060 against the \$2,000 L47 MP as comparing apples to oranges, I have often been surprised by the strong performance of a less expensive "underdog" when comparing mics of different price ranges. Using the Lawson, a mic that I'm quite familiar with, also gave me a good reference point for evaluating the AT3060.

I started my comparison by carefully matching output levels with a 1 kHz tone and by doing loudspeaker tests. For this test, the mics were placed side by side, roughly two feet in front of a powered monitor. I then played a selection of mixes

### PRODUCT SUMMARY

#### Audio-Technica

AT3060  
tube microphone  
\$599

AUDIO QUALITY	3.0
VALUE	3.0

#### RATING PRODUCTS FROM 1 TO 5

**PROS:** Affordable phantom-powered tube mic. Works well for acoustic guitars, percussion, high woodwinds, and vocals. Needs no external power supply. Excellent build quality. Sturdy shock mount.

**CONS:** Lacks warmth for a tube mic. Thin-sounding on some sources. No pad switch. No hard-shell carrying case.

#### Manufacturer

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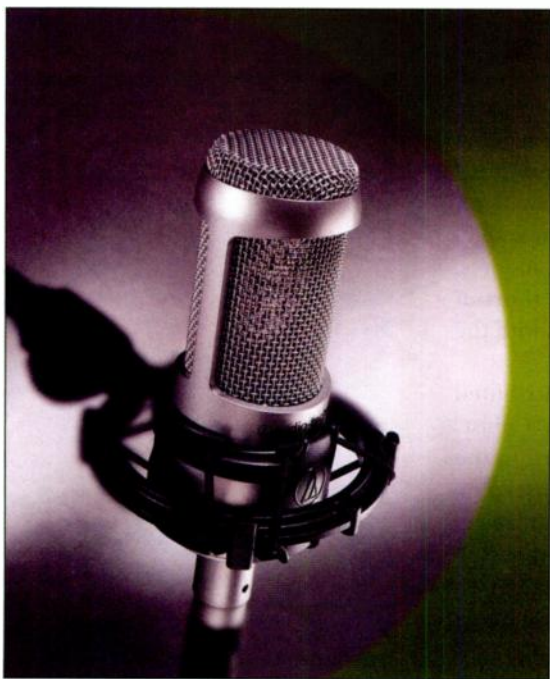


FIG. 1: The phantom-powered Audio-Technica AT3060 is a solidly built large-diaphragm tube mic.

through the monitor and compared the sound of the mics. No surprises here: the AT3060 was simply not able to measure up to the considerably more expensive Lawson's big tone (which is based on an emulation of the famed Neumann U47).

However, when I compared the mics on acoustic guitar, the AT3060 outperformed the Lawson. Whereas the Lawson sounded full but tubby, the AT3060 accentuated the pick attack and sparkle and imbued the guitar's sound with a "ready-to-mix" attitude.

When I tried out the two mics on an electric guitar amp the results were more in line with their price points. Compared to the Lawson, the AT3060 sounded distant and filtered, as if it had been on a different amp with a smaller speaker. On single-note lines the difference was less apparent than on chords, but the AT3060 still diminished the fundamental tone and punch on low notes.

### DRILLING DEEPER

In order to contrast the AT3060 with a mic more comparable in price and timbre, I pulled a Blue Baby Bottle out of my studio's mic closet. Like the



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### Compact 2-Way Active Nearfield Monitor

[illegible]

## FEATURES

### Composite Filers

...the ...

### Appendix

has, and not, amplification power. It is an output power tube with very low gain and 100 ohm input. The stages are designed to maintain the highest selectivity needed—100 dB. The amplifier can also function as a pre-amplifier that provides the output power and impedance for driving the driver tube, and the output impedance to maintain and maintain output.

1999

- The 1000 most dense stars in the Galaxy are found in the GC and are used to estimate the high- $\rho$  distribution. The GC is a concentrated site for the galaxy's elliptical stars.
- The 1000 most dense stars in the GC are used to estimate the high- $\rho$  distribution. The GC is a concentrated site for the galaxy's elliptical stars.

### Mounting Options

- [illegible]



## 1030A

### 64" Bi-amplified Active Monitor

The **64" Bi-amplified Active Monitor** is a very large 30-watt active monitor system, also capable of much larger systems. The **visual amplifier** only has an output of 30 watts but the **audio** has an output of 300 watts. This system contains an active chassis, extremely low impedance output and two power outputs, one for each drive. The **visual amplifier** drives and powers imaging together with its compact size makes it ideal for use in field monitoring, broadcast and TV control rooms, mobile vans, home cinema and monitoring systems. **Audio** output from the **Control Unit** can be used for **telemetry** and is **perfectly compatible** with **imaging** and **telemetry** between vans or **with** **other** **active** **audio** **systems** and the **visual amplifier** **allows** **for** **the** **monitoring** **of** **the** **system** **in** **the** **surroundings**. A **quote** **of** **1000** **Hz** **can** **produce** **good** **horizontal** **fields** **of** **over** **110** **to** **120** **Hz** **on** **the** **TV** **picture** **may** **be** **used** **to** **control** **or** **horizontal** **fields**.



**Same features as the HPDAP401 EXCEPT:**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Run all <b>initial setup</b> steps <b>parallel</b> (1st &amp; 2nd) until all <b>process</b> finish the <b>initial</b> and <b>file</b> download in <b>clients</b></li> <li>• <b>1st</b> - send <b>initial</b> <b>data</b> <b>parallel</b> to all <b>nodes</b> in <b>the</b> <b>high</b> <b>performance</b></li> <li>• <b>The</b> <b>time</b> <b>down</b> <b>is</b> <b>a</b> <b>high</b> <b>value</b></li> <li>• <b>2nd</b> - <b>send</b> <b>initial</b> <b>data</b> <b>parallel</b> to all <b>nodes</b> in <b>the</b> <b>high</b> <b>performance</b></li> </ul> | <ul style="list-style-type: none"> <li>• <b>1st</b> - <b>send</b> <b>initial</b> <b>data</b> <b>parallel</b> to all <b>nodes</b> in <b>the</b> <b>high</b> <b>performance</b></li> <li>• <b>The</b> <b>time</b> <b>down</b> <b>is</b> <b>a</b> <b>high</b> <b>value</b></li> <li>• <b>2nd</b> - <b>send</b> <b>initial</b> <b>data</b> <b>parallel</b> to all <b>nodes</b> in <b>the</b> <b>high</b> <b>performance</b></li> </ul> |
|---|--|

### Summary

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The results of the study suggest that the use of a computer-based system for the management of the patient's medical history and the results of the laboratory tests can be a valuable tool for the physician. The system can be used to store and retrieve the patient's medical history and the results of the laboratory tests. The system can also be used to generate reports and to provide a summary of the patient's medical history and the results of the laboratory tests. The system can be used to generate reports and to provide a summary of the patient's medical history and the results of the laboratory tests.

	CRU AMP	EMMA
CPU		
Maximum CPU #	1000 CPU	1000 CPU
Peak with avail. CPU	1000 CPU	1000 CPU
Software		
OS	2	10
Tools	1000 tools/docs	1000
Customer Support	1000	1000
Integration Support	1000	1000
Application Power (1000)		
OS	1000	1000
Tools	1000	1000
Customer Support	1000	1000

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AT3060—whose published specs highlight a 10 dB rolloff at 20 kHz (see Fig. 2)—the solid-state Baby Bottle has a softened high-end response that can be suitably mellow in some applications, though a bit dull in others.

On acoustic guitar, as with the previous Lawson comparison, the AT3060 was a clear winner. Its timbre complemented the metallic components of rhythm strumming without being strident, while the Baby Bottle sounded too warm and mushy. Likewise, on a tambourine track (with the performer ranging from 4 to 15 feet away) the AT3060 delivered a well-defined sound with plenty of room character at all distances. By contrast, the Baby Bottle sounded closer and drier on the tambourine, delivering a smoother, more listenable timbre at close proximity but sounding diffused as the performer backed away from the mic cluster.

In the loudspeaker test, the Baby Bottle had more of an authoritative thump in the lows, a stronger midrange, and less incisive highs than the AT3060. Tweaking the Audio-Technica mic with EQ (a 4 dB cut at 5 kHz and a 2 dB boost at 200 Hz) brought its sound close to that of the Baby Bottle for midrange instruments in the mix. But I was puzzled to find that, even against the solid-state mic, there was a flatness and lack of depth to the AT3060's sound, irrespective of frequency.

I also tried the AT3060 out for recording bass guitar. For this task I usually rely on an AKG 414-BULS with the -10 dB pad engaged. On a bass amp

AT3060 Specifications	
Element	condenser
Polar Pattern	cardioid
Frequency Response	50 Hz–16 kHz
Signal-to-Noise Ratio	77 dB, 1 kHz @ 1 Pa
Dynamic Range (typical)	117 dB, 1 kHz @ max. SPL
Phantom-Power Requirements	48V, 3 mA typical
Impedance	400Ω
Maximum Input Sound Level	134 dB SPL, 1 kHz @ 1% THD
Dimensions	6.71" (L) × 2.05" maximum body diameter
Weight	1.19 lb.

playing at average studio volume (well below club or rock concert levels), the output of the AT3060 was extremely distorted before it hit the mic preamp. In this case the lack of a pad switch on the mic was a distinct disadvantage, and there was not much else to do but make a change to my standby AKG mic.

As an ambient drum-room mic on a rock project, the AT3060 performed adequately and had no problems handling the drum levels from ten feet away. But because the mic tended to emphasize harshness in the cymbals and didn't do much to enhance the bigness of toms or kick, it didn't figure prominently in the mix.

I had much more success using the AT3060 on clarinet and soprano saxophone. The AT3060 gave a nice woody tone to the clarinet although its 6 kHz presence boost often over-emphasized breath and other air sounds. On soprano sax—an instrument that usually

needs some extra presence—the AT3060 delivered an aggressive, penetrating midrange that really worked. It was not quite the mellow sound I associate with my favorite tube mics, but I liked the high-end definition, and noted no harshness in the sax's upper range.

On a male singer-acoustic guitarist with a baritone voice, the AT3060 turned in another good performance. As a close-mic for vocals it was defined and never sibilant. To overcome some thinness in the vocal sound I did have to get the mic closer than usual, but in so doing encountered no problems with popping or proximity effect. In fact, during mixing I had to add a bit more bass to get enough low-end foundation on the voice.

## SAFETY VALVE

After extensive testing, I feel that the AT3060 has positive attributes, and clearly offers an innovative design and excellent build quality. But to my ears, the characteristics of tube sound—depth, harmonic richness, powerful bass, and silky highs—are not what this mic is about. I just didn't hear the "warm and classic" tube sound promised by the manufacturer. What I did hear was a present and defined timbre that was thin at times, but flattering to sources such as vocals, acoustic guitar, percussion, and high woodwinds.

*Myles Boisen is the head engineer, janitor, and group therapist at Guerrilla Recording and The Headless Buddha Mastering Lab in Oakland, California.*

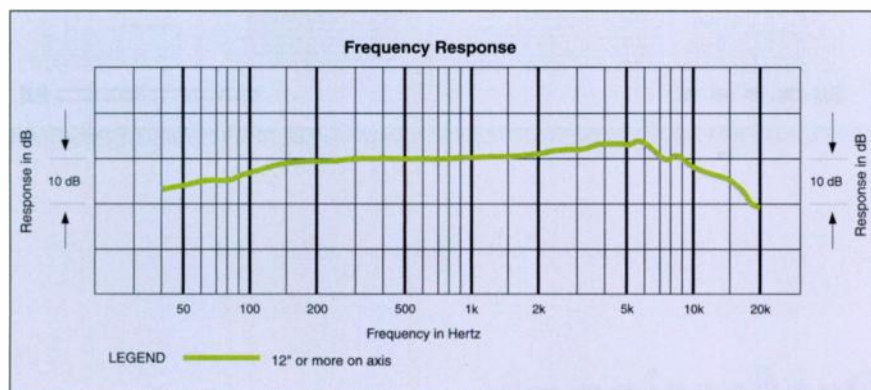


FIG. 2: The AT3060's frequency-response graph shows rolloffs at the bottom and top end, as well as a presence boost that peaks at about 6 kHz.



# Mistral 2500

Analog Power Amplifier, 700 WATT (x2) @ 4 Ohms



ALTO's new Mistral Power Amplifier line comes in 900, 1500, 2500 (shown here), 4000 and 6000 watt configurations. The Mistral line of innovative power amp designs provide clean power and high stability all in two space chassis'. ALTO's Mistral line features a low noise air flow system which directs air flow from rear to front providing maximum efficiency and temperature control. These amps include two channels, each with its own

independent protection system (IPS) and power supply. The Mistral IPS avoids any open circuit, short or overheating while the protection system provides an automatic restart function. All outputs are equipped with standard balanced power connectors and a high quality transformers. Dollar for dollar, the Mistral Line offers reliable amplification at a great price.

# Dragonfly PM-16

16-Channel Digitally Powered Mixing Console

The new Dragonfly Series of powered mixing consoles come in 6, 8, 12, 16 (shown here) and 20-channel board configurations, each ideal for a variety of live performance situations. With ALTO's digital amplifier technology, the Dragonfly Series, offers high power mixing and a dynamic sound. Extremely high efficiency means the amplifier is so compact that the console is no larger and barely any heavier than an

equivalent passive console. The PM-16 in its sleek, portable design weighs in at a mere 18 lbs. Equipped with many useful features, the PM-16 is digitally powered up to 900 watts of on board (both channels in 4ohms). When you need a powerful mixer on the go, go DRAGONFLY!



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## L Series/S Series Mixing Consoles



The "L" Series offers a range of quality, portable mixing consoles with a built-in 24-bit digital effects processor, 3 EQ bands on each input channel, and a 9-band stereo graphic equalizer for overall frequency correction. Offered in 12 (shown here) and 16-channel boards these mixers are ideal for live sound work but equally at home in your project studio.

The "S" Series are feature packed, versatile and compact mixing consoles for a variety of applications. Offered in 6, 8 (shown here) 12 and 16-channel boards, all "S" Series consoles feature ultra-low noise, discrete mic preamps with +48V phantom power, and deliver extremely high headroom offering extra dynamic range. Perfect for any location mixing or fixed install requirements.



## CLE 8.0

8-Channel Compressor/Limiter/Peak-Limiter/Gate



The CLE line of pro compressors come in 2, 4 and 8-channel (shown here) configurations and have grown extremely popular. These interactive compressors have a robust feature

set and are designed to control signal levels for many applications. Each deliver clean, distortion free compression, brick wall limiting and are unequalled in value.

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# M O T U

## MACHFIVE 1.07 (MAC)

*A high-velocity  
sampling experience in a  
streamlined package.*

By Len Sasso

**M**OTU's entry into the growing field of sampler plug-ins strikes a welcome balance between simplicity and functionality. Although it boasts a long list of high-end features, MachFive never sacrifices its straightforward architecture and easy-to-use interface. For example, all of the operations are managed from a single large virtual front panel, and there are clear, concise pop-up hints for each control and feature. If you're the type who likes to dive right in, you could learn to use most of MachFive's capabilities without

ever cracking the manual. What's more, MachFive comes with almost 5 GB of high-quality sounds, and you can import and convert most popular sampler formats using the included UVI-Extract software.

MachFive is currently available for Mac OS 9 and OS X in several plug-in formats: MAS and VST for both operating systems, and RTAS, HTDM, and Audio Units for OS X. A Windows version supporting VST, DXi, RTAS, and HTDM is due out by the time you read this review. MachFive does not presently stream sample playback from disk, which means you'll need a lot of RAM; at least 1 GB is recommended. (MOTU plans to release a free update shortly that will add support for sample streaming.) To prevent piracy, the software uses the Pace copy-protection system, which requires a USB port for the iLok hardware key (dongle).

MachFive comes in three varieties classified by the number of outputs: stereo, quad, and 6-channel for 5.1 surround. (These are all included and available, when appropriate, in the plug-in menu of the host application.) As of

### Minimum System Requirements

#### MachFive 1.07

**MAC:** G3/500 MHz (G4/800 MHz or dual-processor G4 recommended); 256 MB RAM (1,024 MB recommended); Mac OS 9 or OS X

this writing, the Audio Units format supports only stereo, although the new surround support in Panther may change that in the near future. MachFive is also 16-part multitimbral, allowing a single MachFive instance to play up to 16 different multisampled instruments.

To make full use of MachFive's synthesis and effects options, you need a fast CPU; a G4/800 MHz or better is recommended. For this review, I used a G4/800 MHz PowerBook. By minimizing the use of filters and DSP effects and working in 32-bit mode (more RAM, less CPU), I was able to get 24 voices from the VST, Audio Units, and MAS versions without pushing the CPU meter over 50 percent.

### THE LAYOUT

As mentioned earlier, all of MachFive's operations are carried out from a single multisection control panel (see Fig. 1). That allows for fast and convenient access to all of the features, but some of the text displays are quite small and, especially in the orange areas, difficult to read. Many of the gray-on-gray labels are also unnecessarily hard to read.

The File Browser at the top left of the panel manages samples, presets, Soundbanks, and Performances, all of which must reside in the MachFive Sounds folder on your hard drive. That isn't as limiting as it might seem at first, because aliases to folders containing samples can be used instead of the actual sample data. A preset consists of the multisample map, defining key and Velocity zones (called Keygroups) together with synthesis and effects routings and settings. A different preset can be loaded into each of MachFive's 16 Parts, which are managed in the section below the File Browser.

A Performance consists of all Part settings, together with all MachFive global settings. The same information



**FIG. 1:** MOTU's MachFive 1.07 uses a single control panel with eight functional areas. The File Browser and Part sections (left) manage presets on disk and in memory. The Display Area and Keygroup parameters (center) handle multisample management. The Master section, Part parameters, LFO section, and FX section (right) control output parameters, LFO selection and routing, and effects.



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proven to be  
most rewarding!'

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is automatically saved by the host software along with a project, so Performances are really needed only for exchanging setups between projects. MachFive offers several convenient archiving options when saving Performances: you can elect to simultaneously save all presets with or without their samples, and you can save the Performance as a Soundbank, which saves everything in MachFive RAM in a single, new Soundbank folder.

MachFive supports direct loading (including drag-and-drop) of samples in WAV, AIFF, and SDII format. You can import other sample formats as well as instruments and banks in other sampler formats using the included UVI-Extract software (see Fig. 2). UVI-Extract is launched directly from the MachFive control panel, and its operation is seamlessly integrated with MachFive in the sense that imported data is automatically placed in the correct folders and loaded into MachFive. Supported instrument formats include SoundFont, Giga, Akai, E-mu, Pulsar, SampleCell (instruments and banks), EXS24, and Kurzweil. I converted SoundFont, Giga, SampleCell, and EXS24 instruments without any problems other than having to adjust a few parameters, which is to be expected.

## SUM OF THE PARTS

As I pointed out, MachFive Parts hold presets, but Parts also contain settings beyond those of the preset: for example, MIDI Channel, audio output, and mixer and effects settings. Because the MIDI channel for each Part can be freely assigned, setting up layers couldn't be easier. Using the optional Expert settings, you can assign MIDI notes to mute and unmute individual Parts, you can set up automatic fade-ins and fade-outs across MIDI note ranges, and you can even assign MIDI controllers to fade Parts in and out. Parts also contain alternate settings for octave, tuning, Pitch Bend range, Velocity curve, mono mode, and glide. That allows you to have temporary settings for those parameters saved with the project or Performance without affecting the preset settings.

By default, the Display Area shows a Keygroup Editor in the lower pane and a Sample Editor in the upper pane (see Fig. 3). The upper pane has five additional modes: List Editor, Group Editor, Sample Info, Spectrum Analyzer, and Sample Tuner. The last two are very

## ▼ All of MachFive's operations are carried out from a single multisection control panel.

handy for setting synthesis parameters, such as filter cutoff and EQ, and for fine-tuning individual samples.

The Sample Editor lets you set start and end points, looping style and boundaries, and basic DSP functions, such as normalizing, fading, and reversing. Edits are initially nondestructive, affecting only the sample in RAM, but you can also make them permanent by saving the sample. Although the Sample Editor is the largest part of the MachFive Display Area, it can still be a bit awkward to use for detailed editing. It can, however, be expanded to take up the entire Display Area, which provides a better view of the data, and you can zoom in to the sample level to improve editing accuracy.

The List Editor lets you numerically edit sample-mapping parameters, such as note and Velocity range, base (root) note, trigger mode (several forms of Note On and Note Off triggering are provided), output routing, and routing to four insert effects buses. The Group Editor lets you assign each zone to any of 16 groups (multiple assignments are allowed).

You can then use the Select menu to select all Keygroups in a group and edit their parameters simultaneously.

The Keygroup Parameters section (bottom center) provides subtractive-synthesis-style processing. It includes a resonant multimode filter with overdrive, a pitch-modulation section, and an output-level and pan section. Modulation sources include three AHDSR envelope generators and four multi-waveform, syncable LFOs. Two of the LFOs are global, but all other parameters can be applied on an individual Keygroup basis. MIDI Pitch Bend, Note Number, Channel and Poly Pressure, Velocity, and Control Change messages are also available as modulation sources. (There are 28 modulation sources in all.)

MachFive offers 29 DSP effects and an extremely flexible busing scheme. The effects cover the usual bases and more, including five types of delays, three types of reverb, chorus, flanger, tremolo, phaser, "crossphaser," autopan, rotary speaker, auto wah, multiband EQ, "filter" effects, "drive" effects, and gate. There are also a number of unusual effects, such as Robotizer and UVI Drive. Each of the effects has a submenu for presets, but surprisingly, you can't add your own presets to that menu.

Sixteen effects slots are organized into



FIG. 2: MachFive's included UVI-Extract software allows you to import instrument presets and banks in most popular sample formats.

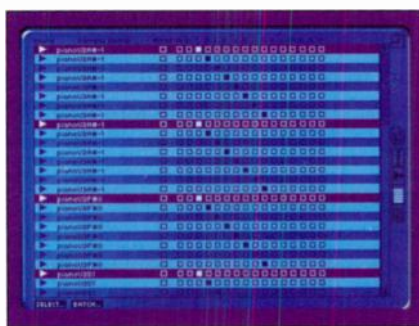


groups of four: four insert effects arranged in parallel for each Part, four more Part effects arranged in series, four send effects arranged in parallel (each Part has its own aux-send controls), and four Master effects arranged in series and applied to MachFive's overall output. As the manual points out, that adds up to a whopping 88 effects paths and 136 effects slots. Of course, DSP effects and synth processing both suck up CPU cycles and need to be used sparingly to maximize MachFive's voice count.

## SOUND BYTES

If MachFive is your first sampler, the large library of included samples will be a welcome addition, and most of the banks are top-notch. The Soundlib Bösendorfer Soundbank is a great-sounding 16-bit, 48 kHz multisampled Bösendorfer grand piano extracted from an upcoming commercial 24-bit, 96 kHz version.

The Electric Keyboards Soundbank contains five Rhodes pianos and two Hammond organs, each sampled with 24-bit, 96 kHz audio quality and offered in four sizes. For example, the largest Rhodes preset has samples for



**FIG. 3: MachFive's Group Editor lets you assign Keygroups to as many as 16 separate groups. Selecting a group lets you edit parameters for all included Keygroups simultaneously.**

every note at four Velocity levels; the smallest preset has two sampled notes per octave at three Velocities. Guitars and Bass is another 24-bit, 96 kHz Soundbank with a modest number of exquisitely sampled instruments: three acoustic guitars, three electric guitars, and three basses.

The Drum Kits Soundbank includes four stick kits and four brush kits in the General MIDI format, and it also includes presets dedicated to individual percussion instruments; the 24-bit, 96 kHz samples are excellently recorded. The rest of the Soundbanks are "sneak previews" of various commercial libraries. I found some usable stuff, but mostly it just whets your appetite for the full versions.

## SPEED OF SOUND

MachFive offers a welcome compromise between complexity and ease of use. Its synthesis and effects sections take you far beyond load-and-play sampler plug-ins that allow you to map and play multisamples but do little else. And best of all, getting around on MachFive is not rocket science; you won't spend a lot of time scratching your head wondering what this or that module does. The software is generally CPU efficient and has the significant advantage of being available in a wide range of plug-in formats. If you are in the market for a professional-level software sampler, especially one with a streamlined, up-front user interface, you should definitely check out MachFive. ☼

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## PRODUCT SUMMARY

### MOTU

MachFive 1.07 (Mac)  
software sampler  
\$395

FEATURES	4.0
EASE OF USE	4.5
DOCUMENTATION	4.0
VALUE	4.0

#### RATING PRODUCTS FROM 1 TO 5

**PROS:** Easy to use. Supports most sampler formats. Flexible effects routing. Includes large library of samples. Versatile editing capabilities.

**CONS:** Doesn't stream from disk (yet). Panel can be hard to read. Requires USB port for copy-protection key.

### Manufacturer

MOTU  
tel. (617) 576-2760  
e-mail [info@motu.com](mailto:info@motu.com)  
Web [www.motu.com](http://www.motu.com)

# CREAMWARE

NOAH

## *A versatile PCI-based synth platform steps out as rackmount hardware.*

By Jim Aikin

Sometimes it's déjà vu all over again. In 1989, Peavey proudly unveiled the DPM 3 and proclaimed that it would never become obsolete because it used general-purpose Motorola DSP chips, which could be reprogrammed to do any type of synthesis. Out of the box, the DPM 3 was a straight-up sample-playback synth, and nobody outside of Mississippi took Peavey's claims very seriously. Indeed, to the end of its days, the DPM 3 was a sample-playback synth and nothing more. But the *concept* was viable; Peavey was just 15 years too early.

In the CreamWare Noah, Peavey's promise is finally coming true. Noah is a spin-off from CreamWare's popular Pulsar synthesis-and-effects platform, which can be installed as a PCI expansion board inside a Mac or PC. Like Pulsar, Noah comes with a handful of software-based synthesizers loaded up and ready to play. In fact, the Noah synths are also available to Pulsar users, though certain Pulsar items such as the modular synth, which would have been awkward to stuff into a unit that can be programmed from a two-line LCD, were dropped from the Noah.

Covering five separate synths in a sin-

gle review, not to mention Noah's capable effects section and its arpeggiator and step sequencer, will take a few pages. So pull on them catfish wadin' boots, and let's get started.

### A VOICE FROM ABOVE

The Noah comes in a sleek gray 2U rack-space unit (see Fig. 1). The 2-line-by-40-character LCD is big enough to read easily, but doesn't show nearly as much information in one screen as the high-resolution display in my trusty Roland JV-2080, whose panel is the same height. Four orange knobs under the LCD are used for data entry and real-time sound control. Located under the big data-entry dial is a slot for a CompactFlash Type I card.

On the rear panel, the Noah separates itself from the pack by including a word-clock input along with an 8-channel ADAT optical audio output and USB port (see Fig. 2). Only two analog audio outputs are provided, but the Noah also has two analog audio inputs, which means you can use it as a synth, an effects processor, or both at once. The absence of multiple analog audio outputs may or may not be a problem for you; many musicians never use the extra outputs on their synths.

The Noah is available in two configurations: standard and EX. The standard model has six DSP chips, and the EX has ten. Thus, the standard model has two DSP slots into which you can insert software synth modules, and the EX has four slots. That makes the standard model two-part multitimbral at most, whereas the EX can be four-part multitimbral and offer more polyphony. If you decide to purchase a Noah, I'd recommend going for the EX model.

Even the EX model is limited in its

polyphony, however. Minimax (a polyphonic Minimoog emulation) loaded into one slot provides three simultaneous notes. If all four slots in the EX are devoted to the Minimax, you get 13 notes, which is about average for the included synths. Granted, digital synths that model traditional analog instruments tend to have less polyphony than sample-playback synths in the same price range, but other modeled analog instruments (from Access and Novation, for instance) manage to squeeze more notes out of their DSP than Noah does.

Although you can use the Noah as a standalone synthesizer, it comes with a CD-ROM containing Noah Remote Editor (Mac/Win) software. The disc also contains drivers that allow the Noah to use USB to receive MIDI data from and exchange audio data with your computer.

### SYNTH STUDIO TO GO

In addition to Minimax, Noah includes synths called Lightwave, Vectron Player, Pro-One, and B-2003. A guitar emulator called Six-String (\$249) is also available (see [www.emusician.com](http://www.emusician.com) for more information). The manual mentions that the Vectron synthesizer (presumably a programmable version of the Vectron Player) is an option, but Vectron's features—unlike those of Six-String and Pro-One—are not covered in the documentation. Vectron is not yet available, and its price has not been announced.

The Noah's memory architecture is a bit more complex than that of most instruments. In Single mode, each synth module has its own memory banks, with 128 presets in each bank. Most of the instruments have one Factory bank (which you can overwrite using the Remote Editor software) and one User bank. Minimax has two Factory banks, however, as well as a User bank. Multi mode provides a Factory bank in which only 32 of the 128 slots contain setups. Minimax and Lightwave each supply a bank designed for use with Vocodizer, Noah's 20-band vocoder model. You can also store effects settings, arpeggiator setups, and step-sequencer patterns.



FIG. 1: The CreamWare Noah brings virtual synthesis capabilities out of your computer and into your equipment rack. Its sound engine depends entirely on the software you load into it.

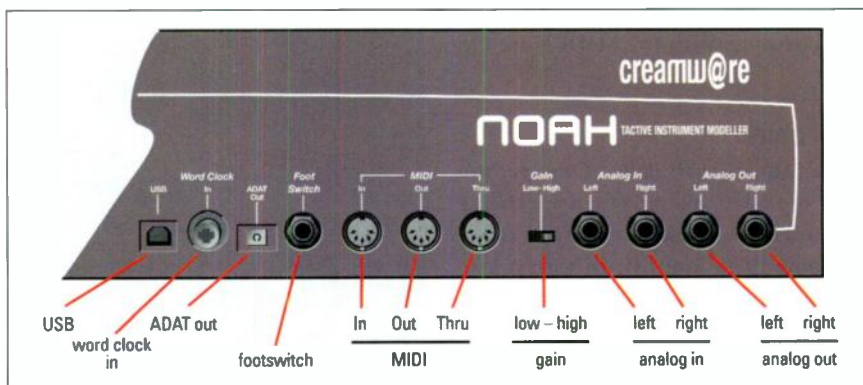


Occasionally, the Noah's user interface and its response to commands betray the fact that the Noah is CreamWare's first standalone synth. It's the little things that trip you up. When naming a preset before saving it, for instance, you'll often want to leave a blank space in the middle of a long name. But because the Noah's list of available characters wraps around, you can't simply twist the data entry dial rapidly a few times to get to the blank-space character, the way you can on some synths; you have to hunt for it.

The documentation is harder to use than it should be. The 160-page printed manual provides no information on the Remote Editor software, for instance. The software installs with no less than 20 different PDF files for documentation, and there's no overall index, though some of the files contain their own indexes. Some PDF files contain the same information as the printed manual, whereas others provide entirely new information. And make no mistake: you *will* need to read the manual. The first time I created a preset in the Remote Editor software that I wanted to save, for instance, I couldn't figure out how to rename it; neither double-clicking nor right-clicking in the name field worked. The correct method is to press the computer's F2 key, which is not exactly intuitive.

## MINIMAX

Because I've been reviewing a lot of real analog synths lately, the first thing I did when I started checking out Minimax presets was to hit the Effects Bypass button. The sound designers at CreamWare are a little too fond of showing off the Noah's capable effects section. The effects tend to obscure the analog character of synth sounds. Once I took care of that detail, I was favorably impressed by Minimax, which sounds *very* analog (see **Web Clips 1** and **2**). Not only were the tones satisfyingly thick, but I was able to play clear up to the top of my 88-note MIDI keyboard without hearing a trace of aliasing. Although the Noah doesn't have as many knobs as a real Minimoog, tapping the Control button brings up 4 sets of 4 controller knobs,



**FIG. 2:** The Noah's rear panel provides two analog outputs, two analog inputs, a gain switch, three MIDI ports, a footswitch jack, a Lightpipe output, a word-clock input, a USB port, and the power switch.

for a total of 16 parameters you can adjust in performance.

Minimax is a pretty faithful recreation of the Minimoog—maybe a little too faithful. Like its inspiration, it doesn't have a dedicated LFO, so you have to switch oscillator 3 to low-frequency mode to get an LFO. The filter is strictly a 24 dB-per-octave lowpass. Keyboard tracking of the filter is programmed with two switches (1/3 and 2/3), exactly as on the original, which is usable but not exactly state-of-the-art. And both envelopes are attack-decay-sustain types, with an on/off switchable release stage. Bob Moog himself didn't try for nearly that level of historical accuracy in his new Minimoog Voyager. The only enhancements I spotted in Minimax were that it has adjustable Velocity response for amplitude and filter cutoff and that Aftertouch can control the filter cutoff; of course, it's also polyphonic.

## LIGHTWAVE

Lightwave is another modeled analog synth, but with a more modern design than Minimax (see **Fig. 3**). It provides dual multimode filters, stereo panning, two LFOs, and three ADSR envelopes with Velocity and key-follow modulation. You can switch the two filters to either parallel or series routing, and each of the two oscillators can send its output to either filter or both. Using balance modulation, you can even crossfade an oscillator's output between the two filters—a solid, effective setup.

Lightwave's oscillators provide 128

different single-cycle digital waves, including noise and something called ReadingRoo, which is not explained in the manual and produces no sound. A parameter called Grunge lets you slightly boost the highs in the waveforms. Lightwave uses different oscillators than Minimax, and it is not free of aliasing in the upper range. I even heard aliasing on the sine wave in the Init patch; that doesn't happen with a true sine wave. CreamWare says that Lightwave uses a sampled sine rather than generating the waveform with modeling technology.

According to the manual, the Lightwave oscillators are "equipped with the wave shaping technology of the legendary Prophet VS." Be that as it may, Lightwave has no waveshaping per se—no pulse-width modulation, ring mod, or anything of that sort—nor does it have four oscillators or an x-y envelope, which the VS had. The VS *did* have aliasing in the upper register, though; they got that part right.

Nitpicking aside, Lightwave is a good-sounding synth (see **Web Clips 3** and **4**). Some of its presets are a little dated, but others are quite striking and modern. I quickly warmed up some of the glassy new-age chimes and pads, such as the vocal-like PPG Soft. The spitty attack of the Dark RnB sub-bass inspired a riff that I could easily turn into a tune, as did the grinding sawtooth wave of Fade2Bass. On the other hand, I heard disturbing intermittent clicks in Digi SQ 02. I also noticed several patches in which an LFO

being used for rhythm didn't synchronize correctly with the MIDI Note On event.

## PRO-ONE

Noah's third synth is Pro-One, yet another modeled analog. (I sense a theme here.) The Sequential Pro-One was a fearsome little monosynth with a low-pass filter that could squeal like a stuck pig, and CreamWare has modeled it faithfully, right down to the odd set of modulation routing switches at the left end of the panel (see Fig. 4). Those switches were confusing the first time around, and they're still confusing.

The original design has been enhanced with polyphony and Velocity response. Unlike Minimax and Lightwave, Pro-One includes both oscillator sync and pulse-width modulation. Pro-One has a tight, solid sound, and bypassing the effects gives it a nice vintage flavor, though it sounds good with effects, too (see [Web Clips 5 and 6](#)).

## B-2003

And now for something completely different. If you've never spent any time with a real Hammond drawbar organ, the parameters in CreamWare's B-3 model might seem a little bewildering. Veteran organists, however, will be delighted that everything in their gig bag is reproduced here: key click, percussion, rotary speaker braking and acceleration time, leakage, and so on (see Fig. 5). Separate sets of drawbars are provided for the upper and lower man-



**FIG. 4:** Although not as well known as the Minimoog, the Sequential Pro-One monosynth is considered a classic by analog aficionados. In the Noah, it is faithfully re-created in software.

ual and pedals, and you can set them to separate MIDI channels if desired, or combine them on one channel and play them using a three-way keyboard split.

A few items not found in the original B-3 have been added to the B-2003. You can switch Velocity response on or off (to control loudness only; Velocity can't be routed to the percussion or key click). A cute knob called Condition adds some detuning to each tonewheel, thus mimicking the sound of a Hammond that's badly in need of a trip to the repair shop. You can control drawbar leakage and distortion. The pitch of the percussion can be set to any of the drawbars, not just the second or third, and both percussion level and decay time are programmable. Unlike the other Noah synths, the B-2003 keyboard is fully polyphonic.

Like most B-3 emulators, Noah lacks

real drawbars. Fortunately, it was easy to assign the sliders on my MIDI slider box to control the drawbars in real time. Noah's drawbar-to-MIDI assignments are fixed and not programmable, but that's not a problem unless the sliders on your master keyboard can't be reassigned either. In addition, Control Change 4 (footpedal) operates as a loudness control, and you can switch the Leslie simulator from slow to fast with the mod wheel or Aftertouch (see [Web Clips 7 and 8](#)).

## VECTRON PLAYER

Vectron Player is a four-oscillator synth that uses two-dimensional crossfade envelopes similar to those on the Prophet-VS. Although Vectron Player is not a programmable synth, you can select and program the effects, so it's a bit more than just a preset player. Filter cutoff and resonance are also programmable.

Vectron Player's pads are sweet, with plenty of animation, and its keyboard comps are very usable. The preset list doesn't include much in the way of basses, and the leads (none of which is in Mono mode) tend to be more new age than cutting edge.

## STEP AND ARPEGGIATE

As arpeggiators go, the Noah's is toward the middle of the pack. It sports a number of useful parameters, from standard (gate time and direction) to mildly exotic (an LFO that can modulate note Velocity as the pattern



**FIG. 3:** Noah's Lightwave synth is a two-oscillator design with dual multimode filters and two LFOs (not shown on this panel).



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FIG. 5: The drawbars on Noah's Hammond organ model exist only in software, but you can control them from a MIDI slider box.

plays). Using the arpeggiator's Hold/Transpose button, you can set up a pattern and then move it around with one finger on the keyboard. You can trigger basic control switches (Run/Stop, Clear, Hold, Scan Direction, and so on) from an assigned range of notes on a MIDI keyboard, which is handy for live performance.

If you have a Noah EX, four arpeggiators can run at the same time, each in its own slot. For folks who like arpeggiating, that's a big plus. On the downside, the arpeggiator is strictly monophonic, and swing/shuffle can't be applied to the rhythm. Initially I was baffled by how to get the arpeggiator running. Clicking on the Run button in the remote software didn't activate it. As it turns out, the synth you want to arpeggiate needs to have its MIDI input switched to Arpeg in Noah's MIDI Manager window. That makes a certain amount of sense, but it isn't as tightly integrated a design as you'll find in some hardware synths.

Instead of (or combined with) the arpeggiators, you can run as many as four step sequencers at the same time. The sequencers are also monophonic, and sequences can have a maximum of 16 steps each. Individual steps within the sequence can be set to a length of more than one time-step (for example, three 16th notes rather than one), and the overall length of the sequence can be adjusted to a maximum of 16 half, quarter, eighth, or 16th notes, making

complex rhythms possible. Programming a step with a zero Velocity turns it into a rest. You can also transpose sequences with one-finger keyboard performances.

## AFTER EFFECTS

In addition to chorus, delay, and reverb, for which each channel in the Noah

mixer has sends, the Noah provides two insert effects. The insert effects can be used with individual synth sounds, for processing the external audio inputs, or on the Noah's main audio outputs.

The list of available effects is fairly long, and the effects I tried sounded quite good. Several flavors of flanger, phaser, and chorus are provided, along with some distortion algorithms, pitch shifters, autopan, tremolo, dynamics control, EQ, and so on. Suffice it to say, the Noah is no slouch in the effects department.

I had no trouble using the insert effects with the analog inputs or the USB audio input. Loading an audio loop into Cubase SX, processing it with the Noah through USB, and then bouncing the output back to Cubase (again, through USB) worked perfectly the first time I tried it.

## THE SOFTWARE SIDE

Jumbled software installation instructions always make me a bit nervous. So when CreamWare started explaining

## Noah Specifications

<b>Sound Engine</b>	analog modeling, drawbar organ modeling
<b>Included Software Models</b>	Minimax, Lightwave, Vectron Player, B-2003, Pro-One, Vocoderizer, Interpole, arpeggiator, step sequencer
<b>Maximum Polyphony</b>	model-dependent: Minimax, (6) notes (EX, 13); Lightwave, (12) notes (EX, 16); Pro-One, (5) notes (EX, 11); Vectron Player, (7) notes (EX, 14); B-2003 has full keyboard polyphony for each DSP slot (2 instances in standard model, 4 in EX)
<b>Multitimbral Parts</b>	4
<b>Analog Audio Inputs</b>	(2) unbalanced 1/4"
<b>Analog Audio Outputs</b>	(2) unbalanced 1/4"
<b>Digital Audio I/O</b>	8-channel ADAT Lightpipe; BNC word-clock in
<b>MIDI</b>	(1) In, (1) Out, (1) Thru; additional In/Out via USB
<b>Additional Control I/O</b>	USB; footswitch jack (not currently supported)
<b>Program Memory</b>	(256) per synth model; (384) Minimax
<b>Effects</b>	aux chorus, delay, reverb; 2 insert effects (including EQ, chorus, flanger, phaser, pitch-shift, autopan, autowah, tremolo, filter, distortion, and dynamics)
<b>Software</b>	Noah Remote Editor
<b>Display</b>	2-line × 40 character backlit LCD
<b>Dimensions</b>	2U × 11" (D)
<b>Weight</b>	8.36 lb.



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PRODUCERS AND ARTISTS  
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FOR SHARING THE GIFT OF MUSIC."  
-TRISHA YEARWOOD

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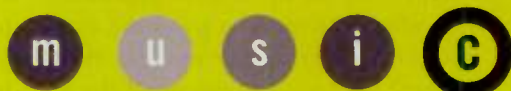
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the Noah software's installation procedure with "Verify that both Noah and the computer are switched on" in Step 1, and then says in Step 2, "Start the computer," followed in Step 4 by "Start Noah by pushing the power button," I can only shrug and say, "Guess I'll have to wing it."

Fortunately, installation was painless. The software (which I installed for Windows; Mac OS X support is also available) has two components: the Noah Remote Editor and a USB driver that handles audio, MIDI, and data communications between the Noah and the computer.

The Remote Editor is extremely useful. It provides luscious graphic front panels for all of the Noah devices and also allows you to archive banks of presets. The Remote Editor is not actually required to program the Noah, as all of the parameters are available in the instrument's LCD. But if you have a computer, the software will make using the Noah a lot faster and more fun.

I had some problems with the USB connectivity, however. To start with, six channels of USB audio are planned,

but currently only two channels are implemented. (The ASIO driver is still in development, but it should be released by the time you read this.) Also, whenever the Noah was hooked up to my computer's USB port, I heard soft but persistent motorboat noises coming from the audio output of the M-Audio Delta 66 that serves as my computer's main audio interface. The Delta is not a USB device—it lives on a PCI board—but somehow, the Noah was contaminating its audio stream. That was true



### The Noah is no slouch in the effects department.

even when the Noah itself was switched off, but pulling the USB cable from the Noah caused the noises to stop. CreamWare speculated that perhaps the Noah hardware unit I was reviewing had a ground loop problem. Aside from that, the Noah worked acceptably as an adjunct to Cubase, but it didn't perform as seamlessly as it might have, either in the MIDI department or in the audio realm.

When I first selected the Noah's USB MIDI as the output for a Cubase track, I could see the Noah's USB light blinking, indicating that the MIDI data was getting through, but I heard no sound. It turns out that you have to switch a given Noah synth to receive MIDI through USB rather than from the rear-panel MIDI jack. For an instrument that has tons of polyphony, that type of setup (which effectively gives the Noah 32 MIDI channels) would make a lot of sense. However, it's physically impossible to use more than 12 MIDI channels with the Noah EX, or 6 channels with the standard model. (The B-2003 can be instantiated separately in all four slots of the EX, and each instance can use up to three channels.) So why force users to go to the extra step of selecting the correct MIDI input? Why not just dump all the in-

coming MIDI data into the same buffer?

On the audio side, playing back Cubase's audio through the Delta 66 using the ASIO DirectX Full Duplex driver produced lots of nasty crackling noises. Using that driver was necessary for Cubase to send and receive the Noah's USB audio, so after bouncing a Cubase track through the Noah's effects, I had to go into the Cubase Device Setup area and manually select the M-Audio Delta ASIO driver to hear the results. Fortunately, the noises weren't recorded into the file.

### WILL IT FLOAT YOUR BOAT?

The Noah is an ambitious attempt to provide musicians with high-quality physically modeled sounds in a rack-mount box suitable for stage or studio. The sounds are exceptional, and the rear-panel USB, ADAT, and word-clock connections are bound to please high-end users. There's nothing else quite like this synth; several other modeled analog rackmounts are on the market, but none of them has a choice of analog models, a Hammond organ model, or an optional guitar model. Nor can they process tracks recorded in your computer-based DAW without the signal leaving the digital domain.

Even so, I suspect the appeal of the Noah may be limited. On the hardware side, it's competing with synths that have more polyphony and sexier user interfaces. On the computer side, it's competing with CreamWare's own Pulsar PCI board. Although the Pulsar has fewer DSPs, it can run all of the Noah synths and more. In addition, the Pulsar functions better as an audio interface for your computer, takes up less space, can be expanded in various ways, and costs less to boot. The dual advantages of the Noah for computer users are that it can interface with a laptop and that it is likely to be a lot more reliable on the road.

Ultimately, though, what matters about any musical instrument is the sound. The Noah has a wide-ranging palette of high-quality sounds, and I'm going to be sad to see it leave my studio. ●



PRODUCT SUMMARY

CreamWare

Noah

DSP engine/synthesizer

\$1,225

EX model \$1,549

FEATURES

4.0

EASE OF USE

3.0

QUALITY OF SOUNDS

4.0

VALUE

4.0

RATING PRODUCTS FROM 1 TO 5

PROS:

Several types of synthesis in one box. Word-clock and ADAT Lightpipe connections. External audio input for effects. Includes editing software.

CONS:

Limited polyphony. USB driver adds noise to some (non-USB) computer audio outputs.

Manufacturer

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# STEINBERG

D'COTA 1.0 (MAC/WIN)

*Unique sounds from a familiar architecture.*

By Jim Aikin

**D**'cota is a VSTi plug-in that offers two unusual kinds of synthesis as well as analog-like capabilities. These allow you to create animated, plucked, and metallic tones that have extraordinary richness (see **Web Clip 1**).

Except in a few details, D'cota is a stripped-down repackaging of the VirSyn TERA software synthesizer. Steinberg's intent was to offer a simplified version of the program that has the same sound quality but is quicker and easier to use. (For more information about VirSyn TERA, see "Virtual Workstations" in the March 2003 issue of **EM**, also available online at [www.emusician.com](http://www.emusician.com).)

## THREE IN ONE

D'cota is set up as three separate synthesizers in one VST plug-in. With two trivial exceptions, the three front panels don't interact with one another. Using the blue buttons in the upper right corner of the D'cota window, you can choose the panel you want to see: Analog, Spectrum, or Wave. D'cota is 8-part multitimbral, so you don't have to instantiate the plug-in multiple times in order to use all three synthesis methods.

All three panels share a single set of four ADSR envelope generators, two LFOs, and three built-in effects processors (distortion, delay, and chorus/flange/phase; see **Fig. 1**). Each multitimbral part has its own effects, which is a big plus.

The Analog panel has three oscillators and a resonant multimode filter. FM, hard sync, wave modulation, and an arpeggiator are available, and you can choose from a list of 64 single-cycle waveforms. This is a beefy-sounding and capable synth. For basses, leads, and pads, it will do the job with power to spare.

Spectrum is a wonderful source for thick, shimmering pads, otherworldly

## Minimum System Requirements

### D'cota 1.0

**MAC:** G4/400 MHz (500 MHz recommended); 20 MB free RAM; Mac OS 9 or OS X 10.2; VST 2.0-compatible host application

**PC:** Pentium III or Athlon/600 MHz (800 MHz recommended); 20 MB free RAM; Windows 2000 or XP; VST 2.0-compatible host application

bells, and timbres that are difficult to describe. You have independent control over two frequency spectra using a graphic display, and you can morph between the spectra, sweep them up and down, and use as many as six oscillators with any amount of detuning; large amounts produce truly massive tone clusters. I love this tone generator. No studio should be without one.

Wave uses a simplified version of the Spectrum synth as one of its sound sources (see **Fig. 2**). Its output is routed through three fast delay lines with feedback—comb filters, in other words. The three filters can be detuned from one another to get beating or tone clusters. In my experiments, this synthesis method proved a bit hard to control. I got some evocative steel-pan sounds and tormented organs, but tweeter-melting overtones sometimes jumped out at me when I played up and down the keyboard.

Filling out the remainder of the Wave panel is a 16-step analog-style sequencer. This only works with the Wave synth; neither Analog nor Spectrum has this type, but that's not much of a loss, because it's not much of a sequencer. For each step, you can choose the MIDI note, Velocity, and one controller amount, which can be used for various types of modulation. You can create up to 16 separate sequences, each of which can be assigned a trigger key on the MIDI keyboard, and each D'cota patch can store its own set of sequences. I was hoping to be able to trigger several sequences from the keyboard at once to get some syncopated polyphony, but it turns out this is possible only in multitimbral operation,



**FIG. 1:** D'cota's three synth panels (including the Spectrum display, shown here) appear in the upper half of the window. The envelopes, LFOs, and effects in the lower area are common to all three panels.



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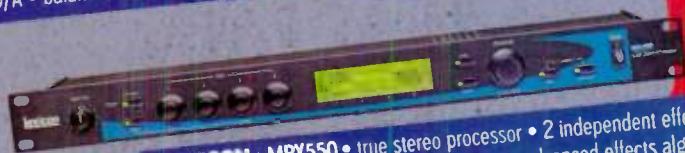
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## • D'COTA

because only one sequence will play at a time on any given channel. The sequencer is supposed to be able to create legato steps, but I couldn't get that feature to work. Individual steps can be turned into rests, but the pattern as a whole is always 16 steps long.

### MODULATION ROUTINGS

Click on the button labeled C to bring up a strip of buttons with which you access D'Cota's modulation routings. On the strip are buttons for the envelopes, LFOs, Velocity, and so on. Click on one of these buttons and the knobs affected

by the chosen modulation source will get blue or orange shading.

This system is easy to understand, but not so easy to use. You can only view the destinations and amounts for one controller at a time, and you have to close the controller strip before editing the basic values of parameters. When the strip is open, each time you touch a knob with the mouse you'll be editing the modulation amount, not the value of the knob itself. Since it's often necessary to adjust basic parameter values side by side with modulation amounts, I found that I had to

### TERA VS. D'COTA: HEAD TO HEAD

So let's say you want to save \$30. What will you be missing out on if you buy D'Cota rather than TERA, and what will you get that TERA owners don't? Here are the most significant differences:

In the plus column for D'Cota, the Wave synthesis page has three delay/comb filters, which can be detuned from one another. TERA has only one, the Wave Delay module. Depending on your processor, D'Cota can yield 128 voices and TERA 64 voices. D'Cota's Spectrum panel gives you a choice of six waveforms; TERA's Spectrum Oscillator offers only one. D'Cota also has a random patch generator.

In TERA, audio-signal routing is user-configurable at such a deep level that it's doubtful many sound designers have fully explored the possibilities. On the other hand, D'Cota has major timbral limitations, because its signal routing of audio is fixed. For example, you can't run the output of D'Cota's Spectrum or Wave through the filter in the Analog panel. The Spectrum panel has its own cut-off knobs, but the filtering they provide is always lowpass and is not resonant. TERA's Spectrum Oscillator has one knob, labeled Spectrum, that provides lowpass filtering for both the A and B spectra. In TERA, the Spectrum Oscillator and Wave Delay

can be run through all three of its filters, in series, parallel, or both at once. They can also be used as a source for FM and ring modulation.

Envelopes in TERA have an initial delay stage that was omitted from D'Cota's envelopes, and TERA's envelopes can be triggered by its LFOs. In addition, TERA has four LFOs, whereas D'Cota has only two. TERA's method of handling modulation routings is more precise and easier to use than the D'Cota method. In TERA, precise numerical values are displayed for the modulation amounts, and you can move knobs on the panel while a modulation-amount box is open.

TERA runs either standalone or as a VST plug-in, but D'Cota is strictly a VST plug-in. TERA is 16-part multitimbral and has global reverb and chorus effects in its mixer section. D'Cota is 8-part multitimbral and has no global effects. TERA provides multiple banks of 128 programs each, all of which can be accessed directly from pull-down menus. D'Cota ships with three banks of 64 programs each, and only one bank is active at a time.

Last but not least, TERA has a unique four-panel mouse-operated control surface (D'Cota has none) and a powerful step sequencer and arpeggiator that dwarfs the toylike sequencer and arpeggiator in D'Cota.



open and close the controller strip repeatedly while editing patches, which was a bit annoying.

## THE WAVE SYNTH

The idea behind D'cota's Wave panel is simple, yet powerful: take an audio source and run it through three fast delay lines in parallel; allow the user to control the amount of feedback in the delay lines, so that they become highly resonant; put a gentle lowpass filter in the delay loop so that tones can gradually lose their highs while decaying; allow the delay lines to be detuned from one another for chorusing and tone cluster effects; and allow them to track the keyboard so they behave like oscillators. The rich tone colors produced by the Wave synth range from glassy bells to ethereal pads.

D'cota provides two audio sources for this algorithm—a slightly simplified version of the Spectrum (as I



FIG. 2: D'cota's Wave panel includes a simplified Spectrum tone generator (left) and a step sequencer (right). The horizontal bar above the envelopes is for editing modulation routings.

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## • D'COTA

mentioned earlier) and a noise source. If you use an envelope with an instant attack and a quick decay, so that the audio input to the delay lines is no more than a quick impulse, you have a classic Karplus-Strong plucked-string algorithm. With a more sustained input, the delay lines function as resonators. And because the noise source (a knob labeled Crackle) can be given its own envelope, you can add a little sparkle to sustaining tones even after the Spectrum Oscillator has provided the impulse and then vanished.

## SPECTRUM OSCILLATIONS

The Spectrum tone generator allows you to draw two independent frequency spectra and morph between them. Up to six oscillator tones can be fed into the input of the spectra, and there are half a dozen waveform choices. A pair of cutoff knobs let you squash some of the highs if you need to. A more exotic knob called Raster lets you skip some of the overtones in the middle of the spectrum.

Modulating the morph knob from an envelope or LFO can provide some spectacular animation. As you detune

the six oscillators from one another, even richer effects come into play. Add a little stereo delay and you might

**I love the Spectrum  
tone generator. No  
studio should be  
without one.**

discover a dream cathedral organ or the steam pipes from hell. The Spectrum panel is a wonderful resource for anyone who's searching for fresh electronic sounds.

## FARGO, D'COTA

Considered on its own merits, D'cota is a respectable plug-in synth that is capable of a broad range of inspiring tones. (For audio examples, see **Web Clips 2, 3, and 4**). And during the review period, the software was extremely stable.

In retooling VirSyn TERA as D'cota, Steinberg got rid of TERA's deeper and more powerful features. (For a direct comparison between the two synths, see the sidebar "D'cota vs. TERA: Head to Head.") If D'cota's price reflected a reduction in features, it would be a worthwhile purchase for those who don't need everything that TERA has to offer. However, the difference between the two programs is a mere \$30—D'cota lists for \$249.99 and TERA for \$279.

Steinberg justifies D'cota by suggesting that it is significantly easier to use than TERA. For newcomers to synth programming, this may be true. Although mastering TERA's signal routing takes a few minutes of study, the program is very well designed ergonomically. In my opinion, the major increase in power more than compensates for the very minor increase in effort.

If Steinberg were to set a more realistic price for D'cota, I'd recommend the synth without hesitation. For anyone who needs vibrant, expressive electronic sounds, it has a lot to offer. ☺

## PRODUCT SUMMARY

### Steinberg

D'cota 1.0 (Mac/Win)

VST synthesizer

\$249.99

FEATURES	3.0
EASE OF USE	3.5
QUALITY OF SOUNDS	4.0
VALUE	2.0

## RATING PRODUCTS FROM 1 TO 5

**PROS:** Powerful. Rich-sounding. Unusual types of synthesis.

**CONS:** Separation between analog panel and other synthesis types significantly reduces timbral flexibility. Less bang for the buck than VirSyn TERA, from which it's derived.

## Manufacturer

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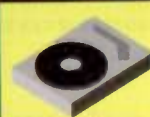
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# Quick Picks

## AUDIX

### D6 Sub Impulse Dynamic Instrument Microphone

By Brian Knave

Audix designed the D6 Sub Impulse Dynamic Instrument Microphone (\$349) for use on kick drums, both in the studio and onstage. This rugged and handsome mic is machined from aluminum and is available in a black anodized or a nickel finish (although the nickel costs more). Weighing less than half a pound, the D6 is light and compact, and its cardioid pattern makes it less placement sensitive than Audix's other kick-drum mic, the subcardioid D4. The D6's maximum SPL handling is rated



at an impressive 144 dB, but based on my tests that figure seems modest—I couldn't get the D6 to distort no matter how hard I slammed it.

As the D6's frequency-response plot makes clear, "sub impulse" is no misnomer. Its low-end boost peaks nearly 14 dB at 60 Hz and is 4 dB up even at 20 Hz; it then trails smoothly down to flat at around 600 to 900 Hz. The mic's high-end boost is even more radical: 15 dB up between 4 and 5 kHz (the range that engineers typically boost to add "click") and nearly 17 dB up between 10 and 12 kHz. Despite the big frequency contours, the D6 sounds quite natural.

### Fixer-Upper

When the D6 arrived for review, I was in the middle of an album project, recording with my 20-inch Gretsch kick drum (double headed with a hole cut in the front head and some muffling on each head). As good as that drum sounds live, it has always presented difficulties in the studio: it tends to sound too resonant and "boingy" and it never seems quite low enough. The D6 took care of all that and then some. I could hardly believe how good the track sounded in the monitors: huge and fat on the low end, clear in the highs, with practically no boinginess, yet very natural.

My enthusiasm for the D6 only increased as I tried it out on other kick drums. On my 22-inch Ayotte kick, for example, which sounds great no matter what mic you put on it, the D6 provided the best kick-drum sound I've gotten in my studio. It also sounded awesome on a vintage 22-inch Ludwig kick with the front head off. The only kick I tried that wasn't so appropriate for the D6 was an 18-inch jazz-tuned bopper (both heads tuned taut and no muffling on either). On that drum, the D6's big low-end emphasis made the drum sound somewhat unnatural and over-the-top (though still very usable).

The D6 tracks were a cinch to mix, as well. I ended up using the mic on all the remaining songs for the album, and the resulting tracks required little or no EQ during mixdown. If anything, I found myself reaching to turn down the lows—typically a decibel or two at 80 Hz (low shelving) and a few more between 220 and 250 Hz, depending on the song. But I'd rather a mic produce a surfeit of the frequencies I want rather than not enough—it's easy to cut

abundant frequencies, but impossible to boost those not present.

### Sub, Dude

Fortunately, I still had my test recordings from a bass-drum mic roundup I wrote with Myles Boisen in 1999 (see "Kickin' It" in the February 1999 issue of *EM*, available at [www.emusician.com](http://www.emusician.com)). Testing the D6 side by side with seven other kick-drum mics, the Audix D6 compared most favorably. It captured plenty of attack and low end, without sounding unnatural or overly hyped, and without making different kick drums sound alike.

In terms of sheer low-frequency content, the D6 produced by far the biggest, fattest, and lowest lows of the bunch. With the D6, Audix has not only rounded out its D-series of dynamic microphones, it has added a wonderful and very potent new voice to the world of kick-drum mics.

### Overall EM Rating (1 through 5): 5

Audix USA; tel. (800) 966-8261 or (503) 682-6933; e-mail [info@audixusa.com](mailto:info@audixusa.com); Web [www.audixusa.com](http://www.audixusa.com)

## BIAS

### SoundSoap 1.1 (Mac/Win)

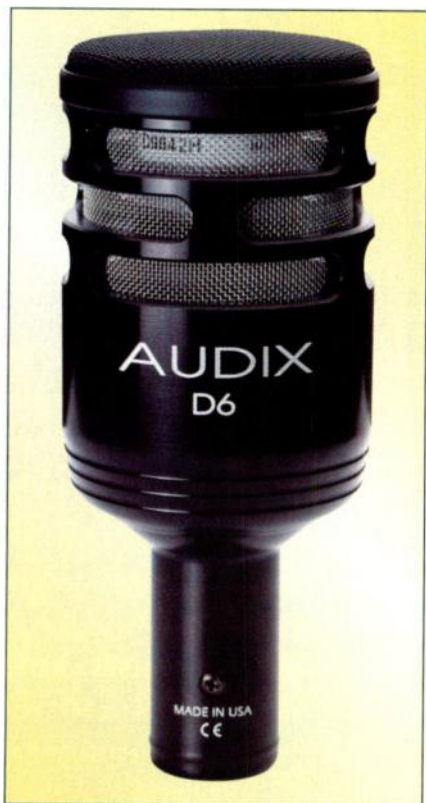
By Marty Cutler

Whether it's for archiving old recordings or restoring master tapes, most studios need a tool that reduces or eliminates unwanted noise from audio files. For that reason, BIAS has introduced SoundSoap (Mac/Win, \$99), an inexpensive program designed to remove common artifacts from musical and spoken-word material.

SoundSoap can be used standalone or as a VST and DirectX plug-in. Mac users will need OS X 10.2, and Windows users will need Windows XP Home or Professional. I tested SoundSoap (on a dual-processor Mac G4/1.42 GHz running OS X 10.2.6) as a standalone program, as a plug-in within Steinberg Cubase SX 2.0, and in Digital Performer 4.1 (using FXpansion's VST-to-AU Adapter).

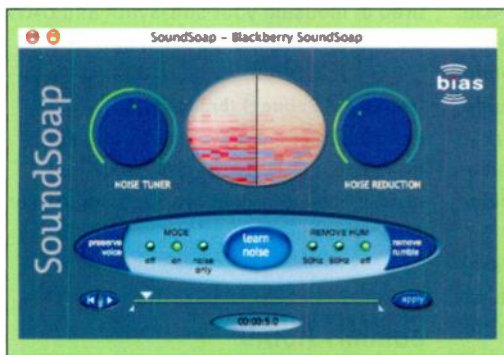
### What's the Buzz

SoundSoap's interface is surprisingly simple. The Wash window shows the



Although the Audix D6 offers a hefty high- and low-end boost, it sounds natural and can bring out the best in a bass drum.





**BIAS SoundSoap's user interface is simple and intuitive to use. For example, buttons are dedicated to removing specific kinds of artifacts, such as 50- and 60-cycle hum.**

amount of unwanted audio debris in red and the unaffected audio signal in blue. The Noise Tuner control homes in on the offending frequencies, while the Noise Reduction knob adjusts the amount of noise reduction.

The Preserve Voice button automatically removes frequencies beyond the range of the human voice. When I applied this process to snippets of phone interviews, most of the background noise and hum generated by my cheap Radio Shack phone mic was removed. I wish I had had this capability years ago, because it would have saved me hours of wringing intelligibility from the original sound files.

Additional radio buttons select the listening mode: Off (no noise reduction); On (noise reduction engaged); and Noise Only, which lets you hear only the material that will be removed, so you can avoid losing useful content. The Learn Noise button samples the noise content, and once SoundSoap previews the track, it automatically adjusts the noise-reduction frequency and amount. Giving SoundSoap an area of isolated noise to work on allows the program to get a more accurate reading of the noise content of the file.

### The Rinse Cycle

SoundSoap includes buttons for removing 50 and 60 Hz hum, and it has a Remove Rumble button that cuts off frequencies below 40 Hz. Although it didn't remove the hum entirely, the 60 Hz button significantly lowered this artifact on a recording of a Stratocaster that had shielding problems.

Things are a bit trickier when you remove higher-frequency noise with Sound-

Soap. Use too much noise reduction, and the track will lose its high-end snap and sizzle. Extreme settings will remove attack transients, but that's not always a bad thing. With Noise Reduction full on and the Noise Tuner set at about one o'clock, I was able to transform a mediocre General MIDI 12-string guitar into a very close approximation of a Joe Zawinul lead sound with a hornlike attack. Conversely, I was able to use the Noise Only settings to create the sound of a cheap, phase-shifted banjo from the same file—perhaps

not a sound on everyone's wish list, but you never know.

The standalone version of SoundSoap has transport controls for file playback and a small window that indicates the absolute-time location in the file, down to a tenth of a second. Left and right markers select boundaries for processing: you can select in and out points on the fly by typing I or O. The markers come in handy for processing files with multiple, but differing, noise problems.

To finish the job, hit the Apply button to commit your noise-reduction settings to the file. The plug-in version of SoundSoap relies on the host program's transport, selection, and time-display features as well as the host's bouncing resources to process the file.

### Come Clean

SoundSoap is not perfect for every noise-reduction application; it is not designed for decrackling or removing pops and clicks. Those who need a broader selection of noise-reduction options may need to look elsewhere. However, SoundSoap does an admirable job of removing hum, rumble, and other relatively steady-state noise. (BIAS recently introduced a high-end version called SoundSoap Pro, which should be shipping in early 2004.)

It is inevitable that removing noise from an audio track will affect the overall sound

quality of the material to some degree. Nonetheless, SoundSoap gives you a simple, elegant, and painless way to remove or reduce some of the most common sonic pollutants at a price that won't take you to the cleaners.

### Overall EM Rating (1 through 5): 4

BIAS (Berkley Integrated Audio Software); tel. (800) 775-BIAS or (707) 782-1866; e-mail sales@bias-inc.com; Web www.bias-inc.com

## EVOLUTION ELECTRONICS

### U-Control UC-33e (Mac/Win)

By Mark Vail

The expanding universe of USB/MIDI control surfaces has just expanded a bit more with the introduction of the Evolution U-Control UC-33e (\$329.95). This compact upgrade of the original UC-33 offers a nice array of faders, knobs, and buttons for transmitting a variety of MIDI messages and SysEx data. The UC-33e comes with Mac and Windows drivers and lets you simultaneously control as many as 47 parameters on a wide range of virtual and hardware devices, including DAW mixers, software synths and samplers, and General MIDI modules.

As its name suggests, the UC-33e provides 33 factory presets for products from a number of companies, including Native Instruments, Propellerhead, Steinberg, CakeWalk, and Creative Labs. You can easily



Evolution's compact U-Control UC-33e MIDI control surface lets you control up to 47 different parameters. Its 33 memory locations come packed with editable presets for a variety of software and hardware instruments.

reorganize the presets, edit them, or replace them with your own presets; there is a librarian program for PC users.

## Let It Slide

The UC-33e's front panel is adorned with 9 faders, 24 knobs, 28 buttons, and a blue backlit LCD. The ninth fader makes an excellent addition to the usual bank of eight; it serves well for adjusting the master volume (or any other parameter).

All of the faders and knobs are user-assignable, as are half of the buttons. The 60 mm ALPS faders have a fairly smooth feel, and each fader has a small green LED that helps you keep track of the fader positions under poor lighting conditions. That's a nice touch, although I'd rather have only the assigned faders light up. The 24 knobs rotate uniformly and are laid out with plenty of room for average-size hands.

The UC-33e comes with five plastic overlays that identify the various fader, knob, and button assignments for different set-ups. Four are labeled for specific applications: Native Instruments B4 and Pro-53, Ableton Live, and the Mixer Channel Strip in Steinberg's Cubase SX and Nuendo. The fifth overlay is unlabeled, so you can mark it up according to your needs. Additional blank templates are available from the manufacturer.

The UC-33e's back panel sports MIDI In and Out jacks, a power switch, a 9 VDC input, and a USB port; a 7-foot USB cable is provided. A power supply is not included, because the unit is powered by USB when connected to the computer. (A power supply is needed only for standalone operation away from a computer.) The UC-33e's silver plastic case measures 12.75 inches wide by 2.5 inches high by 8.5 inches deep. When it isn't in use, I can tuck the unit conveniently beneath my G4 PowerBook (which sits on a Griffin Technologies iCurve stand).

## Under My Thumbs

I mainly worked with the UC-33e in Mac OS X 10.2 and tested the device with an assortment of music applications. One of the coolest presets is for Native Instruments B4, a virtual instrument that simulates a Hammond B-3 organ. With the latest standalone version of B4 for OS X, I can play the organ from my keyboard while

controlling B4 parameters from the UC-33e.

The UC-33e's nine faders integrate especially well with the B4's virtual drawbars thanks to the controller's Drawbar mode, which globally sets the faders to work in reverse. In Drawbar mode, pulling a fader toward you increases a parameter value the way that B-3 drawbars do.

Another useful UC-33e preset addresses the Mixer Channel Strip in Steinberg Cubase SX and Nuendo. It lets you control a channel's volume, pan position, and eight send levels, and also lets you select the effects for eight inserts. Call up a channel's 4-band parametric EQ, and you can enable and adjust the gain, frequency, and Q for each band.

Evolution's presets for Reason have a few weak spots; they suffer a bit from inconsistent fader assignments from one module to the next, and they sometimes lack important parameter assignments. A little preset editing might help. I was also able to program the UC-33e for several programs that don't have factory presets: Native Instruments' Absynth, Reaktor, and Vokator, and MOTU's Digital Performer. Programming the UC-33e is relatively quick and easy, requiring a few button pushes and controller movements for each new assignment. The LCD shows which data is output when you move a controller. A new Controller Mute function mutes the output of all the knobs and faders, so you can reposition them before you start to change parameters. A handy two-button Snapshot command transmits the current knob and fader settings.

## Compact Control

The UC-33e's compact size, clean layout, and modest price tag make it a great choice for most desktop studios. If you're

tired of mousing your soft-synth and DAW parameters around, check it out.

## Overall EM Rating (1 through 5): 4

Evolution Electronics/M-Audio (distributor); tel. (800) 969-6434 or (626) 445-2842; e-mail info@m-audio.com; Web www.m-audio.com or www.evolution.co.uk

## SUMMIT AUDIO

### 2BA-221 Mic & Line Module

By Myles Boisen

Much as it did with the compact TD-100 direct box and TLA-50 tube leveler, Summit Audio has packed an astonishing number of quality features into the half-rack-space 2BA-221 Mic & Line Module (\$695). The 2BA-221's mic preamp section provides a -20 dB pad, phase switch, adjustable high-pass filter (20 to 200 Hz), and a continuously variable impedance control (100Ω to 10 kΩ). Because a microphone's output impedance might range from 50 to 600Ω or more, the Mic Ω knob grants control over the preamp's impedance match to the mic, affecting gain and timbre.

The 2BA-221 also offers a Line/Hi-Z direct-input section, with a single gain control for both inputs and a ¼-inch input jack mounted on the front panel. The line-level and high-impedance inputs can be used simultaneously. By internally mixing the line and mic input stages and running the summed output through a single vacuum-tube (12AX7A/ECC83) output stage, the 2BA-221 is an innovative, multipurpose audio-engineer's helper.

The panel layout is easy to grasp, with the Line/Hi-Z input section on the left, the mic



Summit Audio's 2BA-221 is a preamp with mic-, line-, and guitar-level inputs; a knob to vary the mic input's impedance; and simultaneous solid-state and tube outputs. For maximum boost, mic preamp gain is 58 dB and tube output gain is 35 dB.



preamp on the right, and the output gain knob and meter at center. A three-LED meter indicates signal present, average level, and clipping. A three-way switch combines AC power and 48V phantom switching.

On the back panel are an IEC power connector and fuse, an XLR mic input, a 1/4-inch TRS balanced line input, and a 1/4-inch insert that accesses the summing signal. Two separate tube-stage outputs are provided—a +4 dBu balanced XLR and a -10 dBV balanced 1/4-inch—and you can use them simultaneously for a variety of signal-splitting duties. An additional input and output on the back allow you to link multiple 2BA-221 units, creating a modular monophonic mixer with multiple outputs, inserts, and one final tube output stage.

## Test Tracks

In studio testing, I found each section of the 2BA-221 to have unique and very useful characteristics. The line-in had plenty of gain, even with a -10 dBV CD-player input. Line-level signals were processed cleanly, with subtle smoothing of the high end and a beneficial mid-bass boost heard on a range of music mixes.

The 2BA-221's DI input contributed a warm, thick tone to electric bass that compared favorably to favored DI/preamps such as the Peavey VMP-2 and Langevin DVC. For guitar, however, the DI was rather dull and certainly not as exciting as the Langevin or Grace 101.

In contrast to its mellow DI input, the 2BA-221's solid-state mic preamp sounded bright and aggressive. Compared with the relatively uncolored Grace 101 and FMR RNP, the 2BA-221 exhibited a hefty bass punch as well as incisive highs that never got too harsh. Compared with stock mixing-board preamps, the Summit was definitely lively, dynamic, and detailed.

Paired with an AEA R84 ribbon mic (ribbons being especially sensitive to preamp impedance), the 2BA-221 even came surprisingly close in character to an expensive Focusrite Red-series preamp. The Summit's major differences were its higher noise floor and a bit of harshness in the upper midrange.

Practically speaking, the Tube Output control functions as a boost, passing clean, useable gain at its counterclockwise setting and adding subtle gain and coloration

up to the knob's one o'clock position. When turned further clockwise, output increases dramatically, reaching roughly +20 dB at maximum. In this overdrive range, tube distortion will vary according to the level of the input signal. The 2BA-221 never sounded fuzzy or unpleasant when driven hard, even when the red clipping indicator was continuously on.

This 2BA-221 was a lot of fun to put through its paces, though the lack of decibel or unity-gain calibrations on the knobs was frustrating. In addition, with the condenser and ribbon mics I tested, the impedance control had just two operative settings—rather dull below a threshold around nine o'clock, and uniformly focused throughout the rest of the clockwise range—instead of a spectrum of timbre adjustments.

## Sonic Hand Warmer

Minor quibbles aside, the 2BA-221 is a bargain and a versatile problem solver for studio or stage. Consider the unit's potential for submixing with electric cello, bass, acoustic guitar, or other instruments that combine miked and direct outputs. As a mic preamp, Summit's latest creation has a lavish set of features and impressive audio credentials. It can also be used as a tone box for mild and effective tube coloration when processing any of its input sources. With the 2BA-221, Summit Audio has proved yet again that great things do indeed come in small packages.

### Overall EM Rating (1 through 5): 4

Summit Audio, Inc.; tel. (831) 728-1302;

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Web [www.summitaudio.com](http://www.summitaudio.com)

## PRIMERA TECHNOLOGY

### Bravo Disc Publisher

By Gino Robair

.....

The CD-R is the musician's currency for demos and small-run releases. However, creating and applying good-looking labels significantly slows the process of mass-producing CD-Rs. Primera



The Primera Bravo Disc Publisher combines a high-speed CD-R duplicator and four-color printer in one device.

has come up with a relatively low-cost solution with the Bravo Disc Publisher (Mac/Win, \$1,995), a turnkey system that will duplicate and print up to 25 CD-Rs at a time. In addition, the Windows version offers a Kiosk Mode, which allows you to duplicate 50 discs at a time, and Primera sells an optional 50-disc catch bin (\$49.95) for the finished discs.

### Automatic for the People

Slightly larger than a desktop printer, the Bravo Disc Publisher prints one disc while burning another, and you can determine whether the printing happens before or after burning. You can also tell the duplicator to verify each disc before burning it (although the verification process adds extra time to duplication). Discs that fail the verification process are dropped down a chute that leads from the center of the unit. I chose to burn my discs first to weed out bad media before spending the ink. The Bravo Disc Publisher also lets you do burn-only and print-only runs.

The Bravo Disc Publisher has a 52x CD-R duplicator, which can burn a 700 MB disc in about three minutes. The four-color ink-jet printer offers 2,400 dpi resolution, and the printing process takes only a couple of minutes, depending on the print mode and image you use. A robotic arm moves the media from start to finish, and while the printing and burning takes place, your computer shows you the status of each process.

Primera also offers the Bravo DVD Publisher (\$2,495), which handles CD-R and



DVD±R media (DVD-R only on the Mac). However, the maximum speed of the CD burner on that unit is 16x, and the DVD burn speed is 4x.

## Plug and Play

The Bravo Disc Publisher comes with everything you need to get up and running quickly. Windows users get Sonic PrimoDVD 2.0 for burning and SureThing CD Labeler for printing. On the Mac side, Charismac Engineering Discribe 5.1 is the burning application and Magic Mouse Discus Labeler is the graphics program. The burning programs let you create audio and data discs.

For the most part, the bundled programs offer only basic functionality. Fortunately, Discribe lets you set the amount of time between tracks on audio CDs. You can use third-party burning and graphics software with the Bravo Disc Publisher, but when you do, you forfeit the use of the robotic arm.

The Bravo Disc Publisher requires discs with an ink-jet printable surface, and eight blanks are included for testing purposes (I needed only two to calibrate the review unit). Primera sells printable blank CD-Rs in quantities of 50 and 500, but compatible third-party discs are also available. With the purchase of an adapter kit (\$199), the Bravo Disc Publisher can also process three-inch, rectangular, and hockey-rink business-card CD-Rs.

The minimum system requirements for Windows users are a Pentium III/450 MHz and Windows 2000 or XP. Mac users need a G4/700 MHz computer and OS X 10.2. Both systems require 258 MB of RAM, a minimum of 2 GB of hard-disk space, and FireWire and USB ports. I tested the Bravo Disc Publisher using a Mac PowerBook G4/1.33 GHz.

## The First One's a Snap

It was easy getting the Bravo Disc Publisher up and running. The manual is thorough, showing you how to install the drivers, design and print a label, and burn a disc. Templates are also provided. The calibration routines are explained well and are easy to perform. When I called Primera's tech support to get a few questions answered, the service was excellent. Fax and e-mail technical support are also available.

Once everything was sorted out, the Bravo Disc Publisher ran without a hitch. My first

run—a set of four 73-minute CDs with a four-color label—finished in 18 minutes (less than 5 minutes per disc). And through all subsequent runs, things have gone smoothly: I haven't had a CD-R rejected during the verification process, and the finished discs played on compatible players.

I was also very pleased with the printing quality, which is a major improvement over adhesive labels. My only qualm is that the blank discs occasionally have blemishes, which stand out if you are printing a stark design.

## Burning Desires

With the Bravo Disc Publisher, Primera has brought high-quality CD-R duplicating and printing into the realm of the personal studio. Although it excels at producing large runs of CD-Rs, it's great for customizing individual discs for demo purposes. Once you use it, you'll wonder how you got along without it.

### Overall EM Rating (1 through 5): 5

Primera Technology, Inc.; tel. (800) 797-2772 or (763) 475-6676; Web [www.primera.com](http://www.primera.com)

## SEVEN WOODS AUDIO

### Ursa Major Space Station SST-206

By Larry the O

Seven Woods Audio's original Ursa Major Space Station SST-282 from the late 1970s was a multitap delay-based echo, ambience, and reverb device. Its newest incarnation, the SST-206 (\$1,395), uses a Motorola DSP56311 chip to faithfully recreate all of the earlier Space Station algorithms (and key front-panel controls), and it adds a new Room algorithm that is completely different from the other Space Station programs.

At first glance, the SST-206 is quite a surprise: what appears to be a nicely designed wood-sided remote control unit turns out to be the entire device! At 5 inches wide and 6.5 inches long, the diminutive SST-206 takes up less space than a paperback novel.

A single cable carries the power line along with the AES/EBU digital audio I/O; there's no analog I/O and no power switch. If your AES/EBU and AC connections are in



The compact Ursa Major Space Station SST-206 from Seven Woods Audio offers vintage reverb and echo effects through its digital I/O.

opposite directions, the cable fan-out may not be enough; it was barely adequate in my studio. The SST-206's only displays are sets of LEDs that indicate the selected operating mode, audition delay pattern, and input level. Nothing else is needed because there are no presets, and the unit does not offer MIDI, footpedal, or other controller inputs.

There are, however, plenty of knobs, and they mostly conform to the functions and even the color coding of the original Space Station. In some cases, though, the knobs are redefined for use with the Room program.

## Inner Space

The Space Station architecture is based on the clever use of 24 delay taps: 15 are time modulated and are used to generate the reverb, 8 (the Audition Delay Taps) are arrayed in pairs and provide the algorithm's outputs, and 1 is used for echo. You can choose from 16 tap configurations for different qualities and decay ranges. When combined with the choice of SST Echo or SST Reverb mode, that yields quite a bit of variety. The front-panel controls, including four that set the relative levels of the Audition Delay Tap pairs, enable even further contouring.

The SST-206's specifications are somewhat unusual. The unit is designed to operate at 48 kHz and also supports 44.1 kHz. It can, however, work at rates varying from 32 to 96 kHz with a few caveats: in



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the original Space Station algorithms, the delay times are scaled proportionally to the sampling rate. (In other words, you get longer times at 44.1 and 32 kHz, and shorter times at 88.2 or 96 kHz.) The new Room program, which works the DSP chip much harder than the old algorithms, doesn't function at 88.2 or 96 kHz sampling rates.

The dry signal is always passed to the outputs as a full-bandwidth, 24-bit stereo signal; but the original algorithms sum the inputs before processing, have no more

than 7 kHz bandwidth, and exhibit what amounts to 14-bit resolution. The Room algorithm, on the other hand, provides full-bandwidth 24-bit stereo processing.

The operating manual contains some useful information on how to best use the SST-206. It lacks other basic material, however, such as a front-panel graphic with labels and descriptions for the knobs and a block diagram showing the architecture of the algorithms. Those would help clarify the controls and parameters quite a bit.

## More Space

My favorite use for the old SST-282 was always on guitar and vocal tracks, and I found the same to be true with the new SST-206. Although it's excellent for many other uses, I prefer using the Space Station to make a lead guitar sound big or to put space around a voice without losing it in the mix. The SST-206 is still not my first choice for snare or kick drum, but I enjoyed it as an overall room ambience. In fact, I received wonderful results when I took a stereo room track from a drum session, compressed the heck out of it, and ran the track through the Space Station. That yielded a much enhanced feeling of envelopment.

The Space Station is a remarkably versatile unit with a flavor that you won't hear in other multitrack delays. Even without fully understanding how to exploit its subtleties, you'll find many readily available effects. And once you grasp the architecture, you can easily create many more.

Fans of the old SST-282 will no doubt be delighted to see it reappear as a compact unit that also includes the new Room program. The SST-206 is a bit pricey, but the main reason for the resurgence of vintage processors is that they offer character, and that's the Space Station's strongest suit.

## Overall EM Rating (1 through 5): 4

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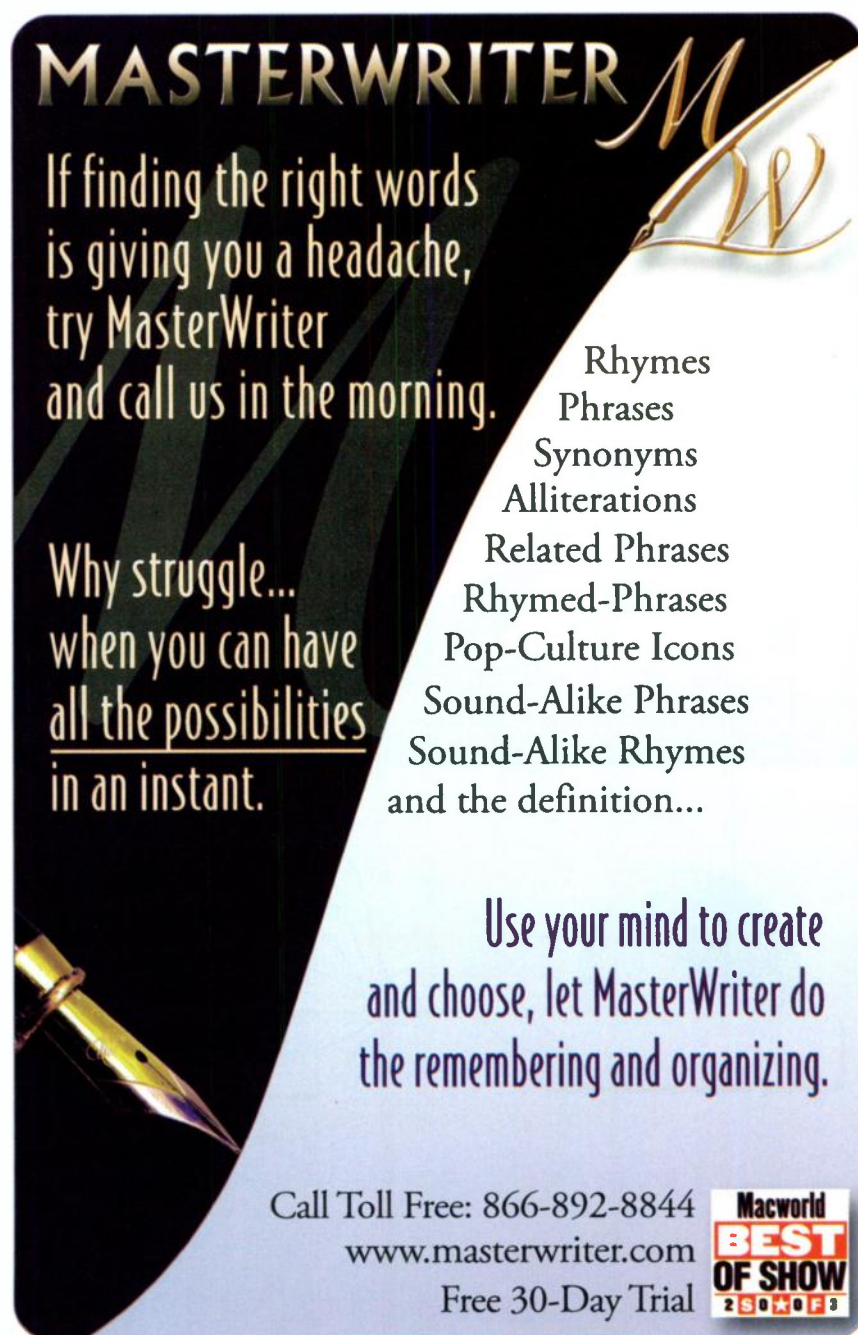
## BIG FISH AUDIO

LA Drum Sessions (Acidized WAV)

By Marty Cutler

.....

**B**ig Fish Audio's *LA Drum Sessions* (\$99.95) consists of three CD-ROMs packed with Acidized WAV-file grooves that you can easily arrange into a variety of song forms. The session drummers varied their hardware setups, using different snare sizes and different sticks to best enhance each style. During the recording process, different mics and mic techniques were used as needed. At mixdown and mastering, the producers applied an appropriate amount of dynamics processing for each performance. For



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Big Fish Audio's *LA Drum Sessions* library offers thousands of Acidized loops in a variety of popular musical styles.

example, funk, rock, and other hard-hitting styles demanded more compression, whereas the jazz-oriented styles required only gentle limiting.

The package touts the collection as having more than 6,000 loops, but the library actually consists of 2,000 loops offered in three versions: dry, room ambience, and a mix of dry and ambient. That arrangement lets you combine a dry track with an ambient track and adjust the balance between the two, which works quite well. You can also boost the overall ambience on some tracks with a bit of small-room-type reverb if the tracks still sound too dry for your taste.

### Stylin'

*LA Drum Sessions* offers a diverse grab bag of musical styles in more than 80 categories, including multiple flavors of rock, jazz, blues, swing, disco, country, and even zydeco. Each folder provides a specific performance broken down into one- and two-bar patterns. With three CDs' worth of material, the folders have ample content to flesh out a song. The Acidizing is well done, allowing you to adjust song tempos with minimal artifacts, and the tracks dovetail nicely into song form.

As is common with drum-groove libraries, the overplaying in this collection sometimes makes the tracks stand out too much in an arrangement. "Country Shuffle 160," for example, has a cool swing, but the fills should be sparser, and the side stick should at least occasionally supplant the snares on two and four. Although these tracks are way too busy for the average country tune,

their brash attitude and heavy bounce would strut perfectly in a Doctor John-type two-beat feel.

Likewise, the Chicago Blues tracks at 120 bpm are too busy; the 88 bpm Blues tracks fare much better. Most of the funk tracks are also too busy and lacking in dynamics. "Late Night 150" swings relentlessly, but in that case, the combination of laid-back timing and busy fills works in its favor. The files would fit nicely in a modern big-band swing chart. "Reggae 130" is noteworthy for its timbale-like snare fills and accents, lilting hi-hats, and clever rim shots and flams. A folder of rolls and comedy hits was fun to play with and might come in handy for soundtracks or special effects.

### Making the Audition

Instead of providing printed documentation in a booklet, the first *LA Drum Sessions* CD includes a PDF file that lists the folders, the number of files in each folder, and the corresponding tempos. Although the file names are marginally descriptive, you can't tell what the performances are like until you audition the individual files. An indexed audio CD would have been a great time-saver for checking each groove's suitability.

The file-naming system further exacerbates the problem by offering no indication of whether a track is an intro, a fill, or a groove. The files are numbered sequentially, but sorting out which is which requires listening to each file until you find something appropriate. Some folders contain individual or paired-instrument hits, such as kick and crash. They're not enough to build a complete kit in your sampler, but you could drop these hits into a track to add variety to an existing groove.

Despite my complaints, the *LA Drum Sessions* collection offers good value for your investment; I found many useful gems in the package. The playing is tight where it needs to be and appropriately loose limbed where the style calls for it. If you want to build a decent library of all-purpose drum grooves, *LA Drum Sessions* is a good place to start. Check out the demo at the Big Fish Audio Web site. ☉

### Overall EM Rating (1 through 5): 3

Big Fish Audio; tel. (800) 717-FISH or (818) 768-6115; e-mail [info@bigfishaudio.com](mailto:info@bigfishaudio.com); Web [www.bigfishaudio.com](http://www.bigfishaudio.com)

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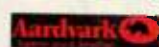
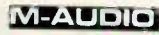
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Use DP4, the 828mkII and the G5 Power Mac to run MachFive, MX4 and a wide array of virtual instruments

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## Novation Remote 25

2-octave (25-key) MIDI controller with knobs, faders & LCD display

The Remote 25 MIDI controller gives you two full octaves of superb action semi-weighted keys with responsive aftertouch. Play MachFive, MX4 and other favorite software instruments with the care and precise control that makes all the difference to the final performance. The Remote 25 connects directly to the computer via USB and gets power via the USB bus or batteries, so if you've got a PowerBook, you can play anywhere. Use programmable pitch / mod / control wheel and 'touchpad' for total control and wild performance effects. Use the LCD to dial up dozens of pre-programmed button/knob/fader presets for the most popular software plug-ins and traditional hardware instruments. Dozens of product-specific colored iDent strips (included) clearly label each control. All 8 rotary potentiometers, 8 sliders, 8 rotary encoders and 24 switches are entirely programmable. Control programs can be named and saved in any one of the 64 template memories. Remote 25 is the perfect compact controller for your DP4 studio.



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## Native instruments Pro-53™

### The second coming of a virtual synth legend

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## Novation V-Station™

### Plug-in instrument version of renown Novation K-Station

When Novation launched the multi-award winning K-Station in 2002, it made an impact akin to lobbing a barracuda into a goldfish bowl. DP4 users were mad for the phatt'ness, the flexibility and the cool sound shaping while reviewers oozed with praise. And history is now repeating itself with the new V-Station Virtual Analog Synthesizer. The V-Station gets the same real 3 oscillator flexibility, awesome liquid analog filters, 8-voice polyphony, rippin' simultaneous FX and the kind of phatt sounds only a genuine Novation synth can offer. It's got sophisticated programming, acres of presets and convenient DP4 plug-in operation. From searing leads to passionate pads to delicate electric pianos, it's all there.





## Universal Audio UAD-1 Studio Pak™

Accelerated effects processing for Digital Performer

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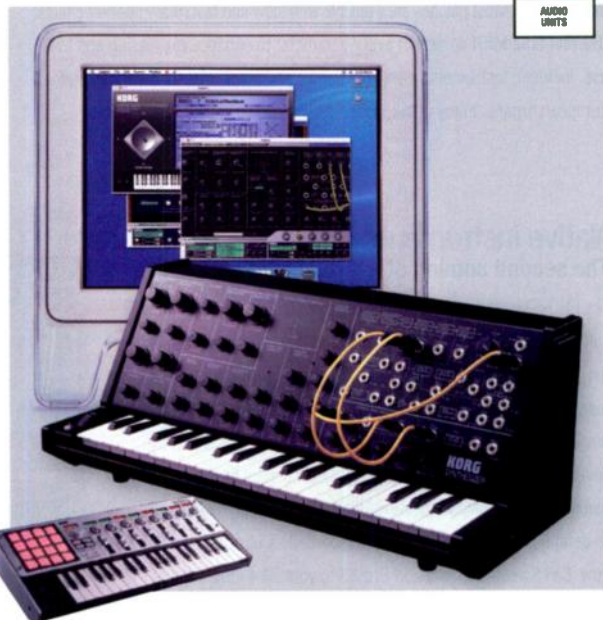
Pultec EQP-1A, and the Fairchild 670. Give your Mac a break, improve your workflow, and save a bundle with the UAD-1 Studio Pak.



## KORG Legacy Collection™

Virtual instruments and effects plug-ins with MS-20 Controller

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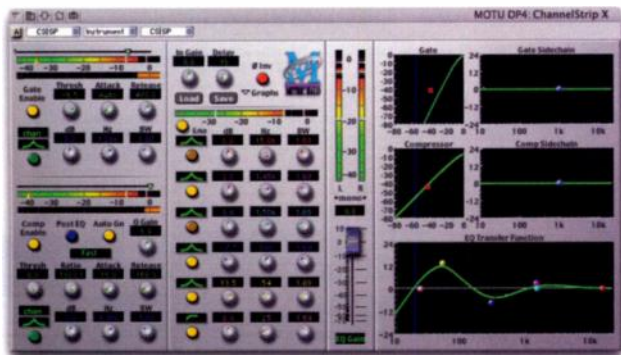
## Metric Halo ChannelStrip™ X

Console-style, integrated EQ and dynamics processing for DP4

Metric Halo's ChannelStrip is the recognized leader in console-style channel strip audio processing for Digital Performer. As the first plug-in to offer the combination of exceptional audio quality, incredible DSP efficiency and a comprehensive user interface, ChannelStrip lets DP4 users work as efficiently and interactively as they would with a dedicated, world-class mixing console. ChannelStrip comes with more than 100 presets included to help you get your mix started. Use the presets to compress your drums, EQ your vocals, get your sessions ready for mastering and much more. With ChannelStrip for DP4, you get an unparalleled EQ, Gate, and Compressor, all in one easy to use interface. ChannelStrip is the critical mixing tool for thousands of top engineers and producers world-wide.

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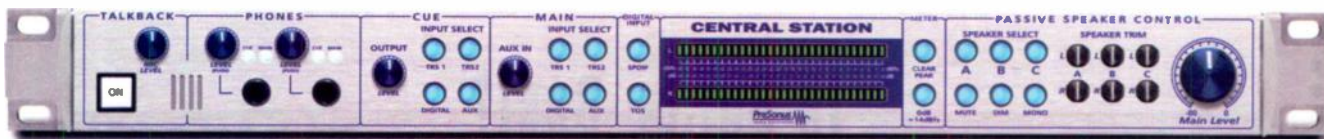


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## Mackie HR-series Active Studio Monitors

### Nearfield monitors for your MOTU studio

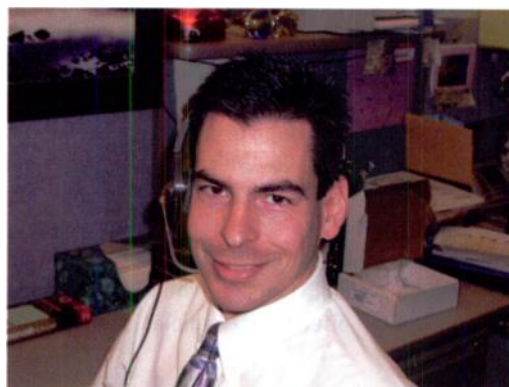
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## Is Better Best?

Although I've discussed quality in past "Final Mix" columns, I haven't talked about whether quality matters in recorded media. At the core of this question is the delivery system for the final product: from wax cylinders and discs to wire recording, vinyl LPs, 8-track tape, and cassettes, each medium has imposed severe limitations on recorded signals, primarily in terms of frequency response and dynamic range. No matter how good the fidelity of the product that came from the studio, mastering degraded it to accommodate the medium.

On the consumer's end, things were worse. Put simply, most people listened on crappy systems, including small, poor-quality, badly placed loudspeakers; amplifiers with high distortion and no headroom; turntables with wow, flutter, and misaligned tracking; and so on. For many years, music was heard mostly on inferior types of car radios; then Sony brought out the Walkman, and everyone was listening on tiny headphones.

Today, the general quality of audio equipment is light-years beyond those old systems, though lousy equipment still abounds. Radio stations have long broadcast in stereo, TV is becoming digital, and DVD is capable of delivering high-resolution audio.

But even as reproduction got better, data compression came into play to counter the improvement. This problem is not new, either: the RIAA curve for LPs, NAB curve for tape, and Dolby noise reduction were early methods of compensating for limitations in delivery media that, while maximizing fidelity within the media's raw capabilities, nonetheless introduced degradation. Then came digital audio, whose data-rate challenges sparked MP3, Dolby Digital, and other forms of lossy compression.

Some of this newer stuff doesn't sound too bad, especially when you compare it with cassettes, but it *is* lossy, and there *is* an audible difference between master and compressed audio. With personal stereo gone to MP3 players, we are a step beyond the original cassette Walkman; yet we are still listening to crap when compared with a high-resolution recording played on a decent sound system. Then there are video games, which even now often offer 11 kHz sampled sound with virtually no

dynamic range. Even a good sound system can't help them much.

Which brings us back to the question of whether quality matters. From a relative standpoint, the answer would be "yes." Engineers and producers have long used Auratones, Yamaha NS-10s, car stereos, boom boxes, and other consumer references to ensure their mixes would sound their best given the limitations of the likely playback systems. I knew of a studio that had a brickwall limiter and a low-power FM transmitter so that a producer could go to his car and hear how the broadcast chain would mangle the mix.

The flip side of the coin was that absolute quality—the best a mix could possibly sound under the optimal circumstances—was compromised. High-quality recordings hold up better than inferior recordings when compressed and played back on bad systems, but MP3s are often improved by high-frequency contouring before encoding, and heavy gain maximization makes things sound bigger on the radio and on personal stereos. So mastering still degrades the product for the sake of the delivery medium.

If playback scenarios are so bleak, does quality matter in an absolute sense? It would be easy to answer "no," and, under deadline pressure, this sometimes is the answer. But that doesn't make me happy, and being happy with the sound is the best reason for being in the business; the money and hours certainly aren't as compelling. What's more, the beauty of recorded media is that it can be around for a while, and—who knows?—playback quality could improve.

So, let's be clear: in my view, absolute quality is important simply because I care and because some people, some time, may be able to appreciate the difference. In the real world of production, though, the goal is to deliver the best sound possible under the circumstances—specifically, the user's expected delivery system. The closer we can bring the latter to the former, the happier everyone will be. The rest of the time, it's just another less-than-perfect aspect of reality that we must live with. ☹





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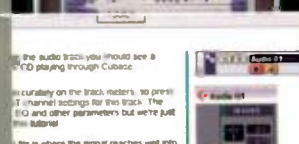
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