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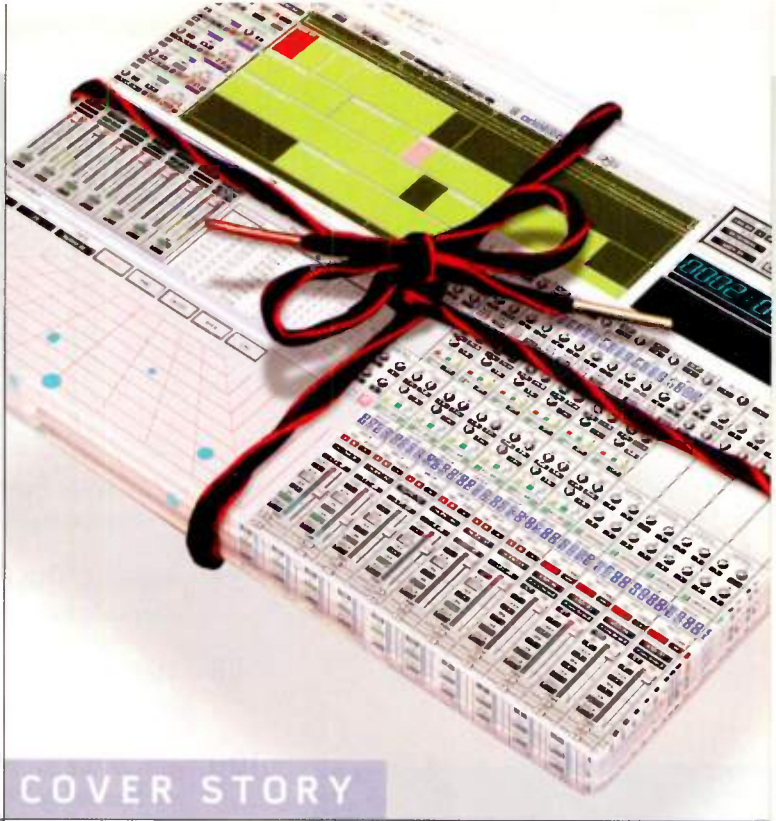

DMITRY PANICH

COVER STORY

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Is it time to equip your studio for surround production? Six pros who create multichannel mixes for music, video, and games give advice about when and how to prepare for surround-sound projects.

By Rusty Cutchin

50 SEQUENCING ON A SHOESTRING

Low-cost digital audio sequencers are an attractive option for musicians who are on a tight budget. They can be a great choice for anyone who doesn't need the huge feature sets that high-end programs have. EM rounds up a dozen lower-priced sequencers for Mac and Windows, and reveals their strengths and weaknesses.

By Dennis Miller, Brian Smithers, and Geary Yelton

85 PRODUCTION VALUES: BEING JOHN MEDESKI

John Medeski of Medeski, Martin and Wood discusses why he loves vintage keyboards and is skeptical of digital gear. He talks about the recording sessions for the trio's latest CD and takes us on a tour of the band's Brooklyn-based project studio, Shacklyn.

By Paul Tingen

Electronic Musician® (ISSN 0884-4720) is published monthly by PRIMEDIA Business Magazines & Media Inc., 9800 Metcalf Ave., Overland Park, KS 66212 (www.primediabusiness.com). This is Volume 21, Issue 9, September 2005. One-year (12 issues) subscription is $24. Canada is $30. All other international is $50. Prices subject to change. Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canadian GST #129597951. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 40597023. Canada return address: DP Global Mail, 7496 Bath Road, Unit 2, Mississauga, ON L4T 1L2. POSTMASTER: Send address changes to Electronic Musician, P.O. Box 640, Mt. Morris, IL 61054 USA.

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Blue Microphones Kickball phantom-powered dynamic microphone

Ultrasone Proline 750 stereo headphones

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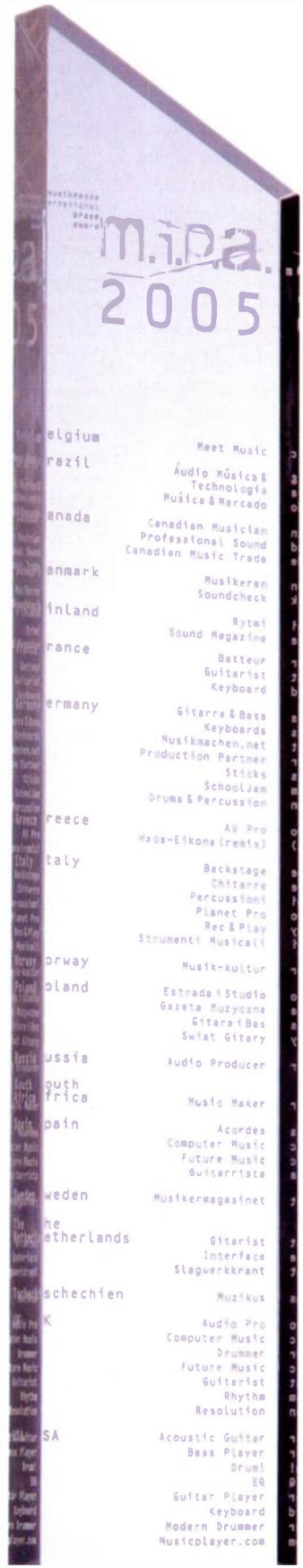

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Seq and Ye Shall Find

When we discuss digital audio sequencers in EM, we usually focus on the professional-level programs, such as Cakewalk Sonar, Steinberg Cubase and Nuendo, Mark of the Unicorn Digital Performer, Digidesign Pro Tools, and Apple Logic Pro. We do cover lower-priced digital audio sequencers, but not as often as we do the higher-end programs. This month, though, we decided to give credit where credit is due, and we produced a cover story dedicated to budget digital audio sequencers (see "Sequencing on a Shoestring" on p. 50).

At one time, low-cost sequencers were so stripped down compared with professional programs that they were useful only for beginners who were thrilled just to be able to record a few MIDI tracks. Today, however, many budget programs offer far more capabilities than you might expect. True, budget programs still don't offer the deep feature sets found in professional programs. But the more features that a developer crams into a professional program, the more complex its user interface becomes. And if your project doesn't require pro-level features, why wade through a complex user interface to find the basic features you need?

JULIE BIRUM

The first time I launched Apple GarageBand 1.0, I recorded all the final tracks I needed for a song demo within one hour. Admittedly, I knew the parts, and I wasn't concerned about capturing a perfect lead vocal. And I used the bundled drum loops to whip out a simple drum part. The bottom line, though, is that I spent exactly zero minutes learning the program, and I easily found all of the features I needed. I learned that it's much easier to use a basic rather than a professional program to knock out a simple piece or as a musical scratch pad.

So if you're a serious sequencer user, don't overlook these low-cost wonders. It would be a mistake to assume that just because they're inexpensive, they aren't of value. And if you are just getting into digital audio sequencers, check out the budget software first. One of these programs might be all you need for a long time to come.

****

The EM staff recently learned that our old friend Dr. Bob Moog has an inoperable brain tumor of the type known as a glioblastoma multiforme or GBM. As virtually all EM readers surely know, the good doctor has legions of friends and admirers worldwide. As a result, his family cannot possibly deal with direct personal mail or phone calls.

Fortunately, the Moogs have set up a CaringBridge Web site at www.caringbridge.com/cb/inputSiteName.do?method=search&siteName=bobmoog. There, you can get accurate and up-to-date information from Bob's wife, Ileana, about how he is doing, and you can leave messages of sympathy, thanks, prayer, and encouragement. Every electronic musician owes a huge debt to Bob Moog, and there's no finer man in our industry than he. I ask every EM reader to please send healing thoughts and prayers his way.

Steve Oppenheimer
Editor in Chief

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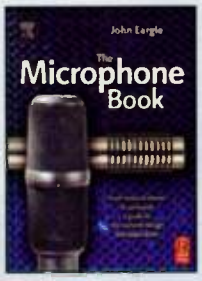

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LAURA WILLIAMS

Letters

Mini Me

I enjoyed your feature on assembling a desktop studio ("Cover story: Build a Desktop Studio on Any Budget," July 2005). I have a pretty decent home studio, but the weak link is my PC, which is on its deathbed. I'd like to use this chance to switch to the Mac platform.

What are your thoughts on the Mac mini? Something like that is within my price range. Obviously, a RAM upgrade would be in order, but I was wondering what you thought about its performance in general.

Jesse Jensen
via email

Jesse—I think the Mac mini is a cool home- and small-office machine. It's not a bad computer for music production, and it might be your best bet given your budget. But if you can save your money and buy an iMac G5 instead, I'd recommend that. Here's why.

The mini's G4/1.25 or 1.42 GHz CPU is older technology but fast enough for music if you aren't trying to run lots of plug-ins and tracks at the same time. The system bus runs at 167 MHz, which is okay but not great. (The system bus routes data to and from the CPU, so a slow system bus wastes some of the CPU's time waiting for data to come and go.) The internal hard drive is 40 GB or 80 GB, depending on the model, and it's a relatively slow drive. The internal RAM starts at a paltry 256 MB and maxes out at 1 GB; OS X chews up some of that memory, however, and some music applications need a lot of RAM, so you should budget for 1 GB of RAM from the start.

The 1.25 GHz Mac mini costs $499, and I have seen 1 GB RAM upgrades from third parties for $130, which is much less than Apple charges. So you're in the $630 range for a mini with a full load of RAM. That price is hard to argue with, assuming you can use your PC's monitor, mouse, and keyboard, since those don't come with the mini. If you are going to do a lot of multitrack audio recording, you will need an external FireWire drive, especially if you have a 40 GB internal drive.

In my opinion, the iMac G5 is far superior to the Mac mini, and although it costs twice as much, it's worth every dime. The bottom of the line is a G5/1.8 MHz, which blows the doors off any G4, and the system bus runs at 600 MHz. You get a fast 250 GB hard drive and 512 MB of RAM (total capacity is 2 GB), so if you want to expand to 1 GB, you're only out another $55 or so (third-party price). And you get a very nice 17-inch flat-screen monitor. The iMac G5/1.8 lists for $1,299, plus the $55 RAM upgrade. For that, you get a machine that is very peppy now and won't be obsolete for some time to come.

That said, the iMac G5 isn't a bargain if you can't afford it. If $630 or so is your limit, and you want to switch to the Mac, the mini might be just the ticket.—Steve O

"In the 15 years that I've been reading EM, it has been unerringly timely in handling subjects that matter."
—Rich Sackett

Studio on a Budget

Am I just confused, or have you guys overpriced yourselves for a basic Mac studio ("Cover story: Build a Desktop Studio on Any Budget," July 2005)? When I bought your magazine, I figured I'd see an example of something in the $1,000 range. But something seems really wacky if you need to spend $5,000 on a Mac studio and call that "low priced."

In Canadian dollars, I bought a used beige Mac G3 for $300, a used Behringer 8-track mixer for $100, a Roland PC-200 for $100, and spent $700 on Steinberg's Cubase. I use my 15-year-old Luxman home stereo and a pair of AKG K 240 headphones that I bought off eBay for $60. An Aria microphone that I bought for $50 is attached to an old drum stand with duct tape, and I use a pair of pantyhose hanging on a wire coat hanger as a sound guard. I have a 266 MHz processor, 320 MB of RAM, and an 80 MB hard drive, and I produced two albums with no problem.

What's the reason for spending $5,000? I could create a working

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Letters

Mac studio for less than $1,000 and spend the other $4,000 on VST instruments and plug-ins.

Schmange
via email

What Gives?

"Build a Desktop Studio on Any Budget" was very disappointing for budget-minded readers. First, if I had $25,000 to invest in a studio, I would buy a few books on the best way to do it. Second, you use list prices instead of actual prices, so you're completely off the mark on prices for certain items. Third, I found your choice for a low-end budget to be pathetic. If I have to spend $5,000 for a budget studio when I can't even afford a Gibson Les Paul at $1,500, you've managed to completely discourage me from ever wanting to build my own home studio. I don't know much about recording. I do want to learn more, but I can't start by sinking $5,000 into a "budget" studio. Please be more practical for your budget-minded readers.

I'm a guitar player, and I want to experiment with music making. I hope that I made the right choice with the gear that I have, but if I had to go back in time and depend on your article to consider a budget studio, I would not have been thrilled.

Thank you for listening. I'm anxious to read the next issue.

Christophe
Apopka, Florida

Schmange and Chris—As I wrote in my introduction to "Build a Desktop Studio on Any Budget," we assumed for the sake of the story that you were creating the entire studio from scratch, except for acoustic treatment, stands, cables, and adapters. In practice, you probably already have some of the necessary gear. We also specified studios that were of high quality and could be used for professional work, including computers that could run the latest software. A $5,000 studio is pretty darned inexpensive by that measure.

But maybe you don't need all that. In that case, you can still get a lot of useful ideas by reading about the various products we discussed and why we chose them, focusing mostly on products that will fill your needs and fit your budget. If you already have enough mics or have a computer that runs the software you need, fine—skip that part. It's not like you have to buy everything we specified and do it all at once.

We specified currently available new gear for a good reason. Sure, you can save money with used gear, and there's nothing wrong with that. But used gear prices vary widely, as does availability. If we based an article on specific used gear, you'd be writing us to protest that you couldn't find many of the items we cite—at least, not in good condition and not at the price we quoted. In contrast, everything we specified is commonly available and can be had for no more than the prices we quoted and often for less. I own plenty of used gear, but we could not base an article of this sort on it.

I hope you read our August cover story about portable digital studios ("Studio in a Box"), including the sidebar about mini portables. Those devices can produce quality recordings, and many are available for bargain prices. And if you are a computer-based musician on a budget, check out "Sequencing on a Shoestring" on page 50 of this issue.—Steve O

The eBay Way

In the 15 years that I've been reading EM, it has been unerringly timely in handling subjects that matter. The eBay article ("EM's Guide to eBay," July 2005), however, was a shock. It might have been fascinating four years ago. I can't imagine anyone reading your magazine who lacks a basic level of knowledge concerning eBay's basic workings.

The most maddening part of the piece is its primary focus on the mundane aspects of the site itself. I'm not sure what the point is of detailing operations and facts that can be learned spending some time on the site, clicking on some of the hot links, and reading the definitions. When I imagine EM's readership, the "push-this-button-see-what-it-does" ethic figures prominently.

Most notably absent are the advanced, gee-whiz techniques that I'd expect from your magazine—subjects such as how to identify frauds, cross-reference feedback, research closed items for both buying and selling purposes, and on and on.

The most important point is to consider the trade-offs involved in using eBay at all: is it right for you?

Rich Sackett
via email

Rich—Thanks for being such a faithful EM reader. My eBay story's target audience was beginning eBay users. Although I included a handful of tips for experienced users, perhaps I should have stated more clearly that the article was an introduction rather than an advanced tutorial. I know a surprising number of computer-savvy musicians who have hesitated to use eBay because they have mental blocks about where to begin. I wanted especially to help novices avoid making expensive and discouraging mistakes. The article explains how effortless getting started can be, and it mentions eBay's resources for digging deeper.

The paradox of eBay is that it's very easy to use yet quite convoluted to master. Subjects that are old hat to you and to other veteran users are less obvious to beginners. You make some very goods points that I wish I had had the space to pursue, but I had to limit the article's scope.—Geary Yelton

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EMspotlight

Recording at the Old Home Place

Malcolm Burn, producer of the String Cheese Incident's *One Step Closer*, feels that the most important parts of a recording are the song and the performance. In this interview, he discusses setting up a studio to help translate the band's live feel to disc. By Mike Levine.

emusician.com/em_spotlight

On the Home Page

EM Web Clips

A collection of supplemental audio, video, text, graphics, and MIDI files that provides examples of techniques and products discussed in the pages of *Electronic Musician*.

EM Guides Online

Get detailed specs on thousands of music-production products with our free online Computer Music Product Guide and Personal Studio Buyer's Guide.

Show Report

The 2005 summer NAMM show is one of the largest annual musical-instrument expos in the U.S. Visit emusician.com for Associate Editor Geary Yelton's report on the exciting new recording gear, music software, and electronic musical instruments unveiled at this year's show.

editor's picks

Senior Editor Gino Robair has selected his favorite EM articles about mastering. The articles include several interviews with top mastering engineers and tips on mastering your next release on a limited budget.

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A weekly update on new hardware and software releases, manufacturer contests, and pertinent industry news.

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By Geary Yelton

E-mu 1616 and 1616M

If you're a PC user who's been waiting for E-mu (www.emu.com) to manufacture an interface for your notebook computer, the 1616 ($599.99) and 1616M ($699.99) have the same features as E-mu's PCI-based 1820, including 16 audio inputs, 16 audio outputs, and 32-channel MIDI In and Out. The included 02 CardBus card, which features 24-bit, 192 kHz A/D/A converters and hardware-accelerated DSP effects, can be used alone with headphones or a line output, or you can connect it to the system's MicroDock for multiport audio and MIDI I/O. The MicroDock also has two Neutrik combo connectors with 48V phantom power and analog soft limiting, as well as 24-bit ADAT, S/DPIF, and AES/EBU I/O ports. The 1616M has mastering-grade converters with a 120 dB signal-to-noise ratio. The 1616's signal-to-noise ratio is rated at 112 dB.

The 1616 and 1616M ship with all the same effects plug-ins that are bundled with E-mu's PCI-based audio systems. In addition to WDM and ASIO drivers for Windows 2000 and XP, they come with E-mu's soft synth Proteus-X LE and software from Steinberg, Ableton, IK Multimedia, Minnetonka, Cakewalk, and other developers.

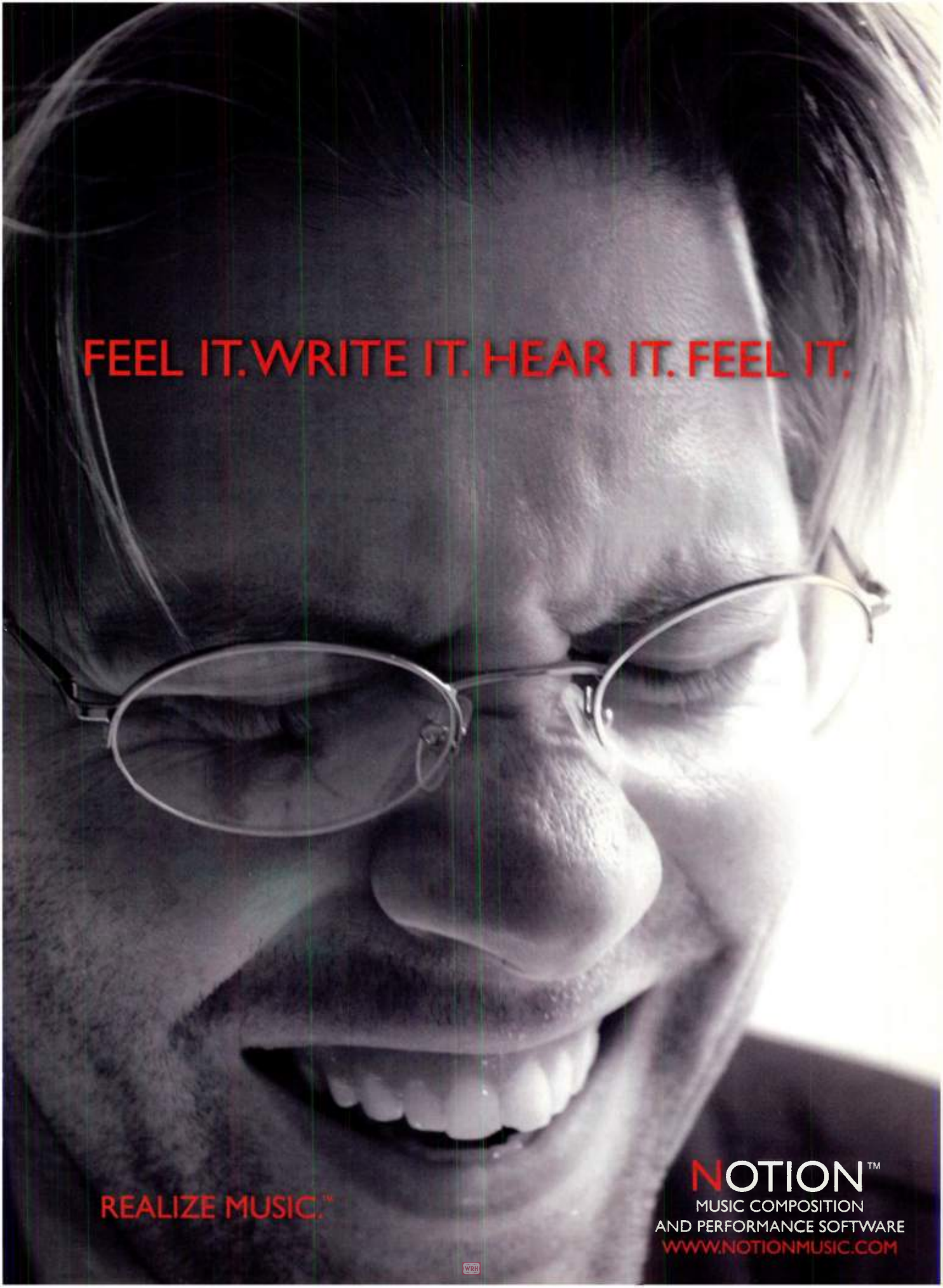
Mojave Audio MA-200

After more than 20 years of experience designing microphones, David Royer knows his business. In addition to cofounding Royer Labs, maker of acclaimed ribbon mics such as the R-121 and R-122, he founded Mojave Audio (www.mojaveaudio.com), known for its custom modifications and DIY tube-mic kits. Mojave recently introduced the fully assembled MA-200 ($995), a tube condenser mic with a hand-selected, 1-inch gold-sputtered capsule; a Jensen audio transformer; and a military-grade JAN 5840 vacuum tube. The MA-200 has a cardioid polar pattern and a balanced transformer output. Mojave recommends it for vocal, voice-over, piano, drum overheads, and other acoustic and orchestral instrument applications. It ships with a padded aluminum-frame carrying case, a shockmount, a power supply, and cables.

TC-Helicon VoicePro

Taking another step toward the future of vocal processing, TC-Helicon (www.tc-helicon.com) has introduced the VoicePro ($3,495). The top-of-the-line VoicePro rackmount processor enhances and alters vocal character using exclusive VoiceModeling technology, transposes pitch with Hybrid Shifting, expands and compresses time with FlexTime, and applies an assortment of effects such as reverb, delay, chorus, and flange—all in real time. It can also correct pitch, generate four-part harmony, and emulate the sound of various transducers such as telephones and radios. The VoicePro's dynamics and EQ offer the same algorithms used by high-end TC Electronic processors.

The VoicePro has memory locations for 250 factory and 250 user presets, and it has a searchable browser for finding and organizing them. The 2U device has two balanced XLR inputs, two balanced XLR outputs, and 2-in/8-out AES/EBU I/O, as well as word-clock in, MIDI In and Out, an RS-232 connector, an Ethernet port, and a passive Ethernet hub.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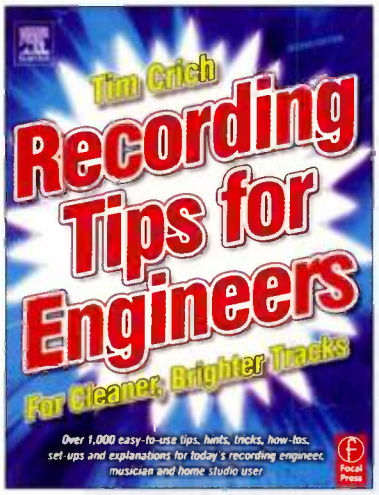
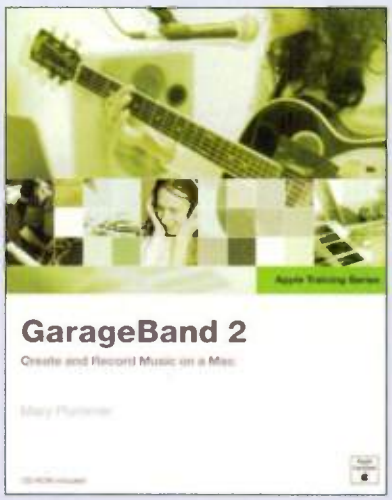
Get Smart

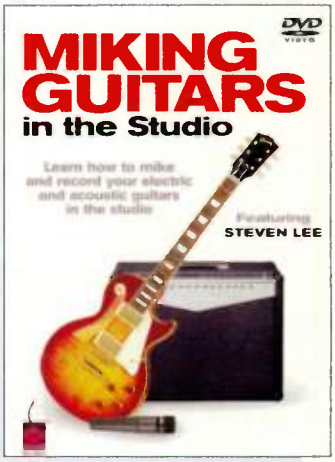
The second edition of *Recording Tips for Engineers* ($29.95), written by Tim Crich and published by **Focal Press** (www.focalpress.com), takes a practical, hands-on approach to recording. More than half of the 254-page book is devoted to discussing monitoring and setting up microphones for the studio and the control room. It also examines acoustical treatments for different types of sessions. Crich has plenty of clear, useful suggestions for recording and mixing, and he makes specific recommendations about EQ, compression, and effects. In addition, he discusses the business of running a recording studio and explains the principles of digital audio.



At 1,577 pages, *Handbook for Sound Engineers* ($79.95) is a veritable audio encyclopedia. Also published by **Focal Press** (www.focalpress.com), it's the long-awaited paperback version of the third edition that was originally published in 2002 in hardcover only for $125.95. This massive five-and-a-half-pound reference covers more than 40 topics ranging from psychoacoustics and fiber optics to amplifier design and surround-sound applications. The book was edited by Glen Ballou and written by 27 authors that include Ralph Heinz, Ray Rayburn, Ken Pohlmann, and Bill Whitlock.

Three new books from **Peachpit Press** (www.peachpit.com) guide readers from basic instruction to official Apple certification. *Apple Training Series: GarageBand 2* ($29.99) is Mary Plummer's follow-up to her book on the previous version of GarageBand. Illustrated in color, it goes from lessons on tracks, loops, and instruments to multitrack audio recording and using Jam Packs. An included CD furnishes course materials and a PDF document about beginning Logic Express and Pro 7. *Apple Pro Training Series: Logic Pro 7 and Logic Express 7* ($44.99), by Martin Sitter, is an introductory sequel to his 2003 book about Logic 6. David Dvorin's 560-page *Apple Pro Training Series: Advanced Logic Pro 7* ($49.99) goes way beyond the basics to cover topics such as managing takes, working with Logic's software instruments, mix automation, and scoring to picture. A 14-page appendix discusses working with all of Apple's pro media applications collaboratively. A DVD supplied with each Logic book furnishes lesson files and other supplementary materials.





Miking Guitars in the Studio ($24.95) is a video DVD from **Cherry Lane** (www.musicdispatch.com). Beginning with studio setup and recording basics, this one-hour tutorial progresses to subjects such as microphone placement, pickups, and amp miking. A section about isolating instruments explains baffling and reamping, and a five-minute glossary defines basic recording terms using onscreen text. Hosted by jazz guitarist Steven Lee, this DVD addresses the specific challenges of recording electric and acoustic guitars.

Zack Price's *The Beginner's Guide to Computer-Based Music Production* ($19.95), also from **Cherry Lane**, targets the novice Mac and PC recordist. Price takes the reader from selecting a computer and peripheral hardware to editing tracks and mastering CDs. Along with way, he explains MIDI and digital audio fundamentals, virtual instruments and effects, and mixing techniques. Appendices focus on hard disks, microphones, General MIDI, and Standard MIDI Files.

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Celemony Melodyne Uno

If you've always wanted to perform the digital magic offered by Celemony Melodyne but your applications and budget just didn't justify the cost, Celemony (www.celemony.com) is now shipping software with your needs in mind. Melodyne Uno (Mac/Win, $199) is a scaled-down version designed for pitch correction, melody editing, and other transformation processes that you can apply to monophonic audio files. Use it to edit the pitch, timing, and formants of mono files, producing radical variations in those parameters while maintaining high sound quality. Uno can recognize a melody's tonality and mode and transpose it in a musical way.

Like the multitrack Melodyne Studio Edition, Uno works intuitively and without complicated recognition procedures. Two macros, Correct Pitch and Quantize Time, let you correct a melody by pressing a single key. Uno can handle most common audio formats, and it integrates smoothly with digital audio sequencers. Special pricing will be available if you ever want to upgrade to Melodyne Studio Edition or Cre8.

Download of the Month

PeterTools LiveSet (Win)

LiveSet 1.0 ($129) from PeterTools (www.petertools.com) is a MIDI-processing program designed primarily for use with Propellerhead Software's Reason, but it's compatible with any application that can function as a ReWire slave. LiveSet is meant to be inserted between your MIDI controller and the target application in order to capture and process all incoming MIDI messages, and it accepts data simultaneously from two MIDI ports.

LiveSet offers an assortment of general-purpose MIDI processing modules as well as two modules that are custom tailored for Reason. The general-purpose modules include a Velocity gate and a compressor, a note transposer, note and controller multiplexers, a chord maker, a controller crossover, a MIDI LFO, and an output router for external MIDI devices.

As an example setup, you could split incoming MIDI notes by Velocity, routing high-Velocity notes to a bass sound and transposing them down an octave while routing low-Velocity notes to a chord maker to play a keyboard sound (see **Web Clip 1**). In general, you can use these modules to split, layer, and MIDI-munge virtual instruments in any ReWire application in just about any way you can imagine.

LiveSet's Impact and Reloop modules plumb new territory in Reason automation. Impact stores complete setups (levels, sends, pan settings, solos, and mutes) for Reason's mixers. You can assign MIDI notes to switch setups, and switching can be quantized to force setups to change only at bar lines, for example.

Reloop is an on-the-fly manager of markers (called Points) and regions (called Blocks) in Reason songs. It accomplishes that by moving Reason's song-position and loop-boundary markers as necessary. In short, it's the remix feature that you always wished was built into Reason. You can assign Blocks and Points to MIDI notes and quantize their triggering. A clever catch-up option remembers the time spent in a loop and jumps the same amount of time ahead in the song when it exits the loop. You can download a save-disabled, time-limited demo of LiveSet at the PeterTools Web site. LiveSet 1.5 should be available by the time you read this, featuring a new Tam Tam module that handles dynamic tempo changes and numerous additional enhancements.

EM WEB CLIPS

—Len Sasso

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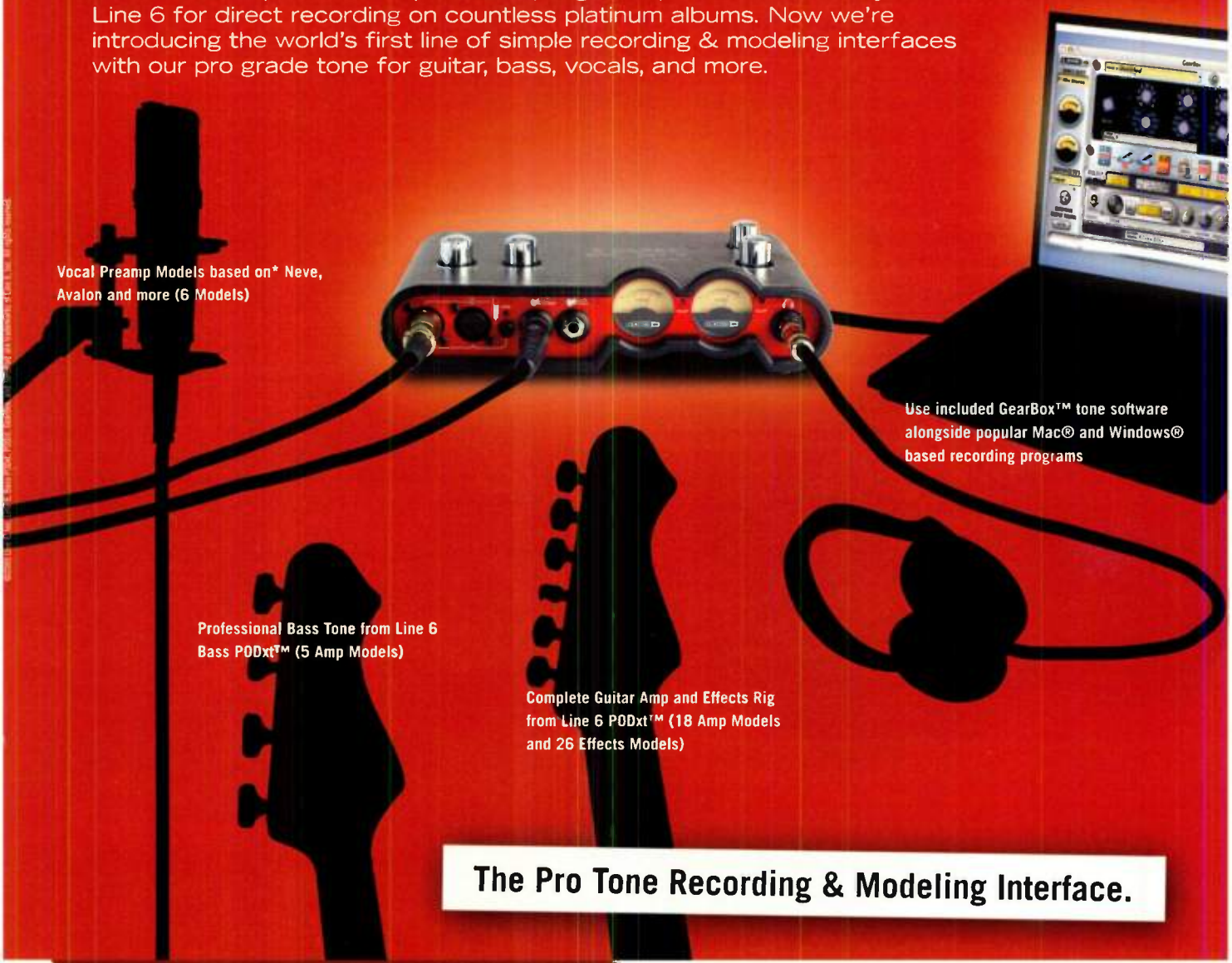

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Audio Ease Altiverb 5

Altiverb 5 (Mac: native $595, TDM $895) introduces more new features than any version since Audio Ease (www.audioease.com) launched its convolution reverb software in 2001. Among its key improvements are many more user controls, greater CPU efficiency, and stage positioning. The Stage Positions parameter lets you change the location of any virtual speaker in two dimensions, allowing you to specify the perceived position of instruments onstage. Because additional data is required, IRI files now accompany impulse responses (IRs). Audio Ease will continue to release free new IRs periodically.

Altiverb 5's new damping controls let you adjust the response of three frequency bands, and you can indicate the crossover points between the bands. A 3-D time-frequency plot of the IR, called a waterfall diagram, can display the effect of every parameter change in color. In addition to the traditional 2-D graph of speaker and mic position, Altiverb's Info box now displays large photos and QuickTime movies of the sampled space, as well as text that may give the venue's history and details about how the IR was recorded. Additional new features include factory and user presets, built-in test samples, 4-band EQ, optional iLok authorization, a CPU meter, and pop-up help. Altiverb 4 users can download an upgrade for $169 (the upgrade from earlier versions is $269).

M-Audio BX8a

The BX8a ($599.95/pair) from M-Audio (www.m-audio.com) has joined the recently released BX5a in the company's lineup of Stereophile near-field reference monitors. An updated version of the BX8, the BX8a has improved driver materials and a new cabinet design. The 8-inch driver is made of Kevlar (the same material used to make bulletproof vests) rather than polypropylene, and the liquid-cooled 1-inch tweeter is made from natural silk. The cabinet has rounded corners to reduce edge diffraction, and, according to M-Audio, its rear port design eliminates the distortion that results when front ports emit low-frequency waves in the same path as the direct signal.

The BX8a is biamplified, with 70W RMS into 4Ω driving the low frequencies and 60W RMS into 6Ω driving the high frequencies. Each monitor is magnetically shielded and has a power indicator and a volume control. Specifications state a wide frequency response, low distortion, a 2.2 kHz crossover frequency, a maximum output SPL of 90 dBA at 1 meter, and better than 100 dB A-weighted signal-to-noise.

Key Changes

PSPaudioware (www.pspaudioware.com) has updated PSP MasterQ, PSP Nitro, PSP 84, and Lexicon PSP42, adding RTAS compatibility and other improvements . . . If you own the prior version, you can download Digital Performer 4.6 for free from **Mark of the Unicorn** (www.motu.com). New features include pitch automation, which facilitates quick audio transposition; and V-Racks, which let you load effects and instrument plug-ins into an aux track that different sequences can share. Audio Units plug-ins and ReWire applications can now have multiple outputs, and you can select from a list of metronome sounds. Other enhancements include the new Pattern Gate plug-in, AAF file interchange, and the ability to control sends with MIDI . . . **Propellerhead Software** (www.propellerheads.se) has updated Reason to version 3.0.3. In addition to optimizing its code for increased performance, the free download adds support for Frontier Design Group's TranzPort and M-Audio's Ozonic, and a software development kit (SDK) is available for other remote controllers . . . **M-Audio** (www.m-audio.com) has begun distributing virtual keyboard instruments from GForce. Oddity ($129.95), Minimonsta ($199.95), M-Tron ($129.95), and impOSCar ($129.95) run standalone or as plug-ins and are available for Windows and Mac OS X. M-Audio has also announced that additional audio interfaces are now compatible with Digidesign Pro Tools M-Powered: the FireWire Audiophile and Solo and the Delta 44, 66, 1010, and 1010LT . . . **SonicBids** (www.sonicbids.com), a matchmaking service for musical acts and venues, has announced the Electronic Press Kit (EPK), a Web-based graphic interface for organizing an artist's or a band's online music, photos, and calendar.

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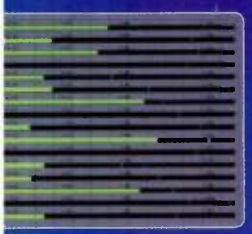

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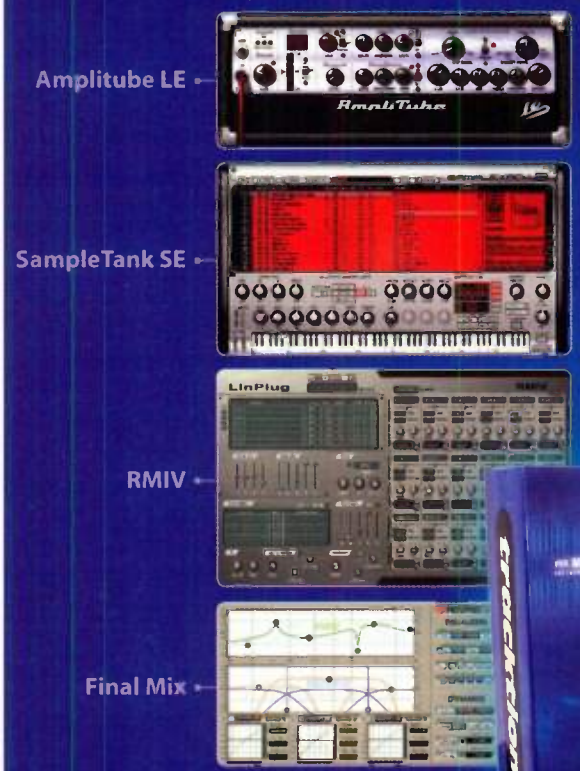

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Piano Resurrection

By Scott Wilkinson

Old piano recordings get new life.

Recordings of past piano masters are a vital musical resource, but they can be difficult to listen to with modern ears that are accustomed to high-quality audio reproduction. What if there were a way to re-create these classic cuts using modern instruments and recording techniques? A company called Zenph Studios (www.zenph.com) has developed a process whereby any solo-piano recording can be completely re-created, with every note and nuance faithfully reproduced.

The Zenph process is made possible by Yamaha's Disklavier Pro, a souped-up version of the company's MIDI-driven player piano. What makes the Pro so special is Yamaha's enhanced implementation of MIDI, which is formally called XP (eXtended Precision) Mode, and informally known as high-resolution or high-definition MIDI.

For example, instead of representing Note On and Note Off Velocity with 7 bits, XP Mode uses 10 bits. It also uses 10 bits to represent each hammer's movement, and 7 or 8 bits (depending on the specific Disklavier Pro model) to encode each pedal's position. The extra bits come from undefined Control Change messages, allowing the Pro's internal sequencer to capture much more of the player's articulation and nuance than conventional MIDI can.

The folks at Zenph Studios realized that XP Mode on a Disklavier Pro could be used to "reperform" classic piano tracks if those recordings could be accurately transcribed and converted into high-resolution MIDI data. Audio-to-MIDI systems have been around for years, but they are not completely accurate (especially with complex polyphonic input), and they can only encode the performance with conventional MIDI messages, which can't capture the nuances of world-class artists.

COURTESY ZENPH STUDIOS

FIG. 1: Zenph Studios built a recital hall around a 9-foot Yamaha Disklavier Pro (left) to help in the development of its software. Also on hand is a Steinway Model D.

Unfortunately, Zenph found that conventional sequencers don't know what to do with high-res MIDI data, often garbling or discarding the extra bytes. In addition, Yamaha does not publish the XP Mode spec, so Zenph had to reverse-engineer it in order to write sequencing and editing software. To aid in that effort, the company built a temperature- and humidity-controlled recital hall around a Disklavier Pro (see **Fig. 1**), and recorded various pianists with its internal sequencer to study how humans actually play.

The company also created software that converts acoustic-piano recordings into WAV files and transcribes them into high-res MIDI data. The process requires human interaction to achieve a successful result. And it doesn't happen in real time; the first three-minute demo took two weeks of human and processor time, though Zenph expects to reduce that time factor as the system is refined.

Once the data is compiled, it is used to drive the Disklavier Pro, the acoustic sound of which can be recorded with modern equipment and techniques. The first demonstrations include Glenn Gould's 1955 recording of Bach's *Goldberg Variations* and tracks from Art Tatum and Alfred Cortot, a French pianist recorded in 1926. The new recordings were done by famed engineer Peter McGrath in 5.1-channel surround sound using a DSD (Direct Stream Digital) recorder, the format used for SACD. The end result is remarkably effective; listening on headphones to the original recording in one ear and the re-created recording in the other ear makes it easy to hear if anything is amiss, down to the smallest detail.

Zenph has no plans to release its software; instead, the company intends to provide a service to record labels who want to revitalize their archived piano recordings. The only things omitted from the new recordings are all the flaws of those early tracks—noise, clicks, pops, out-of-tune instruments, poor dynamic range and frequency response—leaving the artistry completely intact. I will miss Gould and Erroll Garner muttering as they play, but that's a small price to pay for such a dramatic improvement in the quality of these classic recordings. EM

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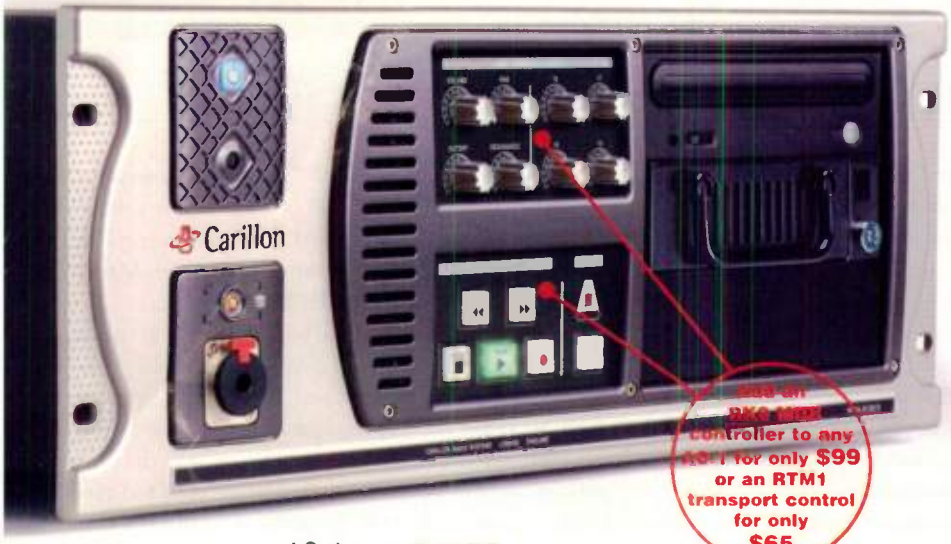

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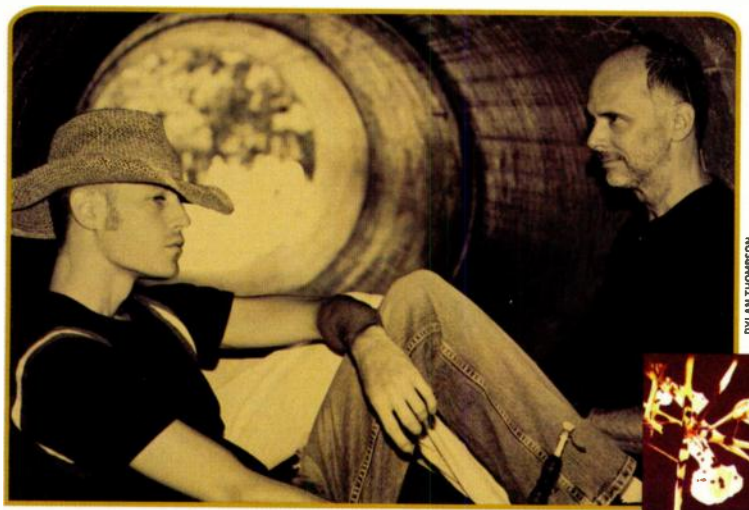
The Grand Experiment

By Matt Gallagher

The Project fuses diverse musical styles.

The Project is the brainchild of Robert Bond and Dustin Michael. Their self-titled debut album (*The Project Music*, 2004) combines Bond's and Michael's compositions with the input of 13 guest musicians from wide-ranging musical backgrounds. The album presents 17 tracks that are rooted in jazz and that incorporate elements of country, rock, pop, soul, and electronic styles. Bond and Michael played drums, percussion, guitars, synths, turntables, horns, and wind instruments, including bansuri and shehnai. They produced the album in their respective personal studios.

The first sessions, however, took place at Mikron Studios in Tennessee. "Three percussionists [Bond, Michael, and Emeline Lavender] jammed over my demo tracks, which varied in style from house and downbeat to drum 'n' bass," Bond says. "We used Mikron's three rooms. "Emeline used two [Shure] SM57s for stereo depth, Dustin used several SM57s, and I used an [Audio-Technica] AT4047. We recorded the audio on separate channels into a Mackie MDR 24/96 24-track [hard-disk recorder]."



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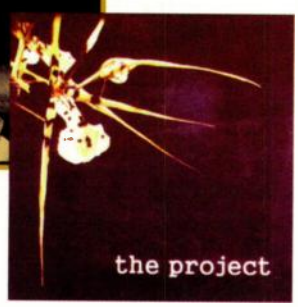

The Project/The Project

Michael reassembled audio tracks on his PC using Audacity and Sony's Sound Forge. Bond recorded percussion, drums, saxophone, violin, and vocals in his apartment studio, which is based around an eMac running MOTU Digital Performer 3.11. "I use my Roland JD-800 to trigger my Korg Triton-Rack," Bond says. "I recorded percussion with a Shure KSM27. For miking live drums I generally use two Oktava MK-012s as overheads and an AKG D 550 on the kick. I use the preamps in my Mackie 1202-VLZ Pro, MOTU 828, and ART DI/O.

"I played lightly, so I used some tricks in DP to beef up the drums," Bond notes. "I'll do a stem mix of the complete kit and another stem of just the overheads. I make a duplicate of the kit stem, compressing it a lot and equalizing it to taste. Then I'll bring it in slowly with the original stem until it sounds right. I put a limiter on the overheads stem and adjust the threshold of it until it sounds good, and then I'll bring in the track to an effective level. Sometimes I put a flanger on the overheads stem and bring it in a little to give the drums some character.

"I added an SM57 on the snare for two songs," Bond says. "I sometimes use the Motown vocal trick on the snare track to give it more presence: copy the snare track, compress the copy to the max, and roll off all the low end. Then I'll slowly fade that in with the drums to brighten up the snare."

Bond and Michael recorded a few guest artists remotely. "Charlie Louvin recorded [his vocal track] in the office suite in the Louvin Brothers Museum at Opryland in Nashville," Bond says. "I recorded Les McCann in his hotel suite. He played on 'Le Fin Cine' using my JD-800 triggering the Triton-Rack. I recorded Moe Denham in his basement studio. I took a direct signal out of a Motion Sound amp to track his Hammond B-3."

Other guests contributed parts in their own studios. "[Bush guitarist] Nigel Pulsford exported his tracks from [Apple Computer's] Logic as 24-bit AIFF files and uploaded them to my FTP server," Bond says. "[Saxophonist] Chico Freeman also posted his tracks. I put a rough mix of the drums and percussion for 'Walking a Thin Line' on my server for Joy Askew. She sent me a CD with the vocal, electric piano, and bass tracks as a DP file. I imported Holmes Ives's piano track for 'Two Hearts' into DP, and then wrote the strings. I didn't edit their tracks; I just applied some mutes." EM

For more information, go to www.projectthe.com.

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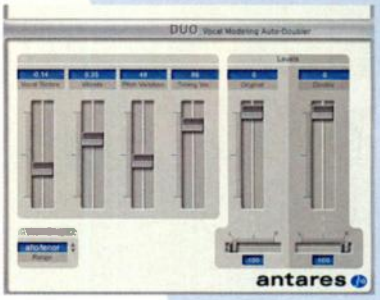

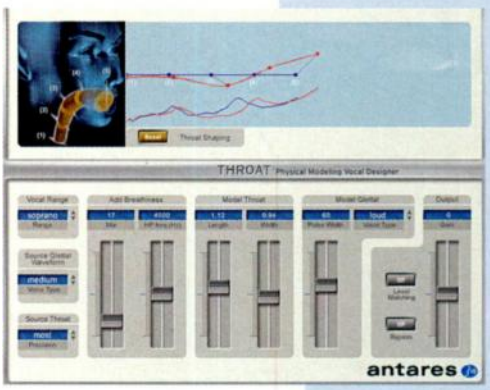

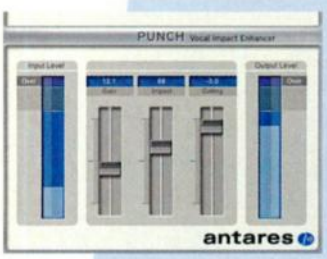

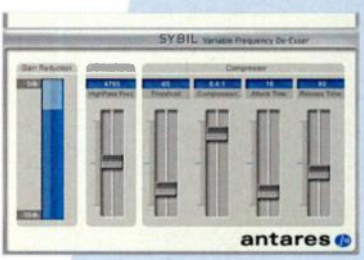

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LAURA WILLIAMS

Studio in the Round

By Rusty Cutchin

Audio enthusiasts have been touting surround sound as the next big thing in audio for several years now. Further, the DVD revolution and video gaming have turned multichannel sound into a standard feature of consumer home-entertainment systems. Movies, TV shows, and concerts are routinely encoded with 5.1 mixes that have one or both of the most popular surround formats, Dolby Digital (or AC-3) and DTS.

Now is the time to make your room multichannel.

The typical project-studio owner, however, may have had good reason for avoiding the 5.1 rush: the music-only multichannel disc (the format that smaller studios could most easily produce) has never taken off as a mass-market item. Despite hundreds of releases in SACD and DVD-Audio—the two high-resolution audio-only formats—consumers have failed to buy enough of the necessary players to significantly increase the popularity of multichannel audio.

For many people today, listening to music is about portability and convenience, rather than detail, frequency response, and spatial expansion (which are the most attractive features of the surround format). High-resolution 5.1 mixes don't translate well to iPod ear buds. (But what about the Dolby Headphone format, you ask? See the sidebar "Modern Surround Formats.")

Even more restricting to the mobile-music crowd is that surround requires you to stay put—your ears must be a certain distance from your five (or seven) satellite speakers to get the full surround effect. (Bass—the "point one" in a 5.1 or 7.1 surround system—works a little differently. See the sidebar "Managing Bass.")

State of the Art

Should these facts make surround a dead issue for your studio? Not if you want your room to be as competitive and attractive as possible to new clients. Multichannel audio has established a foothold in areas that you might not think much about, such as sound design for electronic games, which is a multi-billion-dollar business. Hollywood studios are gearing up for new high-definition DVDs, while consumers brace for a format war between HD DVD and Sony's Blu-Ray—each of which is supported by different groups of manufacturers.

Even more important to small studios is the DualDisc, which provides audio on one side and video with audio on the other. Major label releases such as Rob Thomas's *Something to Be* (Atlantic, 2005), and the Miles Davis classic *Kind of Blue* (Sony, 2005), which includes the original music and a film documentary on the making of the album, have been released as DualDiscs. Car manufacturers have a huge impact on surround's public acceptance, as more autos feature factory-installed multichannel systems and as satellite radio, with its surround capability, grows in popularity.

But for the project-studio owner, surround has been a game of hurry-up-and-wait, because most music-only projects continue to concentrate on stereo mixes. Yet according to several surround experts that EM interviewed, the time to get established as a surround mixer is now (see the sidebar "Entry-Level Surround"). Getting a foothold in the surround business involves many of the same requirements as does entering into the traditional studio business: get the right equipment installed, seek out customers who are looking for surround, and provide good mixes in the right format in a cost-effective way.

FIG. 1: Eric Colvin uses MOTU hardware and Digital Performer to create surround projects such as *Nascar 3D: The Imax Experience*.

WARREN EIG

CLAIRE BIDWELL

FIG. 2: With his Window-based studio and Steinberg Nuendo, Neil Wilkes tackles audio-restoration jobs as well as live-album production and movies in 5.1 at Opus Productions in the UK.

To get a clear picture of the current state of surround, I spoke with six engineers who work in various media, from electronic games to HDTV. Each gave good advice and valuable tips that apply to audio mixing in general, and surround work specifically.

Eric Colvin created the surround mixes for *Nascar 3D: The Imax Experience* (Imax, 2004), and other film and television projects at Soundscape Inc. in Studio City, California (see **Fig. 1**). Using MOTU hardware and Digital Performer, he delivers most of the film projects in 5.1, while the TV work is still primarily in stereo. He is working on a pop album that he intends to mix in 5.1.

Patrick Yacono uses Digidesign Pro Tools to create surround mixes for low- to midbudget films, television programs, and older films not previously mixed in surround. He works at Signal Hill Sound, outside of Chicago.

Neil Wilkes uses Steinberg Nuendo with his PC-based system to create mixes ranging from private quadraphonic restoration jobs to full live album production and movies in 5.1 (see **Fig. 2**). He works at Opus Productions, in the UK.

Paul Klingberg creates music releases in the DVD-Audio format, as well as DualDisc, DVD music videos, and mixes for HDTV at Red Note Studio in California. Recent projects include several SACD remixes of classic Earth, Wind & Fire and Chicago LPs and the HDTV surround mix of the two bands' recent joint tour. He has also created the surround mixes for Emerson, Lake & Palmer's *Brain Salad Surgery* (Rhino, 2000), Carole King's *Tapestry* (Sony, 2002), and Foreigner's *Foreigner* (Rhino, 2001).

David Collins, along with Associate Sound Designer Jim Diaz, mixes in surround for LucasArts, a developer and publisher of interactive titles such as *Star Wars: Episode III, Revenge of the Sith* (LucasArts, 2005), for PCs and game machines such as the Microsoft Xbox and Sony PlayStation 2. The company also oversees and creates sound, voice, and music for externally developed projects such as Pandemic's *Star Wars Battlefront* (Pandemic/LucasArts, 2004).

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Chris Gill **Future Music** **June 2005**

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David Glasser has created many mixes for Sony's SACD format at Airshow Mastering in Boulder, Colorado (see Fig. 3). He recently handled the surround mix for *The Grateful Dead Movie* (Monterey Home Video, 2004). Glasser and Matt Sandoski were Grammy nominees for their audio restoration and mastering work on the boxed set *Goodbye Babylon* (Dust to Digital, 2003), a six-disc collection of gospel recordings from the 1920s through the 1950s. (For additional information on the studio setups and preferred equipment of these surround professionals, see Geared Up for Surround, available online at www.emusician.com.)

TIM MURPHY

FIG. 3: David Glasser has created numerous high-definition audio mixes for Sony's SACD format at Airshow Mastering in Boulder, Colorado.

Changing Channels

All the surround mixers that I spoke with have encountered challenges unique to the multichannel world, and have developed strategies to create successful projects. Understanding the goal of distributing sound creatively among five speakers is only the beginning. Colvin says that the process has been relatively smooth: "The only issues were deciding what gear to buy, how to most effectively and flexibly hook it up, and how to start thinking creatively in surround terms from the inception of a project. Those seem to be fairly unavoidable growth issues that anybody would deal with in the transition from stereo to surround. Aside from that, it's been a playground."

Colvin doesn't think in terms of rules for surround mixing. "I just make it sound as good as possible and follow my instincts. As accessible as surround has become, it's clear we're still in a period of definition. Almost anything goes. I approach surround with no more 'rules' than the ones I approach stereo with. If a mix sounds good, it sounds good—and it's not up to anyone to convince me otherwise.

"One thing that did come up recently as a request from a dubbing engineer on a score of mine for Nascar," continues Colvin, "was to steer clear of the center channel. The engineer knew it was crucial to have Kiefer Sutherland's narration as defined and unobstructed as possible. Knowing that the film was going to be an onslaught of thundering sound effects and driving

MANAGING BASS

Because surround began life as a way to create more dramatic impact for filmgoers, bass had to be handled in a special way. Speakers designed for theater walls couldn't accurately reproduce the rumble of earthquakes or the thundering sounds of running dinosaurs. Subwoofers became necessary equipment in theaters, as they enabled deep bass levels to be controlled independently on playback. When digital audio tracks became the norm for films and multiple channels of sound could be mixed into a single audio file, engineers made a dedicated low-frequency effects (LFE) channel part of the multichannel mix. In written terminology, this channel was separated from the other channels by a dot (5.1) to indicate its restricted frequency range. Sound mixers could now drop a giant footstep or a thunderclap into the LFE channel and know that the effect would be faithfully reproduced in the theater's subwoofers.

With the advent of home-theater systems, electronics manufacturers wanted to give consumers options for matching surround receivers with incompatible speaker systems. Bass-management systems were therefore incorporated into receivers. Bass management routes the LFE channel in a decoded surround mix and the frequencies below a set corner (usually 80 Hz) in the other channels to the system's subwoofer. In a correctly calibrated system, that allows for smoother performance with full-frequency response from all sounds and instruments that have bass content.

Engineers creating music-only surround mixes may add bass-management hardware, such as Blue Sky's Bass Management Controller, to an existing satellite/sub configuration. Alternatively, they may mix in a 5.0 system with no sub if they are confident in their monitors' accuracy and frequency response and know their program material thoroughly. (Horror stories abound of engineers mixing without full-range monitors only to deliver tracks with the sounds of moving scenery, conductor taps, and other stray low-frequency information that jumped out from an end user's subwoofer.)

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music, it made sense to 'carve a hole' for Kiefer to cut through. So we delivered the score in quad with a phantom center. It worked perfectly."

The most attractive thing to Colvin about working in surround is its number of options. "I now have five discrete positions to play with, and all of the convergent possibilities to boot," he says. "It's really fun to try more things in the mixing process. That's not to say I get bogged down with gimmicky exploration; I merely use the 3-D space to try mimicking ultra reality. If I'm listening to music, I want to be in the room where it's being played. Surround makes it more possible to achieve that sense."

Yacono's work with live surround has given him a different take. "A big challenge comes when mixing for a large venue, and trying to compensate for the people who are sitting all the way in front and to the right or left," he says. "An associate of mine went as far as sticking Post-it notes with stick figures along the bottom of my screen to help me with that visualization.

"I try never to think of audio as stereo, mono, or quad," Yacono adds. "I think of the environment as a whole, and mix for everyone in the venue. For theatrical releases, I always leave a little center in everything up front. If you pan hard right, the folks that are seated front left may not be hearing the sound, so I position audio between speakers to give location without leaving anyone out."

High Resolution and High Standards

Wilkes feels the primary challenge of surround comes from its increased clarity. "Surround is a lot less forgiving, on the quality of the source material than stereo is. This is because with stereo you have only the two channels to think about, and so there is

ENTRY-LEVEL SURROUND

Although engineers who regularly create pro-level surround mixes work with dedicated hardware and full-featured versions of software applications, you can form a surround mixing station if you're willing to go through a few extra steps.

Monitors. The first requirement is having the right number of monitors. If you are using powered monitors, you'll need to add three more to create a basic 5.0 system, which is all that's required (as long as you're using full-range monitors) to monitor the placement of elements in the mix. A subwoofer is required only for isolating the bass information (the LFE channel or ".1") that will be encoded onto the final medium. All monitors don't have to be the same model but should be compatible. One combination, for example, might be Mackie HR 624s for satellites and center-channel monitor in a system that uses Mackie's HR 824s as mains.

Interface. You will need to assign each output in your software application to its own line-out to feed your monitors. Your audio interface must therefore have at least six discrete outputs. That requirement eliminates USB interfaces and many FireWire units that provide only stereo monitoring.

Applications. All of the major digital audio sequencers now have some kind of surround compatibility. MOTU Digital Performer, Apple Logic, and Steinberg Cubase SX 2 have enhanced panning features and plug-ins. Although Digidesign Pro Tools is used for many pro-level surround mixes (as is Steinberg Nuendo on PC-based systems), Pro Tools LE doesn't support surround directly, although a multichannel mix and monitoring setup can be achieved using aux busses and sends.

Sequencers will create individual mono files or an interleaved multichannel file, which must then be encoded

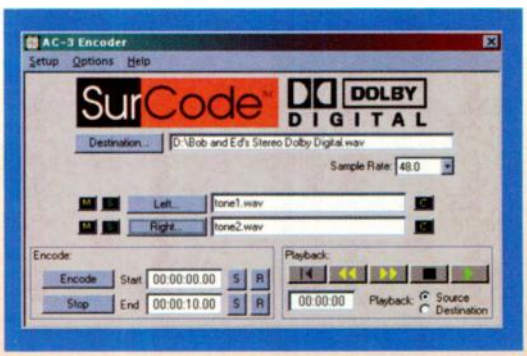

FIG. A: Minnetonka SurCode, available in different versions for specific surround formats, is widely used for Dolby Digital (AC-3) and DTS encoding in Windows-based professional studios.

to one of the major surround formats, usually Dolby Digital (AC-3), before burning to high-resolution DVD-Audio or to the audio track of a standard DVD-Video. (Sony's SACD format requires professional equipment.) Minnetonka's SurCode (Win, $999) is a popular pro-level PC-based encoder (see **Fig. A**). Cubase SX 2 can export 5.1 mixes in Windows Media format for playback on a surround-equipped computer.

Mac users have been restricted to Steinberg's higher-end Dolby and DTS encoders or the Circle Surround VST plug-in encoder ($250; TDM version, $750) made by SRS Labs (www.srslabs.com). Windows and Mac users can use Minnetonka Discwelder Bronze software ($99) to create DVD-Audio discs. Apple DVD Studio Pro ($499) has a Dolby encoder for creating standard DVD-Video discs, which is the easiest way to hear your mix on other systems.

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–**Mark Isham**, composer, "Crash"

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a great deal of masking that hides a lot of the source material's faults and imperfections. You don't have that luxury with multichannel, because every flaw stands out as a result of the extra space and bandwidth available.

The most important component of a pro surround system is proper setup, says Wilkes. "It is imperative to use a correctly calibrated monitor system, with all five main channels set as close to full range as possible—certainly extending to 50 Hz, and preferably lower. Monitors should be of the same make and model, and if you are not using active monitors, then all three amplifiers must be the same make and model. Otherwise, the weighting will be all wrong."

Wilkes favors foregoing the subwoofer and instead mixing in 5.0. "You cannot mix for multichannel using a sub/satellite configuration, or you won't know how it will sound when played back on a properly setup system. You will find that there will be either far too much or far too little bass."

Wilkes also warns against excessive limiting. "It is unnecessary to use the brickwall limiting techniques that are currently so fashionable in stereo mixes to raise the average levels. With five channels, 85 dB SPL is loud enough. If you want it louder, then turn up the amplifier. But never mix like this. If you do, it will sound bad. Overcompressed mixes sound dreadful enough in stereo; they are harsh, tiring and hard to listen to. In multichannel, the listener just turns it off—fast.

Good Seats

"There are two ways to mix for surround," Wilkes says. "Put the listener in the audience or put the listener in the middle of the mix. The first approach works well with live material: place the band in the front three monitors, and use the rears to place the listener in the middle to front of the hall. Try to re-create the actual atmosphere at the show. That can be a very effective method to use, as long as you get it right. The second approach works with most, if not all, mixes. It is known as the 'aggressive' mix and uses all five channels equally with musically significant information coming at you from all sides. I also try to avoid using the .1 LFE [low-frequency effects] channel at the initial stages of the mix. I use it only at the final stage, unless I am preparing a movie soundtrack."

Mixing for games carries a unique set of requirements. As Collins points out, "Often our mixes will be heard on multiple pieces of hardware, which all sound very different. Surround 'folds down' in different ways, depending on what your primary playback box is. For example, PlayStation 2 uses Pro Logic II, whereas the Xbox uses Dolby Digital AC-3; we therefore need to make sure that each mix we do will read on every platform. Sometimes we'll do specific mixes, if time allows. Also, the sound delivery for these games is often a set of cheap speakers built into an old TV, so we check our mixes on that as well. Old television sets serve as our Auratones!"

"Generally, our surround mixes are for *cutscenes*—cinematic movies that propel the game story between levels," adds LucasArts Associate Sound Designer Jim Diaz. "I like to keep things as realistic and natural as possible. I try to stay true to the picture and use the surround field to immerse the player in the game's universe, which for us is the *Star Wars* universe, mostly. Also, I don't want the sound to intrude on the player's awareness. If you notice the sound, it's usually because it's bad. In a good game, the sound will engage the player and raise the intensity of the experience. Bad sound will distract and take away from the fun factor."

Live and Kicking

Glasser tries to ensure that "the sound field or environment of the mixes is well balanced between the channels—that there aren't any holes in the space, and that the front and rear sounds are integrated. We always check the work using the bass manager and frequently add or remove information from the LFE channel. Fortunately, surround mixes do not have to be as heavily compressed or limited to have a dramatic impact. In fact, the Dolby and DTS encoders produce better sounding results with dynamic material."

Because the number of concert DVD-Video projects is increasing, Glasser advises mixers to put up multiple audience mics printed to at least four tracks when recording concerts. For studio recordings, it's helpful to record some room mics, which can be used to place things in space. When mixing surround, calibrate your monitors

MODERN SURROUND FORMATS

Dolby Digital. Also known as AC-3, Dolby digital delivers mono, stereo, and up to 5.1 discrete channels of surround sound: left, center, right, left surround, right surround, and low-frequency effects (LFE). Global standard for DVD-Audio and DVD-Video. Digital audio standard for North American HDTV, digital cable, and DBS systems.

DTS. Similar to Dolby Digital in channels and quality. Popular in theaters, and used on many DVD-Audio discs. (More information is available at dtsonline.com.)

Dolby Digital Plus. Next-generation audio codec that provides higher fidelity, extended channel applications, and broader utility. Backward compatibility with existing Dolby Digital decoders. Selected as the lossy audio codec for the HD DVD format.

Dolby Digital Surround EX. Introduces a center rear-channel to the 5.1 playback format of Dolby Digital. Additional channel clarifies audio effects that pan from front to back and improves the realism of audio that originates from directly behind the listener.

Dolby Headphone. Accurately simulates a 5.1-channel surround-sound speaker system from any pair of headphones for highly realistic "virtual surround." (You can hear demos at www.dolby.com/consumer/technology/headphone.html.)

using the NARAS and Dolby guidelines. Glasser advises clients to bring their in-progress surround mixes into his mastering studios for listening and review.

Klingberg is mindful of the care that's needed in working with classic albums and legendary clients. "My biggest challenge is remixing stereo recordings for artists such as Chicago, Carole King, and Earth, Wind & Fire in surround. The challenge is to capture the feel and emotion of the original stereo mix and translate that into the full 5.1 surround field. By definition, the mix will change, but I always try to retain the feel and vibe of the original. People know what the original recordings sound and feel like. Being sensitive to that feel and emotion is at the heart of remixing in surround.

"All of music mixing is based on a great stereo mix," says Klingberg. "I always start my surround mixes in stereo only. Adding things to the surround channels is the easy part. The great mixers who have years of stereo mixing experience make the best surround mixers. All the fundamentals of balance, EQ, compression, and sound-field placement start in stereo . Years of achieving that in stereo make for very compelling surround mixes. There is no substitute for knowing the fundamentals of audio engineering, including how to use dynamics, microphone technique, preamp settings, a patch bay, EQ, console bus routing, and effects processing."

Wild West of Sound

Will surround as we know it continue to grow in popularity, or should small-studio owners wait to adopt some other format? Colvin feels that, given the growth of investment and interest in the consumer market, surround is steadily positioning itself to replace stereo, in the same way that stereo replaced mono. It is a Wild West of sorts, with surround being the "open territory." The market will grow hungrier for diverse surround content, just as we are currently accustomed to the vast selection of stereo content. Getting in on the forefront of that kind of production makes it possible to carve new paths. That's exciting to me."

The studio owner who wants to expand should be as informed as possible before whipping out his cash, warns Colvin. "The most important factors in my decision were budget, manufacturer reputation, flexibility, and compatibility," he says. He sees no limits on types of work to look for: "Album production, video games, live events, and independent filmmaking—that's where I would look."

"I was recently asked to speak at a game developers conference about surround mixing techniques," says Klingberg. "Many games for the PlayStation and Xbox have now incorporated 5.1 surround sound. The experience is awesome and very cinematic. I'm convinced that audio production for games will include 5.1 surround-sound work for all of us in the industry.

"With the launch of DualDisc, all the labels will want to fill the DVD side of the DualDisc, and 5.1 surround mixes are great content for the DVD side," Klingberg continues. "Is your studio mixing a traditional stereo project for CD release? Why not pitch your client (and record label for that matter) on releasing your project in the DualDisc format, and then pitch them to do a 5.1 surround mix for the DVD side of the DualDisc?"

At LucasArts, Diaz is also optimistic about multichannel. "I believe that surround is the new high fidelity. It is the future of sound in every aspect. When quad sound was introduced in the 1970s, it was too far ahead of its time. That time has now arrived, and the entertainment industry is beginning to take full advantage of surround sound.

"I look forward to mixing music projects for surround," says Diaz. "I have heard a few classic rock albums mixed in surround, and they sounded like completely different recordings in some cases. The surround field really opens up the possibilities to engage the listener."

Collins adds, "I agree with Jim that surround music is excellent, and I hope that more of it is produced. Surround music won't truly take off until one format or another gains wide acceptance and some sort of standard is adhered to. If surround music ever makes its way into automobiles, then there will be a huge demand for it."

"Unfortunately, Pro Tools LE does not support surround," Diaz points out, "so running a Digi 002 is out of the question for project studios hoping to mix surround. Pro Tools TDM systems may be outside the budget of a project studio. Cubase SX and Nuendo by Steinberg have surround capability, as do MOTU's Digital Performer and Apple's Logic. Compatible hardware for those systems is readily available and affordable."

Once you've equipped your studio for surround, Collins believes that games are a great area in which to obtain work. "Lots of surround work needs to be done," he says, "whether it's for small cutscenes or for making dozens of quad ambiences. An increasing number of films are being remixed for DVD, and television shows have been receiving the surround treatment for DVD release. Not all of those projects can support endless hours of surround remixing in larger facilities, so that might be a wonderful place to look for work."

"Word of mouth is big in this business," Diaz adds. "Working on small film projects is a good way to get started. Try a local film school for such jobs. They may not pay at first, but do them well and put them in your portfolio. Having experience and quality work are your best assets for getting another job."

A Caveat and a Confirmation

Wilkes feels that the future of multichannel audio is very exciting, and it will only get better. "New media such as the holographic systems currently under development will combine high-bandwidth multichannel audio and high-definition video simultaneously."

But he doesn't mince words when it comes to breaking in. "To the project-studio owner who is trying to get into surround—don't. Not unless you have a lot of money to spend and a stack of clients all lined up and ready to go. Otherwise, you'll spend far more time talking about surround or trying to talk clients into going for it than you will actually doing it. Initial investment is enormous, its many formats make it seriously expensive, and you must be geared up for all of them. If you aren't, the first job you land will require encoders or software and hardware that you don't have.

"Not only that, but you will need a dedicated space that has to be set up just so," adds Wilkes. "Multichannel is not even close to being as forgiving as stereo is. And you will need to spend the first two years learning, and not earning."

But by and large the surround mixers we spoke to agreed that the future of surround is secure and that when it comes to getting started with surround, there's no time like the present. "We all know that surround is here to stay," says Yacono. "You either have to jump on the wagon or get left behind. Fortunately, it doesn't cost a million dollars to mix in surround anymore, so look for the equipment that will get you in the game early without killing your bank account. Pro Tools HD lets you mix anywhere from mono, to 7.1 right out of the box with some well-thought-out panning features.

"Stereo will be obsolete within the next few years," says Yacono. "At minimum, all stereo programs will have been derived from a downmixed surround program. If you're avoiding getting into surround because of the lack of surround work, create the work yourself. Take your 2-channel clients into the surround circle of life, and give them a taste of something they are going to want again and again."

With the advantages of powered monitors, low-cost satellites and subwoofers, surround-ready software applications, and reasonably priced DVD burners, these experts agree that expanding your studio into a multichannel laboratory should be a simple matter of "when," rather than "if." EM

Rusty Cutchin is an associate editor of EM. He can be reached at rcutchin@comcast.net.

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Sequencing on a Shoestring

By Dennis Miller, Brian Smithers, and Geary Yelton

A digital audio sequencer is the core of almost every computer-based recording studio. More than any other type of software, sequencers have made the personal-studio revolution possible. Musicians everywhere can record their music using the same techniques and many of the same tools as top professionals. For the first time in history, if your recordings are disappointing, you can no longer blame your equipment.

Although top-shelf (and top-dollar) programs such as Pro Tools, Digital Performer, Cubase SX, and Sonar Professional Edition can handle anything that multitrack recording software can, many less expensive products are available to anyone with more modest needs and financial resources. Today's musicians are living in an age of unprecedented democratization: if you can afford a computer, you can afford the software needed to produce professional-sounding recordings in any musical style.

EM set out to find low-cost sequencers and what makes them different from their high-price counterparts. For the purposes of this article, we decided that each sequencer must retail for less than $225 to qualify as affordable. Our research uncovered a dozen products from as many manufacturers (see the specifications table for version numbers). Most are exclusively for Windows, perhaps indicating that the majority of entry-level users own PCs. Bremmers Audio Design MultitrackStudio Pro Plus, Cakewalk Home Studio 2 XL, FASoft n-Track Studio, and Image-Line Software FL Studio Producer Edition fall into that category. Digital Sound Planet's Quartz AudioMaster Pro and PG Music's PowerTracks Pro Audio are Windows-only applications as well.

Most of the Windows programs are completely self-contained, but two provide separate applications for handling audio and MIDI chores. Midisoft Studio Ensemble 2003 XP comprises the multitrack sequencer Studio 2003 and AudioPro Wave Editor. MIDI Studio and Audio Studio make up Magix Music Maker 10 Deluxe.

We found two low-cost sequencers exclusively for Mac users: Apple GarageBand and Sagan Metro LX. GarageBand is part of a software suite that also includes nonmusical applications. Two programs—Mackie Tracktion and Steinberg Cubase SE—are available on either computer platform.

You don't have to be rich to afford a digital audio workstation.

DMITRY PANICH

What follows is a roundup of each sequencer's main features. We'll start with an overview of all the programs and then provide summaries on some unique aspects of each. The specifications table should help you to compare the programs feature-for-feature. If you're shopping for a low-cost sequencer, this article will help you find one that will best suits your needs.

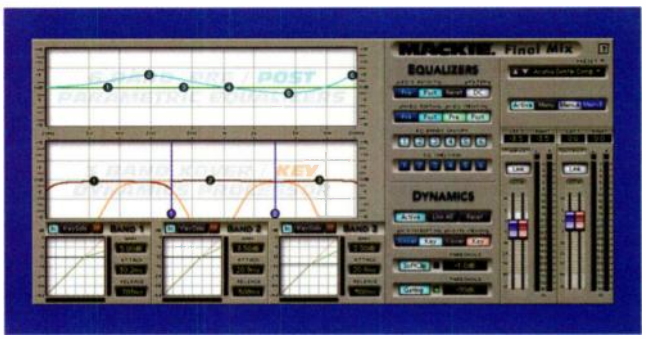

FIG. 2: Several plug-ins that work only with Mackie Tracktion 2, as well as standard VST plug-ins, are included in its software bundle. Originally developed by Acuma Labs for Mackie's d8b digital mixing console, Final Mix is a stereo mastering processor that furnishes a soft-clip limiter, 3-band compression, and two 6-band parametric equalizers.

Interface-off

Some of the greatest differences among sequencers are their individual approaches to the graphical user interface (GUI). A well-designed interface lets you record, arrange, and mix your music quickly and efficiently, with maximum productivity and a minimum number of technical headaches. Because sequencers typically offer many functions and capabilities, having a clear and consistent GUI is essential, so that users can have a pleasant and productive hands-on experience.

Generally speaking, one advantage of low-cost sequencers is that they can be simpler to operate than their high-end brethren because they don't offer such a bewildering array of options. Still, any sequencer needs to provide the basics, which include the means to navigate your way around the sequencer and the project being recorded; to record, play back, and edit MIDI and audio tracks; to import data; to host effects and instrument plug-ins; and to get finished recordings out into the real world.

FIG. 1: FL Studio's Step Sequencer lets you program soft synths and samplers using familiar techniques that were originally developed in the '70s for programming drum machines.

Other than FL Studio (formerly known as Fruityloops), MultitrackStudio, and Studio 2003, all the programs featured in this article present the traditional track view as their primary user interface. Track names are shown on the left side of the main window, with a data area to the right. Alongside the track names are usually buttons or some other means to select MIDI channels, audio inputs and outputs, and related track parameters. The track view is familiar to almost anyone who has used a sequencer. It's also an intuitive way to orient yourself within a program.

FL Studio users spend most of their time in the Step Sequencer, a gridlike interface that has horizontal rows of buttons representing 16th-note steps and vertical rows of instruments such as soft synths, sample players, and the like (see **Fig. 1**). Step sequencing is not a technique you'd use if you want to record your music in real time, however, so FL Studio has the most to offer users who enjoy building tracks note by note. MultitrackStudio uses a variation on the track view, but its data area is hidden by default and appears below the track header when displayed. Studio 2003 shows all tracks only in the Score view; to edit audio tracks, you must open the Wave view, which doesn't display MIDI tracks.

One of PowerTracks' most powerful features lets you toggle a track between audio and MIDI at any point, and GarageBand lets you convert the MIDI data in Apple Loops to audio data. When you assign a MIDI track to a soft synth or the built-in sampler, MultitrackStudio will display notes as generic waveshapes that can be edited or as a rendered waveform view that cannot be edited, but neither option actually commits the track to an audio file. In all the other programs discussed here, tracks are fixed as either audio or MIDI. Although most sequencers let you resize individual tracks, n-Track and PowerTracks have alternate track views that display configuration information, but they don't show actual audio or MIDI data.

Home Studio, MIDI Studio, PowerTracks, and Studio 2003 have a Go To option that lets you quickly view any portion of your project—a handy navigation feature. n-Track has a feature that allows you to simultaneously change the vertical and horizontal ranges that are displayed.

All of the programs except GarageBand and MIDI Studio support markers, a useful feature for locating points in your recording—for example, the start of a verse or chorus, a voice-over's punch-in point, or the boundaries of a phrase that needs effects. In FL Studio,

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Eight combo jacks (XLR or ¼") all with phantom power let you connect 8 mics

Each mixer channel has 4 bands of parametric EQ and compression

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Pitch Fix let's you easily correct out-of-tune vocal tracks

The AW1600 plays back 16 tracks at a time, has 144 virtual tracks and includes a 36 channel mixer with two system effects all based on the 02R96

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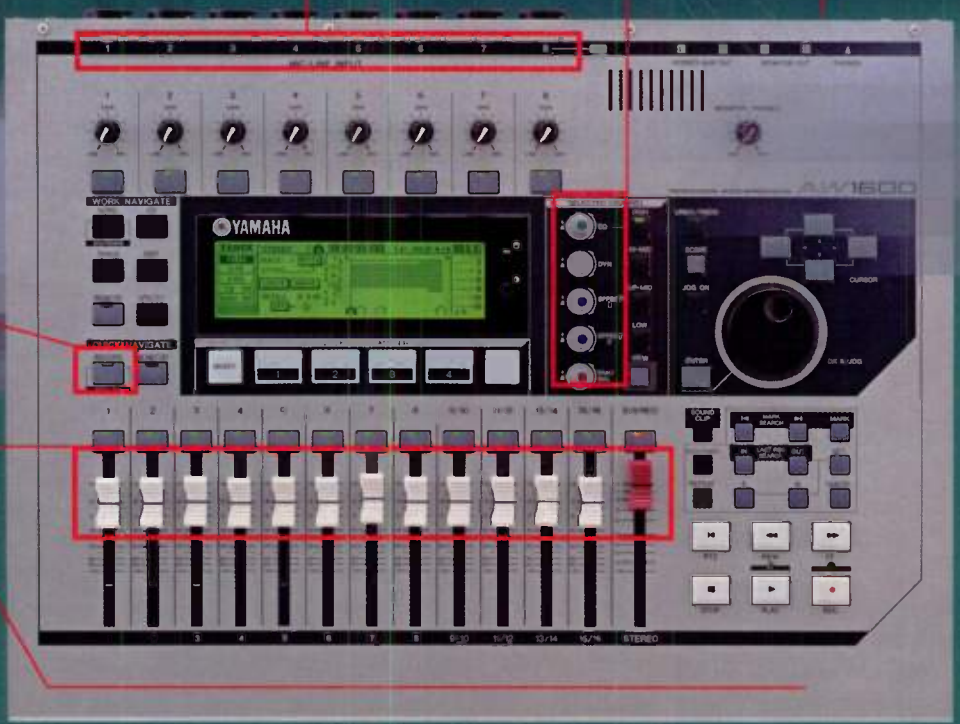

AW1600 PROFESSIONAL AUDIO WORKSTATION

The AW1600 is a complete professional mobile recording studio. It has everything you need to record, mix and master your songs to the built-in CDR in one portable and rugged package. It's also designed to do one thing and one thing only — be the best multi-track studio possible. So you never have to worry about IRQ settings or OS crashes.

The eight transparent/low noise mic preamps, 36 channel 02R96-based mixing engine with 4 bands of EQ and compression on every channel, even the unique Pitch Fix algorithm to correct the pitch of out-of-tune vocals are all built into a durable metal chassis that's road ready and Yamaha tough. You're always ready to pick up and go anywhere you want to record. And, of course, the AW1600 is the perfect centerpiece of a home studio.

So whether you never leave the trailer park or are always on the road collaborating with friends and recording live events, the AW1600 is the perfect mobile/home studio solution.

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markers always appear at the start of a song, and you must drag them to the position that you want. Half the programs have a dedicated Markers window (AudioMaster calls them Cues) for setting and editing markers. In PowerTracks, the markers appear only in the Bars window, not the main Track view. You also can't move them around with the mouse. n-Track has a variety of marker options, including the ability to display a pop-up time-indicator window a few beats before a marker is reached as a song is playing.

A piano-roll view or its equivalent is the main area for entering and editing individual notes in Home Studio, Metro, MIDI Studio, MultitrackStudio, and n-Track. In FL Studio, the Piano Roll view is an alternative to the Step Sequencer window and is used to enter specific pitches for a synth, among other things. Most of the other programs have graphic editors that use piano-roll displays in separate windows that you open for each track.

n-Track has a great feature that allows you to define any range of notes as a pattern, and then use the mouse to draw the pattern repeatedly. Home Studio's Pattern Brush performs a similar function, and the program comes with several dozen preset patterns to use as defaults.

Eight of the 12 sequencers let you see your music as standard notation. If printed music is one of the primary reasons you use music software, you'll want to investigate those programs more closely. The printing options in PowerTracks and Studio 2003 offer the most flexibility. GarageBand and MultitrackStudio are the only ones that display notation but don't let you print musical scores.

FIG. 3: Apple GarageBand 2.0.2 features an uncomplicated single-window interface for recording audio, arranging loops, and tracking software instruments. Its wealth of pro-level features belies its entry-level orientation.

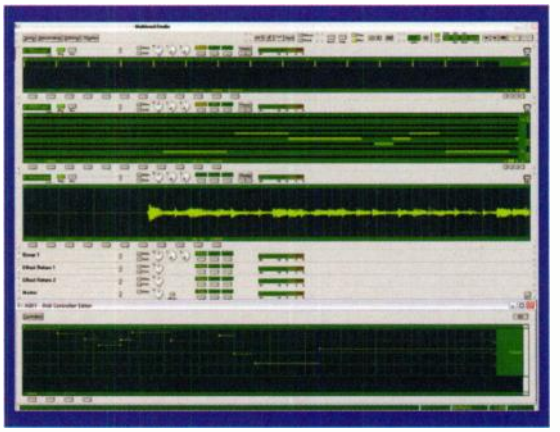

FIG. 4: MultitrackStudio Pro Plus makes recording and mixing MIDI and audio efficient. Three insert effects are available per track, each of which can chain up to six effects courtesy of the Multi Effect.

Seven programs have editable event lists, which can make a significant difference if you like to tweak the tiniest details of MIDI performances. All except GarageBand and Multitrack Studio have a dedicated mixer display, and even those provide almost identical functionality in other windows.

The programs discussed in this article have a variety of other work areas. Home Studio's has Synth Rack, a dedicated soft-instrument display; PowerTracks has Piano-Keyboard and Guitar-Fretboard windows, both of which show notes currently being played; n-Track has Big Time screen, which can use many common video formats as the display increments; and FL Studio has a Browser screen, in which you can preview and select loops. GarageBand's Musical Typing window lets you play software instruments and enter note data with your computer keyboard, and its Loop Browser lets you search for and audition Apple Loops.

Cubase's Pool is used for organizing audio and video resources and various windows for routing and controlling VST instruments and effects. Likewise, AudioMaster offers the Navigator, which lets you browse audio and MIDI assets and display audio file metadata. It also has a unique Karaoke view. MIDI Studio's HyperDraw view gives you graphic editing of controllers within individual sequences. The Object Editor in Audio Studio allows you to assign plug-ins and other mix parameters to individual audio objects. Metro features Rhythm Explorer, an algorithmic assistant for generating percussion and other parts, as well as a Jukebox window that can play and batch convert various audio formats. Cubase, Home Studio, Metro, n-Track, and Tracktion allow you to trigger and view video clips while a song is playing.

MIDI Manipulation

Though digital audio is becoming evermore the *raison d'être* of music software, the 12 programs in our roundup

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offer a respectable range of MIDI options. Although none of them come close to what you'd find in a top-of-the-line sequencer, even the least expensive of today's sequencers runs rings around its predigital-audio ancestors in terms of MIDI capabilities. Nonetheless, GarageBand is unusual in that it can't trigger external MIDI instruments; it can trigger only Audio Units (AU) plug-ins and included software instruments.

All of the sequencers allow you to load a Standard MIDI File (SMF) and to record from an external MIDI controller. You can step record in eight programs, and several of them have a range of punch options. MIDI timing resolution determines how accurately a sequencer captures a MIDI performance; the more parts per quarter note (ppqn), the better the resolution. In the sequencers covered here, MIDI timing extends from a low of 96 ppqn in AudioMaster to a high of 3,840 ppqn in PowerTracks. If you're working with sound for picture, synchronization features are essential. More than half can generate or slave to MTC or SMPTE, and they can display time code in a variety of formats. GarageBand, Home Studio, Cubase SE, Metro LX, and FL Studio don't support time-code synchronization.

All of the programs include basic editing functions such as cut, copy, and paste, and all provide one or more types of quantization. n-Track has a flexible quantize option that allows you to snap to common note durations as well as to a value of any arbitrary number of ticks. Several sequencers allow you to transpose, slide, or change the length of MIDI events. Cubase and PowerTracks include the option to eliminate overlapping notes.

Most of the programs let you get creative with MIDI data by performing some nifty tricks. Cubase, Home Studio, FL Studio, and Metro each have an arpeggiator with adjustable parameters. To loosen up stiff rhythm tracks, Metro and MultitrackStudio have Humanize processes in their gig bags. FL Studio adds flam and strum effects, which come in handy when you're creating drum and guitar parts.

Some programs give you tools for generating random MIDI events, for creating new MIDI events based on existing data, or for changing one form of MIDI data to another. For example, FL Studio's Randomizer lets you determine whether it generates many hundreds of new notes or just a few. MIDI Studio has a sophisticated Transform window that enables logical processing, allowing you to alter the pitch, length, Velocity, order, speed, and other properties of selected data.

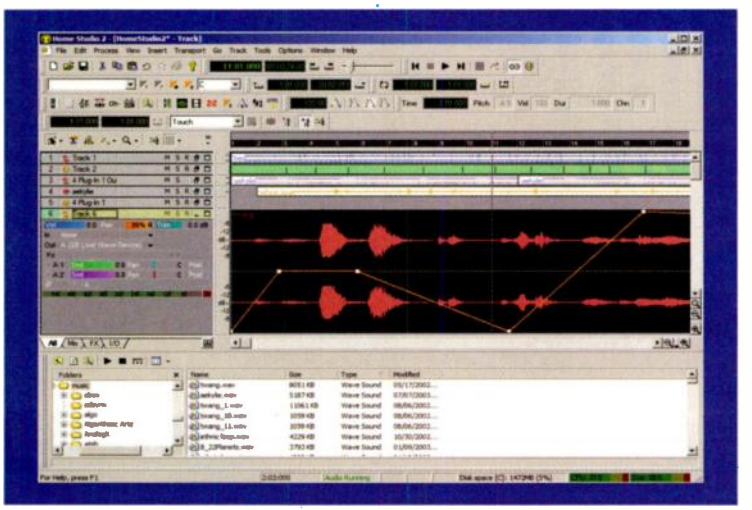

FIG. 5: Home Studio's heritage, Cakewalk Sonar 2.0, ensures the stability of the program and brings the user into an extensive family of desktop musicians.

Sound Investments

All of the programs in our roundup allow you to record, cut, copy, paste, and play back multiple tracks of audio. Beyond those functions, the range of features varies widely. If you want high-quality recordings and don't mind consuming hard-disk space, all but two support 24-bit audio resolution and 96 kHz sampling rates. Although it's somewhat unlikely that low-budget sequencer users own big-budget audio rigs, a few even support 192 kHz (hardware permitting). All except GarageBand and Studio Ensemble can handle sampling-rate conversion. All the Windows programs support MME (except FL Studio), WDM, and ASIO drivers, and all the Mac programs support Core Audio.

All but Studio 2003 can import or export audio files in formats other than WAV, which is great if you want to use audio from sources such as your MP3 collection or custom-format sample libraries. Studio 2003's audio capabilities are limited—it can import and export only WAV files and does not feature any of the routing, automation, looping, and output capabilities of the other programs.

It's easy to adjust an audio clip's length in most of these sequencers: just click on and drag its beginning or end to the desired length. You can also click on and drag a clip to a new location in every audio program except AudioPro. All of the programs except for AudioMaster and MultitrackStudio allow you to loop entire audio tracks or defined regions.

Most of the programs let you bounce multiple tracks to a new track directly from the main track interface, and most can automatically create a new audio file containing the bounced tracks. PowerTracks also has a nifty feature that lets you automatically create a new disk file from the output of a DXi, and FL Studio can automatically insert any recording you make of its output directly back into its Playlist.

Busing and routing options give you the most flexibility for getting your signals from here to there—from a group of channels to a single stereo reverb plug-in, for example. Such features are standard in most of the programs, though they're implemented in many different ways. n-Track supports the most aux channels

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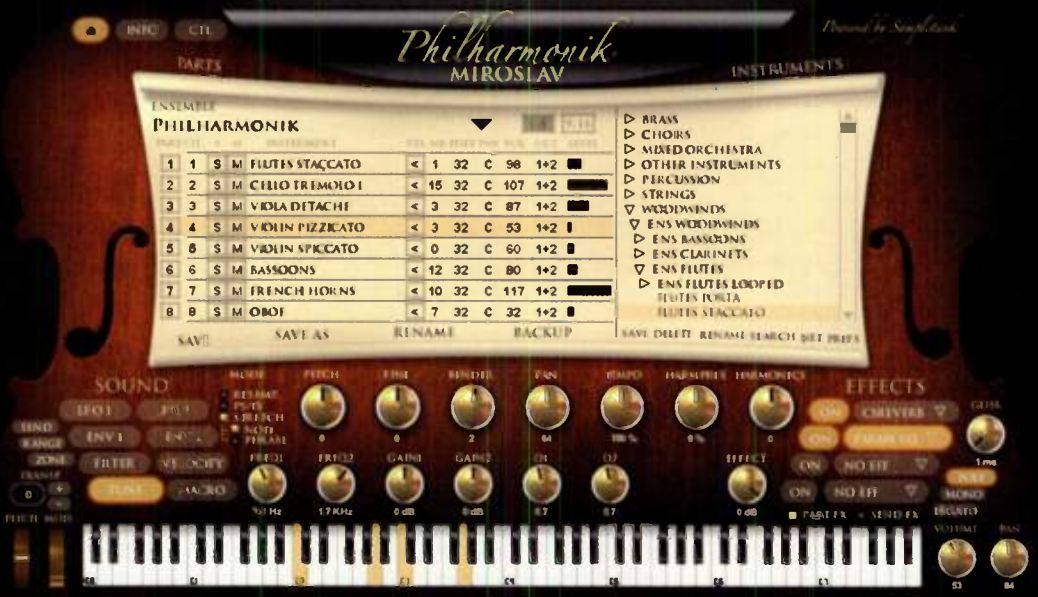

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(32), and PowerTracks supports the fewest (2). GarageBand doesn't have any auxes at all, though it does have a master bus that can serve the same purpose. If you've never used aux channels, though, you probably won't miss them. Not surprisingly, none of the low-cost sequencers offer explicit surround support—a surround mixer, for example—but if you have a multichannel audio interface and use ASIO drivers or Core Audio, you can send a signal to as many channels as your hardware allows. The next version of n-Track, which we've seen in beta, will include a surround (5.1, 7.1, and above) mixer.

Part of the fun of mixing with a sequencer is using automation to control changes—fade up here, add reverb there, and so on. You can record mixer automation in all of the programs except GarageBand and MultitrackStudio, and most (including GarageBand) let you draw volume and pan curves onscreen. MultitrackStudio offers graphic volume editing using its Automated Fader plug-in.

FIG. 6: Quartz AudioMaster's interface should be familiar to anyone who has used a sequencer before. Its feature set includes plenty of audio and MIDI tracks along with an interesting Spacialization window.

Effects Collections

Most entry-level programs differ from top-of-the-line software in the number and types of included effects. Although some of these programs come up quite a bit short, a few are downright bountiful. Fortunately, all of them except Studio 2003 support either AU, DirectX, or VST effects, and half support two plug-in formats. (In theory, plug-in support makes your audio-processing arsenal unlimited.) Several also have native real-time or destructive audio effects. Studio 2003 has no audio effects other than those built into your sound card.

FL Studio stands out for its large number of audio effects. Among its many unique offerings are the Fruity Waveshaper, Fruity Scratcher, and Time Stretcher, the last of which offers five distinct methods for time stretching and pitch shifting. Cubase SE comes with a bundle of 22 VST effects, such as QuadraFuzz, StepFilter, and Tranceformer. It has so many, in fact, that you could go a long time without needing any additional plug-ins. PowerTracks Pro also rates highly in this area with nearly 20 of its own bundled effects. Its Generate Audio Harmonies option is worth a special mention: it can create a single new harmony part and use notes from a MIDI track as the starting pitches for multiple new harmony parts.

GarageBand has a respectable stable of effects, including some nice guitar-amp simulations, the gender-bending Vocal Transformer, Enhance Tuning (for correcting pitch), and Enhance Timing (for quantizing audio). Tracktion has an extensive bundle of freeware VST effects from Maxim Digital Audio (MDA), as well as IK Multimedia's AmpliTube LE modeled guitar amp. Tracktion also comes with Final Mix, a rather sophisticated stereo mastering processor that works only with that program (see Fig. 2). For taking projects all the way to completion, Final Mix gives Tracktion tangible advantages that might cost considerably more using similar plug-ins. Mackie promises to deliver several additional Tracktion-exclusive plug-ins soon.

MultitrackStudio's Convolutor is one of the least-expensive tools that uses impulse responses, and its Band Effect splits a signal path into three frequency ranges for multiband processing. AudioMaster's 20 effects include a pseudo-surround process that can create some interesting results. MIDI Studio includes Digital Factory, a sophisticated suite of offline processes such as pitch shifting, time compression and expansion, and more. Audio Studio offers noise reduction, time stretching, and even a vocoder. Only three of the sequencers don't have time-stretching capabilities: Metro LX, MultitrackStudio, and Studio Ensemble 2003.

All of the programs have some form of EQ, and all but Home Studio and Studio 2003 include dynamics processors. Most give you at least a handful of effects presets, and all but Studio 2003 let you save your own custom settings. Several let you draw effects automation curves, and a few support effects-send automation either

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by using graphic envelopes or by recording changes made on the mixer (turning aux send knobs, for example). Some programs offer a Freeze option: the program creates temporary files on disk containing rendered audio that has been processed by effects, conserving CPU resources. If you need to make additional changes later, you can return a frozen track to its normal state. ReWire support, which lets you sync your sequencer with other programs and route audio from compatible software instruments, is available in most of the sequencers covered in this article.

Instruments and Content

Most of the software in our roundup has instrument plug-ins, sample loops, and other content in addition to the main application; Metro LX is the only exception. Any musician would be happy to use the software-based synthesizers, samplers, or drum machines that ship with several programs. Home Studio, for example, includes the DXi synths Virtual Sound Canvas and DreamStation. Tracktion includes IK Multimedia's versatile sample-playback synth SampleTank SE and LinPlug's virtual drum machine RM IV. Both plug-ins also supply a substantial amount of content. Oddly, Tracktion has a built-in sampler that doesn't have any content, as well as a handful of synth plug-ins from Big Tick, reFX, and LinPlug. Cubase SE comes with the VB-1 bass synth, LM-7 drum machine, and Universal Sound Module. MIDI Studio's arsenal of soft synths includes the 16-voice FMX1 FM synthesizer and Robota virtual analog drum machine. MultitrackStudio comes with a built-in sampler (with only one patch) that can import SF2 and GIG files.

You'll get numerous audio loops and MIDI tracks with PowerTracks Pro, and FL Studio includes a large number of sample files, loops (registered users can download nearly 2 GB's worth), and soft instruments (in its own proprietary format). Among FL Studio's instruments are a text-to-speech synthesizer with 20 different personalities and a variety of analog-modeled synths. Because GarageBand 2 doesn't play external instruments, it has a good variety of software instruments, along with an impressive collection of presets. GarageBand's collection of audio loops (more than 1 GB's worth) is also nothing to sneeze at, and you can expand it with optional Jam Packs and third-party Apple Loops. Studio 2003 ships with 54 MB of short audio clips.

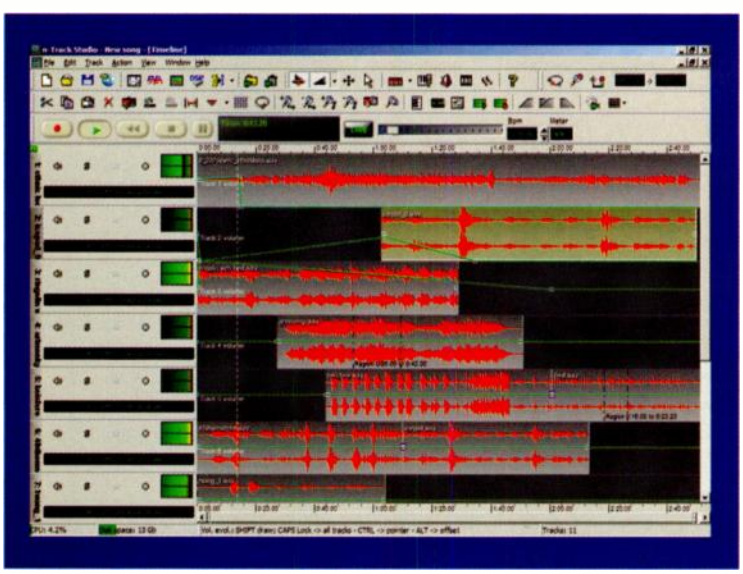

FIG. 7: n-Track Studio is a modern program that includes good-sounding audio effects, extensive MIDI features, and a highly customizable interface.

Read All About It

No matter how easy it is to use a software program, good documentation will often determine how efficiently you explore its features. Printed manuals are useful, but you can more easily search manuals that are displayed on your computer screen. Cubase and Tracktion supply manuals in printed and PDF formats, and Metro has a PDF startup guide. Most of Metro's documentation consists of searchable HTML files and detailed online reference. Although GarageBand furnishes only help files (which are also searchable), Apple's Web site offers plenty of GarageBand support pages in 14 languages, and you can download several brief PDF manuals. Music Studio (MIDI Studio and Audio Studio) has a 95-page printed manual, a 626-page PDF manual, and searchable HTML files.

Home Studio and FL Studio include a getting-started guide and searchable online help, and PowerTracks includes a complete user's guide and searchableonlinehelp.AudioMaster,MultitrackStudio, n-Track, and Studio 2003 have only searchable online help. (You can download a PDF manual for n-Track from the company's Web site.) There are video tutorials at the FL Studio and PowerTracks Pro Web sites and on Music Studio's install disc, and the manufacturers of all the programs except for Studio 2003 run online user forums. Though you won't base your buying decision on which sequencer has the best documentation, what's the advantage of having a program that's easy to use if the manufacturer doesn't make it easy for you to learn how to use it?

Apple Computer GarageBand 2.0.2 (Mac, $79)

GarageBand is just one of five applications bundled together in Apple's creativity suite iLife '05, which also includes iTunes, iPhoto, iMovie, and iDVD. Designed to appeal to musicians and nonmusicians alike, GarageBand combines MIDI sequencing, multitrack audio recording, loop arranging, detailed track editing, soft synths and samplers, and effects processing.

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It can display standard music notation in real time. Considering its status as a low-cost, beginner-level program, GarageBand is surprisingly deep. Although it's the only sequencer in our roundup that can't play hardware-based MIDI instruments (without third-party software, anyway), its loop-sequencing capabilities and its collection of software instruments are thoroughly professional.

GarageBand presents most of its user interface in a single window, with controls for each track on the left, a timeline that displays track data on the right, a control strip across the center, and when you reveal it, an area for editing tracks or browsing loops at the bottom (see Fig. 3). Adding a track opens a dialog box in which you select either a Real Instrument or a Software Instrument from a long list of each. A Real Instrument is an audio track with preset effects that are optimized for a particular instrument or instruments such as acoustic piano, modern rock bass, string ensemble, or modern female vocals. You can also select an audio track with no effects. If you select a guitar track, you can chose from a list of amp-simulation presets borrowed from Apple Logic 7. In fact, most of GarageBand's technology was originally developed either for Logic or for Apple Soundtrack.

Choosing a Software Instrument creates a MIDI track that's preconfigured with a soft synth or sampled instrument. GarageBand's list of available instruments is extensive, and the multisamples are top-notch, with samples for every note and as many as ten Velocity layers. The soft synths use modeling techniques to emulate a nice variety of classic and modern electronic timbres.

For either type of track—audio or MIDI—you can open an information panel that gives you access to effects-processing parameters. GarageBand's host of effects is much more comprehensive than you might expect in a low-price sequencer. It also handles AU instruments and effects extremely well. To place an AU instrument on a track, you must first create a Software Instrument track and then replace the GarageBand instrument with an instrument plug-in.

You have complete control over each track's level and panning, and you can automate them by manipulating a graphic line with breakpoints. In addition to controlling master volume the same way, GarageBand 2.0.2 lets you transpose any portion or an entire song by using breakpoints to vary the master pitch.

FIG. 8: On all counts, FL Studio is not your average sequencer. Its many recording, editing, and playback features merit it the name workstation.

What's in Your Garage?

In addition to audio and MIDI recording, GarageBand is adept at loop sequencing. It has done more than any other program to establish Apple Loops as a bona fide standard. Apple Loops are beat-sliced MIDI and AIFF files imprinted with metadata that contains keywords and information about tempo and key signature, making it possible to search for loops in GarageBand's Browser and to pitch-shift and time-stretch music to make it fit your composition.

More than 1,000 Apple Loops are included with GarageBand, and you can add thousands more with optional Apple GarageBand Jam Packs (which also include additional instruments and effects presets) and with third-party libraries. GarageBand can convert its audio and MIDI tracks to Apple Loops, and it can import SMFs and audio files from other formats and convert them to Apple Loops.

You'll need a fairly powerful, up-to-date Mac to run GarageBand, especially if you want to make the most of Apple Loops. Even then, its instability has been known to cause inexplicable crashes. While its lack of MIDI outputs will be a deal-breaker for some musicians, it is ideal for anyone who wants to explore the world of virtual instruments and sampled loops, and the price is right.

Bremmers Audio Design MultitrackStudio Pro Plus 3.1.1.0 (Win, $119 download or $139 boxed)

It took me a while to wrap my brain around MultitrackStudio's interface, but once I did I found some nicely implemented features. If your habits run toward recording and mixing without a lot of detailed editing, you'll feel right at home. MultitrackStudio supports

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dj line
sampling line
effects line
synth line
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high-resolution audio, has unlimited audio and MIDI tracks, and accepts VST and DirectX plug-ins.

The lack of a mixer view is deceptive: MultitrackStudio is one big mixer, and all of its routing options are available from its main screen (see Fig. 4). Routing is straightforward and powerful, allowing you to send any track to any number of effects returns and assign it to one of any number of groups. Every audio track, effects return, and group has three effects slots. For more processing possibilities, you can assign any or all of the effects slots to the Multi Effect plug-in, which in turn gives you six effects slots. That's a total of 18 insert effects per track, each of which could conceivably hold another Multi Effect. Presets can recall plug-in parameters and entire plug-in chains.

The Stereo Effect gives you separate signal paths for a track's left and right channels, letting you process them independently. A convolution effect is included, and you can download a free set of Classic Reverb impulse responses that include examples from a Hammond spring reverb and the EMT 140 and 250.

It's common for sequencers to integrate audio and MIDI tracks for a smooth workflow, but at times MultitrackStudio blurs the line even further than usual. By default, MIDI tracks have a single effects slot, and you use that to assign the track to a physical MIDI port. If you use the slot to assign the track to a VSTi or DXi virtual instrument, however, you automatically get two additional effects slots, allowing you to process the soft synth's output with additional plug-ins; thus a MIDI track becomes an audio track as well. The included sampler supports both SoundFont and GIG formats, opening the door to oodles of sample libraries that range from cute and cheap to powerful and steep.

I was somewhat less taken with MultitrackStudio's editing features. You can open any audio or MIDI track to reveal its edit view, from which you can do basic cut, copy, and paste operations. Audio crossfades are automatic but not editable, and you must click on a button to undo an operation because pressing Control + z doesn't do anything. Basic logical MIDI functions include such standards as Quantize, Transpose, and Humanize. One interesting edit feature is the Multi Track Editor, which applies all edits to every track that has an open Edit view. You can use it to chop out or repeat entire sections across multiple tracks.

I don't know why each MIDI track is stored as a separate SMF, but it doesn't impede your work. Nice touches include one-click setup of an alternate record take in a new track and the ability to split incoming MIDI notes into two keyboard zones and rechannel and transpose them. For recording and mixing without a lot of editing, MultitrackStudio delivers the goods.

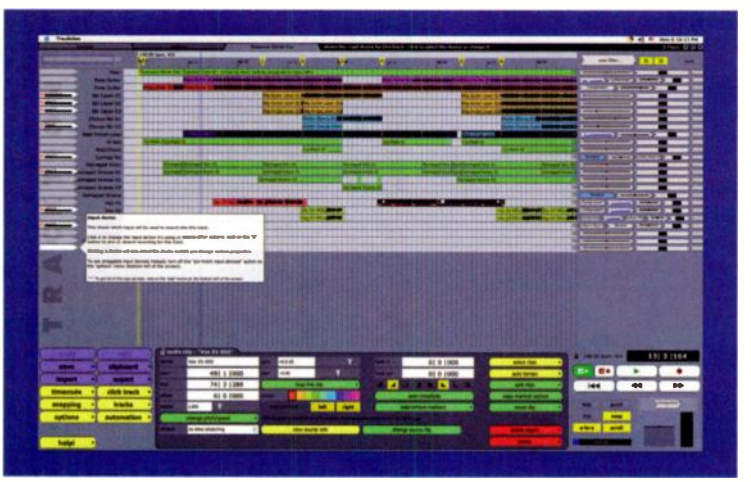

FIG. 9: Although Mackie Tracktion 2's GUI takes some getting used to, it ensures fast and easy operation once you've learned your way around. No commands appear in the Menu bar—not even File or Edit menus.

Cakewalk Home Studio 2.2 (Win, $149)

Although it may not have a modern interface, Home Studio is a solid and stable performer that would be suitable for many common music projects. Its simple and intuitive organization belies a host of powerful production tools, and its long PC heritage (it's built on Cakewalk Sonar 2 technology) ensures that it will integrate well into your workflow.

Home Studio is the model of a classic sequencer. Its Track Properties view appears along the left of the screen, and the area for managing data (audio, MIDI, and controllers, for example) appears to the right (see Fig. 5). There's also an Explorer-style window at the bottom of the screen for locating the files that you need in a project. Numerous aspects of the program can be customized, from picking the location to store audio files and choosing interface color schemes to performing various tweaks to your audio hardware. You can also configure key commands for controlling the program from a computer keyboard or a MIDI controller.

Most of the MIDI activity occurs in the Piano Roll view, where you'll find a keyboard display along the left edge of the screen (unless you're working with a drum track, which shows drum names) and a pane at the bottom for entering and editing controller data. Surprisingly, program changes cannot be entered in this window. Right-clicking on an existing note gives you access to numerous details about the note—Velocity, duration, start time, and so on—and it's easy to fine-tune events to your liking. Just as easily, you can highlight a large number of notes and drag, copy, or delete them as needed. In fact, editing is just about as simple as it gets.

Audio Aspects

For large-scale editing such as moving big chunks of data around in the Track View, Home Studio doesn't

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LOW-COST SEQUENCER SPECIFICATIONS

Manufacturer	Program	Platform	Simultaneous MIDI Tracks	Maximum Clock Resolution (ppqn)	Quantization Types	Sequencing Method	Editing Views
Apple Computer	GarageBand 2.0.2	Mac OS X	Unlimited	960	Normal, swing light, swing heavy	Linear, loop	Timeline, piano roll, notation
Bremmers Audio Design	MultitrackStudio Pro Plus 3.1.1.0	Win 98/SE/ ME/2000/XP	Unlimited	1,000	Normal, percentage, humanize, length	Linear	Piano roll, notation, drum, controller, wave, tempo, multitrack
Cakewalk	Home Studio 2 XL	Win 98/SE/ ME/2000/XP	Unlimited	960	Groove, swing by percentage, tick offset	Linear, pattern	Piano roll, SysEx, event, notation, console, studioware, tempo, markers
Digital Sound Planet	Quartz AudioMaster Pro 4.6	Win 9x/NT/ 2000	128	960	Normal, input	Linear, loop, over-dub, step, punch	Tracks, audio, mixer, piano roll, event list
FASoft	n-Track Studio 4.0.5	Win 98/NT/ ME/2000/XP	Unlimited	1,920	Grid, swing, randomize	Linear	Timeline, piano roll, events list
Image-Line Software	FL Studio 5.0.2 Producer Edition	Win 9X/ 2000/XP	999	768	Swing	Linear, step, pattern	Piano roll, track, envelopes and events
Mackie	Tracktion 2	Mac OS X, Win 2000/XP	Unlimited	960	Grid, swing, groove	Linear, step	Piano roll, timeline, track, controllers
Magix	Music Studio 10 (MIDI Studio, Audio Studio)	Win 98/98 SE/ ME/2000/XP	Unlimited	960	Normal, swing, groove	Linear, loop, over-dub, step, punch	Piano roll, notation, event list, multitrack
Midisoft	Studio Ensemble 2003 XP (Studio 2003, AudioPro Wave Editor)	Win 9x/XP	32,000	1,000	Normal	Linear, loop, overdub, step, punch	Notation, piano roll, event list, wave
PG Music, Inc.	PowerTracks Pro Audio 10	Win 9x/ NT/2000/ XP	48	3,940	Swing, percentage, randomize	Linear, step	Tracks, audio, mixer, events, bars, piano roll, notation, SysEx editor
Sagan	Metro LX 6.3	Mac OS X	48	960	Normal, swing, percentage	Linear, loop, overdub, step, punch	Tracks, piano roll, audio, mixer, event, drum, SysEx
Steinberg	Cubase SE 1.0.7	Mac OS X, Win 2000/XP	Unlimited	480	Normal, soft, groove	Linear, loop, overdub, step, punch	Key, list, drum, score, SysEx

SysEx Editing	Looping	Number of Audio Tracks	Integrated MIDI/Audio Edit Screen	Audio Effects	Pitch-Shift Type	DSP Plug-in Formats	Extract Timing from Audio	Special Features	List Price
No	Yes	Unlimited	Yes	Reverb, chorus, echo, flanger, compression, EQ, amp simulation, Vocal Transformer, more	Enhance Tuning (formant preserving)	Audio Units	No	Software instruments included, converts audio to Apple Loops, export to AIFF; iLife '05 suite included	$79
No	No	Unlimited	Yes	Reverb, delay, chorus, flange, convolution, dynamics, more	Varispeed only	DirectX, VST	Yes (tempo)	Convolution effect, sampler, flexible routing	$119
Yes	Yes	Unlimited	Yes	Reverb, chorus, flange, delay, AmpSim Lite	Formant preserving, traditional	DirectX, DXi 2.0	No	Home Studio and additional audio FX, DXi sampler, CD of ACID-format Cakewalk loops	$149
Yes	No	128	Yes	Reverbs, delays, chorus, flange, more	Traditional	VST, DirectX	No	Karaoke file support, GM/GS/XG editor, Spacialization display	$132 (download); $265 (boxed)
Yes	Yes	Unlimited	Yes	Reverb, echo, compression, pitch shift, chorus, EQ	Formant preserving	DirectX, VST, DXi, VSTi	No	Works with WDM and ASIO drivers, spectrum analyzer	$49
No	Yes	999	Yes	VST(i), DX(i), Buzz & FL	ZPlane Elastique	VST(i), DX(i), Buzz & FL	Yes	Speech synth, drum machine	$149
No	Yes	Unlimited	Yes	Reverb, EQ, delay, chorus, phaser, compresser/limiter, pitch shifter, filter, guitar-amp simulation	Traditional	VST	No	Track freeze, multiple VST directory support, 64-bit mix engine, Rack Filters, ReWire host	$199
Yes	Yes	64	Yes	Reverbs, delays, chorus, flange, more	Elastic Audio (normal, formant preserving)	VST, DirectX	Yes	Software instruments included, CD burning, EQ cloning, ReWire host	$79
Yes	No	256	No	Normalize, echo, chorus, EQ (AudioPro Wave Editor only)	Traditional	None	No	Extensive notation features	$84
Yes	Yes	48	Yes	Compression, gate, distortion, reverb, echo, chorus, flanger, ring mod, tremolo, tone, EQ, exciter	Traditional	Proprietary, DirectX	No	Create audio harmonies from MIDI notes, export to WMA and MP3, CD-RW software, guitar tuner	$49
Yes	Yes	16	Yes	All Audio Units, VST	None	Audio Units, VST	No	ReWire host, track freeze, unlimited markers, plug-in directory, Rhythm Explorer	$134
Yes	Yes	48	Yes	Reverbs, delays, chorus, flange, more	Traditional, formant preserving, harmony	VST	Yes	ReWire host, VST System Link–compatible, supports native audio	$149

distinguish between audio and MIDI. Just click on and drag whatever range of events you want, or draw pan, volume, or effects automation directly on the screen. Home Studio also supports automatic crossfades, which it uses when two audio clips overlap.

Home Studio doesn't offer many options for more detailed audio editing; you'll need an external audio application, which you can link to Home Studio, and the name of that program will appear in the Tool menu. You'll probably spend some time in the Loop Construction window, however, where you can tweak settings to better enable Home Studio to perform its looping functions. Looping is enabled simply by clicking on and dragging an audio clip to the desired length.

The Console View provides access to busing and routing options. There you can configure track and master effects and as many as 16 aux buses, and you can use Home Studio's considerable automation features. Nearly every control in the program can be automated, and it's easy to group multiple controls or take snapshots of specific settings for recall.

Home Studio ships with a Getting Started manual and not much more (aside from the two soft synths), but the online help is extensive. The Cakewalk forum is also a great place for help with the program, and you can rest assured that owning Home Studio will put you in a large family of users who will no doubt help you on your way.

Digital Sound Planet Quartz AudioMaster Professional 4.6 (Win, $132.90 download or $265.90 boxed)

Quartz AudioMaster might not look impressive, but under the hood it has lots to offer. Supporting 128 MIDI tracks, 128 audio tracks, 8 aux buses, and as many as 16 stereo inputs and outputs, AudioMaster has enough power to meet the needs of almost any project. It comes with a variety of audio effects and supports VST and DirectX plug-ins.

AudioMaster's interface is plain but functional, and it should feel familiar to anyone who has ever worked with a sequencer (see **Fig. 6**). It supports customizable key commands for most functions, and it ships with Cakewalk and Cubase key-command templates. AudioMaster presents MIDI and audio data as uninformative empty rectangles, however, which sets it back several years compared with its peers. You can perform basic cut-and-paste editing in the main track view, but more detailed editing takes place in dedicated audio and MIDI windows.

You can do a lot of sequencing and recording in AudioMaster, and if you use GS- or XG-compatible synthesizers, you'll appreciate its direct support of their effects capabilities. Its inability to load virtual instruments, however, may prove frustrating.

AudioMaster's unassuming mixer doesn't reveal its full potential until you click on six separate buttons to show its auxes, dynamics, EQ, groups, inputs, and gain/polarity controls. At that point the program becomes quite impressive, bearing resemblance to a large-format console. Adding insert effects is as simple as clicking on the DSP button and choosing VST, DirectX, or built-in processing from a dialog box. Once you've closed the dialog box, there's no visual indication of whether any plug-ins exist on a track.

Spacial Special

One of Quartz AudioMaster's standout features is an intriguing Spacialization view that allows you to graphically adjust pan and level of multiple tracks by dragging them closer to or farther from the user's position and left or right within a little room. Despite its name, it doesn't actually involve any psychoacoustic DSP, but it makes visualizing placement a breeze. The Surround processor uses perceptual manipulation, and although it's no substitute for true surround panning, it is nevertheless an interesting sonic tweak.

If you're into karaoke, AudioMaster can import and export special karaoke MIDI files (KAR) and display lyrics in a dedicated window. As a navigational aid, the window can display cues (markers) during playback. In addition, AudioMaster can serve as a master or a slave when synchronizing to external sequencers.

Although its software has a lot to offer, Digital Sound Planet's main focus is on serving as a Web site for online musical collaboration. In fact, the site provides a freeware version of Quartz specifically intended for collaboration. Be aware, however, that the company's support is not up to snuff. Despite our best efforts, EM was unable to make direct contact with the company to request a proper review copy of Quartz AudioMaster in time for this roundup. We ended up using the evaluation version, which doesn't let you save projects. If you like what AudioMaster has to offer, don't look for much hand-holding from the manufacturer.

FASoft n-Track Studio 4.05 (Win, $49 or $75 with 24-bit file support)

n-Track Studio is a versatile program that would be a good choice for basic and complex audio and MIDI projects. It has a highly modular interface—the various windows can be easily resized and moved around the screen—and it supports a large number of configurable options. The program's audio-editing features are extensive, and its support for common protocols, such as ReWire and DX and VST instruments and effects, allow it to be the centerpiece of a modern music-production studio.

n-Track opens to a blank slate onto which you can insert any number of audio or MIDI tracks (see **Fig. 7**).

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The program uses the standard arrangement of vertically arranged tracks, with data shown along a horizontal timeline to the right. You can toggle the display of configurable level meters on a per-track basis directly in the tracks area, which is also where you enable the Freeze function. (Freeze renders a track and its effects to disk, and then reloads it onto the same track.)

To begin a mixing or mastering project, you might use the file Import option, which lets you choose one or more WAV or OGG files and pick a time offset to place them anywhere in the project. Like Home Studio, n-Track supports clips, which are chunks of data that you can move around on the timeline. Its autofade feature supports logarithmic and linear curves, and it can apply effects on a clip-by-clip basis. Be careful when removing a track from a project, because the first option you'll see when prompted is to delete the actual file off your hard drive.

FIG. 10: Magix Music Studio's MIDI Studio application is an offshoot of Emagic Logic, featuring the same views, terms, and signal flow.

n-Track's included effects aren't numerous, but they sound very good and have parameters that you can update while a track is playing. The reverb, for example, has ten parameters (predelay, length, room size, damping, and others), and as with the other effects, you can apply reverb to only the left or right channel of a stereo file. Input and output meters appear on the effects' dialog boxes, and you can save as many of your own presets as needed.

MIDI features are ample. n-Track's Piano Roll view has an option to display only the type of events you want, and you can select what type of event will be entered when you click on the Place icon. By Control + clicking on that icon, you can designate the note properties (Velocity and length) for new notes that you enter. In the Events List, you can alter multiple notes at once—transposing all notes in a measure, for example—and filter out types of events that you don't want displayed.

Get Smart

n-Track has a number of smart and helpful features that make common tasks easier. For example, you can snap the cursor to the beginning or end of a clip (as opposed to simply snapping the clip to the cursor position), and you can toggle the display of audio tracks as waveforms or as simple text listings. n-Track also lets you choose whether many of its audio-editing functions result in nondestructive or destructive changes. In some cases (time stretching, for example), you can create a new file reflecting the changes or make changes to an existing file. It also has a handy option that displays a list of all WAV files used in a project, and its built-in CD burning feature is well integrated.

n-Track is available only as a download, and its documentation exists only as online help. (A PDF manual is available as a separate download.) A short, getting-started tutorial is included in the help file, and the indexing is thorough. The users forum appears to be very active, with many thousands of replies to nearly 2,000 individual topics, and the program is updated and enhanced on a regular basis. You'll certainly be in good company if you choose n-Track for your studio.

Image-Line FL Studio Producer Edition 5.02 (Win, $149)

FL Studio offers a slightly different approach to sequencing, using a step sequencer for its main composition interface. Individual layers of the sequencer are called channels, though they serve as what most other programs call tracks. On FL Studio's mixer, you'll find tracks, as opposed to what most programs call channels. But terminology aside, this software is a music-production powerhouse and has capabilities that extend far beyond the techno and electronica styles you might associate it with.

More than any other program in this roundup, FL Studio deserves the name workstation. It includes an audio editor, a robust mixer, numerous internal effects and soft synths, sampler players, and more. But that's just for starters: you'll also find a vast number of tools for manipulating MIDI data, such as the note-randomizing and chord-building functions in the Piano Roll; powerful enveloping tools, including the ability to create highly complex curves using LFO generators; and a variety of recording and automation features.

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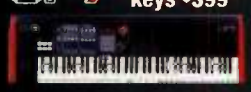

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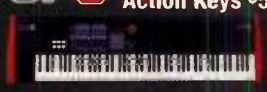

UF-400e: Firewire Audio Interface Option: 2 Analog ins/outs, 24 bit 192 Khz, 1 Midi I/O, 1 co-axial digital I/O, 111 db, 1 mic input, 2 headphone outputs, mLAN Compatible *249

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You would want to include a full set of sequencer transport controls so you could do all your work from your keyboard without needing a mouse or separate controller. Throw in a breath controller and after-touch for added expressiveness for your virtual synths, and then make sure you can add a 24 bit / 192khz firewire audio expansion option, conveniently giving you extra performance and recording power. Of course, don't forget to put in 8 knobs and 9 sliders. For the 88 note version, you would want to put in the same hammer action assembly that is used on one of the most popular digital grand pianos. For the other models, put in a semi-weighted keyboard that is more robust than anything you would find in its price class.

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Step Right Up

When you first start FL Studio, the step sequencer displays four channels, each containing a sample player (see **Fig. 8**). Click on the button for any of the channels (Kick, Clap, HiHat, and Snare), and a Channel Settings window will open. That window brings you to the primary work areas for the type of channel that you're using; for example, sampler settings include a page to enable looping, time-stretching or pitch-shifting a sample; for replacing the existing sample with a new file; and for applying a variety of effects to the sample. At the bottom of the page is a waveform display in which you can access the Tempo Detection and Wave Editor features.

The default number of steps per pattern is 16, but you can easily change that (to a maximum of 64). Tempo settings range from 10 to 999 bpm in 1/1,000ths of a beat increments. Projects can run more than just the length of a single pattern. In fact, you can have an unlimited number of patterns playing as many as 999 times in sequence, and even loop that if needed. You can build complex formal designs in the Playlist window, in which you can determine when and how often patterns play. There are several tools for entering pattern triggers (such as a paintbrush and pencil), and you can customize the window (color schemes and zoom levels, for example) to your liking.

FL Studio has you covered for many common production tasks. It offers presets for everything from mixer configurations and randomized note timings to effects settings. The content is also worth a special mention. Dozens of individual samples, drum loops, and even complete multitrack projects will get you jump started, demonstrating the many facets of the program. The excellent online video tutorials cover aspects of the program ranging from beginning to advanced, and the online help system is extremely thorough.

FIG. 11: The audio portion of Magix Music Studio is called Audio Studio, and it features a powerful combination of pattern-based soft synths, high-quality effects, and multitrack audio recording and editing.

FL Studio was a big, pleasant surprise for me in this roundup. The program crashed several times, however, during the review period. It crashed once when I adjusted polyphony while a sequence was looping (the problem was not repeatable). But the range of music making that you can do with FL Studio is vast. If you're looking for a program that is not your average sequencer, give it a try.

Mackie Tracktion 2 (Mac/Win, $199)

Tracktion was first bundled with Spike, Mackie's turnkey recording system (reviewed in the January 2005 issue of EM, available online at www.emusician.com). Since then, Tracktion has been upgraded to version 2, which includes more plug-ins and enhancements such as external sync, Broadcast WAV file import, new automation features, and support for 64-bit processing and Mackie control surfaces.

Like GarageBand, Tracktion has a simplified user interface with most functions always at your fingertips. By default, pop-up help appears whenever you hold your cursor over an object for more than two seconds. Tracktion has only three windows, each of which can be selected by clicking on the appropriate tab: Projects, Settings, and the currently open project. The Projects window shows project files and their resources, which may include MIDI files, audio samples, and recorded or imported audio files. In the Settings window, you can enable and disable audio and MIDI devices, specify the sampling rate and latency buffer, edit key commands, and indicate user preferences (such as the number of undo levels).

In the open project's window, inputs are on the left, and data is in the middle, with processors and outputs on the right (see **Fig. 9**). At the bottom center is the Properties panel, which lets you access the parameters of any object that you select. If you select a MIDI input, you can change MIDI channels, turn on input quantization, and so on. If you select an audio input, you can specify parameters such as file format and bit depth.

Tracktion's unique graphical approach extends to plug-ins and other effects, which are called Filters. By default, each track has filters for volume, panning, and a level meter. You can insert an additional filter in series with the others by clicking on and dragging it from the New Filter icon and then selecting it from a list. Filters include instrument plug-ins as well. The GUIs of most plug-ins appear in their own windows, just as you'd expect, but most of them look almost out of place in

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Tracktion's flat, 2-D landscape. If you want, you can lock them in place on top of the sequencer's GUI.

Tracktion Packed

One of the first things I noticed about Tracktion was its complete lack of commands in the Menu bar—there isn't a File menu, an Edit menu, and any of the standard Mac or Windows GUI features. Buttons, sliders, and text fields are used for most tasks, and virtually nothing is hidden. Although there isn't an event-list editor, when you click on a note in the track display, you can edit its properties in the Properties panel's MIDI Event window.

If you aren't thrilled with Tracktion's appearance, you can customize the colors of just about everything onscreen. Tracktion can fill the screen no matter what size your monitor is, or you can scale it to make additional room for plug-ins or ReWire-synchronized applications.

Tracktion's user interface is so nonstandard that it could take a while for you to begin performing basic tasks, but it all falls into place once you grasp its GUI. The same traits that might be disorienting at first translate into speed and ease of use after you learn your way around. Because Tracktion's appearance is so unusual, it might be easiest to learn if you're unfamiliar with other sequencers.

Magix Music Studio 10 Deluxe (Win, $79.99)

Magix Music Studio is another case of split personalities, consisting of MIDI Studio and Audio Studio. One look at MIDI Studio and you'll know that Magix collaborated with Emagic—the resemblance to Logic is unmistakable (see **Fig. 10**). If you felt abandoned when Apple bought Emagic and discontinued Logic for Windows, you might want to give Magix MIDI Studio a try. Although it doesn't include the same soft synths that have made the most recent versions of Logic such a great package, it does include some worthy instruments of its own. The interface, terminology, and functionality that you knew and loved (except for the Environment) is there, right down to the fonts and track icons.

If you're less familiar with Logic, here's the rundown: MIDI Studio is a powerful sequencer that supports audio tracks and soft synths. You insert a soft synth on an Audio Instrument track, which holds mix parameters for the synth and its MIDI performance data—a powerful and convenient implementation. You can create and edit MIDI controllers in the HyperDraw view and process them in the Transform window. There is standard piano-roll editing in the Matrix Edit view, and a Drum Edit view and Event List are also among the edit windows. As many as 90 different Screensets can recall specific combinations of views with a keystroke.

MIDI Studio's audio features are extensive, including nondestructive clip editing in the Audio Window and sample-accurate editing in the Sample Editor. There are a number of useful effects, ranging from EQ and compression to reverb, and DirectX effects are supported. Music Studio was upgraded to version 10 just as we were finishing this roundup, and new to MIDI Studio is ReWire support, allowing integration with such staples as Propellerhead Reason and Cakewalk Project5. The one major audio limitation is MIDI Studio's 16-bit, 48 kHz maximum resolution.

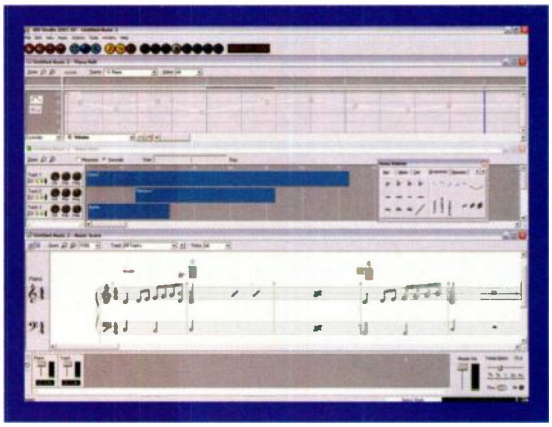

FIG. 12: Studio 2003 XP's strength is in its notation features. It has basic audio recording capabilities, but it does not support plug-ins or complex audio editing.

The Better Half

Audio Studio's lineage is as impressive as that of its fraternal twin: it owes a great deal to Magix's pro-audio software Samplitude, a well-respected (if underutilized) DAW. Audio Studio doesn't have MIDI support, but it does come with several pattern-based soft synths, ranging from a virtual live drummer and an old-school drum machine to a vocoder (see **Fig. 11**).

One of Audio Studio's most interesting new features is the addition of Elastic Audio Easy pitch manipulation. With a graphical interface resembling that of the most famous pitch-correction programs, the Elastic Audio Easy editor does credible manual and automatic pitch correction and manual audio transposition. Although I doubt Elastic Audio Easy will supplant its more-famous peers any time soon, I was able to use it to retune and harmonize vocals discretely, as well as create the infamous Cher effect without so much as a glance at the manual.

My favorite discovery, however, was Audio Studio's CD-creation features. It can burn a disc-at-once Red Book CD directly from a project without having to bounce it first—you simply add track markers and burn away. You also have complete control over the placement of Index 0, also known as the "pregap." It took exactly ten seconds for me to create a "hidden" track in the pause between tracks 1 and 2, something that

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many dedicated CD-burning programs don't allow. CD Text and subindices are also easy to create.

Unlike MIDI Studio, Audio Studio supports 24-bit audio and features a 32-bit floating-point audio engine. If the MIDI features of MIDI Studio and the audio features of Audio Studio were combined in a single program, Music Studio would be a formidable DAW. As two separate applications, it's still a formidable bargain.

Midisoft Studio Ensemble 2003 (Win, $84.95)

Studio Ensemble 2003 is actually a pair of applications. Studio 2003 XP (see **Fig. 12**) does most of the heavy lifting, and AudioPro Wave Editor lets you edit and process audio clips. Such a division of labor is similar to using an external audio editor with Cakewalk Home Studio, but Studio 2003 XP's audio support is far more limited than Home Studio's. Furthermore, the two applications are not tightly integrated: you must save your changes to a file in AudioPro and then reimport it into Studio 2003.

Studio 2003 approaches sequencing from a traditional music-notation perspective and allows much more manipulation of the printed page than most sequencers, especially those in its price range. Complex meters, ornaments, dynamics, rehearsal markings, articulations, bowings, chord symbols, chord fingerings, odd clefs, and more are available from a point-and-click palette. Most of those symbols, however, do not affect playback.

A standard piano-roll view allows you to enter and edit MIDI parts. As in the score editor, you must select a note value from the palette and then click on the spot where you want to insert a note. Once a note has been inserted, you can use the mouse in Selection mode to relocate it or change its duration. A Controllers pane below the Notes pane allows simple graphic editing of tempo, continuous controllers, pitch bend, Channel Pressure, and more. You can edit Velocity by right-clicking on a note and then editing the value in a dialog box.

You can combine audio clips with the MIDI tracks or even record audio parts in Studio 2003, but you can't display audio and MIDI side by side. You can drag audio clips across eight audio tracks, but even simple copy and paste operations are unavailable. Interestingly, each audio track has a Frequency control that actually changes the track's playback speed. It's not a time-stretching feature because pitch changes with the speed.

FIG. 13: AudioPro Wave Editor expands Studio Ensemble 2003's audio capabilities by adding waveform editing, normalization, simple noise reduction, and other DSP processes.

Riding the Wave

Studio Ensemble's audio editor AudioPro supports a variety of basic file-based audio processes (see **Fig. 13**). You can easily reverse all or part of a file, trim to selection, and change the DC offset (although the program doesn't give you a method for measuring the existing offset). With only one level of undo, however, a degree of caution is in order. AudioPro has EQ, normalization, and automatic pop and hiss reduction. All processes with user parameters are controlled by text values within a single dialog box. Echo, chorus, flange, and fades are possible, but reverb isn't available. AudioPro doesn't offer any provision for auditioning effects.

If printing musical scores is your primary purpose in selecting sequencing software, Studio 2003 may be your cup of tea. Don't expect to create CD-ready tracks, however, because it's not that kind of a program. It allows you to track a scratch vocal over your MIDI-performed score, and for some folks, that will be sufficient.

Studio 2003 and AudioPro crashed a few times during my testing—the programs would lock up, requiring the three-finger salute. Midisoft has an update that is said to fix some bugs, but when I downloaded it and ran the updater, it refused to install because the folder to which the original CD installed the software was not the same folder in which the updater wanted to find it. The updater didn't give me the option to install it in a different folder.

PG Music PowerTracks Pro Audio 10 PowerPAK (Win, $69)

PowerTracks Pro Audio 10 is at the low end of the price continuum, yet it offers a good balance of audio and MIDI features. In fact, it may be the best bargain in the bunch. (An even lower-price version, for $49, is comparable in features but comes with less additional context.) For starters, it has some nifty setup options,

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such as the ability to choose any DXi synth on your system as the default sound engine. There are some unique interface elements—for example, the drum window shows actual pictures of the drums in the General MIDI drum set (see Fig. 14). You can play the drums by clicking on their pictures or by using keyboard shortcuts, and you can record drum hits as you play them.

PowerTracks Pro's audio-editing features range from the commonplace to the unusual. Among the former are reverb, echo, chorus, EQ, pitch shift, and flange (though surprisingly, there's no normalize option); and among the latter are the ability to merge multiple, separate audio clips on a track into one continuous clip; the ability to split a stereo track into two mono tracks; and the Auto-Harmonize feature, which is based on TC Electronic's algorithms. In addition to creating a single harmony track at some interval from an existing track or using the notes in a MIDI track as starting notes for new parts, PowerTracks Pro can generate harmony parts based on any chord symbols that you have placed into your song.

FIG. 14: PowerTracks Pro Audio includes features that will appeal to guitar and keyboard players alike. Its drum window is also among the more unusual interfaces that you'll find.

In the MIDI arena, PowerTracks Pro has a number of features that can assist you in your music making. It lets you fill a track with a preexisting note/rhythmic pattern, which is great for making drum tracks quickly. It can also rechannel MIDI data or substitute one type of controller data for another. Its Data Filter lets you isolate specific types or ranges of data (only notes between C4 and C5, for example) for selection prior to editing, and it offers many ways to fine-tune your music, including transposing, sliding, or changing the length of notes.

Taking Notes

PowerTracks has the page-layout and printing options of a good notation program, but the note-entry functions are well below that level. To enter a note in the notation window, you must either choose a note duration from a drop-down menu or let the program automatically determine what note value you want based on where in the measure you click. Entering dotted notes and tuplets isn't as easy as it could be, and there's support for only a few time signatures. Nevertheless, the printouts look great, and the engraver spacing and other professional features make the notation option a big bonus.

Guitar players will appreciate PowerTracks Pro's offerings. A configurable fretboard display shows notes as they're being played, which can be useful for figuring out fingerings. A Guitar-Cleanup window lets you adjust the timing of individual channels of data received from a MIDI guitar. The tuner plug-in can track the frequency of an incoming signal and show how sharp or flat the notes are. The tuner can also generate a variety of tones.

PowerTracks Pro has numerous other features that I haven't mentioned due to space constraints. Its printed manual, though not exhaustive, is more than adequate, and I didn't experience any glitches or crashes during many hours of using the program.

Sagan Metro LX 6.3 (Mac, $134.99)

The history of Metro is long and convoluted. Developed by Jeremy Sagan, Metro began life in 1989 as Dr. T's MIDI-only Mac sequencer Beyond. Macromedia acquired Beyond and changed its name to Metro, pairing it with the audio program Deck. Soon thereafter, a company called OSC gave Metro audio-recording capabilities and eventually sold it to Cakewalk. It has now grown into a family of digital audio sequencers from Sagan Technology.

Metro has been around for a while, gradually migrating from Macintosh System 6 to Mac OS X. Metro's capabilities have grown to the point that it has become a mature sequencer able to hold its own against any other in its price range. Several versions are currently available, ranging from the beginner-level Metro SE ($69.99) to the full-blown multitrack audio workstation Metro

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* *Estimated street price.* Emulator X for Windows XP and 2000 - pictured running on an Open Labs Neko keyboard.

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G4 Altivec ($329.99). Like the other versions, Metro LX is available only as a download.

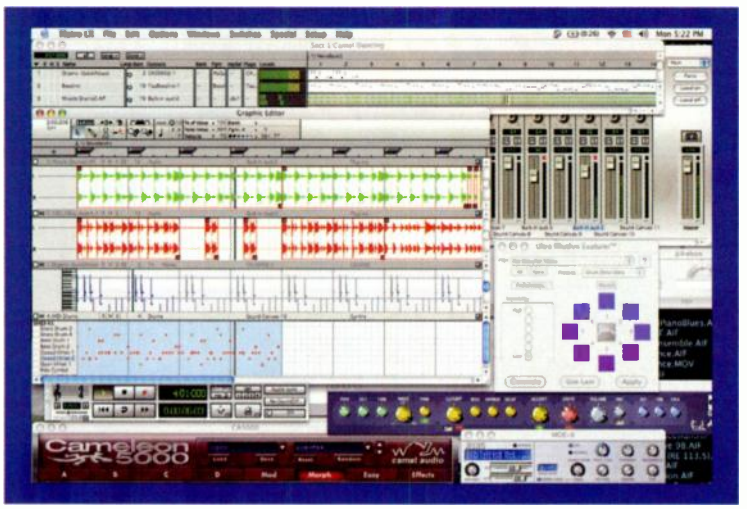
Metro's GUI presents three main windows that are always open by default: the Tracks, Graphic Editor, and Transport windows (see Fig. 15). Any track selected in the Tracks window appears in the Graphic Editor, which can display as many as 16 tracks simultaneously. The Graphic Editor displays MIDI notes in piano-roll notation with stems indicating Velocity, but you can also show data such as Aftertouch, pitch bend, and MIDI Control Change messages by pressing a single key. Double-clicking on any note opens a dialog box that lets you quickly modify pitch, Velocity, location, and duration. A box of Selection Tools appears at the top of the window for performing various edits. Audio tracks are displayed as graphic waveforms.

Most commands are available in the menu bar, and you can access convenient pop-up menus in every window. Inserting any plug-in is as simple as selecting one from a pop-up menu. You can also select only a portion of an audio track and process it offline with any audio-effects plug-in. Working with instruments plug-ins is just as fast and intuitive. I did experience a few crashes while inserting plug-ins, but when I wrote Sagan for a solution, I received an immediate response. Metro LX lets you use only four instrument plug-ins at a time, making it inappropriate for anyone who uses lots of soft synths. If you have ReWire-compatible instrument applications, though, you can use ReWire to connect them to Metro.

Think Different

In a Metro file, a recording can be divided into Sections—multitrack chunks with user-defined durations that appear in the Sections window. Inserting a Section into a single track in another Section creates a SubSection. That allows you to easily reuse motifs, multitrack drum parts, multipart vocal harmonies, and entire sections of songs. Each Section can have a different time signature, but only one Metro file can be open at a time.

FIG. 15: Metro LX, from Sagan Technology, is a mature entry-level sequencer with such a wide range of creative capabilities that you might not ever outgrow it.



Metro LX goes a bit deeper than most of the software surveyed here, offering functionality that you might expect from top-shelf sequencers. The online manual is detailed, but it's also very text-based and could use a few more diagrams to help orient new users. Metro's enthusiastic and well-established user base maintains a lively discussion forum on Sagan's Web site. For recording, editing, and processing audio and MIDI, Metro LX qualifies as one of the more capable sequencers in its price range.

Steinberg Cubase SE 1.0.7 (Mac/Win, $149)

Cubase SE takes its place near the bottom of a fine product line that includes Cubase LE, which is bundled for free with products from several manufacturers other than Steinberg; the midlevel Cubase SL3; and Cubase SX3, one of the top-ranking pro sequencers available. Cubase SE offers many of the same features as SL3 and SX3, with a consistent user interface that ensures a smooth transition if you ever decide to upgrade. SE's support for VST instruments is limited to 16, which should be plenty for most users on a budget. Other minor limitations are that SE supports only 64 channels of ReWire (versus the 256 channels supported by SL3 and SX3), and that it has only one level of undo. Although you can edit sequences in music notation, SE lacks the advanced score-printing functionality of SX3. Those issues aside, Steinberg's budget-price version is nonetheless a real bargain.

Cubase's layout and logical organization make it relatively simple to learn and operate—it's all about workflow. Most of the action takes place in the Project window, which gives you a graphical overview and makes it easy to find your way around (see Fig. 16). The Inspector displays information about your audio and MIDI tracks. The Track List provides the means to view and change individual track settings such as the track name, monitor and record enable, automation read and write enable, and mute and solo status.

The Project window's Event display shows recorded track data as either a simplified MIDI piano roll or an audio waveform. Double-clicking on that data opens either the Key Editor, where you can draw, move, delete, transpose, quantize, and change the length or Velocity of MIDI data; or the Sample Editor, in which you can move, delete, scrub, loop, normalize, reverse, and otherwise transform a selected portion of audio data. The Audio Editor is also where you calculate and manipulate Hitpoints, which gives Cubase the ability to beat-slice audio to more easily vary the tempo of some sounds without affecting pitch.

Cubase has lots of features indicating that it's built for speed. The Devices window contains nothing but

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FIG. 16: Designed for comfort and speed, Cubase SE is an easy-to-grasp audio and MIDI sequencer with impressive functionality and outstanding bang for the buck.

buttons that quickly open other windows. You'll seldom need to open the Mixer window, because you can access all its settings in the Track List or the Inspector. Nor do you need to open the Audio Editor if you want to perform an audio process on an entire clip, such as shifting pitch, stretching time, or imposing an envelope or a fade. You can change the height and width of displayed data using sliders in the corner of the Event display or the Edit window. Cubase also lets you open as many sequence files as your computer can handle and copy and paste between them.

VST Is a Reason to Be

Steinberg invented the Virtual Studio Technology (VST) plug-in format. If a plug-in doesn't work perfectly with Cubase, it isn't truly VST compatible. Cubase SE also provides access to Steinberg's VST System Link, which allows you to network multiple computers over digital audio connections.

Cubase displays details about installed instrument and effects plug-ins in the Plug-In Information window, which shows the number of ins and outs, the number of included presets, and other pertinent data. You can use that window to enable or disable plug-ins at will—a real convenience when you're trying to conserve resources or track down a problem. In addition, automation and ReWire features are especially well implemented. Lots of thoughtful features and professional touches make Cubase SE a polished program that can take you a long way in the world of computer-based recording.

Onward and Upward

At some point in your quest to make better music, you may want to upgrade to one of the premium programs for audio and MIDI sequencing. Several sequencers in this roundup are part of a family of applications, and purchasing any of those gives you access to an upgrade path. For $99, for example, you can upgrade Home Studio to Home Studio XL and receive a DXi sampler, additional audio effects, and several sample libraries. If you've purchased FL Studio Producer Edition online, you can upgrade to FL Studio XXL for $150 and receive a number of additional soft synths, a video player, and a SoundFont player.

Steinberg will upgrade Cubase SE to Cubase SL3 for $299.99 (a $200 savings) or to Cubase SX3 for $549.99 (a $250 savings). For $194.99, upgrading Metro LX to the full version of Metro will buy you many more tracks, 32-bit recording, time- and pitch-shifting, full plug-in automation, and lots of other desirable features. Compared with GarageBand, Apple's Logic Express 7 (Mac, $299) and Logic Pro 7 (Mac, $999) offer greatly increased functionality and many additional plug-ins. Apple doesn't offer upgrade pricing, however, if you want to move up from GarageBand to either version of Logic.

Why Pay More?

Clearly, musicians don't have to spend a fortune to gain impressive multitrack recording and MIDI sequencing power. Most of the programs featured in this roundup offer more tracks than any multitrack tape machine, with audio quality and MIDI resolution that matches or exceeds the needs of all but the most demanding users. Several include an extensive collection of software instruments and effects, and some supply additional content in the form of audio loops and clips.

The recording capabilities of most low-cost sequencers go beyond anything that even the most expensive sequencers could do a few years ago. In a commercial recording environment, recordists need all the sequencing power that modern technology has to offer to stay competitive. With a low-cost sequencer, however, you don't need to waste your time and money on features you may never use. If you don't need all the bells and whistles offered by a pro-level sequencer, you might find everything you need and save yourself a bundle. EM

Associate Editor Dennis Miller lives in the suburbs of Boston. Associate editor Geary Yelton lives in Charlotte, North Carolina. Brian Smithers is Course Director of Audio Workstations at Full Sail Real World Education in Winter Park and teaches music technology at Stetson University in Deland, Florida. Their combined electronic music experience adds up to nearly a century.

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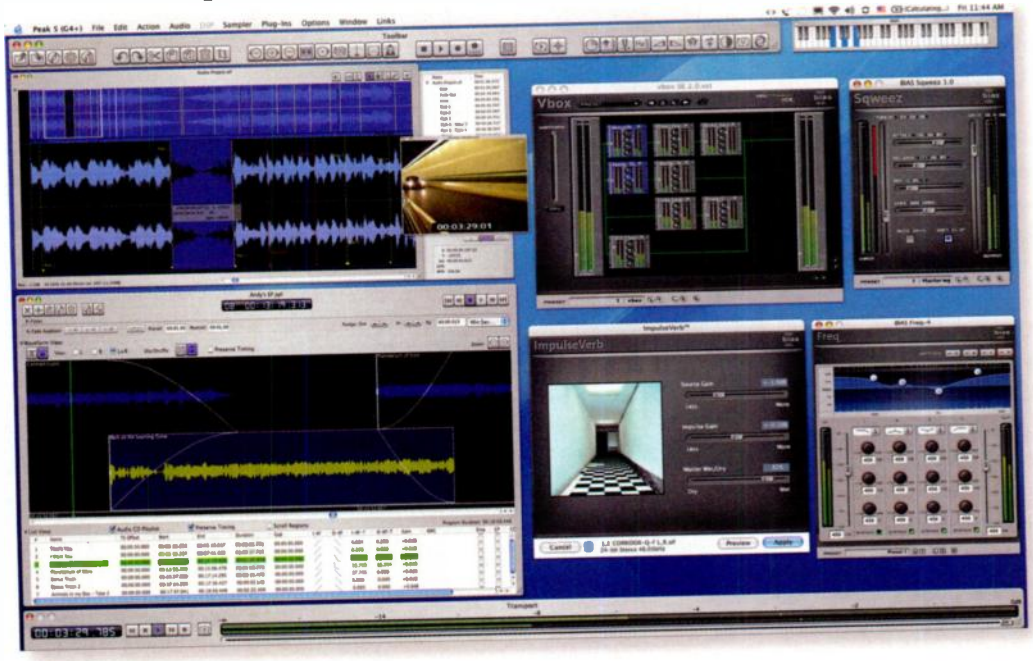

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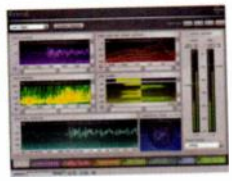

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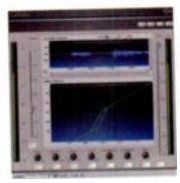

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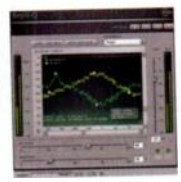

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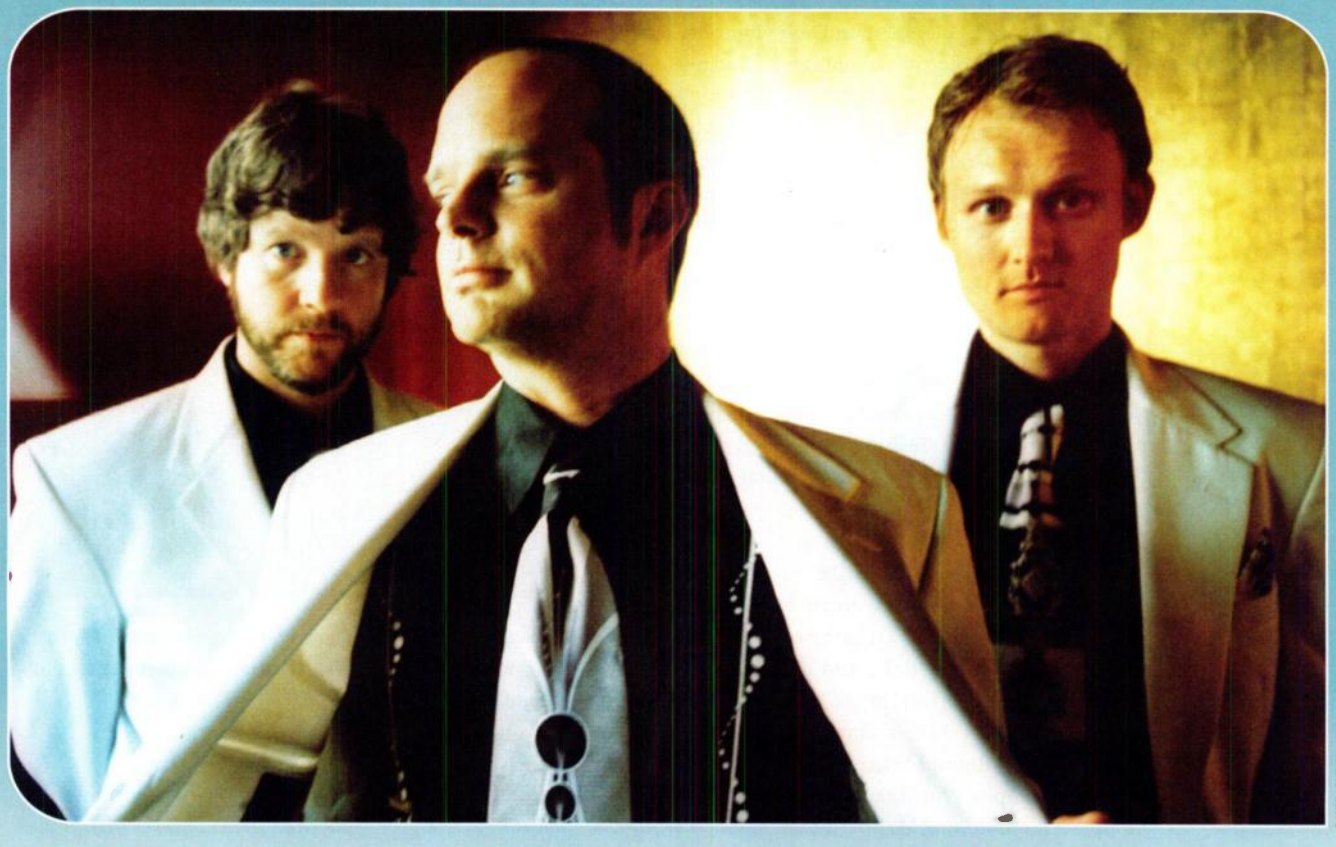

DANNY CLINCH

Being John Medeski

By Paul Tingen

Medeski, Martin and Wood's keyboardist discusses his love of retro gear, his distaste for digital, and recording the band's latest CD.

John Medeski has been known to make strong snap judgments. Imagine this: as a child prodigy, he was groomed to become one of the country's leading concert pianists. Then, when he was only 14, a whiff of perfume at an after-concert party triggered such a wave of revulsion in him that he instantly abandoned the classical-music world. Instead, he set off for a career in left-field jazz and rock, trying his hand at electronic keyboards.

After years of playing mostly jazz with an avant-garde slant, Medeski eventually rose to the top as one-third of Medeski, Martin and Wood (MM&W), spearheading the trio's idiosyncratic concoction of wild improvisations and hot grooves that incorporates influences from jazz, rock, soul, funk, Latin, African, hip-hop, and countless other styles. The trio's music is instrumental, and with Billy Martin on drums and percussion (see **Fig. 1**) and Chris Wood on electric- and double bass (see **Fig. 2**), Medeski's (see **Fig. 3**) keyboards are its leading voice. It's a sound that's full of character, as can be expected from a player who continues to voice strong opinions.

Your Opinions, Please

Ask Medeski any type of question, and you risk having to dodge some vehemently expressed convictions. For example, the mention of digital keyboards triggers an impassioned reaction. "Digital keyboards are toys," exclaims Medeski, "because of the playing-to-sound interaction. There's touch sensitivity, but it's not like striking a string, like you do with a Clavinet.

"Compare a real Mellotron to a sampled Mellotron: it's a joke! Perhaps if I was in a pop situation, backing up a singer, a digital keyboard or a soft synth would be okay. But I play creative music, and the keyboards are my voice. You can argue all you want, but if you really want to

get into the molecules of sound and vibration, a digital keyboard is not doing it—it imitates it. And my life's too short for imitation."

Ask him whether he uses MIDI, and again be prepared to duck. "No!" barks Medeski. "I mean, certain sounds are classics: piano, violin, acoustic guitar, electric guitar, B-3 organ, and Clavinet. Those sounds have passed the test of time. But the DX7 sounds like crap now.

"A lot of 1980s records sound dated, and that's due to a large degree to the keyboard sounds. I'm not interested in technology that has nothing to do with music. And today it's like technology for its own sake. I don't have time for that. I'm a musician. I have time for music, not for technology. Technology is good when it helps make music better. And all these digital sounds do not make music better."

The Vintage Advantage

Medeski's idea of making music better includes surrounding himself with an array of vintage electronic keyboards, effect pedals, and amplifiers. His main instruments are a Hammond B-3 organ, which goes through a Leslie 117; a Clavinet that goes through a wah-wah, a Roland Space Echo, and a 1953 Fender Bassman amp; a Wurlitzer that's sent through a 1957 Fender Tremolux; a Mellotron that goes through a 1968 Fender Pro Silverface; an ARP String Ensemble; a Yamaha CS80 synthesizer; a Melodica, which is another Wurlitzer-type keyboard ("I don't know what the exact name and model number are, but it's somewhere between a Farfisa and an ARP," says Medeski); and a Steinway piano. His only concession to modern times is the Moog Voyager, which he puts through a 1950s Kay 703 guitar amplifier.

MIKE LEVINE

FIG. 1: Martin at rehearsal at his vintage Rogers kit. For a bass drum, he uses a Jamaican Nayabinghi drum.

"I'm more interested in an instrument that has one sound world rather than an instrument that has 1,000 sounds, but each type has its limitations," explains Medeski. "And each of my keyboards has its own sound world. I think of them as different personalities, and that's why they each have their own amplifier. I spend a lot of time finding amps that work. I really like the Wurlitzer sound that comes from its own speaker, but you can't mic it live. Even in the studio it doesn't have enough balls. But in the studio the Wurlitzer and the Mellotron can sound great direct to tape."

MIKE LEVINE

FIG. 2: When the band performs or records, Chris Wood plays both upright and electric bass. For rehearsals, he sometimes uses this electrified upright.

Shack Attack

MM&W are the proud owners of Shacklyn, a studio located in a large basement in the Dumbo (Down Under the Manhattan Bridge Overpass) neighborhood of Brooklyn, New York. It's awash with vintage items such as a 1970s API desk; an MCI 2-inch, 16-track recorder; and all manner of tube and vintage outboard gear.

"We set Shacklyn up right before we recorded *The Dropper* [Blue Note, 2000]," Medeski explains. "It used to be our rehearsal and storage space, because we have so much gear. And then, with *The Dropper*, we decided to set up a space where we could record and feel comfortable and have unlimited time, rather than spend all our money on a commercial studio. So we bought a few things and built a little stage, and even built a control room from plywood. So now we have the API desk, Telefunken mic pres and compressors, and Neve compressors, which are really cool. Most of our gear is from the 1970s, although we have some Avalon things (see **Fig. 4**) that are a bit more modern, though still aesthetically older."

Until recently, digital items were a virtual no-show at Shacklyn, although Medeski does admit to using a MiniDisc recorder on occasion, purely for convenience's sake. "We rehearse in the studio, and we record a lot of what we do there," he explains. "It sounds pretty good with the equipment we have. Sometimes we press Record and go, sometimes we bring in a relatively finished piece, and sometimes we improvise from scratch. If it's a matter of trying to find ideas, or 'seeds' as we call them, in a mass improvisation, then we record to cassette or MiniDisc. Recording everything to analog [reel-to-reel] tape is just too expensive."

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History Lesson

The band may love old gear, but MM&W are anything but a bunch of old-fogey jazzers stuck in a time warp. All three members had been active in the New York avant-garde scene of the 1980s, and when they convened in 1991, alchemy occurred instantly.

Until recently, they bottled their particular brand of musical magic on analog tape, starting with their self-released 1992 debut album *Notes from the Underground* (Accurate Jazz, 1992), as well as their breakthrough album *Friday Afternoon in the Universe* (Gramavision, 1995). The follow-up, *Shack Man* (Gramavision, 1996), was recorded in Hawaii in a studio called The Shack, which later provided half of the name for their Brooklyn studio. The sound of The Shack's API console inspired the band members to buy their own.

Relentless touring, and collaborations with well-known cutting-edge musicians such as guitarist Vernon Reid and DJ Logic, further heightened the band's profile. For a number of years, DJ Logic was the band's unofficial fourth member, his turntable contributions illustrating their openness to present-day influences. Further evidence of this was their association with hip-hop DJ and producer Scott Harding (Wu-Tang Clan, Kool Keith), who was involved in the making of *Combustication* (Blue Note, 1998), *The Dropper*, and *Uninvisible* (Blue Note, 2002).

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Getting Dusted

In 2004, Blue Note released MM&W's *End of the World Party (Just in Case)*. It was cocreated and produced by John King, who is one-half of the Dust Brothers (aka the "Godfathers of Sampling"). The Dust Brothers have built their reputation by working on releases such as The Beastie Boys' *Paul's Boutique* (Capitol, 1989) and Beck's *Odelay* (Geffen, 1996).

The clash of King's computer-enhanced pop and hip-hop sensibilities with MM&W's improvised analog approach resulted in pop and soul and Latin influences vying for space with sonic experimentation and quirky, almost hit-parade-like licks. *End of the World Party* is an ultracool album, as well as a continuation of and radical departure from the band's previous output. One wonders how MM&W got the idea of hiring John King.

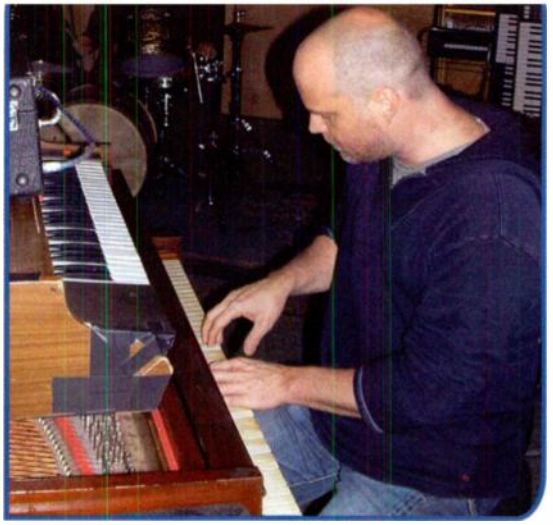
"Over the years, we've been producing a lot of our records ourselves," Medeski explains, "but working with Scotty [Harding] opened our minds. Also, we could make a record once a month. We improvise and create new songs every night we play—at least a third of our set is all-new material and improvised compositions. Fortunately or unfortunately, people record all our live shows and put them on the Web. They may not be the best recordings, but the music is there.

"So the point of making a record is to do something entirely different that uses the studio as the incredible and creative world that it is. It's also a question of 'what more can we do?' So we decided to try a full-blown producer on this record.

And we love all the records John King has done with the Dust Brothers. We felt it would be interesting to get his pop perspective. The avant-garde side is our forte, but the pop thing isn't really what we do. And his process is exactly the way we approach recording music."

Hang on a second. Medeski never misses a beat when an opportunity arrives to proudly proclaim how he loves working with real musicians and how MM&W's live-playing approach is its perfect embodiment. ("I'm old school. There's nothing but a bunch of people playing together live.") Conversely, John King and his Dust Brother partner Mike Simpson wear their nonmusicianship on their sleeves. They started out as computer students and have, over the years, always prided themselves in using cutting-edge digital-sampling equipment to create music through cutting, looping, and pasting material played by others. Surely the Dust Brothers and MM&W inhabit entirely different musical, attitudinal, and technological universes, don't they?

Not so, according to Medeski. "We're a band that composes together, and we like to work on all songs together from the beginning. We start from the bottom up, and we work as a unit to create—improvising and picking out the cherry moments. The approach with *End of the World Party* was also 'let's get together and work on some basic tracks, focusing on bass and drums.' We



MIKE LEVINE

FIG. 3: Medeski at his acoustic piano. Stacked on top is an ARP SE-IV String Ensemble and a Roland Space Echo.

spent a week at Shacklyn with John, playing and improvising every day, while he brought all this stuff that made him feel comfortable recording: tons of microphones and a Digidesign Pro Tools HD system. Then he would go through it and pick out the sweet spots. He worked amazingly hard at this."

"Our impression from the first time we spoke to John was that it would be very looped and very much a pop approach. John indeed constructed the album's first two

MIKE LEVINE

FIG. 4: The control room rack at Shacklyn features outboard gear from Avalon, dbx, Empirical Labs, Furman, Lexicon, Neve, Telefunken, and Yamaha, among others.

tracks, 'Anonymous Skulls' and the title track, from a one-bar loop, and then we'd go back and play to that to create the songs. But after that, he slowly tuned into the way we develop grooves between us and they way we move from point A to point B. We're players, and we have the luxury of replaying things and working on them, and we develop the songs in that way."

In other words, MM&W can loop or rework their "seeds" live, and they don't need a computer to do that. Although that seems like a considerably different approach than King's, Medeski stressed the common ground. "We aren't coming from fully written songs, but from seeds of ideas that are fleshed out as we go. It's about working in the moment, without preconceived ideas. That's very different from having an idea in your head, writing it down, and then getting players to play it.

"The ease with which you can create your vision with digital equipment can be detrimental, because you can really make things exactly the way you have them in your head—that's rarely going to be as good as what happens when you combine the input from different people. And the Dust Brothers, even as they're using the technology, also approach music from the perspective of, 'Hey, what you just did is really cool—hang on for a second.'"

Forward, into the Past

With the similarities and differences in approach between John King and MM&W becoming clear, there's still the gear issue to resolve, with King swearing by the latest digital gizmos, such as Pro Tools HD and Ableton Live, while MM&W and their studio remain locked in the 1970s.

Nor is everything in this situation what it seems. Although the Dust Brothers like to take advantage of the advanced editing capabilities in the latest digital gear, from a sonic perspective they are huge fans of vintage analog and tube equipment, which they claim still sounds better than digital does today. (The Brothers' enthusiasm for such gear is evident at their studio in Los Angeles,

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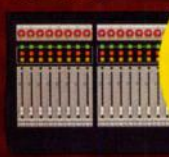

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called The Boat, which sports a 1969 Neve 8028 console once owned by George Martin. (Check out www.theboatstudio.com.)

In addition to the Pro Tools HD system that he rented, King brought his bunch of vintage and tube microphones, and some preamps and other outboard gear, all from his own collection. "The microphones John brought," remarks Medeski, "made a big difference. Additionally, Pro Tools HD, at 96 kHz, is the first digital recording setup I've encountered that's worth using. It's different than analog, and there's a certain low-end thing that you just don't get with digital, but it's good in other ways. In the past, we recorded a couple of our records to 2-track analog tape using a stereo microphone, and with 96 kHz you can get a similar depth and dimension."

Judging that digital technology has finally come of age, Woods and Martin have recently acquired laptops to run basic Pro Tools systems. The band's old Mac G3 was subsequently given to Medeski who, in 2005, at age 40, has finally surrendered to the digital era, even going as far as to acquire an email address. Not that he'll be using the G3 for much else, though. "While studying classical music, I've learned to write for all musical instruments," he explains. "I think what John King does is incredible, but I can write stuff out and get people together and play. I would never say that's a better way of doing things, because I love the way our last few records have come out. It's just different."

INSIDE SHACKLYN

"Funky" would be a good word to describe Shacklyn, MM&W's project studio, rehearsal room, and storage space. It's located in a nondescript industrial building in Brooklyn, New York, just across the bridge from downtown Manhattan. The band has used it as their headquarters since 1997, and plenty of memorable music has emerged from the basement facility.

When you first walk in, you're in a large open area that doubles as an entranceway and a storage room, and is cluttered with instrument, drum, and road cases stacked on shelves and on the floor. On the far left is a kitchen and an eating area. Against the far-right wall is an antique Windsor organ, and beyond that is a hallway that leads to the control room that features the band's vintage API console; an MCI 2-inch, 16-track recorder; and a rack of outboard gear.

In the center of the building is the main recording and rehearsal room (see **Fig. A**), which features wooden pallets for flooring, plywood and Sheetrock on the ceiling with Chinese lanterns hanging down, plywood-covered walls, and Medeski's vintage keyboards all over the place. What are the acoustics like in Shacklyn? "Good," answers Medeski. "It would be nice if we could have the floor filled with sand; other than that, though, it's cool."

MIKE LEVINE

FIG. A: The main room at Shacklyn, set up for rehearsal.

The band built a separate room on the left-hand side that functions as a bass booth when they're recording (and a storage space for bicycles when they're not). On *End of the World Party*, one of the mics that producer John King used on Wood's upright (he played upright on about half of the songs, electric on the other half) was an old RCA 44BX ribbon mic. "It sounds unbelievable," says Wood of the RCA. "It has all the oomph and punch that you would want. It did everything that a direct line would do, but it sounds a million times better."

When recording the basic tracks for *End of the World Party*, Medeski and Martin recorded in the main room with Wood in the bass booth. Medeski's amps were miked, but they were isolated from the sound of the drums using improvised techniques. "We use the road cases, put the amps inside of them, and tried to at least blanket them off," says Wood. "It's crude isolation, but it's good enough."

On this day, the band is rehearsing for an upcoming tour. Medeski sits at a grand piano (which once belonged to his childhood piano teacher) that has an ARP SE-IV String ensemble and a Roland Space Echo sitting on top of it. Woods is playing an electric upright (which he uses only for practicing) through an old Ampeg bass amp, and Martin sits behind a vintage Rogers drum kit from the '60s. He uses a red, black, and green Nyabinghi drum for a bass drum, which he explains is a traditional Rastafarian drum that he bought on the beach in Jamaica in the '80s.

The band members, who had been joking, talking, and answering my questions during the setup, start to warm up and play what seems like an improvised piece, and they effortlessly lock into an impressive groove. As the music bounces off the plywood walls of Shacklyn, one thing is for sure: these guys can play.—*Mike Levine*

JOHN KING TALKS MM&W

Dust Brother John King describes what it was like working with MM&W on their recent CD.

"Making *End of the World Party* (see Fig. B) was very selfish of me," King says, "because I imposed my taste on it. It reflects my musical taste, combined with their tastes and abilities. It was a bit different than the other projects that I do because there was no vocalist and it's not a pop album. It's like an avant-garde jazz album.

"I went to MM&W's studio in Brooklyn where they have a fantastic-sounding API board, and brought my whole collection of microphones, including my Neumann U47, U67, U64, and RCA 44—all the fun mics that I have—and rented a Pro Tools HD system. I set up in their studio, and I would play them music that I like and talk with them about music, and then they would get all fired up and play for a little while, maybe 6 or 20 or 30 minutes. I thought the sound we got at their studio was amazing. These guys are totally sick players, and they're open-minded as well.

"Afterward, I listened to the recording, picked out measures and phrases, looped them, and started to figure out if they would be good to construct a song around. I didn't do much of the editing while I was at Shacklyn, because I wanted to record stuff with them and do the editing back home, where I would condense those 20-minute jams into 3- to 6-minute songs using Pro Tools and Ableton Live.

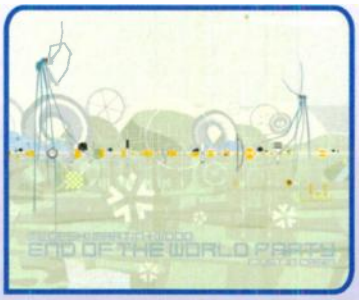

FIG. B: John King's production style on *End of the World Party* featured lots of editing and layering after the basic tracks were recorded.

"Medeski and Wood then came to my place to finish things. We used some of the keyboards from the initial jams, but John and I also did a lot of layering and overdubbing. I have a huge collection of vintage keyboards, so that was fun for John to play with, because he has a ridiculous collection himself.

"The album's opener, 'Anonymous Skulls,' is a good example, with a couple of my favorite keyboards in there. The Mini Korg gives a deep synth-bass sound. There's the Mellotron, the B-3, and a Clavinet that we put through all of my crazy vintage distortion pedals. There's also a 1955 Fender Deluxe Blackface amp and my 9-foot Steinway. I also play the Echoplex on that song, and I used Ableton Live for two tracks of ambient loops."

Express Yourself

Medeski's classical-music background is still a major influence. He recalls that the perfume incident was not about classical music as such ("I love it"), but about the pretentiousness that often surrounds it; or as he puts it, "the whole scene, all these rich people in fur coats." And so, the keyboardist's beginnings on the classical piano continue to drive his keyboard preferences, as well as his wider outlook on music. "The piano is such an expressive instrument," he says, "I can hit three notes on any of my keyboards, and each will sound different. I need that kind of expressiveness."

Medeski played John King's Steinway at the latter's private studio in Los Angeles, at the time called The Medina. Medeski and Wood went there after the initial seven-day recording stint at Shacklyn to complete the record. (Martin, meanwhile, was tending to his newborn.) "King had a whole bunch of keyboards," Medeski comments, "weird little toy things, but also some great old Korg synthesizers. He also has a Yamaha CS70, and I loved his Mini Korg. Plus, he has tons of great guitar pedals. In general, I like using pedals and have the sound coming out of an amplifier. I don't want to play something, and then have someone else decide later on how it's going to sound. I prefer to play it with the sound that will be on the record."

It's an old-school approach to recording, and just before Medeski again risks sounding like an old fogey, he adds, "Some of the most creative things are being done by DJs and with computers. Some of the best musicians out there are DJs. That's because they're used to conceiving things as a whole. Put a DJ in a band situation, and they're looking for what they can add to make the whole sound better. Whereas a lot of musicians just wank all over what you're doing without really listening to the whole. They just want to come in and play their licks.

"On the other hand, with the John Kings of this world, there's something that happens when you don't have all those preconceived notions that you're taught at music school. It's inspiring to hear them layer and put music together in a fresh way."

And it's fresh, without a whiff of bad-smelling perfume, Medeski might add. EM

Paul Tingen is a writer and musician living in Scotland. He is the author of Miles Beyond, The Electric Explorations of Miles Davis, 1967–1991 (Billboard Books, 2001), *a book on early weird funk experimentation. For more information, visit www.tingen.co.uk.*

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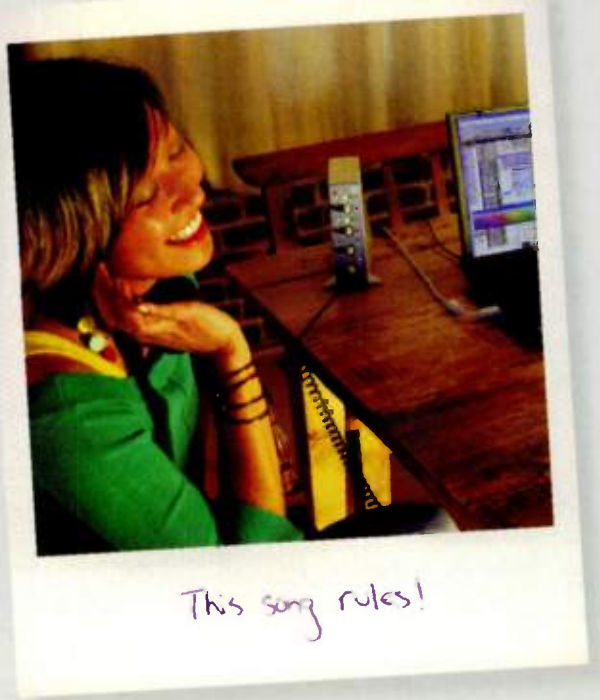

Sound Advice

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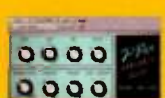

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Analog Gear in a Digital World

By Dave Darlington

Employ old hardware to add warmth to digital mixes

Many of us often find ourselves mixing "in the box"—using plug-ins in place of analog processors and pushing a mouse instead of riding faders. As a result, I sometimes hear engineers expressing a longing for the good-old days of studio production, when their ultimate job was spreading a mix out on a console, inserting some beloved outboard gear (now relegated to a dusty rack in the corner of the control room), and jockeying faders until the mix was just right. Although the good old days aren't coming back, you can interface those favorite pieces of analog gear with your DAW, and they'll give your mix something special that you can't get out of a plug-in.

Fix It Now

Although many DAW hardware interfaces come with input stages such as instrument or mic preamps, using an outboard preamp is an easy way to improve the sound of your recordings. Simply connect the output of a dedicated mic pre to an analog line input of your audio interface or conversion hardware, and you'll usually hear an improvement. With some interfaces (even high-end ones), the quality of the converters is the primary concern, and the onboard mic preamp may be less than stellar. Tube preamps are noted for their warmth and sweet harmonic distortion, and some solid-state models can provide additional colors that can be useful for your projects.

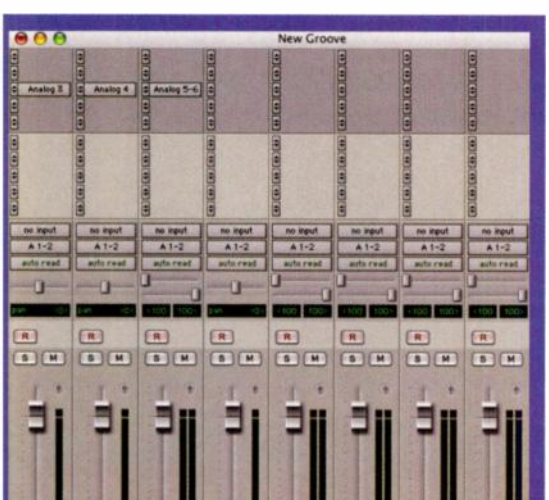

FIG. 1: Analog gear can be inserted into a digital audio applications such as Pro Tools by accessing a specific interface input from a mixer channel's insert points.

Many companies offer improved tube circuitry design and make affordable mic pres that are clean, quiet, and warm with high output levels. Quality analog mic pres can be found to fit any budget and any project, from Mackie's XDR preamps in its small-format mixers to the high regarded "British EQ" in Allen & Heath and Soundcra boards. If your budget allows, you might opt for a cla sic reissue such as Universal Audio's LA-610 or a mo ern "modeling" mic pre like Focusrite's Liquid Channe which can emulate other circuits, morphing into a number of well-regarded outboard mic pres.

Highly affordable mic pres such as M-Audio's DMI and ART's DPS II have made fans of engineers wh appreciate the warmth that the units impart to ba and guitar. Turning that formula around, processo that are designed for instruments, such as a "stom box" compressor or "modelers" like a Line 6 POD, ca be inserted in the analog part of the chain to provide more or less dramatic effect to a vocal as well as instr ment input. Inserting a hardware compressor, such dbx's classic 160X or current 160A, between the m pre and the converter can give you the kind of une pected punch that you can't get from a plug-in.

Fix It Later

If you recorded your a rock band through yo computer's AV port and the recording sounds wimp there are ways to get that analog gear into the mix f a warming trend. I'm often called to project studios enhance a mix coming directly out of the compute and I'm always amazed at the racks of outboard ge sitting untouched and unpowered in the rear of th room. Many project-studio owner/operators use th high-end analog gear on input, and then neglect it the mix, having been seduced by plug-ins.

It's easy, however, to turn your interface conver ers into "insert points" for your analog outboard ge if you have a multiple-output interface. You can feed line output from the interface to the outboard analo processor, and return the analog gear's output to th corresponding input on the interface or converter. your software, insert this loop into the track you a trying to modify (see Fig. 1). You may have to exper ment with the input and output levels of the analo gear so that you don't overdrive the gear or the inte face converters.

Running a channel through the analog pie can produce the desired effect sometimes, impar ing the gear's inherent color to the track. I ofte

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- Delta 1010
- Delta 66
- Delta 44

FireWire interfaces

- FireWire Audiophile
- M-Audio Ozonic
- FireWire Solo
- FireWire 1814
- FireWire 410

* Compatible only with current Delta models listed above.

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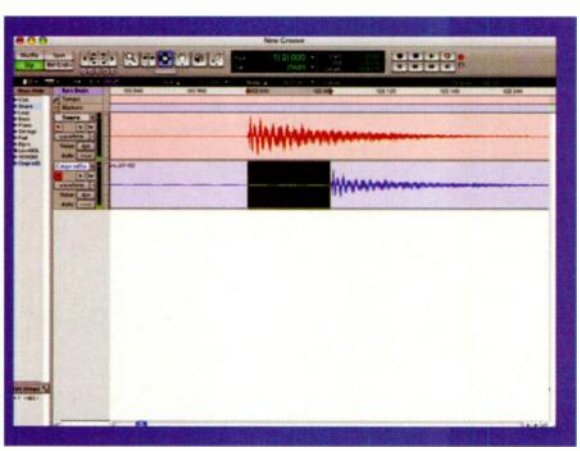
insert a vintage channel strip or a compressor into a track (without engaging EQ or compression), just to gain the quality of the circuitry. The new, affordable channel-strip modules that have tube circuits, such as MindPrint's En-Voice MK II ($799), can also be used as separate EQ or compression circuits on inserts to warm up tracks.

Because A/D/A conversion takes time, tracks that have hardware inserts can become noticeably latent. Some programs can measure the latency, but it's easy to simply record a bit of the processed track to a new audio track. By comparing the original audio with the processed audio, you can measure exactly how late the processed signal has become. Then you can shift the original audio ahead by exactly that amount of time. After insert processing, the new audio will be time-aligned to the other audio tracks (see Fig. 2).

Another good way to use dormant outboard gear is to run it through hardware aux sends and returns. That works especially well for signal processors such as tape echo and plate reverb. It is also a good way to incorporate outboard digital processors that might not be connected to your DAW digitally. By connecting a numbered audio interface output to your gear and assigning an aux send to that output on the software application's mixer, more than one channel can use the outboard processor. Return the processor's output to an interface input (it doesn't have to be the same number), and assign that input to an aux channel in the DAW (see Fig. 3). I often use that method to take advantage of my classic reverb, harmonizer, and analog filter. In fact, any piece that might work on more than one track gets patched this way. Although that method doesn't work particularly well with compressors or EQs because of latency, time- and modulation-based effects such as reverb and delay work wonderfully.

FIG. 2: Recording a processed signal allows you to see the amount by which the unprocessed signal can be offset in order to align the newly processed signal with other tracks.



Do Some Time

Another way to integrate analog gear with your DAW is at the output stage, spreading your mix across many analog faders instead of only the L and R outputs from the DAW. When the budget supports it, I like to do as much of the work on the mix as possible at my desktop studio, and then rent a three-hour block of time at a larger studio (which can cost as little as $300) that has a vintage analog console. (Although I use a mobile Pro Tools rig, you can do the same thing with a laptop and a multiple-output interface.)

FIG. 3: Analog gear such as reverbs and delays can be accessed by several tracks at once by using a DAW's aux-send and -return features.

In the first hour, I calibrate the analog desk so that all faders are at 0 VU and unity gain. I then assign each channel in the song file to a separate interface output (maintaining stereo pairs where necessary), re-create the individual panning from my DAW mix, and print that mix. In most cases, the mix already sounds better, because of the quality of the analog summing bus in the high-end console.

Next, I adjust the DAW faders individually to 0 VU, and then I compensate for any changes on the analog desk. For example, if my bass track was playing at –6 dB in my mix, I raise the software fader to 0db and attenuate the console fader by 6 dB. Now the DAW is doing less calculating, and the console is doing the balance work.The sound is even better when I print that mix.

In the third hour, I do some tweaks, swap out my plug-in reverbs for the studio's hardware units, and print the best mix that I can in the time remaining. Total expense: $300 to $500. Sonic improvement: priceless.

Check It Out

So get out the feather duster, find a spare AC strip, and fire up those hardware effects, analog mixers, and weird stompboxes that haven't seen work since Pro Tools 1.0 was in beta release. It doesn't have to cost anything to get back some of the good from the good-old days. EM

Dave Darlington has just finished recording and mixing a new album for singer Dar Williams. D>Tour's (Darlington's group) debut album is available from Templar Records.

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Parallel Paths

By Eli Krantzberg

Parallel-process your multiple reverb tracks.

In "Sound Design Workshop: Off the Wall" (see the August 2005 issue of EM), I discussed some of the creative possibilities of slicing, displacing, and offsetting segments of the wet-only portion of a reverb-processed drum loop. This month, I'll start with a reverb-processed vocal track and process several copies of the wet-only version on parallel tracks. I've used Logic Pro 7 for these examples, but you can do the same things with any multitrack DAW and a basic set of plug-ins.

I've processed the vocal track with a straightforward plate-reverb setting using a 2.6-second tail (see **Web Clip 1**). One of the most basic examples of parallel processing is applying different EQ, compression, and other effects to the dry and wet files. That alone offers considerable flexibility and control in shaping the sound.

The Splits

You can achieve effects that are even more unusual by splitting the wet file into several frequency bands for independent processing. For example, place copies of the wet file on three separate audio tracks, and place a lowpass and a highpass filter in series on each track. That gives you variable-bandwidth bandpass filters with which to isolate the desired frequency bands. You can then pan and slightly offset the frequency bands to thicken the sound (see **Fig. 1** and **Web Clip 2**).

FIG. 1: With the use of high- and lowpass filters, the frequencies of the wet file can be split across several tracks. Here, they are also panned and offset. The center track is being processed with a tape-delay plug-in.

Once you have split and panned the wet-file frequency across several tracks, you can try a variety of additional things. You can add a filter with some LFO automation to one or more of the wet tracks; you can slice up the wet file and stagger it across several more tracks to create a panned tremolo effect; or you can apply heavy compression, overdrive, or distortion to just one of the tracks.

You can achieve further sonic variation by processing the wet file destructively. For example, you can reverse a copy of the wet file and play it on a different track, with the two copies panned slightly apart. Another trick is to use different pitch- and formant-shifting on several copies of the wet file (see **Web Clip 3**). Those techniques aren't for everyday use but, applied sparingly, add interesting sonic color.

Cut and Dried

Another creative option is to process the wet file with a gating plug-in triggered by a sidechain input. You can use any sort of material from either the same song or another source for the sidechain input. For example, you can use one of the song's rhythm tracks, so that the gating of the wet file is not rhythmically tied to the phrasing of the original vocal. Percussive keyboard parts and rhythm-guitar tracks make good sources, as well.

Instead of a gate, you can use a compressor-expander with a sidechain input. Using expansion (with the dry track as the sidechain input) produces an inverted ducking, in which the volume of the wet track rises and falls with that of the dry track.

A third alternative is to use an enveloped filter such as Logic's Autofilter plug-in to process the wet track. An envelope follower, which can follow either the signal being processed or a sidechain input, is typically used to trigger the envelope that controls the filter's cutoff frequency. The range of possible effects depends on the filter parameters available. In the case of Autofilter, an LFO whose amount is controlled by the envelope follower can also be used to modulate the filter.

Of course, you can combine those techniques, as I have done in **Web Clip 4**. For example, you can apply the gating to a pitch- or formant-shifted version of the reversed wet file; you can gate the dry file; or you can remove the dry file altogether. In the end, your ear (and the singer) must be the judge, but there's a wide range of vocal variations out there for you to explore.

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Eli Krantzberg is a Montreal-based drummer, bandleader, and home-studio owner. *Special thanks to singer-songwriter Angela Latham for the vocal examples.*

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Better Late Than Never

By Jim Aikin

Understanding delay effects.

Musicians are forever looking for ways to improve the sounds that they create. Many of the methods they use fall under the heading of "effects," which can be free-standing hardware devices, specialized chips built into synthesizers, or software processes running on a computer. The purpose of effects, wherever they're found, is to alter a signal in some way.

One of the most important categories of effects is the *delay line*, also known as a DDL (digital delay line) or a delay. Delay effects are easy for manufacturers to create, and they have a number of musical uses. If you use any modern music-production software, it's almost guaranteed that you'll find a delay among the built-in suite of audio effects.

Simple Delay

In the simplest type of delay, a signal is sent through the delay line, which delays it for a short period of time before passing it on to the output. The delayed signal is an unchanged copy of the original. It is typically blended with the nondelayed signal, and you'll usually be able to adjust the relative loudness of these two signals using a wet/dry, a balance, or an output-level control.

The amount of time that passes before the delay line outputs the delayed signal is often measured in milliseconds (1,000 ms equals one second). If the delay time is only a few milliseconds, the delayed signal will not be perceived as separate from the original dry signal. Instead, the combined signal will have a slightly different tone color than the dry signal. A short delay causes tone-color changes due to the *phase cancellation* of some overtones. (For more about phase, see the Square One column "About Phase" in the May 2004 issue of EM.) Another term for this type of timbral change is *comb filtering*.

FIG. 1: The stereo delay in Cubase SX3 includes a separate delay time and output panning knobs for the two delay lines. The wet/dry mix slider is at the right side of the screen.

Slightly longer delays, between 50 and 100 ms, create an effect called *doubling*. Doubling is sometimes used to fatten up vocal tracks. It creates a sound similar to that of a singer recording the same part twice, onto two separate tracks whose outputs were then mixed. The main difference is that when the doubling is done with a delay line, the effect is more perfect and therefore sounds less natural.

A delay of more than 100 ms is perceived as a separate echo that follows the original sound. A delay-based echo can give a track a strong rhythmic character. Because that use of delay is so important in music arranging, your delay effect will synchronize with the tempo of your DAW (digital audio workstation) software. When the delay is synced, you'll set the delay-time parameter in musically sensible units such as quarter notes or eighth notes instead of in milliseconds. The abbreviations "T" for triplet and "D" for dotted values are sometimes seen in delay effects, as shown in **Fig. 1**.

Short delays are not often used on drum tracks because they smear the crisp attack transients of the percussion sounds. That type of doubled attack, which is called *flamming*, is usually an undesirable effect. Longer rhythmic delays, however, can be useful with drum tracks.

Delay with Feedback

Most delay effects have a feedback parameter. When that is turned up, a certain amount of the delay's output is fed back into its input. With long delay times, feedback produces repeating echoes. With short delay times, it intensifies the comb-filtering effect and produces a metallic ringing sound.

If the feedback is turned up too high, the delayed signal can get louder over time rather than softer. Such

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runaway feedback probably won't damage your audio software; it could, however, damage your speakers (and your ears), so be careful when applying large amounts of delay feedback.

A delay line with moderate feedback and a moderate-to-long delay time can be used to simulate a reverb effect. The sense of ambient space is not as convincing as it is with reverb, but a delay line uses fewer CPU cycles, which may be helpful if you're trying to get the most out of a slower computer.

Filtering and Delay

Some delay lines have a lowpass filter in their feedback circuit. As the amount of filtering is increased, successive repeats of the delayed signal have fewer and fewer high overtones (see **Web Clip 1**). Less often, the filter in a delay may have a highpass mode, in which successive repetitions lose their lows, leaving only the most brittle high overtones.

High-end delay software, such as iZotope Spectron, lets you isolate various bands within the frequency spectrum using bandpass filters (see **Fig. 2**). Using this type of software enables you to give each band more or less delay and feedback, creating exotic shimmering or gargling tone colors.

Modulated Delay

Some delay lines allow the delay time to be modulated, (most often by an LFO), so that the delay time gradually increases and decreases. That has the effect of lowering and then raising the pitch of the delayed sound. If you turn the wet/dry knob to 100 percent wet to listen to only the delayed signal, a modulated delay will sound like vibrato. But when the wet and dry signals are mixed, a modulated delay introduces *flanging* or *chorusing* (see **Web Clip 2**).

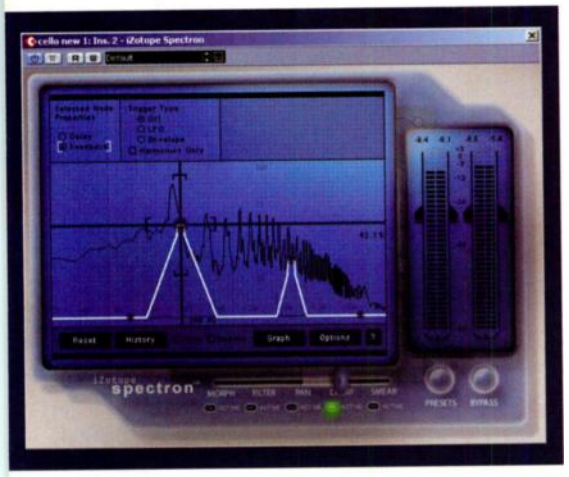

FIG. 2: Shown below is the frequency-based delay in iZotope Spectron. The black curve shows the frequency spectrum of the input signal, and the white peaks show areas where feedback is being applied.

In chorusing, two or more signals that are similar in most ways, but slightly different in pitch, are combined. The differences in pitch cause an acoustic phenomenon called *beating*. A dedicated chorus effect may have two or more modulated delay lines, each with its own LFO. Combining multiple delayed signals in that way creates a fat, acoustically active sound.

The main difference between flanging and chorusing is the width of the modulation. The modulation in flanging is very slight, so that the effect is heard mainly in the overtones as a sort of ringing or swooshing. In chorusing, it's deeper. Flangers often have only one delay line, not multiple delays, and they usually allow feedback. Chorus units generally don't produce feedback. But many delay units can produce either flanging or chorusing as needed, along with other delay effects.

CATCH A GROOVE

Many older delay lines, especially hardware units, can't be set to musically sensible time values such as quarter notes. Here's an easy formula for converting rhythmic values into milliseconds:

60,000 / bpm = ms per quarter note

If you divide the number 60,000 by the tempo in beats per minute, you'll get the number of milliseconds in a single quarter note. To get the correct ms value for an eighth note or other subdivision of the beat, simply divide or multiply the quarter-note value as needed.

Stereo Delay

Many delay effects offer separate processing for the left and right halves of a stereo signal. Stereo delays are most often used with long, synchronized delay times for creating dynamic and exciting stereo rhythmic effects. A stereo delay may offer three feedback controls: one for the right channel, one for the left channel, and another, called *cross-feedback*, that sends a portion of one channel's output into the other channel's input.

A *ping-pong* delay is a stereo delay effect in which the delayed signal with feedback appears alternately in the left and right channels, giving the impression that it's bouncing back and forth.

Multitap Delay

A delay effect that has two or more delay lines, each with its own parameters for delay time, output level, output panning, and feedback, is called a *multitap delay*. Many multitap delays have four or even more "taps" (outputs). By panning various outputs to different positions in the stereo field and giving each its own output level, it's possible to create striking rhythmic effects, such as syncopated rhythmic echoes that get louder and then softer.

Like other effects, delays can be overused. If you apply rhythmic delay to all of your tracks, the result will be a crowded, cluttered mix. But when judiciously applied, delay is a humble yet powerful effect that can do a lot to spice up your sonic palette. EM

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Jim Aikin writes, teaches, and plays music in Northern California. For more on his activities, visit him online at www.musicwords.net.

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Landing the Write Job

By Strother Bullins

Getting technical-writing work from manufacturers.

The idea of "useless knowledge" is inherently erroneous. I am a proud purveyor of "details of limited purpose," like the release dates of classic albums or the career histories of obscure rock musicians. I frequently use such music-oriented facts to write feature articles, turning data that some consider a waste of gray matter into paychecks. And there's certainly nothing useless about paychecks.

Many EM readers possess similar sources of knowledge that could serve more than a singular purpose. Being an expert user of Digidesign Pro Tools, for instance, is great if you're an engineer. But such knowledge could also be leveraged by writing plug-in and peripheral user's guides or product-oriented features for manufacturers. If you're a knowledgeable user of pro-audio technology and you have writing chops in addition to your musical ones, then authoring materials for music-product companies could be a perfect way to supplement your income.

Proving It

Getting started is the most difficult part of breaking into music-product tech writing. Because you will be asking a manufacturer to trust you to inform other end users about its products and how they operate, it's essential that you have hard proof of your expertise and your writing ability.

If you don't have writing samples, create some specifically to show your skills. Before you do, however, research the companies that you plan to contact.

"Know your target," says Greg Rule, editor for Roland Corporation, U.S., and a veteran pro-audio writer. "Study the company you're pitching to and familiarize yourself with its products, magazines, e-zines, newsletters, and Web sites. Nothing will turn an editor off faster than a pitch riddled with incorrect product names or redundant article suggestions."

Then, choose a piece of your own gear—a reverb unit or a plug-in, for example—and write a short tutorial about its use in a specific application. Keep it brief, informative, and interesting. "Reveal useful tips or techniques you've discovered," suggests Rule. "Talk about how you're using the product to improve your music."

Upon completion, ask a couple of musical peers to read your tutorial to ensure that it excels on a technical and a stylistic level. With product writing such as this, informational clarity is paramount. "Write from a musician's perspective," offers Rule. "Don't get too clinical."

Back to the Feature

Writing for music-product companies isn't always technical. You can often write in the style of features appearing in audio-related publications such as EM. Many manufacturers, especially those who have in-house public relations or marketing departments, generate articles about the way performing artists, engineers, and producers (who are usually product endorsers) use their products.

Authoring a sample article of this type is another good way to show off your skills to manufacturers. Because you lack a stable of product endorsers to write about, look to your network of musically creative counterparts for a feature subject. Most likely, you know a few "buzz-worthy" local musicians in the midst of recording projects or club tours, and surely some of them are using gear or instruments in creative and interesting ways.

In writing your article, be sure to include a short description of the artist's music and career, what he or she is currently up to, and the interesting way in which this musician is using a particular product. To stimulate your creative writer within, read through a few pro-audio magazines that regularly have artist features, paying attention to editorial structure and how product

"A Dozen Labels and Publishers Came To Our Showcase Because We Joined TAXI"

Crossfade – www.crossfadeonline.com

We stopped by TAXI's office to pose for this photo because we wanted to thank them for all the great things they've done for us.

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.

We had really high expectations when we joined. And we're happy to report that TAXI has exceeded all of them.

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.

The convention alone is worth much more than what we invested to become members.

Would we recommend that you join TAXI? Without hesitation. It's the best thing we've ever done for our career.

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mentions are dealt with. Then, formulate your article accordingly.

Make the Pitch

At this stage, your task is to prove your writing ability. Sending a well-crafted email or letter to a key contact in a firm's marketing department is a good way to start pitching your writing services. In your letter, enclose or attach writing samples along with an announcement of your availability, a description of your relevant musical background, and an explanation of why you are an ideal candidate to write about the company's products. After a day or two, follow up with a phone call reintroducing yourself, ask whether your note was received, and reiterate your eagerness to provide writing services for the firm.

"Submit your article alongside additional promo materials," explains Rule. "That can make a great first impression and can help distinguish you from other freelance writers—especially from nonmusician writers. It shows initiative on your part, as well as your product knowledge."

Showing Off

If cold-calling potential clients doesn't produce results, try getting up close and personal. The best connections are usually made while face to face, so if you live near a city where a music-products trade show is taking place, attend one for the purpose of promoting yourself. Shows such as those held by NAMM (www.namm.org), AES (www.aes.org), and NAB (www.nab.org) feature rows upon rows of manufacturer booths where products are showcased. Staffing the booths are those key contacts you've desperately been trying to reach via email and phone—all right there in the same building.

Although AES conventions are open to the public, NAMM and NAB conventions are not. For that reason, the latter-mentioned shows may be difficult to gain admission to. In those "closed-convention" scenarios, ask a friend who works for a pro-audio firm, a music store, a broadcast entity, and so on, for assistance in gaining show credentials.

Once you are at a convention, remember that manufacturers frequent these events to generate product interest and sales, not to find wannabe freelance writers. Be considerate of their time, and you'll make the best impression. Executed correctly, attending a show may help your emails and calls to be answered more promptly in the future.

Your First Gig

Continue to pitch your services until you receive your first writing gig, and then temporarily halt the pitching process. Now is the time to become knowledgeable about of your own writing speed, agility, and general workflow habits. As a fledgling writer, it is imperative that your first work be impeccable.

FIVE TIPS FOR GETTING WRITING GIGS

- Know your subject. You'll never get anywhere without a thorough knowledge of the topics (gear or artist related) you want to write about.
- Research by reading other articles and editorial material. Seeing how others have done it will help you do it right the first time.
- Build your portfolio. Write gear-instruction articles or artist-profile features to use as writing samples.
- Pitch your services via email, phone, and in person. Persistence and patience are key.
- Be professional, meticulous, and punctual. If you behave like a pro, you'll be treated like one.

An initial submission of your work often prompts valuable feedback from your clients; that may include requested revisions, compliments, and suggestions that can be valuable for your future as a music-products writer. You're now a general contractor, and you need to be the best you can. Avoid the problems associated with "bad" contractors: blowing deadlines, missing crucial details, and leaving clients with a post-job mess. "Just be confident that you've nailed it," concludes Rule. "Submitting a sloppy article can do more harm than good."

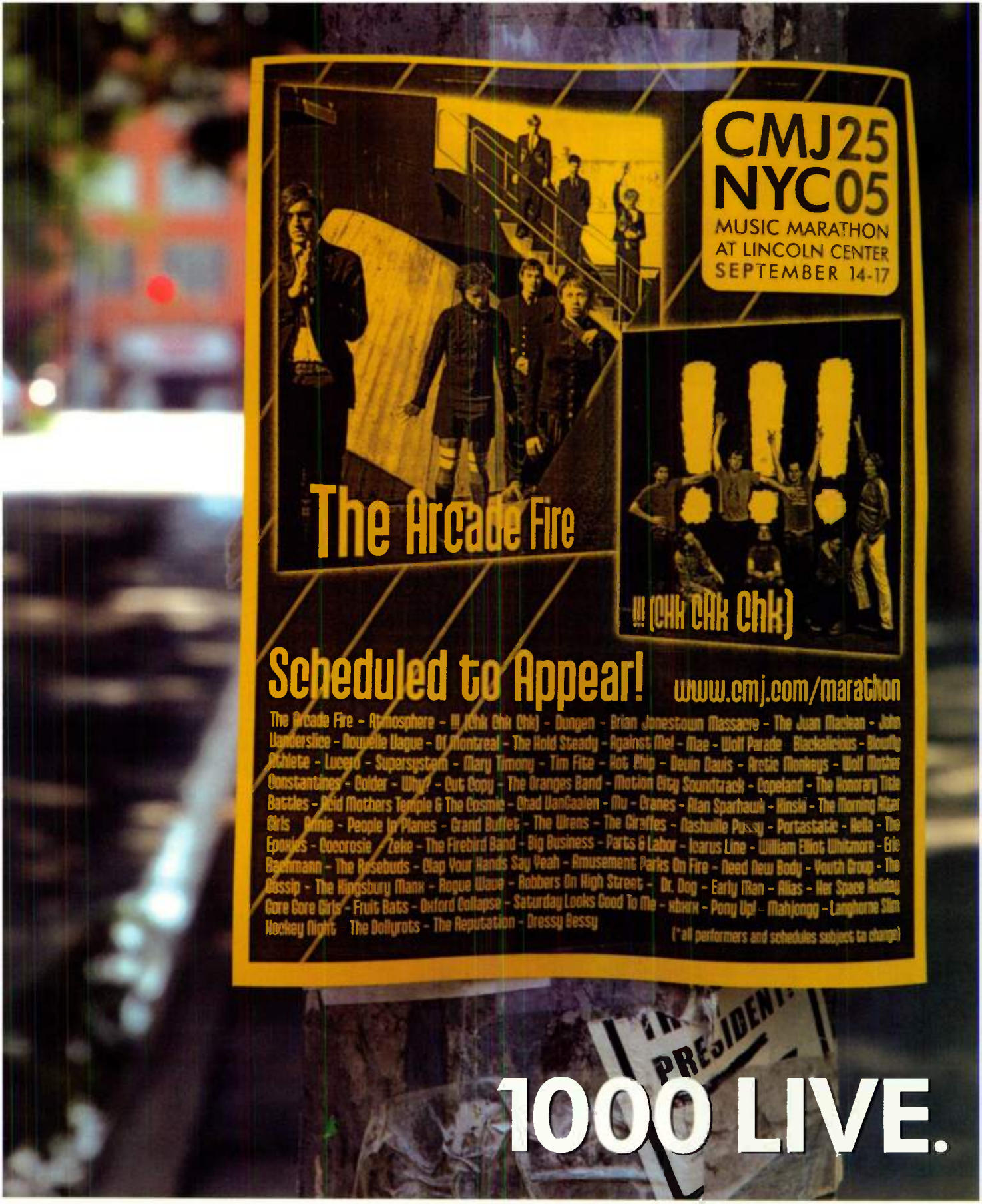
Write On

What are the downsides to writing for manufacturers? First, pay can be unpredictable—even low—especially in the beginning. Writer's compensation (often based on word count) varies from client to client and may be determined by your own level of writing and technological expertise. I've found, however, that most introductory writing jobs pay between 20¢ and 25¢ per word (or between $200 and $250 per 1,000 words).

Second, just like most other jobs, you're paid to do what you're told. If you want to become a first-call freelance writer, give your clients a heap of convincing music-product information served with a carefully measured dose of style. You're not being paid to put quill to parchment and craft ambitious Shakespearean prose. If you can live with those limitations, writing for manufacturers can be a sweet gig, since few other employment opportunities allow you to spend an afternoon monkeying with the microphone placement on a 4×12 guitar cabinet.

So with valuable music-product knowledge inside your head just waiting to be shared with others, take a stab at writing to make it even more useful to you. Besides, knowledge is only useless if unused. EM

Strother Bullins is a North Carolina–based musician and freelance writer specializing in the professional-audio, music, and entertainment industries.



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GENELEC 8030A

A quality monitor for tight spaces.

By Rusty Cutchin

In 2004, Genelec launched its 8000 MDE Series, a line of midprice powered monitors designed to complement the company's 7000-series subwoofers and to form stereo and surround systems that work in any type of mixing environment. The MDE (minimum defraction enclosure) monitors are characterized by strong aluminum casings that have large internal volumes and curved exterior edges. Each 8000 MDE Series monitor comes with Genelec's Iso-Pod (isolation-positioner decoupler), which is a mounting stand that allows the speaker to be positioned vertically or horizontally. It also insulates the cabinet from the surface on which it sits.

Until recently, the 8030A was the baby of the family, with its 5-inch woofer and ¾-inch metal-dome tweeter (see Fig. 1). The newer 8020A has a 4-inch woofer. The 8030A drivers are powered by 40W amplifiers that can generate 105 dB (peak) SPL in a close-field environment. The unit's compact low-frequency driver extends to 58 Hz. Studio owners who are working on hip-hop and other styles that have a bone-crushing bottom may want to beef up their system with Genelec's 7050B (stereo) or 7060A (surround) subwoofer, which gives you a frequency response extending to 25 Hz.

FIG. 1: The Genelec 8030A can be positioned with the aid of a unique insulating stand called the Iso-Pod, which can be adjusted forward or backward to change the speaker's angle.

Even without the subwoofer, however, the 8030A is a great match for studios that have limited space and that cater to sound-design, voice-over, or editing work—when accuracy and first-rate imaging are required. Genelec has infused the 8030A with the better quality that is generally found in the company's higher-end monitors.

Breaking the Mold

The 8030A's looks differ from Genelec's traditional designs. Its rounded corners, molded front and rear sections, and sturdy metal grille covering both drivers give the monitor the look of a speaker designed for heavy-duty (even exterior) sound-reinforcement work. But some obvious features signal that the unit is designed for studio use.

Genelec wisely placed the unit's volume pot, power indicator, and power switch on the front panel. The pot is positioned a bit too low, and its ultrathin lip is hard to grasp if you have a large thumb and index

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finger. You can, however, easily move the pot back and forth using one finger. The rounded power toggle switch is simple to press, and the LED is large and prominent. The rest of the front panel is vacant except for the concave woofer grille, the tweeter grille, and the wave guide, which allows for smooth on- and off-axis response.

The rear panel (see Fig. 2) hosts the high-quality (if somewhat limited) features that are typical of Genelec monitors. A recessed cavity at the bottom of the monitor allows for upward insertion of a power cord and balanced XLR cables (a female jack for main input and a male jack for output to additional monitors or to a satellite and subwoofer system). As many as six 8030As can be connected together. The 8030A's volume pot controls the level at the XLR output, so the first monitor in the chain gives you a master volume control for the entire system if you keep all the other pots turned fully clockwise.

Above the connector section is a small recessed area containing four DIP switches that you can use for bass rolloff or subtle EQ adjustments (what Genelec calls tilts) to make the monitor match your room. The first switch (Treble Tilt) attenuates the response above 5 kHz by 2 dB. The second switch activates an 85 Hz highpass filter for use with subwoofers. The third and fourth switches are used singly or in combination to engage three degrees of bass attenuation: –2, –4, or –6 dB. Those may be helpful when the monitors are placed close to walls or corners that generate bass buildup.

At the top of the monitor's rear section is a reflex port created from a long, curved tube that ends in a wide flare, giving you improved bass articulation. A number of strategically placed mounting holes allow for bottom or side positioning of the novel Iso-Pod, wall or ceiling mounting with brackets, or standard mic-stand mounting.

FIG. 2: The 8030A's rear panel hosts a recessed I/O section and a small cavity that contains DIP switches for the monitor's bass rolloff and EQ features.

Iso-Podded

I was eager to hook up the 8030As to see if they would be a logical replacement for my older powered monitors. The 8030As fit better on my workstation desk and in the control room that I use than my main speakers do.

In getting a pair of Genelecs at this price, I expected that there would be some trade-offs, and they became apparent during setup. The lack of balanced TRS inputs meant that I had to drive the 8030As from my FireWire-equipped mixer using XLR outs instead of from my high-quality USB interface. The recessed DIP switches were inconvenient—most new powered monitors have slider switches for those functions. (I happened to have a stereo miniplug headphone adapter nearby, which turned out to be a perfect DIP-switch tool.)

The Iso-Pod works like a computer-monitor stand, except that you can't easily slide the speaker back and forth because of the friction necessitated by the rubberlike padding. It's easier to turn the monitor on its side and slide the pod into a new position. That requires some trial and error to find the optimum angle, especially when the monitor is mounted vertically. When positioned fully forward, the Iso-Pod gives the 8030A an approximately 30-degree downward angle; when slid all the way back, the upward angle is about 10 degrees. If you put your monitors on a surface that's slightly below ear level (such as the riser on my workstation desk), you may need an additional prop to point the 8030A directly at the sweet spot. The Iso-Pod gives you more flexibility when the monitor is positioned above ear level.

Packing a Punch

I liked the sound coming from the 8030As. I tested the monitors on a variety of material, including CDs by Shania Twain, the Black-Eyed Peas, and Herbie Hancock. The 8030As offered crystal-clear highs, excellent definition and transient response, and superb imaging. The isolation and interplay between contrasting elements, such as bass guitar and stereo reverbs, was consistently distinct. The Genelecs gave new life to CDs that I thought held no more surprises. The 8030As sounded as good as I've ever heard for monitors of their size.

I did conclude, however, that the Genelec subwoofer is a required component. Although I could mix bass elements on the 8030A that would sound fine on systems with enhanced low frequencies, the

PRODUCT SUMMARY

GENELEC 8030A

powered close-field monitor
$685 each

OVERALL RATING (1 THROUGH 5): 4

PROS: Excellent sound. Superb imaging and transient response. Compact size. Front-mounted volume pot, power switch, and power indicator. Adjustable stand.

CONS: DIP switches for rolloff and EQ features. XLR connections only.

MANUFACTURER
Genelec
www.genelec.com

8030A SPECIFICATIONS

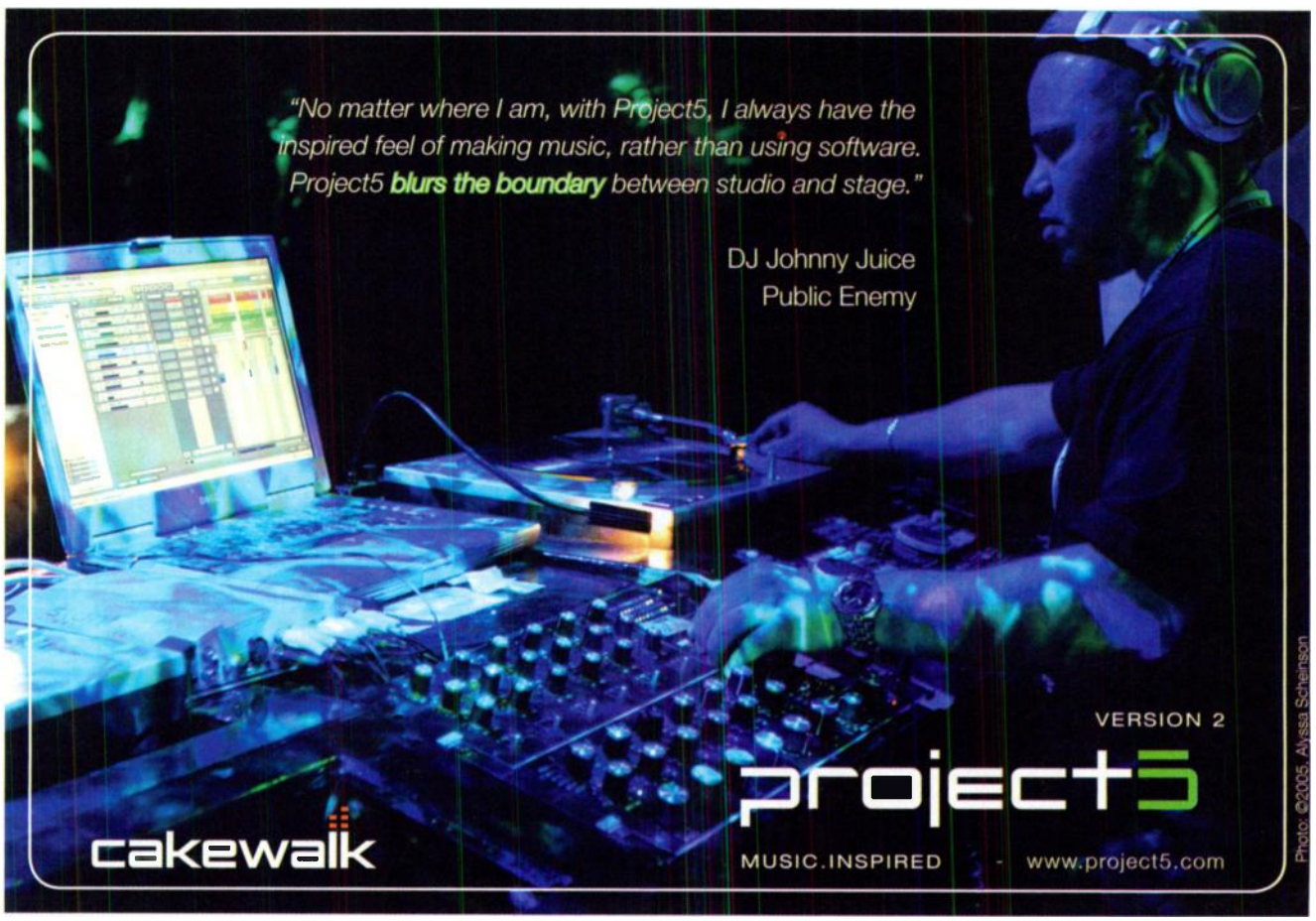
Analog Inputs	(1) balanced XLR
Analog Outputs	(1) balanced XLR
Peak Output SPL	108 dB SPL
Woofer	5"
Tweeter	¾" metal dome
Crossover Frequency	3 kHz
Frequency Response (free field)	58 Hz–20 kHz (±2 dB)
Power Output RMS (woofer/tweeter)	40W/40W
Dimensions	7.4" (W) × 11.8" (H) × 7.6" (D)
Weight	12.3 lbs.

monitors didn't give me the rich low end that I need for working with various music styles. I wouldn't use the 8030As for hip-hop or dance music. I tested the 8030As on my own mix of a jazz-rock instrumental that has a tightly constructed bass-synth and bass-guitar arrangement. I loved the definition that the 8030As gave me, but I didn't like the subdued bottom.

Flexible and Expandable

The 8030A is one component in a product line that has something for everyone in a wide range of prices. If you need to mix in a tight space and don't need to hear deep-bass frequencies, the 8030A, with its superb definition and imaging, is an excellent choice. If you know that a 2.1 or a 5.1 system is right for your room, the 8030A can be an excellent foundation. (You can also save a few bucks by selecting the smaller 8020A along with your chosen subwoofer.) If you need deep bass but don't want to go with a subwoofer, Genelec also offers the larger 8040A and 8050A. And if you've been a fan of Genelec's high-end monitors, as I have been for years, you will love the price and the performance ratio of the 8030A.

Rusty Cutchin is an associate editor of EM. He can be contacted at rcutchin@comcast.net.



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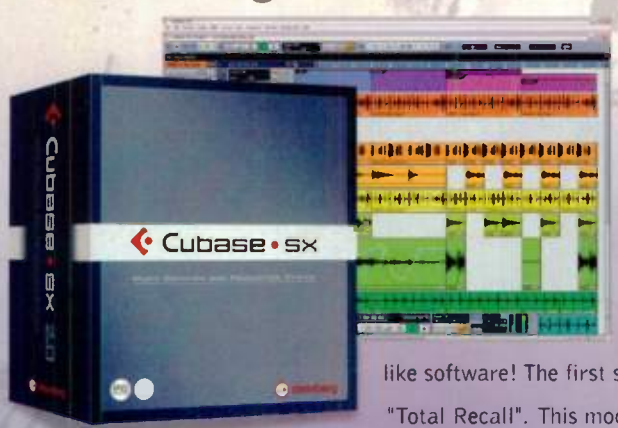

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audio-technica AT4040

A marriage of technical precision and artistic inspiration, the AT4040 microphone features an advanced large diaphragm, tensioned specifically to provide smooth, natural sonic characteristics. Designed as a multipurpose performer, this externally polarized true condenser microphone offers exceptionally low noise, wide dynamic range and high-SPL capability. Held to the highest standards of consistency and reliability, the AT4040 may be used with confidence in a wide variety of miking applications in today's modern digital studio.

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FIG. 1: Soundtrack Pro's Multitrack and Waveform editors share the same Project window. Individual projects are accessed using the tabs along the top.

APPLE COMPUTER Soundtrack Pro 1.0 (Mac)

Soundtrack Pro raises the bar for sound design and audio repair.

By Len Sasso

Soundtrack Pro is the sound-design and multitrack-audio-editing component of Apple's comprehensive video-production environment called Final Cut Studio. Soundtrack Pro, also available as a standalone product, is an outstanding sound-design and audio-repair tool that sports a huge library of accompanying sounds.

The program has been completely redesigned, although it shares the name and a number of features with its predecessor, Soundtrack 1.1, which was covered in the February 2004 issue of EM. In this review, I will focus on its new features, such as its Waveform editor, its expanded complement of plug-ins, and its audio library.

What It Is and Isn't

Soundtrack Pro is designed for post-production audio, with an emphasis on arranging and mixing audio to picture. Although its Multitrack editor incorporates many of the features of other digital audio workstations, it is not a substitute for a standalone DAW. For example, there is no MIDI support, scoring capability, or hosting of virtual instruments; Apple's Logic Pro 7 contains those features.

You can, however, use GarageBand ($79 and free with new Macs) to achieve a certain degree of virtual-instrument support by creating Apple Loops from virtual-instrument tracks. GarageBand hosts Audio Units (AU) plug-ins; provides MIDI recording, editing, and basic scoring; and will render software-instrument format Apple Loops using the original instrument. The latter allows you to time-stretch and pitch-shift without the artifacts associated with audio files, and then render the result as a new Apple Loop for use in Soundtrack Pro (see **Web Clip 1**).

Soundtrack Pro's malleable, nondestructive DSP management sets it far ahead of the pack.

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Soundtrack Pro's Waveform editor covers most audio-editing tasks for individual audio files. You might still want a standalone audio editor for robust region management, playlists, and the ability to burn CDs. But Soundtrack Pro's malleable, nondestructive DSP management sets it far ahead of the pack.

The combined features of the Multitrack and Waveform editors, along with their tight integration, are a sound designer's dream. Add the flexible handling of Apple Loops, the inclusion of the Apple Loops Utility for creating Apple Loops from standard audio files, and the huge Apple Loops library, and you have a standalone product whose usefulness extends well beyond post-production and sound for picture.

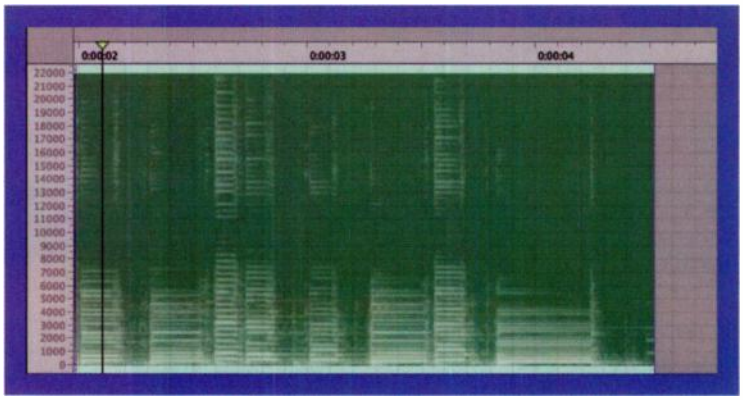

FIG. 3: The Waveform editor's Spectral display shows the frequency spectrum of the audio file over time. Here, a parametric EQ has been used to take out a swatch around 10 kHz.

Get the Picture

Soundtrack Pro's user interface includes two main windows, Inspector-Browser and Project editor, with a multitrack Mixer window thrown in for good measure. Multitracking and audio-file-editing projects share the Projects window and many of the same controls. Individual projects are accessed by clicking on tabs at the top of the Projects window (see **Fig. 1**).

You can use Soundtrack Pro strictly as a stereo audio-file editor, opening one or more audio-file projects to work on in the Waveform editor. But if you want to take advantage of Soundtrack Pro's multitracking capabilities and their integration with the Waveform editor, it's easiest to start with a blank multitrack project (the default behavior) and add audio files to it before working on them in the Waveform editor. Otherwise, you need to save a file from the Waveform editor before it can be available to a multitrack project.

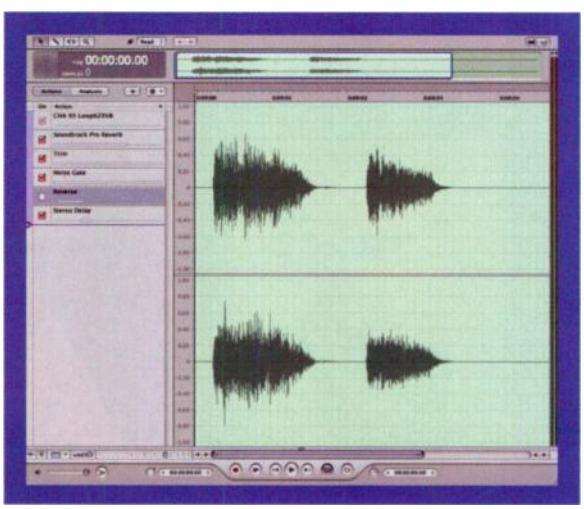

FIG. 2: Waveform editor's Actions list along the left allows you to mute and reorder the processes until you have what you want.

Over the Waves

Soundtrack Pro's new Waveform editor has a Photoshop-style layered architecture, and combines tools and processes typically found in audio editors (along with some atypical ones). You can add, remove, bypass, and reorder processing nondestructively until you are satisfied, and then print the result to the same or to a new audio file.

Soundtrack Pro's layers, called Actions, surpass having just an undo-redo history (see **Fig 2**). Reordering, for example, is a simple matter of moving Actions around by clicking-and-dragging, whereas in an undo-redo environment you need to undo all intermediate processes, and then redo them in the desired order. Furthermore, Actions can be temporarily bypassed rather than undone.

For example, you can start with EQ followed by compression, but then reverse their order to decide which way works best. You can insert two similar plug-ins (or two copies of the same one with different settings), and then use the A/B Last Two Actions key command to compare them on the fly. You can make a copy of the original file, add reverb, add other processing to a 100 percent wet mix, and finally, track the dry and wet files separately in the Multitrack editor (see **Web Clip 2**).

No Last Chance

Another advantage of Action layers is that Waveform editor projects can be saved with their Actions intact, and you can therefore take up where you left off when you reopen them later. They can also be saved as standard audio files, which requires making the Action sequence permanent (called *flattening*). Of course, you can save a flattened copy, preserving the original project for future editing.

In a nice touch, you can save Action sequences as AppleScript droplets for drag-and-drop batch processing. (You can also invoke saved scripts from Soundtrack

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Pro's Scripts menu.) Saving an Action sequence as a droplet involves a simple save operation from within Soundtrack Pro. Action droplet settings can also be edited directly in the AppleScript Script editor, which can save time in making minor changes to batch processes.

Sound Surfing

Soundtrack Pro's DSP processing falls into four categories: manual editing, fixed processes, analysis-based processes, and real-time effects. The Sample Edit and Time Stretch manual editing tools allow you to edit individual samples and time-stretch segments of an audio file. Each action with either tool produces an entry in the Actions list for easy undoing.

The fixed processes, accessed from the Process menu, include the usual suspects—fade, normalize, invert, reverse, convert to mono or stereo, and resample—along with some handy unusual effects such as add or replace with ambient noise; insert silence, noise, or a fixed waveform; and noise-print-based noise reduction. Most of the fixed effects can be applied to selections or the whole audio file, and in all cases, an entry is created in the Actions list.

Analyze This

Analysis-based processes start by analyzing the audio file for common anomalies including clicks and pops, power-line hum (50 and 60 Hz), DC offset, phase problems, and clipping. There's also a silence analyzer, which locates portions of the audio file below a given threshold. Analysis results in a list of found problems, which you can fix individually or as a group. Fixing creates entries in the Actions list for further manipulation.

In addition to the standard waveform display, the Waveform editor offers a spectral view, which shows the audio file's changing harmonic content over time (see **Fig. 3**). Like the waveform display, the spectral display is interactive, showing the effect of all processing as it is applied. That's very useful when working with frequency-based effects such as EQ because you can see exactly what's happening to the sound's frequency spectrum as you edit.

PRODUCT SUMMARY

APPLE COMPUTER Soundtrack Pro 1.0

multitrack audio-editing software
$299
upgrade $99
OVERALL RATING [1 THROUGH 5]: **4**

PROS: Photoshop-like nondestructive effects layering. Tight integration of Multitrack and Waveform editors. Eight gigabyte Apple Loops library. Includes most Logic Pro 7 plug-in effects. Includes Apple Loops Utility for creating Apple Loops from standard audio files.

CONS: Awkward region management. Can't turn scrolling off. Supports only Mackie Control–compatible control surfaces for remote automation.

MANUFACTURER
Apple Computer, Inc.
www.apple.com

A Plug for the Plugs

Soundtrack's complement of plug-ins has been expanded to include most of Logic Pro 7's effects plug-ins. These 47 top-quality plug-ins have a wide variety of EQ, dynamics, distortion, modulation, and reverb effects, and some interesting special effects. Standouts are the convolution reverb Sound Designer, the formant- and pitch-shifting Vocal Transformer, the frequency-shifting and ring-modulating Ringshifter, and the Matching EQ. In addition, Soundtrack Pro hosts Audio Units effects plug-ins. Plug-ins can be used in both the Multitrack and Waveform editors.

Plug-ins can be applied in two ways in the Waveform editor: they can be inserted directly as Actions, and they can be inserted as real-time effects. As direct Actions, they are applied to the current selection or whole audio file. As real-time effects, their parameters can be automated on the Waveform editor's timeline using automation envelopes. In the latter case, once automation envelopes are set up, you can convert the processing from real time into an Action that incorporates the automation. Furthermore, you can later edit the Action to alter the automation envelopes.

Sound Ideas

Apple has added 3.75 GB of content to Soundtrack's original 4 GB library. The original content, divided into sounds from Swedish producer PowerFX (www.PowerFX.com) and sounds from a variety of musicians working at Apple, has looping and one-shot files in a variety of genres. The new content, contained in the SoundIdeas folder, consists primarily of sound effects, further enhancing Soundtrack Pro's scoring-for-picture capabilities.

The sound-effects library has 1,000 clips ranging from natural sounds (ambiences, animals, people) and special effects (Foley, crashes, mechanical) to a variety of musical and cartoon sounds. Some sci-fi and weapons sounds are thrown in for good measure. Whether or not you're working to picture, you'll find plenty of fodder here to liven your audio tracks.

Integration

Opening clips in the Waveform editor that you've already opened in the Multitrack editor is as simple as double-clicking. If the clip is part of a larger audio file, its boundaries are automatically delimited by Waveform editor markers (although those markers can't be changed or deleted).

Going the other way isn't as simple. If you open and edit a file directly in the Waveform editor, you must save it to disk, and then manually drag it into the Multitrack editor or into its bin of available audio files. Once you get

used to adding files to the bin and opening them in the Waveform editor from there, it's no big deal. It would be nice, however, to be able to share the bin between the two editors.

My only other quibbles with the Waveform editor are that there is no region management, and you can't turn scrolling off. The former can be worked around using markers and the handy Create New File From Current Selection key command. That's less convenient, though, than being able to create regions that you can immediately access as clips in the Multitrack editor. Scrolling during playback (which can't be turned off in the Multitrack editor, either) makes it impossible to edit at a high zoom while listening to a larger selection—an ability that is necessary for fine-tuning loop boundaries, for example.

For the Musician

Soundtrack Pro has a great deal to offer the musician. The Waveform editor is the only one I know of that has a Photoshop-like layered architecture. That alone is worth the price of admission. Being able to freely juggle and toggle fixed and real-time effects along with their automation, and to create batch-processing droplets from effects chains is a sound designer's dream.

The Multitrack editor offers a fast and easy environment for multitrack sound design and audio-only composing. Soundtrack Pro supports control surfaces for automation that use the Mackie Control protocol. It would be nice if generic MIDI control surfaces were also supported, but aside from that there is very little missing. It won't replace your DAW, but it's not meant to.

The huge library of Apple Loops, and especially the newly added sound-effects collection is another big bonus. It offers something for every taste and is a welcome alternative to the dance-oriented loop collections that generally accompany audio applications. In short, regardless of whether you work to picture, there are many good reasons to give Soundtrack Pro a listen. EM WEB CLIPS

Len Sasso is an associate editor of EM. He can be contacted through his Web site at www.swiftkick.com.

FIG. 1: The Mackie Onyx 800R is a fully featured and transparent-sounding 8-channel mic pre and A/D converter.

MACKIE Onyx 800R

A value-packed, 8-channel mic preamp and A/D converter.

By Orren Merton

Mackie has refined its preamp technology for each successive generation of mixers that it's produced. True to form, the preamps found in its new Onyx series of mixers have supplanted the well-respected VLZs as the preamps of choice in Mackie products. According to Mackie, the Onyx preamps are designed specifically for transparent tracking to a DAW, a PDS, or an HDR system.

Considering its confidence in the Onyx preamps, it's not surprising that Mackie has put eight of them—along with 24-bit, 192 kHz A/D converters—into the Onyx 800R, a unit designed as a front end for a digital recording system.

Mother Lode of Options

Like other Mackie products, the Onyx 800R has an amazing amount of connectivity and features. You get eight channels of Onyx microphone preamps that offer a gain range of 60 dB (–20 dBu to 40 dB for the balanced line-level inputs, or 0 dB to 60 dB for the XLR inputs). You can access those preamps through the eight XLR inputs on the rear of the 800R. Channels 7 and 8 have a high-impedance instrument input for direct recording.

Unlike some competing units, there are no line-level ¼-inch input jacks on the 800R. The inputs are instead on a DB25 (25-pin) connector on the rear panel, into which you can plug a breakout cable (not provided). Two other DB25 ports are included: one for analog line outputs and the other for AES/EBU or S/PDIF output.

All eight channels are not identical, but they do share a number of features. Each has a large metal knob that gives you continuous adjustment of preamp gain (see Fig. 1). The individual channels can also be switched between the mic- and line-level inputs. A phase button allows users to reverse the polarity of the signal. A low-cut switch activates an 18 dB/octave highpass filter that cuts off frequencies below 75 Hz.

Each channel is equipped with a phantom-power button that, when pressed, activates a green LED status light. Finally, three LEDs run across the top of every channel to indicate signal-strength levels of –20 dBu, 0 dB, and overload. I wish Mackie had provided a more extensive metering setup; even the narrowest channels look as though they could have accommodated six LEDs across.

Channeling the Onyx

Channels 1 and 2 have a couple of features rarely found in multichannel mic preamps in this price range. The 800R has a built-in M-S (middle-side) decoder. M-S recording is a stereo-miking technique that uses one mic with a cardioid pattern and another with a figure-8 pattern to capture a 3-D stereo field (see the sidebar "M-S Recording and the Onyx 800R"). The 800R uses channel 1 for the cardioid (mid) signal and channel 2 for the figure-8 (side) signal. To facilitate using the

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800R with vintage and other high-quality microphones, channels 1 and 2 have a mic-impedance switch with four selections: 300Ω, 500Ω, 1,300Ω, and 2,400Ω.

On channels 7 and 8, you get a ¼-inch, unbalanced, high-impedance instrument input in addition to the XLR mic input. There is also a button to select which input type is active.

Rounding out the front panel is a power button, a sampling-rate select knob for the digital output, and a button for bit depth. The Sample Rate knob lets you choose from seven sampling rates between 32 kHz and 192 kHz or from External sync using BNC word-clock input. Unless you want to use the Onyx 800R as your digital-clock master, you'll need to use the BNC word-clock option. The Bit Depth button selects either 16-bit (with dither) or 24-bit settings. LEDs indicate sampling-rate lock and bit-depth setting.

Lightpipe and More

The rear panel of the 800R houses the unit's input and output connectors (see **Fig. 2**). To the right of the eight XLR mic inputs is the Mid/Side Decode button and two DB25 connectors for balanced line-level inputs and outputs.

The 800R has two ADAT Lightpipe digital outputs. Both of them output the signal from channels 1 through 8 if the sampling rate is 48 kHz or less. If you select a sampling rate of 88.2 kHz or 96 kHz, channels 1 through 4 are transmitted through the first ADAT output, and channels 5 through 8 are transmitted through the second ADAT output (using the S/MUX II protocol).

If you select a sampling rate of 179.4 kHz or 192 kHz, channels 1 and 2 are transmitted through the first ADAT output, and channels 3 and 4 are transmitted through the second ADAT output (using the S/MUX IV protocol). If you are connecting the 800R to an audio interface through the ADAT outputs, and you're using sampling rates higher than 48 kHz, make sure that your interface is compatible with the S/MUX protocols.

The external word-clock input and a termination button are also located on the 800R's rear panel. If the 800R is the last digital device receiving word clock, make sure to terminate the signal. There are buttons on the DB25 connector for AES/EBU and S/PDIF digital output to select between 110Ω or 75Ω signals, professional

ONYX 800R SPECIFICATIONS

Analog Inputs	(8) balanced XLR mics, (2) ¼" TRS high-impedance instruments, (8) balanced line-level inputs (on DB25 connector)
Analog Outputs	(8) balanced line-level outputs (on DB25 connector)
Digital Outputs	(8) channels ADAT, S/MUX II/IV on Toslink optical connectors, (8) channels AES/EBU or S/PDIF on a DB25 connector
Digital Sync	(1) BNC connector for external word-clock input
Frequency Response	mic input to line output (gain @ unity): +0/-0.1 dB, 20 Hz–30 kHz; mic input to digital output (AES, 192 kHz sampling rate): +0/–0.2 dB, 20 Hz–85 kHz
Distortion (THD + N)	mic input to line output: < .0007%, 20 Hz–20 kHz, 1 kHz input at +4 dBu, preamp @ unity gain; mic input to digital output (AES, 48 kHz sampling rate): < .004%, 10mV RMS input
Dynamic Range	mic input to line output: >123 dB; mic input through A/D converters: >113 dB
Signal-to-Noise	> 103 dB (A-weighted, ref. +4 dBu, mic in to line out, gain @ unity)
Crosstalk	< –100 dB (@1 kHz, +10 dBu signal on adjacent input)
Input Gain	mic in: 0 dB–+60 dB line in: –20 dB–+40 dB
Phantom Power	+48V
Dimensions	19" (W) × 1.75" (H) × 14.4" (D)
Weight	10.6 lbs.

FIG. 2: The rear panel is where you find the XLR mic inputs, the analog line inputs and outputs (on DB25 connectors), and the various digital outputs.

M-S RECORDING AND THE 800R

M-S (middle-side) recording is a technique involving stereo recording with coincident-pair microphones. This type of technique uses a pair of closely positioned microphones that are oriented in a specific way in order to capture the true stereo field.

M-S uses the unidirectional characteristics of a cardioid microphone that is pointed straight at the sound source, and the bidirectional characteristics of a figure-8 microphone that is placed next to the cardioid microphone and perpendicular to the sound source. Combined, these two techniques capture a side-to-side and front-to-back stereo image (see Fig. A).

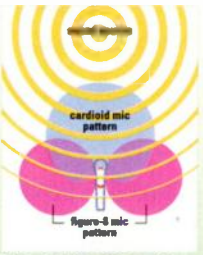

FIG. A: With M-S miking, a directional mic is used to pick up the middle of the stereo image, and a figure-8 mic is used for the sides.

Since the raw tracks are not standard "right-side/left-side" stereo tracks, the image needs to be decoded using sum-and-difference matrix so that the listener hears a normal stereo image. You can adjust the depth of the stereo field by adjusting the gain of channels 1 and 2. You can then record the output of channels 1 and 2 into a stereo track on your DAW, MDM, or HDR, and you will get a stereo image that will play back normally on any monitor system.

AES/EBU or consumer S/PDIF operation, and dual- or single-wire format. Additionally, there is an input for the power cable. The unit automatically adjusts for any VAC between 100V and 240V.

Overall, the unit has a solid feel to it. It's heavy, none of the buttons or knobs feel loose, and the jacks are securely anchored to the chassis. All the channel buttons have their functions silk-screened onto them for easy identification. Other than the minimal metering, the 800R is a superbly designed device.

Sonic Onyx

The real test, of course, is how the Onyx 800R sounds. My initial impression was that its preamps sounded full bodied, transparent, and noise free, even at the highest levels of gain. They sounded as though they had been designed to avoid coloring the signal, rather than sounding like "character" preamps. The high-pass filter seemed very effective, limiting the low-end rumble of the source material without otherwise coloring the signal.

I compared the Onyx 800R to the mic preamps of the RME Fireface 800, which are the same preamps from RME's OctaMic D. The OctaMic D has features that are similar to the Onyx 800R; it offers almost identical amounts of gain, and it retails for $200 more.

The preamps of the RME units sound quiet, transparent, and usable in almost every situation except for powering ribbon mics (there's not enough gain). I compared the Onyx and Fireface preamps by recording acoustic guitar, electric guitar, and vocal sources through dynamic, condenser, and ribbon mics. I also compared electric guitar DI signals. I tested the Onyx 800R as word-clock master and as word-clock slave.

The Onyx 800R and the Fireface 800 preamps were almost identical—so much so that I used Apple Logic Pro's Match EQ to learn the EQ footprint of each for comparison. The results were almost completely flat across all the sources and instruments tested.

Like the RME units, the preamps in the Onyx 800R did not provide enough gain for a ribbon mic that was close-miking an acoustic source. Adjusting the Onyx 800R's mic impedance switch helped to match the unit to the source mic, but not quite enough for that application. To its credit, however, even at maximum gain, the 800R was still silent. The Onyx 800R sounded the same to me when it was used as a word-clock master as it did when used as a word-clock slave.

Gem of a Unit

Overall, I was impressed with the Onyx 800R. It has eight full-bodied, usable, and transparent preamps, and a host of very desirable features at a great value (less than $160 per channel). It also easily integrates into any recording setup.

The 800R comes with an excellent printed manual, which is a rare thing these days. Anyone looking for a well-featured front end for a DAW system or other multitrack should give this unit serious consideration.

Orren Merton is the author of Logic Pro 7 Power! *(Muska & Lipman, 2004) and* Logic 7 Ignite! *(Muska & Lipman, 2005).*

PRODUCT SUMMARY

MACKIE Onyx 800R

8-channel mic preamp and A/D converter
$1,279

OVERALL RATING [1 THROUGH 5]: **4**

PROS: Good sound. Good value. A wide range of digital connectivity. Variable mic impedance for two of the channels. Individual phantom-power switches for each channel. Two channels with high-impedance instrument inputs. M-S support.

CONS: Limited metering. Not enough gain for ribbon mics. Must purchase third-party breakout cables to access ¼-inch line-level I/O and AES/EBU and S/PDIF digital outputs.

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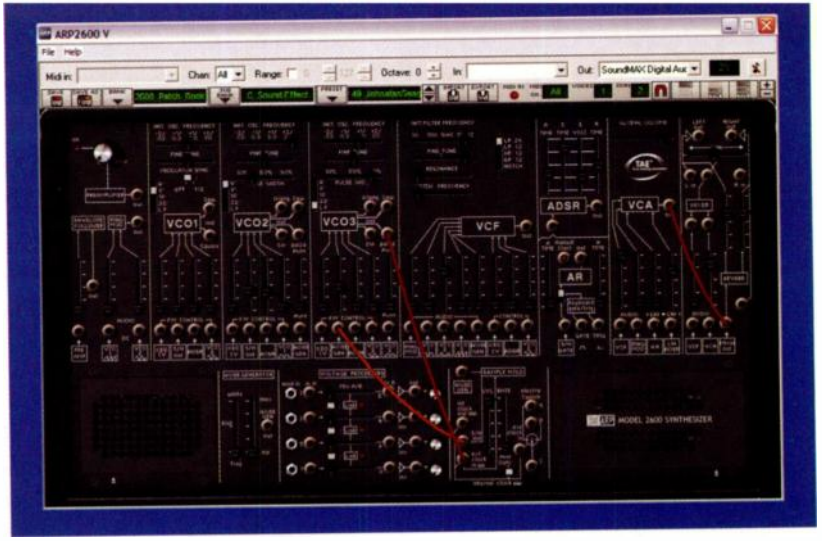

FIG. 1: Like its other classic synth emulations, Arturia's ARP 2600 V adds modern conveniences such as MIDI, polyphony, and effects.

ARTURIA ARP 2600 V 1.0 (Mac/Win)

Virtual vintage synth with an old-school sequencer.

By Brian Smithers

The ARP 2600 V from Arturia is a cross-platform software emulation of the vintage ARP 2600 monosynth (see **Fig. 1**). ARP 2600 V works as a standalone program and as a VST, a DirectX, an RTAS, an HTDM, or an Audio Units plug-in within appropriate hosts. It models the original ARP 2600 in every way possible and includes emulations of the model 1601 sequencer and the model 3620 keyboard.

The original ARP 2600 was a direct competitor to the Minimoog. Like its rival, it served up searing leads, thundering basses, and all manner of special effects. Its design was semimodular, with prewired connections that enabled it to create a variety of sounds without patch cables. To create more complex sounds, you could use patch cables to redirect any output to any input in the style of a modular synth.

ARP 2600 V runs on Mac OS X 10.2 and above, and on Windows 98SE, 2000, and XP. It requires at minimum a 1 GHz processor and 256 MB of RAM. I tested ARP 2600 V in standalone mode running on the Open Labs neKo 64 2 GHz dual-Opteron workstation, and as a DXi plug-in within Sonar 4 on a Toshiba Tecra 2 GHz Centrino notebook. ARP 2600 V behaved well on both.

Looks Like One

As with its other virtual vintage synths, Arturia has modeled ARP 2600 V's user interface on that of the original. I sometimes wish that soft-synth manufacturers would be more imaginative than emulative in creating their user interfaces (as in the case of Arturia's CS-80 V, which is difficult to read). Fortunately, the 2600 V's interface is functional and legible. The ability to trace the virtual patch cables makes the emulated interface a particularly good idea, especially in an educational setting. As on the original 2600, all of the normaled connections are labeled. Clicking-and-dragging from any output to any valid input creates a patch cable to illustrate the connection.

When you click on an output connector using your right mouse button (Shift + click on a Mac), a pop-up Connect menu displays a list of all valid patch destinations.

> Arturia has done an excellent job of capturing the character of the classic 2600.

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Right-clicking on a connector also lets you remove a connection. You can drag a connection from one destination to another; unfortunately, the same is not true of a source. If you change your mind about the source, you must remove the connection and start a new one from the preferred source—a minor annoyance in an otherwise well-thought-out implementation.

Holding down the Control button while clicking on one of the many sliders (virtual potentiometers) allows you to assign a MIDI Control Change message to automate that slider's parameter, either by typing the value or by using a Learn mode that detects the controller number when you move a physical MIDI control. Such controller assignments are global, rather than patch-specific.

FIG. 3: The tracking generator lets you draw as many as four independent curves to use as modulation sources within 2600 V's architecture.

For finer control over any slider, right-click (Shift + click on a Mac) on a slider and drag. A 2600 has only a handful of knobs, and in typical Arturia fashion, you can set a preference to operate them in either Linear or Circular mode. Linear operation is usually simpler, but Circular mode has a built-in graded resolution—dragging in a larger circle yields inherently finer resolution than a smaller circle because of the greater number of pixels involved.

FIG. 2: ARP 2600 V includes software versions of the classic ARP sequencer and keyboard. When all three sections are shown, the window is too tall for most displays, but you can scroll it by dragging any noncontrol area of the window.

With the sequencer, synthesizer, and keyboard displayed together, the window is 1,180 pixels high, making it awkward on all but the largest displays (see **Fig. 2**). You can display the synthesizer, the sequencer, and the keyboard either individually or simultaneously. It's annoying that Arturia chose to bypass normal Windows functions such as scrollbars and the Maximize function. Once you get used to grabbing the gear with the mouse and dragging it up and down, though, it's not too bad.

You can choose from three different skins for your 2600 V. The first skin features the look of the Blue Meanie, the earliest ARP 2600 produced. The second is the more common dark gray with white labels, and the third resembles the final model—dark gray with bright orange-brown labels that provide increased visibility on a typical computer monitor.

Sounds Like One

I took ARP 2600 V to the Audio Playground Synthesizer Museum to compare it with its namesake. The poor old ARP was feeling its age, so the comparisons were limited. The biggest obstacle was that the original keyboard could not communicate properly with the synthesizer. It was unclear whether the problem was with the keyboard or the synth, but I had no better luck with a contemporary keyboard and a MIDI-to-CV converter. Still, I was able to compare the oscillators and the filter.

The basic waveforms of the 2600 V stacked up well against those of the original 2600. The sawtooth of 2600 V was brighter than the original's. Additionally, 2600 V's pulse (set as close to symmetrical as possible) was a bit richer than that of the original, which had a more nasal quality.

The original synth's filter was difficult to control because of a sticky potentiometer, but as I swept the cutoff on both of them, their general characteristics and ranges were similar. The filter's resonance, however, sounded noticeably different. Arturia's version exhibited a rich complexity that was interesting in its own right but qualitatively different than the original. The 2600's filter self-oscillated more quickly and more dramatically than its virtual cousin.

The similarities were generally remarkable. Arturia has done an excellent job of capturing the character of the classic 2600. Any residual temptation toward sonic hair-splitting evaporated with the realization that I didn't have to spray anything on 2600 V's sliders to get them to operate smoothly.

In practice, it's easy to coax rich sounds from ARP 2600 V. It has bite, warmth, and sizzle, and plenty of options for shaping the sound as you go.

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REVI

Better than One

Arturia added some features that go above and beyond simple emulation. For starters, bundling the keyboard and the sequencer was a nice touch. The keyboard has controls such as pitch-bend range, portamento parameters, global tuning, and a virtual pitch knob like the one that the vintage synth had. More importantly, you can choose monophonic, polyphonic, or unison operation, and there's a dedicated knob for unison detuning. You choose the number of voices from the toolbar at the top of the window, which is an odd placement. It is in plain sight, but it wasn't where I expected to find it, which is next to the mono/poly/unison switch.

A polyphonic ARP 2600 is a real treat to play. One of the classic patches from ARP's patch book was called Monster Organ, but you couldn't play chords on the original. Arturia's version lets you play as many as 32 notes of any patch. For my money, though, it's 2600 V's Unison mode that really kicks it up a notch (see **Web Clip 1**). You can stack and detune as many as ten voices for supersize solo synths and bigger, badder basses.

The 2600 allowed you to use VCO 2 as an LFO, but 2600 V's keyboard adds a dedicated LFO. That lets you use all three oscillators while still being able to apply LFO effects such as vibrato.

The sequencer is addictive, and because it can sync to your DAW's tempo, it's also very useful. It can be configured as a 16-step monophonic sequencer or as two parallel 8-step sequencers. Its most obvious use—to sequence pitches—is its less interesting function; it was more exciting to map its output to filter cutoff to create a rhythmically shifting timbre (see **Web Clip 2**). You can easily mix and match the two functions by taking a pitch-quantized output to the oscillators and an unquantized output to the filter.

Unlike more-modern step sequencers, the virtual 1601 doesn't allow you to store multiple patterns and map out a song with them. If your CPU doesn't experience problems when running multiple instances of 2600 V, however, you could have different patterns in each and switch between them.

The ARP 2600 had two built-in speakers, which obviously aren't useful in a virtual instrument. Controls for a chorus and a delay are cleverly hidden behind the 2600 V's left speaker grille. The chorus features simple rate, depth, and wet/dry mix controls, but the delay is a bit more involved. In addition to wet/dry mix, it offers separate left and right controls for delay time and

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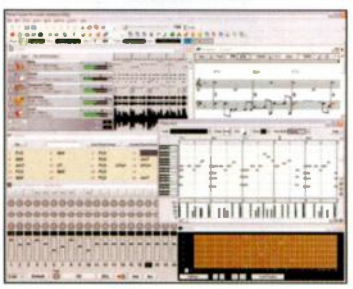

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feedback, and it can sync to your DAW's tempo. The effects add useful qualities to 2600 V, and are well exploited in the included presets.

Behind the right-speaker grille is an innovative tracking generator that you can use to create complex modulation sources. The tracking generator holds four user-created curves (per preset) that you can use individually or in combination to modulate any component with a control input. The graphic editor is simple in design, yet it provides powerful tools for drawing sinusoid, parabolic, square, or freehand curves (see **Fig. 3**). It even has a noise tool to prevent the modulation curve from being too perfect.

After you've adequately tweaked the curve, you can set, automate, or sync its frequency to MIDI Clock and smooth it to soften its effect. The four curves can be used independently to modify various parameters, or you can patch them through the voltage processor to combine them into a single complex modulation curve.

In addition to the 4-pole (24 dB-per-octave) lowpass filter that is characteristic of the vintage 2600, the virtual 2600 features 2-pole (12 dB-per-octave) lowpass, highpass, bandpass, and notch filters modeled after those found in the 2600's predecessor, the ARP 2500 modular (see **Web Clip 3**).

Gotta Have One

So what's not to like about Arturia's virtual 2600? Aside from nit-picking about the interface (you can't zoom in on any given module for serious tweaking) and a slight difference in the filter's resonance (at least compared with the real unit available to me), I didn't find much to dislike.

The documentation left me with mixed feelings. On one hand, it's hard to argue with more than 90 pages of paper repeated in three languages. On the other hand, the manual's translation into English is spotty, and there are some typos that can be frustrating. Arturia deserves kudos for chapter 6, "The Basics of Subtractive Synthesis," and for chapter 7, "A Few Elements of Sound Design," which are well-thought-out tutorials about creating sounds with ARP 2600 V. Brickbats, however, are in order for incomplete and occasionally scattered descriptions of elements such as the keyboard and the tracking generator.

If you can find a vintage ARP 2600 in good condition and can afford to spend some money on the various retrofits, upgrades, and tweaks that are available, knock yourself out. You'll have a great instrument, but you still won't have presets, unison, polyphony, and total recall within your DAW. For the rest of us, Arturia has brought the best of the past and present together in a cool instrument that upholds the tradition of its namesake while living up to the demands of contemporary production.

EM WEB CLIPS

Brian Smithers is Course Director of Audio Workstations at Full Sail Real World Education in Winter Park, Florida. Special thanks to Joseph Rivers and the Audio Playground Synthesizer Museum.

PRODUCT SUMMARY

ARTURIA ARP 2600 V 1.0

software synthesizer
$310

OVERALL RATING [1 THROUGH 5]: **4**

PROS: Sounds like a real ARP 2600. Broad plug-in format compatibility. Standalone mode. Useful nonemulative features, including presets, delay, chorus, unison mode, and 32-note polyphony. Innovative tracking generator provides custom modulation curves.

CONS: Manual suffers from incompleteness and mediocre translation. Graphical user interface is too tall for most monitors.

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FIG. 1: The MindPrint TRIO combines input and monitoring functions that might otherwise be missing from a mixerless personal studio.

MINDPRINT TRIO

An audio-routing nerve center for your mixerless studio.

By Orren Merton

udio-hardware manufacturer MindPrint first established its reputation with the well-regarded, tube-based En-Voice channel strip. More recently, MindPrint introduced the TRIO, which stands for Total Recording solutIOn. Resembling a tabletop navigation console on the Federation Starship Enterprise, the TRIO serves as an input and monitoring station for studios that don't have a mixing console, offering all the analog and digital I/O that the budget-minded recordist might need.

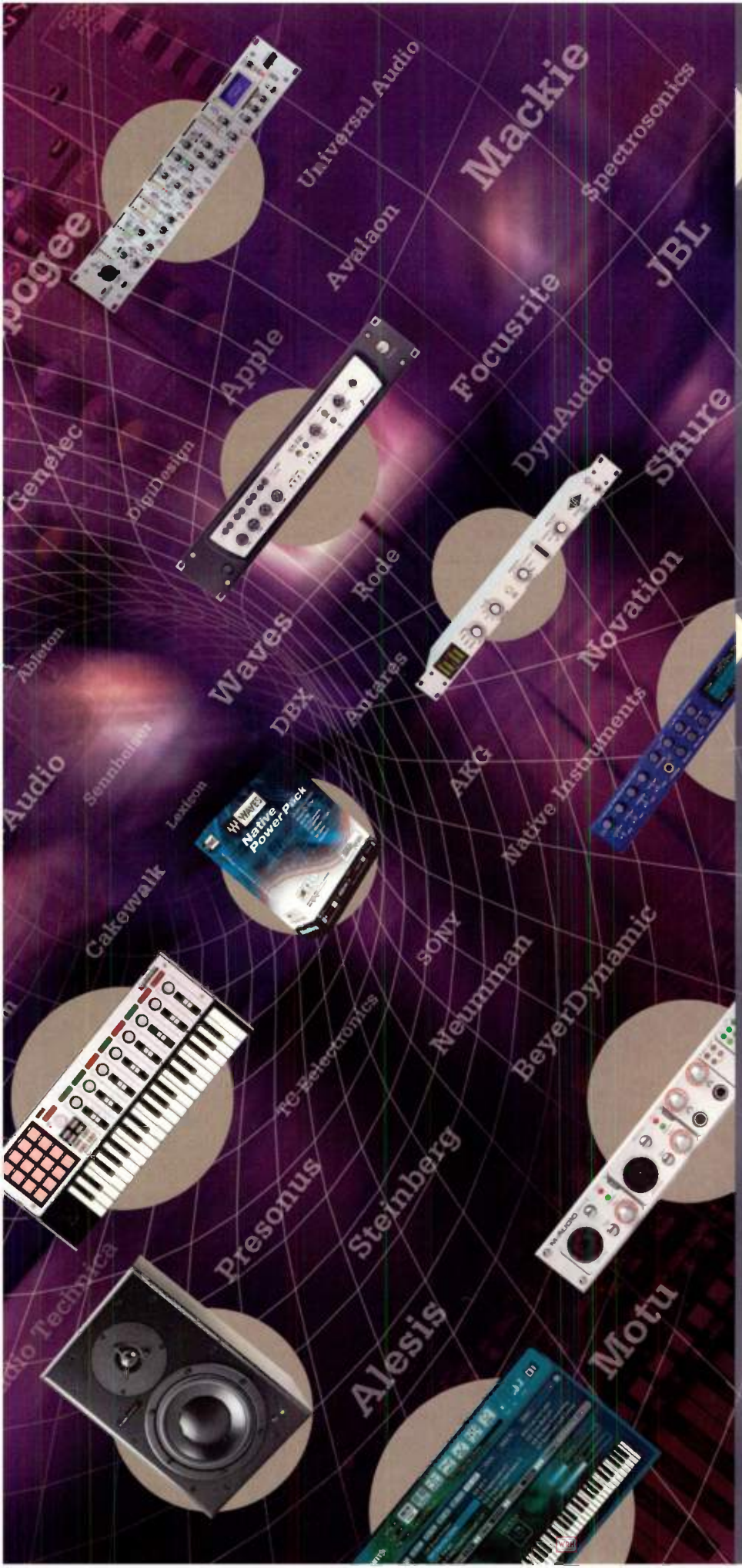
The TRIO functions as a channel strip and as an instrument preamp, and it has talkback communication, headphone monitoring, computer DAW connectivity, and more. Four pairs of outputs allow it to simultaneously route stereo signals to multiple destinations, which might include a pair of powered monitors, a subwoofer, a cassette recorder, and a home-stereo receiver.

> The TRIO has a far more robust metering system than many other units.

TRIO I/O

Despite its novel appearance, the TRIO's layout is straightforward and logical. The front panel's left side houses all the controls relating to the input and signal-processing functions, and the middle and right side allow access to monitoring functions (see **Fig. 1**). The rear panel supplies jacks for all the I/O connections, which follow the layout of the front-panel controls: the input jacks line up with the input controls, and the output jacks line up with the monitor controls. Between the rear panel and TRIO's underside are two sets of DIP switches and three recessed screws to make additional adjustments to the S/PDIF, speaker, analog I/O, and record-monitor sections.

The TRIO has a generous complement of input and output connectivity (see **Fig. 2**). In addition to a Class-A XLR mic input, it has a 1 MΩ, ¼-inch instrument



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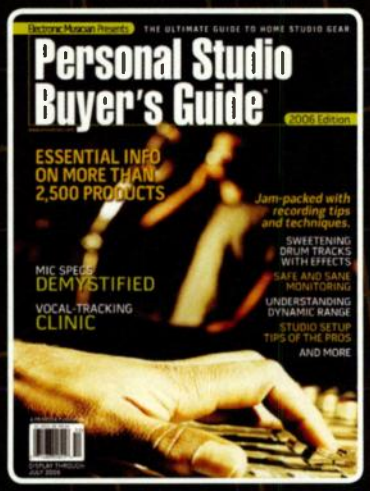

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REV

FIG. 2: The TRIO's rear panel has jacks for connecting two pairs of headphones, three pairs of speakers, a tape recorder, a computer audio interface, an outboard processor, a stereo keyboard, a guitar, and a microphone—all at the same time.

input designed by Hughes & Kettner that, according to MindPrint, avoids loading or degrading the signal from guitar and bass pickups. When I plugged in my Gretsch Duo Jet with Filtertron pickups, the signal was strong and noise free.

Because the instrument input has priority over the mic input, you can leave a mic plugged in, and the TRIO will automatically switch to the other input when you plug in a guitar. You can set the DIP switches on the unit's underside to either distribute the signal evenly to both channels or route the mic and instrument signals to the left recording and monitoring channel.

In addition to the mic and instrument inputs, the TRIO supplies a pair of unbalanced ¼-inch line-level inputs. The input section has unbalanced ¼-inch send and return jacks, which let you insert a signal that bypasses the TRIO's processing. Although it would have increased the cost, having balanced inputs would have been preferable, because many signal processors and line-level sound modules have balanced outputs. A stereo auxiliary input on unbalanced RCA jacks accommodates consumer-level devices such as CD players. I prefer ¼-inch jacks for the auxiliary inputs, so I wouldn't need TRS-to-RCA adapters to connect additional instruments, mics, and so on, but RCA jacks are more typical for devices such as CD players.

The TRIO can interface with your computer's DAW software using either optical S/PDIF I/O on Toslink connectors or stereo analog I/O on unbalanced RCA jacks, both of which you can use simultaneously. DIP switches on the rear panel let you select the sampling rate (44.1-, 48-, 88.2-, or 96 kHz) and internal or external sync. I wish MindPrint had used coaxial S/PDIF connectors (which are more common on pro gear) or had offered ADAT Lightpipe connectivity.

The TRIO's output section has two ¼-inch stereo headphone jacks, three pairs of speaker outs, and a pair of Direct Out jacks. The Speaker A output is on a pair of unbalanced ¼-inch jacks, whereas Speaker B and Speaker C are on RCA jacks. The main volume knob affects all three outputs.

Speaker A's outputs are the only monitor outs connected to the Volume control. Speaker B's outputs are on RCA jacks, and you can adjust the level with a screw on the unit's underside. Speaker C and the Direct Out are also on RCA jacks and don't have any level control.

The TRIO's monitoring section is almost perfect for some recordists. For my studio, which has balanced connections throughout, I prefer balanced TRS outputs for at least the Speaker A outputs and for the Direct Out jacks as well.

All Hands to the Bridge

The leftmost column of buttons and dials on the TRIO's front panel control the mic and the instrument input signals. When engaged, the 48V button supplies phantom power to the mic input. The Low Cut button inserts a highpass filter into

the signal path, centered at 80 Hz with a 12 dB-per-octave slope. A steeper slope would be more effective at removing rumble and hum.

The Gain knob controls how much preamplification is applied, adding as much as 60 dB of gain to the mic signal or 54 dB to an instrument-level signal. The preamp has low noise and a neutral sound, though it is noisier at the highest gain settings. I compare it favorably with the preamps on M-Audio's FW1814 and other interfaces, but it didn't have quite enough gain to power my Royer R-121 ribbon mic.

The TRIO furnishes two bands of equalization. On the mic/instrument inputs, the high-frequency shelving filter is centered at 7.5 kHz, and the low-frequency shelving filter is centered at 100 Hz. Both have 12 dB of boost or cut and a vintage frequency-dip-before-boost design. The EQ section cannot be removed from the signal path; luckily, each knob features a detent at 0 dB.

The high-frequency EQ was surprisingly good at adding sheen to vocals, but it was less effective on acoustic or electric guitar. I used the low-frequency EQ to effectively cut boominess from vocals, electric, and acoustic guitars. I didn't like using it to add lows, however, because it was too pronounced, even at low boost settings.

After the EQ section, the TRIO features a soft-knee compressor with an automatic-gain makeup stage and program-dependent attack and release. The compressor's only user control is a single knob labeled Fat, which simultaneously

TRIO SPECIFICATIONS

Analog Inputs	(1) balanced XLR mic with 48V phantom power, (1) ¼" unbalanced high-impedance instrument, (2) ¼" unbalanced line, (1) ¼" unbalanced insert return, (2) RCA unbalanced auxiliary, (2) RCA unbalanced DAW
Analog Outputs	(2) unbalanced ¼" monitor, (4) unbalanced RCA monitor, (2) unbalanced RCA DAW, (2) unbalanced RCA direct; (1) ¼" unbalanced insert send, (2) ¼ " stereo headphones
Digital I/O	24-bit optical S/PDIF
Sampling Rates	44.1-, 48-, 88.2-, 96 kHz
Maximum Input Levels	4 dBu (mic), 14 dBu (instrument), 21 dBu (line), 12 dB (aux)
Mic Input Gain	–74 dBu to –14 dBu (with compressor), –74 dBu to –10 dBu (without compressor)
Instrument Input Gain	–∞ to +19 dB
Maximum Output Level	2 dBu
Dynamic Range	>105 dBa
Dimensions	10.24" (W) × 2.60" (H) × 7.68" (D)
Weight	3.42 lbs.

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controls the amount of compression and the time-dependent parameters. You can't remove the compressor from the signal path, but turning the Fat knob fully to the left turns off the compression. The compressor was useful for taming vocal and guitar dynamics, but it was definitely not transparent. It sounded like a midrange boost when turned up higher than halfway. If you want an easy, one-knob approach, you can't go wrong with MindPrint's method, but I prefer the control that I get with outboard compressors.

The Rec Vol (record volume) knob controls the mic/instrument level sent to your computer's DAW, independent of the signal sent to the monitors. That control is a welcome feature that is missing from many comparably priced units.

The second column of buttons on the TRIO's left side has two EQ controls and a Rec Vol knob for the stereo line inputs. The shelving filters for the line inputs function similarly to the mic/instrument EQ filters, with the high-frequency shelving filter centered at 9 kHz and the low-frequency filter centered at 120 kHz. I ran a soft synth from my RME Fireface's line output to the TRIO's line input. The high-frequency EQ sounded almost too high; it would have sounded better if it had the same frequency as the mic/instrument's high EQ. The low-frequency EQ did a good job of fattening up synth bass sounds without making them muddy, and it was also effective at removing boominess in the low end of a lead patch.

Next to the line-level controls is a Talkback button that cuts the monitor signal by 12 dB, as well as a small talkback microphone that is routed to the headphone outputs. The usefulness of the talkback section depends on how you work. If you have a large room or recording booth, it is a welcome addition that's well implemented. If you're recording a singer or an acoustic musician who's wearing headphones, it's a great convenience even if you have only one room. If you record only yourself or someone in the same room that is not wearing headphones, however, you won't need talkback.

PRODUCT SUMMARY

MINDPRINT TRIO

multifunction audio I/O
$549

OVERALL RATING [1 THROUGH 5]: 3.5

PROS: Lots of inputs and outputs. Excellent metering. Zero-latency hardware monitoring. Well-written manual. Good value.

CONS: No balanced line inputs or outputs. Too little control over the compressor. No separate headphone mix.

MANUFACTURER
MindPrint
www.mindprint.com

Over and Output

At the front panel's bottom center is the Zero Latency Monitor section, which has three knobs for controlling mic/instrument, line, and auxiliary levels sent to the monitors. On the right, separate buttons engage the three speaker banks, collapse the signal to mono, attenuate the master volume by 20 dB, and switch between the monitor and computer return signals.

A large Volume knob adjusts the master level, and the TB Vol and Phones A and B knobs adjust the talkback and headphone levels, respectively. You cannot send separate mixes to the headphone outputs. Considering that most audio interfaces give you zero-latency hardware monitoring, the ability to send a separate headphone mix would have helped the TRIO stand out from the crowd.

The TRIO's stereo 10-segment LED meters have a button to switch between metering the input or the output. In Input mode, the left channel shows the mic/instrument level, and the right channel shows the summed level of both line inputs. Although it might not seem ideal, the TRIO has a far more robust metering system than many other units in this price range. Anyone using an audio interface without meters will appreciate the TRIO's excellent metering.

The Final Frontier

The TRIO is part channel strip, part DI box, part monitor and output router, part talkback unit, part headphone amp, and part A/D/A converter. Its affordable price, flexibility, solid construction, and excellent manual make it compelling. It isn't designed for everyone, and it isn't necessarily the best device for any single task, but it does furnish a broad range of functions for anyone who needs them. Unless your computer already has built-in S/PDIF I/O, it does not eliminate the need for a dedicated audio interface, and many interfaces provide at least some of the TRIO's capabilities.

By adding so many features to the TRIO, MindPrint had to make compromises in order to keep the price attractive to nonprofessional recordists. Unbalanced analog I/O (other than the XLR input) might keep the TRIO out of some better-equipped project studios. Nonetheless, for personal-studio recordists who want all its functionality, the TRIO is in a league of its own.

Orren Merton recently coauthored Logic 7 Ignite! *(Muska & Lipman, 2005), and has authored* Logic Pro 7 Power! *and* GarageBand Ignite! *(Muska & Lipman, 2004).*

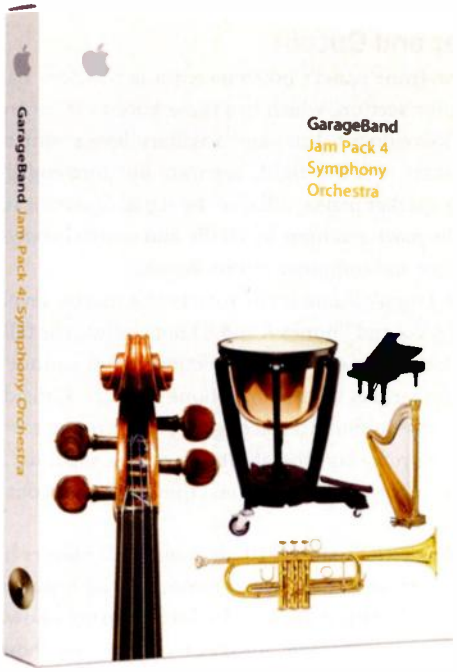


FIG. 1: GarageBand Jam Pack 4 is the most recent entry in Apple's series of loops and instrument samples for Mac-wielding musicians.

APPLE COMPUTER GarageBand Jam Packs 2, 3, 4 (Mac)

Pack your digital garage with loads of loops and sampled instruments.

By Geary Yelton

With the release of GarageBand 2, Apple Computer's consumer-level audio sequencer continues to expand and gain more converts. As its user base grows, so does the demand for the loops and software instruments that make GarageBand a stimulating environment for creating music. The release of Logic Pro and Express 7, which support Apple Loops and GarageBand instruments and have the ability to import GarageBand files, has heightened that demand even more.

GarageBand's introduction in January 2004 coincided with the release of the original *GarageBand Jam Pack* (Mac, $99), a single-DVD collection of add-on loops, instruments, and effects presets (see the July 2004 issue of EM online at www.emusician.com). Since then, Apple has launched three additional titles in the *Jam Pack* series. Each has its own stylistic niche that targets a different group of musicians. The second volume concentrates on electronica and dance music, the third on traditional and pop genres, and the fourth on orchestral instruments. Each supplies more than 2,000 Apple Loops and numerous multisampled instruments.

I installed *Jam Pack 2* and *Jam Pack 3* when they were released in October 2004, and *Jam Pack 4* in January 2005. Instead of providing sample files that you simply copy to any hard disk, each *Jam Pack* disc has an installer program that places data in various folders on your main hard drive. Discovering what went where proved to be a challenge, but most files go into folders within your startup drive's Library folder—either into Application Support's GarageBand folder or into Audio's Apple Loops folder. Along with the content, each *Jam Pack* comes with several demo files that show off the kind of music that you can create using the resources it has. Some demos are resource intensive and require a Mac G5 to play.

Music for Remixers

GarageBand Jam Pack 2: Remix Tools (Mac, $99) is packaged on a single DVD. It supplies content for an assortment of electronica and dance genres that span 2-step, breakbeat, down-tempo, drum 'n' bass, electro, Euro, Goa trance, hip-hop, house, new jazz, R&B, and trip-hop. If you're unfamiliar with some of the musical descendents of funk and techno, working with *Jam Pack 2* can teach you to recognize what makes any of these styles distinct from the others. Most are beat heavy by nature, and each has its own evolutionary lineage that can be traced to the Detroit club scene, German discos, or London's all-night raves.

Although most of *Jam Pack 2*'s Apple Loops are categorized by style, these grooves invite you to mix and match styles to create your own hybrids (see **Web Clip 1**). Many of the most exciting loops are the beats; if the drum and percussion grooves here don't make you want to get up and move to the rhythm, you might want to check for a pulse. *Jam Pack 2*'s software instruments also focus on the funk, containing drum kits, percussion, and synth timbres.

As a synthesist and an EM editor, I've had ample opportunity to hear dozens of sample discs in most of

the genres represented on this disc. *Jam Pack 2* is certainly one of the finest collections of funky beats and danceable grooves I've heard, and for less than a hundred bucks, nothing else comes close.

Fascinating Rhythm

Most musicians will find *GarageBand Jam Pack 3: Rhythm Section* (Mac, $99) to be the most useful of the three. These two DVD-ROMs offer the greatest breadth in terms of style, encompassing rock, blues, folk, Latin, jazz, country, and other mainstream genres.

About half the Apple Loops are drum patterns, with the other half divided between rhythm-guitar patterns and chord progressions, bass grooves, and even some mallet percussion. If you don't already own a library of prerecorded drum loops, *Jam Pack 3* is an excellent place to start. Most of them offer enough variations and fills to bring your backing tracks to life. The rhythm guitars alone make this collection a worthwhile investment, though you must be careful not to transpose pitch or tempo too far from the original (see **Web Clip 2**). Acoustic and electric strumming patterns are presented in many styles, and thanks to the ability to change the key and meter of Apple Loops, most of them transpose well as long as you avoid extremes. Like the loops, *Jam Pack 3*'s software instruments concentrate on drums, bass, and guitar, a classification that also includes banjo and Dobro.

Jam Pack 3 is an essential collection of sounds that almost any user of Apple Loops and GarageBand instruments—especially songwriters—should definitely have. More than any sample collection I've heard (except for *Jam Pack 1*), it adds a wide-ranging and colorful palette of useful sounds to the content that comes standard with iLife '05.

Hooked on Classics

Given the enormous selection of orchestral sample libraries available, any competing collection faces a challenge. Nonetheless, *GarageBand Jam Pack 4: Symphony Orchestra* (Mac, $99) stands out from the crowd (see **Fig. 1**). Its Apple Loops supply enough recorded phrases to compose some respectable mood music. Most of the loops are best suited for quickly producing soundtracks (see **Web Clip 3**). In fact, many of its demo files pay unspoken tribute to the works of contemporary film and television composers, from Danny Elfman ("Escape") to Snuffy Walden ("Capitol"). Many MIDI piano patterns are available—enough to arrange your own piano concerto—and more than two dozen are in waltz time. I especially appreciated the whole-tone piano parts.

Like most symphonic soundware compilations, *Jam Pack 4* has a nice variety of instrumental samples, but their high quality belies its bargain price. Almost any orchestral instrument you might need is on hand, including legato and staccato woodwinds (individually and in sections), orchestral harp, glockenspiel, gong, and tremolo timpani crescendos. String-section articulations include legato, staccato, pizzicato, tremolo, and trills. The pipe organ samples are especially impressive and well worth the entire price if you need pipe organ samples.

Jam Pack 4's orchestral instrument samples are a major improvement over those that come with most sample-playback plug-ins. These two discs will never compete, however, with big-budget soundware from developers such as Sonic Implants, Garritan, or Quantum Leap. But for users on a budget or for those who are looking for ready-made orchestral and cinematic loops, this collection has plenty to offer.

PRODUCT SUMMARY

APPLE COMPUTER GarageBand Jam Packs 2, 3, 4

sound libraries
$99 each

OVERALL RATING [1 THROUGH 5]: 4.5

PROS: Excellent sound quality. Masterful multisampling. Impressive variety. Outstanding bargain.

CONS: Some samples lose their integrity when transposed too far beyond their original pitch or tempo. Too few endings among the Apple Loops.

MANUFACTURER
Apple Computer
www.apple.com

Something for Everyone

I rate all of Apple's *Jam Packs* extremely highly for value and very highly for quality. The diversity of loops and multisampled instruments is comprehensive. The only common instrument in short supply is the human voice; only a handful of loops tread that territory, and most of those are heavily processed effects. Considering the fact that transposition artifacts are most evident in vocals, perhaps vocals are unsuitable for Apple's pitch-stretching algorithms.

In lots of ways, *Jam Packs*' loops provide the ultimate in needle-drop. (*Needle-drop* is a term referring to libraries of canned music, so named because in the age of vinyl, you could buy music-library LPs and license the music as needed.) Many of the problems associated with traditional needle-drop—finding music suitable for a particular project's pacing and density requirements—are easily solved by using Apple Loops. My only wish is for more endings, because I found myself doing fades at the end of most loop-based compositions.

Like the original *Jam Pack* collection, all three volumes give you more than what you pay for, and each sounds exceptionally good. If you create music in any of the genres targeted by these soundware libraries, you will not be disappointed by the GarageBand *Jam Pack* series.

EM WEB CLIPS

EM associate editor Geary Yelton bought his first Mac in early 1984. He authored the book Music and the Macintosh *(MIDI America, 1989) five years later and has reviewed Mac software for EM since 1986.*

QUICK PICKS

AKG

C 542 BL

By Larry the O

The C 542 BL ($320) is one of a handful of boundary-layer microphones made by AKG. Boundary-layer microphones are unique in their fundamental attributes: the evenness and low-end extension of the mic's frequency response depend on the size of the boundary on which the mic resides; the pickup pattern is normally hemispherical; and there is less differentiation between the direct and the reverberant sound (especially in frequency response) than with other kinds of mics. At the same time, room sound contributes largely to the audio that a boundary-layer mic captures.

PZM (a trademark of Crown) mics are similar but not identical to boundary-layer mics. (PZM stands for pressure-zone microphone.) In a PZM mic, the transducer faces downward toward the boundary's surface; in a boundary-layer mic, the transducer faces forward (or upward) toward the sound source. According to AKG, the C 542 BL's upward-facing mic element has several advantages over the downward-facing elements in some other pressure-recording microphones, including more-accurate and detailed sound and more consistent performance.

The AKG C 542 BL is a hemispherical-pickup, boundary-layer mic in a 3.2-inch diameter disk with a 12 dB/octave, 150 Hz highpass filter in the attached phantom-power adapter.

Those characteristics make boundary-layer mics popular for amplifying voices in theatrical productions, in conference settings, and in churches. Boundary-layer mics also have become popular in music recording applications such as miking pianos and large ensembles. I use a pair of boundary-layer mics for recording interviews, because the technique allows the subject to move around the space without sacrificing intelligibility on the recording.

The C 542 BL is a classic boundary-layer hemispherical-pickup mic in a 3.2-inch diameter disk. Although some boundary-layer mics are designed for specific applications, the C 542 BL is intended to cover the full range of boundary-layer use. The disk is only 0.2 inches thick, making the C 542 BL a small, low-profile package. The attached phantom-power adapter in the mic's XLR connector has a 12 dB/octave, 150 Hz highpass filter.

On the Surface

There are two methods of deploying boundary-layer mics: either attach them to a wall, a ceiling, or a floor or attach them to a sheet of Plexiglas or other portable flat surface. I performed my evaluations using the first method. Adhesive is included with the C 542 BL for attaching it to surfaces, but the disk has three holes drilled through it to allow permanent mounting to Plexiglas, walls, ceilings, or floors. If you aren't going to mount the mic permanently, the adhesive will come in handy, because boundary-layer mics don't lend themselves to or function optimally with direct-stand mounting. The C 542 BL has rubber feet for easier floor deployment and to isolate the mic from vibration.

I tried the C 542 BL on a number of instruments (vibraphone, drum overheads, acoustic guitar, djembe, and shakers) and a few voices (spoken and sung) in my personal studio. Unfortunately, I was unable to try a pair of the mics on piano. For sport, I compared the C 542 BL with one of the notorious Radio Shack boundary-layer mics, and the difference was clear: the C 542 BL captured a much more balanced spectrum of sound and exhibited greater extension and openness of high frequencies, especially above 8 kHz or so.

Placing a pair of C 542 BLs about 48 inches apart on the ceiling in a two-point stereo arrangement over the vibes rendered a nice, wide stereo image and achieved an even balance through the instrument's range, leaving no hole in the middle. The attack of my harder-than-usual mallets was quite audible, though not as sharp and peaky as it would have been with close-miking. The low-frequency pickup was pleasing in its range but did not seem smooth. Overall, it was an excellent sound on a notoriously difficult instrument.

Moving Targets

Solo-sung vocals were my least favorite application for the C 542 BL—it had a bit of a "bark" in the midrange. It showed little change in sound quality, however, when I played rock star and threw myself around the room while singing. (Under those conditions a cardioid condenser would have captured audio that was all over the sonic map.) I could definitely see recording a vocal group in a nice room with this mic.

Next, I recorded a spoken-word passage while walking all around the room as I read, occasionally turning my back on the mic. Other than when I turned my back, the sound varied only slightly. This is the classic boundary-layer experience.

The C 542 BL did a fine job on other instruments as well, though on acoustic guitar the mic did not have the detail of a good small-diaphragm condenser. The contribution of the room sound, however, gave the guitar an immediacy that did not feel unnaturally dry, as close-miking can.

The C 542 BL is a good choice for applications in which boundary-layer pickup is advantageous. It has a clean, well-balanced sound that is free of noise problems and is contained in a compact, low-profile package. Overall, the mic is an excellent and affordable performer.

Overall Rating (1 through 5): 4
AKG Acoustics
www.akgusa.com

LOOPMASTERS

Raw Power (Mac/Win)

By Gene Porfido

Raw Power ($69.95) is a collection of more than 1,500 samples and loops in

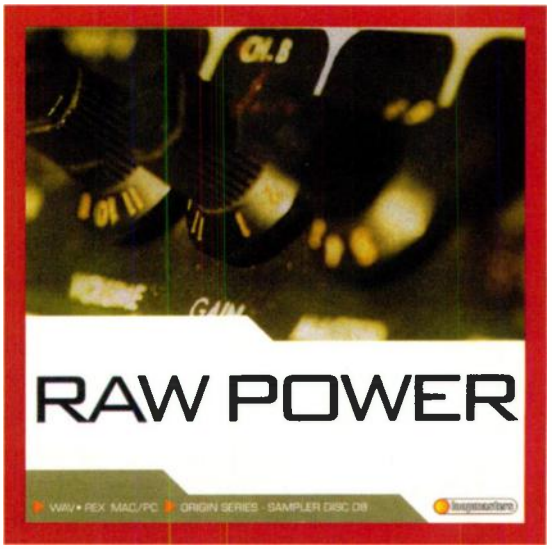
several rock styles, primarily for use in Propellerhead Reason. The CD comes with NN-XT and Redrum patches, REX2 samples, and WAV files. Produced by Jay Price and Jez Miller for Loopmasters, the sounds were recorded at various studios throughout London specifically for use in this library.

Raw Power is divided into five main folders, each based on a musical style. Each folder contains subfolders that include drums, guitars, basses, and synth samples. Within each instrument's subfolder are individual folders for WAV- and REX-format files. The samples were recorded at 44.1 kHzand 16-bits, and the loops are anywhere from one to four measures in length. A sixth folder, Toolbox, contains Reason NN-XT and Redrum patches with full drum kits, vocal effects, guitar noises, acoustic guitar sounds, and synth hits. A PDF file with CD registration and additional Loopmasters product information is provided, as well as a demo WAV file using samples from the *Raw Power* collection.

The Power of Inspiration

The five main folders—AlternativeUSA, Artskool, NewWave, NewYork-Underground, and England'sDreaming—hint at the styles and bands that inspired this library (such as the Stooges, Blondie, the Sex Pistols, and Radiohead). Each Guitar folder contains a mixture of electric-guitar power chords and riffs, and acoustic strums. The Bass folder has synth and electric-bass-guitar riffs played with a pick and fingers through a variety of amps and stompboxes. The Synth folder has loops ranging from classic 70s Clavinet funk to early techno sounds. The Drums folders are divided into two additional folders, one for loops of beats and one for fills. The drums are played on a mixture of live kits and electronic drum machines.

Each style of folder has its own tempo, with all of the samples conforming to the same bpm. The names of the individual samples hint at the feel, genre, or song after which they are modeled. For example, AlternativeUSA, recorded at 145 bpm, has a Who-like guitar riff named "Can't Refrain." This folder also has wah-basses, Rhodes riffs, and a variety of tasteful drumbeats.



***Raw Power* is a collection of samples and loops inspired by the music of the Stooges, The Who, Blondie, the Sex Pistols, and Radiohead.**

Artskool (135 bpm) contains much heavier guitar sounds that are reminiscent of Jimi Hendrix and Eddie Van Halen, as well as bass growls and slides,

fat Oberheim synth lines, and various hard-rock drumbeats with flanging and other effects. NewWave (120 bpm) contains cleaner guitars with jazzlike '80s tones, tremolo riffs, and fuzzbox leads. The folder's synth sounds contain classic new wave lead lines, and the bass and drum loops are as raw and innocent as the music itself was when it first appeared.

England'sDreaming (140 bpm) offers guitar loops reminiscent of early Rolling Stones, Beatles, and other British bands from the '60s. Add a few classic stereo B-3 licks in the Synth folder and some stock drumbeats and fills, and it's the British Invasion all over again.

NewYorkUnderground (130 bpm) is full of classic New York–style rock and alternative licks and beats. The crunchy guitars, echo-laden Rhodes, filtered Wurlitzers, and solid drum loops remind the listener of the breakthrough acts that New York City spawned after the punk revolution landed from England.

Rock On

Raw Power is an interesting collection of samples that stays true to its inspiration. Although my first impression was that the sounds lacked polish and refinement, as I began to explore the CD further I remembered that polish was not what these musical styles of sound and attitude are about. *Raw Power* does an admirable job of re-creating both.

There are plenty of clean and open chords, licks, and riffs as well as dirty power chords in the Guitar folders to piece together any kind of rocking tune. The guitar samples are well recorded, with good tone, feel, and the power to sound loud (according to the liner notes, they were recorded loud). The acoustic-guitar samples are especially well recorded.

The basses have a wide array of licks and tones, most of which are appropriately basic and straightforward. Along with the drumbeats and fills, they can drive the pounding rhythms for which these styles of music are known. Add in the classic keyboard sounds and memorable synth lines, and this collection captures the sound and feel of a musical generation that believed in baring its soul through music.

Overall Rating (1 through 5): 4
Loopmasters
www.loopmasters.com

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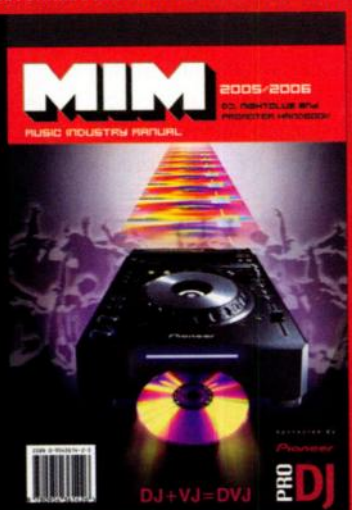

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BLUE MICROPHONES

Kickball

By Rusty Cutchin

Blue Microphones recently introduced another member of the company's innovative and colorful Ball family, which includes the original dynamic Ball (blue) and the condenser 8-Ball (black). Painted red and designed to excel in low-frequency applications, the Kickball ($149) shares with its predecessors a unique spherical shape. Like the original Ball, the Kickball is a dynamic microphone; the Kickball, however, requires 48V phantom power. As such, Blue claims, the Kickball gives you a consistent frequency response and acoustic balance while safely handling

the high sound-pressure levels associated with kick drums, toms, bass cabinets, and the like.

Game Ball

The Kickball is about the size of a grapefruit. The striking Blue logo is molded into the mic's hard plastic shell, where it is broken by black mesh covering the capsule on the address side of the sphere. The phantom-power indicator above the grille is a welcome feature. The small pyramid-shaped indicator glows brightly—a helpful aide, because the Kickball will pass signal without phantom power engaged.

On the other side of the globe, a series of slotted openings arc over the mic's male XLR jack and bass-frequency slider switch. At the bottom of the ball is a mic-stand receptacle that allows the Kickball to swivel forward or backward to angle the address side down or up. (For more flexibility, Blue makes the Ringer, a substantial shockmount and adapter that works with all of Blue's spherical mics or with any mic that has a standard thread mount and fits within the ring.)

The bass frequency slider switch has three settings: "0," "+," or "–". At the "0" setting, the mic exhibits an elevated bass response of about 6 dB at 80 Hz. The "+" setting further elevates the curve to about 10 dB in the same range. The "–" setting creates a steep rolloff at about 110 Hz that reaches –20 dB at 40 Hz. Frequency response is listed as 35 Hz to 16 kHz.

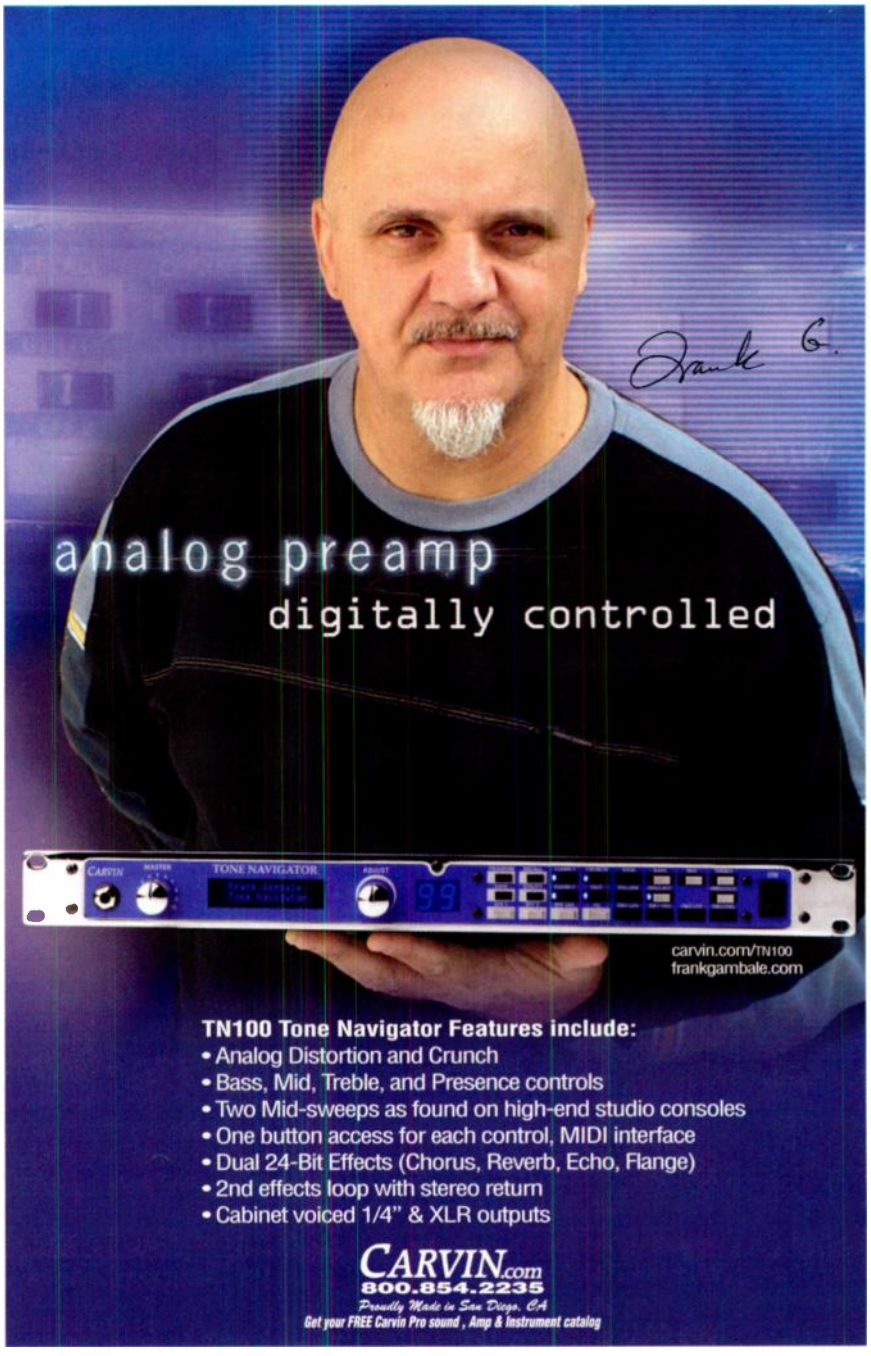
Playing Field

After years of examining Blue's eye-catching designs, I still find myself marveling at the company's approach. Upon opening the first Kickball's box (I examined two Kickballs for this review), I enjoyed the little art deco touches: the typeface of the Blue logo, the gold trim, and the slotted ports that make the mic look like a miniature radio built in the 1940s.

The Kickball case is rugged, and the mic sits still on a desktop if placed directly on the mic-stand receptacle. It is, however, a ball, and when I picked up an adjacent item, the Kickball tipped slightly and then rolled off the desktop onto the carpeted floor. The ball survived the fall with nary an effect on the mic's sound. Blue points out in its amusing manual that the Kickball "doesn't bounce well," and so harried engineers should remember that a spherical mic should be palm-gripped instead of handheld.

In the areas that really counted, the Kickball sounded fine. I was able to listen to the mic in my small (and dead) "live" room through the XDR preamps on a Mackie Onyx 1620. After checking both mics for sonic consistency and finding no apparent differences, I listened to the mics capturing a standard 15-inch Yamaha kick drum, the same kit's chrome snare, and a vintage Fender Bassman cabinet. I was also able to listen to recordings made by the Kickball side by side with recordings of the same instruments made by two other dynamic mics: a similarly priced Shure SM57 and an AKG D 112 "egg," which lists for twice the Kickball's price.

The Kickball quickly stood apart from those well-traveled transducers. Recording primarily jazzy R&B and country when using a live kit in recent



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years, I've grown accustomed to the D 112's 4 kHz bump, which gives a nice "point" that I've preferred for balancing low kick frequencies with other LF content from funk or synth bass. Expecting a relative excess of boom from Blue's mic, I was glad to find that the Kickball, nestled comfortably in the middle of the kick-drum pillow, provided heft at the "–" and the "0" filter settings, rather than a muddy spread of low-frequency energy. The "+" setting was too much for this kick, but the tracks recorded with the Kickball's other settings were the preferred ones for the funk-rock project.

On snare drum, I got another pleasant surprise when the Kickball's "0" setting fattened up the strident bite that the session drummer had trouble taming. Using the handy Ringer, I was able to position the Kickball over the snare and avoid what I thought would be an

Blue's spherically shaped Kickball dynamic mic features a phantom-powered low-end boost.

increase in bleed from the hi-hat. (Those slots in the back of the Kickball didn't seem to diminish the mic's cardioid performance.) I couldn't hear any loss of detail in stick attack or buzz from the snares.

On the bass cabinet, which I recorded with the intention of blending its miked sound with a direct feed, I gave the nod to the Shure for the purposes of the demo project. As the bassist was going for a deeper hip-hop-style bass sound, however, I didn't need the Kickball's LF boost on settings "0" and "+". The "–" setting came across as slightly muddy compared with the SM57.

Field Goal

The Kickball was a solid performer on specific, traditional dynamic-mic applications in need of bass enhancement. The boost provided by Blue's design enhanced the sound sources that I selected for it. The spherical mic and its large shockmount are too bulky for tight spaces, but they are generally worth making room for. Although it's natural to wonder if function is following form on a mic like this, the Kickball is solid enough to be a good recording role player on the right studio team. And at a street price of around $119, it could be a kick out of the park.

Overall Rating (1 through 5): 3.5
Blue Microphones
www.bluemic.com

ULTRASONE

Proline 750

By Michael Cooper

Most headphones give you an unnatural listening experience by bypassing the pinna—the external portion of the ear largely responsible for sound localization—and piping program material directly into the ear canal. In a natural listening situation, sound is diffracted when it strikes the pinna. The brain analyzes the resulting phase discrepancies, time delays, and tonal colorations (caused by comb filtering), and it forms conclusions as to the localization of discrete sounds.

The Ultrasone Proline 750 circumaural, dynamic headphones ($399) were designed to produce a more natural listening experience by offsetting its left- and right-channel, 40 mm titanium drivers from the listener's ear canals so that program material is diffracted by the pinnae before entering the ear canals. The company calls its proprietary approach, which employs no signal processing, S-Logic Natural Surround Sound.

S-Logic purportedly helps protect the listener's hearing by producing the same perceived volume as traditional headphone designs, but with sound-pressure levels reduced by up to 4 dB. Another health-related design aspect is the incorporation of Mu-metal shields, which Ultrasone claims reduce the head's exposure to potentially harmful

low-frequency magnetic radiation by up to 98 percent.

Head Games

The Proline 750 comes with useful features and ships with several accessories. The left and right ear capsules fold up toward the headband so that they fit neatly inside a supplied nylon storage bag. You close the bag by pulling on a drawstring. No toggle or other locking mechanism is offered. Ultrasone gives you two detachable cables—one straight and about 9.4 feet long, and the other partly coiled and roughly six feet long when not stretched. You choose the cable you prefer, and then push and screw its stereo 3.5 mm plug into the base of the 750's left ear capsule. The other end of each cable is fitted with a ¼-inch stereo phone plug. A ¼-inch female-to-3.5 mm male stereo adaptor is also included. All connectors are gold plated. The 750 also ships with a spare pair of ear pads, a demo CD, and an instruction manual.

The Proline 750 weighs a little more than 10 ounces without a cable attached—about the same as the average pro headphone set. The unit's impedance is 40 , and its frequency response range is listed at 8 to 35,000 Hz (with no tolerances given).

Testing 1, 2, 3

I first used the 750 while recording my own lead vocals. The headphones felt somewhat rigid on my head, no matter how I adjusted the headband. The 750's partly coiled cable was too short for use without an extension cord, but the straight cable gave me plenty of length for my setup.

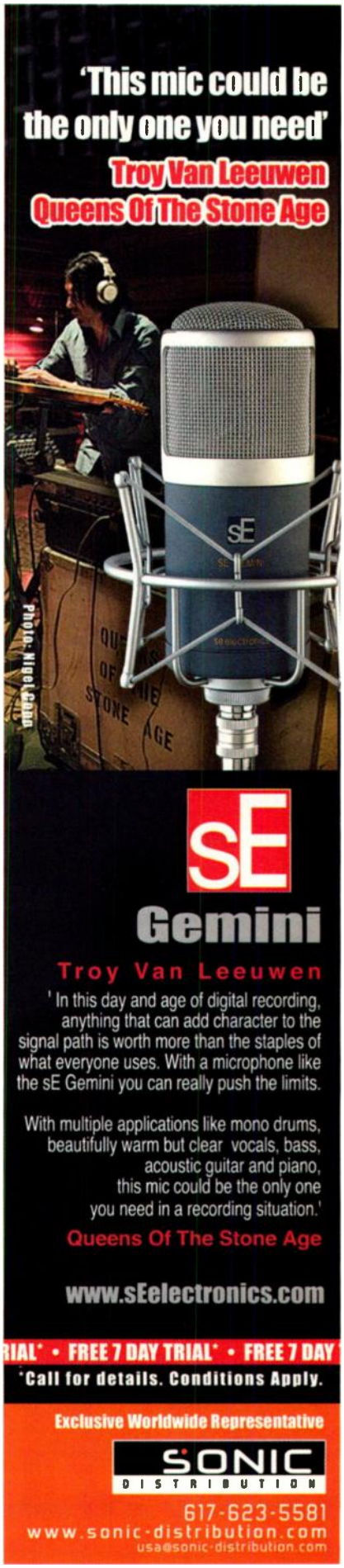
The 750 provided excellent isolation and respectable sensitivity—about the same as that of my AKG K271 Studio headphones. But my vocal sounded atypically lean in the upper-bass and low-midrange bands and overly bright in the upper-mid to high frequency range. The vocal also sounded more ambient and less focused than it did on the K271s.

Next, I listened to several familiar pop, rock, and country recordings, including my own recently completed mixes. The 750's transient response and reproduction of high-frequency details were both excellent. I was amazed at how much the bass range lows were extended by—the 750 gives subwoofers a run for their money, accurately reproducing the lowest Chapman Stick notes on Paula Cole's "Tiger." But the 750 sounded lean in the upper-bass and low-midrange bands and hyped in the low highs on all the material that I listened to. I could hear loads of detail in the upper-midrange band, but only because the low mids were unsuitably lean and had negligible frequency masking. The overall sound was thin, harsh, and cutting, especially on vocal-heavy material and mixes that had a moderate bottom end. Vocals, electric guitars, and violins routinely sounded harsh, and snare drums sounded papery thin.

The Proline 750's left and right ear capsules fold up toward the headband for compact storage.

While the 750 produced a subtly increased sense of ambience, I wouldn't characterize the effect as a surround or a natural experience, as the name S-Logic Natural Surround Sound implies. The sound was more diffuse, but localization wasn't especially enhanced. For panning elements in a mix, the headphones did not give a reference that was better than that provided by conventional headphones. (I've heard spatialization software in headphones that has conveyed the illusion of a natural acoustic environment that sounds better than the Proline 750s do.) You'll have to hear the S-Logic effect for yourself to decide whether it's an improvement over what traditional headphone designs offer. To me, the 750's subpar spectral balance made the effect moot. EM

Overall Rating (1 through 5): 2
Ultrasone
www.ultrasoneusa.com



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The true story behind the worldwide #1 best-selling ear training method

by **David Lucas Burge**

It all started as a sort of teenage rivalry . . .

I'd slave at the piano for five hours daily. Linda would practice far less. Yet somehow she always shined as the star performer of our school. It was frustrating.

What does she have that I don't? I'd wonder.

Linda's best friend, Sheryl, bragged on and on to me, adding more fuel to my fire.

"*You* could never be as good as *Linda*," she would taunt. "*Linda's* got *Perfect Pitch*."

"What's Perfect Pitch?" I asked.

Sheryl gloated about Linda's uncanny abilities: how she could name *exact tones and chords*—all BY EAR; how she could sing any tone—*from memory alone*; how she could play songs—after just *hearing* them; the list went on and on . . .

My heart sank when the realization came to me. *Her EAR is the key to her success.* How could I ever hope to compete with her?

But it bothered me. Did she *really* have Perfect Pitch? How could she know tones and chords just by *hearing* them? It seemed impossible.

Finally I couldn't stand it anymore. So one day, I marched right up to Linda and asked her point-blank if she had Perfect Pitch.

"Yes," she nodded aloofly.

But Perfect Pitch was too good to believe. I rudely pressed, "*Can I test you sometime?*"

"OK," she replied.

Now she would eat her words . . .

My plot was ingeniously simple . . .

When Linda least suspected, I walked right up and challenged her to name tones for me—*by ear*.

I made her stand so she could not see the piano keyboard. I made sure other classmates could not help her. I set up everything perfectly so I could expose her Perfect Pitch claims as a ridiculous joke.

With silent apprehension, I selected a tone to play. (She'll *never* guess F♯, I thought.)

I had barely touched the key.

"F♯," she said. I was astonished.

I played another tone.

"C," she announced, not stopping to think.

Frantically, I played more tones, skipping here and there all over the keyboard. But somehow she knew the pitch each time. She was AMAZING.

"Sing an E♭," I demanded, determined to mess her up. She sang a tone. I checked her on the keyboard—and she was right on!

Now I started to boil. I called out more tones, trying hard to make them increasingly difficult. But she sang each note perfectly on pitch.

I was totally boggled. "*How in the world do you do it?*" I blurted.

"I don't know," she sighed. And that was all I could get out of her!

"How in the world do you do it?" I blurted. I was totally boggled. (age 14, 9th grade)

The dazzle of Perfect Pitch hit me like a ton of bricks. My head was dizzy with disbelief. Yet from then on, I knew that Perfect Pitch was real.

I couldn't figure it out . . .

"How does she DO it?" I kept asking myself. On the other hand, why can't *everyone* recognize and sing tones by ear?

Then it dawned on me. People call themselves *musicians* and yet they can't tell a C from a C♯?? Or A major from F major?! That's as strange as a portrait painter who can't name the colors of paint on his palette! It all seemed odd and contradictory.

Humiliated and puzzled, I went home to work on this problem. At age 14, this was a hard nut to crack.

You can be sure I tried it out for myself. With a little sweet-talking, I'd get my three brothers and two sisters to play piano tones for me—so I could try to name them by ear. But it always turned into a messy guessing game I just couldn't win.

Day after day I tried to learn those freaking tones. I would play a note *over* and *over* to make it stick in my head. But hours later I would remember it a half step flat. No matter how hard I tried, I couldn't recognize or remember any of the tones by ear. They all started to sound the same after awhile; how were you supposed to know which was which—just by *listening*?

I would have done anything to have an ear like Linda. But now I realized it was way beyond my reach. So after weeks of work, I finally gave up.

Then it happened . . .

It was like a miracle . . . a twist of fate . . . like finding the lost Holy Grail . . .

Once I stopped *straining* my ear, I started to listen NATURALLY. Then the simple secret to Perfect Pitch jumped right into my lap.

Curiously, I began to notice faint "colors" within the tones. Not *visual* colors, but colors of *pitch*, colors of

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sound. They had always been there. But this was the first time I had ever really "let go"—and *listened*—to discover these subtle differences.

Soon—to my own disbelief—*I too could name the tones by ear!* It was simple. I could hear how F♯ sounds one way, while B♭ has a *totally different sound*—sort of like "hearing" red and blue!

The realization struck me: THIS IS PERFECT PITCH! This is how Bach, Beethoven, and Mozart could mentally envision their masterpieces—and know tones, chords, and keys—all by ear!

It was almost childish—I felt sure that *anyone* could unlock their own Perfect Pitch with this simple secret of "Color Hearing."

Bursting with excitement, I told my best friend, Ann (a flutist).

She *laughed* at me. "You have to be *born* with Perfect Pitch," she asserted. "You can't *develop* it."

"You don't understand Perfect Pitch," I countered. I showed her how to listen. Timidly, she confessed that she too could hear the pitch colors. With this jump start, Ann soon realized she had also gained Perfect Pitch.

We became instant celebrities. Classmates loved to call out tones which we would then magically sing from thin air. They played chords for us to name by ear. They quizzed us on what key a song was in. Everyone was fascinated with our "supernatural" powers, yet to Ann and me, it was just normal.

Way back then, I never dreamt I would later cause such a stir in the academic world. But as I entered college and started to explain my discoveries, many professors *laughed* at me.

"You must be *born* with Perfect Pitch," they'd say. "You can't *develop* it!"

I would listen politely. Then I'd reveal the simple secret—*so they could hear it for themselves*. You'd be surprised how fast they changed their tune!

In college, my so-called "perfect ear" allowed me to skip over two required music courses. Perfect Pitch made everything easier for me—my ability to perform, compose, arrange, transpose, improvise, and even sight-read (because, without looking, you're sure you're playing the correct tones). And because my ears were open, music just seemed richer.

I learned that music is definitely a HEARING art.

Oh, you must be wondering: whatever happened with Linda? Excuse me, I'll have to backtrack . . .

It was now my senior year of high school. I was nearly 18. In these three-and-a-half years with Perfect Pitch, my piano teacher insisted I had made ten years of progress. And I had. But my youthful ambition still wasn't satisfied. I needed one more thing: *to beat Linda*. Now was my *final chance*.

The University of Delaware hosts a performing music festival each spring, complete with judges and awards. To my horror, they scheduled me that year as the *grand finale* of the event.

The fated day arrived. Linda gave her usual sterling performance. She would be tough to match, let alone surpass. But my turn finally came, and I went for it.

Slinking to the stage, I sat down and played my heart out with selections from Beethoven, Chopin, and Ravel. The applause was overwhelming.

Later on, I scoured the bulletin board, searching for our grades in the most advanced performance category. Linda received an A, which came as no surprise. I scored an A+.

Sweet victory was music to my ears—mine at last!

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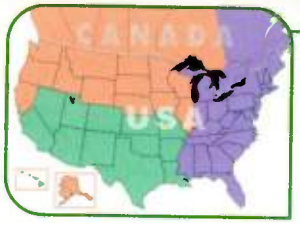

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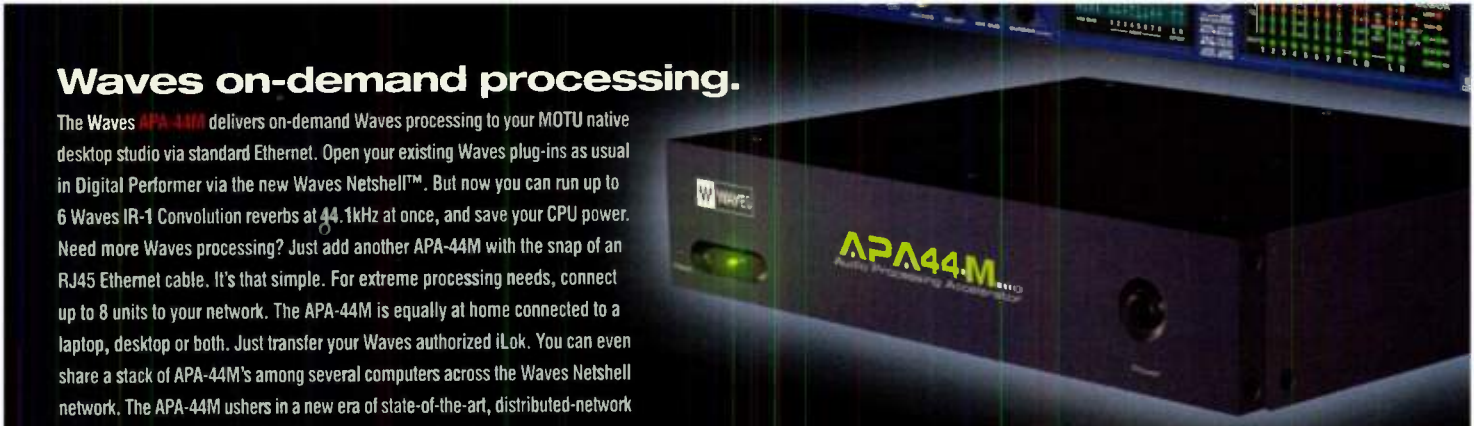

The mix.

The new Grace Design m902 Reference Headphone Amplifier is the final word in high fidelity headphone amplification and is the new must-have tool for audio playback in your MOTU power-on-demand studio. Combining a full compliment of analog and 24-bit/192kHz digital inputs with dual headphone and unbalanced line outputs, the m902 is an ideal solution for critical editing, mastering and monitor control for a MOTU studio of any scope.

Mastering & restoration.

Your DP mastering and processing lab awaits you: BIAS Peak Pro 5 delivers award winning editing and sound design tools, plus the world's very best native mastering solution for Mac OS X. With advanced playlisting. Superb final-stage processing. Disc burning. Plus PQ subcodes, DDP export (optional add on), and other 100% Redbook-compliant features. Need even more power? Check out our Peak Pro XT 5 bundle with over $1,000 worth of additional tools, including our acclaimed SoundSoap Pro, SoundSoap 2 (noise reduction and restoration), Sqweez-3 & 5 (linear phase multiband-compression/limiter/upward expander), Reveal (precision analysis suite), PitchCraft (super natural pitch correction/transformation), Repli-Q (linear phase EQ matching), SuperFreq (4,6,8, & 10 band parametric EQ) and GateEx (advanced noise gate with downward expander) — all at an amazing price. So, when you're ready to master, Peak Pro 5 has everything you need. It's the perfect complement to DP. Or, perhaps we should say, it's the perfect finishing touch.

The feel.

Looking for the ultimate compact keyboard controller for your MOTU studio? The Alesis Photon™ X25 delivers the revolutionary Alesis AXYZ controller dome and ten 360-degree rotary knobs, giving you powerful hands-on MIDI control of your Digital Performer studio and software plug-ins. Advanced features include 24-Bit 44.1/48 kHz USB audio I/O with balanced stereo audio inputs and outputs, 25 key, velocity sensitive keyboard, full-size pitch and modulation wheels, and an LCD screen with dedicated encoder for fast and easy set-up.

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The MOTU Power-on-Demand Studio

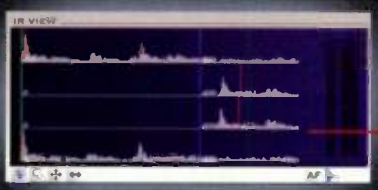
Audio Ease Altiverb V5™

Your first choice in convolution reverb

Altiverb broke new ground as the first ever convolution reverb plug-in, delivering stunningly realistic acoustic spaces to your MOTU desktop studio. Altiverb V5 continues to lead the way with cutting edge features. Altiverb V5's ever growing Impulse Response library provides the most diverse and highest quality acoustic samples on the market. Recent additions are shown below from the Altiverb Fall 2004 East Coast Tour. Version 5 delivers more seconds of reverb, more instances, and less CPU overhead than any other convolution reverb. And its new adjustable parameters are a snap to use! Altiverb takes full advantage of the Altivec™ processor in your PowerBook G4 or desktop Power Mac G4 or G5. THE must-have reverb for every MOTU studio.

See a 15 minute demo move at www.audioease.com

- Highest quality samples on the market.
- Legendary concert halls and studios.
- Versatile damping and hires-EQ section.
- Click-and-drag 3D sound placement.
- 'Size' parameter shifts resonances and room modes.
- Gains and delays for direct early-reflection and tail.
- Waterfall diagram shows time-frequency behavior in 3D.
- Surround up to 192 kHz.
- Snapshot automation for mixing and post-production.

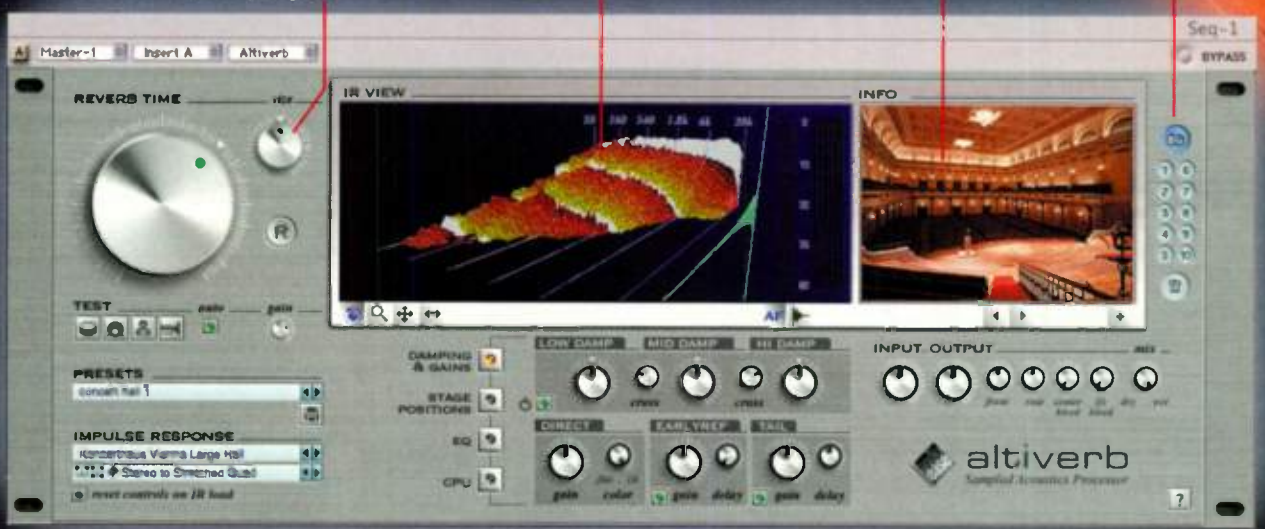


The new multi-channel waveform overview reveals crucial detail about gain levels and timing during the first tenth of a second of a reverb tail. The rotatable and zoomable 3D time/frequency plot reveals even more about damping, EQ and resonances.

Shift resonances and room modes while adjusting reverb times.

A rotating Virtual Reality movie helps you feel the presence of each space.

Snapshots let you automate complete preset changes.



Altiverb is the most efficient convolution reverb. Reduce CPU load even further with extensive settings.

Place the violins stage left, cellos stage right, and percussion in the back, all in stereo.

Use up to four bands of EQ, tailored for reverb tail adjustment, to fine-tune the sound.

Allaire studios — Shokan, NY

Haydn Hall — Eisenstadt

Schubert Hall — Vienna

Mechanics Hall — Worcester, MA

Forest Austerlitz — Netherlands

www.allairestudios.com

www.mechanicshall.org — Photo by Steve Rosenthal

Sound on Sound Studios — NYC
www.soundonsoundstudios.com

The control room.

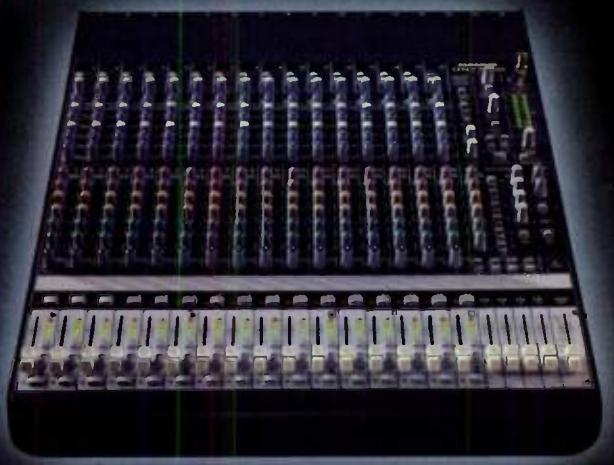
The PreSonus Central Station™ is the missing link between your MOTU recording interface, studio monitors, input sources and the artist. Featuring 5 sets of stereo inputs (3 analog and 2 digital with 192kHz D/A conversion), the Central Station allows you to switch between 3 different sets of studio monitor outputs while maintaining a purely passive signal path. The main audio path uses no amplifier stages including op amps, active IC's or chips. This eliminates coloration, noise and distortion, enabling you to hear your mixes more clearly and minimize ear fatigue. In addition, the Central Station features a complete studio communication solution with built-in condenser talkback microphone, MUTE, DIM, two separate headphone outputs plus a cue output to enhance the creative process. A fast-acting 30 segment LED is also supplied for flawless visual metering of levels both in dBu and dBfs mode. Communicate with the artist via talkback. Send a headphone mix to the artist while listening to the main mix in the control room and more. The Central Station brings all of your inputs and outputs together to work in harmony to enhance the creative process and ease mixing and music production.

The faders.

Imagine the feeling of touch-sensitive, automated Penny & Giles faders under your hands, and the fine-tuned twist of a V-Pot™ between your fingers. You adjust plug-in settings, automate filter sweeps in real-time, and trim individual track levels. Your hands fly over responsive controls, perfecting your mix — free from the solitary confinement of your mouse. Mackie Control delivers all this in an expandable, compact, desktop-style design forged by the combined talents of Mackie manufacturing and the MOTU Digital Performer engineering team. Mackie Control Universal brings large-console, Studio A prowess to your Digital Performer desktop studio, with a wide range of customized control features that go well beyond mixing. It's like putting your hands on DP itself.

The desk.

When you're on the road and looking to record a full band, the Mackie Onyx™ series of mixers from Mackie is the perfect complement to your MOTU Traveler. Whisper quiet and built like a tank, Onyx mixers feature an all-new mic preamp design capable of handling virtually any microphone. With the optional Firewire card, you can connect an Onyx mixer to your laptop with a single Firewire cable and have all the extra mic preamps and line inputs you need to capture every drum mic, vocal mic, individual synth output and DI the band throws at you. Since Digital Performer works seamlessly with multiple Core Audio devices, configuring a Traveler/Onyx system is a snap.



The monitors.

The Mackie HR-Series Active Studio Monitors are considered some of the most loved and trusted nearfield studio monitors of all time, and with good reason. These award-winning bi-amplified monitors offer a performance that rivals monitors costing two or three times their price. Namely, a stereo field that's wide, deep and incredibly detailed. Low frequencies that are no more or less than what you've recorded. High and mid-range frequencies that are clean and articulated. Plus the sweetest of sweet spots. Whether it's the 6-inch HR-624, 8-inch HR-824 or dual 6-inch 626, there's an HR Series monitor that will tell you the truth, the whole truth, and nothing but the truth.

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Doing It on Purpose

By Larry the O

Understanding the real purpose of any undertaking is crucial to guiding an endeavor to success. When you don't understand the essence of an effort, it is easy to operate from a wrong set of priorities. But in practice, one can easily miss the forest for the trees, especially with projects that involve a lot of detail. Naturally, this problem multiplies in groups because varying interpretations of the mission can produce divergent sets of priorities.

Even two people with the same destination may approach it with very different ideas about the point of the exercise. A friend of mine had quite a learning experience when making his first album. Not only was he finding his way through the recording process, but he was also learning about songwriting and arranging. Most of his learning took place at the sessions; that is, he was writing in the studio, which would have been fine except that the album's producer-engineer preferred a more disciplined recording approach and expected much more pre-production than the artist had done. The producer's objective was to bring the project to completion, while the artist was fashioning an étude out of the album-making experience. Both wanted a finished disc, yet they differed fundamentally on how they were trying to accomplish it. The result was friction between them.

Decision making is surely enhanced by clarity of purpose, too. A soul-funk band that I play with started working on new material that took the band in a more contemporary R&B direction, which made some members unhappy. In considering the material, I tried to examine the band's real reason for playing. Was it to work the events circuit? If so, then we should learn the material that would please the audience. But if the band existed so that we could play the dance music we liked and see how far we could make that go, then we should choose material according to our tastes.

There is also the "why do I put myself through it?" test. Consider the question of working cheaply or for free. There are many good reasons to do so, such as to support worthy charity benefits, get greater public exposure, widen professional contacts, gain experience, do a favor for a friend, and so on. Time is money, though, as are expenses. So you need to decide whether playing for low pay is actually an investment toward a hoped-for return of some sort.

That said, if after six years you are still working for peanuts in order to enlarge your contact base, you need to ask yourself why you're doing it. By that point, you should have either a bunch of great contacts or some other reason for continuing to work cheaply.

Clarity of purpose once saved me from considerable emotional pain, if not financial loss. I provided the majority of the funding for my band's album, mixed the album, produced the sessions, and called in a lot of accumulated favors to make things happen. I was aware that I was putting a lot on the line for a band that I knew to be volatile. I had to weigh the possibility that I might never see any of what I was owed come back.

If after six years you're still working for peanuts in order to enlarge your contact base, you need to ask yourself why you're doing it.

After intense reflection, I concluded that if the album turned out the way I realistically thought it could, it would be worth doing as a musical and production statement, regardless of the financial loss. I had access to great facilities and the opportunity to finally make an album the way I thought it should be done.

You've already guessed that I lost all my money, but it's a work I'm proud to have played a part in, and I have never once had a second thought or a regret about the time, the energy, the equipment, or the money I put into making that album. Incidentally, it eventually became somewhat of a cult favorite, not that that helped my bottom line.

It is all too common to realize after the fact that our objectives—or someone else's—were not what they seemed to be initially. All we can do is to continually try to gain and maintain enough perspective to examine all of our possible reasons for doing something, and then discern which is driving us and why. EM

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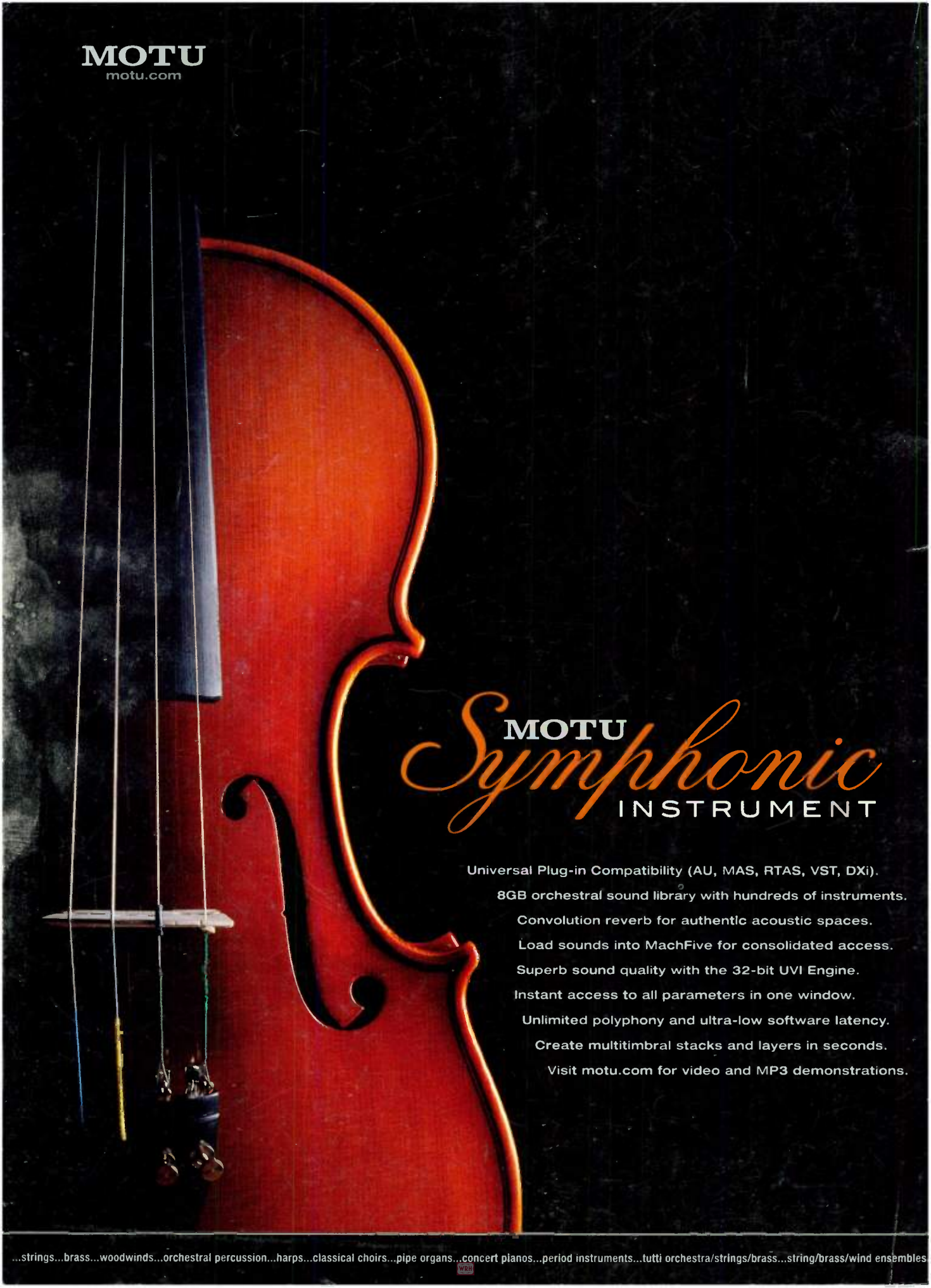

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