Win Big in Our Ultimate Personal Studio Giveaway! Plus 15 Product Reviews!

Electronic Musician®

July 1998

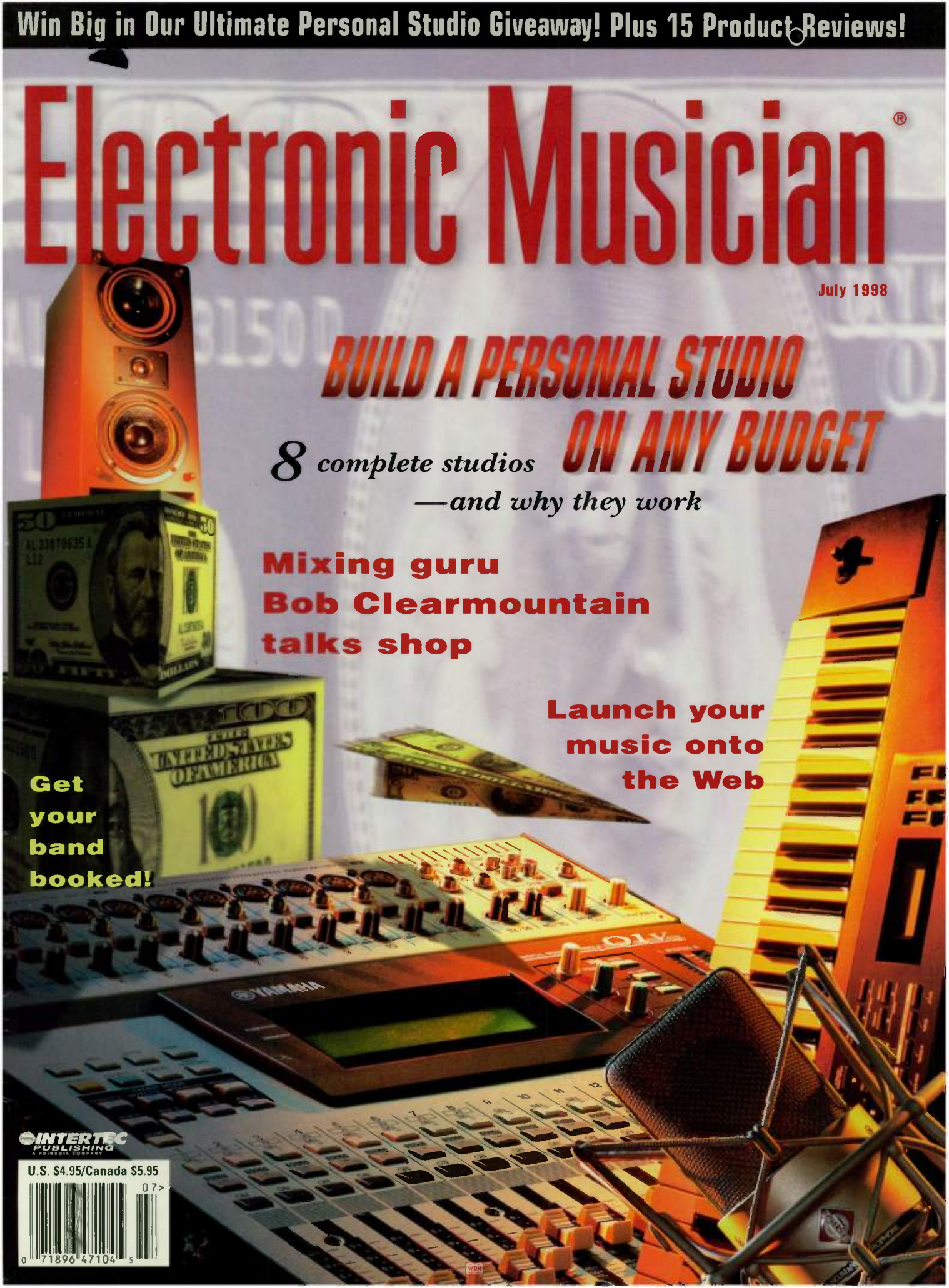
BUILD A PERSONAL STUDIO ON ANY BUDGET

8 complete studios —and why they work

Mixing guru Bob Clearmountain talks shop

Launch your music onto the Web

Get your band booked!



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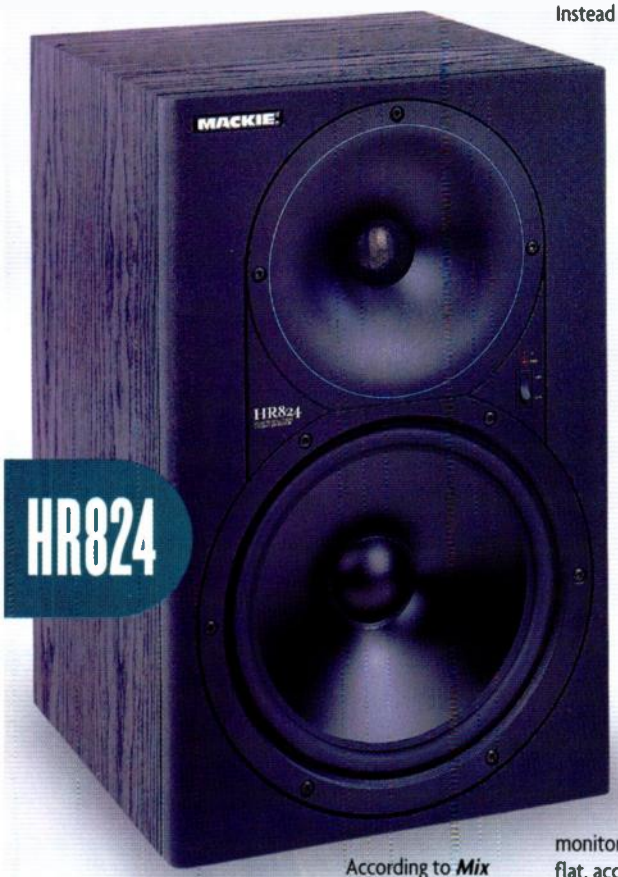
HR824 ACTIVE NEAR FIELD

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



HR824

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

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

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

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

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

Again, *Mix* magazine...

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

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

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

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

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

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

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

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

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

MONITOR—WELL WORTH DISCOVERING.

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

HUMBERTO GATICA, TRIPLE GRAMMY AWARD-WINNING ENGINEER/ PRODUCER

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

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

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

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800/898-3211
www.mackie.com

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

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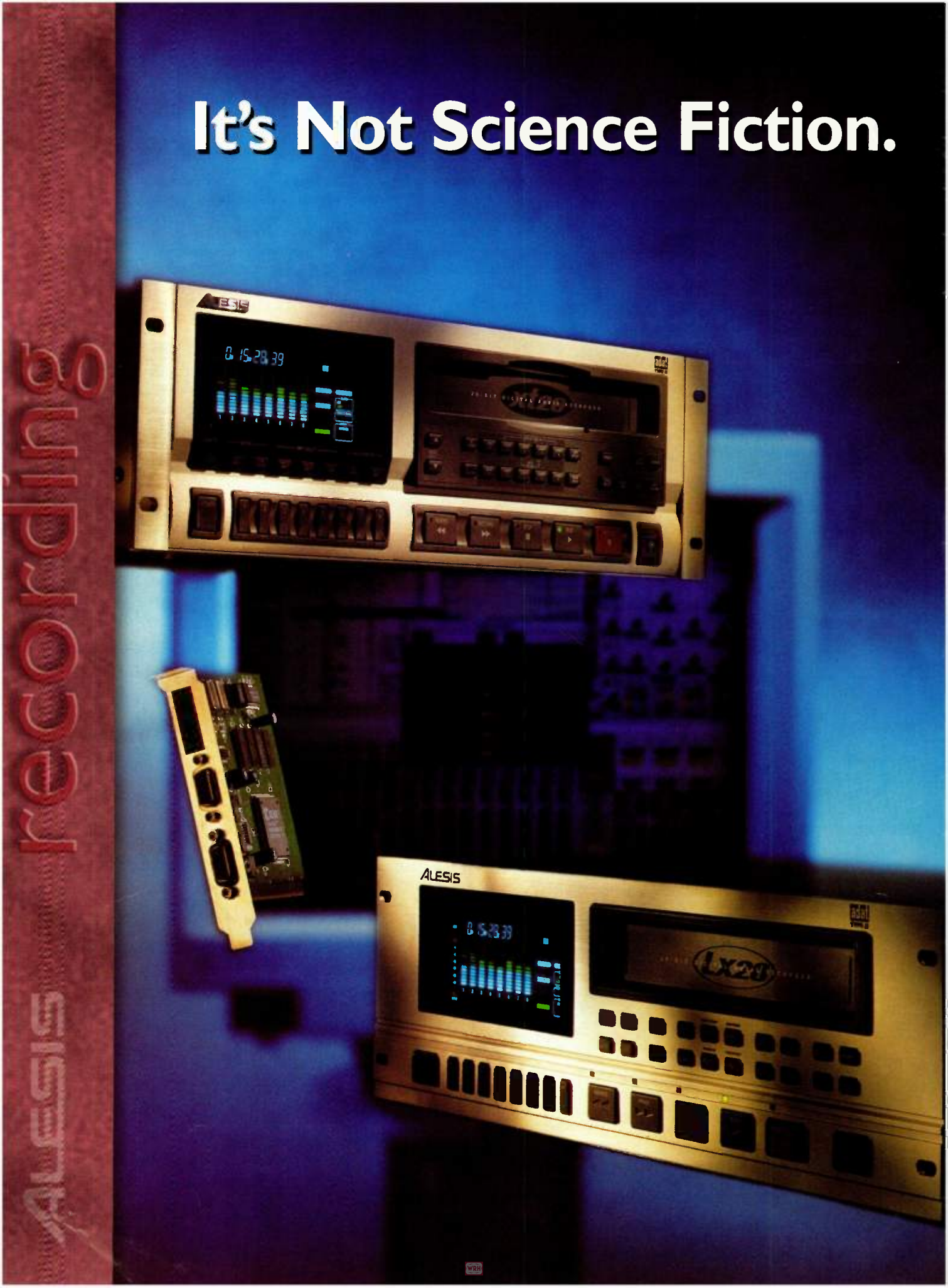
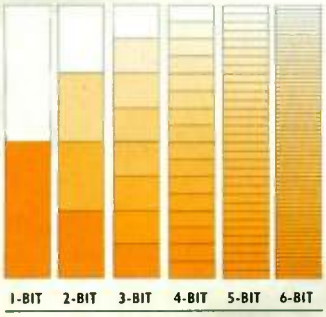
It's Not Science Fiction.



It's Reality.

While the rest of the world is trying to figure out the final frontier of recording formats, you need to make a decision. What's the best choice today that will keep you ahead of the game tomorrow?

The answer: **ADAT Type II**. It's the next generation of Alesis' award-winning digital audio technology that combines the proven power of ADAT with the astonishing fidelity of true 20-bit linear recording.



Every bit you add doubles the resolution of a digital recorder. Compared to 16-bit formats, ADAT Type II's non-compressed, linear 20-bit recording offers a wider dynamic range, less quantization distortion at low levels, more headroom and even lower noise. Result: detailed, full-spectrum audio fidelity that far exceeds the quality of any analog recorder.

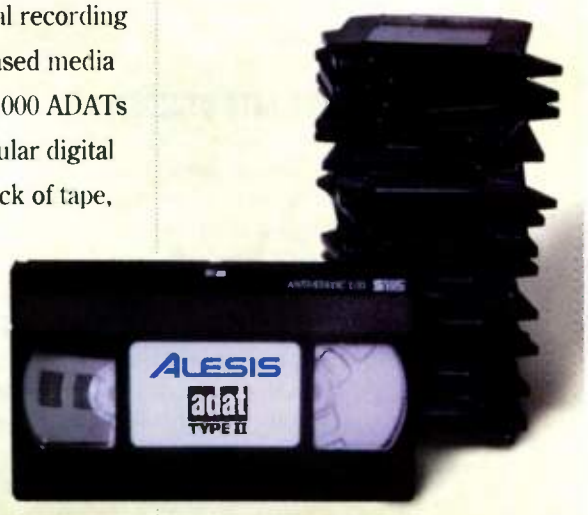
With the new **XT20**™, you get a serious improvement on the world standard for professional recording. The new **LX20**™ is the most affordable ADAT ever made. Both provide all the real-world qualities that made ADAT the most popular professional recording format: modular design, efficient tape-based media and complete compatibility with over 110,000 ADATs around the world. Plus, as the only modular digital multitracks that write 20 bits to each track of tape, the new ADAT Type II recorders offer audio quality that's miles ahead of any 16-bit system, period. And with the introduction of the **ADAT-PCR**™ interface card, you get the advantages of nonlinear editing on your Mac® or Windows® computer seamlessly integrated with ADAT format recording.

Most importantly, the intuitive ease-of-use, comprehensive features and incredible affordability of the ADAT Type II systems put no limits on your creativity. Because, after all, the final frontier is really your imagination.

adat TYPE II

There are over 110,000 ADATs in use today, and the new ADAT Type II recorders are compatible with all of them. The XT20 and LX20 will work with your 16-bit ADAT tapes, and you can combine the Type II recorders in a system with any model of older ADAT.

Don't get fooled by the science fiction of some "24-bit" recording systems. Just read the fine print: the state-of-the-art ADAT Type II recorders offer audio specs that rival any 24-bit system, without resorting to tricks like data compression or track sharing.



If you think tape isn't as advanced as other removable recording media, think again. You'd need more than 30 Zip® disks to equal the 3.4 gigabyte storage capacity of just one inexpensive ADAT tape.

For more information on ADAT Type II, the XT20, the LX20 and the PCR, see your Authorized Alesis Dealer. Or call 800-5-ALESIS to order the ADAT Type II Systems video and brochure ($4.95 for shipping and handling).

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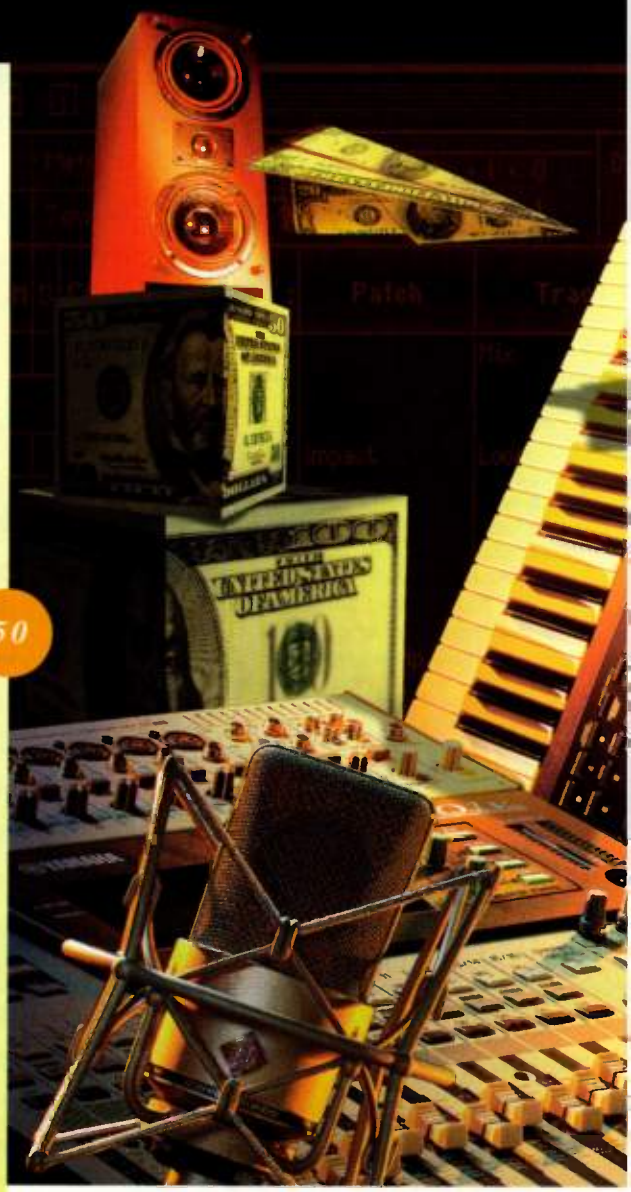
FEATURES



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DEPARTMENTS

Electronic Musician®
JULY 1998 VOL. 14, NO. 7

COLUMNS

REVIEWS

Cover: Photo illustration by Philip Kaake.

The Studio of Dreams

If you build it, they will come.

ANTHONY PIDGEON

I heard the disembodied voice as clearly as if it were coming from our hard-driving publisher. *"If you build it, they will come,"* it insisted. At first I thought I had fallen asleep with the television tuned to *Field of Dreams*. But no, I wasn't dreaming about Kevin Costner constructing a baseball diamond in an Iowa cornfield, and I swear I wasn't smoking corn silk. I was merely contemplating this month's cover story, "Build a Personal Studio on Any Budget."

Believe me, we editors had much to contemplate before we got this story mixed and in the can. It's no picnic planning the gear for eight well-integrated studios within the limits of strict budgets. But the struggle itself was the point of the exercise; we didn't merely spec products, we designed systems, and we explained why we chose each piece. We want you to come away from this article not merely drooling over gear but thinking about your studio master plan.

It is no coincidence that this story and our 1999 *Personal Studio Buyer's Guide* are hitting the newsstands simultaneously. The two were designed together and combine to offer you a systems approach to designing and growing your studio. *PSBG*'s lead feature, "Holistic Studio Design," offers a theoretical framework for designing a complete, integrated studio. Having read that story, go back and reread this issue's cover feature, where we put this theory into practice. The two together should show you the big picture.

Obviously, many **EM** readers don't have to build their studios completely from scratch. You might, however, be considering a redesign or wish to dramatically expand your studio. In either event, the principles introduced in the *Personal Studio Buyer's Guide* and illustrated in "Build a Personal Studio on Any Budget" apply.

"Ease his pain," whispered the mystery voice. Now what the heck does *that* mean? After some thought, the message was clear: designing and building a dream studio—or its foundation—is just the start. Mixing is one of the most difficult and indeed painful stages of production. So Associate Editor Jeff Casey was dispatched to seek the advice of mixing guru Bob Clearmountain on how to ease the pain of mixing or at least, how to achieve worthwhile results. Clearmountain hates giving interviews, but Casey was a man on a mission: he begged and beseeched, and Clearmountain assented. Once you have read "Mixer with the Midas Touch" (p. 98), I think you'll agree that it was well worth the effort.

"Go the distance," hissed the specter. The odds that "they" will come to your studio of dreams are a lot better if you or the bands you produce are getting public exposure by performing live. One way to get those gigs, of course, is through the booking agent. Few of us musicians like dealing with agents, but if we're going to achieve success, we might have to go the distance and learn the ropes. This month's "Working Musician" column discusses the basics of booking—with and without agents—especially for local and regional gigs.

This business of music can lead you to some strange and wonderful places. It has taken me all over this land and led me to work at this magazine, a world I had never even considered. Indeed, if you "build it" and "go the distance," you might reach goals beyond your wildest dreams.

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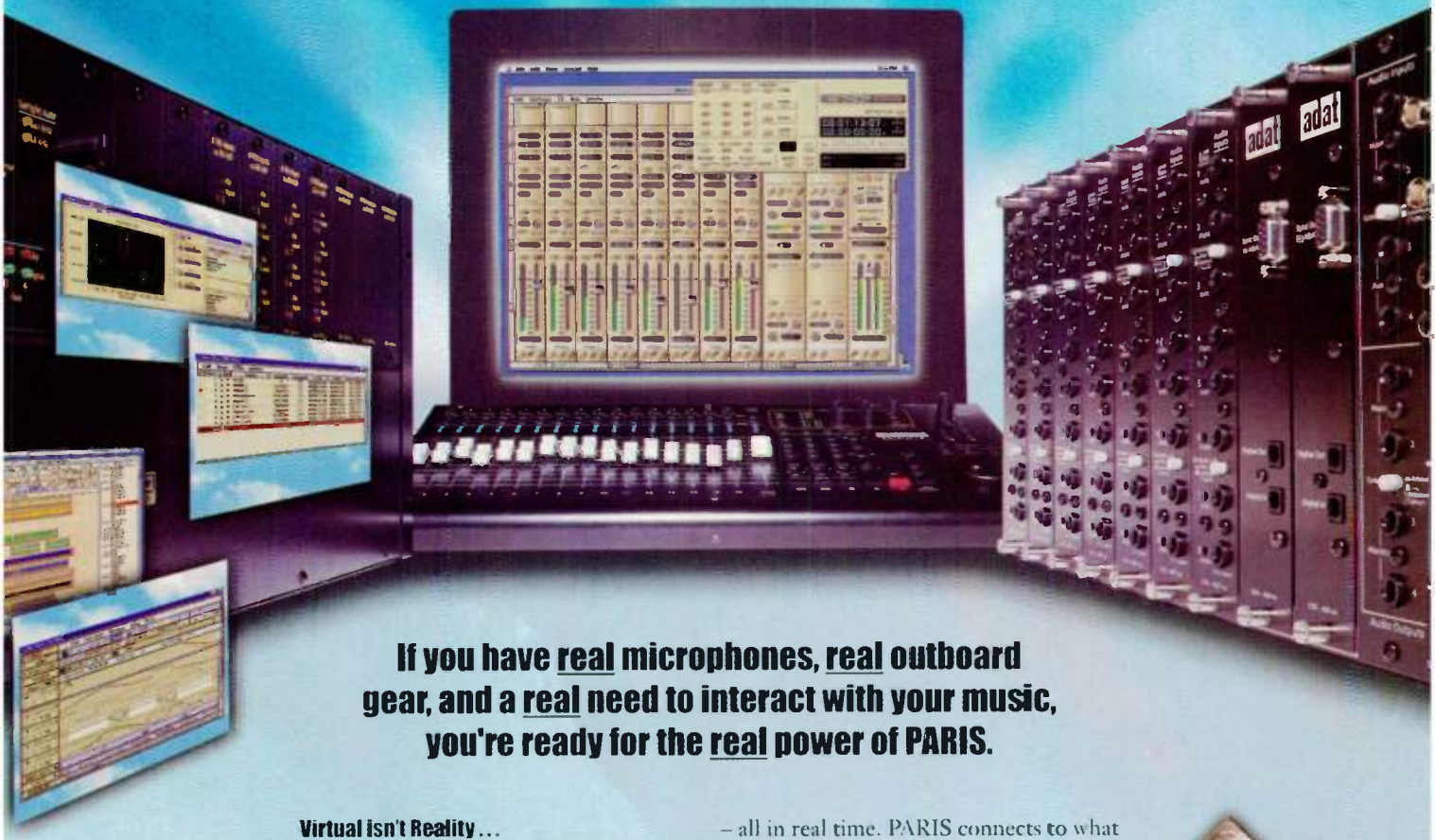
BPA

Software vs. Hardware: A PARIS Perspective



If you have real microphones, real outboard gear, and a real need to interact with your music, you're ready for the real power of PARIS.

Virtual isn't Reality...
Software DAWs fall short when they perform in the real world. PARIS gives you all the advantages of an expandable computer-based recording and editing system. *But there's more.* PARIS adds extensive hardware options, 24-bit inputs and outputs, 100mm faders, and world class signal processing to a single, integrated studio. Combine all that with pedal-to-the-metal *Intelligent* software, and you have the most effective integrated audio workstation in the world.

In with the MEC (Modular Expansion Chassis)...
PARIS stands out because it fits in. The Interface MEC gives you more ways to expand your inputs and outputs than any other digital audio workstation – all with the addictive sound of 24-bit resolution. With all of these ins and outs, you can track live music, mix with outboard effects, import and export to digital tape – all in real time. PARIS connects to what you have – now, and in the future. It fits in.

Out with the Mouse...
How much control could you possibly muster with one measly mouse? **Never enough.** PARIS includes a dedicated control surface that lets you mix your music with all 10 fingers, as nature intended. Put yourself back in control.

A Final Perspective...
One reality you can bet on – PARIS is, by far, *the* most complete integrated studio on earth. *And it's available today!* Compare for yourself. Who else is shipping a 128 track, Mac and PC compatible system, with real-time effects and a dedicated control surface? **No one.**

PARIS – It's time to get REAL!

Get a hands-on demo of PARIS today at one of the new PARIS Display Stations at select ENSONIQ dealers, worldwide.

Download a demo version of PARIS from the PARIS website:

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ENSONIQ
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CREATIVITY WITHOUT COMPROMISE

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

Mix Magazine
1997 AES Report

The concept seems so obvious. Combine a digital disk recorder and a digital mixer in one convenient box. Eliminate complex interfacing and keep everything in the digital domain. Add optional internal effects. Creative heaven. But **up until now,** buying anything that you could afford meant settling for almost enough tracks to record your music. Or a compressed data format that sounded almost as good as CD quality. Or a user interface that you could almost make sense of.

Now, finally, the concept of integrated digital recording and mixing lives up to its promise with Akai's DPS12 Digital Personal Studio. Designed for those unwilling to compromise their creative vision, the DPS12 combines a 12-track random-access digital recorder (with professional-quality uncompressed 16-bit sound and powerful non-linear editing) and a 20-channel MIDI-automatable digital mixer in one compact, incredibly easy-to-use package. All at a price that is nothing short of spectacular. It's **creativity without compromise.**

AKAI professional DPS12

SEE US AT NAMM BOOTH #218

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

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

More Is Better

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

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

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

The Wait Is Over

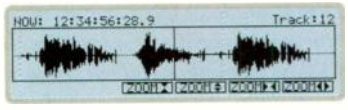
Since the DPS12 is a random-access recorder, waiting for tape to wind is a thing of the past. The DPS12's locating functions let you move instantly to any of 12 quick-locate points and 100 stack memory points. The stack points can even be named, so you can identify locations by the part of the song (FIRST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

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

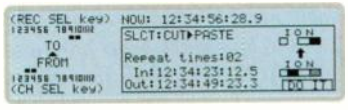
Easy Editing

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

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



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



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

Mix Master

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

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

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

Effects Inside

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

It Wants To Be Your Friend

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

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

Check It Out

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

$1499.00 msrp.

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AKAI professional

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HELP WANTED

I am sorry, but I just don't buy your May 1998 editorial ("Front Page"). *Electronic Musician* staffers must be under this internal illusion that this magazine has always been "of the people." Sure, you get solicitations from various sources, but I'm one "of the people," and I often just feel frustrated by your magazine. The recent "In-Your-Face Mixing" (April 1998) was an exception—an article that really answered some questions for people out here who aren't experts and need some ideas on how to think about things.

It's those types of articles that keep me coming back. I come to your magazine to have my questions answered and thoughts provoked by people with experience. But it's hit or miss whether the magazine does that. I think part of the problem is that there is no place to ask our questions and have really qualified, thoughtful responses. Despite the myriad articles you've published that talk about miking vocals, I *still* have fundamental questions unanswered.

So when you say that "Operation Help" is an example of "for the people," well, I applaud the column in itself, but it does not afford us readers the opportunity to ask deep, probing questions (and sometimes dumb questions, sure, but maybe things aren't as obvious to us) and to get some expert answers. We're still at the mercy of whether the editorial staff thinks the topic will make a good article. There are a small number of real experts with experience. If you look at your number of subscribers, most of them are the ones with the questions, not the answers.

Janet Guthrie-Granja
dgranja@prescott.edu

Janet—Keep in mind that we're writing for a broad group of musicians, so not every article will help everyone. If you find enough of value in each issue to feel you got your money's worth and want to come back for more next month, then we have been successful.

As to being at the "mercy" of the editorial staff's ideas, of course you are! The content of any magazine is determined by its editors. We editors have our jobs because **EM***'s publisher believes we will make good decisions about what to write and how to write it. (Obviously, there's more to the job than that, but you get the point.) That doesn't mean we make these editorial decisions in a vacuum; as I pointed out in my editorial column, most* **EM** *editors are musicians, and we constantly network and talk shop with our fellow musicians. We keep our ears to the ground, and what we learn influences our choice of topics.*

We also place a high value on reader feedback, so if you have questions we're not answering, why not write us a letter (or e-mail) and ask your questions? That, in fact, was the final point I made in my column: we want you to get involved! Please don't be concerned about whether a question seems dumb; if you don't know the answer, you probably have company. Besides, it might turn out to be a much better question than you think it is. Try to state your question as clearly as you can so we can give you a useful answer.

Of course, you can't expect us to troubleshoot your specific system; our job is to publish information of general interest to **EM***'s readers. Product-specific troubleshooting questions and problem-solving should be directed to a users group or to the manufacturer's tech-support staff. (After all, that's what tech-support staffs are for.)*

But if you have questions about the way things work or how to use musical equipment, we'd like to try to help. Even if we can't respond directly—and that usually is the case because answering questions individually is extremely time-consuming—you may well stimulate an article in which we try to answer those questions for our whole readership. The next letter is an example of exactly this process.—Steve O.

MIXING ELECTRONIC MUSIC

The article "In-Your-Face Mixing" by Jeff Casey (April 1998) was well written and informative, especially the parts about dynamic range and compression. But I was disappointed to see that it had nothing to do with electronic music.

I am an electronic musician, which is why I subscribe to **EM**. This article would have been much more informative if the techniques of people such as Sascha Konietzko (KMFDM), Liam Howlett (Prodigy), or Cevin Key (Skinny Puppy, Doubting Thomas, Download) had been focused on. These are people mixing music that is either entirely or almost entirely electronic. Most people probably know little about these artists and producers, but I bet a great many of your readers know who they are.

Please keep this in mind for the next article you do about mixing for your otherwise excellent magazine.

Andy Bouc
Palatine, IL

Andy—Thanks for the compliment! Indeed, "In-Your-Face Mixing" focused primarily on acoustic instruments and the problems specific to them during the mixdown process. Many **EM** *readers incorporate acoustic instruments into their arrangements, and we felt this topic was relevant.*

Mixing is a complicated process, and there are certain issues regarding acoustic instruments that simply don't apply to electronic ones (and vice versa). For example, much of the time devoted to an acoustic mix can be spent trying to recapture the natural sound of a particular instrument, which may or may not have been recorded accurately. That variable (theoretically) doesn't exist when you're working in the land of electronica. On the other hand, mixing synthesized and sampled sounds involves other issues that need to be dealt with.

BEN FISHMAN

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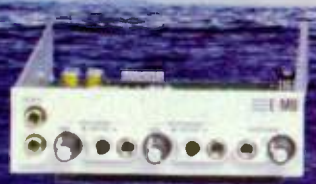

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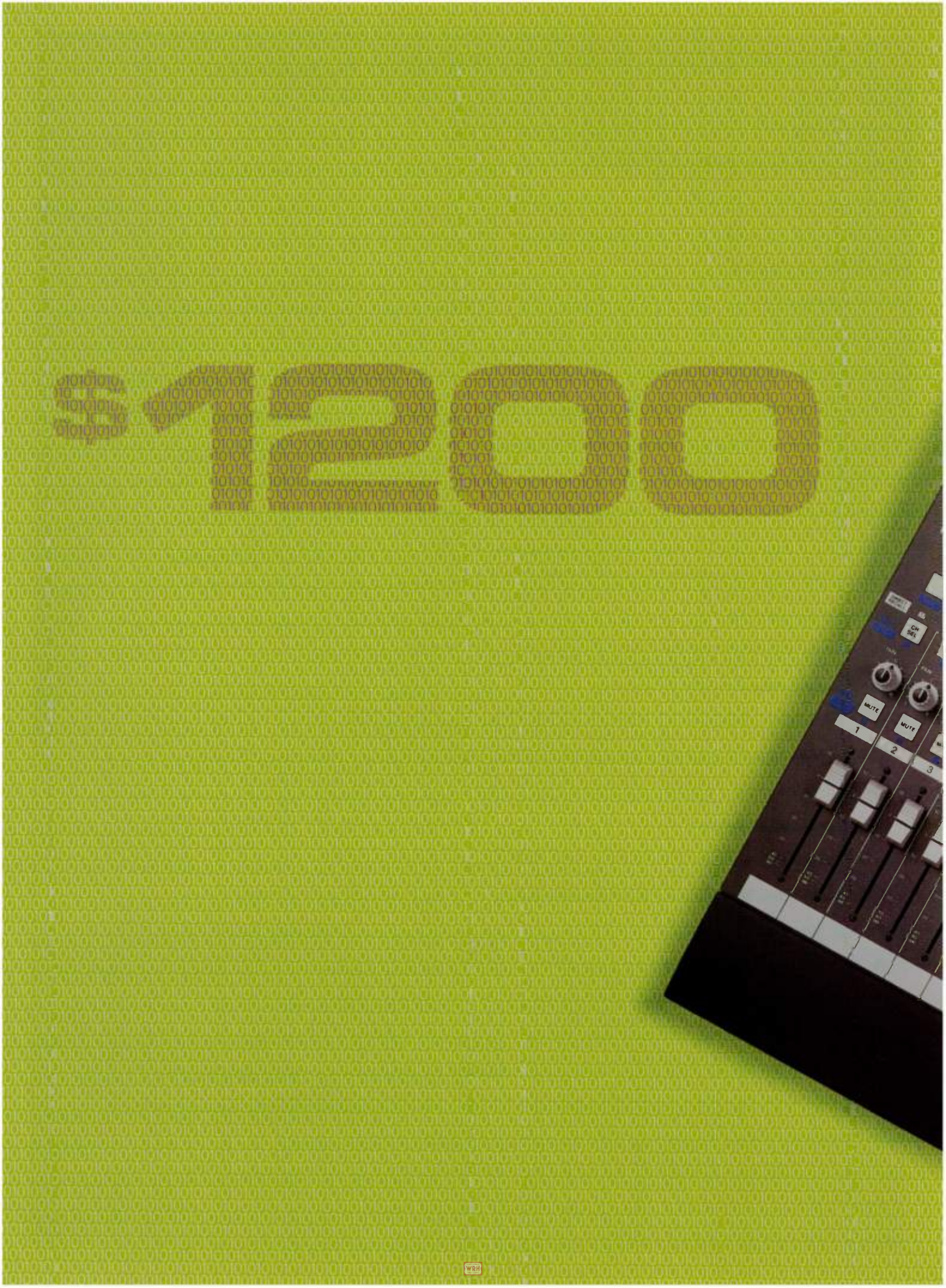
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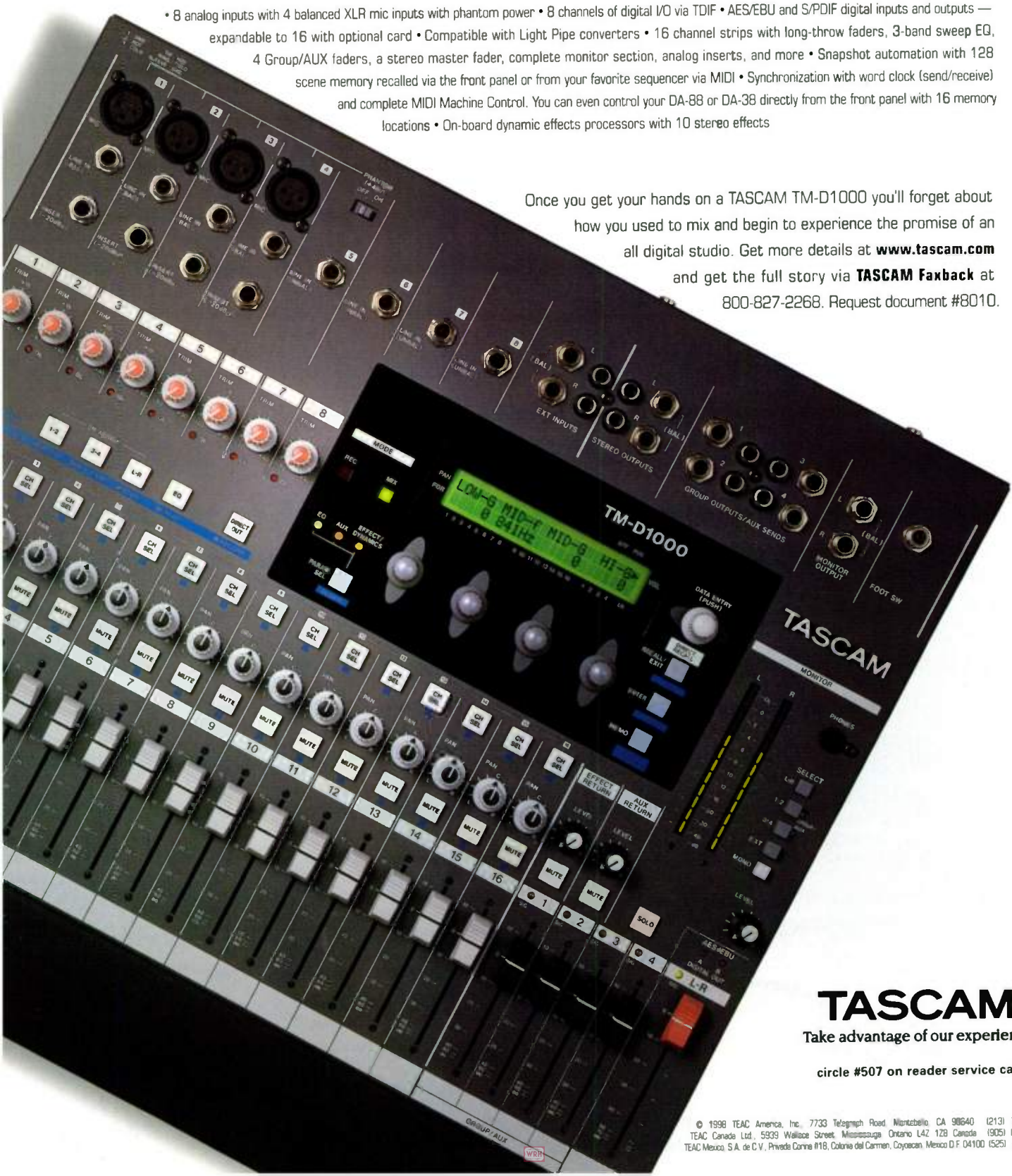

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In the future, look for a piece specifically on mixing with electronic instruments and how to successfully combine them with acoustic tracks.—Jeff C.

DANGER, WILL ROBINSON!

I wonder whether you might know of any shareware or other kind of speech synthesis capable of creating robotic sound, Kraftwerk-style. I have to produce some sound effects that require that sort of speech.

K. Ahang
hamid@megsinet.net

K.—I can think of several approaches that might get you the result you want. Though you didn't mention which computer platform you are on, you should look at www.speech.su.oz.au/comp.speech/Section5/Q5.5.html, where you'll find a number of programs, both commercial and free, that can do text-to-speech conversion. The idea here is that you type the text you wish your "robot" to speak into a text file and have the program read it back to you. The quality of the vocal renderings is "robotic," to say the least.

Another approach would be to manipulate prerecorded vocal samples using the processing features of a digital audio editor. On the PC, Chris Craig's shareware editor Goldwave *(www.goldwave.com) has a flange feature with a "robotic" preset. According to Chris, you might also try using the program's Mechanize effect and experiment with the different settings it offers.*

One final idea is to use a commercial program such as Synoptic's Virtual Waves *(Win). This sound-design software has an FOF module, which is a synthesis method commonly used to produce vocal sounds. The program ships with several "robot" presets that use the FOF method as their main sound source. You could tweak the presets until you get the effect you want, but you probably won't be able to produce a large vocabulary of intelligible words using this approach.—Dennis M.*

K.—I'll add two more possibilities. KAE Labs (www.kaelabs.com) just introduced VocalWriter *for the Mac, which uses your choice of over 85 synthesized voices to "sing" English lyrics you type in, following the*

EM ONLINE

http://www.emusician.com

The debate is heating up in eMusician.com's "Perspectives" forum, where readers can share their opinions on the burning issues of modern music making.

Of course, there's also Karen Dere's "Re:Views" column, our monthly crop of CD reviews. "The Biz," written by Taxi's Michael Laskow, is an ongoing exploration of the online music business.

We have an archive of articles from past issues and a database of industry contacts. We also post files that relate to the articles in the current print edition. All this, and more, awaits your Web browser at **www.emusician.com.**

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"I stopped a mix for Prince of Egypt to use the AD-8000 because it sounds so much better." —Alan Meyerson, engineer with Hans Zimmer.

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notes from a Standard MIDI File. The voices are created using physical-modeling synthesis that models the human vocal tract. Some of the voices are designed to be synthetic or used for special effects, so you might find exactly what you want. This software just arrived this week, so we haven't tested it yet, but the idea is appealing!

There's an easier solution, though: you could process a recorded voice using a ring modulator and pitch shifter to get a more robotic sound. That can be done on a computer (e.g., with Opcode's new Fusion Vocode *DSP plug-in for Mac) or with an outboard hardware effects processor.—Steve O.*

WHAT IS dB?

The other day, somebody asked me why the level reading on a CD player was denoted in dBs with 0 as the maximum and a negative value as the minimum. I dug around for the superb tenth-anniversary issue of **EM** in which you addressed this topic admirably ("Square One: The Wizard of dBs," January 1996). (Being a loyal **EM** reader, I save all my back issues.)

After reading the article again, there is still something I don't understand: When people say, "Humans can hear things at 40 dB," what is the reference? What is this being compared to? I've also heard people refer to "the dB level of sound that causes pain." Wouldn't this be a constant pressure level, not a ratio of something to something else?

Jeb
jebbono@aol.com

Jeb—You pose very astute questions. As you know already, decibels are used to express the ratio *of two values, not an absolute value. In both cases you cite, the decibels refer to* sound pressure level, *and the reference is the minimum sound pressure level that the average young person with undamaged hearing can perceive in the ear's most sensitive frequency range (1 to 4 kHz). The absolute value of this sound pressure level is 0.0002 dynes/cm^2, which is the force exerted by acoustic sound waves over a given area, such as the eardrum. This is the definition of 0 dB SPL, and it has nothing to do with the 0 dB maximum-level reading on a CD player.*

Unfortunately, many people assume the "SPL" part when speaking about sound pressure level decibels and don't use it explicitly, which causes much confusion. When someone says that humans can hear things at 40 dB, they really mean 40 dB SPL, which is 40 dB greater than 0 dB SPL. However, the meaning of this statement is unclear. Do they mean that 40 dB SPL is the minimum sound pressure level that humans can perceive? This is true for frequencies below 50 Hz, but humans can certainly perceive sounds that are lower than 40 dB SPL at higher frequencies, especially in the range of 1 to 4 kHz. The "dB level" that causes pain in most people is 120 to 130 dB SPL.—Scott W.

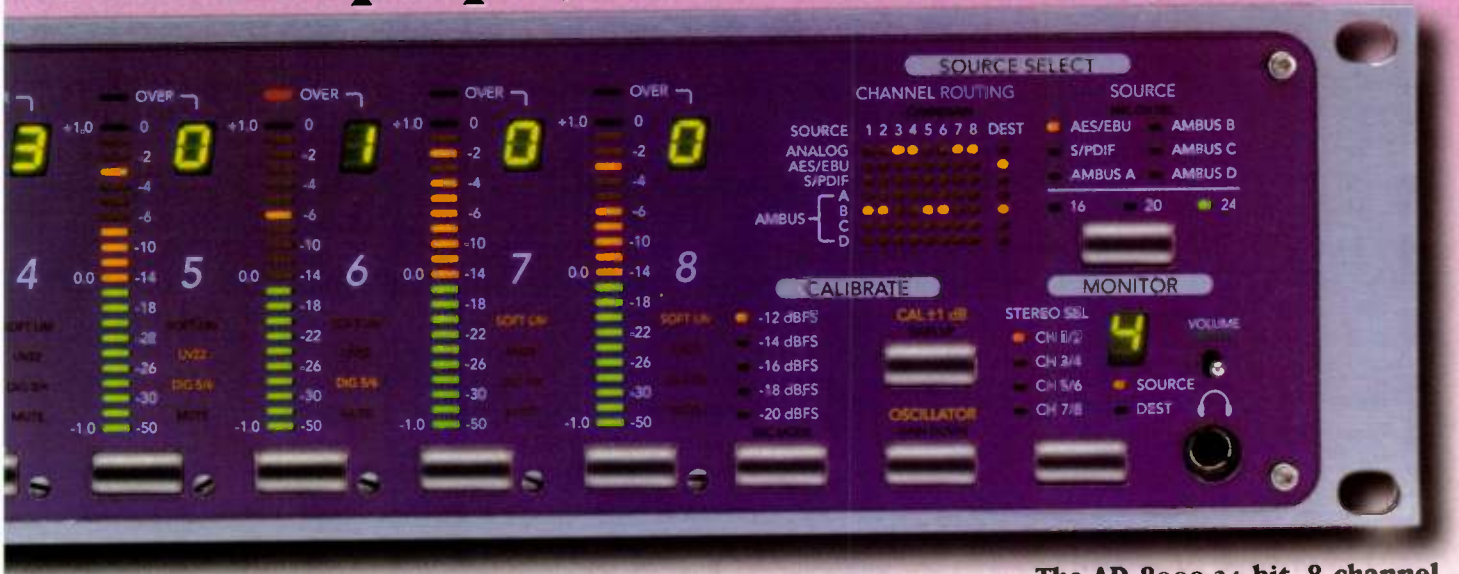
ERROR LOG

June 1998, "Is The SM58 Still King?" p. 46: The Sennheiser E835 is part of the company's Evolution series.

WE WELCOME YOUR FEEDBACK.

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

For these people, there's *no* turning back.



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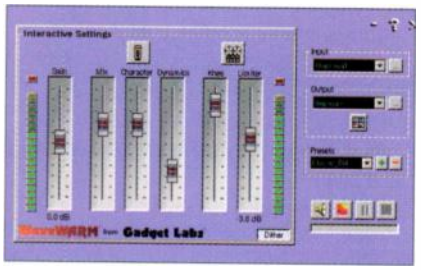
WHAT'S NEW

By Carolyn Engelmann and Rick Weldon



GADGET LABS WAVEWARM

Analog warmth is still the touchstone that digital recordings aspire to, and you can easily bust your budget on tube preamps, vintage mics, and outboard effects in an attempt to heat up your tracks. But if you're trying to get that vintage tube-and-tape sound from your Windows recording setup, check out Gadget Labs *WaveWARM* ($99). Functioning either as a stand-alone WAV-file processor or as a DirectX plug-in, the program simulates the compression that results from analog-tape saturation and the mild distortion associated with vacuum tubes. You get real-time preview with control over gain, wet/dry mix, distortion character and dynamics, compression, and limiting.

You can store and recall settings; eight presets are provided. In addition, there's an optional dithering feature. The program uses 32-bit processing. A 120 MHz Pentium and Windows 95 or NT is needed. Gadget Labs; tel. (503) 827-7371; fax (404) 685-0922; e-mail info@gadgetlabs.com; Web www.gadgetlabs.com.

Circle #401 on Reader Service Card

LEXICON MPX 100

Audio products just keep getting less expensive while including more features, and Lexicon's MPX 100 ($249) is a great example. The discrete stereo processor offers 240 preset effects, including tremolo, rotary, chorus, flange, pitch, detune, delay (up to 5.7 seconds), echo, and ambience, plate, chamber, and gate reverbs. You also get sixteen user program locations.

Dual-channel processing allows you to put separate effects on the left and right channels; an Effect/Balance knob lets you adjust the level and balance of the two effects. Effects parameters can be manipulated with an Adjust knob, and Effects Level, Adjust, Bypass, and Tap parameters can be controlled via MIDI.

The unit features 20-bit A/D and D/A converters and 24-bit internal processing. Ports include ¼-inch unbalanced inputs, ¼-inch balanced outputs, a ¼-inch headphone jack, MIDI In and Out/Thru, a ¼-inch footswitch input, and 20-bit S/PDIF digital output on an RCA jack.

Frequency response is rated at 20 Hz to 20 kHz, S/N at >95 dB, and THD at <0.05%. Dynamic range is rated at >95 dB (unweighted) for analog output; >100 dB (unweighted) for digital output. Lexicon, Inc.; tel. (781) 280-0300; fax (781) 280-0490; e-mail info@lexicon.com; Web www.lexicon.com.

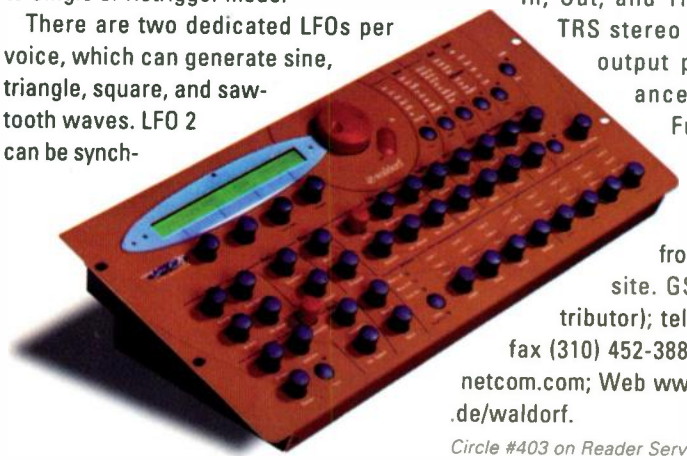
Circle #402 on Reader Service Card

WALDORF MICROWAVE XT

A striking, burnt-orange casing houses the third generation of MicroWave products from Waldorf: the new MicroWave XT ($1,995). Each of the 5U rack-mount synth's ten voices has two simultaneously usable oscillators and two Wave Generators that draw from 64 ROM wavetables and 32 RAM wavetables, each containing 64 waves.

Each voice has two filters. The first can operate as lowpass or highpass, with a 12 or 24 dB/octave slope, or as bandpass with 12 dB/octave slope. The second filter can be lowpass or highpass, with a slope of 6 dB/octave. Each voice also features four envelopes, each of which can be set to Single or Retrigger mode.

There are two dedicated LFOs per voice, which can generate sine, triangle, square, and sawtooth waves. LFO 2 can be synchronized to LFO 1, or both can be synchronized to MIDI Clock. Such classic analog features as ring modulation and sample-and-hold are also provided. A programmable arpeggiator is included, which syncs to MIDI Clock.



The MicroWave XT features a 16-slot modulation matrix with 31 sources (including both Channel and Poly Aftertouch) and 31 destinations. There are also effects such as flanger, delay, overdrive, and phaser.

The unit has 44 data dials, two buttons, and an LCD for making parameter changes, and all parameter edits are sent and received as MIDI Control Change messages. Ports include MIDI In, Out, and Thru; one ¼-inch TRS stereo in; and two L/R output pairs on unbalanced ¼-inch jacks. Future software upgrades will be available free of charge from Waldorf's Web site. GSF Agency (distributor); tel. (310) 452-6216; fax (310) 452-3886; e-mail gsfa@netcom.com; Web www.waldorf-gmbh.de/waldorf.

Circle #403 on Reader Service Card

ROLAND MC-505

Roland's MC-303 Groovebox made a big splash on the techno and hip-hop scene a couple of years ago, winning fans among deejays and dance-music mixers. Now, Roland has followed up with a new dance machine, the MC-505 Groovebox ($1,595).

The MC-505 retains the silver, retro-style front panel that recalls the analog days, but this box has an innovative feature: the D-Beam infrared controller. Using Dimension Beam technology licensed from Interactive Light (see the review in the July 1996 **EM**), the D-Beam lets you control effects or sounds with hand or body movement by interrupting an infrared light beam. For example, you can use the D-Beam to improvise melodies theremin-style, control the tempo of a sequence, or control any Groovebox effects.

The 24 MC-505 effects include goodies like Step Flanger (changes pitch in steps synched to tempo), Phonograph (simulates record-player noise), and Slicer (rapidly mutes and unmutes the signal in sync with the beat), in addition to more basic effects, such as reverb, chorus, and delay.

Under the MC-505's hood is a full JV-1080 synth engine. Many parameters can be accessed from the front panel, and all can be accessed via MIDI. The synth includes 512 patches and 26 onboard rhythm kits, among which you'll find both the latest dance-music sounds and classic Roland drum and synth sounds (TR-909, Juno, etc.).

The Groovebox provides 714 preset, editable dance patterns in lots of styles, including trance, ambient, drum 'n' bass, funk, hip-hop, and more. With the Megamix feature, you can create original patterns on the fly by combining elements of different preset patterns, for example, taking the rhythm from one pattern and the bass groove from another and combining them with the melody from a third.

The onboard, 8-track sequencer is pattern based and has a 95,000-note internal capacity; external storage is available on 2 MB or 4 MB SmartMedia cards, giving you the additional capacity of up to 480,000 notes. The MC-505 also sports full MIDI control and 64-note polyphony. Roland Corporation U.S.; tel. (213) 685-5141; fax (213) 722-0911; Web www.rolandus.com

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MIDDLE ATLANTIC PRODUCTS RACKS

You practically live in your studio anyway—why not give it a classic, homey look with oak-laminate racks from Middle Atlantic Products? The new racks are designed to be aesthetically pleasing, professional-looking, durable, and reasonably priced.

The OBRK series (starting at $169) comes in 8-, 12-, 16-, and 20-space sizes, each measuring eighteen inches deep. The OSR series (starting at $300) are slope-front units and are available in 16- and 24-space sizes that measure 19½ inches deep at the top of the rack and 23 inches deep at the bottom. Each of the OSR models comes equipped with a steel-caster base and wheels so you can keep your gear within easy reach and can shift the rack when you need to access the rear connections.

The racks are put together with ¼-turn fasteners, making them very easy to assemble with the provided tool. The fasteners are not visible on the outside surface, giving the racks a sleek look. Middle Atlantic Products; tel. (973) 839-1011; fax (973) 839-1976.

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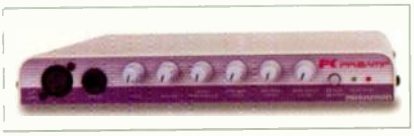

ROCKTRON PC PREAMP

Turn your PC into a practice amp or personal studio with Rocktron's PC Preamp ($329). The unit plugs right into your sound card's mic input with a provided ⅛-inch cable, giving you a convenient instrument and mic pre that fits snugly under your monitor. Both ¼-inch and XLR inputs are included on the unit's front panel, and there's an auxiliary input on the back.

You can choose between a clean mode that adds just a little compression for punch and a distorted channel with controllable gain and noise reduction. Other controls include EQ shape and a digital emulation of a vintage-style spring reverb. The preamp also has a stereo effects loop so you can use any external effects box. Rocktron; tel. (800) 432-7625 or (248) 853-3055; fax (248) 853-5937; e-mail rocktron@eaglequest.com; Web www.rocktron.com.

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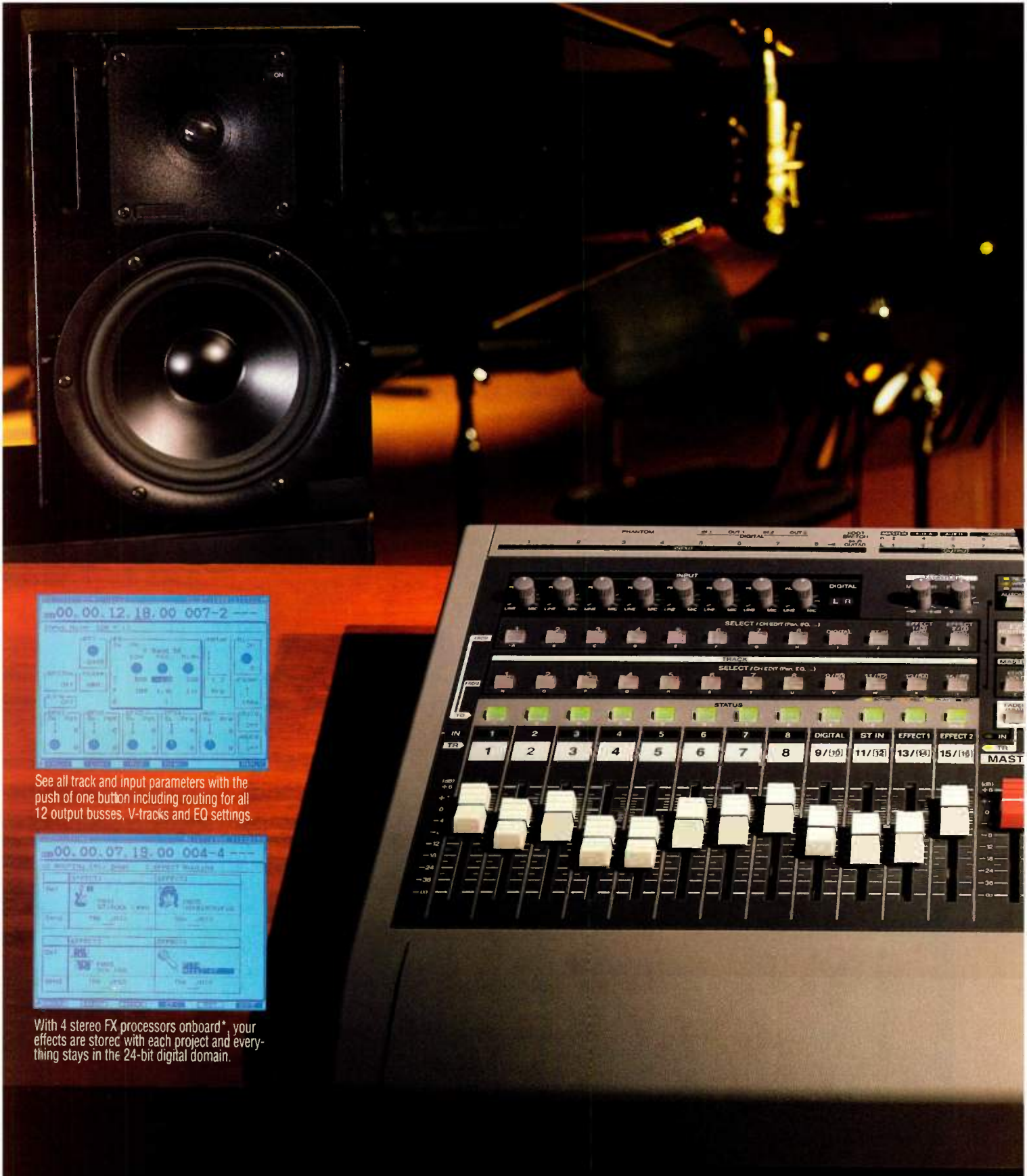

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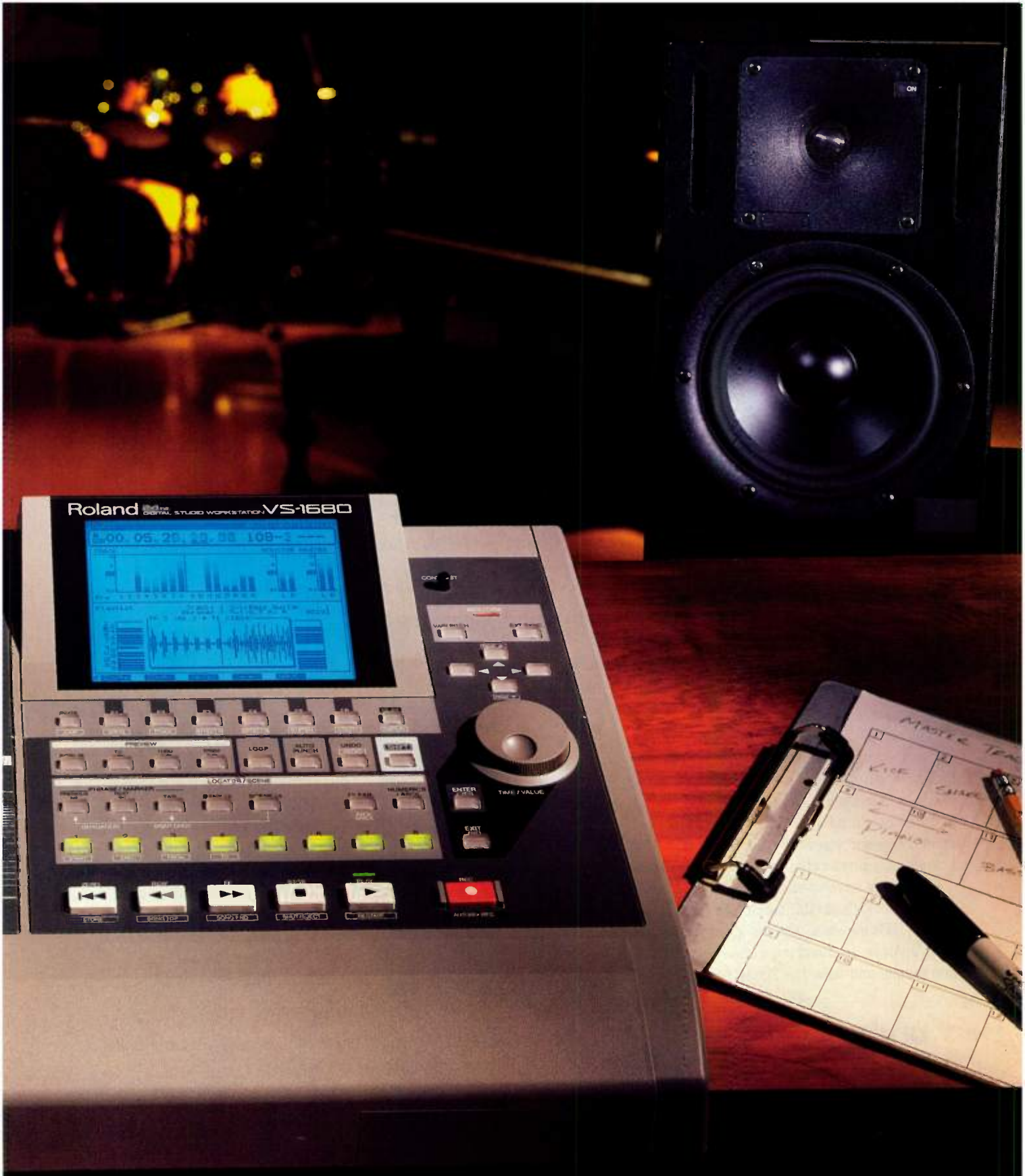

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▶ GALILEO DESIGNS MIDI WAVE

Galileo Designs' *MIDI Wave* ($129) is a software sample-playback synth for Windows 95 that offers 8- to 32-note polyphony (depending on resources and the complexity of the patch). It works with Direct Sound–compatible sound cards and uses SampleCell and Downloadable Sound (DLS) sounds.

MIDI Wave can play mono or stereo, 8- or 16-bit samples. It allows up to four layers and sixteen multisamples per voice. Each voice can have a 2- to 64-stage gain envelope, a gain LFO, and one band of parametric EQ. You can microtune the pitch for each voice. You also get pitch shift, reverb, and chorus effects.

You can trigger *MIDI Wave* sounds from a MIDI keyboard; according to the developer, lag time is negligible. The program comes packaged with *MIDI Connect,* which routes MIDI messages between up to eight applications. The *MIDI Wave Engine,* a run-time version of *MIDI Wave* that developers can include in their applications, is available separately for $499. Galileo Designs, Inc.; tel. (408) 973-7812; fax (408) 725-8885; e-mail sales@galileodesigns.com; Web www .galileodesigns .com.

Circle #407 on Reader Service Card

▼ JOMOX SUNSYN

New from German manufacturer Jomox is the SunSyn ($2,900), an 8-voice analog synth. Each voice has two analog oscillators with classic discrete transistor circuitry and two digital oscillators. The analog oscillators generate sawtooth and rectangle waveforms, and the digital oscillators draw from 256 complex waveforms. Each oscillator has its own volume knob.

Each voice has a resonant, 4-pole analog filter; you can set the cutoff frequency for each pole independently and make it lowpass or highpass. All filter parameters can be stored in two scenes for instant recall, and you can morph between scenes with a dedicated knob.

Four-stage envelopes are hard-wired to the amplifier and filter cutoff. You also get two LFOs per voice with triangle, sawtooth up/down, and rectangle waveforms and sample-and-hold. The SunSyn uses a modulation-routing system that provides four Routing Elements for each voice. For each Routing Element, you set one or two modulation sources from two menus of eight choices. You can choose one modifier for the sources, again from a choice of eight, including a MIDI controller. The eight modulation destinations include oscillator frequency or pulse width; filter cutoff or resonance; the filter's audio input; or amplifier amount.

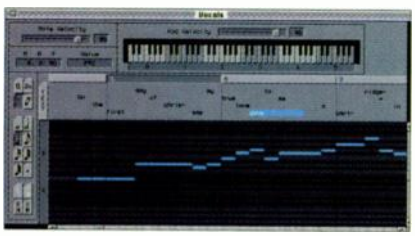
Editing is done with 40 front-panel knobs, an LCD display with soft controls, and a 3-digit LED display. All knob and button edits are sent and received as MIDI controller data. The onboard memory holds 256 waveforms, 350 Single patches, and 150 Multi patches. About half the slots are factory loaded. There's also a PCMCIA slot for additional storage; each 16 MB card holds as many programs as the internal memory.

In addition to L/R stereo outs, the SunSyn has an individual out for each voice. There are also two ¼-inch inputs for external audio or control voltages. The ¼-inch headphone out has its own volume knob. The unit can be mounted in six rackspaces (plus one more for the jacks on the back panel) or used as a tabletop console. SoundBox (distributor); tel. (213) 769-5510; fax (818) 822-0110; e-mail soundboxla@aol.com.

Circle #408 on Reader Service Card

▼ KAE LABS VOCALWRITER

Make your compositions really sing with KAE Labs' *VocalWriter* ($99), a Mac software synth that lets you add vocal sounds to your music. The program "sings" lyrics you type in and assign to notes in a Standard MIDI File. A phonetic dictionary with over 100,000 entries allows the software to "pronounce" individual phonetic units, which can then be edited for a realistic language sound.



The vocal sounds are generated with a new acoustic modeling technology called Resonant Articulatory Synthesis, which models the human vocal tract. This lets the program re-create the shape and sound of each word. You get 85 voice models, ranging from realistic voices to special effects. In addition, you get a full set of General MIDI instruments for creating a complete instrumental accompaniment.

The synth is 4-voice polyphonic and multitimbral for vocal tracks and 48-voice polyphonic overall. MIDI controllers can be mapped to parameters such as Brightness, Breath, Portamento, and Vibrato.

You can download *VocalWriter* from KAE Labs' Web site for a 15-day free trial. System requirements are a Power Mac with 16 MB of RAM and Mac OS 7.5.3 or later. KAE Labs; e-mail kae@kaelabs.com; Web www.kaelabs .com

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WANT THE BEST OF BOTH WORLDS?

ANALOG DIGITAL

MOTU

2408 Digital Hard Disk Recording System

A R T

APPLIED RESEARCH AND TECHNOLOGY

Pro MPA and VLA Modules

Analog or digital? Chances are, you want the best of both worlds: the warmth and creative flexibility of tube processing and the exacting clarity and editing ease of digital recording. Too expensive? Think again! Enter the amazing 2408 Hard Disk Recording System from Mark of the Unicorn and the lush Pro MPA stereo tube mic preamp and Pro VLA stereo tube Compressor from ART. These devices complement each other perfectly, bringing a wide range of creative power to your rig. Sure, you could spend more than four times as much to get the same sonic quality and features. But don't you have better things to do with your money? Let's take a look at what makes these products so special . . .

With Mark of the Unicorn's 2408, you get up to 24 simultaneous digital inputs and outputs, 8 channels of analog I/O and as many tracks as your computer allows, 16-bit recording (expandable to 24-bit), digital I/O to connect with ADAT, DA-88 and S/PDIF and much more, all for under $1,000! It even works as a stand alone translator between ADAT, TDIF and analog. Connect up to three 2408s for 72 inputs and outputs! Works with your choice of Mac or Windows computers and a wide variety of music software including MOTU's award winning Digital Performer sequencing/recording package. Cut, copy and paste any portion of your performance for unsurpassed editing ease. Just add the 2408 and your home computer rocks! It becomes a professional digital audio workstation with power far beyond limited tape-based or stand-alone systems.

The 2408 is one of the hottest new products we've ever had at Sweetwater. It's great by itself or in combination with a tape-based system such as ADAT or DA-88. If you've been wanting the ease and power of random access multitracking but were waiting for a more economical approach, your time has come. With the money you save on the 2408 over other systems, you can buy yourself an amazing computer to run it on!

Classic tube preamps and compressors have become hot commodities, costing thousands of dollars. What if you could have all of the sound, coupled with today's low-noise, high-reliability design advancements for a fraction of the cost? The processors from ART give you that vintage sound to warm up your digital recordings. Hit them softly for a clear, transparent sound. Crank it up to add more "heat." Check out some industry raves:

"Useful on all kinds of sessions . . . whisper-clean or add a nice warm thickness. The Pro MPA is great for making mid-priced mics sound like pricey, big-ticket models. An excellent value. ART has a winner on its hands." — *George Peterson, Editor, Mix Magazine*

"Every manufacturer loves to use buzz words like transparency, warmth, and musicality. For my money, ART is justified in using exactly those words to describe the Pro VLA . . . One of the few products I have encountered that has caused me to rethink the way I work in my studio. ART has built a real winner." — *Jim Miller, Electronic Musician*

Electronic Musician 1998 EDITORS CHOICE

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SOUND ADVICE ▲ ▲ ▲ ▲

▲ SONIC REALITY

Add high-quality string and piano samples to your sound repertoire with *Interactive String Section* ($299 CD-ROM) and *Concert Grand Pianos* ($199 CD-ROM; $99 audio CD). These new sample libraries are part of Sonic Reality's "Studio Collection" series. *Interactive String Section*, available in Akai S1000 and Roland S-700 formats, lets you construct virtual string ensembles by combining the string samples. Violin, viola, cello, and bass are represented in both solo and ensemble and in various playing styles, including legato, marcato, tremolo, and pizzicato.

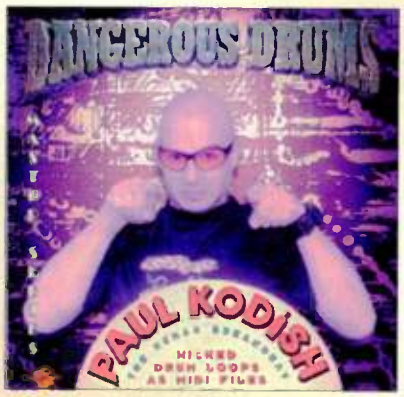
Top-flight Yamaha pianos were used on *Concert Grand Pianos:* a C7 was recorded in a professional studio and a C9 9-foot grand was recorded in a concert hall for natural ambience. The full range of the keyboard is represented on both pianos, played at multiple velocities to allow for a wide dynamic range. Also included are samples of notes with the damper released to capture the resonance of the harp. Looped and unlooped files are available in sizes from 16 MB to over 120 MB. This library is currently available in Akai S1000 and Kurzweil K2000/K2500 formats.

Sonic Reality recommends a minimum of 16 MB RAM and 24-note polyphony to take full advantage of the "Studio Collection" libraries. Additional native format versions, such as Digidesign Sample Cell, will be available soon. Sonic Reality Productions; tel. (800) 232-6186 or (818) 784-3088; fax (818) 784-3018; e-mail sales@sonicreality.com; Web www.sonicreality.com.

Circle #410 on Reader Service Card

▼ KEYFAX SOFTWARE

So you have an arsenal of hot drum sounds but you can't play a tight drum fill to save your life. Not to worry: Keyfax Software found someone who can. The third volume in Keyfax's "Master Series," *Dangerous Drums* ($39.95), delivers a collection of MIDI files on floppy disks that contain burning beat patterns performed by "human breakbeat" Paul Kodish. The files can be loaded into your computer or workstation and used with any synthesized or sampled sound you have. Because they



are MIDI files instead of samples, they are easy to edit. In just minutes you can loop, sequence, transpose, and otherwise tweak them to fit your needs.

Dangerous Drums provides basic patterns, breaks, and fills that you can easily assemble into a complete drum track. The collection includes more than 500 drum grooves in a wide variety of styles, from swing and shuffle to high-octane drum 'n' bass, performed by Kodish on a Roland TD-7 MIDI drum controller. All files come to you unquantized to provide that raw, live feel. Keyfax Software; tel. (408) 460-0172; fax (408) 460-0173; e-mail us@keyfax.com; Web www.keyfax.com.

Circle #411 on Reader Service Card

▼ POCKET FUEL

Two new drum CD-ROMs have been added to Pocket Fuel's Rhythmic Architectural Design Systems series. Volume 2, *Multi-Track Drum Patterns,* and volume 3, *Multi-Track Hihats & Rides,* are both available in Mac (SDII) and PC (WAV) formats ($99.95 each). The discs contain short loops that can be combined into phrases in a digital audio workstation.

Multi-Track Drum Patterns is divided into eight tracks: bass drum miked inside, bass drum miked outside, snare, hi-hat, left and right tom mics, and left and right overheads. The loops are eight to ten measures long, comprising a theme loop with hats, a bar or two without hats, a lead, and a fill. There's also a section of individual drum and cymbal samples.

Multi-Track Hihats & Rides has three tracks: two overheads and one close mic. There are about 125 loops on this disc, each with a theme and variations (e.g., different snare placement, fills, etc.). These loops are designed to work with those on volumes 1 and 2, with naming conventions that help you match up compatible loops.

Custom configurations, such as 20- or 24-bit audio, 48 kHz sampling rates, and premixed 2- or 4-track versions are available. Pocket Fuel Productions; tel. (888) 643-8263 or (212) 726-1341; fax (718) 403-0913; e-mail radsinfo@pocketfuel; Web www.pocketfuel.com.

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Hit record?

Hit "record."

The D8 Digital Recording Studio includes everything you need to record and mix your music. An 8-track recorder, a 12-channel mixer, onboard effects, a built-in 1.4GB hard drive and a whole lot more.

Because the D8 is easy to operate and uses the familiar concepts of analog tape recording, you can record and mixdown your songs in high quality digital audio without going through a long, frustrating learning curve.

And because it's digital and uses no signal-robbing data compression, it delivers consistently great sound quality—no matter how many times you bounce tracks.

State-of-the-art features like programmable snapshot memory make mixing a snap—the fader, EQ and pan settings can be memorized as a scene, up to 20 scenes per song. And with 130 digital effects programs (50 different types) you can add just the right studio polish to your all-digital final product.

With superior sound, simple operation and a low $1250 list price, the Korg D8 delivers everything you need to make your dream of making it big a reality. See your authorized Korg dealer today, and we just might see you on the charts in no time.

circle #511 on reader service card

KORG *D8 Digital Recording Studio*

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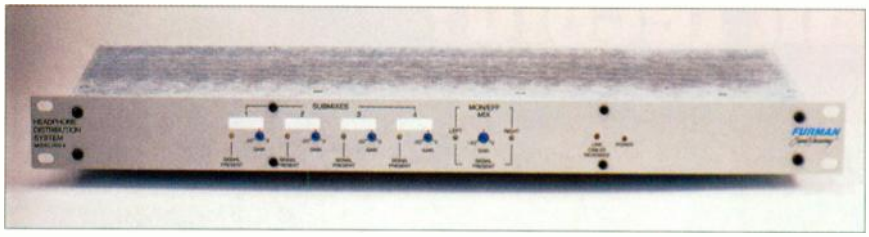
www.korg.com • Tech support: (516) 393-8737 • For more information about the D8 Digital Recording Studio via fadback call: (516) 393-8530 doc # 4101

KEY CHANGES

A major dispute apparently has arisen between **Cakewalk Music Software** and **Opcode Systems**. Cakewalk has hired Don Williams, the developer of Opcode's *Overture* notation software for the Macintosh, and has announced that it has also acquired the rights to the software. The Massachusetts-based company says it plans to release an upgrade in the second quarter of this year. However, according to California-based Opcode, the company still owns the rights to proprietary source code that is derived from *Overture*. Opcode says it plans to drop the Overture name but integrate the program's notation features into *Studio Vision Pro* as well as release standalone notation software for both Macintosh and Windows. According to published reports, Opcode is considering taking steps to protect its alleged interests...**E-mu**'s E4-series samplers running EOS 3.0 support 8 and 16 MB Flash ROM ($895 and $1495, respectively), allowing for permanent onboard storage of custom ROM sound banks. These can then be used simultaneously with RAM-based sounds. Also shipping is ESI 3.02 ($99.95) for the ESI-32. The software adds eighteen new filter types, support for hard drives up to 4 GB, enhanced support for Iomega Zip and Jaz drives, and a digital harmonic enhancer...**TC Works,** a division of TC Electronic, is shipping *Native Essentials* ($349), a DirectX plug-in that includes reverb, 3-band parametric EQ, and hard- and soft-knee compressor functions...**Digital Audio Labs** has announced that Qsound's *QTools,* AnTares's *Auto-Tune,* and Waves' DSP bundle are available for DAL's V8 hard-disk recording system. The plug-ins operate in real time.

—Steve O. and Rick Weldon



▲ FURMAN HDS-6 AND HR-6

The bass player needs to hear more kick, the guitarist wants more snare, and the singer can't hear herself at all. But with Furman's new personal headphone-distribution system, every musician in the studio can control a personalized headphone mix. The system consists of the HDS-6 signal distribution unit and up to eight HR-6 remote mixers ($349 for HDS-6 and one HR-6; $129 for each additional HR-6).

The HDS-6 is a rack-mount unit that provides power and grounding in addition to high-current, buffered signals for the HR-6 mixers. It has balanced ¼-inch inputs and can be connected to your mixing console with either balanced or unbalanced cables.

The HR-6 is a compact, 6-channel, 5-pot mixing station that can be mounted on any mic stand, allowing musicians to customize their own headphone mix and listening level without the engineer touching the board. The unit has four mono pots for control of four channels or buses from the console as well as one stereo pot for a main control-room mix, stereo effects return from the console, or two more mono channels. The HR-6 also provides a Submixes Included/Excluded button that allows the user to isolate the stereo source.

Multiple HR-6s can easily be linked to one HDS-6 in a daisy chain using any standard ethernet cables. A pair of cables and a mic stand clip come with the HDS-6/HR-6 bundle. Furman Sound; tel. (707) 763-1010; fax (707) 763-1310; e-mail info@furmansound.com; Web www.furmansound.com.

Circle #413 on Reader Service Card

▼ HUGHES & KETTNER ROTOSPHERE

Portable Leslie simulators have been popular for years, but it's noteworthy when a company known for its tube-based instrument preamps jumps into the fray. Hughes & Kettner's Tube Rotosphere pedal ($499) uses analog circuitry and tube technology to reproduce the warm, expressive sound of a rotary speaker.

The 6 x 7-inch stomp box features a footswitch for alternating between preset fast and slow speeds with acceleration and deceleration. A Breaker switch quickly decelerates the rotation to a complete stop. The effect includes both a high-frequency "tweeter" and a low-frequency "woofer" that respond independently to rotation-speed changes.

A Balance knob allows you to adjust the relative levels of the two speaker sections, and a Drive knob controls a Leslie-like "growl," which is produced using a 12AX7A tube. An output level knob and bypass switch are also provided.

Input and output jacks are provided for both mono and stereo; stereo capability enhances the expressiveness of the effect. With the stereo Remote jack, the Tube Rotosphere can be controlled with a remote footswitch or MIDI-controlled switcher. The unit is powered by a 12 VAC external adapter. Hughes & Kettner; tel. (800) 452-6771 or (847) 439-6771; fax (847) 439-6781; e-mail info@hughes-and-kettner.com; Web www.hughes-and-kettner.com.

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5

"I cut my latest album 5 entirely in Pro Tools... no tape!"

– Lenny Kravitz

Lenny Kravitz refuses to be limited by his creative tools.

"I turned to Pro Tools, because I felt like a kid who needed more crayons to play with. Now anything is possible. I record everything into Pro Tools and have this tremendous palette to work with. It's all album-quality, so I can piece songs together and mix them however I like. There are no boundaries."

Wait a minute: Isn't Lenny, like, an analog guy?

"I can still run sound through my old tube equipment or use Plug-Ins like flange or some weird little filter. Any color that I want, I can get with Pro Tools. It depends on the record I want to make. Pro Tools is the future."

Lenny's finally found a box of crayons as unlimited as his imagination. Isn't it time you had the tools to expand yours?

For more information about Pro Tools and Third-Party Developer products, call 1.800.333.2137 ext. 369 for a free Pro Tools video, or to schedule a free demo.

LENNY KRAVITZ, ARTIST|PRODUCER|SONGWRITER

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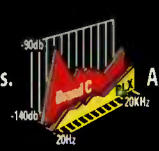
Our exclusive PowerWave™ Technology POWERWAVE used in our PowerLight™ Series for chest pounding bass and crystal clear highs. 

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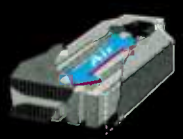
An advanced thermal management system  for true 2-ohm performance. And not to mention QSC's 30 year reputation for reliability. They're called PLX. And at a low impact price, you'll definitely want to find a dealer near you. Call (800) 854-4079.

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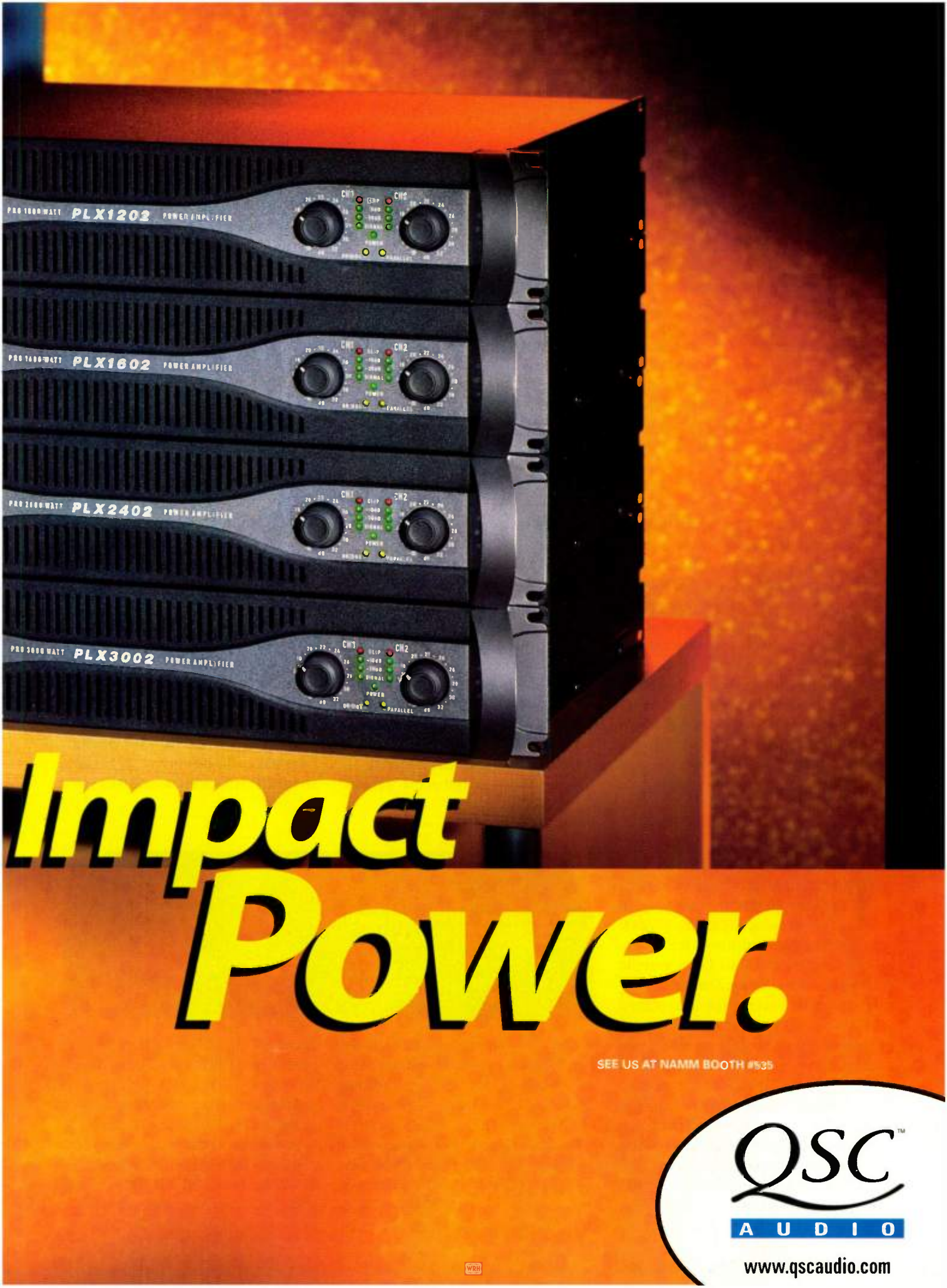
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CREAMWARE'S SCOPE FUSION PLATFORM

Computer-based synthesizers and effects processors certainly are nothing new. Software-based systems are legion nowadays, and software/hardware combinations have been around for some time, too. At least until now, the most powerful commercial hardware/software sound-design system has been Symbolic Sound's Kyma system, but Creamware's new SCOPE sound-design system might go Kyma one better.

SCOPE (SCalable Object Processing Environment) Fusion Platform comprises software and a PCI board stuffed with DSP chips. The system enables a variety of complex synthesis techniques, including physical modeling, modeled analog, FM, granular, additive, and more.

Although a variety of preprogrammed synths and effects processors will be included, SCOPE is anything but a prefab synthesis program. First and foremost, it is a development platform with a user-friendly front end. You can design synthesizers of all types from the ground up, using multiple oscillators, a huge variety of filters, amplifiers, modulators, etc., and can combine different types of synthesis to create custom instruments. Depending on the complexity, you could even create multiple multitimbral synths that operate at the same time.

FIG. A: A sampling of modules from Creamware's SCOPE.

Creamware, best known for its tripleDAT hard-disk recording system, has designed the system for more than synthesis, however. SCOPE provides sampling; extensive, custom-designed effects processing; and full-featured mixing (see **Fig. A**). All of the features operate in real time, and the prototype I saw exhibited no audible latency when triggered from a MIDI keyboard. The MIDI implementation, by the way, is extensive, with dynamic control over virtually all parameters.

The aforementioned features were impressive, but here's one for which I wasn't quite prepared: in the higher-end "developer" version that is scheduled for release in the fourth quarter of 1998 (expected list price $6,000 to $8,000), you

A.R.T. TUBE PAC & TUBE EQ

The Tube PAC ($249; shown at right) and Tube EQ ($249) are the latest in A.R.T's growing line of tube devices.

The Tube PAC, which pairs the company's Tube MP and Tube Compressor in one extruded-aluminum chassis, is a single-channel device with unbalanced ¼-inch and balanced XLR I/O. There are rotary controls for gain, threshold, and output level, and the unit supplies 48V phantom power. The compressor uses optical electronics rather than VCAs for gain reduction. A slope button allows you to switch between limiting and compression, and another lets you choose slow or fast release. There is also a button for inverting the phase and one for signal bypass. Two 4-segment LED meters monitor gain reduction. The unit uses an internal power supply. Frequency response is rated at 20 Hz to 20 kHz, dynamic range at >90 dB (unweighted), EIN at -129 dBu (XLR to XLR, A weighted), and THD at <0.1% (typical).

The 4-band Tube EQ has a low band that shelves at 40 or 120 Hz and a high band at 6 or 18 kHz. The low-mid band is sweepable from either 20 Hz to 200 Hz or 200 Hz to 2 kHz; the high-mid is sweepable from 200 Hz to 2 kHz or 2 kHz to 20 kHz. All four bands offer 12 dB of cut or boost. The unit also has a bypass switch and both gain- and output-level controls. Inputs, outputs, power supply, and all specification ratings are the same as the Tube PAC. Applied Research & Technology; tel. (716) 436-2720; fax (716) 436-3942; e-mail artroch@aol.com; Web www.artroch.com.

Circle #416 on Reader Service Card

get a full set of draw and paint tools, so you can create your own graphic interfaces. You can even incorporate materials from TIFF files. Want to make a chorus box that sounds like an old Ibanez Bi-Phase? Don't stop there; create an interface that looks like that classic stomp box—or create something entirely different. I saw a lovely Minimoog emulation that looked like the real thing (see **Fig. B**) but had a few extra components not found on the real thing. At first impression, at least, it sounded quite good.

Although some advanced features are especially aimed at third-party developers, the full-blown "developer" version will also be offered to the general public. A less expensive and less well-endowed "consumer" version is planned, but details were not available.

The system's PCI board contains six Analog Devices SHARC floating-point DSP chips that handle the number-crunching, and more DSP chips can be added. The computer CPU mainly runs the user interface, though a moderately fast CPU is still recommended to run the system. SCOPE will initially be released for the PC (Windows 95 and NT), where a Pentium 166 with 64 MB of RAM, a 2 GB drive, and a graphics card with 4 MB of VRAM is recommended. A Power Mac version is in development, and a UNIX version is possible.

The number of voices you can achieve with a single-card system depends on how complex your synth is, but the maximum for a simple synth is 128 voices. However, if you need more voices or want to design incredibly complex sounds, you can expand the system by adding more DSP chips to a card or by adding more cards.

Several analog and digital I/O options will be offered via daughterboards, including a dual ADAT optical interface for 16-channel digital transfers. The audio specs are, well, spectacular: 32-bit floating-point processing and digital I/O will allow the unit to handle up to 24 channels of 24-bit, 48 kHz audio, or up to twelve channels sampled at 96 kHz. According to Creamware, plans are in the works to let you save SCOPE's output directly to a WAV or other audio file.

FIG. B: This Minimoog module was created with SCOPE's draw and paint tools.

Creamware's tripleDAT 2.x for Windows integrates with SCOPE, allowing the sound-design system to address the tripleDAT I/O hardware. The two systems can run concurrently on the same PC and can exchange signal processing so that you can use tripleDAT effects on SCOPE patches or run a tripleDAT audio track through SCOPE's DSP. Dedicated SCOPE DAW software is planned for early 1999, and tripleDAT software users will be offered a free upgrade to the new software. Creamware; tel./fax (604) 527-9924; e-mail info@creamware.com; Web www.creamware.com.

—Steve Oppenheimer

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AARDVARK AARK 20/20

Aardvark's new Aark 20/20 8-channel hard-disk recording system for Windows ($995) comprises an outboard tabletop box that holds the 20-bit DACs and ADCs and a PCI card with 24-bit DSP to handle mixing and routing. You can patch any input source to any output, and record and play simultaneously.

The Aark 20/20's converter box has eight channels of analog I/O on unbalanced ¼-inch jacks and stereo S/PDIF I/O on RCA jacks. Word-clock I/O and video sync (black burst) input are on BNC connectors.

A software control panel provides a monitor mixer and displays sync status, sample rate, and more. The panel has eight input meters and one stereo meter that can be assigned to playback, input, or monitor submix. SEK'D's *Samplitude Basic* is included, and a bundle with Sonic Foundry's *Sound Forge* 4.0 costs $1,245.

Aardvark rates the system's frequency response at 7 Hz to 22 kHz ±0.5 dB, THD +N at 0.002% (20 Hz to 20 kHz, A weighted), and dynamic range at 100 dB (A weighted). It requires a Pentium with 64 MB RAM and Windows 95. Aardvark; tel. (734) 665-8899; fax (734) 665-0694; e-mail lovell@aardvark-pro.com; Web www.aardvark-pro.com.

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PLUG-IN BONANZA ▲ ▲ ▲ ▲

▲ WAVES

If your audio is sporting too much sssssibilance, give Waves' new *DeEsser* plug-in ($200) for Mac and Windows a go. The plug-in uses high-pass and bell (bandpass) filtering algorithms in a Sidechain function that works as if you were running an equalizer into the sidechain of a compressor. Presets are included for male and female vocals, each with wide- and narrow-bandwidth filters to focus on eliminating "ess" sounds and "shh" sounds.

DeEsser is available in TDM, VST, AudioSuite, and Sound Designer II formats for Mac and in DirectX format for Windows. Waves; tel. (423) 689-5395; fax (423) 688-4260; e-mail waves@waves.com; Web www.waves.com.

Circle #418 on Reader Service Card

DARTECH

Dartech has released two new DirectX plug-ins in its Digital Audio Restoration Technology (DART) line of products for cleaning up audio from virtually any audio media. *DeClick* and *DeHiss* ($149 each; both for $209) use the same algorithms as the click- and hiss-removal functions of the company's *DART Pro 32* software.

DeClick is designed to remove impulsive disturbances and low-intensity, wide-band noise. You can adjust the Detection Threshold and Detection Alarm Maximum Length to avoid unwanted removal of audio information. The plug-in also features adjustable Smoothing Factor and Postfiltering Factor settings for retaining maximum audio clarity and performing some hiss removal. You can also choose between a music or speech setting.

DeHiss is designed to remove high-frequency and wide-band noise based on a noise model in the plug-in. It features a Gain setting for calibrating the intensity of the noise to be removed, a Smoothing range for amount of noise removal, Frequency Carving for setting the amount of high-frequency attenuation, and a Preview option. Dartech; tel. (800) 799-1692 or (612) 844-0915; fax (612) 844-9025; e-mail santa@dartech.com; Web www.dartpro.com.

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▲ APHEX

Aphex's popular Big Bottom bass-enhancement effect has been released in software plug-in form. *Big Bottom Pro* ($379), available in Digidesign's TDM format, is designed to enhance bass response and increase sustain without increasing peak output or introducing distortion.

The plug-in offers Drive and Mix controls to adjust the timbre and amount of bass enhancement, respectively, and AutoTrace, a function that automatically adjusts the compression threshold in relation to the input signal. You also get an input-level fader; input-level, compression, and output meters; and Compare and Bypass buttons. A lowpass filter, a stereo/mono option, and phase, in/out, and solo buttons round out the features.

Big Bottom Pro requires a 68040 or Power Mac, running Mac OS 7.1 or later, and uses the processing power of a full DSP Farm chip. Aphex Systems, Ltd.; tel. (818) 767-2929; fax (818) 767-2641; e-mail sales@aphexsys.com; Web www.aphexsys.com.

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▼ OPCODE

Opcode's Fusion series of effects began with the *Vocode* and *Vinyl* plug-ins (announced in the February 1998 "What's New"). The company's latest offering to the lineup is *Filter* ($199.95), a plug-in that emulates analog filters with resonance control. The plug-in offers two lowpass filters (one with variable poles); a highpass filter with variable poles; bandpass and notch filters; a ring modulator with sawtooth, sine, square, and triangle wave modulators; and overdrive. You can use up to three filters simultaneously in any combination.

Filter also includes six LFOs with multiple waveforms, including saw, square, and sine; programmable filter envelopes (six can be drawn by the user; another six can be extracted from any digital audio file); and an envelope that follows the audio file's volume. *Filter* is available in Premiere, AudioSuite, and DirectX formats (TDM coming soon). Opcode Systems; tel. (650) 856-3333; fax (650) 856-0777; e-mail info@opcode.com; Web www.opcode.com. ❦

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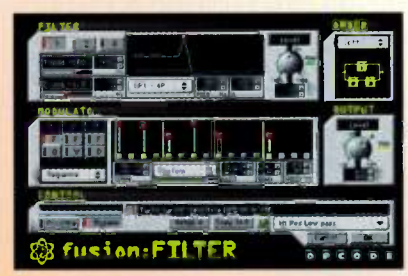

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PRO FILE

Cart before the Horse

Bhoss coalesces while the tape rolls.

By Diane Lowery

The personal-studio revolution has done more than give voice to solitary songwriters holed up in their foam-lined bedrooms. It has also provided the tools for musicians to flesh out band arrangements of their songs—even before a band exists. Such was the origin of bhoss. What started as a recording project between engineer–lead guitarist C. L. Lane and singer–rhythm guitarist Deonne Kahler eventually evolved into a 5-piece group.

"It was hard to get a band together with the particular musicians Deonne and I wanted to work with because everybody was in two or three other bands and was too busy to show up for rehearsals," says Lane. "So we prepared sections of each song in advance and then brought in the musicians as needed. If we had waited to get the perfect band together first, we might never have started recording."

The group's debut release, *Trust Me,* serves up eleven distinctive-sounding songs characterized by straight-eight grooves, hooky guitar riffs, unpretentious singing, and an honest-to-goodness rock-band vibe; the lyrics, alternately imploring and acrimonious, are consistently heartfelt.

To provide a solid foundation for the songs, Lane, Kahler, and bassist Sara Kelleher recorded scratch tracks while Chip Trombley laid down final drum tracks to a click. Kelleher and Lane then redid their parts, Lane added some percussion, and Kahler recorded her lead vocal tracks. Late in the process, the evolving group added John Brevik on piano and organ—which meant Lane had to rewrite and again rerecord several of her guitar parts.

Lane, who recorded and mixed *Trust Me* at her own Cramped Studio, attributes the CD's authentic rock sound in part to her prized TASCAM 8516B 1-inch, 16-track, open-reel recorder. "To me, rock 'n' roll doesn't sound right unless it's recorded analog," she explains. "Basically, we did everything the old-fashioned way: no time code, no automation, no computer editing, and no MIDI."

But that's not to say Lane didn't employ a studio trick or two. Being limited to sixteen tracks—eight of which were dedicated to the drum set—she took advantage of the remaining channels on her Mackie 32•8 to add extra signals to the mix. For example, a harmony vocal at the end of "1000 Years" was created by splitting and routing the lead vocal to a Lexicon LXP-15II, pitch-shifting it down a minor third, and returning the signal to a separate channel.

"Several background vocals were done that way," says Lane. "By tweaking the EQ, we made them sound like different voices. We brought in extra percussion tracks through the returns, too. For example, we triggered an Alesis D4 tambourine using the gated snare track, returned the tambourine to a separate channel, and muted it in and out during the mix."

Lane's and Kahler's goal was to create a CD that would showcase their songs with the cohesive sound of a real band. They achieved that as well as gained a group to work with. "We plan to perform live soon, but right now we're getting carried away with writing material for a second CD," Lane says. "For me, the creative process is the best part."

For more information, contact Actionpatch Music, PO Box 40897, San Francisco, CA 94140; e-mail actionpatch@earthlink.net.

Bhoss (clockwise from top): John Brevik, Chip Trombley, Deonne Kahler, C. L. Lane, and Sara Kelleher.

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TECH PAGE

CD? No, DVD!

Yet another contender for the consumer-audio crown.

By Scott Wilkinson

In the never-ending quest for higher-quality audio storage and distribution media, one of the most interesting proposals was inspired by innovations from the consumer-video world. By now, you've probably heard of DVD, which is poised to supplant laserdisc and even videotape as the medium of choice for movies in the home. However, it also holds great promise for replacing CDs as the next generation of consumer audio storage.

The DVD disc itself is the same size as a CD, but it holds much more information: 4.7 GB in a single layer, which is roughly seven times the capacity of a CD. In addition, DVDs can store information on both sides, and each side can include two layers that store completely separate sets of data, which provides a maximum storage capacity of 17 GB. (The lower layer holds slightly less than the upper layer, which is why this figure is less than 4 x 4.7 GB.) This capacity is made possible by a smaller pit size, narrower track width, shorter wavelength laser, and more efficient coding scheme than CDs use.

Although DVD was originally designed as a medium for movies, many audio professionals are salivating over its immense storage capacity. As a result, the official DVD development and administrative body, the DVD Forum, established a committee called Working Group 4 (WG-4), which is charged with creating a specification for high-resolution, audio-only DVDs. (A different proposal called Super Audio Compact Disc is being developed by Sony and Philips; see "Tech Page: CD—The Next Generation," in the March 1998 EM.)

Among the most interesting aspects of this spec, which is expected to be finalized this fall, is the wide range of sample rates and bit resolutions it allows. For multichannel mixes (up to six channels), sample rates of 44.1, 48, 88.2, and 96 kHz are supported; even higher rates of 176.4 and 192 kHz can be used for stereo mixes. In all cases, the resolution can be 16, 20, or 24 bits.

The maximum data-transfer rate is 9.6 Mbps, which exceeds DVD Video's maximum rate of 6.4 Mbps but is still not high enough to accommodate six channels of 96 kHz, 24-bit data without special coding. However, different sample rates and resolutions can be used for different channels (e.g., 96 kHz, 24-bit for the front three channels and 48 kHz, 16-bit for the rear two channels and dedicated subwoofer channel).

The audio data can be stored as linear PCM, or it can use lossless compression to increase the available playing time or enable 96 kHz, 24-bit data on all channels. Further data reduction can be achieved in the form of Dolby Digital, DTS, MPEG, and other lossy schemes, but this defeats the whole purpose of high-quality audio, so don't expect it to be used much for music discs.

An optional feature called System Managed Audio Resource Technique (SMART) will allow engineers and producers to save mixdown parameters on DVD Audio discs. This information can be used by the player to combine several channels of data into a stereo mix for systems with only two playback channels. Alternatively, a separate stereo mix can be included on the disc.

Some current DVD players can accommodate a special audio-only version of DVD called Digital Audio Disc (DAD), which encodes two channels of 96 kHz, 24-bit audio; this format is already part of the DVD Video spec. However, WG-4 discs will require a DVD Audio player or an updated DVD Video or DVD-ROM player; a "universal" player is also planned, which will play any type of DVD. All DVD players are expected to be compatible with existing CDs, as well.

As DVD enters the marketplace, it should be very interesting to watch the development of a high-resolution audio standard that will ultimately replace CDs. It will be quite exciting to witness the birth of a new and better digital audio format that will silence the digital critics—at least for a little while.

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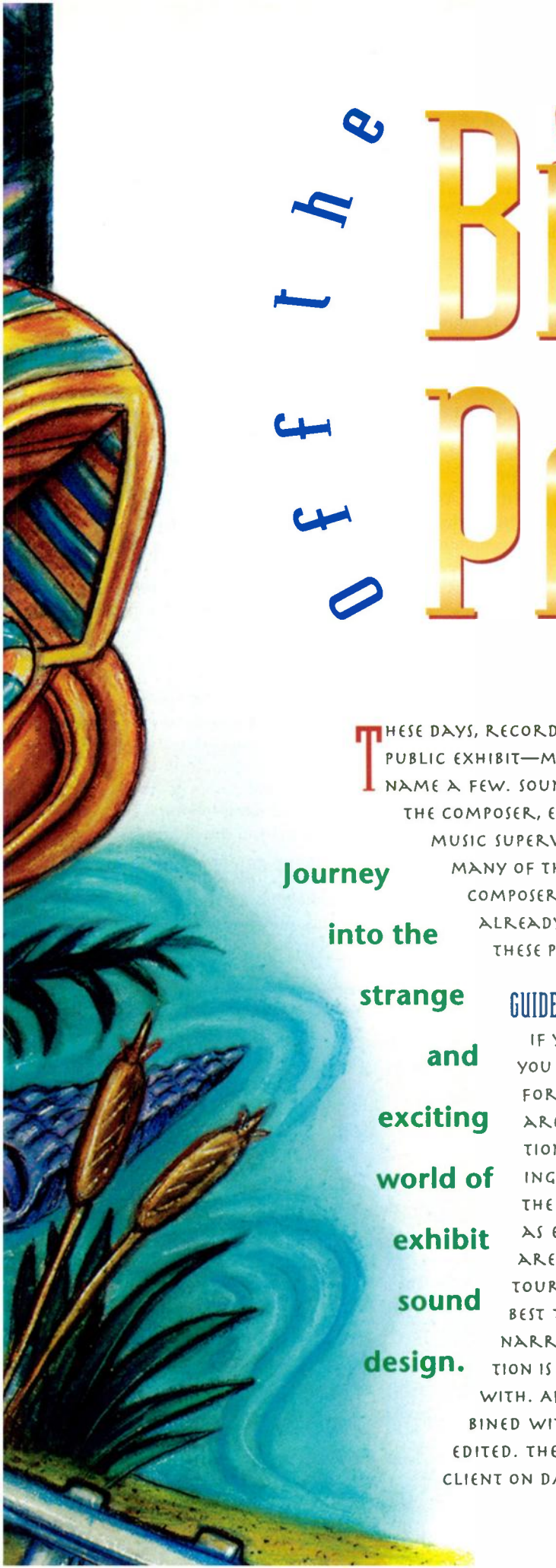

Off the Beaten Path

By Gino Robair

Journey into the strange and exciting world of exhibit sound design.

These days, recorded audio productions are a part of almost every public exhibit—museums, zoos, planetariums, and theme parks, to name a few. Sound design for such displays combines the skills of the composer, engineer, sound designer, Foley artist, editor, and music supervisor. In these days of budgetary belt-tightening, many of these jobs are being contracted out to independent composers and multimedia producers. And as you may have already guessed, the production tools needed to turn out these projects are sitting right in your own studio.

Guided by Voices in Your Head

If you've been to a museum in the last twenty years, you know that the modern-day tour guide comes in the form of a pair of headphones. Audio tours, as they are often called, offer visitors a detailed description of the exhibits and serve as a guide for navigating the exhibition space. Depending on the budget and the savvy of the designer, these tours can prove to be as entertaining as they are informative. There are a number of steps involved in creating an audio tour. First, a script is written and recorded, and the best takes are edited into a coherent, suitably timed narration of the exhibit. Next, a tape of the narration is given to the composer and sound designer to work with. After they have scored the piece, the music is combined with the narration, and the project is mixed and edited. The final copy of the tour is then presented to the client on DAT.

To complicate matters, many of these exhibits are visited by foreign tourists, which means that the sound designer must edit and mix the tour in a number of different languages. Many of the foreign-language audio tours heard around the country cross the desk of audio specialist Ed Herrmann.

THE KING IN LAS VEGAS

The Luxor Hotel in Las Vegas called in Herrmann to revise the Spanish, French, German, and Japanese versions of its Tomb of Tutankhamen exhibit, which had recently been redesigned. Having produced the original tour, Herrmann was the obvious candidate for this project.

"The exhibit is still in the same space," Herrmann explains, "but they have rearranged the sequence of the rooms, making the original script completely out of order. Some rooms were deleted altogether, and in many cases, the directions from one room to the next were inaccurate." The Luxor was able to resequence the original English version of the tour so that it would work with the new layout. However, due to vocal inflection and grammatical differences, it was not possible to do this in the other languages.

"Sentences with the same meaning vary in length in different languages," Herrmann points out. "Spanish and French sentences tend to be about ten to fifteen percent longer than English sentences, Japanese more than twenty percent longer. So one of my biggest tasks was to make the music and sound effects hit correctly in each language, even though they had been composed to fit the shorter English version."

RECENT SONIC EXCAVATIONS

Herrmann needed a few things from the client before he could start: a tape of the newly resequenced English tour, tapes of the old foreign-language tours, a version of the original script, and a copy of the new script.

"That's where the detective work began on my part," Herrmann says. First, he had each script translated into English. He then imported the old mixes of each language into Digidesign's *Sound Designer II*. By comparing the new script to the old while listening to the tracks, Herrmann figured out which sections could be reused, which could be edited, and which parts needed to be completely rerecorded. Ultimately, about ten paragraphs in each language were redone.

The original tours were recorded on an analog 8-track recorder. "I transferred everything over to an ADAT because I didn't want to jeopardize the master tape," Herrmann explains. "Also, I wanted to be able to rely on the ADAT's timing references."

Even though Herrmann was using the same vocal talent as before, one of the challenges he faced was matching the quality of the newly recorded material to that of the original. His studio had been relocated since the original recordings, which further complicated things. "To match the vocals," he explains, "I did a little equalizing, but I mainly worked on the narrator's proximity to the mic. I also used the highpass filter on an AKG C 414 condenser mic to approximate the old studio's sound."

Once the narration was rerecorded, Herrmann created a file for each language in Pro Tools. "In these files I loaded parts of the original narration [from the ADAT tapes] as well as the new narration, the old stereo music files, some new stereo music files [provided by the composer], and various mono and stereo sound effects. This gave me a palette with which I could cut in new words or sentences or copy the music and sound effects from the ADAT—basically rebuilding the scene."

Transitions from room to room posed another problem because every one of them was different from the original tour. "Solving that dilemma involved editing the music," he adds. Here, Herrmann's musicality was a great advantage. "I looked for sections that could be repeated, crossfaded, or extended in some way, so that the original intention of the music remained. I did the same thing with the sound effects, which had to hit on corresponding words in each language.

"The hardest part was creating the mix," Herrmann relates. "It had to sound seamless, with the levels of the new voices and music matching the levels of the old stuff." Herrmann also realized that the original project had been routed to a compressor before it went to DAT. "I had to compress the new mix identically to the old one, and I accomplished this with some software in Pro Tools. Fortunately the entire production was covered in music, which helped mask any tape or compression hiss from the older versions."

ATMOSPHERE AND EMOTION

Victor Spiegel is a composer with over 100 audio tours under his belt, including the Luxor's Tomb of Tutankhamen

GINO ROBAIR

Audio specialist Ed Herrmann is well respected for his work designing foreign-language exhibit tours.

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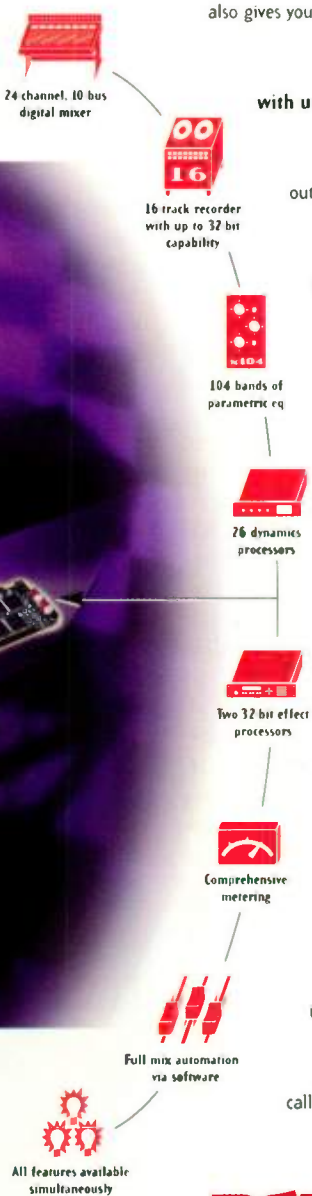

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exhibit. "With an audio tour, you are musically interpreting each object on the tour, whether it's a painting or a sculpture," explains Spiegel. "The trick is to match the music with the historical period, the piece of art, the narrator, and the physical surroundings of the display."

For Spiegel, an audio tour project begins with the arrival of a script and a tape of the edited narration. Sometimes the client will include photos of the exhibit or a description of the kind of music they're looking for. Drawing on his background in jazz, blues, and various world music, Spiegel tries to enhance the script with music and carry the listener from point to point along the tour.

Often, he will take musical cues from the narrator's vocal emphasis during certain passages. The exact timing of each musical cue is not as critical as it is for film, but the development of emotion and atmosphere is. Whenever possible, Spiegel includes extra material to give the editor more flexibility during final assembly and layback. "If I have the time, I will often include alternate versions of the soundtrack—some with different orchestrations, others at various tempos, and some using completely different compositions." This additional material often comes in handy for putting together the sometimes lengthier foreign-language versions.

THE MUSIC OF THE KING

For Tomb of Tutankhamen, several narrators were used throughout the tour, so Spiegel had a number of dialog styles to play against, including an English archeology professor (whose narration had been mixed dry) and the voices of various Egyptian priests and deities (whose voices were processed with other-worldly reverb).

To capture the ancient Egyptian vibe, Spiegel decided to use live musicians playing a variety of ethnic flutes and percussion. He selected an AKG C 501 E to record the flutes and a Sennheiser MD 421 for the percussion and experimented with mic placement dependent on the mood of the track. A touch of room ambience was added using a Lexicon LXP and an Alesis QuadraVerb. Particularly striking in these tracks is the bass flute—because of its size, this instrument takes quite a bit of wind to play. Consequently, the flute was close-miked to capture its harmonically rich windiness, which lent an evocative edge to the music.

On this particular project, Spiegel decided that the musicians didn't need to listen to the narration while they were performing. By maintaining eye contact with them during the recording session, he was able to coax a wide array of moods from the musicians, while allowing the arrangement to follow its natural course. He explains, "Usually, I time the compositions to line up exactly with the narration. However, in this case, I tried creating general moods that could later be fitted in as needed. The musicians were at their best with this kind of arrangement—playing music they loved without any pressure. It really was a joy to be able to capture them like this."

After the music was recorded, it was presented to Ed Herrmann, who incorporated it into the final mix of the tour.

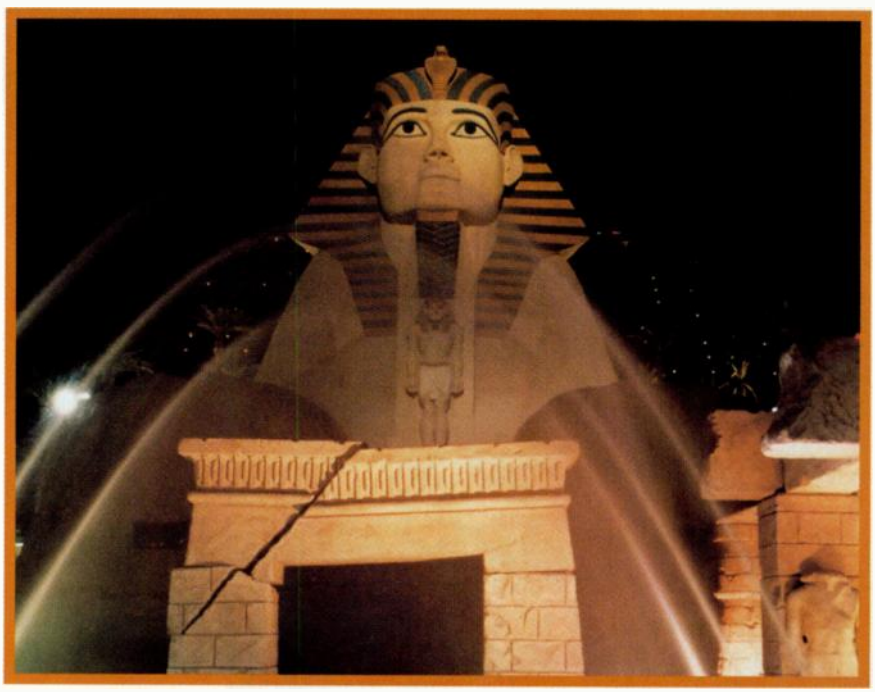
LANDING AN ADVENTURE

What if you were asked to create a two-and-a-half-hour symphony using only the sounds of mythical instruments such as the "Tooth Kazoo," the "Three Snarper Harp," and the "Oom-Pah Boom-Pah"? For composers Tony Humecke and Chip Smith, who have a knack for finding odd sounds and a penchant for melody, it was a dream gig. With their help, the many whimsical characters created by Dr. Seuss come alive in Seuss Landing, one of the Islands of Adventure at the new Universal Studios theme park in Orlando, Florida. When it came to the music, Humecke and Smith were given free rein.

FIRST THINGS FIRST

Humecke and Smith began this massive endeavor by first imagining what the instruments of the Seuss Symphony would sound like. Much of their inspiration came from illustrations in the Dr. Seuss classic *Horton Hears a Who,* including the Arabian Floating Bridge Marimba, the One Nozzled Noozer, and the aforementioned Three Snarper Harp.

The next order of business was to create the 20-minute "Welcome Symphony," a 4-movement work that would provide the themes for seven additional arrangements to be used in various areas of the park. Visitors to Seuss Landing will hear the "Welcome Symphony" slowly transmogrify from conservative to rowdy and mischievous as



COURTESY LUXOR HOTEL

A new layout of the Tomb of Tutankhamen exhibit at the Luxor Hotel in Las Vegas required Ed Herrmann and Victor Spiegel to do a sonic restructuring of the audio tour.

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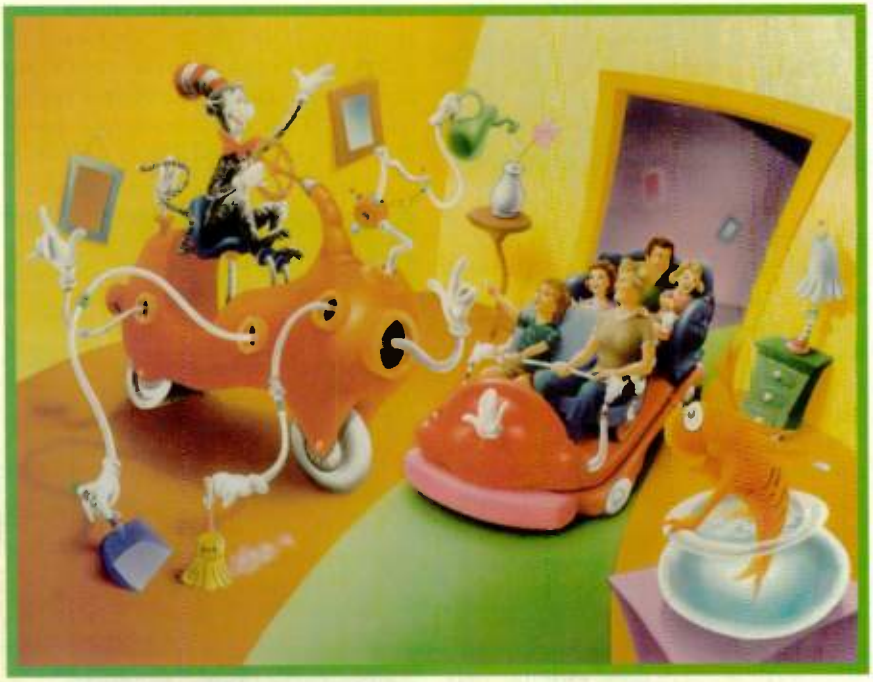
they make their way through the exhibits.

The writing of the opening melody went hand in hand with the design of their first instrument. "We knew we wanted to have a calliope as the glue for every arrangement," says Humecke. "We brought a couple of 12-foot PVC pipes in from the garage and miked them a few different ways. We then started blowing, buzzing, and puffing into them any way we could." The result came to be known as the Wheezing Oom-Pah Calliope.

"Basically, if something could make a sound, we used it," Humecke adds, describing the various wooden, plastic, and metal "instruments" that were taken from almost every room of his house (aka Tonehead Studios). Sounds were recorded into Roland S-760 and S-770 samplers and then sequenced using Mark of the Unicorn's *Digital Performer*. Although Humecke and Smith did record a number of live performances, they employed the samplers when certain instruments needed some extra help in making their unique voices audible. "A rubber-band harp was originally intended to be played in real time for the Three Snarper Harp, but its tuning and lack of projection presented problems." Humecke is particularly fond of the Circular-Saw-Blade Fun Tree, an instrument that doesn't need much help with projection but one that, he points out, "shouldn't be played with the hands!"



COURTESY UNIVERSAL STUDIOS

Opening in 1999, Seuss Landing is one of the new Islands of Adventure at Universal Studios' Orlando, Florida, theme park.

Live performances were recorded directly into *Digital Performer*. "To make sure everything coming into the system had a nice, natural, warm sound," explains Humecke, "we used a variety of microphones and put most everything through tube preamps—in particular, a TL Audio dual-valve mic pre."

Only on a few occasions did Humecke and Smith have to record instruments in a larger studio. "We really needed the extra space for the fifteen kids in the children's choir," explains Humecke. "We also tracked a 10-piece string section with woodwinds in a professional studio." This out-of-house work was done using a pair of slaved TASCAM DA-88s. A reference track was prepared beforehand for the musicians to sync with. The tapes were then brought back to Tonehead and dumped into the computer.

THE FINAL SYNC

With eight versions of the 20-minute piece in separate *Digital Performer* files,

KING TUT'S STUDIOS

Since much of what he produces deals with the spoken word, Ed Herrmann's studio, Garuda Records, is optimized specifically for voice-over tracking. "In my live room, I wanted one corner to sound dead," Herrmann notes, "but not feel claustrophobic. It had to be an open, comfortable place for narrators to work, while still giving them direct eye contact with the control room. In addition, it had to be isolated from everything else."

The studio employs a variety of gear, including an Alesis ADAT, a Darwin hard-disk recorder, three Panasonic SV-3800 DAT recorders, an Apple Power Mac 7300, a number of samplers and keyboards, a Serge modular synth, and a Soundtracs Solo Logic mixing desk. Narration is tracked using an AKG C 414 routed directly into the console.

Victor Spiegel's studio is customized for working under extremely tight deadlines—most of it is MIDI-based. A Kurzweil PC88mx is his main axe, driving a Kurzweil 1200 Pro1, a Roland U110, and an Alesis D4. He also uses an E-mu Emax II and a Yamaha DX7 with a Gray Matter E! modification. He says, "Except for the Kurzweils, my studio is composed of all funky gear. But it's all my budget will allow right now!"

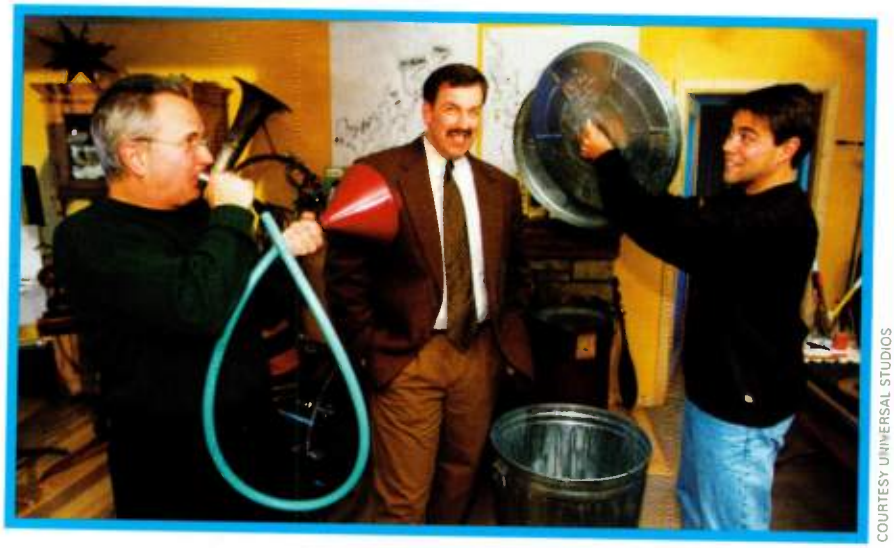
Spiegel runs the keyboards through a Mackie 1604 directly to his TASCAM DA-30. He sequences with MOTU's *Performer*. "I've been using *Performer* ever since it came out. I know it, and it helps me get the job done quickly. I also use *SoundEdit 16* for recording and editing and for saving the material as AIFF files."

Off the Beaten Path

Humecke and Smith now needed to mix them and start assembling the tour. Universal had asked that each version of the arrangement be delivered both as a stereo mix (for a compilation "teaser" CD) and as a mono mix (for use at the park).

"I started with the stereo mixes and then collapsed them into mono," Humecke says. "This was a little difficult because the instruments that were imaged in the center of the mix would come forward when I converted it to mono. So we spent some extra time on the mono mixes to even them out." Mixing chores were done with the help of a Yamaha 03D digital console, and the final mix was recorded directly to an Akai DR4 hard-disk recorder. The mixes were then loaded into Pro Tools III for final synchronization.

"The client wanted the music presented in DA-88 format with each arrangement on a separate track but playing simultaneously," Humecke continues. "This way they could put it through a mixer and demonstrate how the music would flow as you navigate the park." This was accomplished using the original Welcome Symphony as the guide track. Because they did their homework and were prepared from the beginning for the final sync session,



COURTESY UNIVERSAL STUDIOS

Tony Humecke (left) and Chip Smith (right) demonstrate some of the wacky instruments they recorded for John Rusk (center), the Universal executive who contracted them to compose the soundtrack for Seuss Landing.

INTRODUCING THE 48

GINO ROBAIR

Victor Spiegel composed the music that tourists hear as they travel through the Tomb of Tutankhamen at the Luxor Hotel in Las Vegas.

Humecke and Smith were able to synchronize everything without the use of SMPTE and with only a minimal amount of effort. The results were more than satisfactory. "For the entire twenty minutes, nothing goes out of sync—I think that's pretty impressive," Humecke says proudly.

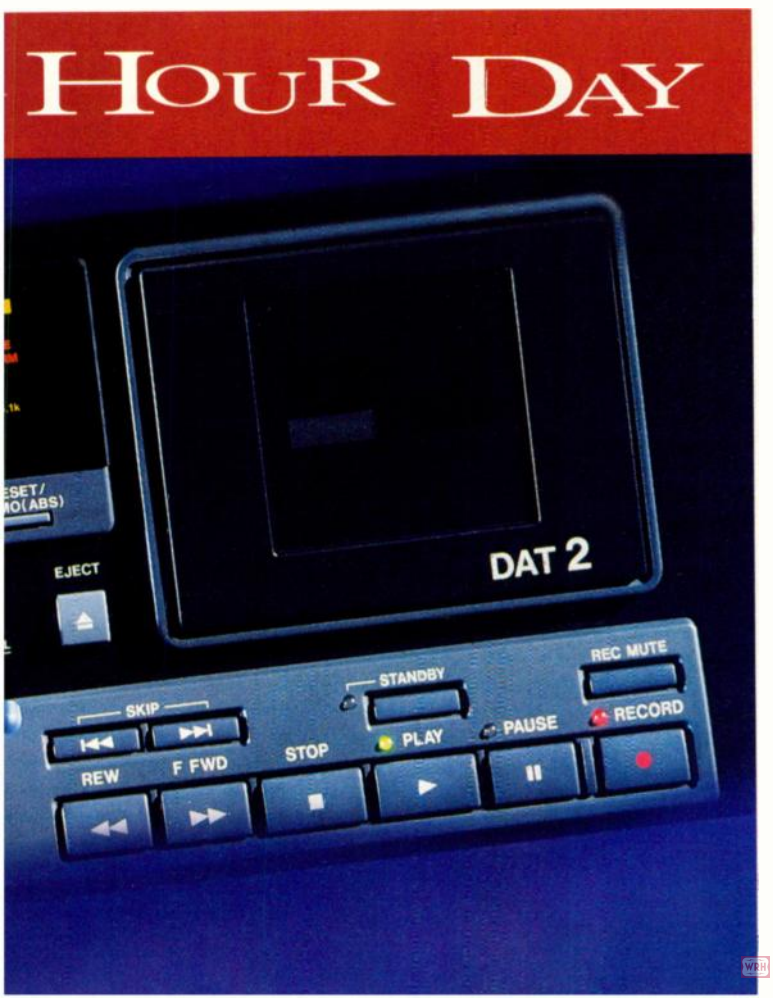
Although initial layback was to the DA-88, the final destination of the music is still being determined. Until then, Humecke is keeping disk backups of every file. "My hope is that they will ask for the computer files rather than use the mixes from the DA-88's, which would obviously add an extra generation."

"It seemed like an endless mission," Humecke reflects. "But it gave us lots of laughs and the chance to add something fresh to the Seuss legacy, which we hope will last a long time."

END OF THE PATH

Scored soundtracks and narration are part of almost every entertainment exhibit in the world. New exhibits are opening up every day, and museums and theme parks will often hire outside composers and designers to give voice to their creation. With a little investigation and the desire to succeed, you, too, can land jobs that stretch the definition of sound design.

Gino Robair *is a composer and percussionist whose credits include sound design for silent film, theater, dance, and television. He also enjoys teaching his Maestro theremin to talk and playing his snare drum with an EBow.*



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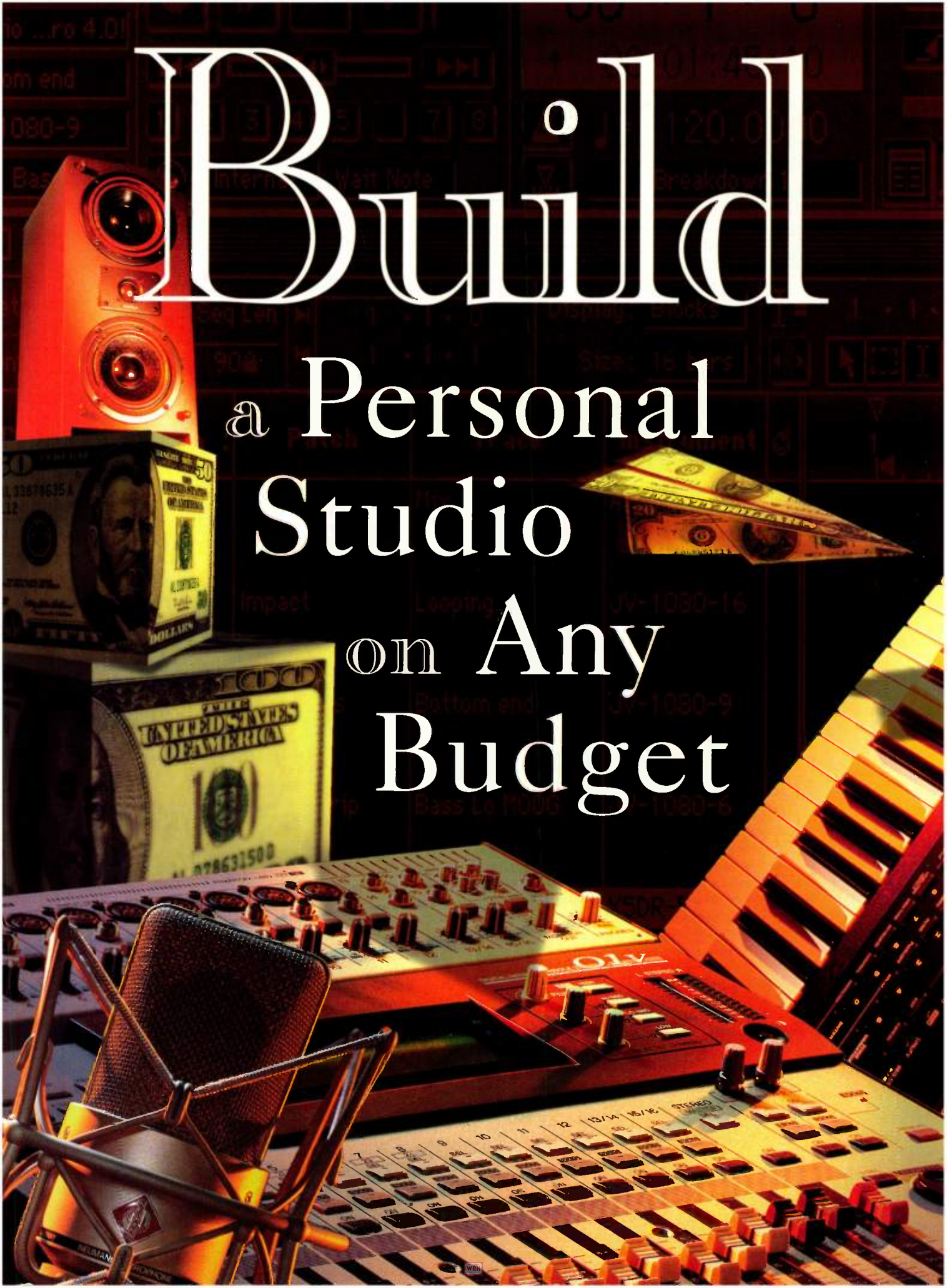


WHETHER YOU HAVE A CHAMPAGNE OR BEER BUDGET, A PRO-QUALITY STUDIO IS WITHIN REACH.

PHOTO ILLUSTRATION BY PHILIP KAAKE

I wish I had a dollar for every time an **EM** reader has asked an editor which products to buy and then added, "but I am on a tight budget." Right there, I'd have enough money to build a top, no-compromises studio! We editors started thinking, though: given a specific budget to build an entire studio from scratch, what would we buy? Furthermore, what amount of money constitutes a reasonable budget for a personal studio?

As soon as we started discussing these questions, we realized that we had opened Pandora's box. For one thing, each of us had different recording objectives and approaches. For another thing, we couldn't just pick one dollar amount, so we had to consider what we would do with several different budgets. And we also had differing opinions on whether and when to use computers.

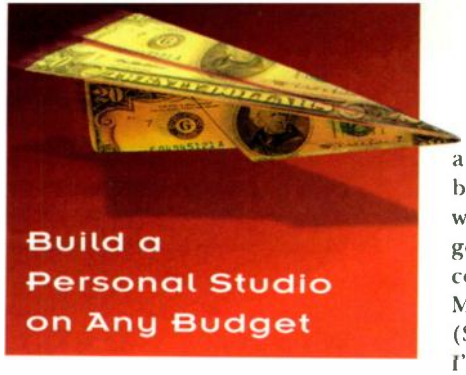
In the end, we decided to create eight studios, four with computers and four without. After some experimentation, we found that budgets of $4,000, $8,000, $16,000, and $32,000 made sense. At each price point we were able to create reasonable studios, with and without a computer.

THE GROUND RULES

This could have become a completely unmanageable project, so we had to agree on some ground rules. The first is that we would start from scratch; obviously, prospective studio owners are likely to already have some gear, and that will affect what they need to buy. We also agreed to consider only new equipment because the prices and availability of used gear vary hugely. If you can buy quality used gear, great; that gives you extra money to play with. On the software side, we mostly specified commercial applications, but we included a few shareware programs in the $4,000 system. (You can get a lot of mileage out of shareware, and we encourage you to explore more of these programs. Just make sure you pay your shareware fees!)

After a few initial discussions, it became clear that to just spec, say, a generic hard-disk recorder for so many dollars would have been worthless; we decided to specify particular brands and models. Of course, we tried to pick high-quality products, but we didn't simply pick out the best products in each category. This is emphatically *not* a variation of our annual Editors' Choice Awards. Rather, we chose products that worked well together. We considered connectivity and complementary features as well as our omnipresent budget concerns. That said, certain products appear again and again, which clearly indicates that these items deliver great value at a relatively low cost.

The main point is that these studios are not mere collections of great parts; they are designed to work as *systems*. We left out literally thousands of excellent products simply because they didn't fit with these particular systems. For an exhaustive list of available studio products, see **EM**'s 1999 *Personal Studio Buyer's Guide*, which will reach the newsstands at the same time as this issue.



Determining Costs

Because street prices vary greatly, we decided to follow **EM**'s usual policy of quoting list prices only. The exceptions are the computer systems and some disk drives because list prices don't exist or are effectively meaningless.

We also decided that all the major components had to be specified, including power conditioning. However, we decided not to include the cost of cables, connectors, studio furniture, or acoustic conditioning. Our logic is that in the real world you won't pay list price for the major components, and you might find some used gear, to boot. The money you save off of the list prices will pay for these additional expenses. The larger the studio, the more the savings, but the more extras you need. In addition, we didn't account for sales tax because that varies from state to state and might not apply to mail-order items.

We also acknowledge that you would inevitably want to expand each studio beyond our original specifications; we planned studios that are workable as is but will grow as future income allows.

Divide and Conquer!

Finally, we divided the work among four editors. Each editor created two studios that suited his particular objectives and interests. The two $4,000 studios were primarily designed for demo production, but you could create a complete, quality production in any of our eight studios.

Brian Knave only occasionally uses computers in his real-world studio, so we gave him the $4,000 and $16,000 studios without computers. Brian does a lot of work with acoustic instruments and singers, so his studios are designed for these applications. Dennis Miller loves synthesizers and digital audio and focuses on instrumental electronic music. He is also **EM**'s Windows PC guru, so he was assigned the $4,000 and $16,000 studios with computers—a PC with Windows 95 in both cases.

Jeff Casey has engineered in several major New York studios, recording CDs and working in post-production and broadcast. Given his champagne taste, we decided to give him the biggest budgets: two $32,000 studios, one without computer and the other with a Power Macintosh computer. That left me (Steve O.) with the two $8,000 studios. I'm pretty good at getting more for less, so that made sense anyway. I chose a Mac for my computer-based studio, which gave us two studios with PCs and two with Macs.

With all this in mind, we set out to build eight personal studios. I dealt out the play money, and the editors gleefully spent it all—and in some cases even came begging for just a few extra bucks. It was one heck of a lot of work but, at the same time, an equal amount of fun. We hope you enjoy reading through our proposals as much as we enjoyed creating them!

—Steve Oppenheimer

Times are good for the aspiring home recordist on a low budget. This is due largely to the advent of inexpensive, ministudio-style, integrated hard-disk recorder/mixers, which not only sound good and are relatively easy to operate but also provide sophisticated digital editing capabilities.

Configured for laying down live instruments one track at a time, the following 8-track studio provides the essentials for making premium demos, cassette dupes, and even finished DAT mixes ready for CD replication, all for only four grand and without requiring a computer. This setup could also integrate easily with a MIDI rig, and it's small enough to fit on a card table (see **Fig. 1**).

Recorder/mixer. When deciding on this studio, I first weighed the merits of several integrated hard-disk recorder/mixers. Most attractive was the new Akai DPS12, which records without data compression and provides twelve tracks rather than eight. However, when you add in the optional EB2M effects board and a 1 GB Jaz drive (or 2 GB fixed drive), the DPS12 costs $2,149—too big a chunk of my tightly budgeted dollars.

I looked, too, at the Fostex DMT-8VL ($1,395), but again, the cost of an external hard drive adds three hundred or so precious dollars to the system. The new Korg D8 ($1,250) also seemed promising, because it records without data compression and comes stock with effects and a 1.4 GB internal hard drive. However, that unit records only two tracks at a time, and it provides only 2-band EQ (high and low shelving) and no dynamics processing, which means more money to allot for outboard gear.

I opted not to go the MiniDisc route primarily because of the format's inferior-sounding ATRAC data-compression algorithm. The prices aren't very competitive, either, ranging from $1,199 for the Yamaha MD4 to $1,499 for the TASCAM 564.

I settled on Roland's VS-840 ($1,395) as the centerpiece of my $4,000 studio. Considering its low price, the VS-840 is loaded with amenities. It offers 20-bit digital converters, 8 "real" and 64 virtual tracks, 12 channels of digital mixing, 24 bands of parametric EQ, dynamics processing, onboard digital effects, and a built-in Iomega Zip drive that allows for 50 minutes of 8-track recording per disk when recording in the premium data-compression mode. (It can record four uncompressed tracks.) These and other features make the VS-840 a hard-to-beat value.

Unfortunately, we cannot afford a backup drive right now. That is bad news indeed: if a Zip cartridge dies, the project dies with it. So adding some sort of external disk drive later will be a top priority.

Microphone. For getting pristine signals into the VS-840, I couldn't help but go for the Røde NT1 ($349) microphone. This baby not only sounds great but is evidently the lowest-priced large-diaphragm condenser on the market.

THE $4,000 STUDIO
WITHOUT COMPUTER

ITEMS	PRICE
Roland VS-840 digital recorder/mixer	$1,395
Røde NT1 large-diaphragm condenser mic	$349
A.R.T. Tube MP tube mic preamp	$159
Sony PCM-R300 DAT recorder	$995
TASCAM 102 mkII cassette recorder	$369
Event Electronics 20/20p powered monitors	$599
Sony MDR-7504 headphones	$128
APC Surge Station Pro8	$29.98
TOTAL	**$4,023.98**

The compressor that forgives, but never forgets...

dbx digital

Gate

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

Compressor

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

Limiter

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

De-esser

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

and More

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

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• **New dbx technology, the TYPE IV™ Conversion System with TSE (tm) (Tape Saturation Emulation) gives you the pleasant overload characteristics of analog tape without the harsh distortion of most digital input systems. No more dancing around with the input levels to protect the integrity of your audio.**

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• **With the extensive metering of the DDP, you can see EXACTLY what is going on with ALL parts of your signal: input, internal processing, and output, with peak and VU, as well as gain reduction for both sides of the stereo image.**

• **And speaking of stereo, you can work in stereo with dbx's True RMS Power Summing™ for phase-coherent tracking, or in dual mono mode, without the two channels interacting at all, making the DDP a great processing value.**

It Never Forgets

• **The DDP works right out of the box. It comes with 50 factory setups that are guaranteed to knock your socks off. There are presets for every application you can think of, and then some. dbx engineers are musicians and recording engineers. We know what a compressor is supposed to sound like, and we know it better than anyone else. We invented compression. We eat, sleep and breathe compression.**

• **Want to duplicate that perfect compressor set-up? Each processor in the chain has all the parameters you would expect. After you set the parameters the way you want them , save it as a processor preset, available to be recalled any time. These building blocks allow you to save entire setups just for the way you like to work. It doesn't matter that you are doing a live gig one night, then mixing the tracks in the studio the next night, the DDP will be there, just the way you left it.**

• **When you save a preset, you also save the information that makes it work behind the scenes, too. Digital output (optional), sample rate performance, MIDI setup, as well as any of the other utilities, like sidechain setup and monitor, EQ settings, and SysEx functions.**

• **When you make changes to any parameter, you can see where your adjustments are effecting the signal, simply by looking at the Hi-Res graphical display, which shows the processing curve in real time as you make your adjustments.**

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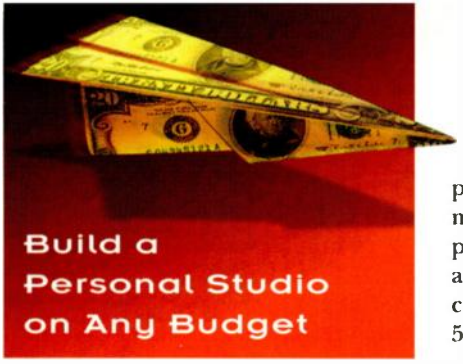


That makes it the ideal mic for the budget recordist who frequently tracks instruments such as acoustic guitar, vocals, hand percussion, etc., and wants the clarity, detail, and presence that a large-diaphragm condenser can provide.

Mic preamp. To supply phantom power and preamplification for the NT1, as well as tube coloration, the A.R.T. Tube MP ($159) mic preamp seemed an obvious choice. Not only is it superaffordable but the Tube MP doubles as a DI box, which means you can record electric bass, guitar, and other instrument-level signals direct. Actually, the VS-840 provides a special instrument-level input for guitars, but this way you get the option of putting a tube in the signal path or of recording electric bass and guitar simultaneously.

Mixdown decks. A studio isn't fully functional until you can produce a finished mix for folks to listen to. For this system, I specify both a DAT and a cassette recorder: you mix to DAT and then dupe cassette copies from there. The least expensive full-size DAT deck I've found is the Sony PCM-R300 ($995), which provides S/PDIF both optically and on RCA connectors, allowing you to mix digitally direct from the VS-840. Moreover, the SCMS copy protection is defeatable.

Event 20/20p

For a cassette recorder, I picked the TASCAM 102 mkII ($369). If you would prefer to have a dual deck and to save $50, you could check out the Sony TCW-565R ($320).

Monitors. It's hard to beat the value of Event Electronics' line of reference monitors. For this system, I chose Event's 20/20p ($599), which has the same 8-inch, polypropylene woofer (big bass!) and 1-inch silk-dome tweeter as the 20/20bas but employs a passive, rather than active, crossover and is not bi-amplified. These are great-sounding, very revealing monitors that would serve well in any studio. And because they're powered, you avoid the hassle and extra expense of purchasing a separate power amp.

On the other hand, if you're not into powered monitors, you could opt for an inexpensive power amp—for example, the Carvin HT150 ($229) or the TASCAM PA-20 ($239). These units would combine nicely with inexpensive passive monitors from companies such as Alesis, Audix, Fostex, JBL, KRK, Spirit, Tannoy, or Yorkville.

Of course, because most personal studios are one-room operations, it's unlikely that you'll monitor through the speakers while tracking. What you need are headphones. I chose the Sony MDR-7504 ($128), which I like because they're clear, bright sounding, and plenty hot. Also, the collapsible design makes them easy to position over just one ear—a nice feature if you want to hear another instrumentalist in the room. (Cellists, in particular, appreciate this design because conventional headphones can interfere with the position of the head in relation to the cello's neck.)

Power conditioning. Finally, don't forget to protect your studio from power surges. A fully regulated, uninterruptable power supply is ideal, of course, but you won't be able to afford one with this particular $4,000 system. Still, power conditioning is important, so I'm going to cheat by just a few dollars and opt for American Power Conversion's Surge Station Pro8 ($29.98), which delivers excellent EMI/RFI filtration and surge and spike protection. Three of the Pro8's eight outlets are spaced to accept wall-wart supplies, a big plus.

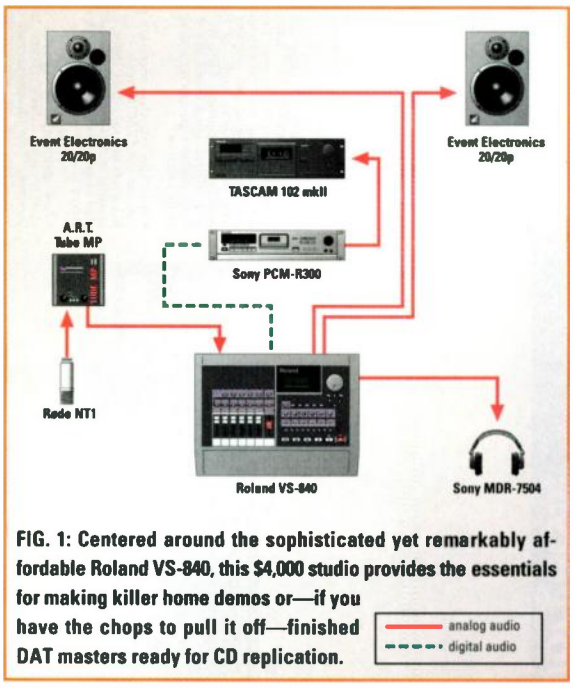
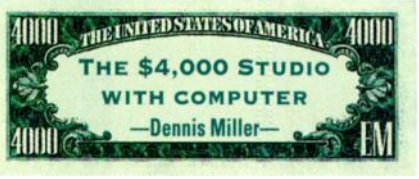


FIG. 1: Centered around the sophisticated yet remarkably affordable Roland VS-840, this $4,000 studio provides the essentials for making killer home demos or—if you have the chops to pull it off—finished DAT masters ready for CD replication.



With just $4,000 to spend, you may not get all the bells and whistles your heart desires, but there's still a lot of desktop music production in your future. If you plan carefully, you should end up with a respectable computer, one each of the major categories of music software, a good sound card, and enough external hardware to keep you busy. You'll be able to produce decent demos in your starter studio and have adequate gear to include live vocals with your MIDI scores (see **Fig. 2**).

Computer. MIDI and digital audio place very different demands on a computer, and you'll want to be prepared for both. I'm a Windows user, so I'm specifying a Pentium and Windows 95–based system. In the PC world, a good starter system can cost as little as $1,000. Many of the major mail-order companies, including Quantex, Hewlett-Packard, and Dell, will sell a Pentium 233 MMX with 32 MB RAM, 24× (or better) CD-ROM drive, 4.1 GB EIDE drive, 15-inch monitor, and modem for

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15. 2-Track Tape Return (RCA)

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as low as $1,200. That's a better system than the one I used for nearly three years to do jingles, soundtracks, and original concert music. (The entry-level system price will have dropped even further by the time you read this, thanks to the release of Intel's 350 and 400 MHz chips.)

The system will most likely include "multimedia" speakers and a basic sound card, complete with MIDI interface. However, you'll probably get whatever low-end, Sound Blaster–compatible card the vendor happens to offer. If you want a better card, you'll need to come up with some more bread.

Software. With a good computer accounted for, it's time to think about software. I allocated $500 for software, which can be spent in several ways. All of the major sequencer makers offer low-cost, "lite" versions of their programs that contain a surprisingly large number of features. For example, Cakewalk Music Software *(Cakewalk)*, Steinberg *(Cubasis A/V)*, and Emagic *(MicroLogic)* offer integrated audio with MIDI across their entire product line. For as little as $99, you can find a program with sixteen tracks of MIDI and support for digital audio, and you can upgrade to a professional version of the program when the need arises. Any of these programs will serve your needs, but I'll go with *Cubasis A/V*, which packs a lot of power for just $99.

Though all integrated MIDI and audio programs have some basic audio editing features, we can squeeze a dedicated audio editor into this budget. Sonic Foundry's renowned *Sound Forge* stereo editor is available in a trimmed-back version called *Sound Forge XP* ($49.95), and if you look hard enough, you might even find it bundled with a sound card. SEK'D also offers two introductory flavors of its excellent *Samplitude* multitrack editor: *Samplitude Multimedia* ($69) has four mono audio tracks with limited editing, and *Samplitude Pro* ($199) gives you eight audio tracks and solid editing and processing features.

Now let's add some useful, albeit not necessarily critical, functions to the studio, without blowing the budget, by choosing two shareware programs. Noteworthy Artware's *Noteworthy Composer* ($39) is an excellent notation program that offers numerous features for its reasonable registration fee. Chris Craig offers a "multimedia" program called *Multiquence* ($50) that allows you to record and play MIDI, audio, and video clips. Clips are sequenced using the familiar "track sheet" interface, and you can link directly to external editors for each type of data you are using.

Synthesizer. Given our budget, we're probably best off choosing an integrated keyboard synthesizer rather than a controller and sound module. I have decided on the Roland XP-10 ($895), a 61-note keyboard with onboard effects, 28-note polyphony, and 16 MB of internal sounds. Keep in mind that I am not a keyboard player; if you are, the action on this keyboard might not be adequate.

Multitrack recorder. This is a low-budget system, so I wanted to be able to record on an inexpensive medium. Therefore, I decided to pass up newer technology (such as Fostex's impressive new FD-4 hard-disk recorder/mixer) and stick with good old multitrack cassette tape. TASCAM's 414 Portastudio ($449) is a reliable, 4-track cassette recorder with 2-band EQ on each of its four mixer channels.

Microphone. In the cover story of **EM**'s June 1998 issue, Brian Knave posed the question "Is the SM58 Still King?" Although the Shure SM58 may be the king, it costs just a bit too much for my humble budget. Therefore, I've selected the king's slightly less expensive sibling, Shure's SM57 dynamic cardioid microphone ($146). The SM57 is indeed a prince of a microphone: it's great for miking instruments and can be relied on to deliver its famous vocal sound when you want to belt out a few choruses.

Outboard processing. The Portastudio's two effects sends come in handy for mixing in just the right amount of effects from the Alesis NanoVerb ($179). We can only afford one outboard effects processor here, and the easy-to-use NanoVerb delivers surprisingly high-quality effects, especially considering its price. If you want in-depth parameter editing, well, you can't get there on this budget.

Monitors. In this studio, we'll usally monitor through Event Electronics

THE $4,000 STUDIO WITH COMPUTER

ITEMS	PRICE
Pentium 200 MMX PC with 32 MB RAM, 4.1 GB hard drive, 15" monitor, Sound Blaster–compatible sound card, Windows 95/98	$1,200
Steinberg *Cubasis A/V* digital audio sequencer	$99
Sonic Foundry *Sound Forge XP* 2-track audio editor	$49.95
Noteworthy Artware *Noteworthy Composer* notation software (shareware)	$39
Chris Craig *Multiquence* multimedia software (shareware)	$50
Roland XP-10 keyboard synthesizer	$895
TASCAM 414 Portastudio multitrack cassette recorder/mixer	$449
Shure SM57 cardioid dynamic microphone	$146
Alesis NanoVerb multi-effects processor	$179
Event Electronics 20/20p powered monitors	$599
Audio-Technica ATH-M3x headphones	$49.95
APC Back-UPS BP280PNP	$180
TOTAL	**$3,935.90**

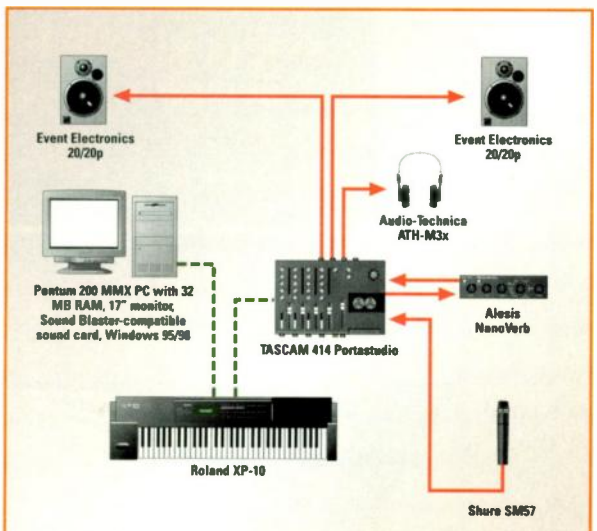
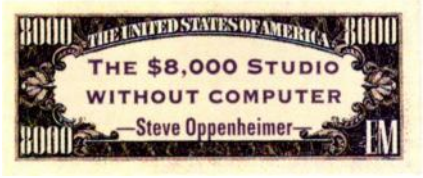


FIG. 2: The $4,000, Pentium-based studio contains enough hardware and software to produce quality demos that integrate digital audio and MIDI. Although our budget only allows for a few programs, we can stretch it with shareware.

20/20p powered speakers ($599), but when it's quiet time, we'll have our Audio-Technica ATH-M3x headphones ($49.95) on hand to get up close and personal.

Power conditioning. Any system with a computer should have an uninterruptable power supply, especially because these are so affordable nowadays. I've chosen the APC Back-UPS BP280PNP ($180) to keep us going when the lights go off.



Eight thousand clams seemed like a lot of seafood when I started designing this system, but it turned out to be a drop in the ocean. I'm primarily a keyboard player, sound designer, singer, and arranger, so my system focuses on synthesis, sequencing, vocals, and digital audio. I generally work alone, playing my parts linearly (rather than in chunks) wherever possible, and I only occasionally bring in outside musicians. I also wanted a system I could grow with as my needs changed. These factors, along with my budget, defined my choices far more narrowly than I had anticipated (see **Fig. 3**).

Keyboard workstation. This was one of my two most important decisions. MIDI is important to the way I work, so I needed a hardware sequencer. (Computers are banned from this studio, at least initially.) I also wanted as many synth voices as I could afford; 64 voices would be a good start. That all added up to a keyboard workstation rather than a separate controller and sound module because the only sound module I know of that includes a sequencer is the Kurzweil K2000R ($1,795), which has only 24 voices. I have a K2000RS in my real studio, and I love it dearly, but for this system I plainly could not afford to spend that much for a 24-voice module, its sequencer and sampling option notwithstanding.

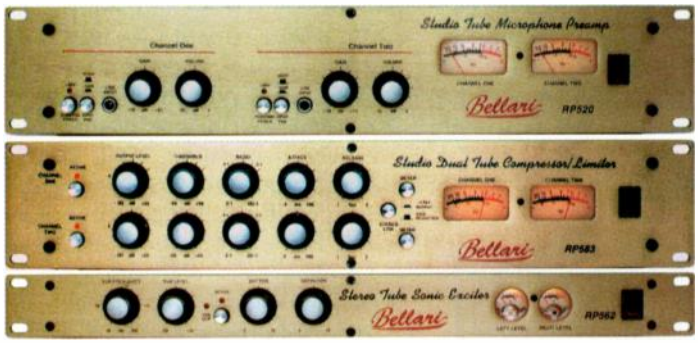
I would have preferred an 88-key, weighted-action keyboard for my piano parts, but the only 88-key synth I could afford was the Alesis QS8, which lacks a sequencer. Fewer than 76 keys would be simply unacceptable, so I went shopping for a 76-key keyboard workstation and found that the Roland XP-80 ($2,495) fit the bill nicely. Aside from its 76-key semiweighted action and 64-voice polyphony, it has powerful MIDI control capabilities, plenty of

THE $8,000 STUDIO
WITHOUT COMPUTER

ITEMS	PRICE
Roland XP-80 76-key keyboard workstation (w/sequencer)	$2,495
Roland VS-880 V-Expanded w/1 GB drive, CD Recording Kit, and multi-effects board	$3,390
SyQuest SyJet 1.5 GB drive	$299
Crown CM-700 small-diaphragm condenser mic	$289
Rane MS 1 solid-state mic preamp w/phantom power	$199
DigiTech Vocalist Performer	$420
Audix PH25-vs powered monitors	$479
AKG K 141 M headphones	$138
APC Back UPS Pro 420	$299
TOTAL	**$8,008**

Bellari

Studio Tube Processors



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- Phase Reversal
- Analog Metering

RP583 Studio Tube Compressor/Limiter
- Designed for Subtle compression applications such as: Vocals - Program Material - Soft Instruments
- Side Chain for direct detector circuit access
- Smooth, natural tube compression
- All Tube Gain Circuitry

RP562 Studio Sonic Exciter
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- Adds Life and animation to the Sound
- Automatic Sound Separation
- Adjustable 18dB/Octave Subwoofer
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sliders and buttons for easy parameter control, four foot-controller inputs for real-time performances, extensive sound editing, good effects, and a well-designed, 16-track sequencer with loop recording. Furthermore, its already generous waveform ROM can be greatly expanded with up to four of Roland's SR-JV80 Wave Expansion Boards. Sold!

Recorder/mixer. The other key decision involved the recording device and mixer. Given that the XP-80 had already consumed 31 percent of my budget, I decided that an integrated recorder/mixer was called for, but I still wanted automation, effects, and plenty of tracks. I also decided that I could not afford a DAT machine, so I needed to go straight to CD-R. I looked at Akai's DR8, but with the sync options and a mixing surface, it was beyond my budget. Ditto for the E-mu Darwin. With an MDM and digital mixer, I would have needed a stand-alone CD-R or a DAT machine for mixdown. Not on my budget!

It was Roland to the rescue again, this time with the VS-880 V-Expanded with CD Recording Kit ($2,995) and optional multi-effects board ($395). This system includes a 1 GB, internal drive and lets you burn a CD submaster using the provided JVC CD-R drive, which is a regular SCSI CD-R. The optional effects are exceptional, and the VS-880 can be completely controlled (including audio editing) from such software as *Cakewalk Pro Audio* if I ever decide to add a computer to the studio.

True, the VS-880 can only record four tracks at a time (eight real tracks total), but I don't expect to record live bands with this system unless I expand it. With the XP-80's sequencer and the VS-880's 64 virtual tracks (more, if you know a few tricks; see "Master Class: Secrets of the Virtual Studio" in the February 1998 **EM**), that's a limitation I can live with. And yes, the audio is compressed, but the VS-880's compression seems relatively benign. Besides, if you can get by with recording four real tracks, you don't need to use compression.

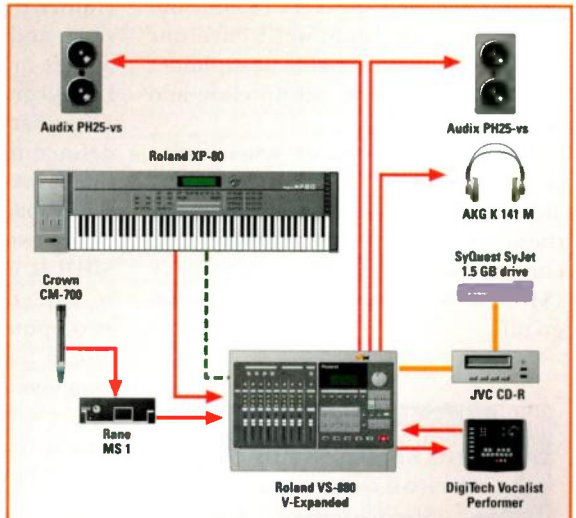


FIG. 3: The keys to this $8,000 studio are the Roland XP-80 keyboard workstation and the Roland VS-880 modular hard-disk recorder/mixer. The former provides sequencing, synthesis, and a good keyboard controller.

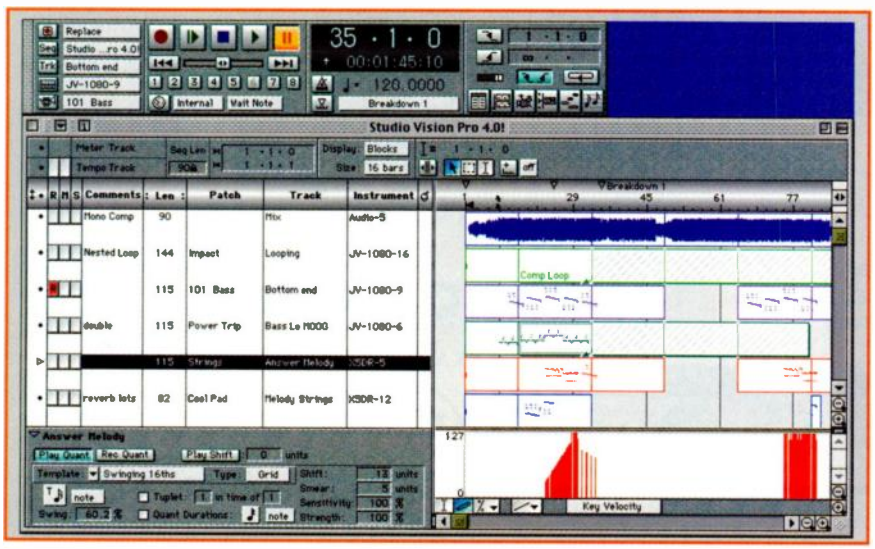
Data storage. This system is not workable without additional storage, both for backup and for extended recording time. A removable SCSI drive solves this neatly, and SyQuest's SyJet 1.5 GB drive ($299) is my choice. Why not Iomega's 1 GB Jaz drive ($299.95)? Storage capacity for the money is one reason: the SyJet holds a third more than a comparably priced Jaz, and SyJet cartridges cost $69, as against $125 for 1 GB Jaz cartridges. (Iomega introduced a 2 GB Jaz drive recently, but it costs $649.95, and its cartridges cost $169.95.)

But the main reasons I prefer SyJet are that it is faster and quieter, both major considerations for the recording studio. So far, my two SyJet drives have been extremely reliable, too.

Microphone. Now that I have blown about three quarters of my budget, I have to skimp from here on in. Then again, maybe I don't! Crown's CM-700 may be inexpensive ($289), but it is a dandy small-diaphragm condenser mic that can be used for a wide variety of applications. In my studio, it will mostly be used for vocals, but if I do have a guest artist, it can be used to mic instruments, as well. Eventually, I'd buy a second one so I could mic instruments in stereo, especially if I ever added a sampler.

Outboard processing. Outboard gear is one place where I'd expect to expand in the future, but that doesn't mean we have to live with insufficient effects processing. As mentioned, I opted for the VS-880's exceptional effects board. Did I also mention that the VS-880 has extensive onboard EQ and dynamics processing on every channel? And of course, the XP-80 synth has its own effects, which are quite good.

Two things are missing though: a clean mic preamp with phantom power for the condenser mic and something a little special for vocals, because I really love vocal arranging. For the mic preamp and phantom-power supply, I



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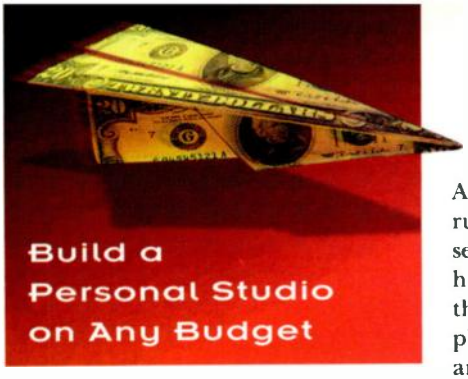


chose Rane's MS 1 ($199), a very clean, solid-state unit. I don't need a tube preamp because the VS-880 can model different kinds of mics and preamps, and I just want to feed it the purest, cleanest sound I can.

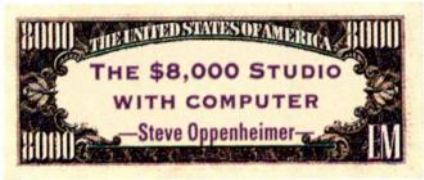
One way I'll process the vocals later is with that "something special" I alluded to earlier: a DigiTech Vocalist Performer vocal-harmony processor ($420). This gadget lets me easily sing parts beyond my normal range. Unlike higher-end Vocalists, the Performer doesn't include MIDI, but thanks to the VS-880's architecture, that doesn't matter. We can record a clean lead vocal into the VS-880, applying preprocessing if desired, and then send the recorded vocal to the harmony box. The Vocalist outputs three harmonies (as well as a dry part, which we don't need); we can return these three to the VS-880, giving us four vocal parts that can be individually processed. We can move these tracks farther down the recorder's time line (one of the tricks gleaned from the aforementioned "Master Class"), where we can submix them to stereo, process them collectively if desired, and bring them back to the current time. That lets us add more harmony parts and still have open tracks for instruments.

Monitors. I really like Audix's powered monitors, and the PH25-vs's are such a deal at $479 a pair! With twin 5.25-inch woofers and a 0.75-inch dome tweeter, they deliver smooth mids and highs that are crisp but not harsh. The bass is clear, full, and much more solid than you would expect from 5.25-inch woofers.

Of course, we'll need headphones for tracking vocals. I have been using the AKG K 240 M ($173) for years, and if I could come up with a few more dollars, I'd stick with them here. These semi-open, circumaural cans sound great, are lightweight, and can be used for extended periods. But given that I can't quite afford them for this system, I'm going with AKG K 141 M ($138), which offer most of the same advantages.

Power conditioning. I'm a big fan of APC's Back-UPS Pro series of uninterruptable power supplies, and as you'll see, the other editors agree. These units have complete AC line regulation so that sags, spikes, and surges are completely smoothed out. They deliver EMI and RFI filtering, of course. But they also are uninterruptable power supplies, so that if you get a power failure, you have several minutes to save your audio files (or synth patches in progress) and shut down the studio. For this little system, I've specified a Back-UPS Pro 420 ($299), but if I had another hundred bills, I'd step up to the Back-UPS Pro 650 ($399).

By the way, APC also has a Back-UPS series, which has filtering, surge and spike protection, and an uninterruptable backup supply but not full line regulation. My advice: go with the Pro.



When planning a studio at the same budget that includes a computer, a few parts of the studio turn out to be the same, but the differences are interesting. For one thing, with the computer providing sequencing and audio editing, our synth and controller options are much greater. On the other hand, I had to make some tough trade-offs. Once again, I built for the future, spending money on items that could be expanded, even though it meant holding off on some things that I'd really like to have, especially outboard effects processing (see **Fig. 4**).

Computer. I am, at heart, a Macintosh user. For this system, I want an Apple Power Macintosh G3/266 MiniTower. We can get one with 32 MB of RAM, 4 GB internal hard drive, 24× CD-ROM drive, keyboard, and mouse for $1,999. We'll add more RAM as soon as possible, of course. Sure, I'd love to get a 300 MHz screamer, but this 266 is very, very fast; the G3 blows the doors off of a 604e running at the same clock rate. I chose the MiniTower because it has plenty of drive bays.

I have been using a Sony 17-inch Multiscan 17sfII monitor in my studio for the last two and a half years, and I love it. Rather than buy a 15-inch monitor that we'll want to replace in a few years, we'll bite the bullet and buy the bigger monitor now. The current 17-inch model is the Sony Multiscan CPD-200ES ($569); there is a higher-end model, but that's overkill.

Data storage. Ideally, you should record audio to a different hard disk than the one on which your applications and System folder reside. We also need a backup medium and preferably removable storage. Unfortunately, the budget precludes purchasing both a second hard drive and a removable drive, so I'm going to get the SyJet drive first. It's fast enough for direct-to-disk recording, and I won't run out of storage. Plan on adding a large (say, 9 GB), fixed hard drive later, but this will do for now. With the MiniTower, we could go for an internal SyJet, but it wouldn't save us significant money, so we'll stick with an external drive and leave that drive bay open.

We're going to both mix down and archive files to CD-R. I'm not an expert here; my ancient CD-R drive was a hand-me-down. But well-informed sources advise me to go with the Yamaha CDR200t internal drive, which is available bundled with Adaptec's *Toast* mastering software for Macintosh ($395). It isn't the fastest CD-R, but it is extremely reliable.

Software. Oh boy, I dread this decision, but here we go. For practical

THE $8,000 STUDIO
WITH COMPUTER

ITEMS	PRICE
Apple Power Mac G3/266 MiniTower w/ 32 MB RAM, 4 GB drive, 24x CD-ROM, Sony Multiscan CPD-200ES 17" monitor	$2,568
SyQuest SyJet 1.5 GB drive (external)	$299
Yamaha CDR200t internal drive (w/Adaptec *Toast*)	$395
Steinberg *Cubase* VST	$399
MOTU Micro Express 4x6 MIDI interface/synchronizer	$299
Fatar StudioLogic SL-880 88-key MIDI controller	$1,295
Korg NS5R synth module	$850
Mackie MS1402-VLZ mixer	$599
Crown CM-700 small-diaphragm condenser mic	$289
Audix PH25-vs monitors	$479
AKG K 141 M headphones	$138
APC Back UPS Pro 650	$399
TOTAL	**$8,009**

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purposes, the Macintosh digital audio sequencer world is divided into two camps: MOTU and Not MOTU. Mark of the Unicorn software relies on, and requires the company's FreeMIDI system extension. But no other music-software developer uses FreeMIDI: most support Opcode's OMS instead, which accomplishes much the same thing as FreeMIDI. The two system extensions don't get along all that well, though they can sometimes be made to work together. But still, why invite headaches? My advice is to choose one world or the other and stick with it.

MOTU, of course, makes the *Performer* family of digital audio sequencers. *Performer* is a great program, and you can get it bundled with *Unisyn*, a powerful patch editor that is kept up-to-date to support all the new gear. You should seriously consider joining the MOTU world, especially if you might want to go with MOTU's new 2408 hard-disk recording system later on.

The Not MOTU world primarily consists of three companies, with a fourth recently joining the party. Opcode's biggest claims to fame are its *Vision* family of digital audio sequencers, which are bundled with the *Galaxy* patch librarian. Steinberg is best known for its *Cubase* family of digital audio sequencers. Emagic offers the *Logic* family of digital audio sequencers. These three companies go head to head with MOTU.

The newest Not MOTU member is Cakewalk Music Software, which recently acquired and updated *Metro*, formerly distributed by OSC. *Metro* 4.0 includes audio features and it is inexpensive, but it's so new we haven't received a copy yet. So for now, I'm going to pass on *Metro;* maybe next time.

Okay, let's narrow this down. I prefer to be able to process audio in real time, especially with this system, which is painfully short on outboard gear. In addition, we can't afford the top-of-the-line programs and have to go with the midlevel versions. *Digital Performer* has a fine proprietary real-time architecture that runs native on the Power Mac, but regular *Performer* lacks this architecture, so the MOTU world is out. *Vision* does not support real-time native plug-ins, either, so it's out, too. If we had a larger budget, things might be different, but we haven't, so they aren't.

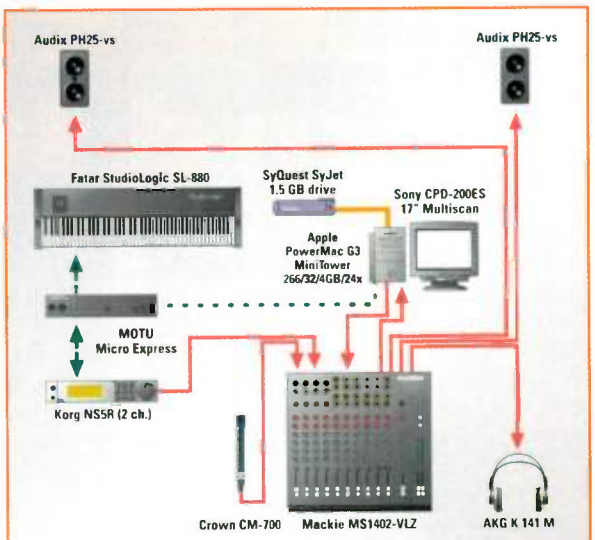
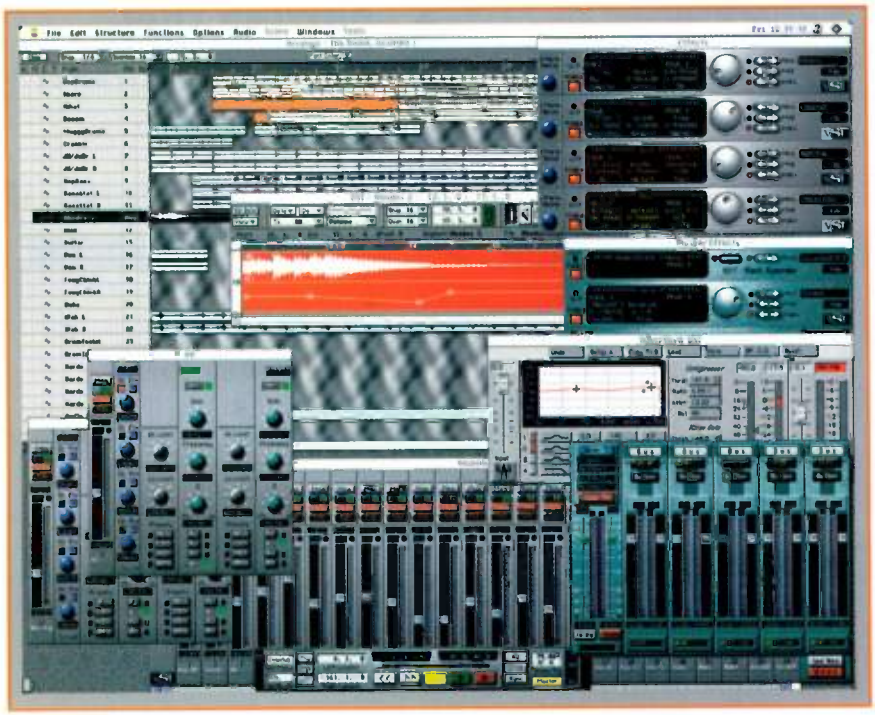


FIG. 4: We're building for the future with this $8,000 computer-based studio by spending our cash on a large monitor and a fast CPU in a MiniTower frame with lots of drive bays. The trade-off is a dearth of outboard effects, and we'll have to rely on the Power Mac's audio converters now and buy an audio card later.

On the other hand, all versions of *Cubase VST* and *Logic Audio* support Steinberg's VST real-time DSP plug-in architecture, which runs native on the Power Mac. And we *can* afford the lower-level versions of these programs. Which to choose? Just thinking about it gives me a headache! But I have to choose one, and I think I could get up and rolling faster with *Cubase VST* ($399). Still, I wouldn't argue if you chose the less-expensive *Logic Audio Silver* instead. (It should be available by the time you read this.)

We have no budget for other software unless we can bum a few bucks to buy some shareware. But *Cubase VST* will do the job for now.

MIDI interface. Given the budget, our best choices appear to be Opcode's Studio 64X ($319.95) and MOTU's Micro Express ($299). Both are 4-in, 6-out interface/patch bays for Mac and PC that can read and write SMPTE time code. We won't need all those inputs and outputs right away, but they leave room for growth. Although we're using Not



Steinberg *Cubase VST* 3.0 for Mac

or

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The alternative? Spend thousands of dollars on outboard gear and processors, string them together with noisy cords and *try* to make it all work together.

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MOTU software, we can still use a MOTU interface because the company provides software support for both FreeMIDI and non-FreeMIDI systems.

At any rate, we have to choose! The half-rackspace Micro Express is half the size of the Studio 64X and has a pair of front-panel jacks that would be handy if you borrow an extra MIDI device or someone brings one into the studio. It's also $20 less. Sold.

Keyboard controller. When discussing the computerless $8,000 studio, I mentioned that I really wanted an 88-key weighted controller for piano parts. This time, I'm buying one! My choice is the Fatar StudioLogic SL-880 ($1,295), which has a very nice weighted-hammer action with Velocity and Channel Aftertouch, pitch and mod wheels, four independent zones for splits and layers, eight Velocity curves, and sustain and continuous pedal inputs. It sends Bank Select and Program Change messages and has a Transpose feature. That's pretty much it, but given that we can do most MIDI processing in the sequencer, it's all we need.

Synthesizer. Synth modules are everywhere nowadays, so there's no lack of choices within our price range. I can only afford one module to get this studio started, so I'm going for the half-rackspace Korg NS5R ($850). This 64-voice, 32-part multitimbral module has lots of those big, fat sounds one expects from Korg: 1,049 patches in ROM and 128 user programs. It's GM compliant and includes XG and GS sound maps. In addition, a card slot accepts WaveBlaster-compatible synth daughterboards. You get a stereo multi-effects processor with the usual effects. There's a MIDI interface for Mac and PC, too, but we won't need to use it.

Mixer. As much as I would like a digital mixer, it's out of the question financially. Fortunately, Mackie's wonderful MS1402-VLZ mixer ($599) will fit both the budget and our mixing needs. It has plenty of inputs, enough sends to accommodate the outboard gear we haven't bought yet, and two sets of main outs (¼-inch TRS and XLR balanced) as well as tape inputs and outputs. That means we can send signals to and from the computer, feed the monitors, and still have a set of outputs for a cassette or DAT recorder in the future.

Audio-Technica AT4050

Microphone. I liked the Crown CM-700 for my computerless system, and I still like it. Enough said.

Monitors. The Audix PH25-vs powered speakers are still my choice. They're shielded, by the way, so you can place them close to the computer monitor. We still have to pinch pennies, so I'm going to stay with AKG K 141 M headphones.

Power conditioning. Given that I now have a computer to protect, I'm going to spend the extra C-note and get the APC Back-UPS Pro 650. When I add significantly more hardware in the future, I would add a second power conditioner, too.

What's missing? In case you haven't noticed, I haven't specified any outboard signal processors. I admit this is not good; it means we have to rely on software plug-ins to process vocals and acoustic-instrument tracks. Of course, the NS5R synth module has its own effects, but even so, we will want variety. This is the consequence of buying products that allow for future expansion, especially for choosing a faster computer, larger monitor, and 88-key keyboard controller. I think it's a worthwhile trade-off.

Therefore, the number one future purchase will be outboard effects, including multi-effects (perhaps a DigiTech S100 for $219.95 and a Lexicon MPX 100 for $249) and a compressor. A parametric EQ would be handy, too. After that, we might go for more RAM and a second hard drive.

There's one more problem: we don't have an

E-mu E-synth

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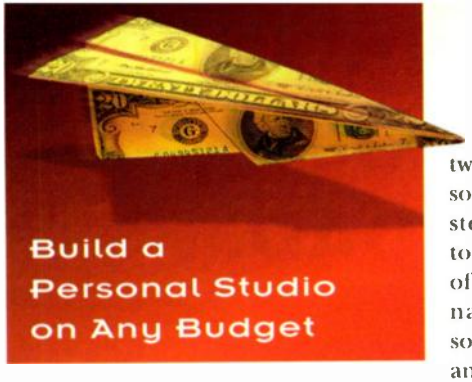


audio card, so we're going to have to use the Power Macintosh's stereo inputs and outputs. Although not ideal, the Mac's 16-bit converters are good enough for now.

My goal was to put together a versatile, predominantly digital, 16-track studio maximized for recording "real" instruments, capable of recording up to four musicians playing at once, and sophisticated enough to allow digital mixing and basic digital editing. With enough microphones to mic a drum kit and headphones for each musician, this system will cover a variety of tracking situations and provide everything you need to turn out superlative mixes on both DAT and cassette tape (see **Fig. 5**).

Mixer. The heart of this system is the affordable, new Yamaha 01V digital mixer ($1,999). Similar to the 03D but without surround-sound capability and onboard dynamic automation, the 01V is a 24-channel, 6-bus beauty featuring two 32-bit stereo effects processors (ProR3), six aux sends, two stereo returns, and fifteen motorized faders. Channels 1 to 16 offer 4-band parametric EQ, dynamics processing (compressor/limiter/ gate), solo-in-place, and a 250 ms delay line. Balanced XLR mic inputs with 48V phantom power are available on channels 1 to 12. The mixer accepts one I/O expansion card; I chose the Alesis optical digital interface card ($299).

Although it lacks onboard dynamic automation, almost everything on the 01V can be MIDI-controlled in real time. However, we don't have a sequencer in this studio, so dynamic automation will have to await future expansion.

Multitrack recorders and synchronizer. Rather than use two MDMs, this system combines a modular digital multitrack tape recorder (MDM) with a modular hard-disk recorder (M-HDR) to gain the advantages of both formats: inexpensive tape storage on the MDM and random-access digital editing on the M-HDR.

The Alesis ADAT-XT20 ($2,995) is the master MDM deck, and the Fostex D-90 M-HDR with onboard 2.5 GB hard drive ($1,895) is the slave. These are connected to the 01V with a Fostex DP-8 ($359) digital/optical patch bay. Synchronization of the two decks is handled by a JLCooper dataSYNC^2 ($299.95), which is connected to the ADAT via standard ADAT multipin synchronization cables (included with the dataSYNC^2) and to the D-90 via MIDI. Slave mode on the D-90 is set to "ADAT."

This arrangement allows for ready digital audio transfer between the two multitrack recorders as well as perpetual lockup. Also, either deck can be accessed (individually) through the 01V's eight channels of ADAT digital I/O. At mixdown, however, signals from one of the multitrack decks must be returned analog. But don't think that this compromises the system's performance. For one thing, both the ADAT-XT20 and the Fostex D-90 use quality 20-bit DACs. Furthermore, in my experience, digital signals returned via analog inputs are hardly distinguishable from those returned digitally. After all, unless you're recording more than eight tracks at once, it's only during mixdown that some of the tracks have to be routed analog; otherwise, using this setup, it's possible to perform all tracking, transfer, and editing in the digital domain.

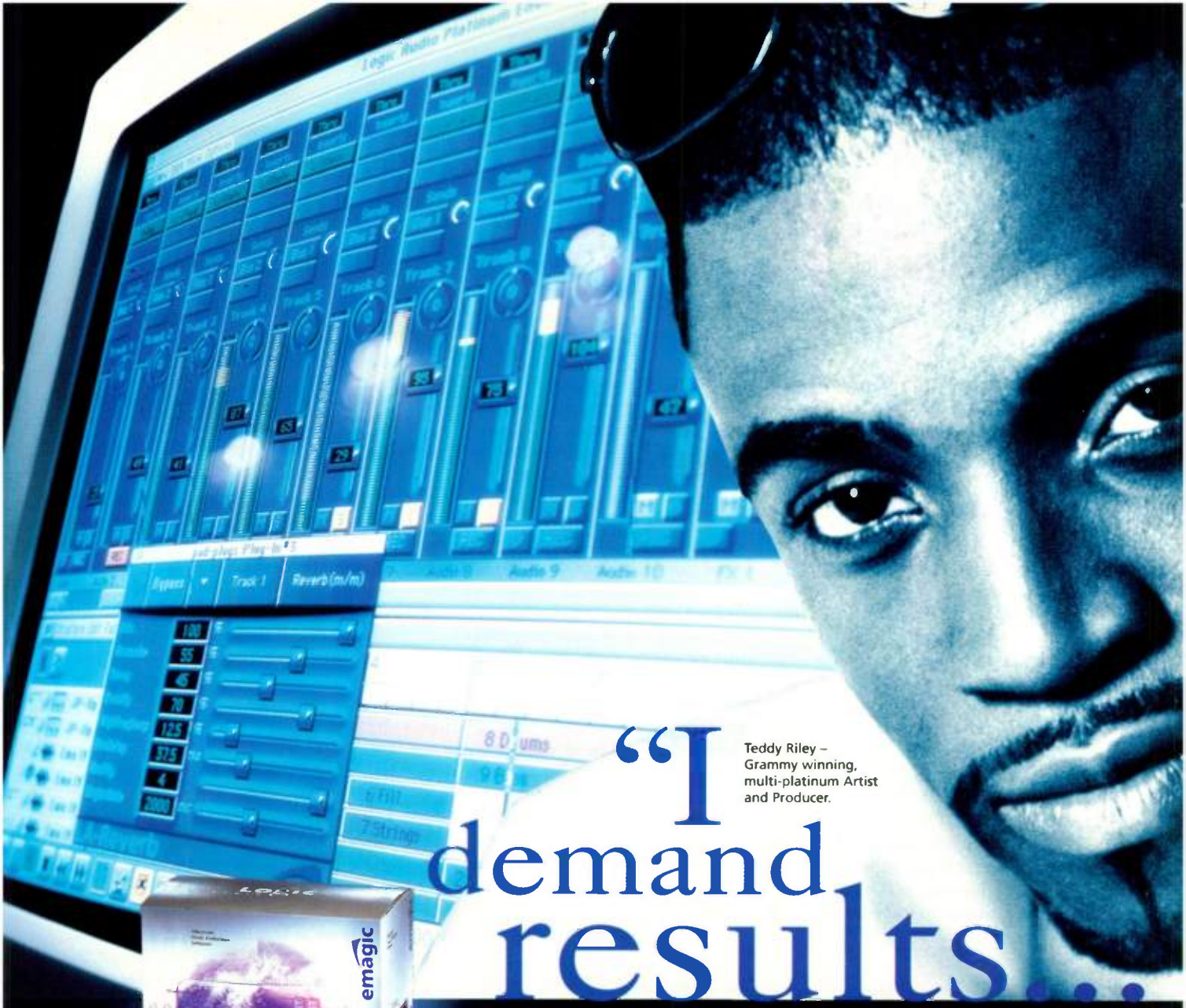
Microphones. For this studio, a good chunk of our budget gets eaten up by microphones. For a large-diaphragm condenser, I specified the new Neumann TLM 103 ($995), which is the least expensive large-diaphragm Neumann and a lovely sounding, inordinately quiet mic (7 dB self noise, A weighted). However, if you need the versatility of a multiple-pattern condenser (the TLM 103 is cardioid only), for the same money you could substitute the Audio-Technica AT4050cm5, which provides omni, figure-8, and cardioid patterns as well as a 10 dB pad and 80 Hz highpass filter. Either way, your signals are beautifully captured from the get-go.

Because we need to be able to close-mic a drum kit, I've included the Audio-Technica ATM25 ($278) kick-drum mic, two AKG C 1000 S small-diaphragm cardioid condensers ($274 each) for use

THE $16,000 STUDIO
WITHOUT COMPUTER

ITEMS	PRICE
Yamaha 01V digital mixer w/ADAT digital I/O card	$2,298
Alesis ADAT-XT20 MDM	$2,995
Fostex D-90 hard-disk recorder w/2.5 GB hard drive	$1,895
Fostex DP-8 digital/optical patch bay	$359
JLCooper dataSYNC^2 synchronizer	$299.95
Neumann TLM 103 large-diaphragm condenser mic	$995
Audio-Technica ATM25 condenser drum mic	$278
AKG C 1000 S small-diaphragm condenser mics (2)	$548
Audix OM-2 dynamic mics (4)	$596
Peavey VMP-2 dual-channel tube mic preamp/DI	$949.99
Re'an RPM48 audio patch bay	$179
Alesis Wedge multi-effects processor	$499
A.R.T. Pro VLA 2-channel tube compressor	$599
Event Electronics 20/20bas powered monitors	$999
Sony MDR-7504 headphones (4 pr.)	$512
Fostex PH-50 5-channel headphone distribution amp	$279
TASCAM DA-20 mkII DAT recorder	$1,099
TASCAM 102 mkII cassette recorder	$369
Back-UPS Pro 420 power conditioner	$299
TOTAL	**$16,047.94**

DigiTech Vocalist Performer



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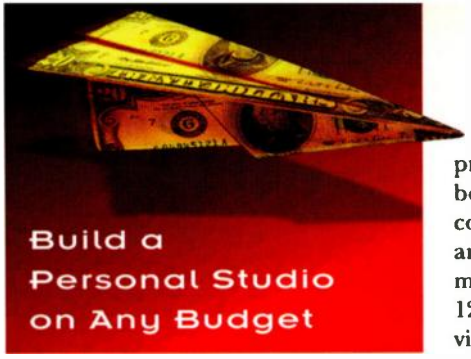


as overheads (or other stereo-miking applications), and three Audix OM-2 dynamic mics (one for snare drum, two for toms). At $149 each, the OM-2s are a great value. I compared them recently with several other inexpensive, handheld dynamics and found them very natural sounding and the best of the bunch on drums and guitar amps.

A fourth OM-2 will be used for close-miking the guitar amp when recording a 4-piece band. The bass guitar is routed through the DI input on a VMP-2 (discussed shortly), and the keyboards go direct into stereo line inputs on the 01V.

Optional kick-drum mics include the Audix D4 ($289), Electro-Voice N/D 868 ($309), and AKG D 112 ($319). And at $289 each, the Crown CM-700 small-diaphragm condensers could be substituted for the pair of AKG C 1000 S mics.

Mic preamp. The Peavey VMP-2 ($949.99) remains one of the best-sounding tube mic preamps in its price class. Having this unit in the system provides an alternative to the solid-state mic preamps in the 01V. Moreover, being a dual-channel unit, it could also be used to warm up and fatten a completed stereo mix. The VMP-2 employs 12AX7 tubes throughout. It provides switchable 48V phantom power, 20 dB input pads, ¼-inch and XLR inputs, high and low shelving, and a very sweet-sounding tube EQ (with bypass). Also, thanks to two ¼-inch instrument-level jacks on the front panel, the unit serves double duty as a tube DI.

Alesis Wedge

Outboard processors. The 01V provides much of the studio's processing power, but I've thrown in some supplemental outboard gear to expand the tonal palette. Each of the following units is first routed through a patch bay configured with denormaled patch points to allow for individual access, daisy chaining, or whatever. I selected the Re'an RPM48 ($179). This 48-point, balanced TRS bay provides easily removable patch modules that, when reversed, change the patch points from half-normaled to denormaled (or vice versa). Other balanced patch bays in the same price range include the dbx PB48 ($179.95) and the 40-point Furman PB40T ($180).

The Alesis Wedge ($499), though billed as a digital reverb, is in fact a multi-effects processor that can also handle chorusing, flanging, autopanning, pitch shifting, rotary-speaker simulation, and up to 5.5 seconds of delay. A tabletop unit with four faders, a data wheel, and a big LED screen, the Wedge is easy to use and sounds great.

Although the 01V provides ample dynamics control both on individual channels (1 to 16) and on the stereo outputs, I've also included the A.R.T. Pro VLA tube compressor ($599). The Pro VLA has a warm, smooth, and musical sound. Whether used during tracking or on the final stereo mix, it should provide a quite different sound from the 01V's digital compression.

There are various ways to bring a stereo mix out of the 01V and into an outboard processor before printing to DAT. Let's say you want to lightly compress the mix through the Pro VLA. The most straightforward approach would be to send the mix through the analog stereo outputs directly into the compressor, patch the compressor into the DAT, and perform the fade (if there is one) using the output-level controls on the Pro VLA (or the input-level controls on the DAT). Or if you want to use the 01V's stereo fader and you don't mind the mix passing through 18-bit converters along the way, you could assign all the tracks and processing to buses 1 and 2 on the 01V, go from there into the compressor, from the compressor back into a stereo channel (or the 2-track input) on the 01V, and then assign those channels to the stereo output (which is routed digitally to the DAT). There are other ways, as well, thanks to the flexible routing options on the 01V.

Monitors. With this setup, I'm assuming that the studio has a separate control room so the engineer can monitor through speakers rather than headphones during tracking sessions. (However, the engineer-producer could appropriate one of the four sets of headphones I've specified, so this setup will still work for a one-room studio.) I selected the Event Electronics 20/20bas ($999) powered monitors, which are biamplified and use an active crossover. These are an excellent value—probably the best-sounding full-range active reference monitors available for less than $1,000.

Another great buy for just a bit more money would be Genelec's 1029A powered monitors ($1,070). However, with their 5-inch "woofers," the 1029As practically require the use of a subwoofer if you really want to hear all of the low

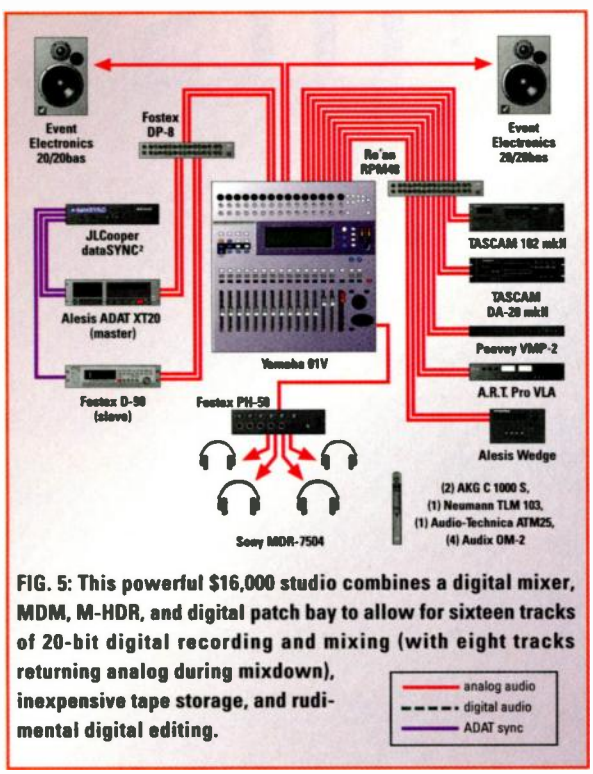


FIG. 5: This powerful $16,000 studio combines a digital mixer, MDM, M-HDR, and digital patch bay to allow for sixteen tracks of 20-bit digital recording and mixing (with eight tracks returning analog during mixdown), inexpensive tape storage, and rudimental digital editing.

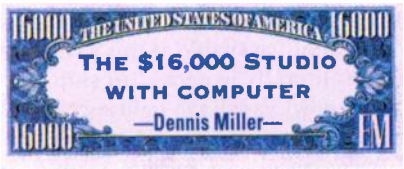
frequencies. (The 20/20bas employ 8-inch woofers.)

To record all at once, of course, our hypothetical 4-piece band needs four sets of headphones. Again, I specified the Sony MDR-7504 headphones ($128 each). For a headphone distribution amp, the 5-channel Fostex PH-50 ($279) will serve well. It offers individual level controls for each pair of phones and can accommodate a fifth pair when the need arises.

Mixdown deck. A stand-alone CD recorder would be nice, but I'm constrained by budget to leave this mixdown option out of the picture. Fortunately, DAT is still the predominant digital mixdown format, and you can't go wrong with a good DAT deck. For this system I picked the new TASCAM DA-20 mkII ($1,099), which provides both AES/EBU and S/PDIF I/O for connecting digitally to the 01V.

I also went with TASCAM for the cassette recorder, in this case, the 102 mkII ($369). You could also, as mentioned previously, go with the Sony TCW-565R ($320) dual cassette recorder and save $50. Either unit could be connected directly to the outputs of the DAT deck or routed first through the patch bay for increased flexibility and convenience.

Power conditioning. For a digital system as involved as this one, some type of power conditioning and surge protection is a must. To stay within budget, I specified the APC Back-UPS Pro 420 ($299). If I could afford it, I would spend the extra money and move up to the Back-UPS Pro 650 ($399), which can handle a large system and keep the juice flowing during a power outage.



With a budget of $16,000, you will have the luxury of owning several top-notch hardware devices and a powerful, fully loaded computer. This will prepare you for many types of scoring jobs, jingle and game work, and the ability to produce high-quality recordings and deliver them on industry-standard media. You'll also have an important sound-design tool on hand (see **Fig. 6**).

Computer. Rather than bogging down this studio with numerous external hardware devices, we'll be doing as much work as possible on the PC itself. Our system will start with today's state-of-the-art processor, the Intel 400 MHz Pentium II. We'll choose a motherboard that is dual-processor ready, which will prepare us for a move to NT sometime in the future. Windows 95 and 98 only support a single processor, so we'll only install one CPU chip now. We'll get a V.90-compliant modem, keyboard, and mouse in the bargain.

For video, we'll need an 8 MB AGP card so that the screens on our 19-inch monitor redraw quickly, and of course, the 128 MB system RAM will give a boost to many computing processes. All of this is included in the system price I've quoted ($5,000).

Data storage. In order to enhance drive throughput, our system will be all SCSI-based. In addition to its speed advantages, SCSI allows us to connect

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numerous different devices. Our system hard drive will be a 9.1 GB Seagate Cheetah, which, at 10,000 RPM, is about the fastest drive going. We'll add an internal Travan 4 tape backup to the SCSI chain, providing us with eight GB of compressed storage for archiving files. Our internal Yamaha CRW4260 rewriteable CD drive ensures that the audio CDs we make will play on any system, and it will also give us the option of making data CDs. With its 6× read and 4× write capabilities, the 4260 will let us burn our CD masters in short order. Again, all of these items are included in our $5,000 system price.

Although you won't see this exact system configuration advertised, you can call your friendly computer-system integrator (check the ads in computer magazines) and get a quote.

Software. What do we intend to load on this screamer? At the heart of our studio is SEK'D's *Samplitude 2496* professional multitrack audio program. This awesome software supports 24-bit audio at numerous sampling rates up to 96 kHz and has built-in CD writing, automated mixing, and nearly unlimited tracks. If we get those scoring jobs we're after, we'll be able to watch AVI files while audio is playing, and the large number of built-in effects, coupled with DirectX plug-ins we can add later—we can't get *everything* we want for $16,000—give us plenty of processing tools to work with. With luck, we'll be able to recoup *Samplitude*'s price of $1,500 after only one or two jobs.

The choice of audio-hardware configurations is especially difficult because *Samplitude 2496* provides so many options. We could use an external converter box such as SEK'D's own 2496S ($995), which provides eight 16-bit analog ins and outs as well as stereo S/PDIF converters, or we could add any one of a number of digital I/O cards. I have chosen to install the new Layla card from Event Electronics($999). This long-awaited, multi-I/O system (still not available at this writing but literally expected to ship any day now) has all the right specs: 20-bit, 128× oversampling A/D and D/A converters, eight analog ins and ten analog outs on ¼-inch TRS balanced connectors, 24-bit S/PDIF digital I/O, and onboard MIDI In/Out/Thru. And with Sonic Foundry's *CD Architect* and *Sound Forge XP* included with the bundle, we'll get an extra software bonus.

THE $16,000 STUDIO WITH COMPUTER

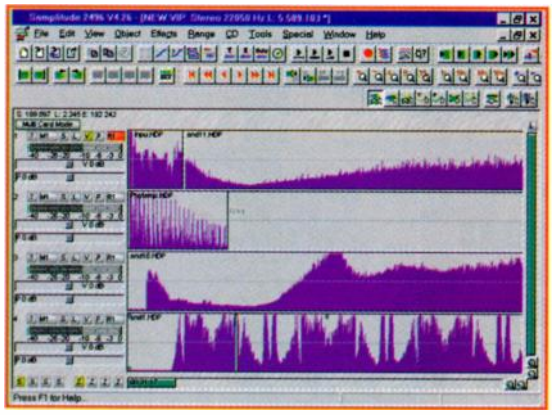
ITEMS	PRICE
Pentium II 400 MHz PC with 128 MB RAM, 9.1 GB Seagate Cheetah hard drive, 19" monitor, Travan 4 tape drive, Yamaha CRW4260 CD-RW drive, Windows 95/98	$5,000
SEK'D *Samplitude 2496* multitrack audio editor	$1,500
Event Electronics Layla audio card/MIDI interface	$999
Cakewalk Music Software *Cakewalk Pro Audio* 7.0 MIDI/audio seuencer	$429
Synoptic *Virtual Waves* sound-design software	$199
E-mu E-Synth keyboard synth/sampler	$3,995
Quantum Fireball ST 2.1 GB SCSI drive (internal)	$219
Mackie MS1402-VLZ mixer	$599
Sony PCM-R300 DAT player	$995
Denon DN-600F CD player	$450
Marantz PMD-501 cassette deck	$329
Event Electronics Tria 3-way powered monitors	$849
Altec-Lansing ACS45 multimedia speakers	$99
Sony MHDR-7502 headphones	$74
APC Back-UPS Pro 650	$299
TOTAL	**$16,035**

Our sequencer will be a top-of-the-line buy. For me, the choice is between *Cubase VST* 3.55 and *Cakewalk Pro Audio* 7.0. However, you should also look into Emagic's *Logic Audio,* an extremely powerful program that has just added DirectX and VST plug-in support. *Logic* is a powerhouse; once you get up to speed, you can do pretty much whatever you need to do, but it takes a while to get to that point. *Cubase* and *Cakewalk* are more my speed.

Cubase VST has a very slick interface and offers a huge number of processing options for MIDI data, such as an arpeggiator and my all-time favorite real-time processor, the Interactive Phrase Synthesizer. It supports both a growing list of proprietary audio plug-ins and the industry-standard DirectX variety. Though the version we're considering does have decent scoring functions, we could upgrade later to a version with world-class notation options for only $150. The ability to trigger AVI files directly from within the program will also come in handy during audio-for-video projects.

Given that I can only afford one of these programs, however, I'll go for the new version of my old favorite, *Cakewalk Pro Audio* ($430). Version 7.0 has a much improved interface and audio processing options. The new Virtual Mixing Console makes working with different data types easy, and the built-in StudioWare features allow you to control your hardware as if you were turning knobs and tweaking settings right on the units' front panels. *Cakewalk* is the first pro sequencer to support Windows NT, which could be an issue if we move to that platform any time soon, and the program's stability and ease of use are legendary. It also offers the Cakewalk Application Language, which allows those with sufficient courage and programming chops to customize *Cakewalk* to a degree not possible with other sequencers.

To round out our software arsenal, I'm adding one of my favorite programs to the list. Synoptic's *Virtual Waves* ($199) is among the most useful tools I've ever owned. This graphic sound-design software allows you to build "synths" that combine numerous types of synthesis methods. By dragging icons that represent different sound-creation or processing functions onto the program's workspace and "patching" these



SEK'D *Samplitude 2496*

The PROs

J.T Thomas

Keyboardist with
Bruce Hornsby, Tracy Chapman, Rita Cooiidge, Sparks, Captain Beefheart

"The PRO2 has the most realistic grand piano sound I have ever heard in a performance keyboard. The solid action and easy programming features make the PRO2 a great choice for both studio work and live gigs".

Composer, keyboardist and founding member of the Grammy award winning fusion ensemble **Yellowjackets**

"As a musician often accused of being hard to please, it's a privilege to be associated with a company with such an unwavering commitment to excellence. In other words - 'Killer piano sounds dude!'"

Russell Ferrante

Darrell Smith

Keyboardist, producer with
Herbie Hancock, Maxwell, Brian McKnight, Impromp2, Gerald Albright, Doc Powell

"I've played all of the keyboards that attempt to recreate the acoustic piano faithfully, and the PRO2 is my favorite by far. I love the feel, the adjustability, the portability and the built-in phaser effects on Rhodes and Clavs are hot!! I'd recommend this to any professional musician."

Jason Miles

Keyboardist / Producer, programmer with
Marcus Miller, Luther Vandross, Michael Jackson, Whitney Houston, Chaka Kahn, Michael Brecker and Grover Washington Jnr

"I am totally knocked out by the PRO2. A real achievement in the day when everybody says they have got the great piano sound - Generalmusic has backed that statement up with a truly awesome instrument. The Rhodes and Wurlitzer pianos are also fantastic."

Keyboardist with
Lee Ritenour, Dave Grusin, Michael Jackson, Eric Clapton, Big Mountain, Go West, Manhattan Transfer, Al Jarreau and Sheila E.

"The PRO2's grand pianos are outstanding, sounding very real throughout the full range, with none of the regular 'cheese factor' keyboardists have been subjected to for years. The PRO2 has become an indispensable part of my musical life."

Larry Williams

Roy Bittan

Keyboardist with
Bruce Springsteen and the E Street Band, David Bowie, Dire Straits, Stevie Nicks, Peter Gabriel, Meatloaf, Lou Reed, Bob Seger and Jackson Browne

"The PRO2's sounds record beautifully and fit well in the tracks I record. It's also very user-friendly and has a beautiful piano keyboard action, which is so important to me being an acoustic piano player."

The PRO

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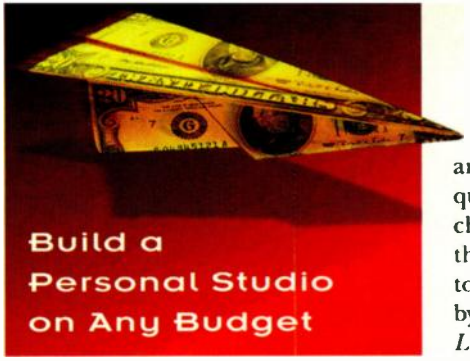

icons together, you can build an unlimited numbers of sounds with very little effort. The program even includes a wizard-style "assistant" that will walk you through the creation process. This program is a must for any serious PC desktop musician and is the perfect tool for creating the "aliens munching sheet metal" effect that you know you'll be getting a call for.

Synths and samplers. We're keeping our studio lean and clean by using only a minimum of sound modules outside of the PC. The main hardware purchase is our keyboard and sampler. I narrowed this down to two of the top units: a Kurzweil K2VXS and E-mu's new E-Synth. Both integrate high-quality samplers with ready-to-run synth engines and are easily upgradeable. They both also offer digital I/O.

The K2VXS has an excellent sequencer, but we have *Cakewalk* to cover those chores. It also has some pretty amazing MIDI modulation possibilities (see "Master Class: Too Much Fun" in the January 1998 **EM** for details) that go even further than E-mu's flexible MIDI matrix modulation. With our budget, though, the E-Synth makes more sense, because for its $3,995 base price, we've got more options right out of the box. Not only is the E-mu's keyboard larger (76 keys compared to the Kurzweil's 61), but the 4 MB of included RAM is double that of the Kurzweil. And the E-Synth uses E-mu's latest sampling hardware; to match its quality in a Kurzweil unit, we would have to go to the more expensive K2500, and we can't afford that.

We'll have to add an internal Quantum Fireball 2.1 GB SCSI drive ($219) to save the samples we'll be making, but beyond that, the E-Synth is ready to plug and play. And to get up and running quickly, we can explore the E-Synth's architecture by analyzing its presets using the included Emagic *Sound Diver* editor/librarian software. (This software, by the way, integrates especially well with *Logic Audio*, which is an argument for going with Emagic all the way.)

Mixer. We'll run all our audio gear through a superclean Mackie MS1402-VLZ mixer ($599). The unit has more than enough inputs for our current needs, and we can keep the tape outs hardwired to our DAT.

Microphone. What microphone? Not in this studio! For the kind of work we'll do in this studio, we don't need one. If we get a project that requires a live recording, we'll budget some time at a local pro studio into our fee. We wouldn't want to record in the same room with a noisy computer, anyway, but if we decide to add a mic later on, we'll go with the good old Shure SM58.

DAT, CD, and cassette decks. In addition to delivering ready-to-press audio CDs, we may need to accommodate a client with a DAT. Our studio will have a Sony PCM-R300 DAT recorder ($995); we'll send digital audio directly to the Layla card through the unit's S/PDIF (RCA) outputs. We should have no trouble getting samples off our sound effects CDs using the digital outputs of a Denon DN-600F CD player ($450). We'll also pick up a Marantz PMD-501 cassette player ($329), which

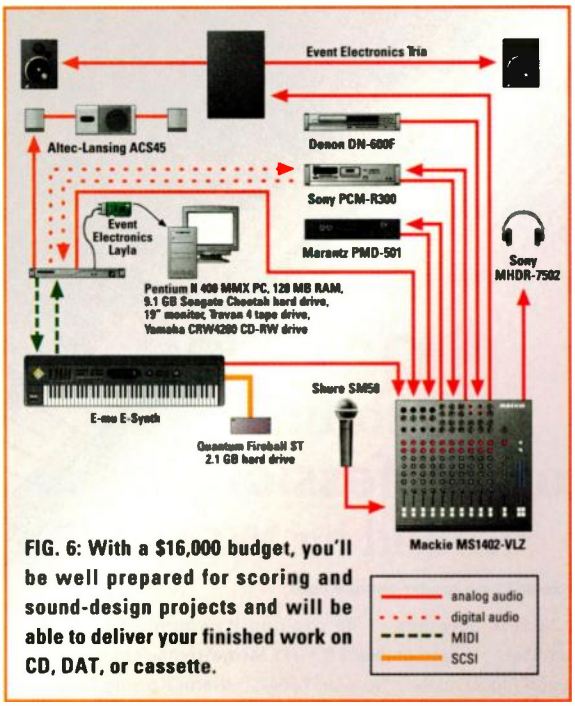

FIG. 6: With a $16,000 budget, you'll be well prepared for scoring and sound-design projects and will be able to deliver your finished work on CD, DAT, or cassette.

3. Get it right.

Mixer window

Automating a mix is child's play. Just click on "write" and record levels, pans, solos and mutes on the fly. EVERYTHING is automated - effect sends, effect parameters, etc. You can no longer call yourself a tortured artist.

2. Get it sweet.

EQ/Effects rack

Each channel strip has 4 bands of parametric EQ. There's also a four-space effects rack loaded with reverb, chorus, delay, etc., with room for more third party plug-ins than you've ever had compromising dreams about.

You're independent, stubborn, one of a kind, on a first name basis with your inner self.

Let it flow.

4. Get it warm.

Magneto™

This plug-in is outrageous. It adds tape saturation warmth to digital recordings. Yowza.

5. Get it ready to burn.

Master section

Here's where the true mastering comes in. There's an *additional* four-space effects rack for pin-point EQ fixes and other mastering effects. With the ultra high-end Loudness Maximizer™, your master mix is guaranteed to pack a whal.op. Amateur hour is officially over.

1. Get it together.

Arrange window

This is the nerve center, where most of the work is done - MIDI and audio recording, editing and trying out new arrangements. There's up to 32 tracks of digital audio at the ready - just follow your intuition.

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gives us the option of delivering cassette demos to prospective customers when the need arises.

Monitors. The Mackie's main outs will be connected to a set of Event Electronics Tria 3-way, powered speakers, one of the best bargains around at $849. Because we hope to be doing numerous multimedia music projects, we're adding an Altec-Lansing ACS45, 3-way desktop speaker system ($99). That way we can do a second mix directly to the Altecs and be sure we hear what our end-users will be hearing. We'll need headphones, of course. I like Sony's MHDR-7502 headphones, which are eminently affordable at $74.

Power conditioning. This is easy; we'll go with the APC Back-UPS Pro 650 ($299).

It may seem like a lot of money, but $32,000 can disappear quickly when you're putting a studio together. Trust me, this wasn't as easy as it seems! This system is designed to be a dedicated music-production facility with 24 tracks of digital audio recording, a digital console with onboard processing, scene recall and mixdown automation, sampling capabilities, a well-rounded arsenal of microphones, and a whole bunch of analog and digital outboard gear—everything you need to turn out professional music projects (see **Fig. 7**).

Multitrack recorders. To start, you'll need three MDMs, which offer quality digital audio recording on inexpensive tape. I prefer the TASCAM DA-38 ($3,499) over the Alesis ADAT. It has been my experience that the 8 mm format is faster and more reliable than Super VHS. I also find that the TASCAM MDMs sound warmer than the ADATs. There are two main issues, however. One is the ability to transport tapes to and from other personal studios, which more often have ADATs. (Post-production facilities, on the other hand, often have TASCAM DA-series MDMs.) The other is connectivity: a wealth of products support the ADAT optical ("Lightpipe") interface, whereas relatively few manufacturers currently offer products incorporating TDIF I/O. However, it's only a matter of time until TDIF-interface devices become abundant.

Designed with the musician in mind, the DA-38 gives you a good deal of control. The features include track copy, track delay, machine offset, and sample rate select (44.1 or 48 kHz). A digital patch bay is available for accessing any track from any input. The DA-38 also has extensive MIDI features, making it easy to incorporate MIDI gear into your studio. Although the unit features 18-bit A/D and 20-bit D/A converters, we'll be transferring audio to and from the console digitally.

Mixer. A digital mixer is the way to go. There are only a few contenders on the market that fit into our price range; for instance, I wanted to include a Yamaha 02R, but its price tag ($8,995) was wreaking havoc on my budget. I then contemplated the Yamaha 03D (the compact version of the 02R), but with only eight channels of digital I/O and four buses, the 03D simply wouldn't accommodate a 24-track setup.

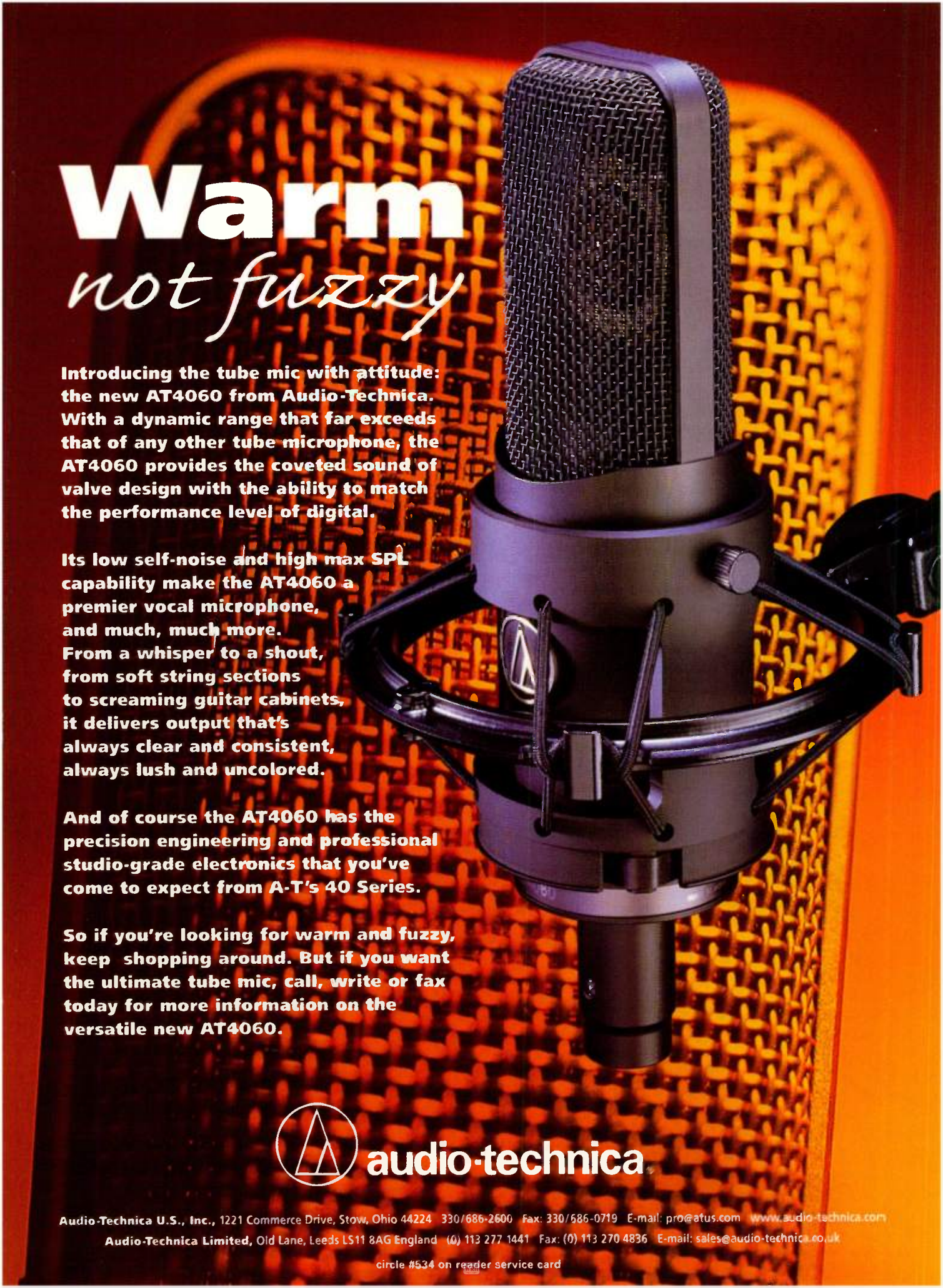
That brings us to the Panasonic/Ramsa WR-DA7 ($5,000). I'm taking a bit of a leap of faith here because, although I have seen demos of a prototype unit, and delivery of final units is expected by the time you read this, the mixer was not shipping as of this writing.

The WR-DA7 is a 32-input, 8-bus console with onboard delay and dynamics processing, scene recall, dynamic automation with moving faders, 24-bit A/D and D/A converters, and 5.1 surround-sound processing. There are sixteen mic/line inputs (eight XLR and eight TRS), six aux sends, and AES/EBU and S/PDIF digital I/O. In addition, the WR-DA7 can generate word clock for controlling the DA-38s' transports.

In order to maintain a complete digital signal path between the console and the MDMs, you'll need to purchase three digital TDIF I/O cards ($350 each) for the WR-DA7. If you plan on doing any video production work, you should also consider the optional video sync card, which provides LTC/VITC chase lock and MIDI Machine Control. This console's only drawback is the lack of onboard multi-effects. However, with the money we save by not buying an 02R, we can get some very nice outboard processors.

Microphones. Every studio should have a good large-diaphragm condenser mic. One of my favorites is the Audio-Technica AT4050 ($995). There have been times when I've chosen the 4050 over a Neumann U 87, especially when working with acoustic guitars. It features selectable patterns (omni, cardioid, and figure-8), a -10 dB pad, and a low-frequency rolloff at 80 Hz. It would be a good idea to purchase a matched pair of these mics for recording pianos, drum kits, and group

Mackie MS1402-VLZ


Warm
not fuzzy
Introducing the tube mic with attitude: the new AT4060 from Audio-Technica. With a dynamic range that far exceeds that of any other tube microphone, the AT4060 provides the coveted sound of valve design with the ability to match the performance level of digital.
Its low self-noise and high max SPL capability make the AT4060 a premier vocal microphone, and much, much more. From a whisper to a shout, from soft string sections to screaming guitar cabinets, it delivers output that's always clear and consistent, always lush and uncolored.
And of course the AT4060 has the precision engineering and professional studio-grade electronics that you've come to expect from A-T's 40 Series.
So if you're looking for warm and fuzzy, keep shopping around. But if you want the ultimate tube mic, call, write or fax today for more information on the versatile new AT4060.
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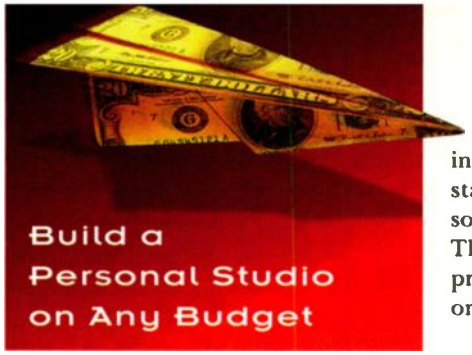


vocals. I'd also invest in a pair of pencil condensers. Check out the AKG C 1000 ($274); no other mic in this price range can deliver as much sonic information.

When you make your selection of dynamic mics, think about the drum kit: what mics would you use on the snare, toms, kick drum, and so on? This is always a good way to select a few decent contenders. Keep in mind that we've already purchased a pair of AKG C 1000s, which can be used as overheads, and we also have a couple of AT4050s, which sound great on a snare drum. So I'd start with a dedicated kick-drum mic, such as the AKG D 112 ($382). In addition to bringing out the "punch" of a kick drum, the D 112 also works wonders on a bass-guitar cabinet. I'd also invest in three or four all-purpose dynamics, such as the Shure SM57 ($146) and Audix OM-2 ($149). The OM-2 sounds great on drum toms, and we all know that the SM57 is a staple of rhythm-section recording. By getting two of each, you'll have a versatile collection.

Don't forget a couple of direct boxes; you'll need them for a number of applications! Stewart's ADB-1 delivers a clean signal and is relatively inexpensive ($106). If you have some extra money, you might want to upgrade to a tube unit, such as the TubeWorks Tube Direct ($450).

Preamps. Despite the high fidelity and pristine sonic clarity of digital recording, there are certain nuances of analog tape that simply can't be replicated by a digital deck. To compensate for this, many engineers employ a good deal of tube processing.

The Drawmer 1960 compressor/preamp ($2,349) is a great choice for processing mic signals before they go into the digital domain. By fattening up instruments with tube processing at this stage, you'll end up with tracks that sound warmer and have more depth. The 1960 is also a great unit for compressing individual tracks at mixdown or for patching across the L/R bus.

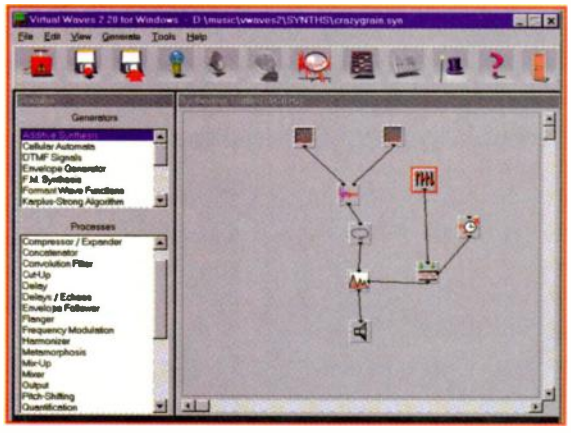
Outboard processors. You should have access to stellar reverb patches, and you can find quite a few of them in the Roland SRV-330 ($995). Featuring Roland's RSS 3-D processing, the SRV-330 contains over 300 factory presets, so you can find an appropriate reverb for literally any track without having to adjust a single parameter. Of course, you get plenty of editing power, too.

Another good investment is the DigiTech Studio 400 ($869). This unit offers four independent mono processors (or two stereo), with up to eight simultaneous effects that can be programmed in any order or combination. Although we can't afford it here, for $279 you could purchase an S/PDIF digital I/O card for the Studio 400, which guarantees a clean signal path.

To round out your effects collection, take a listen to the Lexicon MPX-1 ($1,299). This extremely flexible multieffects processor doesn't offer digital I/O, but it features 18-bit A/D and 20-bit D/A converters, in-depth parameter editing, and extensive MIDI control.

In a studio this size, you should also patch a graphic EQ between the console outputs and the monitors. Check out the Alesis MEQ230 ($299); with two channels of ⅓-octave EQ, it provides more than enough flexibility to compensate for any acoustic anomalies.

Patch bay. For the sake of convenience, you should invest in a patch bay. This setup includes several outboard processors, and you don't want to have to reach behind racks constantly to



Synoptic *Virtual Waves* 2.2

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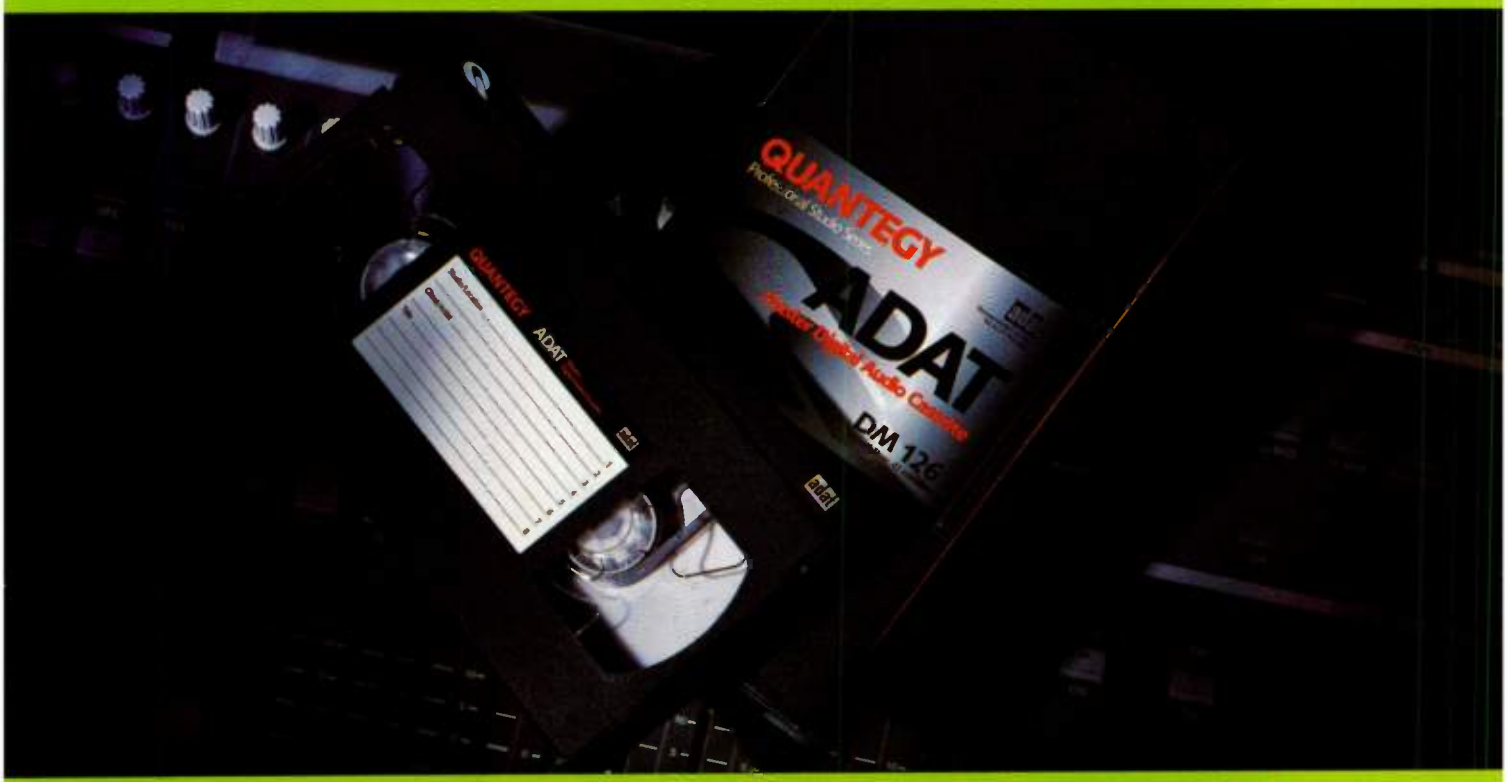

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make connections. Re'an's RPM48 ($179) is sturdy and reliable.

Sampler. Considering that this setup doesn't include hard-disk recording or MIDI sequencing, incorporating a sampler will allow you to enter the world of rhythmic programming. A fine choice is the Akai S2000 ($1,195). The S2000 features 32-voice polyphony, 2 MB of RAM with expansion options, DSP processing, and a SCSI port. For an extra $299, you can purchase the IB802P, which provides eight digital outputs. The S2000 can be synched with the rest of the system through its MIDI ports.

Mixdown decks. This studio requires only a functional DAT recorder for importing and exporting audio, not one with elaborate editing and sync capabilities. Although the Panasonic SV3800 and TASCAM DA-30 mkII are studio staples, you should be fine with a unit like the TASCAM DA-20 ($1,099), which offers digital audio transfer via AES/EBU and S/PDIF.

You'll also need a cassette deck. The TASCAM 202 mkIII ($529) is a smart choice, featuring two independent recorders that can function either as stand-alone units, with discrete ins and outs, or as a conventional double deck.

Monitors. Powered monitors are increasingly popular in personal studios. These self-contained systems offer biamped designs and require almost no maintenance. Mackie recently stepped onto this scene with the introduction of their HR824 monitors ($1,598/pr.). For the price, nothing else comes close to these speakers.

During tracking sessions, you may have more than one musician playing at a time, so having at least two sets of headphones is essential. The Sony MDR-7504s ($128) have always been a favorite of mine. They're flat, clean, and loud! Although the console provides dedicated headphone outputs, you'll also want to have a distribution amp so performers can adjust their own volumes. A good, budget-conscious solution is the Rane MH 4 ($299).

Power conditioning. With a digital console, five tape machines, a tube compressor, powered speakers, a sampler, and a rack of multieffects units, it would be foolish not to have some reliable power distribution in this studio. The APC Back-UPS Pro 1400 ($459) should accommodate this setup nicely.

THE $32,000 STUDIO
WITHOUT COMPUTER

ITEMS	PRICE
TASCAM DA-38 MDMs (3)	$10,497
Panasonic/Ramsa WR-DA7 digital mixing console with three TDIF digital I/O cards	$6,050
Audio-Technica AT4050 large-diaphragm condensers (2, matched)	$1,990
AKG C 1000 small-diaphragm condenser mics (2)	$548
AKG D 112 dynamic microphone	$382
Shure SM57 dynamic microphone (2)	$292
Audix OM-2 dynamic microphone (2)	$298
Stewart ADB-1 DI (2)	$212
Drawmer 1960 tube compressor/preamp	$2,349
Roland SRV-330 reverb	$995
DigiTech Studio 400 multi-effects processor	$869
Lexicon MPX 1 multi-effects processor	$1,299
Alesis MEQ230 graphic EQ	$299
Re'an RPM48 patch bay	$179
Akai S2000 sampler with IB802P digital I/O card	$1,494
TASCAM DA-20 DAT recorder	$1,099
TASCAM 202 mkIII cassette deck	$529
Mackie HR824 powered monitors	$1,598
Sony MDR-7504 headphones (2 pr.)	$256
Rane MH 4 headphone distribution amp	$299
APC Back-UPS Pro 1400 power conditioner	$459
TOTAL	**$31,993**

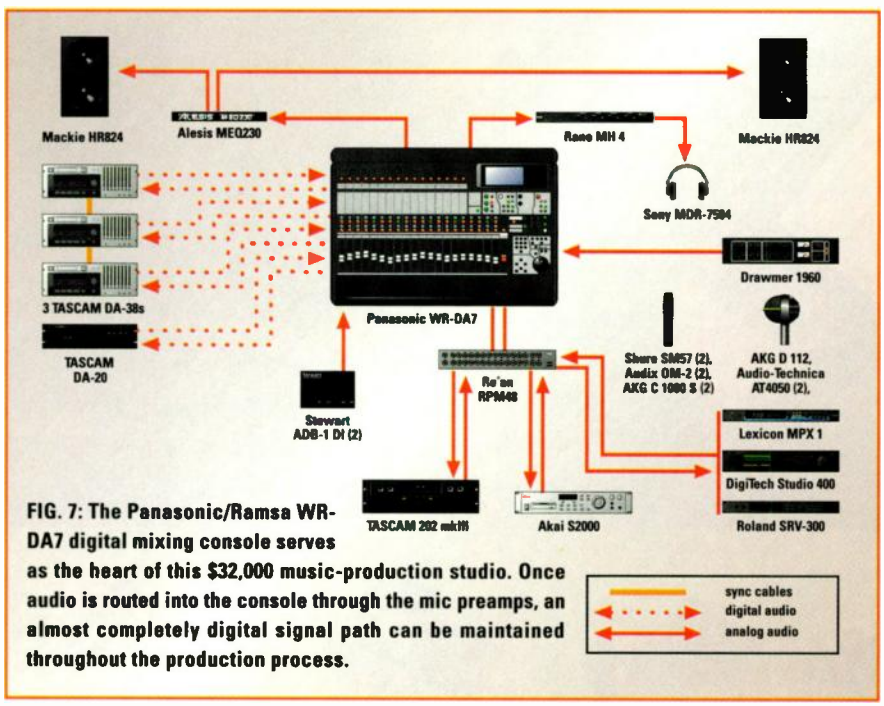

FIG. 7: The Panasonic/Ramsa WR-DA7 digital mixing console serves as the heart of this $32,000 music-production studio. Once audio is routed into the console through the mic preamps, an almost completely digital signal path can be maintained throughout the production process.

Complete control—that's what this studio is all about. Every major component is fully integrated, and almost anything can be automated. Whether you're doing audio editing, sound design, video post-production, or music production, this system provides all the tools needed to complete professional multimedia projects in one of the most pristine audio environments available (see **Fig. 8**).

The feature set is outstanding: 32 tracks of 24-bit audio recording, waveform editing, MIDI sequencing, real-time internal DSP processing, support for several plug-in formats, QuickTime editing, comprehensive automation, CD mastering, and CD printing. In addition, you'll be able to interface with virtually any external tape machine or video deck and perform online editing with the utmost accuracy.

Keep Up With Storage Technology That Doesn't Even Exist Yet.

Get The Fostex FD-4 Digital Multitracker. Under $600!!

Typically, by the time you commit to a digital media standard a better one has already come along. How can you keep pace without losing your mind or your savings? Simple. The brand new Fostex FD-4 gives you four tracks of fully-digital audio as only Fostex can, plus something never before offered as a standard feature in a digital multitracker at this price: choices. Because rather than loading up the FD-4 with an expensive internal hard drive in a size you may not even want, we simply provided a built-in SCSI-II interface. So you can hook up virtually any SCSI-II device you'd like—an external hard drive, let's say, or a removable Zip™ or ezflyer™ drive. That way, you can configure your recorder as you see fit. It even has an internal hard drive bay, so you can add your own IDE-compatible hard drive if you'd like.

What does such flexibility and insurance against future technology cost, you may ask? Well, try cutting your lowest estimate in half, because the retail price on the FD-4 is less than $600. It's packed with 4-channel mixing capabilities, 4-channel recording in 16-bit, CD-quality digital audio, 2 "Virtual" tracks, easy digital editing, and something you won't get from anyone else: the simple freedom to pick the media of your choice.

The back panel of the FD-4 shows off its tremendous flexibility. Balanced XLR Mic inputs, optical S/PDIF and MIDI in and out, SCSI-II plus standard analog ins and outs make the FD-4 adaptable to any application.

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Multitrack recorder. Since its introduction in 1994, Digidesign's Pro Tools has quickly become an industry standard. Although there are currently several versions of the system, for this studio, you'll want the best. Pro Tools 24 delivers 32 tracks of 24-bit digital audio recording, advanced automation, extremely flexible signal routing, and support for Digidesign's TDM real-time plug-in architecture and AudioSuite non-real-time plug-in architecture. Pro Tools 24 can read a number of file types, including Sound Designer II, AIFF, WAV, QuickTime, and SND.

Digidesign's Pro Tools 24 Core System ($7,995) includes a d24 PCI audio card, DSP Farm card (which provides the processing power for the TDM plug-ins), mixing/editing software, and a selection of plug-ins. (Extra audio cards can be purchased separately, providing a total of 72 tracks. You also can buy more DSP Farms, allowing you to run more plug-ins simultaneously.)

You'll also need a Digidesign 888/24 I/O ($3,495), which provides eight channels of 24-bit A/D and D/A conversion, eight channels of digital I/O, and S/PDIF RCA connections. Up to nine interfaces can be connected to the system.

Although Pro Tools 24 is capable of recording up to 32 tracks of audio, you probably won't need more than one 888/24. For mixdown, a stereo send can be assigned to outputs 1 and 2 for your monitoring system, and the L/R bus can be sent to your DAT recorder via the 888/24's S/PDIF jack. This leaves you with six channels of I/O for external processing or other routing. On the tracking side, eight simultaneous inputs should be enough to cover almost any instrument, and the 888/24's outputs can carry headphone mixes.

Computer. For this studio you're going to need a fast, reliable computer with a number of expansion options. The PowerMac G3 fits the bill and is about the most efficient personal computer you can buy right now—which is why I'm picking it for this system.

The Apple G3 MiniTower that I've chosen offers a 300 MHz processor, 32 MB of backside cache, and a 2.1 GB internal Ultra Wide SCSI-3 hard drive, and it comes with an Apple 17-inch monitor. (A 17-inch monitor is imperative because you'll be working in multiple windows.) This setup is fast and reliable, traits that you'll appreciate once you start doing a lot of work.

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Although the Apple-made G3 machines provide only three PCI slots, you should be all right with this arrangement: one of the slots can be used for the d24 audio card, another for the DSP Farm card, and the third for either a video card or a second DSP Farm. (Of course, future PCI chassis expansion is also possible.)

Data storage. Although the Mac G3/300 has a 2.1 GB internal hard drive, audio files should ideally be recorded onto a dedicated drive. The Seagate Cheetah ($1,159) is a 9 GB drive that will give you roughly 60 minutes of 32-track recording time and uses the new Ultra Wide SCSI-3 protocol. We would need a SCSI card to take full advantage of this high-speed bus, but we can't afford that now. We'll buy the faster drive anyway so we can upgrade the whole thing later on. My advice is to get a drive larger than you think you'll need—because you probably will need it!

In addition to your working hard drive, you're going to need a storage medium. Many people choose to archive their audio to a tape-based multitrack format, such as ADAT or DA-88. But since our system is capable of recording 32 tracks of audio, that solution would prove extremely costly. Instead, I suggest saving your computer audio files to a removable hard drive. The Iomega 1 GB Jaz drive is a good choice, but I prefer the SyQuest 1.5 GB SyJet ($299).

Software. Although *Pro Tools* 4.1 software is adequate, there are a number of more elaborate programs on the market that offer MIDI sequencing and more detailed audio processing. The software that you settle on should be the one that you feel most comfortable working with. In other words, there is no *best* program. This is the component of the system that needs to be researched the most.

For a TDM-based setup, there are essentially three programs that you will want to consider: MOTU's *Digital Performer*, Opcode's *Studio Vision Pro*, and Emagic's *Logic Audio*. For this studio, I'm going with *Studio Vision Pro* 4.0 ($995), which offers comprehensive multitrack audio and sequencing software, complemented by with a wealth of processing goodies. Version 4.0 includes a ton of user-suggested enhancements, including a drum-grid editing window, audio crossfade library, and nondestructive groove-quantize feature. Over the years, I have found *Studio Vision Pro* to be one of the most intuitive programs on the market. Designed with the musician in mind, it doesn't require a degree in nuclear physics to navigate.

Keyboard controller and synthesizer. Now that you've got a powerhouse sequencer, you're going to need a good sound module and controller. I've always loved the Roland JV-1080 ($1,195): its sounds are fantastic, and it has a very intuitive user interface. I'm also partial to the Fatar StudioLogic SL-760 76-key, semiweighted controller ($799). Although you might consider buying an integrated keyboard workstation, such as the Yamaha EX5 or Kurzweil K2000, I find that having discrete units gives you the option of upgrading components later without spending quite as much money.

MIDI interface. You will need a MIDI patch bay/processor/interface that will let you quickly sync your computer and external devices using a variety of time-code formats. In light of the fact that *Studio Vision Pro* uses the Opcode-authored Open Music System (OMS), I chose to go with an Opcode MIDI interface. (Had I chosen to use MOTU's *Digital Performer*, I would have selected a MOTU MIDI interface.) The Opcode Studio 64 XTC ($495) combines a 4 × 6 MIDI patch bay with an elaborate synchronizer that can generate Superclock and word clock, sync to black burst, read and write SMPTE, and route MTC and MMC. This will let you to synchronize your studio with virtually any audio or video tape machine imaginable.

THE ROCK-BOTTOM DIGITAL STUDIO

The eight studios we have presented are all well and nice, but what if you can't afford to spend $4,000? Believe it or not, you can produce a professional-quality DAT for less than $3,000, and you only have to cut a few corners to do it! The big corner we cut is that there are no synths in this studio; we assume you are bringing in acoustic instruments or borrowing a synth. But the recording quality is excellent, and all the basic pieces are in place. I'm sure we could specify a similar system with a computer, but enough's enough!

—Brian Knave and Steve Oppenheimer

ITEMS	PRICE
Fostex FD-4 4-track hard-disk recorder/mixer	$599
SyQuest SyJet 1.5 GB removable drive	$299
Audix PH25-vs powered monitors	$479
Sony PCM-R300 DAT recorder	$995
Audix OM-2 dynamic mic	$149
DigiTech S100 multi-effects processor	$199
dbx MC6 compressor	$139
Koss TD/61 headphones	$24.95
TOTAL	**$2,883.95**

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VP88

BG4.1

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Microphones. Just like any music production facility, yours should have a well-rounded arsenal of microphones. A matched pair of large-diaphragm condensers is a good start, not only for recording instruments but also for capturing samples. I like the Audio Technica AT4050 ($995), which features selectable patterns, a low-end rolloff, and a pad. It sounds just as good as the AKG C 414 and costs about $250 less. You should also have a pair of pencil condensers, such as AKG's C 1000 ($274). I've used these mics on everything from acoustic guitars to kick drums.

A good selection of dynamic mics is also a must. Although the Shure SM57 is a standard, there are a lot of other all-purpose dynamic mics on the market. Check out the Audix OM-2s ($149) as an alternative. These mics fared very well in Brian Knave's recent dynamic microphone faceoff ("Is the SM58 Still King?" in the June 1998 **EM**). I'd purchase four OM-2s; this will give you enough flexibility to work with almost any instrument.

You'll need a DI box to connect your MIDI sound module to the 888/24. Although you could simply plug its line-level outputs into the line-level inputs of the 888, a better approach would be to route the audio through a DI, into the mic preamps, and then into the computer. This will match input impedances and produce a warmer signal. Check out the Stewart ADB-4 ($379); its four channels of direct injection should accommodate your synth outputs just fine.

Preamps. Here's the catch with this system: the Pro Tools 888 I/O accepts only balanced XLR *line-level* signals—you need to supply the preamps. While you want to be able to record at least eight simultaneous tracks (say, for a drum kit), you don't need to have eight channels of high-end mic preamps. My advice is to save your money: invest in four channels of *really* nice amplification, and round out the system with four additional channels of decent preamps.

I would start with two Focusrite Green 1 units ($1,099 each). These 2-channel, solid-state preamps are derived from Focusrite's acclaimed Red-series processors and sound fantastic. For the other four channels, check out A.R.T.'s Dual MP ($349). Also a 2-channel unit, the Dual MP delivers a reasonably clean signal, adds a nice tube warmth, and fits nicely into our budget.

THE $32,000 STUDIO
WITH COMPUTER

ITEMS	PRICE
Digidesign Pro Tools 24 Core System hard-disk recorder	$7,995
Digidesign 888/24 I/O	$3,495
Macintosh G3/300 w/32 MB RAM, 2.1 GB hard drive, 17" monitor	$3,229
Seagate Cheetah 9 GB hard drive (Ultra Wide SCSI-3)	$1,159
SyQuest SyJet 1.5 GB removable storage drive	$299
Opcode *Studio Vision Pro* 4.0 digital audio sequencer	$995
Roland JV-1080 synth module	$1,195
Fatar StudioLogic SL-760 76-key keyboard controller	$799
Opcode Studio 64 XTC MIDI interface/patch bay	$495
Audio-Technica AT4050 large-diaphragm condenser mics (2, matched)	$1,990
AKG C 1000 condenser mics (2)	$548
Audix OM-2 dynamic mics (4)	$596
Stewart ADB-4 4-channel direct box	$379
Focusrite Green 1 solid-state mic preamp (2)	$2,198
A.R.T. Dual MP mic preamp (2)	$698
TASCAM DA30 mkII DAT recorder	$1,599
Yamaha CRW4000ti CD recorder	$375
Digidesign *MasterList CD* CD mastering software	$495
Alesis MEQ230 graphic EQ	$299
Mackie HR824 powered reference monitors (1 pr.)	$1,598
Sony MDR-7504 headphones (2 pr.)	$256
Rane MH 4 headphone distribution amp	$299
APC Back-UPS Pro 1400 power conditioner	$459
TOTAL	**$31,450**

Mixdown decks. Multimedia production work often requires you to fly audio back and forth between your computer and DAT recorder, and maintaining sonic integrity in this transfer is very important. Having a DAT deck with S/PDIF digital capabilities is essential. TASCAM's DA30 mkII ($1,599) is always a good choice and will save you $100 over the Panasonic SV3800.

Just as a dedicated music-production facility should have a good cassette deck on hand, a multimedia production room needs a CD recorder. I prefer the Yamaha CRW400ti ($375), a very reliable 4× recorder. Although you can get CD-Rs bundled with a variety of software, we'll use a dedicated CD mastering program. Since we're using Pro Tools, it's probably a good idea to consider Digidesign's *MasterList CD* ($495). The program can either print master CDs that meet Red Book standards or one-offs that can be played on

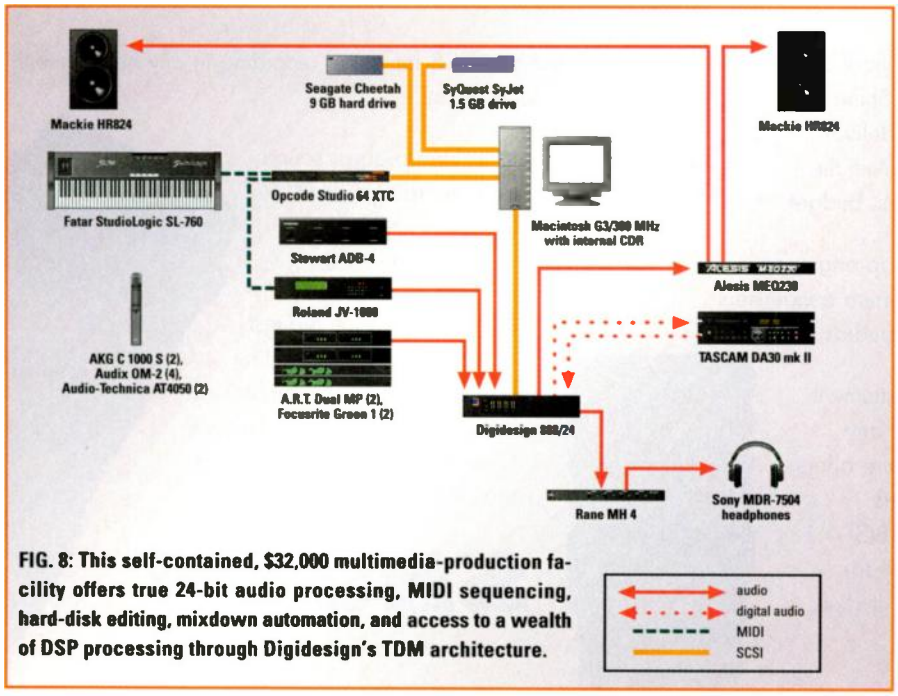

FIG. 8: This self-contained, $32,000 multimedia-production facility offers true 24-bit audio processing, MIDI sequencing, hard-disk editing, mixdown automation, and access to a wealth of DSP processing through Digidesign's TDM architecture.

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- 100 User Preset Locations
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Lose yourself in lush waves of our most heralded reverbs to date. Create volume-dependent stereo rotary speaker simulations. Model the most sought-after vintage phaser (without the noise). Or do it all at once - that's the power of having two discreet stereo processors in one box.

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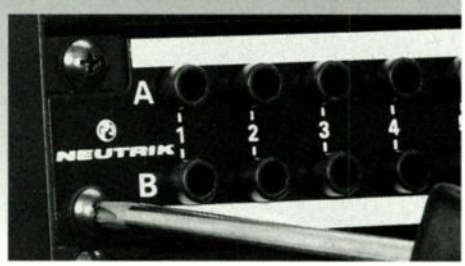
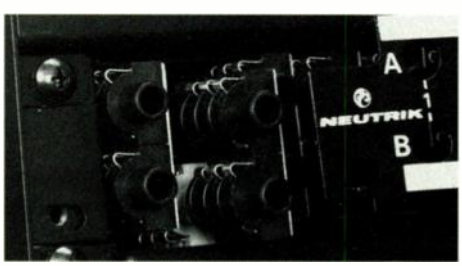
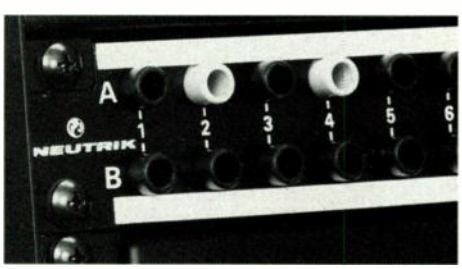


2. There are no nuts on the back holding the PC cards in place. Just pull the PC card out of its position, rotate and replace. It's that easy. Identification strips are on the front and back so you know the exact purpose for each position.



3. With each vertical front-to-back pair half-normalled to the other, multiple combinations (normalled, paralleled, etc...) for linking your audio gear are a snap. Jacks are color coded in black and grey eliminating any guessing after changes are made.



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any commercial CD player. *MasterList CD* is concisely organized and lets you create playlists very efficiently.

Outboard processing. Be sure to include a graphic equalizer for fine-tuning the system. As with my other system, I chose an Alesis MEQ230 ($299), which gives you two channels of 30-band, ⅓-octave EQ.

Monitoring. Again, Mackie steps to the plate and delivers! For $1,598, the HR824 powered monitors are a fine choice and don't require much maintenance.

A few pairs of headphones and a distribution amp are necessary for tracking live musicians and voiceover performers. Sony's MDR-7504 headphones ($128) feature a flat frequency response and deliver the signal *loudly* (for those hearing-impaired drummers!) Rane's MH 4 headphone amplifier ($299) should accommodate this setup nicely.

Power conditioning. We all know how sensitive computers are to begin with, and with all of the peripheral hardware and software included in this system, you should opt for a good uninterrupted power supply/power conditioner. Once again, I'm going for the APC Back-UPS Pro 1400 ($459).

Plug-ins. Now comes the fun part! If you have some money left over—and we have over $500 left in our budget—there are a plethora of DSP plug-ins out there for the TDM and AudioSuite formats. Keep in mind, however, that the Pro Tools 24 Core System comes with several plug-ins, including a multiband parametric EQ, compressor, gate, peak limiter, and digital delay, so check with your dealer to see what's included.

If I had more than $500, my first purchase would be Waves' TDM Bundle ($1,000). It comes loaded with the *L1* (peak limiter), *C1* (compressor/gate), *Q10* (10-band parametric EQ), *S1* (stereo image processor), *TrueVerb* (reverb), and *PAZ* (audio analyzer). Quite a lot for the money! But since I only have $500, I'm going to put that money in my pocket for SyJet cartridges and other ongoing expenses. ●

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Dave Peters of Clarence "Gatemouth" Brown's band kicks for one reason, to find the groove. Electro-Voice has designed the N/D868 Bass Drum Mic to capture the attack of the beater on the head with solid and powerful definition. For a microphone that listens first, then speaks just the way you want to be heard, contact your nearest Electro-Voice dealer and check out our complete line of application specific, N/DYM® Series mics.

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Illustration by Ron Brown

LAUNCHING INTO CYBERSPACE

Promote your musical wares by adding sound to your Web site.

by Philip De Lancie

Audio on a World Wide Web site can be a great way to expose your portfolio to some potential clients. But even if you're a whiz kid in music or audio production, you might not know the ins and outs of Web-site design. To the uninitiated, taking advantage of the Web's promotional opportunities can be a daunting task. Although there are many ways to add audio to a Web site, the goal of this article is to outline one simple approach. By exploring the process, you'll gain a feel for doing it yourself, and you'll learn about important issues and terminology that will help you communicate more effectively in case you hire someone else to do the job for you.

If you're not clear about the advantages of adding sound to your Web site, be sure to read "Look before You Leap" in the May 1998 **EM**. That article poses some basic questions to help you get started thinking about Web-site audio. For the purposes of this article, however, let's assume that you have recently released a self-produced CD. You don't have much of a promotional budget, but you think that, if people heard excerpts from your album, they just might want to buy it. You have a site set up to announce the album's release and to publicize the dates of your upcoming appearances. All you need now is to incorporate the excerpts into your pages (as streaming audio files) so Web surfers can listen to your music with the click of a button.

FLIGHT PLANS

Given this scenario, it's possible to start narrowing the options for what will be your first important decision: choosing from among the several available formats for playing back the audio clips. Because of the promotional purpose of your site, your highest priority will be to choose the format that allows as many people as possible to hear your music, while keeping costs low.

Headspace's Beatnik offers great interactive capabilities, and its Rich Music Format can integrate MIDI with a variety of audio formats. But Beatnik isn't truly a streaming technology, and it is most effective when handling MIDI files. So it's not the best candidate for your hypothetical Web site.

The Liquid Audio system is designed primarily for marketing music and audio over the Internet. It allows users to preview CDs before buying them, and the *Liquid Player* interface can even display album cover art and artist information. But Liquid Audio's main claim to fame is its ability to directly download music to users with access to CD-R drives. Because you won't be taking advantage of Liquid Audio's direct delivery capabilities, paying for the *Liquid Server* software required by this format is probably not the wisest use of your limited resources.

That leaves Macromedia's Shockwave and RealNetworks' RealAudio system as the remaining contenders. It used to be that Shockwave was the only option for streaming audio that you could use without paying for specialized audio server software. But last year, RealNetworks modified the RealAudio system to make some of its capabilities available for files stored on a standard HTTP server. With that move, the company effectively undermined an important advantage of Shockwave.

That doesn't mean that there are no longer any reasons to choose Shockwave. It's still an excellent choice when you want to customize the look and "feel" of the interface used for music playback or add interactivity using Macromedia's Lingo scripting language. (See "Shockwave on a Shoestring" in the July 1997 issue of **EM** for more about this technology.) But for the basic user, Shockwave's versatility with interface design is likely overshadowed by RealAudio's biggest draw: it has the largest installed user base of any streaming audio player on the Internet. (RealNetworks claims that there have been 40 million downloads of its *RealPlayer* software.)

RealAudio's vast user base means that more people will be able to hear your music with less trouble than with any other format. That's important for a small site, because the more unknown you are, the less likely it is that people will go to the trouble of downloading a special browser plug-in just to hear what you have to offer. And that makes RealAudio the most sensible choice for reaching the widest possible audience.

RealAudio offers several forms of *codecs* (compression/decompression algorithms). The codecs pare down the musical information to a size that can play over phone lines. (For more about audio compression, see "Square One: Space Savers" on page 116.) Codecs may be optimized for a variety of playback conditions, such as the connection speed (ranging from 14.4 kbps modems up to ISDN and beyond) and the type of program material (speech, classical music, pop). To reach the most people while maintaining at least a shred of intelligibility, you should use a codec (probably mono) designed for playback with a 28.8 kbps modem.

Not all RealAudio codecs work with every version of the *RealAudio* or *RealPlayer* software (*RealPlayer* 5.0 is the current version). RealNetworks' latest and best 28.8 audio codecs come in three flavors that are optimized for different needs: "Full" for classical music, "Medium" for pop and rock, and "Narrow" for speech. Unfortunately, these codecs require that the end user have *RealAudio* 3.0 or higher. If your number one goal is to take maximum advantage of RealAudio's large installed base, you will have to settle for the less effective but more widely used 28.8 codec in *RealAudio* 2.0. That's because—as RealNetworks concedes in its technical notes—in spite of the fact that most of the current players are version 4.0 or 5.0, there is still a "large *RealAudio* 2.0 user base who have yet to upgrade."

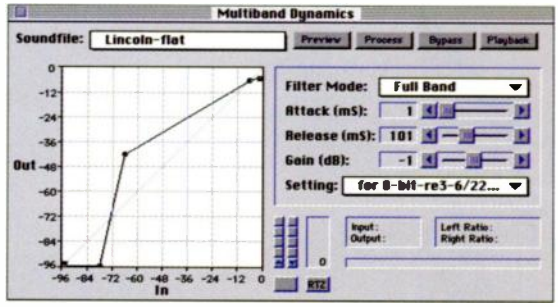

FIG. 2: Compression is used to move program levels into the upper reaches of the dynamic range.

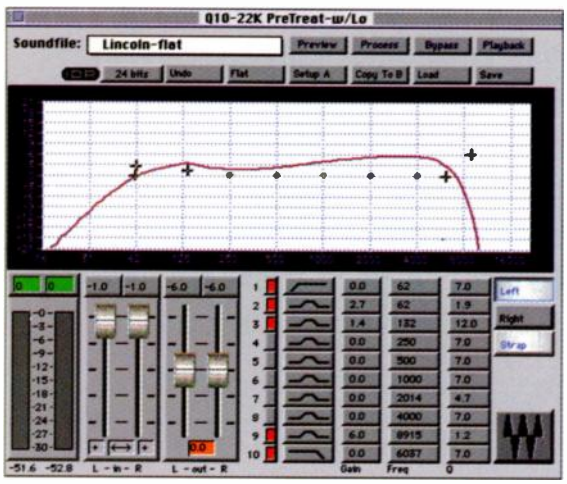

FIG. 1: Pretreat audio files using an EQ curve such as the one shown here to reduce bandwidth and compensate for the resulting loss of frequency response.

PREPARING FOR LIFTOFF

So how does *RealAudio* 2.0's 28.8 music codec sound? Frankly, not great. A 30-second mono sound clip that takes about 2,500 KB at CD fidelity (16-bit, 44.1 kHz) ends up at just 64 KB after being processed for 28.8 playback. As you might expect, the codec's effect on the music is not pretty. Comparing this codec to Shockwave's 28.8 codec on the same music, I found that the RealAudio files were more prone to swishy phasing effects and high-pitched whistling artifacts. They sounded more grainy and were lower in overall fidelity. But in the case of your hypothetical

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Web site, the broadest possible distribution, rather than the fidelity, is your priority.

If you can't bear to have your music heard at anything less than its best, you're going to have a hard time accepting Web-based streaming audio no matter which format you choose. Of course, you can always trade accessibility for fidelity by using a more recent version of *RealAudio*. That may improve the sound quality, but it also adds complexity to the preparation process, and you may ultimately lose some potential customers. It's a balancing act. (As more people upgrade to better software during the next couple of years, the issue will most likely resolve itself.)

Despite the limitations of streaming audio, however, there are some basic things that you can do to make your music sound as good as possible under Web conditions. Just as you would for Shockwave or for 8-bit, 22 kHz CD-ROM files, you should pretreat your audio by tailoring the dynamics and frequency response to improve the translation into RealAudio format.

Your first task is to transfer the selected audio excerpts from your CD onto your hard drive. The easiest way is to use a CD-audio capture utility that copies and converts tracks from an audio CD into computer file formats such as WAV and AIFF. If you don't have an audio capture program or an audio editor that offers the same capabilities, you can record the music into the computer by playing it from the outputs of a CD player to the inputs of an audio card. Some people even prefer this method. Be careful in adjusting your levels to avoid overloading the audio card's input stage because this will introduce clipping distortion that will be impossible to eliminate down the road. Of course, you don't want to set the levels too low either; that will raise the noise floor when the signal is boosted later. Depending on your setup, you may have to insert a mixer between the CD player and your audio card so you can optimize the level. (This step isn't required if you have digital outs on your CD player and digital ins on your audio card.)

Because the 28.8 codec is the target (rather than a higher fidelity ISDN codec), it's a good idea to reduce the amount of data in the audio files by capturing to 16-bit, 22 kHz mono. (Do not capture to 8-bit.) Cutting the sample rate will, of course, reduce the high end. But you are going to be doing that anyway, because part of prepping your files for encoding involves reducing the bandwidth of the signal to be encoded.

A suggested starting point is to roll off the lows below about 60 Hz and the highs above 6 kHz. To keep the sound full and bright, you may want to boost the high bass (120–200 Hz) and the upper end of the mids (2–6 kHz) during recording or later when editing the resultant sound files. You will have to experiment a bit to find the curve that seems to work best across various types

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of musical excerpts. You can then use that curve as your standard precompression EQ (see **Fig. 1**).

After reducing the frequency range with EQ, you should normalize each file to bring the loudest sample up to the maximum level. RealNetworks recommends normalizing to 95 percent rather 100 percent. The normalized file is then compressed to reduce the dynamic range, a process that is crucial to maintaining intelligibility after encoding. Compression such as that shown in **Figure 2** will maintain a little of the relative dynamics of the original while still squashing the entire program into the top seven bits or so of the dynamic range.

AT THE LAUNCHPAD

Now that you've prepped your files, you are ready to convert them to RealAudio files. RealNetworks offers several Windows and Macintosh encoding tools, which you can download from its Web site. Depending on your platform and conversion program, your prepped source files will need to be in WAV, MOV (QuickTime), AU, SND, AIFF (Mac only), or Sound Designer II (Mac only) format.

If you are running Windows 95 or NT, you have the option of using either the free *RealEncoder* 5.0 or the $49.95 *RealPublisher* 5.0, which includes encoding templates, HTML-generation capabilities, and automatic server uploading.

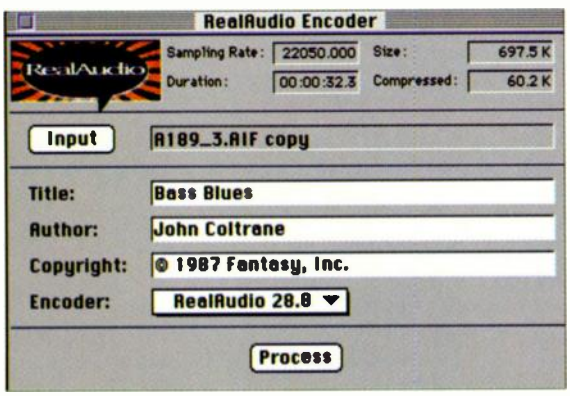

FIG. 3: *RealAudio Encoder* 2.0 shows the specifications of the file you are encoding.

The minimum recommended CPU for running these programs is a 80486/66 DX. You can also output files to RealAudio format with a plug-in for Adobe *Premiere* or with Sonic Foundry's *Sound Forge* or Syntrillium's *Cool Edit Pro*.

On the Mac, you do not have the *RealPublisher* option. A Mac Premiere plug-in is available, however, as is a RealAudio encoding Xtra for Macromedia's *SoundEdit 16*. BIAS's *Peak* also allows export of RealAudio files. Power Macs running OS 7.5.5 with 16 MB of RAM can use *RealEncoder* 5.0. The 680X0 Macs are limited to the older *RealAudio Encoder* 2.0.1 (FPU required). That's not a problem for our purposes, however, because that version encodes to our target *RealAudio* 2.0 codec. And because it's a simple utility, it's actually easier to use than wading through the more sophisticated options offered by the newer version.

The *RealAudio Encoder* 2.0 works only on monophonic sound files recorded at a sampling rate of 8 kHz, 11.025 kHz, 22.05 kHz, or 44.1 kHz. First, select the file that you want to encode by clicking the Input button to open a file dialog box. Once the file is chosen, display fields show the sample rate, duration, original size, and projected size after encoding (see **Fig. 3**).

Next, enter the title, author, and copyright information that you want displayed when the clip plays back in *RealPlayer*. Finally, choose 28.8 from the pull-down codec menu, and click the Process button. A dialog box allows you to select a file name and directory for the new file that is given an ".RA" extension. (Don't change this extension.) Then simply click Save to begin encoding.

If you want to encode a number of files at once, *RealAudio Encoder* allows you to select the files on the desktop and drag them onto the *RealAudio Encoder* icon. Using the Preferences dialog, you can turn off the Save File dialog so you don't have to repeatedly specify the destination folder for the RealAudio files. You can also set default information that is common to all the files (author and copyright, for instance) so you don't have to retype it each time. You still need to enter the title for every file, however, and there is no provision for setting all of the titles before running a batch; the dialog comes up before the start of each file's encoding process. You can, however, create batch processing routines for large numbers of files using Apple Script (sample scripts are included with the download) or an automation utility such as CE Software's *QuicKeys*.

FIG. 4: In the example shown above, a simple Web page displays the link to a RealAudio file with the *RealAudio* 2.0 player "popped up" over it, playing the file.

INTO ORBIT

Once you have a set of RealAudio files, you must choose how to incorporate them into your Web pages. One option is to have end users see a stand-alone playback controller, referred to as the RealAudio "pop-up" player. It appears in a separate window that is independent of the Web page being viewed. The other option is to "embed" individual control components (a play/pause button, for instance) directly into your Web pages. These are enabled by the RealAudio plug-in.

To allow the site designer this choice, the HTML links that enable playback do not refer directly to the RealAudio (RA) files. Instead, the Web page is set up to point to something called a *metafile*, a simple text file containing a list of the URLs (Uniform Resource Locators) of one or more RealAudio files. If you want to use the plug-in player, the extension of your metafile will be ".RPM." If you want to use the pop-up

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As a performance instrument, the MP9000 offers instant access to each of 16 internal sounds. Sounds can be split or layered across the keyboard, and transposed into any key. The front panel features four knobs that provide Real-Time editing and control of the internal sounds, on-board Effects and Reverb, and a responsive Equalizer. Current settings are displayed by a bright, back-lit LCD panel. In addition to standard outputs, we even included XLR outputs for direct connection to a Studio Console or Live Sound System.

Power

The MP9000 also does double duty as a MIDI Controller. Two Internal MIDI Zones and two External MIDI Zones can be combined for each of the sixty-four performance set-ups. The Pitch Bend and Modulation wheels, plus an extensive array of pedal options are assignable and independent for each zone. The front panel knobs transmit Cutoff, Attack, Decay, Release and can also be assigned to any other MIDI Continuous Controllers for live performance or sequencing.

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player, you use the ".RAM" extension instead.

A comprehensive discussion of the embedding process is beyond the scope of this article, so I'll touch only on the basic steps that are involved when working with the pop-up player. Using the pop-up player is less complicated than embedding individual control components.

To set up a file for playback, you must first create the metafile that refers to the exact location of the audio file. Be aware that if you are testing playback from your local drive, the URL in the metafile will need to be revised once you upload your files and pages to the Web server. If you want several audio files to play in a row when the link is clicked, simply put the URL of each audio file on a separate line (with no intervening blank lines) in the desired playback sequence in the metafile. If you're using an HTTP server (rather than *RealServer*), the correct form for each URL in the metafile is:

```
http://drivename/path/filename
```

In your page, you will need to insert an HTML tag something like the example below. Instead of the text, you may use an image (a speaker or note, for instance) as a link in the tag.

```
<A HREF="mysoundfile.ram">Click this
to hear me sing!</A>
```

When the user clicks on the link, the browser sends a request to the Web server (*RealServer* or an HTTP server) saying, "Give me the file mysoundfile .ram." The Web server sends the file back to the browser, along with a header packet saying, "This is a RAM [pop-up player] file, and it is *x* KB big." Seeing that the file is a RAM file, the browser hands it off to the pop-up *RealPlayer*. (If it were an RPM file, it would call up the plug-in player instead.) The player opens the metafile, which contains an address that tells it where it can find the audio file to be played. It then opens its own direct conversation with the server and starts playing the file (see **Fig. 4**). The pop-up can remain open and continue playing even as the user browses away from the page where the player was originally invoked.

For every page where you want audio, you can follow the procedure above, creating the metafile and inserting the HTML link. After thoroughly testing all the pages to be sure that each link works properly, you will be ready to upload the pages, the metafiles, and the audio files to your server. (Your Internet service provider will tell you the procedure to use.) Remember, your final metafiles will have to specify the correct path for the server where the site is hosted rather than the paths you used when testing from your local drive.

Once the uploading is complete, it's time for the moment of truth. If you've taken it slowly and carefully each step of the way, you'll be rewarded with the sound of your own music playing back from your Web page. And that can be a real audio thrill.

Philip De Lancie *is a freelance writer, multimedia designer, and audio engineer in Berkeley, California. He can be reached at pdel@compuserve.com.*

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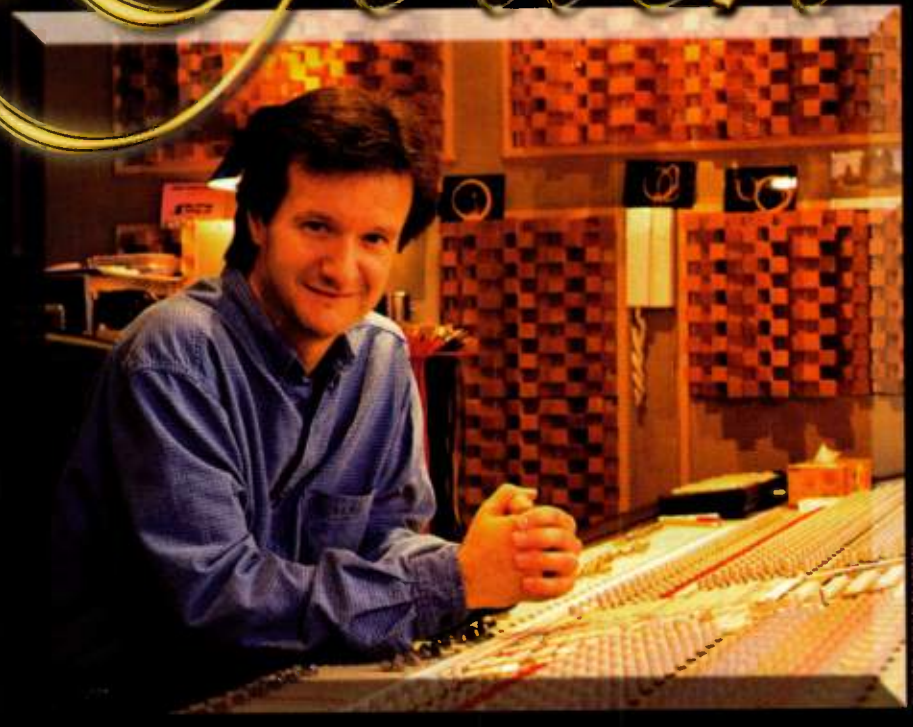
Mixer WITH THE Midas Touch



BOB CLEARMOUNTAIN ON THE TOOLS

BY JEFF CASEY

& TECHNIQUES OF HIS TRADE.

If you take a look at some of the liner notes in your CD collection, I can almost guarantee you'll come across Bob Clearmountain's name.

With a long and distinguished career as a recording engineer, producer, and mix engineer, Clearmountain has a discography that reads like a rock 'n' roll encyclopedia: Bryan Adams, David Bowie, Paul McCartney, Robbie Robertson, and the Rolling Stones, to name a few. ■ A seven-time recipient of *Mix* magazine's TEC Award and recent Grammy nominee for his work on John Fogerty's *Blue Moon Swamp*, Clearmountain has earned the respect of engineers worldwide and secured a place for himself among the elite few who have entries in the audio history books. In addition to session work, he recently entered the world of product development by designing Apogee's studio management software, *SessionTools*. In the midst of his busy schedule, Clearmountain was gracious enough to spend some time with **EM**, discussing his mixing techniques, his studio, and the music industry in general.

Mixer with the Midas Touch

It seems like your name appears on an album every other week. What does your daily schedule look like?
Mixing, mixing, mixing! My mix room, Mix This!, is in my house, so around ten in the morning I wander downstairs and start. The artist and/or producer I'm working with comes over at about eleven; we'll finish up a mix that was left up overnight, and then they'll brief me on the next song. Then they'll either go away or sit out by the pool for a few hours while I get the mix together. When they come back, they'll tell me either it needs a few minor changes here and there, or it's simply total garbage, and I've missed the point altogether. We usually have dinner about 6:30, then work on the mix until about nine or ten, run copies, and finish it in the morning.

What console and multitrack are you working with these days?
I have a custom-built, 72-input SSL G+ with Total Recall. I use a bunch of multitracks: a Sony PCM 3348, a Sony PCM 3324, a Studer A800, and the obligatory Alesis ADAT and TASCAM DA-88. I also have a Digidesign Pro Tools 24 system, which I use strictly for editing.

How about your mixdown format?
I'm now mixing 24-bit through an Apogee AD-8000 8-channel A/D—which I helped design—to a TASCAM DA-88 and a DA-38 for backup. The AD-8000's TDIF card bit-splits the 24-bit word, putting the extra 8 bits for each channel on a separate track of the 16-bit TASCAM machine. It sounds pretty amazing! It'll work the same way with the AES/EBU and ADAT interface cards. I'm also using the AD-8000 as the analog and digital front end for the Pro Tools system. With the Digi-8 card, the AD-8000 plugs directly into the Digidesign I/O. The AD-8000 also makes digital transfers between formats a breeze.

How do you feel about the current craze of computer-based recording?
I'm not the guy to ask; I only use them for editing, not for recording. I don't actually trust hard disks, although Lisa Loeb's album *Firecracker* was recorded in Pro Tools, and I thought the tracks sounded great.

What outboard gear is in your current collection?
As far as the old stuff goes, I have three Pultec EQP-1A3 EQs, three Urei LA-3A compressors, a Urei 1178 limiter, two MXR Flangers and two Phasers, an Ursa Major Space Station, a Roland Space Echo tape-delay box, and an ancient RCA limiter, which sounds awful but looks great.

Other good boxes include three Yamaha SPX990s; a Yamaha D5000 digital delay—the best one going at the moment, in my opinion; a Focusrite Red 3 compressor; three Roland SDE-3000s; an Eventide H3000, two H3500s, and a DSP4000; two Lexicon PCM 70s; a pair of Distressors; a BSS DPR-901 Dynamic Equalizer, which, on a vocal, is like cheating; an old AMS Reverb and DDL; an SSL compressor; and lots of Drawmer gates and dbx 901 de-essers.

My favorite pieces of outboard gear are my two live chambers. Another new thing I'd like to mention are the KRK E7 monitors—absolutely amazing! They're self-powered and biamped. They're not "hype-y" at all but fun to listen to. Great for mixing—and parties!

How do you approach a mix?
I think of the mix as an environment with the elements appearing in different places, almost like the characters in a play on a stage: some are in the front, some are in the back, the center, the left, etc., and some are more important than others at different times.

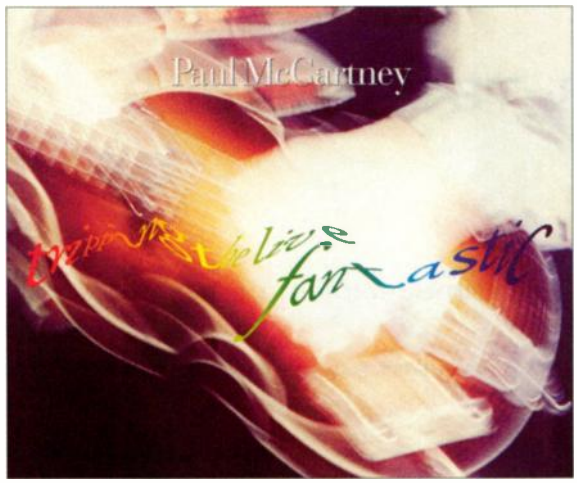
For a pop record mix—basically anything with vocals—the most important element is, of course, the lead vocal. My starting point is usually a quick vocal-heavy rough mix to give me an idea of what the song is about.

Do you ever have a preconceived idea of what the mix should sound like?
Never, unless the artist or producer has given me one to work with. Either way, I try to let my ideas develop as I work. It's really all dependent on the material.

Your mixes are pretty identifiable. What constitutes the signature Bob Clearmountain Mix?
Hopefully, there is no "signature Bob Clearmountain Mix," only that it is enjoyable to listen to. I believe each mix should sound like the artist had mixed it themselves—a true reflection of how they want to sound—possibly with a bit of extra commercial potential thrown in.

How about a brief tutorial on mixing—Clearmountain-style?
I mix at various monitoring levels, through different speaker systems, in a somewhat random order. I also use a bit of overall compression and, of course, make the important things louder and the not-so-important ones quieter. I've found a good, generally useful technique is to make sure there's no unwanted extra low end coming from instruments other than the bass and kick drum. Doing this will almost always make the bass sound better, louder, and clearer.

How do you feel about radio-specific mixes?
Unfortunately, radio seems to have developed a severe case of tunnel vision over the years, categorizing records into specific "formats." In fact, just today I mixed a very nice pop record that happened to contain a steel guitar. We had to mix a special version without



Paul McCartney's *Tripping the Live Fantastic*, one of the many live records that Clearmountain has mixed, is a composite of more than 80 shows.

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Mixer with the Midas Touch

the steel guitar because there are a lot of Top 40 stations that won't go near anything that remotely sounds like a country record, and the steel is a signature of country music. I've been asked to remove *all* guitars from some pop/rock records so they can be played on Adult Contemporary stations.

Let's talk about automation for a minute. How often do you use it, and how do you approach automating a mix?
I use it for every mix I do. I really believe in it. Whoever invented that "manual mixing" thing was really full of it! If there are a lot of mutes to be done, I'll do them first and work in Play Cuts Only mode on the computer. If not, I'll leave the computer off and get a reasonable static mix happening. Once it sounds decent, I'll start from the top, with the computer in Absolute or Play Cuts Only mode, working on each section of the song—paying attention to all the tracks but mainly dealing with the vocals.

In the next pass, I may work on drums, guitars, or whatever seems to need the most attention. I'll then keep doing more passes, catching whatever I hear that seems to be out of place, possibly adding a tricky effect or two if it's called for, until I can listen to the whole thing without rewinding and riding any levels. Then I'll take a break, go out for a walk or something, come back, listen again, and inevitably ride a few more things or change an EQ.

OSCAR ELIZONDO

One of the industry's most respected engineers, Bob Clearmountain has mixed albums and singles for Lisa Loeb, John Fogerty, Soul Asylum, and Dada.

You've mixed quite a few live albums. Do you find these types of projects to be a challenge?
It depends on how good or bad the performance and recording is. If both are good, it can be really easy. The big trick is using the ambience from the audience mics and blending them with whatever artificial effects you're using to achieve a realistic impression of a live performance, while keeping it all sounding good.

How does your technique differ from working on studio-recorded tracks?
Well, live stuff is generally a lot more straightforward than studio recordings because there are usually no overdubs. As far as how my technique differs, I think it actually differs for *everything* I mix, depending on what's recorded. So no different than anything else, except having to ride the audience mics and always muting vocal mics when no one's singing.

I mixed a live Bryan Adams track the other day that was interesting because it was being used for a movie soundtrack: *Hope Floats* on Twentieth Century Fox. The producers, of course, wanted it to sound like a studio track, so I had to completely eliminate the audience, which was hard because at the end of the song the audience was leaking into practically every mic. Luckily, the last chord of the song was held by a real string section that was miked with contact mics, so I was able to mute everything else, letting the strings hold that chord where the audience would normally have been roaring.

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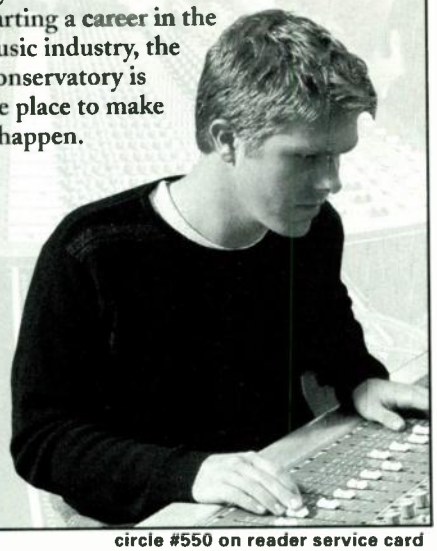

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Mixer with the Midas Touch

Paul McCartney's *Tripping the Live Fantastic* is, in my opinion, one of the best-sounding live albums to date.
Thanks!

Was this a difficult project to mix? How clean was the location audio?
It was very good, although the guy who recorded it was sitting next to the monitor mixer while wearing headphones and couldn't hear the cymbals clipping occasionally. There were 80 shows on digital tape, so we had plenty to pick from. They didn't replace anything, although I did do a few electronic repairs, like taking a solo from one show and putting it on another—things like that.

David Bowie has a reputation for using innovative recording techniques. What was it like being a part of that process?
The *Let's Dance* album took a total of fifteen 8-hour sessions to record and mix. It went by so fast I hardly remember it! His most prevalent technique was the "first take" method. He and Chrissie Hynde are probably the best singers I've had the pleasure of recording. Unfortunately, on *Let's Dance* he didn't use any of those innovative techniques he's supposedly known for, unless they went by so fast I didn't notice them!

What is the most challenging project you've worked on?
Probably the first two Robbie Robertson albums. The first one because most of the songs were recorded with absolutely no arrangement in mind, so it all had to be created in the mix. I must add that this made it one of the most interesting and fun albums to mix, despite being difficult. Also, Robbie tends to have a new mix or edit idea every 30 seconds or so, and they're mostly pretty good.

The producer on the second album, *Storyville*, left the project after about a year. He had recorded it on Dash 24-track and made slaves for Robbie to do his vocals and guitar on. It turns out that they did quite a number of digital edits on the slaves before they were finished recording on them. Besides not duplicating the edits on the masters, no one thought to keep notes on where the edits were done or *what* edits were done, for that matter. When I came in to mix it, the producer was long gone. Robbie told me we had to bounce the slaves back onto the unedited master tapes to tracks 25 through 48, and there were just one or two edits to match on the masters. No problem!

I soon discovered it was more like fifteen or twenty edits, and I barely had enough time to mix the album, much less duplicate massive edits, before I had to start my next project. I remember transferring the tapes and Robbie saying, "Hey, wait a minute, the vocal and guitars are playing the second verse, and the drums and bass are still on the first chorus! Oh yeah, I guess I forgot about that one too...." This went on for more than a week. Of course, the edits had to be matched *exactly*, otherwise everything after the edit would have been out of time.

What do you think is the best mix you've ever done?


On Robbie Robertson's album *Storyville*, Clearmountain had to match multiple edits between slave and master tapes.

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There isn't just one, but if I have to narrow it down, there's "Into Temptation" by Crowded House, not because the mix is all that great, but because it's one of the most incredible songs I've ever worked on; there's "Ghost" by Altered State because it's a real fun, "effect-y," over-the-top mix; "Satisfied" by Squeeze and "Victim of Love" by Bryan Adams because they're both great songs and pretty good mixes; there's Aimee Mann's entire first solo album, *Whatever,* because it's amazing and unusual sounding; and, probably most of all, Jonatha Brooke's album *Ten Cent Wings* because the songs are so good I just can't stop listening to it.

How about a mix that someone else has done?

It could be "Tempted," by Squeeze, because it simply sounds perfect. In fact, the whole thing—the song, performance, recording, and mix—is absolutely perfect, no matter where I hear it. Hats off to Squeeze, Elvis Costello, and Roger Bechirian! Also it could be "Street Fightin' Man" by the Rolling Stones.

Tell me about your involvement with the development of SessionTools.

It started when I became tired of not being able to read DAT and cassette J-cards that assistant engineers had scrawled on. I got turned on to Claris *FileMaker Pro* by someone at A&M Studios, and I started printing them myself. When I opened Mix This! I needed a system of work orders and invoices that was quick and easy because I was doing it all myself. So, having taught myself *FileMaker,* I created some layouts. I also needed a client database and an efficient way of logging tapes. It turned out the same program was well suited for all these things.

In 1994 I hired Ryan Freeland as my assistant engineer, and he expanded the J-card section to include many other formats—sticky labels, floppy-disk labels, track sheets, and outboard-gear recall layouts. Last year, after a few clients with their own studios asked for copies of the program, my wife, Betty Bennett [president of Apogee Electronics], suggested that Apogee market the whole thing as a stand-alone program. Ryan and I then spent about eight months trying to get it to the point where the general public would be able to use it.

So what projects are next for you?

I'm doing a new Paul Westerberg album, a live Counting Crows project, and more work for the soundtrack of *Hope Floats,* which I'm producing with Don Was. Aside from that, I'm trying to engineer a couple of days off. I've worked pretty much seven days a week for my entire career, and I recently discovered that there indeed is a world outside the recording studio—and it's actually pretty cool!

To sum it all up, what do you think is the key to a great mix?

I really have no idea. When you find out, please let me know!

Jeff Casey *is an associate editor of* **EM.**

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DESKTOP MUSICIAN

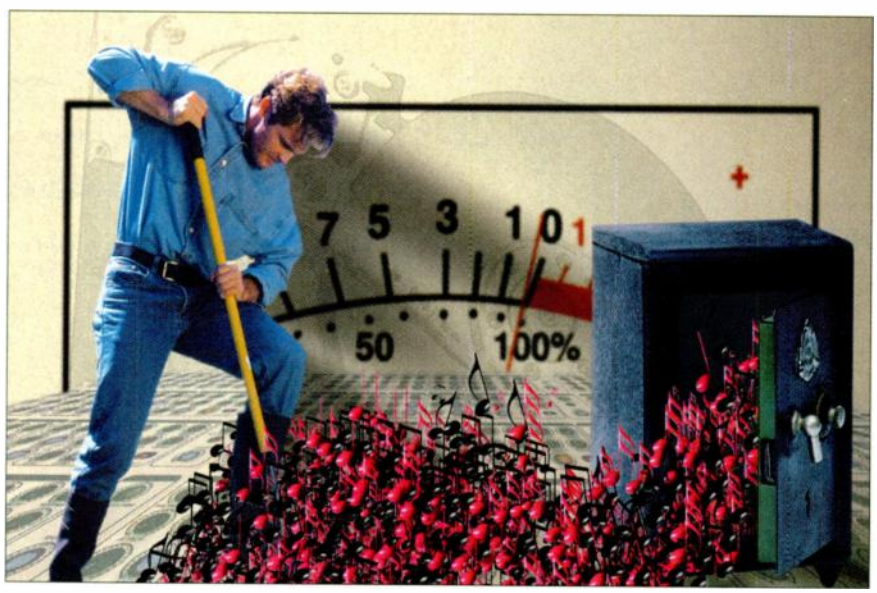
Mass Storage for Musicians

Consider the options for stashing your valuable bits and bytes.

By Oliver Masciarotte

We've come a long way since the days of punched paper tape and washing machine–sized 40 MB "Winchester" drives. Today's storage devices offer impressive speed and high reliability even though they pack huge amounts of data into astonishingly small-sized containers.

In fact, storage options have proliferated quicker than banner ads on your favorite Web site, so sorting out the best choice for your desktop music studio can be problematic. Let's take a look at some of the available options to see where their strengths and weaknesses lie.



STEVE RAMIREZ

MAGNETIC MACHINATIONS

There are basically two types of storage methods: magnetic and optical. Combining the two has produced a hybrid method called magneto-optical, or MO. It offers some of the best attributes of both types.

We'll begin by examining magnetic storage, which includes tape as well as fixed and removable disks. Magnetic media are widely used because they're inexpensive. The cheapest of these, the tape drive, is among the oldest methods of storage. Tape mechanisms range from fixed-head, linear types to rotary-head contraptions that borrow their designs from videotape technology.

Older, linear formats, such as QIC (Quarter-Inch Cartridge), are simply more sophisticated versions of the familiar analog-tape format. They're reliable, very inexpensive, and as slow as molasses. The more costly Exabyte, Data DAT, and DTL rotary formats provide progressively more storage capacity, more throughput, and reduced seek times.

Tape is typically used for "offline," or long-term, archival backup from a faster device. That's because the speed at which tape-storage devices can seek a particular datum and then play it back is too slow for high-fidelity, real-time recording. Though the initial drive cost for rotary formats is higher than for hard disk or MO, the cost per megabyte of the media is very low.

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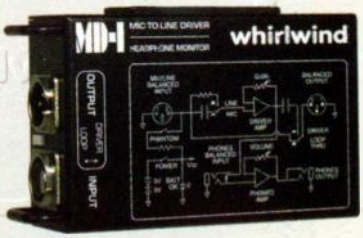

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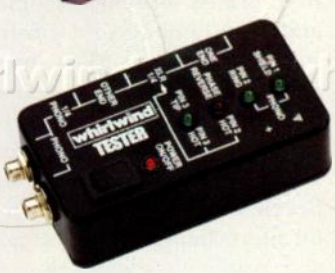
The Qbox® is an all-in-one battery powered audio line tester. It includes a built-in mic, speaker, tone generator, headphone amp, and voltage detect LEDs for verifying phantom or intercom power.



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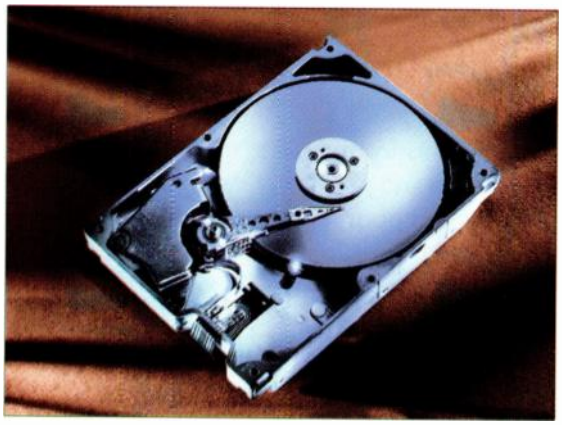

Because of their speed and reliability, fixed hard drives, such as this Quantum Fireball (shown with the top removed), are still the preferred storage devices for most musicians.

DISK DISCUSSIONS

If you coat a flat plastic disk with the same magnetic coating used on a tape, you get the ubiquitous floppy media such as 3.5-inch floppies and Iomega Zip disks. For some low-performance applications, these formats provide a great way to transfer files from one location to another. Flexible media are also great for archiving the products of your hard-earned labor. (Did I say "backup"?)

If, instead of using a flexible substrate for your medium, you use a rigid disk or "platter," you get the Winchester hard disk that we've come to know and love. Hard drives are now available in a wide variety of storage capacities and performance ratings, and the trend is definitely toward bigger and faster.

Whether disk or tape, the physics involved in storing data on a magnetic medium are the same. Ferromagnetic material, such as iron or cobalt alloy, is first formed into microscopic needles and then bonded to a substrate. The substrate may be glass, metal, or a polyester sheet, as is the case with flexible media. Mr. Science says that, when you pass an electrical current through a wire, it creates a magnetic field. Magnetic storage devices work by coding useful information into an electrical current and passing it through a tiny coil of wire in the read/write head of a tape or disk drive. The resultant field then magnetizes the tiny captive needles in a meaningful way. Mr. Science also says that the converse is true. By moving a "recorded" array of magnetized particles past the drive head, a current is induced in the coil of wire that is an "analog," or replica, of the original signal.

MO BETTER DRIVES

The technology behind MO drives has advanced recently. MO drives rely on the ability of a laser's heat to alter the magnetic properties of a ferromagnetic recording substrate. They used to be too slow and too expensive to use for audio applications. Things are looking up, however. The reason for the improvement in performance is that, unlike older drives, the newer drives do not require a separate erase pass before you can write new data to disc. They're still expensive (over $1,000), but you can buy a fast, removable LIMDOW (Light Intensity Modulation—Direct Overwrite) drive with a 2.6 GB capacity (1.3 GB per side) and also have the convenience of a removable medium.

Most of us have heard of the more common rigid removable media storage devices, such as Iomega's Jaz or SyQuest's SyJet drives. Though they're not recommended for many systems, if you're able to use them, they can work quite well, yielding twenty or more tracks of audio. Larger and faster versions of these products are released on the market every year with ever lower costs per megabyte.

These drives differ from the older Winchester technology in that they have fixed head assemblies and removable platters. Because the platter is exposed to the environment when the disk is inserted or removed, there is more likelihood of contamination from dust or other grunge. Also, the heads have been known to meet an untimely death if the cartridge is inserted with a bit too much gusto. For these reasons, removable rigid media tend to be less reliable than the fixed variety.

OPTICAL OCCULTISM

Purely optical mechanisms are represented by the marvelously cheap CD-R (compact disc–recordable) and its cousin, the newly hatched CD-RW (compact disc–rewritable). Both have a capacity of 650 MB and, though too slow for direct recording, are an increasingly popular alternative to tape as a backup choice. When formatted with the proper software, a CD-R can also be played back as a CD-DA (compact disc–digital audio) in a garden variety audio CD player. In fact, hybrid packages are available containing a rigid removable-media drive (usually a Jaz drive) to speedily store temporary audio data, with a CD-R in the same case and with the same power supply. These products are great for desktop burning of audio and data (CD-ROM) discs.

Remember, you need specific software in addition to a CD-R drive to make CD-DA–compliant Red Book discs. The resultant disc can be sent to a replicator for premastering and mass replication. (See **EM**'s August 1997 Desktop Musician column for more on preparing recordings for CD replication.) Most CD-R driver software creates an Orange Book CD-ROM that is not suitable for reliable replication of audio.

CD-RW is a significantly more expensive, erasable version of the "write-once" CD-R format. With up to 1,000 overwrite cycles, CD-RWs use laser heating to change a substrate from crystalline (ordered) to amorphous (disordered) phase and back. This flip-flop brings with it an alteration in the substrate's reflectivity. That same laser, on low power, can read those differences in reflectivity as the written data. A CD-RW's laser can also "burn" data onto CD-R blanks. On the other hand, just to confuse things, CD-RWs can't be read by a CD-DA player.

As new members of the venerable compact disc family, CD-RWs coexist as rewritable companions to CD-Rs and mass replicated CD-ROMs. So if you buy a new or replacement CD-ROM drive, you should be sure to purchase a new Multi-Read (MR) enabled version that can read CD-RW discs. Manufacturers claim that with proper handling and storage, compact discs can last 30 years or more.

SCSI Maximum Burst Rates

Bus Width	SCSI (original)	SCSI-2 Fast	Ultra SCSI-3
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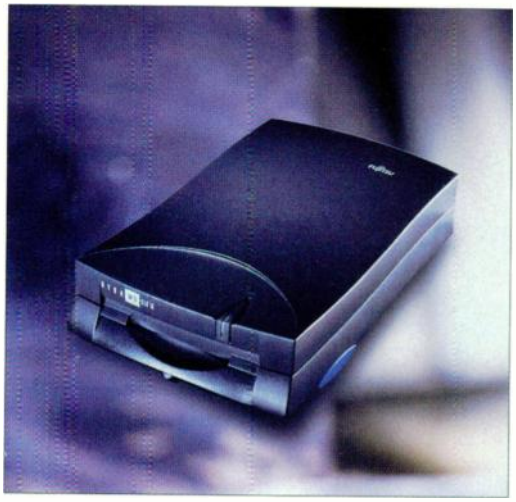
MAKIN' CONNECTIONS

Most drives of interest to an electronic musician are attached to the host computer using a Small Computer Systems Interface (SCSI) port rather than an AT Attachment (ATA) port (also known as IDE). The reason is that the ATA standard and its progeny, such as ATA-2 and ATAPI, were designed above all to be low in cost. As a result, ATA drives tend to be less expensive and offer lower performance than SCSI devices. In other words, they're the mopeds of the hard-drive world. IDE mechanisms are found on many Windows systems due to their low cost. Avoid them unless you're financially challenged.

It should be noted, however, that there are now Ultra ATA drives that come in the 7,200 RPM class with burst rates of 33.3 MB/sec. and access times similar to their SCSI counterparts. (Burst rate refers to the data transfer speed from the disk cache through the bus.) They might make promising alternatives for the budget conscious. Of course, that will depend on the digital audio workstation (DAW) that you're using. Before buying an Ultra ATA drive, check with the workstation manufacturer to determine whether such drives are supported.

SCREAMING SCSI

The beefier SCSI protocol has spawned a wide range of choices as the standard has evolved from the original 5 MB/sec. (burst rate) to the current 40 MB/sec. (burst rate) now provided by Ultra Wide SCSI-3. (See the table, "SCSI Maximum Burst Rates.") SCSI-2 Fast is currently the most common and affordable choice. The latest version of SCSI, however, is called Ultra2-LVD (Low Voltage Differential). It supports burst rates up to 80 MB/sec. and cable lengths up to 12 meters (as long as the host and all devices on the chain are LVD). LVD is backward compatible with everything back to SCSI-1, although the lowest common denominator prevails in terms of performance and cable length.



Newer magneto-optical drives, such as this one from Fujitsu, offer improved performance that makes them more suitable for studio use.

How do these drives perform in an audio system? In the real world, where the host computer controls the flow of data, eight to twelve channels of 44.1 kHz, 16-bit audio is all you can expect. But on some high-end systems where a separate SCSI bus is used exclusively

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by your audio hardware, the number of channels delivered by a single SCSI-2 Fast drive can exceed 30.

Keep in mind, though, that all of the transfer rates mentioned so far are burst rates, not sustained rates. Sixty-four tracks of 24-bit, 48 kHz audio only requires a sustained rate of 8.8 MB/sec. Sixty-four tracks of 16-bit, 44.1 kHz audio only requires a sustained rate of 5.4 MB/sec. More important than transfer rate, however, is access time. Drives with 10,000 RPM offer the fastest access times, although 7,200 RPM drives provide very good access times. (For a detailed explanation of SCSI protocols, see "Square One: Get on the SCSI Bus" in the June 1997 **EM**.)

COMING ATTRACTIONS

The future looks bright for those of us who traffic in digital technology. RAIDs, Fiber Channel (FC), 1394, DVD-ROM, and DVD-rewritables are all gaining acceptance as viable replacements for existing products. For more on DVD, see "Tech Page: CD? No, DVD!" p. 38.

RAID (Redundant Array of Independent Disks) systems are still a bit costly for the average Joe, as are most of these alternatives. RAIDs allow you to unify two or more Winchester disks into one composite mechanism, improving performance or reliability or both. Keep an eye out as increasingly cost-effective versions are certified for multitrack applications.

Equally important to musicians are two new interface protocols that are approaching the market from opposite ends of the price spectrum. IEEE 1394, commonly called FireWire by its inventor, Apple Computer, is an inexpensive, peer-to-peer, distributed networking protocol that provides up to 400 megabits/second of isochronous, time-critical

CD-R drives, such as this Ricoh 1420C, have rapidly gained in popularity as the drives and blank discs have become more affordable.

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data transport. FC is similar in its features, though more expensive and complex in its implementation. Both should find a home in digital media production environments.

DVD is here to stay, and phase-change, rewritable versions are coming soon to a geek paradise near you. Unlike the puny CD family, first generation DVDs will be "half sized" at 2.6 GB. Full-capacity 4.7 GB versions will follow, and yet larger sizes are on the horizon as higher frequency solid-state lasers become less expensive.

APPROACH WITH CAUTION

No matter which drive you decide to buy, make sure you check several things. First, talk to the manufacturer of your audio product to confirm that you're buying an approved mechanism. Talk to the CPU manufacturer, too. The Web sites of both companies should have a list of acceptable choices. Don't buy in a state of blissful ignorance and then expect your purchase to work. Second, choose a drive vendor that will work with you on a swap in case an unforeseen compatibility issue should arise.

Next, avoid drives that are "optimized for video." They are typically designed to record a single, contiguous stream of data rather than the stereo or multichannel jumble of audio associated with many music-production applications. Another issue to consider when shopping for a drive is termination. High-speed data buses, such as SCSI, require proper electrical loading to prevent data corruption. Rather than using the cheaper, passive method, go with active termination if at all possible. It provides more consistent performance under adverse conditions.

Here's another consideration: the drive you use to run your computer shouldn't do double duty as your audio storage device. Fragmentation is the main culprit. Fragmentation results when data gets chopped up into small pieces and gets sprinkled in different locations on a disk each time new information is written. This normal behavior for a disk operating system is fine for text files, but it impedes the glitch-free playback of audio files.

Editing systems expect their data to be continuous runs of samples, not discontiguous fragments that need stitching together before they can be played. To meet that need, most Mac systems dictate either a dedicated, internally connected disk or, for peak performance, a separate SCSI controller card for an external disk. The separate controller also allows the drive to work more independently from the host computer. Though there are dedicated PC audio hardware systems from Spectral, Digidesign, Soundscape, and others, most Windows systems do not use a separate drive and controller for audio. Your best bet here also is to dedicate one physical drive for audio or at least partition your main drive and devote one partition to audio and one to your programs. Regardless of your approach, defragmenting your disk is a necessary part of sensible maintenance.

All things considered, a little bit of caution is always justified when dealing with storage devices. Unlike the virtually bulletproof motherboard on which your computer relies, storage drives themselves can be fickle, and data loss always looms. So back up often, and look forward to faster, cheaper, and smaller!

When not helping folks solve their audio and DVD dilemmas, **OMas** *abuses his various two-wheeled vehicles. Drop by the-message.com and say "Hi!" Special thanks to Steve Rosenthal of Digidesign for his help in preparing this article.*

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Space Savers

Bend, twist, and crunch your audio files for the Web.

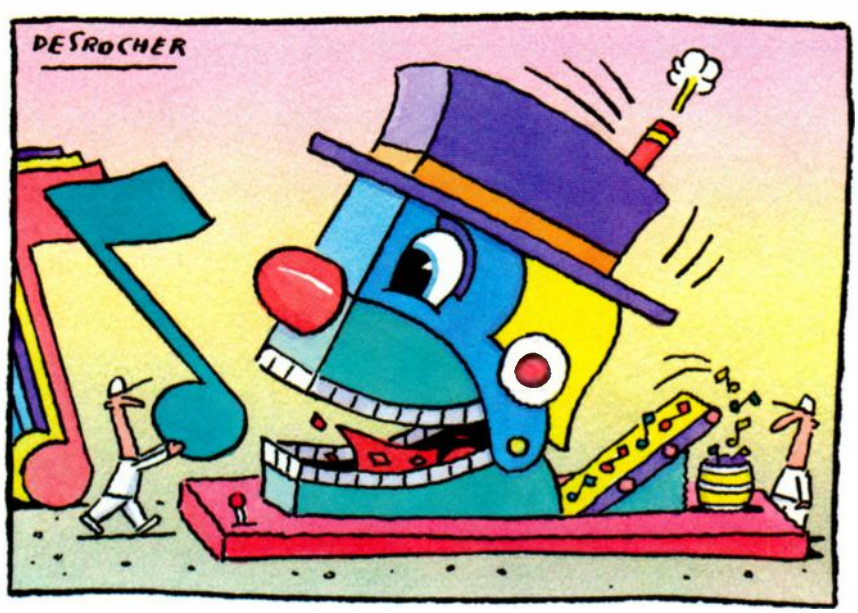
By Neil Leonard III

One of the big reasons that music distribution on the Web is more complex than CD or cassette distribution is that the available bandwidth is more limited. Although some people access the Internet using high-speed digital lines, most people still use 28.8 kbps or even 14.4 kbps modems, which have severe bandwidth limitations. If you try to download one minute of stereo, CD-quality audio using one of these modems, you will have a lot of free time on your hands.

In order to expedite transfer rates and reduce the amount of disk space occupied by digital audio files, several approaches to compressing or "encoding" audio data have been developed. These encoding techniques are used when you download audio clips, tune in to a Web radio station, play a digital video, or listen to audio streaming from a musician's or record company's Web site.

Web distribution is not the only reason to use audio-file compression, of course. For instance, early PC sound cards commonly used compression to record and play back audio because this allowed real-time playback with minimal processing power. Today, Roland's popular VS-series modular hard-disk recorders use an improved type of audio compression for similar reasons. However, we're going to focus on compression for Web audio.

Note that the type of compression we're discussing is not dynamic-range compression. Instead, these algorithms reduce the number of bits that are required to represent a waveform.



JACK DESROCHER

AT A LOSS

The software that makes all this possible is called a codec, which stands for compressor/decompressor. The codecs that we will discuss here are *lossy*, meaning that they record a close approximation of the waveform that uses fewer bits than the original. Therefore, decompressing the encoded waveform will not produce an exact replica of the original data.

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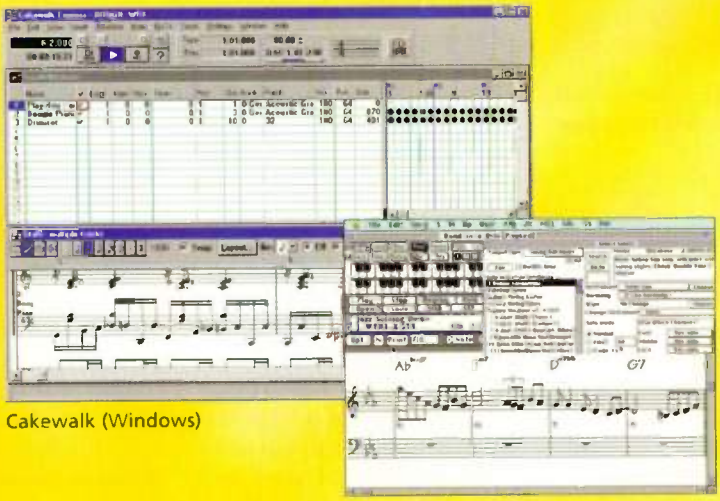

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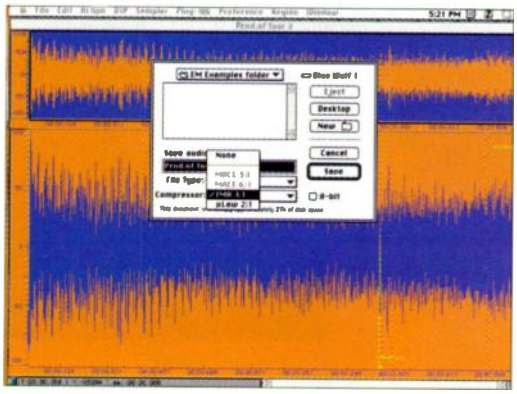

FIG. 1: BIAS's *Peak* audio editor for Macintosh can save audio files using IMA-ADPCM, μ-Law, and MACE compression.

or *Stuffit* for audio files, in which the original file is fully restored upon decompression. This type of compression is useful for saving disk space, but it generally reduces file size by smaller amounts than do lossy algorithms. It's a different beast, and we won't get into it here.

ALL IN THE CODE

How can we just throw away parts of the signal? To begin with, it's not a free ride; the sound quality is affected to a varying extent, depending on the algorithm and degree of compression. There are several approaches, each with its own trade-offs.

A *waveform coder* is a common type of codec. One widely used waveform coder is IMA-ADPCM (International Multimedia Association's specification for Adaptive Differential Pulse-Code Modulation). This is a variant of the ADPCM that is widely used in the telecommunications industry. IMA-ADPCM was designed specifically for desktop-audio applications and is incorporated into the Windows operating system, where it is referred to as ADPCM. It is also part of Apple's QuickTime media layer. (Mac users often refer to it as IMA compression.)

IMA-ADPCM works because the amplitude of an audio waveform tends to change gradually. Because of this, the waveform can be represented more efficiently by saving the *difference* between consecutive samples as opposed to saving the *absolute value* of individual samples. Programs such as BIAS *Peak* for the Macintosh can be used to encode audio files using a variety of codecs, including IMA (see **Fig. 1**).

When an audio signal is sampled by a 16-bit analog-to-digital converter, the incoming analog signal is measured at periodic intervals and converted to corresponding 16-bit quantities. Using sixteen bits, we have a range of 65,536 numbers available. (Each bit that is used increases by a factor of two the number of values that are available for measurements, so 16-bit offers 2^{16}, or 65,536, values.) These numbers are typically distributed between -32,768 and 32,767.

If we measure the difference between consecutive samples in one channel, we often find that the absolute difference between two values is very small, rarely exceeding 100. Therefore, a full sixteen bits per sample aren't needed to represent this small range of numbers. Instead, IMA-ADPCM represents each sample by a 4-bit difference value, which, for a 16-bit file, reduces the file to one-quarter of its original size. (Other ADPCM formats are also available that provide higher bit resolution but lower compression ratios.) This gives us a fixed 4:1 compression ratio. Sometimes the difference between samples is referred to as *difference modulation*, or *delta modulation*. Difference modulation is not unique to IMA-ADPCM; in fact, it is the basis for other audio codecs, including Dolby Labs' AC-1.

Let's have a closer look at how these 4-bit values are employed. Using four bits, you would expect to have sixteen different values in your numbering system because 2^4 (2 × 2 × 2 × 2) = 16. However, because we must be able to represent signed (positive and negative) numbers, one of the four bits is used to designate the sign. That leaves us with only three bits for the actual values. With three bits, we can represent eight numbers, e.g., 0, 1, 2, 3, 4, 5, 6, and 7. Therefore, a 4-bit difference value could represent any whole number between -7 and 7. Because this method has the potential to produce a positive and negative 0 value, we can expand our range to -8 by "reassigning" -0 to the number -8.

But what happens when the waveform's amplitude jumps by a value greater than 7? Rather than using the range -8 to 7, we would then use the same four bits to represent a wider range of numbers, such as all even numbers between -14 and 14 (-14, -12, -10...10, 12, 14) or every tenth number between -70 and 70 (-70, -60, -50...50, 60, 70). The exact range of numbers that is chosen differs depending on the largest value that the codec finds in every group or *packet* of samples it analyzes. To wrap up our overview of this codec, let's look at how these packets work.

THE PACKET

The IMA-ADPCM codec groups various quantities of consecutive samples into packets. On the Macintosh, each packet consists of 64 samples. At the beginning of every packet is a step index, or multiplier, which is used to scale the range of difference values for that group of samples. By looking at the entire packet and determining what the largest difference value is, the codec decides what the most appropriate range of values would be. It then sets the multiplier accordingly. (The step index value will vary, or adapt to, the needs of each packet, hence the "Adaptive" in ADPCM.) The beginning of each packet also has a predictor value to specify the absolute amplitude of the first sample of each packet.

Despite its often excellent results, there are drawbacks to this method. The IMA did not define the number of samples that are in a packet or the number of bits that are allocated for the step index and predictor values. As a result, Microsoft and Apple came up

FIG. 2: Liquid Audio's *Liquid MusicPlayer* plays files encoded with the company's *Liquifier Pro* software.

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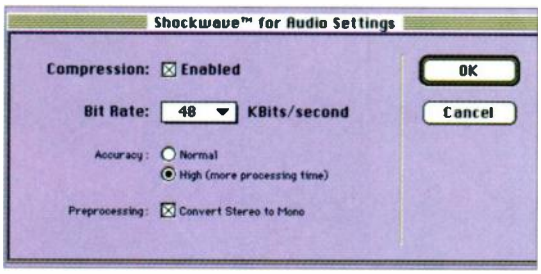

FIG. 3: Macromedia's Shockwave Audio codec allows the user to determine the compression ratio by setting the desired modem speed.

with their own incompatible implementations of IMA-ADPCM that use different packet sizes and bit allotments for step index and predictor bytes. You might need to know what platform was used to create an IMA-ADPCM file prior to selecting a piece of software to listen to it.

There are additional caveats. ADPCM does not lend itself to random access. You might have to decode your IMA-ADPCM files with utility software before editing them with your favorite waveform editor. Also, IMA-ADPCM encoders convert the original source file to 16-bit before creating the compressed output file. If you start with an 8-bit sound file, it will automatically be converted to sixteen bits before finally being reduced to a 4-bit compressed sample file. You're better off encoding a 16-bit version of the file to save time and the disk space needed by the extra version of your file.

Finally, if you happen to have large and small difference values in the same packet, the codec will have to round off, or *quantize*, the values fairly drastically. Just imagine if the real value needed was 40, and the step index was incrementing by hundreds. The codec would have to assign a 0 to that difference value because it could only choose between 0 and 100, and the 0 is closest to the actual value. This type of error introduces noise into the file. Higher frequencies in a sound are most affected by this noise because they tend to have softer amplitudes. In fact, the noise can actually be louder than the high-frequency levels and can drown out or "mask" the high frequencies entirely. This explains why many people avoid using IMA-ADPCM for anything but speech, where higher noise levels and less high-frequency content does not affect our recognition of the sound.

DOORS OF PERCEPTION

What happens when you go to a Web page where audio playback happens nearly instantaneously and files are not downloaded? In that case, streaming technology comes into play. These streaming technologies rely on *perceptual coders*, which use more intensive algorithms to provide even greater data-reduction ratios. Perceptual coders are the basis of MPEG (used in Macromedia's Shockwave) and Dolby AC-2 and AC-3. (See "Surfing the Pipeline" in the September 1997 **EM** for an overview of products that use these technologies.)

Perceptual coders radically reduce the amount of stored data, and although they are lossy algorithms, the best of them can yield near-CD-quality sound files. Many members of the music industry view streaming technology as a powerful alternative to traditional distribution methods. Because Web distribution practically eliminates manufacturing costs and provides around-the-clock shopping, the appeal to the consumer is clear.

At present, you can audition high-quality files or even purchase tracks that have been encoded using a perceptual coder directly over the Net. You can also download a track and use various types of software to decode it and burn it to a standard Red Book audio CD. Both Liquid Audio and Real Networks use perceptual coders developed by Dolby Laboratories as the basis of their streaming technologies. Liquid Audio's system (see **Fig. 2**) has recently been used to publish Duran Duran's latest single, "Electric Barbarella," which was available online prior to its release in retail stores.

Unlike waveform coders, perceptual coders do not attempt to preserve the contour of the original waveform. Instead, their goal is to ensure that the final output signal sounds like the original by using a psychoacoustic model of the human auditory system to determine what parts of the signal are masked, or inaudible. These parts of the signal are deemed irrelevant and are removed.

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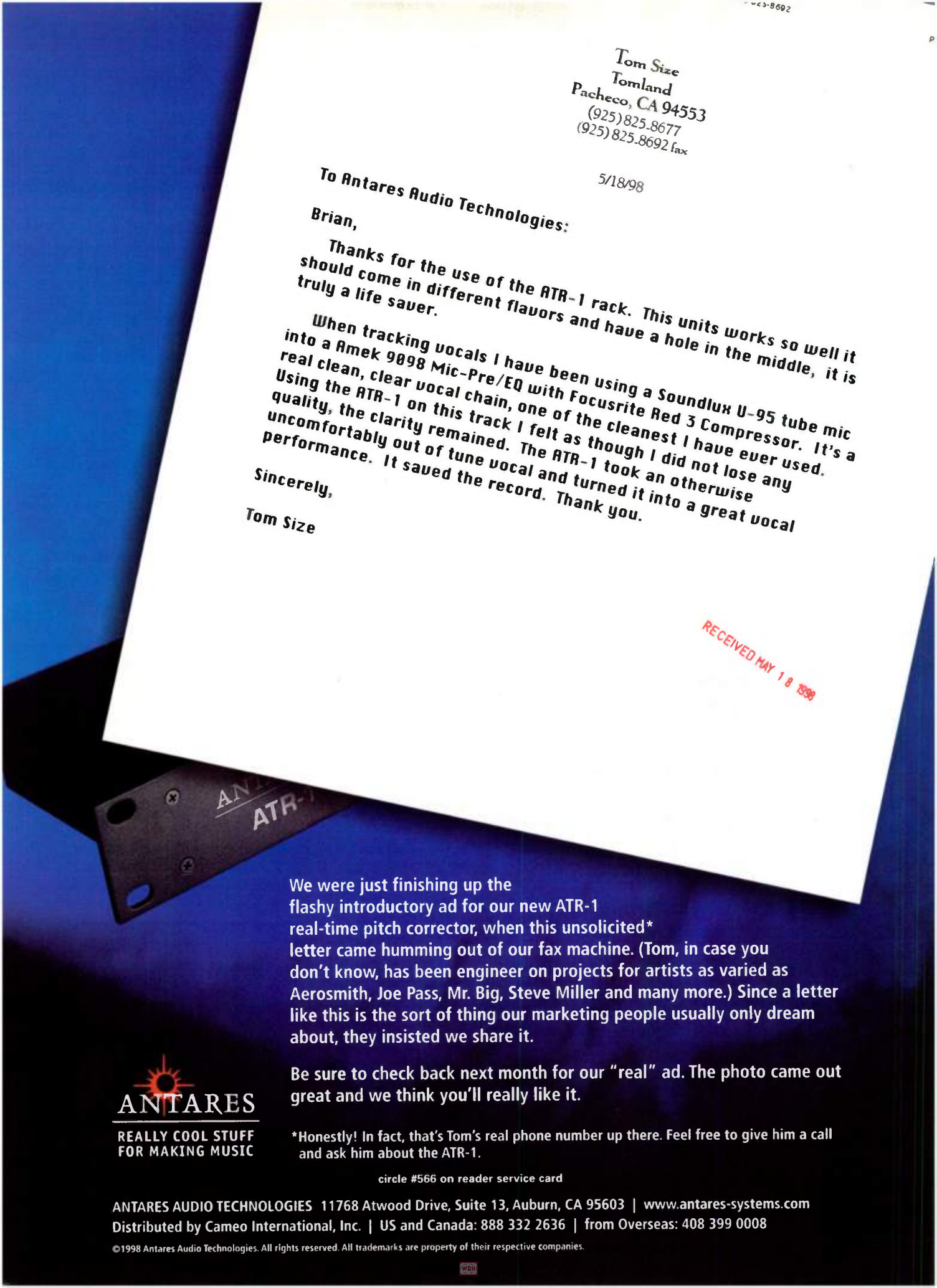
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Tom Size
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We were just finishing up the flashy introductory ad for our new ATR-1 real-time pitch corrector, when this unsolicited* letter came humming out of our fax machine. (Tom, in case you don't know, has been engineer on projects for artists as varied as Aerosmith, Joe Pass, Mr. Big, Steve Miller and many more.) Since a letter like this is the sort of thing our marketing people usually only dream about, they insisted we share it.
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FIG. 4: Numerous audio codecs appear in the Control Panel of a Windows system. Some of them are installed with the operating system and others by applications that require them.

Hence, the amount of data that needs to be stored is reduced. By definition, these systems are lossy, so some audio quality is sacrificed. But at best, the loss is so subtle most people couldn't tell the difference.

To perform this task, the encoder analyzes the input signals within consecutive, overlapping time blocks that might be anywhere from a few hundred to a few thousand samples long. Each block is divided into narrow frequency subbands of different sizes according to the frequency sensitivity of human hearing. A psychoacoustic model is then used to determine which subbands contain irrelevant information that can be discarded.

Perceptual coders are scalable codecs, meaning that the compression ratio can be adjusted by the user. It is common for these coders to include a dialog box that allows the user to set the compression ratio to meet a minimum bit rate that is expected when the file is played back via a modem of a particular speed. Macromedia's Shockwave Audio codec allows the user to scale the size of the encoded file to match the limits of a particular modem speed (see **Fig. 3**). This information is used to help determine how many bits to allocate for different frequency ranges. Subbands that are deemed more critical to our perception of the music get a more generous allotment of bits.

Encoded files can be streamed or posted on the Web for downloading. In either case, the end user must have the special software required to play back such files. At playback time, the decoder uses an inverse filter bank to synthesize the audio.

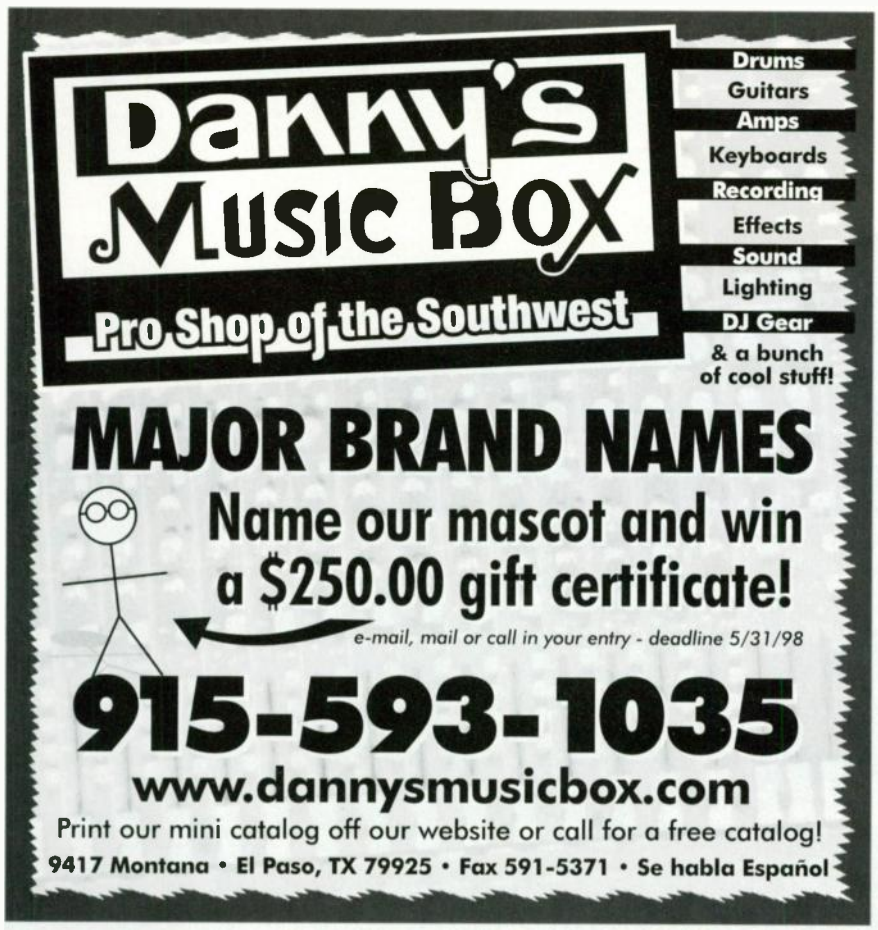
Two other codecs that you may come across are μ-Law and MACE. μ-Law (pronounced "myu-law") was defined by the CCITT (Consultative Committee for International Telegraph and Telephone) and compresses audio using eight bits per sample. It can achieve a signal-to-noise ratio and dynamic range equivalent to that of a 12-bit system using a step index that is based on a logarithmic scale. It's especially well suited for encoding speech. Finally, Apple's MACE (Macintosh Audio Compression Expansion) is a waveform coder that encodes 8-bit files using difference modulation.

MORE IN STORE

I've discussed only a few types of audio codecs; there are more where those came from. If you're running Windows 95, look at the Advanced Multimedia Properties in the Control Panel. Chances are that you will find over a half dozen audio codecs listed there (see **Fig. 4**). In most cases, Windows determines the right codec for the task, and you might not even know that codecs are being used.

Other commercial coding technologies are appearing on a monthly, if not weekly, basis. By the time you read this, Apple will have released QuickTime 3.0, which ups the ante even further by incorporating two new audio codecs. The QDesign Music Codec (QDMC) is designed to deliver CD-quality music via a 28.8 kbps modem in real time. QDMC offers compression ratios beyond 100:1 while retaining good-quality sound. Qualcomm's *PureVoice* is optimized for speech and can stream telephone-quality speech information over a 28.8 kbps modem. With all these new codecs coming down the pike, you have ever more options for condensing your audio for the Web.

Neil Leonard III *received an award for the most valuable contribution to the Music Technology Division curriculum at Berklee College of Music. He recently performed his interactive pieces at the Alternative Festival in Moscow. Thanks to Kurt Hebel of Symbolic Sound for help with this article.*



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WORKING MUSICIAN

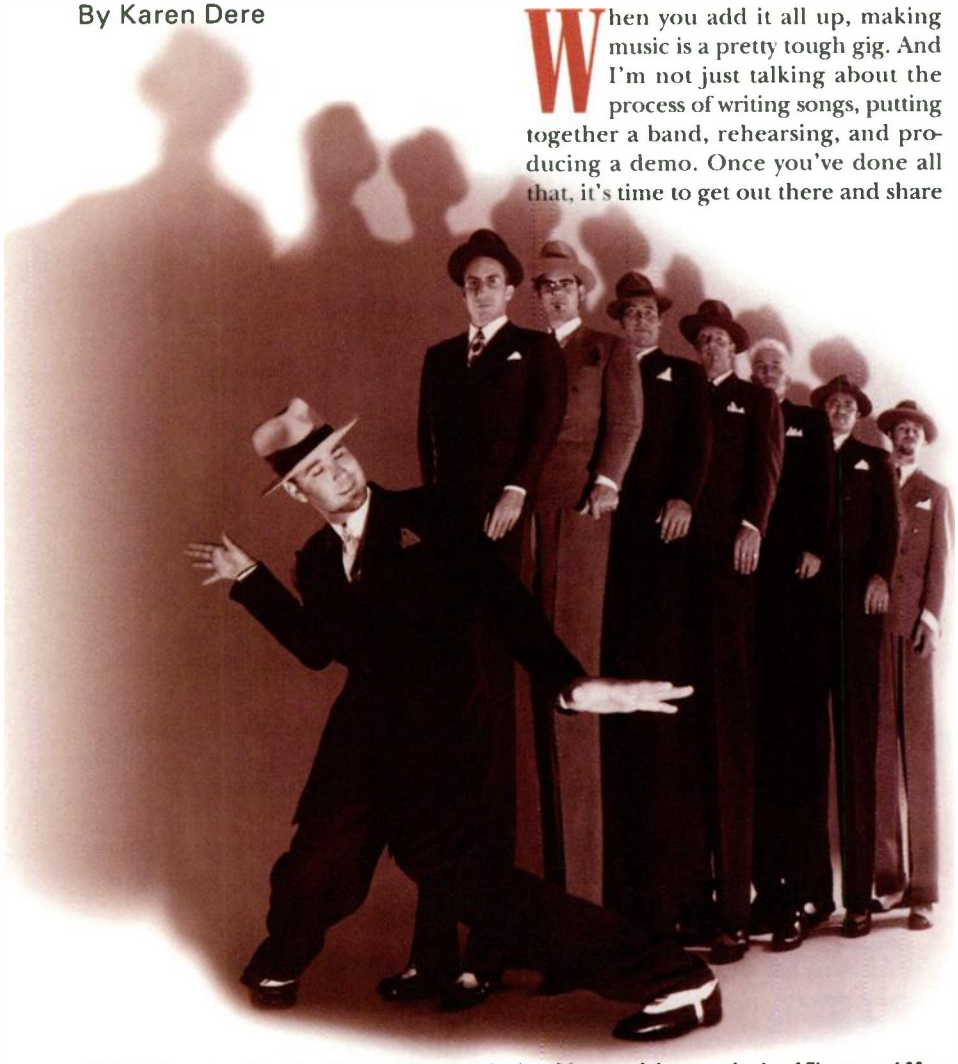
Booking Basics

It's time to face the music and get your band some gigs.

By Karen Dere

When you add it all up, making music is a pretty tough gig. And I'm not just talking about the process of writing songs, putting together a band, rehearsing, and producing a demo. Once you've done all that, it's time to get out there and share the fruits of your labor with the public. The entertainment sections of local and regional papers list plenty of bands playing in all sorts of venues, but how can you go about getting these gigs? You can do it in a variety of ways, though none of them are easy.

The most basic element of playing a gig is getting *booked*, which means that a club schedules you to play. (You have to get in the door before you can play, right?) Sounds simple enough, but here are some basic insights into how booking works and what you should do to increase your chances of getting booked for gigs, as well as a few tips to help you keep your sanity.



APA is a large national booking agency that deals with acts of the magnitude of Fleetwood Mac and Johnny Cash. However, they also book gigs for newer acts, such as swing fiends Big Bad Voodoo Daddy (shown above), which helps these up-and-coming artists garner a larger following.

DON MILLER

PLAN OF ATTACK

If you want to play the places best suited for your band, you're going to have to do some research and spend a good number of hours on the phone. Most clubs book local bands at least a month in advance, so it's best to start planning two to three months before you want to play.

For the purposes of this article, let's assume you only want to play locally or regionally—say, nothing more than an overnighter or a weekend trip away. (The next installment of "Working Musician" will cover planning and booking a tour.) If you are planning on going away for a night or two, you'll need to sort out some logistics, including what you need to bring, where you'll stay, food, transportation, gas costs, and so on. Come up with a ballpark figure so

The Internet is a good place to get the skinny on prospective venues. The Ultimate Band List site (www.ubl.com) has information on, and links to, hundreds of bands and clubs around the world. Shown above is part of the club listing and the home page of 9:30, a Washington, D.C., club.

you won't be shocked if you find out your gigs might not even cover the costs involved in the trip.

There are a couple of ways to approach booking, and the smart musician will use both. One method is to try to hook up with friends' acts and see whether they can get you a slot as an opening act or refer you to the people who book the clubs where they've worked. Another way is to do your own research into all the possible places to play. Local newspapers and independent weeklies (e.g., *Village Voice, San Francisco Bay Guardian, L.A. Weekly*) are great sources of club information. Many even list all the clubs in the area, with phone numbers and addresses.

Target venues where your music fits in with the types of music the club generally books. Of course, if you're playing locally, you should be well enough tapped into your scene to know the venues that best suit your style of music. However, it never hurts to research the scenes in neighboring communities; you never know what you'll turn up.

Try surfing the Net for information on clubs. Most newspapers and weeklies, such as those mentioned above, have Web sites, and nightclubs often have their own sites as well as listings on city-oriented sites, such as City Search (www.citysearch.com) or Sidewalk (www.microsoft.com/sidewalk). A great place to check is the Club/Concert listing at the Ultimate Band List (www.ubl.com). This site has hundreds of club listings and links for venues all over the world, which makes it a good resource should you decide to venture far outside your city limits.

In compiling your list of possible venues, don't forget to contact larger promoters; they often have opening slots to fill at bigger venues. Also, you might decide to take a gig in a larger place for less money—or even none—if you feel it would give you good exposure.

When you have narrowed down the list of places you really want to play, it's time to do a mailing and get their attention.

PUT THE WORD OUT

Gather photocopies of any significant press you've received and type out a short bio of your band. It's helpful to include photos to give bookers an idea of the band's aesthetic.

Make sure your demo has the strongest material first. Bookers rarely have time to listen all the way through tapes, so be sure your demo conveys the flavor of your band at the outset. Also consider including something distinctive with your mailing, like a band sticker, a key chain, flyers, etc., that might keep your package from ending up at the bottom of a bin in someone's office. (For help on putting together a comprehensive promotional package, see "Working Musician: Seductive Promotion" in the March 1996 **EM**.)

Put all of your promotional materials together with a copy of your demo tape and a short cover letter, and you're ready to roll.

LOG SERIOUS PHONE TIME

Once you've sent out your packages, you need to follow up with the booker at each club. Try your best to find out the club's "office hours" and call during that time. This is where your people skills are crucial. Remember that there is a fine line between staying on top of your business and being a relentless jerk; polite persistence usually pays off.

Anthony Bonet, one of the bookers at San Francisco's Bottom of the Hill, recommends that you have patience. Bottom of the Hill has music every day, and in addition to fostering local talent, they have also been the proving ground for international acts like Elastica and Alanis

WHO DOES WHAT

booker The person at a venue who schedules shows for the club. They listen to (many, many) demos and negotiate terms with bands.

booking agent The person who books shows for bands. Most agents work for a percentage of what the band makes. They work independently or for an agency.

promoter Promoters usually work on a regional basis and oversee all aspects of organizing a show or tour and promotion. Some promoters actually produce the show (get the venue, book the bands, supervise the evening's activities), and some are just responsible for promoting the show via print, radio, and street buzz.

stage manager The person in charge of the logistics of the show. This generally includes the backstage area and getting the bands and equipment on and off the stage.

talent buyer Anyone who is responsible for booking acts for a venue or a production company. This term mainly refers to people who work for organizations that book for larger venues.

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...DEFINE YOUR VOICE

A Harman International Company

The New Orleans funk/acid-jazz group Galactic are proof that you don't need big-agency clout to create a national audience. Galactic books their gigs through Madison House, a small agency in Athens, Georgia.

Morisette. Bonet books alongside Ramona Downey, and they get hundreds of calls every week. "I am able to return about 20 percent of the calls I get," says Bonet. "Give bookers about a month and then call. Be prepared for a lot of busy signals."

Bonet, who also plays in the band A Night of Serious Drinking, suggests that you build a reputation in smaller clubs and be prepared to play weeknight shows. "If you're planning your life, you can't count on winning the lottery," he counsels. "Think in terms of taking logical steps and working your way up. Imagine that you're taking small steps up a slippery slope." Once you establish some sort of draw and develop a mailing list, you will have much more leverage with bookers.

He also advises that you define your act's identity. "Forge alliances with bands that you go well with, and start booking shows together," he says. "It gives bookers and the crowd a handle on you."

Try to negotiate to get as much money as you can to cover your expenses. Bookers will offer you either a guarantee or a percentage of the money they make at the door. If it's a show out of town that is not paying much, see whether the club can help you with accommodations or food. Some even have arrangements with local hotels or restaurants. But bear in mind that, when starting out, you might not make much money, if anything at all—especially in major music centers, such as Nashville, San Francisco, New York, and Los Angeles. Consider it an investment in your musical career.

Another thing to keep in mind is that there is no surefire method of getting booked in a particular venue. Bookers have to think about the bottom line: How many paying people will you draw, and how much alcohol can the club sell? Some types of crowds tend to drink more than others. Obviously, the club would prefer to book a band that draws a drinking crowd.

Bookers have different priorities when it comes to choosing live bands. Some want musicians to play quietly as background for dining, and some pride themselves on booking the talent of tomorrow. Take this into consideration before you set your heart on playing a particular venue.

GET IT IN WRITING

Once your hard work pays off and you have made an agreement, you should try to get it in writing. Most clubs don't require a written contract, but it is best to have one on hand and have it signed by the club in case things go awry. It doesn't have to be a complicated legal document; just outline the basic terms of the

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	MS1202	MS1402
Mic preamps	4	6
Mono inputs	4	6
Stereo inputs	4	4
–10/+4 switch[1]	no	yes
Total channel inputs	12	14
Aux sends	2	2
Stereo aux returns	2	2
Channel inserts	4	6
Equalization	3-band	3-band
True low-cut filter	yes	yes
Channel controls	sealed rotary	60mm faders
Master control(s)	ganged rotary	separate L/R faders
Ctrl Rm matrix	yes	yes
In-place solo	PFL	AFL/PFL
Metering	12-LED	12-LED
Stereo outputs	both XLR &1/4"	
Tape ins/outs	RCA	RCA
ALT 3-4 bus	yes	yes

Musical 3-band EQ with wide, natural midrange bandwidth centered at 2.5kHz.

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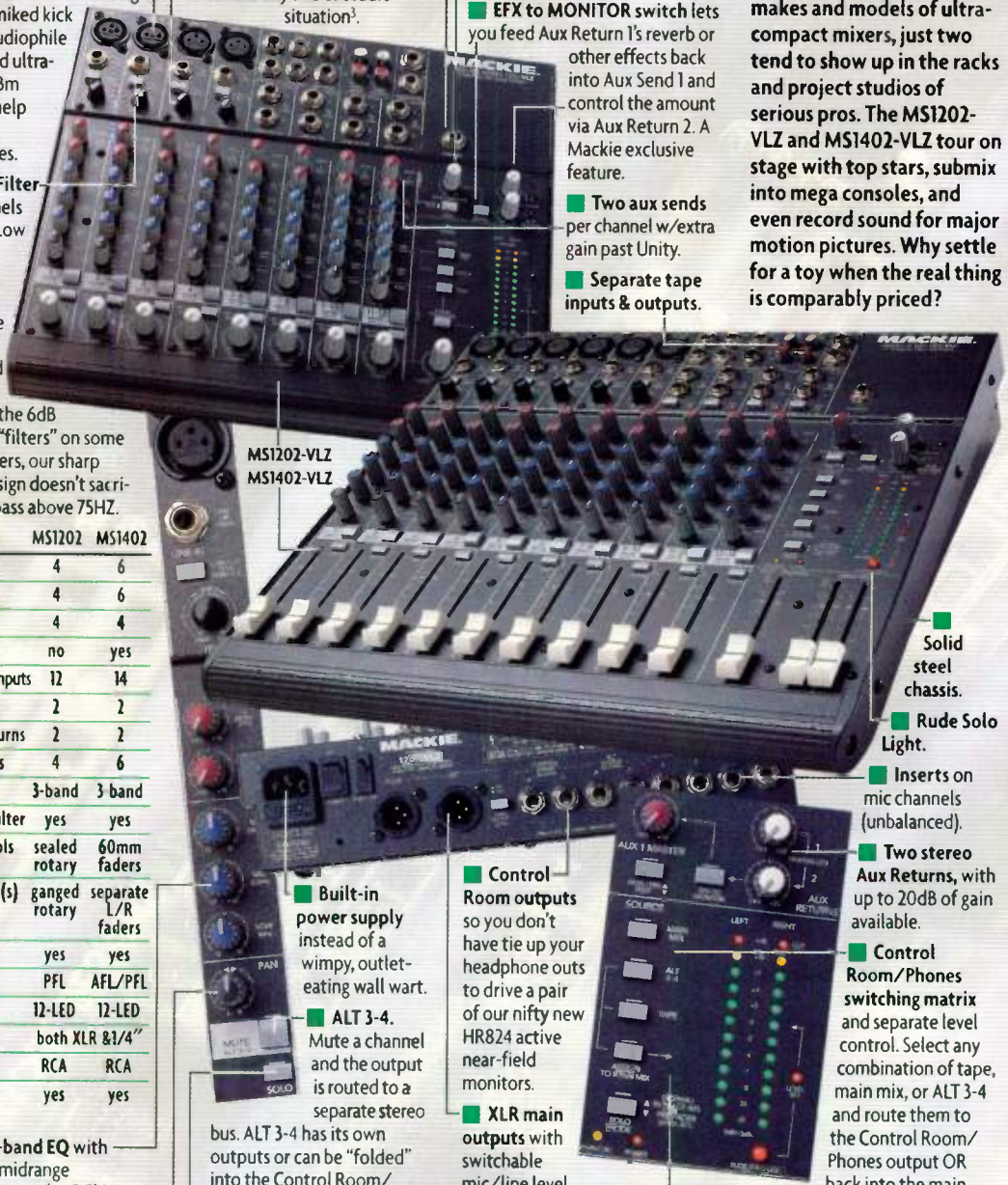

Check around. You'll discover that even though there are about a gazillion makes and models of ultra-compact mixers, just two tend to show up in the racks and project studios of serious pros. The MS1202-VLZ and MS1402-VLZ tour on stage with top stars, submix into mega consoles, and even record sound for major motion pictures. Why settle for a toy when the real thing is comparably priced?

Solid steel chassis.

Rude Solo Light.

Inserts on mic channels (unbalanced).

Two stereo Aux Returns, with up to 20dB of gain available.

Control Room/Phones switching matrix and separate level control. Select any combination of tape, main mix, or ALT 3-4 and route them to the Control Room/Phones output OR back into the main mix. Consider the possibilities: easy assign to control room monitors, multitrack recorders, submixes, separate monitor mixes, broadcast, or 2-track tape feeds. A Mackie Designs exclusive.

Built-in power supply instead of a wimpy, outlet-eating wall wart.

ALT 3-4. Mute a channel and the output is routed to a separate stereo bus. ALT 3-4 has its own outputs or can be "folded" into the Control Room/Phones bus OR main mix.

Stereo in-place solo (1402) retains channel's correct position in the stereo mix. A soloed channel's operating level appears on the main LED display. Solo is PFL (pre fader) on the MS1202-VLZ, and globally switchable to AFL (after fader) on the MS1402-VLZ.

Control Room outputs so you don't have tie up your headphone outs to drive a pair of our nifty new HR824 active near-field monitors.

XLR main outputs with switchable mic/line level.

Above right: The MS1402 Control Room section. MS1202-VLZ is similar except without Phantom LEDs, Level Set LEDs and global AFL/PFL solo switch.

Below: A few of the 400+ folks who work at Mackie Designs in Woodinville, WA, 20 miles north of Seattle.

1) On stereo channels.
2) This would make a great album title for the '90s.
3) Except possibly drummers who drink triple espressos.

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agreement: name and place of engagement, date of engagement, starting time, length of sets, and compensation.

Because most booking is done verbally, usually on the telephone, it is your responsibility to make sure that everyone involved is on the same page. When the inevitable misunderstandings occur, it is much better to have something in writing than to rely on people's memory.

REEL THEM IN

Once you've booked gigs, you need to promote them. (I warned you that this is a lot of work.) The whole point of playing live is to get as many people out to the venue as possible, especially if it is in an area where you haven't played before. It's pointless to do all of the work to get booked just to play to an empty room. If the show goes well, it is more likely that the club will have you back again, and other clubs are more likely to book you if you have a good word-of-mouth reputation.

In short, do everything you can to fill the venue with bodies. Get together a mailing list, do in-store appearances, put up fliers around the city, set up interviews on local radio, or perform a free show at a college campus—whatever it takes to pack the house.

THE NEXT LEVEL

If you've been booking your own gigs for a while and are getting overwhelmed by sheer volume of work, you should consider using a booking agent. The type of agent or agency you should hook up with depends on the type of shows you're planning to do. Some agents just do regional booking, some just do national or international, and some do it all.

Usually an agent's fee is a negotiable percentage of the amount you will make for the show. If you don't make much money per show, you might have to pay your agent a flat monthly fee or take care of their expenses, such as mailings and phone bills. Many agencies work on the basis of exclusive agreements whereby they book all of your gigs. However, some agents, especially those who handle local venues, can book you just for specific rooms. Occasionally, two or more agencies might even cooperate to help construct a tour—if the money is right.

Agencies understandably prefer to work with bands that can show a good track record of successful gigs at established venues, in addition to having a strong promotional package. If you are mostly interested in playing local and regional shows, booking through small agencies might be sufficient.

However, the ante goes up when you move to more extensive tours and bigger gigs. For example, Josh Humiston, booking agent for APA (Agency for the Performing Arts), one of the largest booking agencies in the U.S., says that several factors lead his company to take on new clients. Radio airplay and record sales, even if they're just regional, make a bigger agency sit up and take notice. Sometimes the agent's emotional response to the band is a factor, too. "Believe it or not, people still sign bands just because they love them," says Humiston. "Rarely do our agents sign a band that they don't like just because they make money."

Humiston urges bands to have a strong game plan before they approach an agency at this level. "There are a few key things bands need to have for an agency to get involved: a good record label, a good manager, a good lawyer—basically a good team behind them. The better the team they have already, the more likely we are to join it."

Still, you don't have to be with a major booking agency to achieve success at a national level. The funky New Orleans quartet, Galactic, has built up a huge audience on the strength of its live show. The band is booked by Madison House, a small agency in Athens, Georgia. Galactic makes several trips through sections of the United States every year and has worked its way up from playing small clubs to selling out larger venues all around the country.

As with most things in the music industry, your success in booking comes down to a few basic qualities: talent, reliability, and patience. Try to build a reputation as being not only musically talented but reliable when it comes to handling the business aspects of playing live. It'll get you a lot farther than you might think.

Karen Dere, *the label manager for Tripek Records, has been on both ends of booking and doesn't envy either party.*

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Real words from a Reality™ user

Ethan Eves
Reality User
Performer/Studio Musician
Toolbox
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Roland® MC-505, Boss® SE50,
Novation™ BassStation

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"Most of my shows...

...are pretty heavily dance oriented. I do the break beats with Reality™ and also throw in a lot of samples, like different vocal samples and weird, B-movie, sci-fi samples. I can do break beats on top of slow beats on top of weird, sort of eerie, background ambience on top of vocal samples. I've done gallery openings and fashion shows where I have done more ambient-type stuff.

"I have a rather portable computer with an LCD screen and stripped-down Windows 95. I run Cakewalk™ with Reality. Cakewalk can loop, so when I do live shows, I have it loop and I mix live by muting and un-muting parts of the song, using Reality as the synthesizer.

"Reality is very straightforward. Having had even minor experience with other synthesizers, you pretty much know what everything is. The filters are really responsive—that's another good thing. You can get the resonance up real high. I use Reality primarily as a sampler, just because it works so well that way. I use a set of MIDI sliders with it.

"Recently I have been getting into making a lot of weird atonal sounds, pushing the FM stuff as far as it will go. You can get some really insane sounds out of that. The frequency response with [Reality] allows you to do stuff that is pretty complicated and textured, but still sounds good.

"With a lot of the digital synths, when you try and do a hefty bass, you don't get it. I have never run into that with Reality—I've been able to get really enormous bass sounds.

"At shows, I let people see what's going on. A lot of people are into break beats and they sound a lot more complex than they really are, so they want to see how I'm doing it. Having it on the computer screen, you can see everything. You get to see where everything is. It also makes it much easier to manipulate it, set the different sliders to different things. When you're dealing with Reality, it's all sitting right there."

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REVIEWS

AKAI

DPS12

A self-contained, 12-track digital studio.

By Rudy Trubitt

I make a living doing audio production on my Macintosh. But when I decide to play artist instead of engineer, the last thing I want to do is fumble around with a mouse or endure the buzz my monitor induces into my electric guitar. And yet, I'm not prepared to give up the easy editing, random access, and other benefits of hard-disk recording. Rather, I want a multitrack recorder that's quick and easy to use yet doesn't compromise sonics or flexibility.

Apparently, many others feel the same, as evidenced by a whole new generation of inexpensive, integrated hard-disk recorder/mixers with nary a mouse nor keyboard in sight. One of the most recent of these studio-in-a-box wonders is the Akai DPS12 Digital Personal Studio, which combines a 12-track digital recorder and 20-channel digital mixer in a tabletop unit no bigger than a breadbox.

The DPS12 records 16-bit audio with no data compression. In addition to twelve physical tracks, the DPS12 provides 250 data-storage (virtual) tracks. Data is stored on an optional 2 GB internal hard disk or 1 GB Iomega Jaz drive ($350). An optional multi-effects board, the EB2M ($299), can be installed, as well. The DPS12 is competitively priced, with the base unit starting at $1,499 (that's without the options), and a fully tricked-out model costs just a tad over two grand.

Akai delivers excellent value with its 12-track DPS12 hard-disk recorder. The ministudio-style recorder/mixer has limited routing and interfacing options, but it delivers quality sound and is extremely easy to use.

ACCESS AND EGRESS

At the top of the mixing surface, sound reinforcement–style, are six analog inputs on ¼-inch TRS

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connectors, which accept balanced or unbalanced, mic- or line-level signals. A trim pot is provided to adjust the input level. Each trim pot is accompanied by a peak-indicator LED that lights when the input signal clips. The front panel of the DPS12 provides a headphone jack and headphone-level control, and the optional Jaz drive is mounted here.

The rear panel provides two master outputs (L/R) on RCA jacks, two mono aux sends (A/B) on ¼-inch unbalanced jacks, two S/PDIF optical jacks (In/Out), MIDI In and Out/Thru connectors, a SCSI connector, and a footswitch jack (for controlling either Punch In/Out or Playback/Stop operations). The unit's power button and IEC power connector are also located on the rear panel.

The DPS12 has a SCSI connector for use with external drives but cannot communicate directly with a computer. Its optical S/PDIF digital I/O can be used for mastering or backup to audio DAT. Optical-to-coax converters are inexpensive and commonly available.

FACE OF THINGS

The physical layout of the DPS12 is straightforward, with the mixer section on the left, tape-style "transport" controls and other operation keys in the lower right corner, and LCD, jog/shuttle dial, and cursor in the upper right section.

The mix surface provides twelve channel strips, each with a 60 mm fader, rotary pan control, and keys for channel select and record select. in addition, there is a 60 mm master fader. Below the LCD are six more function keys that correspond to functions appearing on the bottom row of the display.

Three other keys serve multiple functions. The Solo/Cancel key enables the Solo function in the mixer section and is also used to cancel entry of numeric values and characters. The Number/Name/Enter key enables input of numeric values and characters and confirms their entry. You can assign your own names to projects, mixer snapshots, and locate points.

In addition to using a jog wheel for entry of text, you can use certain front-panel buttons as a "keyboard" for entering text. The Channel Select keys are numbered and labeled A through L, six of the function buttons serve as M through R keys, and the Mixer, Edit, and Edit In buttons do double duty as X, Y, and Z keys.

The Jog Play key enables jog and shuttle playback. When this key is engaged, the waveform of a selected channel appears on the LCD, allowing for jog playback using the jog dial and shuttle playback with the shuttle dial.

The jog dial, situated inside the shuttle dial, is used both for jog playback and to change settings or values of items selected by the cursor on the display. Speed and direction of shuttle playback are regulated by the direction and amount that you turn the shuttle dial. The shuttle dial is also used to select time-field values (one at a time), which are displayed via the jog dial. The cursor key is a matrix of four buttons providing up, down, left, and right movement within the display.

Seven mode keys—Main, Track View, Assign, Disk, Project, Mixer, and Edit—are used to switch between the various operating modes. There are also an Undo key, two Edit Point keys (In and Out), two Edit Play keys (To and From), and two Locate keys (Memory and Go To). Transport controls include the standard Record, Play, Stop, Rewind, and Fast-Forward.

THE BASICS

The DPS12 can record six tracks simultaneously using its six analog inputs. In addition, you can use an external A/D converter to feed two more signals into the unit's optical digital inputs, allowing up to eight tracks to be recorded at once. A DAT machine in record-ready mode will do, although you will also need a coax-to-optical converter if your DAT doesn't have optical I/O.

Audio can be recorded at three sample rates: 32, 44.1, or 48 kHz. The internal Jaz drive provides just over sixteen minutes of 12-track, 44.1 kHz recording per 1 GB cartridge. However, you can extend recording time by using fewer tracks: for example, at 44.1 kHz, you can store up to 32 minutes of 6-track recording per cartridge and over three hours of mono.

Flub a line in your solo? The DPS12 lets you punch in and out on the fly, either from the control surface or with a footswitch. If you blow a punch, don't sweat it: the DPS12 provides a user-variable undo feature that can be set to allow for up to 256 undos.

As for editing, the DPS12 provides all the basic tools one would expect from a hard-disk recorder. Deleting, copying, or moving a track or group of tracks is as easy as setting in and out points and telling the machine what to do. This means you can fly in backing vocals from chorus to chorus, rearrange song sections, fix botched chords, etc.

The DPS12 has considerable mixing capabilities, as well. Built-in scene memory stores mixer and internal effects snapshots. Mix-related parameters can also be adjusted via MIDI, and by adding a MIDI sequencer you can have dynamic mix automation of fader, pan, and aux-send moves for all twenty inputs. In addition to the pair of mono aux sends that can be used to access outboard effects, the optional EB2M effects board provides two internal mono-in/stereo-out effects. However, EQ and effects parameter changes can't be automated.

Need more than twelve tracks for a particular project? With the DPS12, you could record ten tracks, mix them down internally, and then bounce the submix to the remaining two tracks. Then, you could turn off (but not necessarily discard) the original ten tracks and continue adding new material alongside the stereo mix. Because this process is done entirely in the digital realm, it can be repeated quite a few times with relatively little signal degradation. (There are limits to this, however. As you add new material, the self-noise of the mixer preamps adds cumulatively to the bounced tracks. Quantization noise also builds up.)

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

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Life will be easier if you plan your session using the "ministudio" philosophy: either use one mic per track or employ an external submixer to combine multiple mics before they get to the DPS12. For example, an external mixer will make it much easier to combine a number of drum mics onto two DPS12 tracks, leaving other tracks free to record the rest of the rhythm section at the same time. Akai is apparently evaluating the possibility of adding another software mix bus to the DPS12 mixer in the next software update. This will significantly simplify busing and bouncing operations.

THE LIMITS

As you can see, the DPS12 is a pretty complete product, capable of covering everything from tracking to editing and mixing. It does have its limitations, though. For one thing, if you're tracking in the same room that the band is playing in, be sure to bring a headphone amp because the DPS12's headphone output is pretty feeble. Also, note that neither XLR mic inputs nor phantom power is provided. This means you will need XLR-to-¼-inch TRS cables or adapters to connect microphones to the unit. Of course, if you intend to use condenser mics, you will also need an external source of phantom power (unless the condensers are of the self-powered variety).

As with most products of this type, you can get a fair number of signals into the DPS12, but it's more difficult to get them out. Because there are only four outputs (main stereo mix and two aux sends), there's no simple way to take your basic tracks and bump them up to a larger multitrack for additional overdubs and mixing. Although this may not be an issue for some users, I'd feel better knowing I had the option of outputting more tracks at once. As it stands now, transferring a project to another system requires synchronizing the DPS12 to the multitrack and dubbing the project four tracks at a time (or two at a time, if you want to stay in the digital domain).

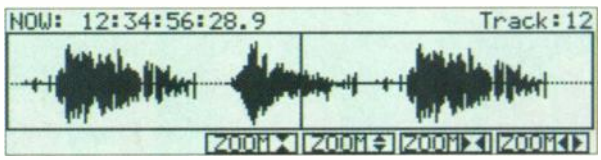

FIG. 1: You can use the jog/shuttle wheel to scrub and view the waveform of one track at a time to help you precisely set edit points.

One little glitch I discovered is that all tracks get muted for a couple of seconds during punch-outs, even though "playback" hasn't stopped. This doesn't interfere with the data in any way, but operationally it's a bit disconcerting. Akai promises to correct this problem in the next software update for the DPS12.

CHANGING REELS

The DPS12 I reviewed came fitted with an internal, 1 GB Jaz drive. This is nice because it offers the convenience of "changing reels" without having to back up to and restore projects from a fixed hard disk. I had a brief problem with the review unit—the internal SCSI connection had come loose from the Jaz drive in transit—but this was quickly

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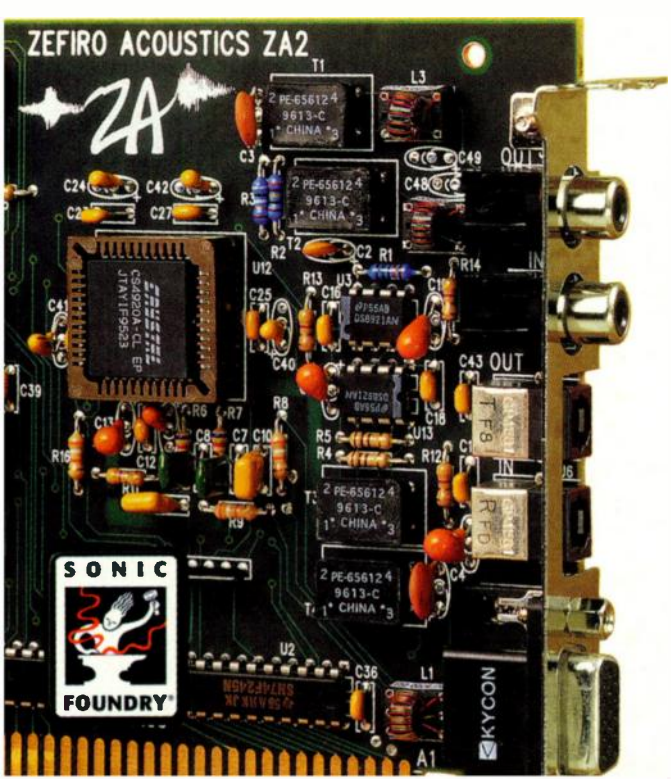

The ZA-2 includes the professional features the other cards leave out. Its powerful 24-bit DSP sample rate converter lets you take inputs directly from a 48kHz pro DAT or a 32kHz LP DAT, and converts them on the fly to perfect 44.1kHz for CD mastering. Its Multi-I/O configuration gives you AES/EBU on real XLR cables and S/PDIF (both optical and coax) inputs and outputs, plus analog outputs for monitoring. You can use all the inputs and outputs simultaneously to do sample rate or format conversion (for example, S/PDIF in and AES/EBU out) or tricks like managing SCMS, or manipulating DAT start ID's or CD PQ codes — and you can switch back and forth between inputs with just a few mouse clicks.

The ZA2 delivers up to 24-bit recording — beyond the range of any commercially available A/D converters. It also works as a Windows sound card, converting all wave audio data (even mono, 8-bit, or 11kHz) to 16-bit stereo. You get drivers for Win95 and NT, plus Sound Forge XP 4.0 editing software and a discount upgrade path to CD Architect.

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remedied. Other than that, the Jaz drive worked fine during testing and was quieter than other Jaz drives I've used. It wasn't silent, however, so recording a quiet acoustic instrument while sitting in front of the DPS12 could be problematic.

As with any multitrack recorder, media costs are a consideration. Each Jaz cartridge will hold a few average-length, 12-track songs at the cost of about $85 per cartridge. Compare that to tape costs for a modular digital multitrack, such as an ADAT or DA88—ouch! Of course, the trade-off is the oodles of editing capability you gain by using disks rather than tape.

If you don't opt for the Jaz, you can choose a factory-installed, internal, 2 GB SCSI drive. There also is a SCSI connector on the back of the DPS12, allowing you to hook up multiple external drives. Akai publishes drive performance specs you should observe if you buy your own drives for recording.

▼

The DPS12 provides all the basic editing tools one would expect from a hard-disk recorder.

As with any hard-disk recorder, multiple edits and new takes tend to scatter data across discontiguous sections of the hard disk. The DPS12's Align command reshuffles the drive data so that each track is kept together on the drive, making playback less of a strain on the drive. In one unrepeatable case, I got a "disk too slow" warning and heard some audio skipping. However, "aligning" the Jaz cartridge and restarting the DPS12 apparently fixed the problem.

Nonetheless, experiences like this are a good reminder that this box *is* a computer at heart, and computer data needs to be backed up regularly—and repeatedly. As mentioned previously, individual projects can be backed up to an external SCSI drive. Another option—less expensive but more time-consuming—is to back up to audio DAT. If you do this, remember to turn your speakers

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down; the DAT backup starts with some digital-sounding noise before the individual tracks are recorded to DAT, two at a time.

My hope is that Akai will write drivers to allow the use of a SCSI CD burner. This is my backup system of choice because the cost is only about one dollar per blank 650 MB CD. If CD-R were to be supported, I would also want to be able to print final mixes directly to an audio CD, as the latest V-Extended version of Roland's VS-880 can do. However, CD-R is not supported in the current version of the DPS12's software, and Akai has made no promise to support it.

CUT 'N' PASTE 'N' COPY

Editing is where disk-based multitracks really shine. To make an edit on the DPS12, the first thing you need to do is mark in and out points. This sets the range of audio that will be affected by subsequent edits. In and out points can be adjusted with great precision by using the jog wheel to audibly scrub while simultaneously viewing any single track's waveform (see **Fig. 1**). (It's too bad that you can't scrub multiple tracks!)

Once in and out points are set, you can delete, copy, and move audio to any point on any track. Although Akai didn't go with the typical computer "clip/cut/copy/paste" paradigm, its approach is equally workable. However, there's no way to fine-tune edits. If you cut too early or too late, you can't tweak the edit the way you can with playlist-based editing systems. The DPS12's editing is destructive, so you will have to undo and try the edit again.

The default setting is one undo. As mentioned previously, though, the undo chain can be extended to allow for up to 256 undos. Note, however, that multiple undos can reduce disk space available for recording. For that reason, I usually stuck with one or two undo levels, which seemed to be enough for my needs.

The DPS12 provides no user crossfades. Instead, the unit automatically applies brief crossfades during edits to avoid clicking or unnaturally sharp-sounding discontinuities in the waveform. But there's no way to perform the longer crossfades sometimes required to hide difficult edits. Still, after a session or two, I was able to quickly make satisfactory cuts and moves. Obviously, the DPS12 can't match the editing flexibility of playlist-based DAW editors. It does, however, get the job done satisfactorily and with a minimum of fuss.

DPS12 Specifications

Physical Tracks	12
Virtual Tracks	250
Analog Inputs	(6) ¼" TRS
Analog Mix Outputs/Aux Sends	(2) RCA/(2) ¼" unbalanced
Digital Inputs/Outputs	2/2 (S/PDIF optical)
Additional Connections	MIDI In and Out/Thru; footswitch jack (Punch In/Out or Playback/Stop); SCSI; IEC power
A/D Converters	18-bit, 64x oversampling
D/A Converters	20-bit, 8x oversampling
Sampling Rates	48 kHz, 44.1 kHz, 32 kHz
Sampling Resolution	16-bit linear
Frequency Response (@ 48 kHz rate)	10 Hz–22 kHz (±2 dB)
Total Harmonic Distortion (48 kHz rate)	0.05% or less (1 kHz @ -10 dBm)
Channel Crosstalk	75 dB or higher (10 kHz)
Nominal Input Level	-46 dBu to +4 dBu
Nominal Output Level	-10 dBu (aux sends and master out)
Dimensions	17.5" (W) x 3.86" (H) x 13.15" (D)
Weight	9 lbs., 8 oz.

THE MIXING SCENE

With the current software, mixing is the DPS12's weak point. The biggest limitation is the lack of dynamic mix automation. But fortunately, because all fader, pan, and send controls generate MIDI Control Change messages, an external MIDI sequencer can be used to capture and play back many mix moves. However, EQ changes are not transmitted by MIDI, nor can you change effect algorithms or recall mixer snapshots during playback.

MIDI Control Change number assignments are fixed and are transmitted on a single MIDI channel of your choice. (When connecting the DPS12 to an external sequencer, remember to turn your sequencer's MIDI Thru setting to Off to prevent a MIDI feedback loop.) The DPS12 can synchronize via MIDI Clock (as master only) or using the more convenient MIDI Time Code (as master or slave). When slaved to external MTC, the DPS12 review unit locked to the master in just under two seconds.

All that aside, the digital mixer itself, though simple conceptually, can be tricky to use. For example, the unit can accept eight inputs (six analog and two digital) from outside sources during mixdown. The remaining twelve of the twenty channels are hard-wired as track returns. The twelve track-return channels are routed through the unit's faders, so it's easy to grab a fader and control the level of a recorded track. However, the other eight inputs have no physical faders, so you have to use button presses and the jog wheel to adjust their levels.

Although not so convenient to control, these extra eight inputs can be handy for bringing in external effects returns or MIDI tracks from an external synthesizer. Also, soloing any of the twenty inputs is simple, whereas channel muting is needlessly inconvenient.

In addition, the output side of the mixer is fairly limited. The two mono sends are switchable pre- or postfader on a per-channel basis. This limited number of physical outputs confines you to mixing inside the DPS12 rather than through an external mixer. (To be fair, portable studios have never been big on independent outputs, and many users may find the DPS12 offerings sufficient.)

The DPS12's mic preamps, though somewhat noisier than those in my

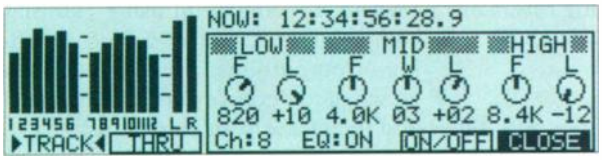

FIG. 2: All EQ settings for a single channel can be viewed using the optional Strip mode. The 3-band EQ shown here can be used on a maximum of six simultaneous tracks/channels.

faithful Mackie MS-1202, still proved capable of making good-sounding recordings. However, if your recording work tends toward quiet, acoustic instruments rather than loud, electric ones, this could be a concern.

For mixdown to DAT or other digital medium, or to connect the DPS12 with a computer, the digital outputs are the way to go. Using the Fostex COP-1, an inexpensive ($95) optical-to-coax converter, I connected the DPS12 to my Digidesign Audiomedia III card's coaxial S/PDIF I/O.

THE EQUALIZATION STORY

Two types of EQ are provided with the DPS12. You can choose either twelve channels of high/low shelving EQ or six channels of high/low shelving as well as a fully parametric mid band. However, if you use the 48 kHz sample rate, the EQ capacity drops to ten 2-band or five 3-band equalizers. (The optional effects board gives you an additional 3-band parametric EQ program.)

I had to crank the EQ pretty hard to get the results I wanted, but on the positive side, even the 2-band EQ provides a wider range of swept frequency ranges than most analog mixers offer. In default mode, the DPS12 shows a single EQ control for all twelve tracks at once. More convenient is the optional Strip mode, where all of the EQ controls for a single channel are displayed simultaneously (see **Fig. 2**).

Changing EQ settings in Strip mode requires cursoring your way to the desired knob before you can use the jog wheel to make adjustments, which is a hassle. I wish Akai had assigned keys to directly select EQ knobs in the same way that channels can be selected. I must also carp briefly about the 14-item-long selection list of mixer parameters one must jog through: level, pan, mute, EQ low frequency, EQ low cut/boost, EQ high frequency, and so on. It's easy

AKAI
DPS12 modular hard-disk recorder/mixer
$1,499

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EASE OF USE ■■■
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VALUE ■■■■■
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CONS: Limited signal routing. Limited options for interfacing with external gear. No built-in mix automation. Unimpressive optional effects. No CD-R support.
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to get lost in lists containing this many options.

LIMITED EFFECTS

The review unit was equipped with the optional EB2M effects board. The EB2M provides two simultaneous effects, including a variety of delays, reverbs, flangers, choruses, compressors, auto-wahs, and more. Basic editing parameters are supplied for each algorithm, and the settings are stored with each project. However, there's no way to recall effects presets created in other songs. Fortunately, though, the number of effects parameters is small enough that this isn't much of an issue.

Signals are routed to the internal effects via the DPS12's two aux sends. Unfortunately, this means that two is the maximum number of effects at your disposal—whether you use internal effects, outboard effects, or a combination of the two. In addition, be aware that two or four of your external inputs are used by the effects board as effects returns, so you have to choose between using these inputs as returns or channel inputs.

Each effect provides a mono input and a mono or pseudostereo output. To get discrete stereo processing, you can set the two effects to the same algorithm, which gives you a single aux control and adds panning—a thoughtful touch. Note, though, that whether or not you have the internal effects board, you can route either or both aux sends to external equipment.

Although I liked some of the delay algorithms, including an effective tape-echo simulator, I found the reverbs uninspiring. They had a pronounced "ringy" character, which was evident even on nonpercussive sounds.

My attempts to add compression to previously recorded tracks turned into an exercise in frustration. Typically, dynamics processing is done via an insert-type signal flow. The DPS12, however, requires that you use aux sends and returns for all effects, including dynamics processing. This is very confusing; an insert-routing mode should be provided, as well.

Furthermore, the DPS12's compressor offers no metering, so you can't tell when a signal has crossed threshold, nor can you determine how much, if any, gain reduction is taking place. Yes, compression can be done, but in my opinion, the results aren't worth the effort. Instead, I recommend using external compression judiciously during recording or outputting a previously recorded signal to a good external compressor and then back to an empty track.

THE VERDICT

For those seeking a self-contained "studio in a box," the Akai DPS12 is an excellent choice. Fundamental sound quality is quite good, operation (for the most part) is simple and straightforward, and the unit provides solid editing and modest mixing capabilities. As long as you use quality mics, this box is capable of making great-sounding 12-track recordings. All this makes the DPS12 ideal for, say, solo artists without a lot of preexisting gear, or for bands seeking a highly portable and affordable way to make high-quality demos.

By the same token, however, the DPS12 is self-contained almost to a fault. Indeed, were there only a way to transfer a multitrack project over SCSI (such as Airwork's *VS/Link* provides Roland VS-880 users), I'd stop harping on this point and buy a DPS12.

Another thing I'm not sold on is the EB2M optional effects board. There's no disputing the convenience it provides, but I'll take sound quality over convenience any day. I suggest, instead, that you put your three hundred bucks toward a good quality outboard multi-effects unit.

Despite these concerns, though, I can't find fault with the DPS12's basic capabilities. I made music with this thing, and I'm happy with how the songs sound. Also, its extreme portability allowed me to create in a variety of environments with minimal schlepping. Indeed, this box quickly transforms any space into a 12-track recording studio. Party!

Reviewing the DPS12 reminded me just how far we've come in the past ten years. The last time I bought a "personal studio," I paid $1,200 for an outstanding 4-track cassette machine with built-in mixer, which comes to about $300 per track. Today, the DPS12 gives you twelve tracks for about $150 each—and it sounds far better than any cassette recorder. That's what I call progress!

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EMAGIC

LOGIC AUDIO 3.0 (MAC/WIN)

A heavy-hitting audio sequencer gains muscle.

By Rick DiFonzo

The digital audio sequencer arms race continues to accelerate as the software giants strive to dominate the MIDI marketplace. The resulting proliferation of features is great news for musicians. High-end digital audio sequencers have become more powerful, and perhaps more importantly, they've become more versatile.

Emagic's sequencers have long been known for offering a truckload of features in a unique work environment that doesn't simply mimic the competition. Beginners may find *Logic Audio*'s latest incarnation a bit daunting, but much of the seeming complexity results from the level of customization that the program offers as well as from the program's efforts to cover so many bases.

Logic Audio 2.0 was reviewed in the May 1995 issue of **EM**. Much of the program is still the same, so I'll briefly describe the main parts of the program and then focus on some of the coolest and most important new features.

I reviewed the Mac version of *Logic Audio* 3.0 using an Emagic Audiowerk8 card; the Windows version is essentially the same. (Of course, I can only evaluate performance on the Mac.) Both versions offer a maximum of 48 audio tracks and such high-end amenities as nondestructive crossfading, MIDI scrubbing, automated mixing, sample editing, and real-time DSP effects.

In addition to the Audiowerk8 card, the Mac version supports Power Mac native audio (with Sound Manager), Korg's 1212 I/O card, Yamaha's CBX hard-disk recording hardware, and any of Digidesign's DAE-supported devices. The PC version supports most 16-bit MME sound cards.

ENVIRONMENTAL ISSUES

To understand *Logic Audio*, you must first understand the Environment section of the program (see **Fig. 1**). Much of the customization and configuration—and many of *Logic Audio*'s important processes—take place here. The Environment window can seem a bit strange at first, though some aspects of it resemble Opode's OMS or MOTU's FreeMIDI.

You begin by creating MIDI Objects for all the gear in your studio. Multitimbral devices can be assigned as Multi-Instruments that can address any or all of the sixteen MIDI channels. Once you've configured the Environment to reflect your MIDI setup, you can connect everything with virtual cables and make some truly amazing things happen.

In addition to mapping out a virtual representation of your MIDI gear, the Environment also lets you create other powerful types of MIDI Objects. The Arpeggiator, for example, has a lot of interesting options, including seven Direction parameters, a Crescendo setting, and other settings for pitch range, note length, and octave spread.

The Delay Line simply delays MIDI data, and the Channel Splitter splits the MIDI data into different channels. I especially like the Chord Memorizer. It enables each key on your keyboard to play a different user-defined chord. The Transformer changes one kind of MIDI data into another. (I easily set up a Transformer to make my sustain pedal act as a kick drum, for example.)

Speaking of drums, you can create a "mapped instrument" to make drum kits from any combination of sound modules. Each note on the keyboard can be named and mapped individually to any other note and channel of any device in your studio. A simple Combination Instrument allows you to assemble sounds by patching devices together. For example, a huge pad can be created by assigning a Combination Instrument to several pad patches on different synthesizers.

You'll find all sorts of faders for MIDI Volume, Pan, and SysEx. Also provided are mute buttons, switches, predefined GM consoles, Modem and Printer Port Objects, MIDI click, and the Physical Input (for the MIDI signal path). You can experiment with cabling all this stuff together in different ways and keep busy for years without exhausting the possibilities.

Each change you make is saved on the Song level, so you can have a different Environment for each Song. You can also save the changes in your Autoload, a Song file with your customized settings that's used as the template for new Songs.

All of these options, however, can be confusing to the new user. For instance, it isn't immediately clear whether you should directly assign an instrument to a port and channel via its parameter box or connect it with a virtual "cable." To help newcomers get straightened out, the *Logic Audio* CD-ROM includes a couple of tutorial documents in Adobe *Acrobat* format.

The Environment is split into Layers, which can also add to the confusion. For example, you can place all of your faders on one Layer and all of your synths on another Layer. This keeps the windows from getting cluttered with too many Objects, although it makes connecting things in different layers more difficult to visualize. And navigating Layers can soon become

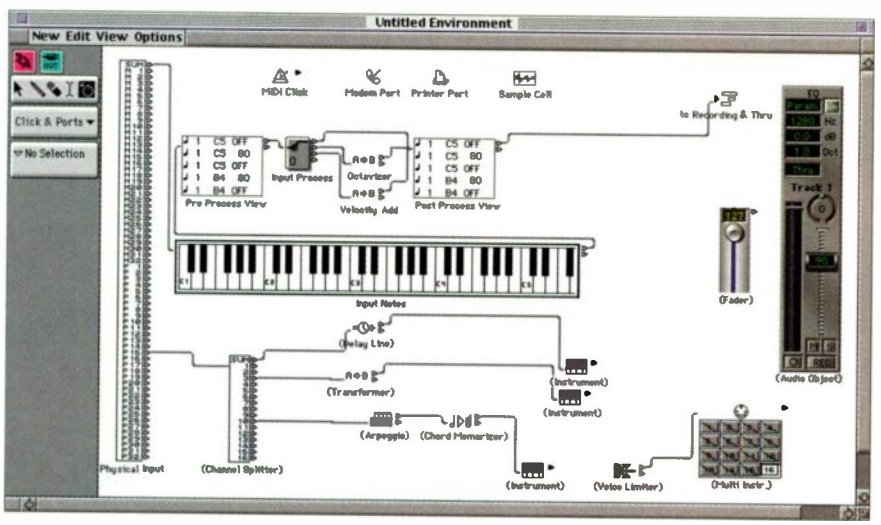

FIG. 1: In *Logic Audio*'s Environment window, you configure various Objects to create a virtual representation of your studio.

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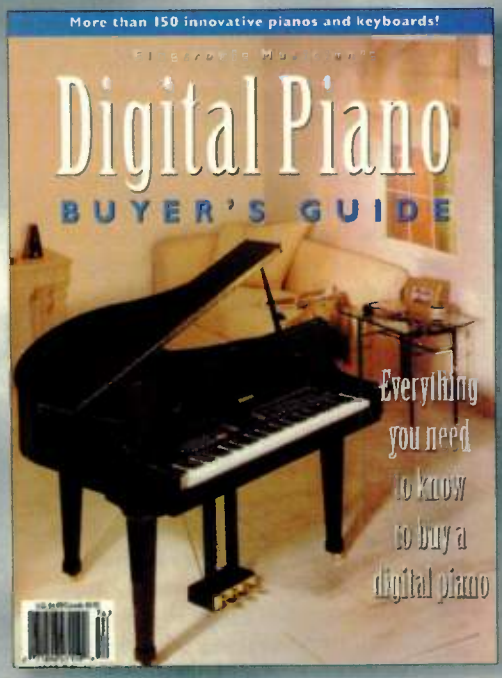

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Logic Audio
Minimum System Requirements
Mac: PowerPC 603e 133; 48 MB RAM (64 MB recommended); Mac OS 7.5.1.
PC: Pentium 133; 48 MB RAM (64 MB recommended); Windows 95; 16-bit sound card.

tiresome. Once you've mastered the Environment, however, you've really mastered the core of *Logic Audio.*

MAKING ARRANGEMENTS

Logic Audio's main screen is called the Arrange window (see **Fig. 2**). At first glance, it looks like most track-overview displays. But the Arrange window includes several unusual features that can help boost productivity. As you would expect, track parameters appear in a vertical column along the left side of the window, but when you click and hold on a track name, a pop-up list appears that contains all of the instruments in your studio. You can then quickly choose the playback instrument for that track. (You select which MIDI Objects appear in the list by designating them in the Environment window.)

The Arrange window also lets you put any combination of tracks into one or more folders. You can then move and modify groups of tracks by simply editing the folder that contains them. Furthermore, you can nest folders within other folders; for example, you can have a folder called "rhythm section" that contains a folder called "drums" along with folders for the other elements of your rhythm section. You can also place all of your audio tracks in a separate folder to save time when making edits on those parts.

The Transport window's counter display is also very cool. You can change its time format (SMPTE time or bar/beat), size, and position.

THROUGH THE WINDOWS

Logic Audio is especially powerful when it comes to MIDI editing. The program includes several editing windows, including a Matrix (piano roll) Editor, Event List Editor, Score Editor, Hyper (controller) Editor, and a Transform window. Together they provide a formidable collection of editing tools.

The Event List Editor is much like the event lists found in most sequencers. It displays the data of one or more tracks in a list format, and it's the only place where all of the various kinds of data (including the start times of audio regions and all kinds of MIDI data) can be viewed together in a single display. You can tab through the data columns and change values by sliding the mouse up and down or by double-clicking in a field and entering numbers. All changes occur in real time, so if you drag the Volume value of a note, you hear that note triggered with the changes. This is handy for fine-tuning dynamics, especially in a drum sequence.

The Matrix Editor is a familiar, piano roll–style editor that lets you modify note position, length, and controller data. You can change a note's position, pitch, and/or duration by dragging with the mouse. Double-clicking on a note opens the Event List Editor, with that note selected for further editing. Unfortunately, the piano keyboard disappears if you zoom out too far when resizing the window, even though it doesn't really have to.

The Hyper Editor window (see **Fig. 3**) offers a unique way of working with Velocity, Control Changes, and other types of MIDI data. The data is displayed graphically along a horizontal time line similar to that in the Arrange window. The various data types (Velocity, Volume, Modulation, Program Change, etc.) are listed in a column on the left side of the window. To the right, the editing field shows events in bar-graph form and enables you to perform intricate edits while viewing several types of data at once.

The Score Editor allows you to edit your tracks while viewing the music in standard notation. As in the Matrix Editor, you can drag notes around to change pitch and time position. In the Score Editor, you can have multiple tracks appear in a full-page score format, so you can edit different instruments without changing windows. That's important when you want to view and edit the way instruments interact. Want to fine-tune that string quartet? This is the place to do it.

If there are small anomalies in the way the MIDI data is displayed when it's converted into standard notation, you can fix them with *Logic Audio*'s

THE PURSUIT OF LOGIC

By the time you read this, Emagic will have subdivided and realigned its cross-platform *Logic* family into a newly christened series of programs. Mac and PC versions will cost the same. The entry-level version of the program is now called *MicroLogic AV* ($99). It offers real-time effects and sixteen audio tracks. Next in line, *Logic Audio Silver* ($299) serves as an upgrade from *Logic Audio Discovery* (an intermediate-level version of the program that ships with the Audiowerk8 Home Studio Kit). *Logic Audio Silver* offers up to 24 audio tracks, 3-band EQ on three effects buses, and DirectX and Steinberg VST plug-in support.

The current version of *Logic Audio* will branch into two packages: *Logic Audio Gold* ($499) and *Logic Audio Platinum* ($799). As with the current version of *Logic Audio* 3.0, *Logic Audio Gold* supports up to 48 digital audio tracks and simultaneous sound-card/native-audio recording and playback. The transformation from *Logic Audio* into *Logic Audio Gold* and *Platinum* will coincide with the release of version 3.1 of the software. New features include a newly designed, jazzy-looking mixer called the Adaptive Mixer, which automatically configures itself to your setup. Other enhancements include nondestructive, real-time crossfade capability; redesigned plug-in windows; and support for VST and DirectX plug-ins.

Emagic is introducing *Logic Audio Platinum* to satisfy its most demanding high-end users. It includes all of the capabilities of *Logic Audio Gold* as well as support (on the Mac) for 24-bit audio and Digidesign's Pro Tools III/24 (TDM) system. On the PC side, the program supports Soundscape's SSHDR-1 hard-disk recording system. On both platforms, *Logic Audio Platinum* offers up to 96 digital audio tracks with unlimited simultaneous hardware support. The Mac version also includes a copy of BIAS's *Peak SE;* the Windows version comes with Syntrillium Software's *Cool Edit Pro LE.*

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

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extensive set of notation-editing tools. That makes it possible to print out clean, professional-looking scores. I never had to change a thing, however. *Logic Audio* consistently printed out nice, legible charts without any 128th notes tied to whole notes followed by 64th-note rests. This is a powerful editing module that rivals many standalone notation programs.

CHAIN OF TOOLS

Logic Audio's linking feature doesn't sound like a big deal at first, but it proves to be extremely useful in practice. You can link any editor window to any other window so that whatever is selected in one is displayed in the other.

Once you have a window or group of windows positioned, sized, and linked together the way you want, you can store the configuration as a Screenset. For example, in one Screenset, I have a Matrix Editor and an Event List Editor open and linked to an Arrange window. With that Screenset I can select a track in the Arrange window, and its contents are instantly displayed in the Matrix and Event List Editor windows. Changing one window changes the data displayed in the others.

Screensets are an elegant design concept that makes the editing process more efficient. Instead of opening and closing different windows to see data displays and editors, you just call up a predefined Screenset. You can store up to 90 Screensets per Song and quickly switch between them using the numeric keypad.

My main Screenset includes an Arrange window with a linked Matrix Editor window and a large counter display. I also have Screensets for MIDI data editing with the Matrix, Event List, and Score Editor windows; audio editing with the Sample Edit and Audio windows; and a Screenset with MIDI and audio faders—a very cool-looking console. Other Screensets include one for the Score window, one with a virtual TASCAM DA-88 controller, and one for the Environment window so I can quickly make changes to my setup.

THE GROOVE FACTOR

Logic Audio's nondestructive quantization tools are excellent. (The data isn't actually moved, only the playback is affected.) Because quantization occurs in real time, you can listen to the changes in your music as you adjust a variety of quantization parameters. That makes it possible to set quantize values by ear rather than through dialog boxes and guessing.

A floating Extended Sequence Parameter box offers a large number of quantize functions, such as quantize swing, strength, range, flam, and Velocity. Unfortunately, there is no onscreen indication that these parameters

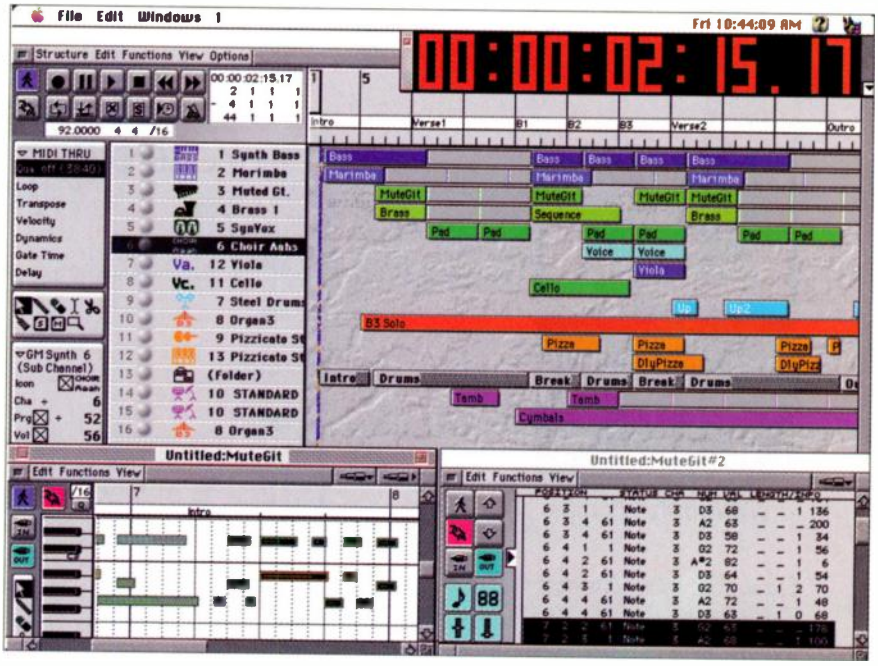

FIG. 2: *Logic Audio*'s Arrange window is shown here in a Screenset that includes the Matrix Editor, Event List Editor, and large SMPTE display. Note the folder in track 13.

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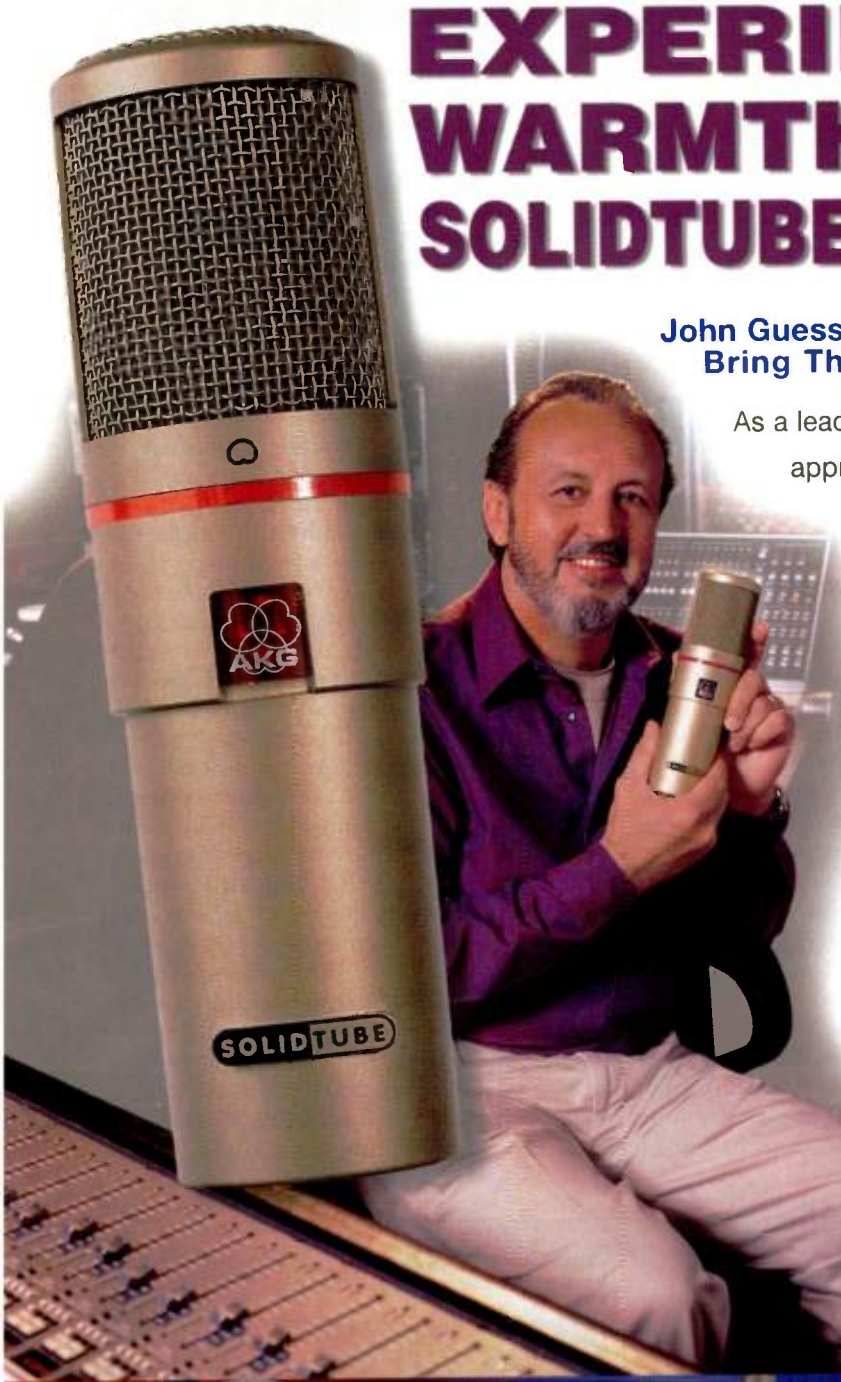

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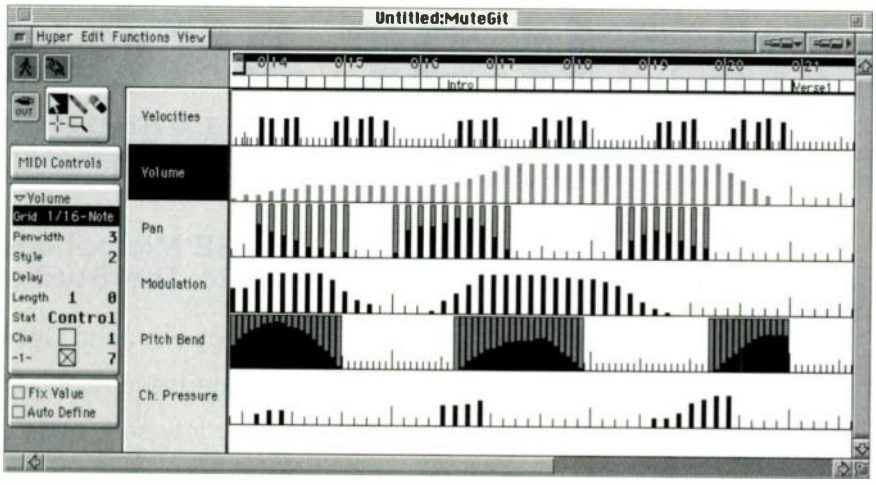

FIG. 3: The Hyper Editor window enables you to view and edit Velocity and several types of controller data simultaneously.

exist, and they can only be found by carefully reading the manual. I'd like to see some sort of visual clue to indicate where these powerful extended functions are lurking.

Logic Audio enables you to build groove templates from your own MIDI data, or the program can import groove templates from third-party developers, such as DNA Grooves. The software can even extract a groove from audio source material (more on this a little later). With its resolution of 996 ppqn, the program has a very smooth feel and accurately captures all of the rhythmic nuances at any tempo.

AT YOUR COMMAND

The Key Command window allows you to customize the program with your favorite keyboard shortcuts. You can assign every command from every menu—and some commands that don't appear anywhere else—to a key or combination of keys. You can also assign all of the various commands to MIDI notes, which allows you to trigger any function remotely from a MIDI controller. Even with *Logic Audio*'s high level of customization, however, I was unable to find a way to have the metronome click play only during the count off in Play mode. It's a small point, but one that's important to me.

Logic Audio also supports MIDI Machine Control, so you can use the program to shuttle, record-enable tracks, and punch in on your multitrack recorder (as long as it reads MMC). That capability makes it possible to control almost everything in the modern studio from your computer or MIDI controller, and it adds efficiency to the recording process.

One of the coolest features in *Logic Audio* is its ability to display and sync to a QuickTime movie (or to an AVI movie in the Windows version). In fact, you can move a MIDI event in any editor window and watch the film shuttle back and forth in perfect sync. That makes it incredibly easy to place a sound effect or musical event exactly where you want it, right down to the frame. You can even loop a section of the sequence, and the movie stays right with it. (Try that while locked to a video deck!) For users who score on a regular basis, especially jingles where the client wants everything hit with a bang, this is a must.

THE AUDIO BITS

The most powerful audio-editing functions in *Logic Audio* reside in the program's real-time (destructive) stereo Sample Editor in a menu option called the Digital Factory (see **Fig. 4**). Here you perform such operations as time compression, pitch shifting, and sample-rate conversion.

The Audio Energizer command performs a function similar to spectral enhancing that increases the perceived volume of an audio track. The Silencer command removes clicks and performs single-ended noise reduction. And when you transpose with Harmonic Correction, the original formants (resonant timbres) are preserved, which produces a more natural-sounding result.

Moreover, with *Logic Audio* you can adjust and set the tempo (with very high resolution) of a selected region based on the tempo of an audio recording. This feature really sold me on the program. With *Logic Audio*, you can record an audio track (such as a live drum performance), select an equal number of bars in the Arrange window, and the software will calculate the correct tempo for that region or for the whole Song. Furthermore, the program can look for peaks in the dynamics of the audio and quantize MIDI data to them. This feature is now also available

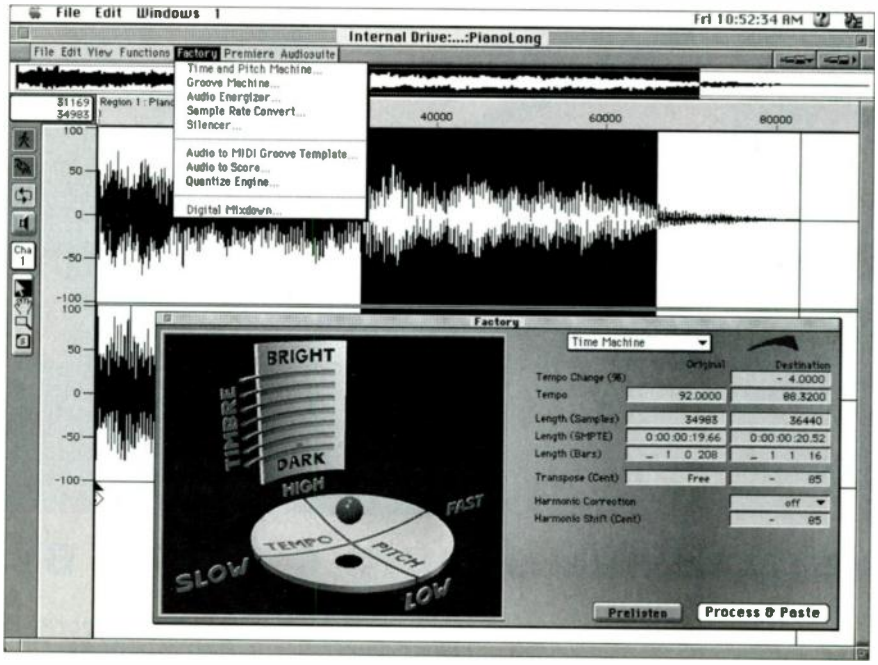

FIG. 4: Many of *Logic Audio*'s most powerful processing functions take place in the Digital Factory.

in other high-end sequencers, but it's still impressive. It enables you to extract the groove from a piece of audio and save it as a groove template to use with other songs.

Another cool feature is *Logic Audio*'s ability to analyze a single-line, mono audio track, extract the melody, and transform it into MIDI data. You can actually record a single-line phrase and have the software display the music in standard notation. That's pretty amazing, but there's more. *Logic Audio* can track the pitch in the recording and use the MIDI data to double the line with a synth! With harmonically complex, fast, or heavily modulated sources, the results can be unpredictable. But with a little fudging, you can make some pretty cool things happen.

For the most part, audio editing is a breeze. If you're familiar with other audio editing programs, such as Digidesign's *Sound Designer II*, you'll feel right at home with *Logic Audio*. Moreover, the software can import a number of file formats, including 16- and 24-bit Sound Designer II, AIFF, and WAV.

NEW AND IMPROVED

Logic Audio 3.0 includes an array of new features, and most of the minor quirks and bugs of previous versions are gone. One huge improvement is the implementation of input monitoring while

EMAGIC
Logic Audio 3.0 digital audio sequencer
Mac $799
PC $699

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

PROS: Extensive feature list. Built-in real-time DSP effects. Flexible busing capabilities. Customizable user interface. Supports several plug-in formats.

CONS: Significant learning curve. Some features not intuitively implemented. Fast CPU needed for maximum capabilities. Documentation needs improvement.

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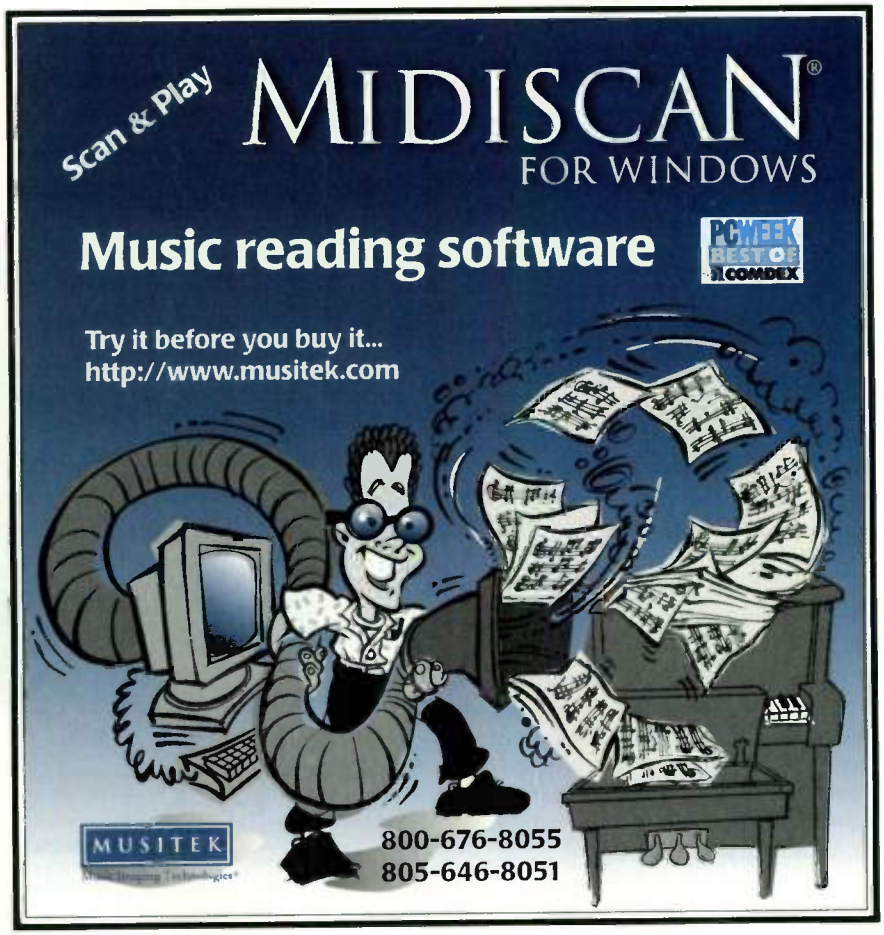


recording audio. The absence of this essential feature was a colossal oversight in version 2.6, but thankfully, it has now been addressed.

Another welcome improvement in version 3.0 is the addition of record-enable buttons on every audio track. In previous versions, you could only record audio on tracks 1 and 2. You then had to drag those recordings to different tracks for playback to free tracks 1 and 2 for further recording. This revision saves a lot of hassle.

The really big news in this release, however, is the addition of real-time digital signal processing for the audio tracks. You can now use chorus, reverb, delay, flanger, five EQ effects, and two filters via channel inserts or bus sends. Each audio track can have (depending on your computer) as many as eight separate insert effects and eight bus sends. And you can assign up to eight inserts to each bus. This adds a lot of power to *Logic Audio*'s virtual mixing console (see **Fig. 5**). (By the time you read this, version 3.1 will be shipping, which includes Steinberg's VST real-time DSP plug-in architecture. That adds considerable versatility to the program. Version 3.1 for Windows will support DirectX plug-ins.)

Reverb is probably the most critical effect in the group. A good-sounding reverb is usually the first piece of outboard gear added to a home studio, and it's typically the one that gets used the most. So I worked extensively with this effect first. The reverb includes parameters for Room Size, Mix, Decay, Density, High-frequency Damping, Predelay, Quality, and Regiongate. (Regiongate determines the trail-off length of the time-based effects.)

Experimenting with the array of parameters at the low-quality setting never yielded a usable reverb. It sounded like the reverb built into a small 1960s guitar amp: not altogether useless on a guitar, but I wouldn't recommend it for a vocal track unless you are going for a major cheese factor. The higher-quality settings, however, were quite an improvement. I could achieve long, smooth, cavernous decays, tight rooms, and rich halls with a little tweaking and some patience. *Logic Audio*'s reverb would never replace my Lexicon PCM 80, but it's always nice to have another reverb around, and this one is worth using.

The chorus effect has the usual assortment of parameters: Mix, Offset, Width, Speed, Feedback, Quality, and Regiongate. Offset is simply the delay time. While tracking guitars, I wanted to add some chorus to give the parts some sparkle. Although the chorus effect is wide and deep at its highest quality setting, the lower-quality version is essentially useless. I found it to be noisy and thin, and it crackled during playback at all levels.

Logic Audio's delay effect is simple, straightforward, and useful. Its parameters include Mix, Time, Feedback, and Regiongate. Unfortunately, there is no filter on the delayed signals. That would allow simulation of tape-based delay systems such as the ancient and revered Echoplex. Also, all time-based effects stop abruptly when the sequence is stopped, because the CPU stops processing the current algorithm. Too bad you can't hear the reverb and delays ring out.

Parameters available on the flanger include Mix Offset Speed, Width, Feedback, Quality, and Regiongate. The flanger didn't impress me as much as the other effects. It just sounded too mushy. Nonetheless, it added a bit of fatness to a metal guitar track in one of my projects, and when used sparingly, it came in handy on the final mix.

Keep in mind that the higher-quality settings on all DSP functions require more processing power and RAM, so depending on your machine, you might find yourself limited to using lower-quality settings, especially if you're using multiple effects.

Remember also that each new bus demands more processing power, so unless you have a fast CPU and plenty of RAM, your options will be limited. I tried to record five audio tracks and use all eight effects simultaneously, but this proved to be more than my system could handle. (I have a 200 MHz Mac 8600 with 64 MB of RAM, of which 24 MB is assigned to *Logic Audio*.) I began to get overload error messages that halted playback after a few bars. When I cut back to five buses, the errors occurred less frequently, but I still couldn't play back an entire Song without problems. My system would only allow me to use four simultaneous buses with high-quality effects. I could use all eight buses with the lowest-quality setting, but I didn't like the results.

Furthermore, as I added buses and raised the quality of the effects, screen redraw slowed to a crawl. The level meters became sluggish and even stopped, and scrolling was a chore. In real-world situations, this is typically not a problem for me. I generally don't go crazy with effects, but when I do, four buses and my outboard gear prove more than enough to get really zany.

If you want to use all the power of this software (sixteen or more tracks, all eight buses, and EQ at high-quality settings), I'd recommend a fast machine (a

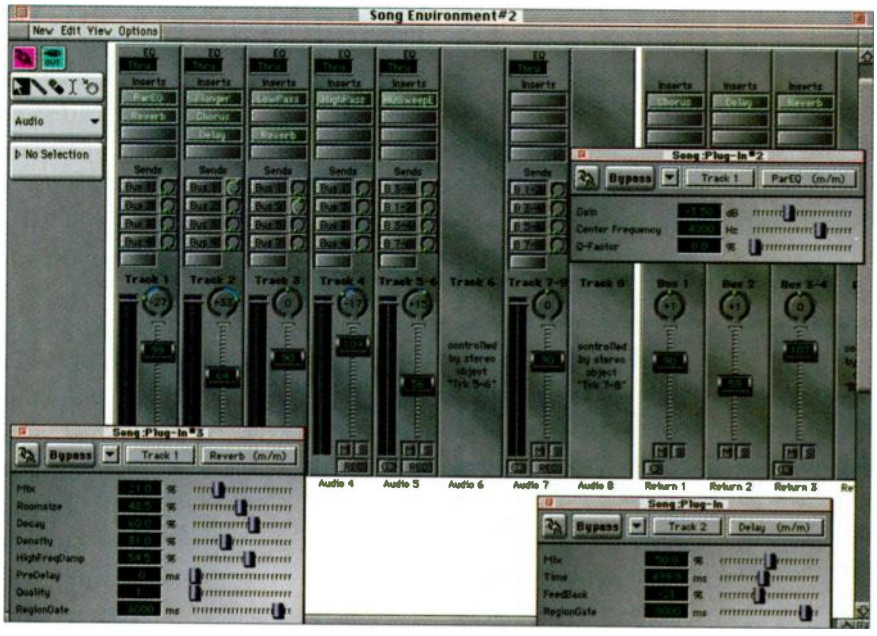
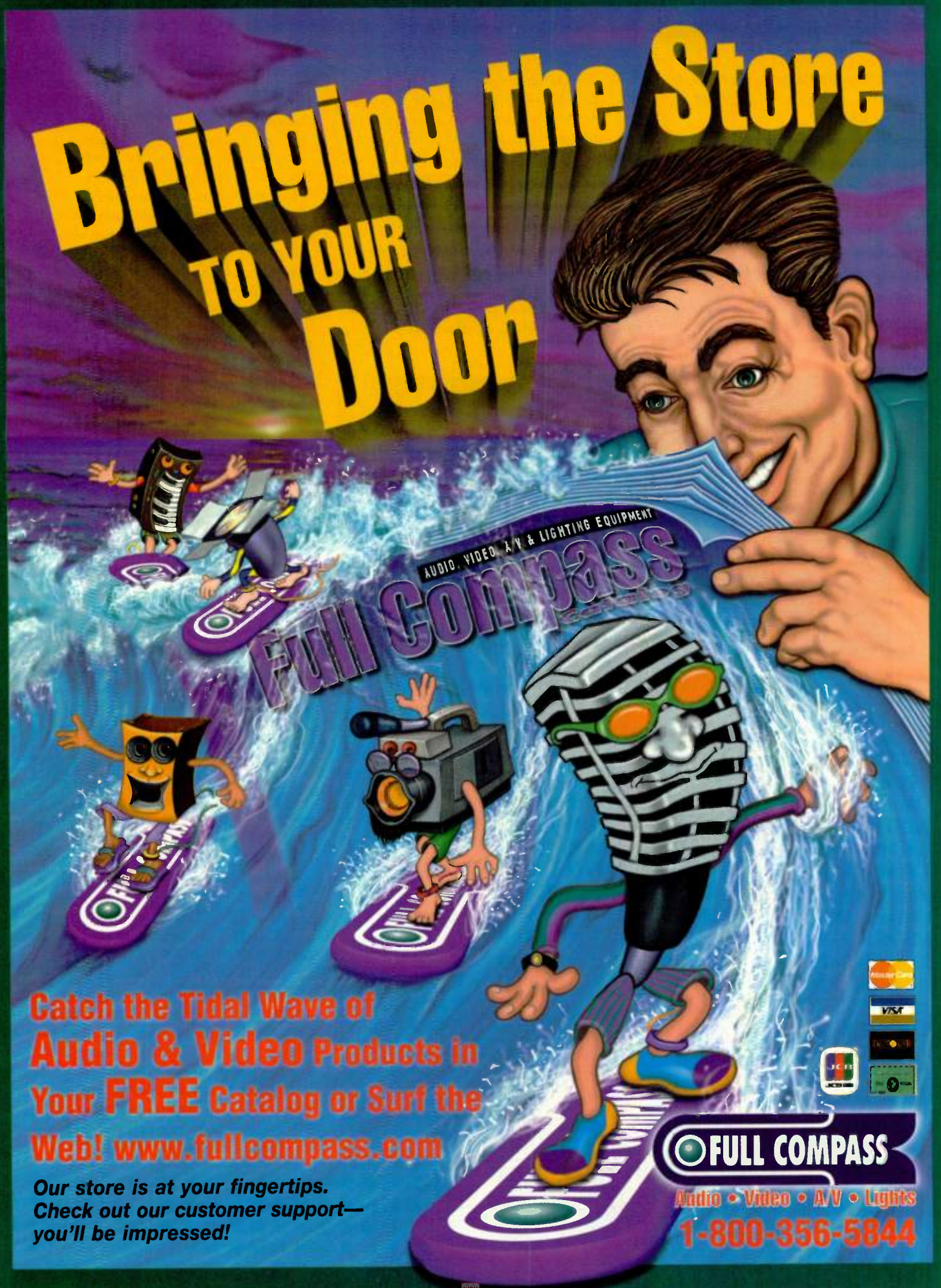


FIG. 5: *Logic Audio*'s virtual mixing console now includes an assortment of real-time DSP effects, including the reverb, delay, and parametric EQ shown here.



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275 to 300 MHz PowerPC 604e or G3) with gobs of RAM; 128 MB would be optimal.

All in all, *Logic Audio* offers quite an assortment of good-sounding DSP options, as long as you have enough processing power to use the high-quality settings. In addition, *Logic Audio* 3.0 supports Adobe Premiere and Digidesign AudioSuite and TDM plug-ins. (As noted, *Logic Audio* 3.1 for Mac will add VST support.)

Other new audio features include "punch on the fly," which allows for manual punch-in recording. Another new feature, Audio Cycle recording, enables you to set up a loop and then set auto-punch points within the loop. You can then record multiple takes of a passage without stopping between takes (each pass creates a new audio track) and pick the best performance later.

In terms of graphic appeal, previous versions of *Logic Audio* were about as exciting as a spreadsheet. Version 3.0 offers some improvement, particularly when building a console from the new faders, but I'm still not swept away by the look of the user interface. And although you can customize the behavior of *Logic Audio* to a large extent, there are still some design elements that are not intuitively implemented.

Version 3.0 has addressed some of my earlier complaints, but some functions are still hidden away where you would not expect to find them. There are too many menus in too many places, and some things are impossible to find until you carefully read the manual.

MAKE THE SWITCH?

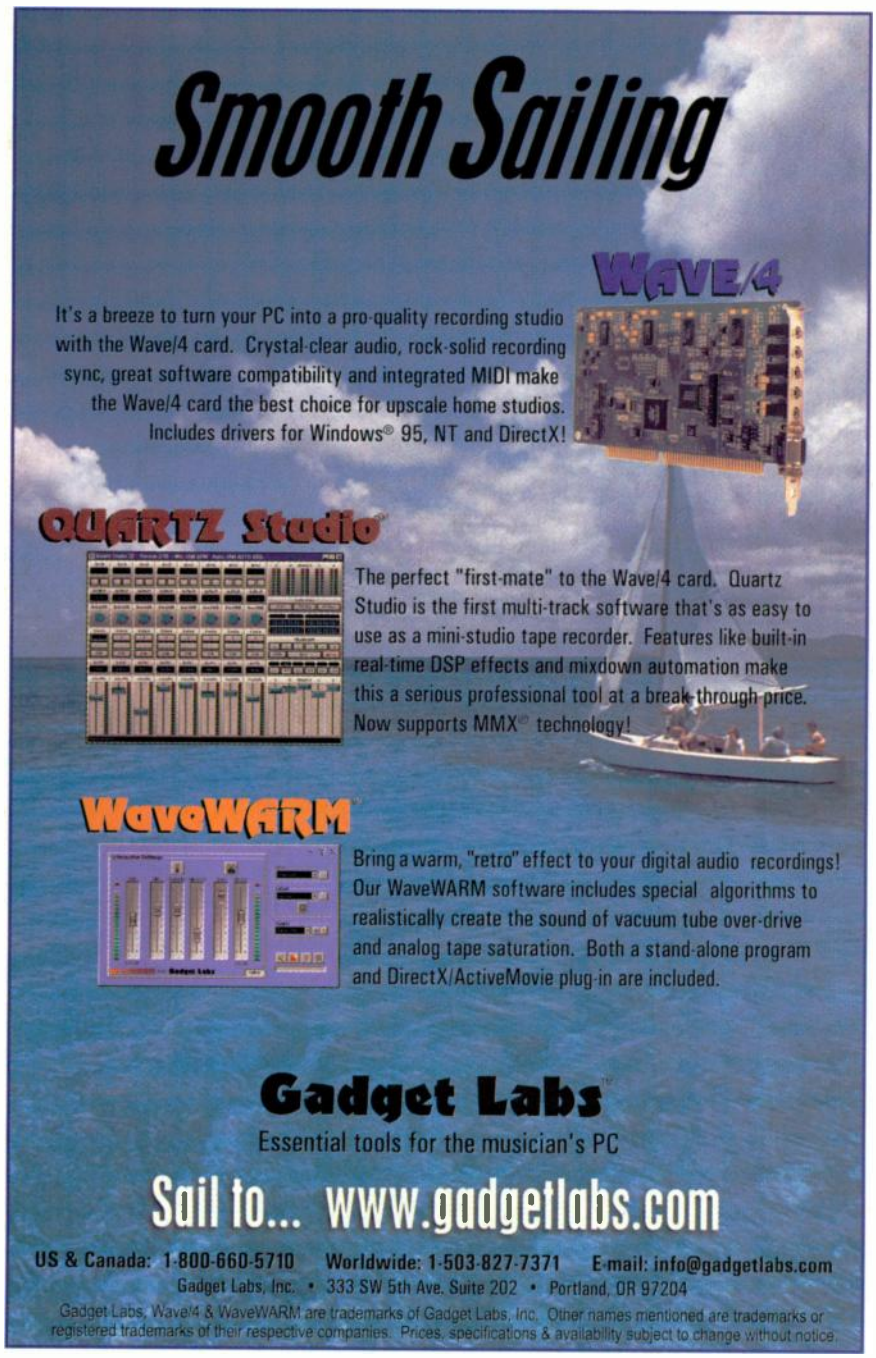
For current *Logic Audio* users, some irritating problems have been resolved, and the graphics have been somewhat improved. The big news in this revision, however, is the addition of real-time audio DSP effects. If you use an Audiomedia or other DAE-driven card, you should realize that you won't benefit from the real-time DSP effects because the DSP functions require the *Logic Audio* drivers.

I used to use MOTU's *Digital Performer*, but I became intrigued by some of the exotic features that *Logic Audio* offered. Making the switch, however, was a bumpy ride that required weeks of reading the manual and calling friends for help.

Speaking of the manual, the documentation runs more than 750 pages, and although it's improved over previous versions, it could still benefit from better organization, writing, and editing. The section for beginners, for example, should tell you exactly how to do the simple things you need to do to get some immediate gratification. Instead, it barely scratches the surface. Nonetheless, after many weeks of working with the manual propped up on my keyboard, my neural pathways realigned, and I gradually became more adept at using this powerful package.

Is it worth the effort? It was for me; I use the program every day. Once you've gotten over the learning hump, you'll find *Logic Audio* 3.0 a versatile, deep, and thoroughly professional sequencing, audio-editing, notation, post-production package that can handle just about any task that you come up with and even a few that you haven't thought of yet.

Rick DiFonzo *can't wait for time travel to be perfected so he can go back to the Cavern in the early 1960s and hang with John, Paul, George, and Pete.*



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Each entry must consist of:

- Completed and signed entry form (or photocopy). All signatures must be original.
- Audio cassette(s) containing one song only, five (5) minutes or less in length.
- Lyric sheet typed or printed legibly (please include English translation if applicable). Sheets not required for instrumental compositions.
- Check or money order for $30.00 per song (U.S. currency only) payable to John Lennon Songwriting Contest. If paying by credit card, $30.00 per song will be charged to your account.

Entries must be postmarked no later than August 31, 1998.

1. Each song submitted must be contestant's original work. Songs may not exceed five (5) minutes in length. No song previously recorded and released through national distribution in any country will be eligible. Songs may have multiple co-writers, but please designate one name only on the application. **Contestant may submit as many songs in as many categories as he/she wishes, but each entry requires a separate cassette, entry form, lyric sheet, and entrance fee. One check or money order for multiple entries/categories is permitted.** (Entrance fee is non-refundable. JLSC is not responsible for late, lost, damaged, misdirected, postage due, stolen, or misappropriated entries.)
2. Prizes: Twelve (12) Grand Prize Winner will receive $2,000 in cash, $5,000 in Yamaha project studio equipment, and a $5,000 advance from EMI Music Publishing. One (1) Grand Prize Winner will receive $20,000 for the "Song of the Year" courtesy of Maxell. Thirty-six (36) Finalists will receive $1,000. Seventy-two (72) Winners will receive portable CD players.
3. Contest is open to amateur and professional songwriters. Employees of JLSC, their families, subsidiaries, and affiliates are not eligible.
4. Winners will be chosen by a select panel of judges comprised of noted songwriters, producers and music industry professionals. Songs will be judged based upon melody, composition and lyrics (when applicable). **The quality of performance and production will not be considered.** Prizes will be awarded jointly to all authors of any song; division of prizes is responsibility of winners. Void where prohibited. All federal, state, and local laws and regulations apply.
5. Winners will be notified by mail and must sign and return an affidavit of eligibility/recording rights/publicity release within 14 days of notification date. The affidavit will state that winner's song is original work and he/she holds all rights to song. Failure to sign and return such affidavit within 14 days or provision of false/inaccurate information therein will result in immediate disqualification and an alternate winner will be selected. Affidavits of winners under 18 years of age at time of award must be countersigned by parent or legal guardian. Affidavits subject to verification by JLSC and its agents. Entry constitutes permission to use winners names, likenesses and voices for future advertising and publicity purposes without additional compensation.
6. Winners will be determined by January 15, 1999, after which each entrant will receive a list of winners in the mail. Cassettes and lyrics will not be returned.

I have read and understand the rules of the John Lennon Songwriting Contest and I accept the terms and conditions of participation. (If entrant is under 18 years old, the signature of a parent or guardian is required.)

Signature Date

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DIGITECH

S100

Clean, quiet, quality effects in a budget box.

By Barry Cleveland

These days, many multi-effects processors are available, ranging in size and shape from tiny modules that clip onto your belt to self-contained pedalboards and large rack-mount units. Prices also vary widely from around a hundred dollars to several thousand. The trend has been to offer ever more processor for less and less money, and currently even some of the least expensive models are capable of producing dozens of different types of effects, often four, five, or more at a time. A few processors even offer extensive routing, programming, and control options.

Of course, the down side of this trend is that cost cutting usually requires compromises in quality and/or trade-offs in features. The way different manufacturers balance the compromises and trade-offs largely defines the differences between their products.

The S100 dual-engine multi-effects processor is the first in DigiTech's new Studio series, which is aimed at home and personal studios. The company has taken pains to distinguish the Studio series from its previous lines of effects processors. Given the fact that the S100 is being marketed as a "studio quality" reverb and effects processor, it must be judged by those standards as well as in terms of value.

Creating a product that straddles the price/performance fence is tricky, as is evaluating it. If the question is whether the S100 is an incredible processor for the money, the answer is a resounding "yes." But if you want to know how it stacks up against comparable low-cost processors, then things get a bit more complicated.

POWER PLAY

It's clear in the case of the S100 that DigiTech chose to focus on basic sound quality and make compromises in other areas. The S100 boasts impressive architecture and specs: 20-bit converters, 24-bit internal processing, 24 full-bandwidth effects, a 96 dB signal-to-noise ratio, and THD of less than 0.008 percent. It's a versatile box, too, with two effects engines, or Half Modules (they are referred to by both names in the manual), that can be configured in five different ways, including in series and parallel. The most powerful and best-sounding effects, however, are created when both of the Half Modules are combined into a single Whole Module.

Effects are grouped into five categories: Modulation (six types), Pitch Shifters (two), Delay (four), Reverb (nine), and "Other," which is composed of a compressor, a vocoder, and a ring modulator. The S100 also has a noise gate and a quasi-parametric EQ, both of which may be included in individual programs. Up to three parameters per effect, as well as effect level, are adjustable using the S100's four parameter controls. Programs are grouped into two banks: 99 factory presets and 99 user slots.

MISSING IN ACTION

On the compromise and trade-off side, the S100 is incapable of displaying program and parameter names and it displays many critical parameter values as a range of 1 to 5, 1 to 10, or 1 to 99, without giving the actual values (more on this below.) The values aren't given in the manual, either, so basically you're left guessing. Although these limitations may be excusable in a budget processor, they maybe not likely to please dedicated engineers.

MIDI implementation, too, is minimal. The unit has a MIDI In jack but no Out or Thru. This means no SysEx capabilities and no way to save or load programs. But the unit does receive Program Change messages (channels 1 to 16, All, and Off) that can be routed to either bank of programs, and a single Continuous Controller message for defeating the dry level. Once again, this is perfectly reasonable in an inexpensive effects unit, but it constitutes a significant limitation for a primary studio-effects processor.

UP FRONT & AROUND BACK

The S100's minimalist control interface is centered on a rich metallic-blue faceplate. It consists of a Configuration Matrix, an Input Meter/Effect Display, a Number Display, and a Program/Data encoder wheel, all situated above a row of twelve thin buttons.

The Configuration Matrix (see **Fig. 1**) is a nonfunctional graphic that displays the five configuration types. The Input Meter/Effect Display is a dual, 4-segment LED meter that serves as a stereo input level meter (0, -6, -12, -18 dB) when in Program mode and indicates which types of effects (Mod/Pitch, Reverb, Delay, and Other) are active in the two modules while in Edit mode. It also briefly displays effect types when a new program is loaded. Program numbers, numeric values, and abbreviations of parameter names are shown on the 2-character Number Display, and a small "User" LED next to it lights to distinguish the user program bank from the preset bank.

The twelve buttons, in conjunction with the Program/Data wheel, are used to select and store programs, select configurations, select and edit the EQ and gate functions, select the two effects engines, and select the four adjustable parameters. There is also a Bypass button.

The back panel offers an input-level trim pot, left (mono) and right ¼-inch input and output jacks, a MIDI In jack, a jack for the optional FS-300 footswitch, and an AC connector for the unit's

The first product in DigiTech's new Studio series, the S100 dual-engine multi-effects processor offers a lot of versatility at a low cost.

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

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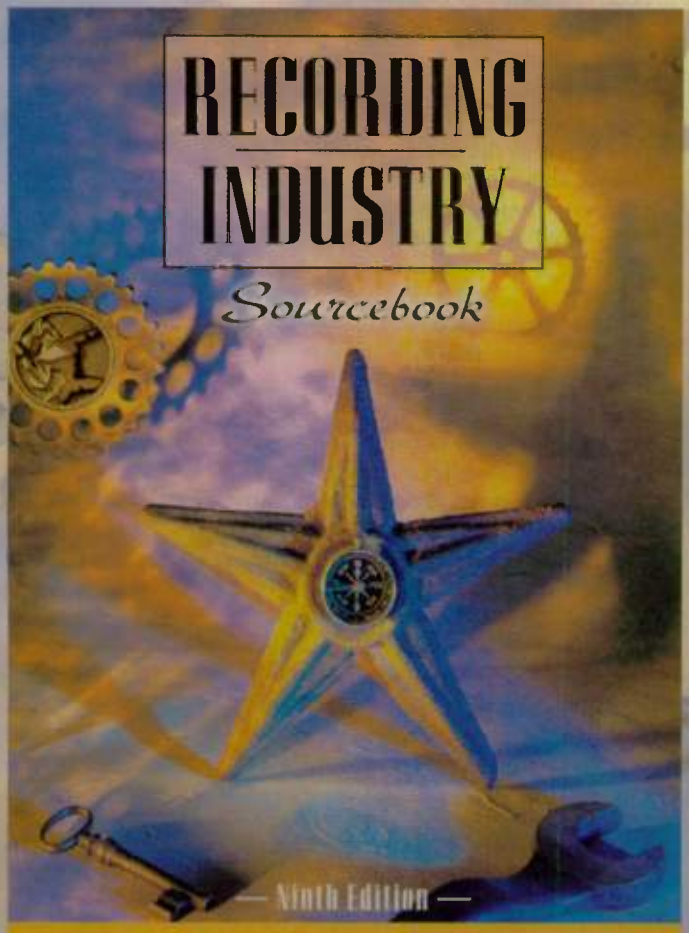

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MANUAL OPERATION

It's a good thing the S100 is fairly simple to use and that most of its functions can be figured out by trial and error, because the user's manual amounts to little more than an incomplete outline. For example, 99 user program slots are referred to in the introduction and again in passing in the Storing Changes section; however, they are not mentioned at all in the Program Mode section. Likewise, although the Configuration Matrix shows five configuration types, only Configuration 1, which combines the two engines into one, is explained in the text. For the other four configurations, the reader has to look for clues in various places and put them all together in order to figure out what's where and what does what.

The S100's delay section even includes a Repeat Hold function.

But that's not all. As mentioned earlier, the actual values for many effects parameters are not displayed on the unit, nor are they provided in the manual. Instead, you get cryptic, inconsistent designations. For example, EQ parameters are designated "Lo," "Hi," "Parametric Frequency," and "Parametric Level." Lo and Hi each boost or cut 12 dB of some frequency—but the frequencies are not identified. Parametric Level boosts or cuts 12 dB of whatever frequency is selected using the Parametric Frequency control, but again, the frequency affected is unclear. The manual states that its range is 1 to 26, but the display shows a series of 25 numbers—3, 4, 5, 6, 8, 9, 11, 15, 19, 24, 30, 38, 48, 61, 77, 1.0, 1.6, 2.0, 2.5, 3.1, 3.9, 4.9, 6.2, 7.8, 9.9—which mean, well, who knows what? Equally disconcerting, the threshold range for the noise gate is displayed as "0–99/Off" and its release time range as "1–10"; however, there is no clue given as to what those numbers mean. As a last example (there are quite a few more), the manual mentions five "types" of vocoder without explaining what they are.

ECHOES AND VERBS

Overall, the S100 is very quiet and clean sounding, though there are some exceptions. The most notable (and bizarre) is that, when the unit is placed in bypass mode, the "dry" signal sounds as if it is being slightly phase shifted! That aberration notwithstanding, most of the S100's effects are at least passable, and some of them are quite good.

On a more positive note, one of the S100's really cool features is that the dry path is automatically defeated when any program that already includes the dry signal (such as tremolo, panner,

S100 Specifications

Inputs	(2) ¼" unbalanced
Outputs	(2) ¼" unbalanced
Maximum Input/Output Level	+18 dBu
ROM Presets/RAM Programs	99/99
A/D & D/A Converters	20-bit, 128x oversampling
Internal/External Signal Path Width	24-bit
Sampling Rate	46.875 kHz
Frequency Response	20 Hz–20 kHz (±0.5 dB)
THD	<0.008%
S/N Ratio	>96 dB (A weighted)
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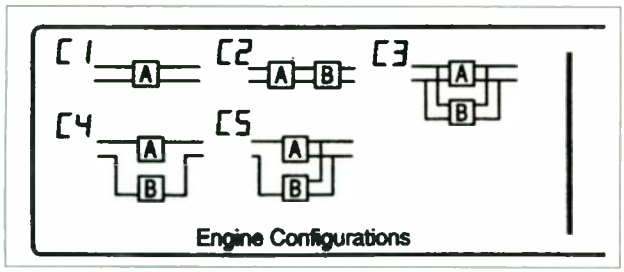

COURTESY DIGITECH

FIG 1: The S100 offers five different effect configurations, which are represented by this (static) graphic on the front panel.

reverse reverb, vocoder, rotary speaker) is selected. On most other multi-effects processors I've used, this is a global feature, meaning that you're forced to manually change the wet/dry balance when you select one of these types of programs.

The S100's delay section is generally excellent and it even features a Repeat Hold function. This feature used to be common on digital delays but nowadays, for some reason, is seldom found on even the most costly units. The repeat-hold feature simply allows you to lock in a delay loop and have it repeat indefinitely, while simultaneously defeating the input. You can create a delay loop (up to two seconds long in this case) and then solo along without the solo becoming part of the loop. Very cool. (Then again, it would have been even cooler were it controllable by a footswitch.)

In addition to the typical mono, stereo, and ping-pong delays, the S100 provides a fourth option: karaoke! Before you laugh too hard, consider that karaoke is an *industry* (read: "billions of dollars") and that the S100's karaoke delay produces some very interesting sounds. It offers a selection of five delay times and ten levels of repeat, which should be more than enough options for even the snazziest karaoke singer.

The S100's other three delays allow control over coarse and fine delay times (displayed as milliseconds and seconds) and feedback (displayed as 0 to 99 percent or Repeat Hold). The unit's maximum delay time is two seconds, depending on which configuration and delay type are selected. For example, if you pair Configuration 1 (which combines both engines into a Whole Module) with Delay 1 ("Mono"), you get two seconds of mono delay. But if you pair it with Delay 2 ("Stereo"), the two seconds become one second per side, so the total delay time is only one second. On the other hand, if you pair Configuration 1 with Delay 3 ("Ping Pong"), the two seconds are still divided into one second per side, but because they follow one other, the total delay is two seconds.

The S100's reverb programs are certainly very clean and quiet, and considering that this is a very low-priced box, they are quite good. However, depending on your tastes, you may not find them suitable for use on critical instruments, such as lead vocals or solo acoustic guitar. Of course, "good" reverb is a fairly subjective measure. To my ear, as compared to a reverb from a premium personal studio–oriented unit (say, the Lexicon MPX 1) the S100's reverbs sound overly crispy, lack richness and detail, and get cloudy when employing longer decay times. Then again, for the cost of an MPX 1 ($1,299), you could buy six S100s and still have money left over!

The S100's reverb palette consists of six increasingly larger acoustic spaces (Stage, Room, Hall, Chamber, Cathedral, and Arena) as well as Plate, Gated, and Reverse. The six spaces and the Plate provide predelay, decay time, and damping as parameters 1 to 3. Predelay is shown in milliseconds (0 to 99) but damping is shown as a range of 1 to 10, with no actual frequencies given. Decay time is also shown as a range of 1 to 10, with maximum decay for the Stage and Room reverbs probably around 20 ms and for the Arena around 10 seconds. (I'm guessing here; the actual values are not provided in the manual.) While these controls do not offer great precision or a vast range of possibilities, the parameters do seem intelligently chosen.

MODS AND ROTORS

The S100 sports the usual chorus, flange, phaser, and tremolo effects, along with a panner and a rotary-speaker simulator. Parameter 1 affects speed for all of the effects with a range (slow to fast) of 0 to 99. Parameter 2 selects

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one of six modulation extremes for the rotary speaker and controls depth (0 to 40) for the others. Parameter 3 is either delay for the chorus, feedback for the flanger and phaser, or crossover frequency for the rotary-speaker simulator. On the tremolo and panner programs, Parameter 3 is inactive.

The chorus programs are bright and clean though not particularly rich or deep sounding. One exception is the very rich Four-Voice Chorus, which combines two stereo-chorus modules using Configuration 5 (see **Fig. 1**). The flanger, too, is clean and crisp and capable of both subtle shimmering and not-so-subtle runaway sweep sounds. With the depth and feedback cranked up, the sweeps can take on an almost synthlike quality; however, there is a very harsh and uneven spike at the end of the sweep as it returns to the beginning of the cycle. The phaser has a certain charm, but it is not particularly versatile, nor does it reproduce any of the thick, classic phasers such as the Mutron Bi-Phase or the MXR pedal. But, again, it is bright and clean.

The S100's tremolo sounds pretty good, but the panner, when speeded up, produces a more interesting tremolo effect than the tremolo itself. The choice of adjustable parameters for the rotary-speaker simulator is interesting: besides toggling between slow and fast speeds, it has six different modulation types to choose from. The manual describes these types as "modulation extremes," but they sound more like relatively subtle variations of speed and panning width. There is also a useful crossover frequency control with four settings. As usual, though, no actual values are given. The rotary-speaker simulation is passable, though far from convincing.

UPS, DOWNS, AND OTHERS

The S100's single-voice pitch-shifter has a range of one octave down to two octaves up, adjustable in half-step intervals. Three different levels of "tracking," which basically means delay time, can be selected. The detuner effect allows ±12 cents of detuning and, when set to extremes, sounds almost like a tremolo.

DIGITECH
S100 dual engine multi-effects processor
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1 2 3 4 5

PROS: Pro specs at a budget price. Delay has repeat-hold function. Easy editing.
CONS: Uninformative manual. Inadequate display. Sparse MIDI implementation.
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The ring modulator can be quite effective on sounds with quick attacks, such as percussion, and is a nice little extra. Its sole adjustable parameter, "Frequency," is shown as a range of 1 to 99. The compressor is functional but not great, particularly because its actual parameter values are not given. The vocoder, though extremely limited, actually works fairly well. As mentioned above, there are five types to choose from, but you have to just try them to figure out what they are. They range from an even voice/synth mix to voice-only when a synth is being played.

Both the EQ and the noise gate work passably well, though the former generates a lot of hiss, and the latter is not particularly smooth. Both effects affect only the wet signal, *not* the dry signal.

THE LOWDOWN

For the price, the DigiTech S100 is an exceptional value and I highly recommend it as a secondary studio processor or as part of an instrument rig. For instance, it would make a great dedicated delay or chorus. If you are considering buying it as your main studio reverb processor, proceed cautiously, but check it out just the same. Depending on your needs, you may find its reverb programs perfectly adequate.

Barry Cleveland *is the directories editor for* Mix *magazine as well as a composer, engineer, and producer. He also plays guitar in the improvisational quintet Cloud Chamber.*

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SOUNDSCAPE

SSHDR1-PLUS 2.0 (WIN)

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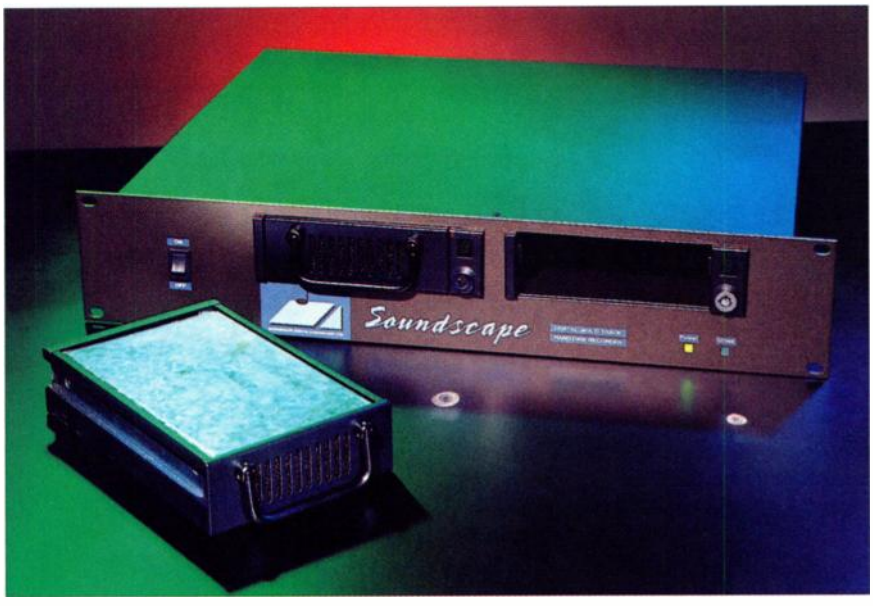
By Allan Metts

A few years ago, our British friends at Soundscape brought a rack-mounted PC hard-disk recorder across the ocean. The SSHDR1 provided eight tracks of audio at once and came complete with two input and four output channels. (**EM** reviewed this unit in the November 1994 issue.) Well, the British are coming again, and this time they're bringing much more. The SSHDR1 now has a "Plus" on the end of its name, and what a "plus" it is. The SSHDR1-Plus supports twelve audio tracks at once, with ten input and twelve output channels and real-time mixing and effects.

A base model SSHDR1-Plus comes with one stereo pair of analog inputs and two stereo pairs of analog outputs on unbalanced RCA connectors (switchable between -10 and +4 dB), two channels of digital input and four channels of digital output on coaxial S/PDIF connectors, and eight channels of digital I/O via a TDIF (TASCAM) connector. This configuration also includes the *Soundscape Editor* software and carries a $4,495 list price. All of the SSHDR1-Plus configurations include MIDI In, Out, and Thru ports, a 37-pin host cable connector, and a 68-pin expansion port. The expansion port carries both audio and synchronization signals and will be used for future hardware upgrades related to DSP and input/output expansion.

A base model also includes the half-height, ISA host adapter card and cable. Because one host adapter can drive two SSHDR1-Plus units, you can save a few bills when you get a second SSHDR1-Plus by purchasing an expander unit for $4,220. The expander unit is identical to a base model, except it doesn't include the host adapter and cable.

For an extra $375, you can add a "Pro" option to the base model. The Pro option provides balanced XLR connectors for the two analog inputs and four analog outputs. You also get AES/EBU connectors as digital I/O. There are only two input and four output channels of non-TDIF audio output, so you don't gain any more I/O channels by adding the Pro option. To put it another way, the unbalanced analog, balanced analog, AES/EBU, and S/PDIF outputs all carry the same set of signals. On the input side, you must choose which non-TDIF signal to use. (For example, you can't use the AES/EBU and unbalanced analog inputs at the same time.)



The SSHDR1-Plus system from Soundscape consists of an external, rack-mountable unit and a half-height, ISA host adapter card. Additional audio I/O options are also available.

None of the units include a hard drive. You can use a maximum of two standard IDE drives with a total capacity of up to 8.5 GB with each SSHDR1-Plus unit. (A forthcoming 2.02 upgrade allows unlimited drive size with supported drives only. Check the manufacturer's Web site for a list of those drives.) With the base model, you mount the drives permanently inside the unit. But for an extra $450, you can get a removable drive option. This option allows you to mount IDE drives inside lockable, removable cartridges. (Extra cartridges are $86.) You can then change hard drives with ease by simply sliding the cartridges in and out.

HOOK IT UP

The folks at Soundscape sent me two SSHDR1-Plus units, two SS8IO-1 I/O audio expansion units (see the sidebar "The SS8IO-1"), and one host adapter card for my PC. I wanted to fully experience the system's real-time mixing capabilities, so I disconnected my mixer and made the SSHDR1-Plus units and the SS8IO-1s the central "brain" of my studio. I don't have an ADAT, so I connected the Lightpipe interface of my Alesis S4+ synth to one of the SS8IO-1s. To the other SS8IO-1 went a couple more synths, the output from my guitar direct box, and the ins and outs of an external effects box. (The real-time mixer supports effects sends and returns.) I still needed microphone preamps, so I ended up running the output of my Mackie mixer into the two remaining analog ins on the second SS8IO-1.

Next, I connected each SS8IO-1 to an SSHDR1-Plus using its TDIF port. Then I connected my DAT recorder to one set of the digital I/O connectors. I also ran a stereo digital line from one SSHDR1-Plus to the other, making a submix of the first unit available to the second. By doing this, I could have all the audio from both units appear on one stereo output for monitoring and mixdown. And when I needed it, this connection also provided a way to synchronize digital audio between the two SSHDR1-Pluses.

Speaking of digital audio synchronization, the system as configured gave me a wide variety of digital audio formats running around my system. I knew that I needed to lock each SSHDR1-Plus to its respective SS8IO-1

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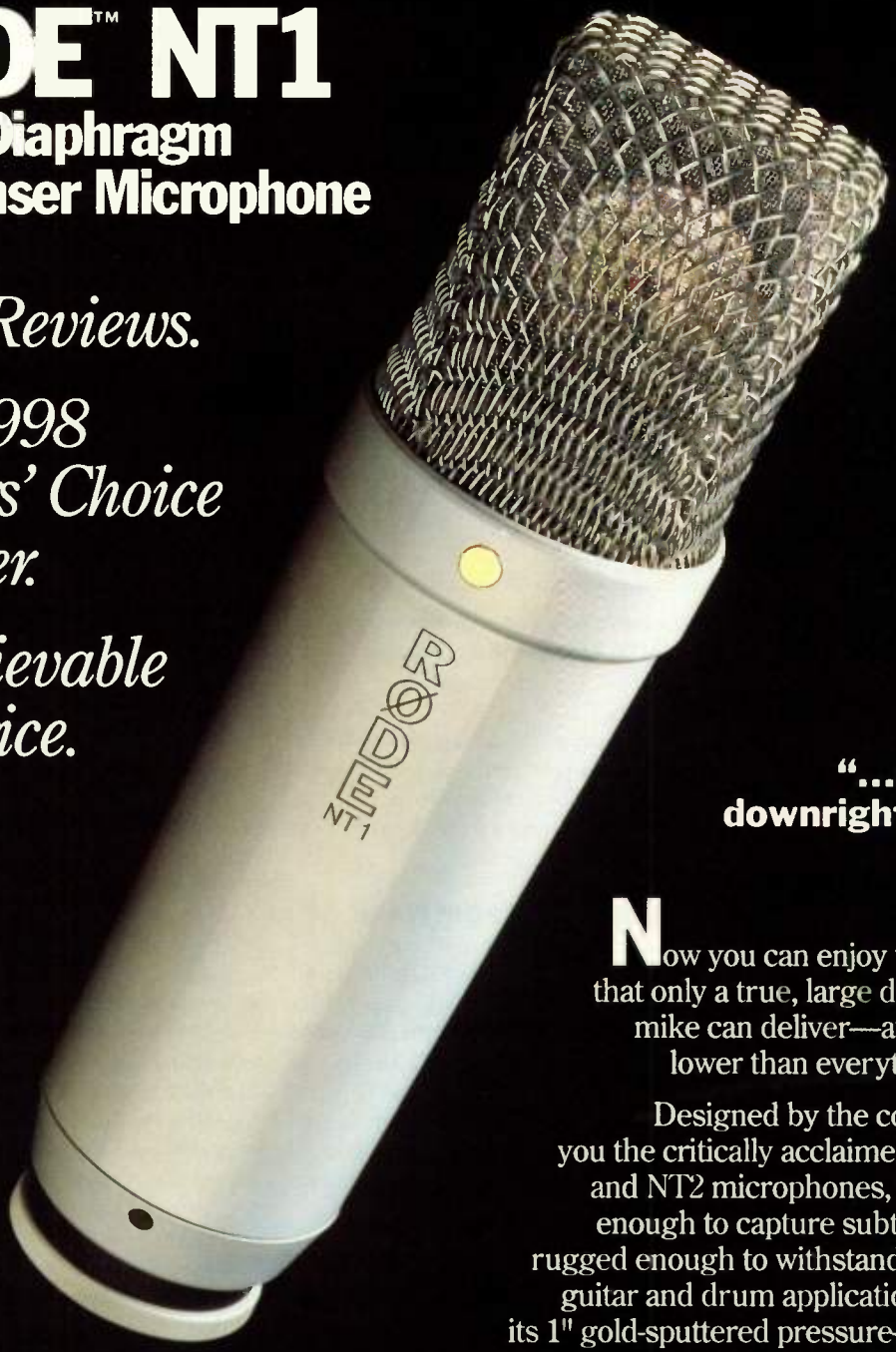

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during tracking, because that's where all the audio was coming from. But one of the SS8IO-1s was deriving audio sync from its ADAT input, while the other one (with all the analog connections) was generating its own sync internally. Everything sounded fine when I hooked it up this way. But just to be safe, I ended up slaving the analog-connected SS8IO-1 to the ADAT-connected SS8IO-1 using the word-clock connectors. (This created a slight problem that I'll mention later.)

While trying to make all of these connections, I experienced difficulties in getting everything physically installed where I wanted it. All four of these units are *full-size*, 2-space rack units, running all the way to the back of the SKB cases they were shipped in. My studio racks are built into cabinets, and I don't have access to their back sides. It was quite a chore to make all these connections because it meant reaching in through the front of my racks to the back of these deep boxes.

Because the units were so bulky, I found it impossible to bolt them into my rack when they were all stacked on top of each other. All four devices were 3.5 inches tall at the faceplate, as they should be. But the top panels on a couple of the devices protruded a tiny bit above the faceplate, causing any units on top of them to be too high in the rack. I also noticed that the mounting-hole spacing on the faceplate differed slightly from the spacing on my rack (78 mm versus 76 mm on my Middle Atlantic Products rack rails).

All of these small errors added up, and the bulkiness of the SSHDR1-Plus units left me with no "wiggle room" to get things bolted in. This made connecting everything even more of a chore. If I made a mistake on the bottom unit, I usually had to pull out the top two or three units to get to the problem.

There was one other installation complexity. The cable that runs from the PC host adapter to the SSHDR1-Plus is only five feet long. Five feet doesn't get you very far in an equipment-cluttered studio. Soundscape doesn't offer a longer version (it can't guarantee that anything longer will work), so I made my own 12-foot cable with parts from my local electronics store. I haven't experienced any problems.

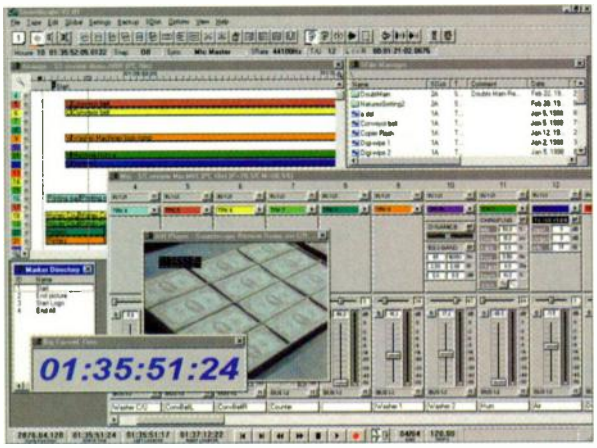

FIG. 1: *Soundscape Editor* provides a wide variety of tools to work with your audio. Each window shares a common set of tools and status indicators.

SOUNDSCAPE SOFTWARE

All of this hardware isn't very useful without the *Soundscape Editor* PC-based audio editing software, which provides all of the basics for multitrack audio recording, editing, and mixing. All of these operations can be performed without bogging down your computer, because the audio number crunching takes place in the Soundscape hardware.

The *Soundscape Editor* windows share a common set of status indicators, editing tools, and transport controls (see **Fig. 1**). Unfortunately, the editing tools are fixed at the top of the application window—you can't move them around to other places. However, you can configure nine different toolbars with any tools you like and switch among them using the Page Up and Page Down keys.

The transport controls contain exactly what you'd expect (play, stop, record, fast-forward, rewind, move-to-start, and move-to-end), and there are status indicators for current song position (in bars/beats and SMPTE time), current mouse position, and left/right locator positions (described later). Also visible are the current settings for time signature, tempo, snap (for editing), sample rate, and synchronization source. (The system can send MTC and MIDI Clock and can chase or trigger from MTC.)

IN THE MIX

Before you can do any playing or recording, you have to tell the system how to route all the audio from the inputs to the recording tracks and back out through the outputs. This routing takes place in the Mix window (see **Fig. 2**). In this window, you can use the mouse to create new channels on your virtual mixing board. Each channel will take any SSHDR1-Plus input, route it through a pan and a volume control, and send it to any output on the same unit. Connections between units must be made externally, which is why I ran the stereo digital line from the output of one SSHDR1-Plus to the input of the other.

Peak/Level meters, solo buttons, and mutes for both the input and output are automatically created with a new mixer channel. I really appreciate the Mix window's ability to create stereo, mono-to-stereo, and stereo-to-mono mixing channels. I've seen similar programs that only offer mono channels, and it can be a real pain to manipulate two onscreen faders, when all you want to do is tweak the volume of one stereo source.

But *Soundscape Editor*'s Mix Window would be rather boring if it only sent inputs to outputs. Each channel has an insert area that lies between the input and the fader/pan controls. Using the

Soundscape's SSHDR1-Plus is one of the few hard-disk recording systems that includes a TASCAM TDIF port. You also get unbalanced analog I/O and S/PDIF digital I/O.

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

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mouse, you can put all sorts of mixer elements (in any order) into any channel. I used plenty of track inserts, which allowed me to record to, and play back, the hard-disk tracks. Both mono and stereo tracks are supported, and you can combine the signals from the track and live inputs into the same mixer channel.

There are other mixer elements that you can insert. These include a 2-band EQ, "extra" faders and meters, and effects sends that can route to any channel output. If you purchase extra real-time plug-in effects, they appear here, as well. So my fully loaded system had quite an assortment of reverbs, delays, dynamics processing, and other effects. Only Soundscape-format effects are supported, however, so don't plan on using your DirectX plug-ins.

VIRTUAL EFFECTS VIEWING

Once placed, double-clicking the more complex insert elements brings up a graphic editing window with settings and real-time visual feedback. You can also save or load preset settings from these windows or bypass the effect with one click of the mouse. For the equalizer, I could adjust the shape of the EQ bands. With the dynamics processing, I could adjust a graph that showed the input signal along the horizontal axis and the processed signal along the vertical axis. As I played, I could watch my music travel along the graph. This is an incredibly intuitive way to set up a compressor.

Some of the displays are quite impressive. The *TC Reverb* element (an optional third-party plug-in) has plenty of real-time meters and three-dimensional displays of the reverb parameters (see **Fig. 3**). And if you want, each element's settings window can stay open on the screen. With a large monitor, you can end up with an impressive display of fancy controls and flashing meters.

As if all of this weren't enough, you also get sixteen mixer buses with each SSHDR1-Plus, allowing you to set up mixer subgroups and effects sends. The buses appear as channel inputs and outputs, allowing them to be treated in the same manner. You can send the buses to recording tracks and process them with an arsenal of effects.

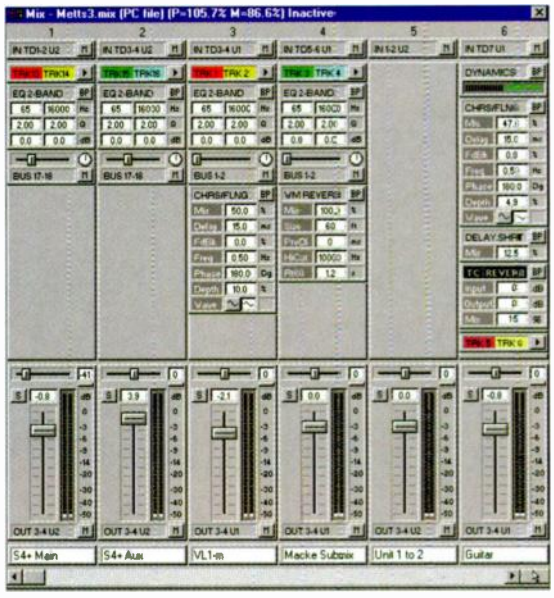

FIG. 2: *Soundscape Editor*'s Mix window provides a robust interface for routing audio and configuring effects. Support for both mono and stereo mixer channels is provided.

So from the standpoint of the Mix window's interface, there wasn't an audio-routing or effects-processing scheme that I couldn't set up. But that doesn't mean that the system has no limits. Each SSHDR1-Plus has a fixed amount of DSP processing power, and it wasn't too difficult to set up configurations that exceeded that power. With a basic 8-channel routing scheme in place, I started running into processor limitations with a modest number of effects elements. I could set up one channel with dynamics, chorus, and reverb processing, but I usually ran into trouble when I added another reverb to this configuration. It's difficult to predict exactly where you will run out of processing power, because it very much depends on the mixer configuration and specific effects you are using.

When I did hit the limit, the system behaved quite gracefully. At the top of the Mix window, you always see the current DSP processor and memory utilization of the most-used SSHDR1-Plus unit. When you exceed 100 percent utilization, you get a warning message, and the SSHDR1-Plus goes into an inactive state until you fix the problem. This is a reasonable approach because, rather than second-guessing how you would want to reconfigure your mix, *Soundscape Editor* allows you to make those decisions.

RECORD READY

With all the hardware installed, audio connections made, and virtual mixer configured, it was finally time to record something. (This is, after all, primarily a hard-disk recording system!) An individual recording is called a Take in the SSHDR1-Plus system. Takes are stored in Take files (go figure) on the system's own hard drives. These files are always monophonic. (Stereo files are supported in the upcoming 2.02 revision.) If you make a stereo recording, two Take files will be generated—one

SSHDR1-Plus Specifications

Analog Inputs	(2) unbalanced RCA (balanced XLR connectors optional)
Analog Outputs	(4) unbalanced RCA (balanced XLR connectors optional)
Digital Inputs	2 ch. S/PDIF (RCA coax); TDIF 25-pin D-type (8 channels) (balanced XLR connectors optional)
Digital Outputs	4 ch. S/PDIF (RCA coax); TDIF 25-pin D-type (8 channels) (balanced XLR connectors optional)
Sampling Rates	22.05 kHz, 32 kHz, 44.056 kHz, 44.1 kHz, 48 kHz
A/D Converters	16-bit delta-sigma
D/A Converters	18-bit delta-sigma
Sync Options	master: MTC, MIDI Clock, MIDI SPP slave: MTC w/continuous or trigger chase lock
Input S/N Ratio	93 dB unweighted, 96 dB A weighted
Output S/N Ratio	113 dB unweighted, 115 dB A weighted
Internal Processing	24-bit
MIDI Connections	MIDI In/Out/Thru
Dimensions	2U x 13.75" (D)

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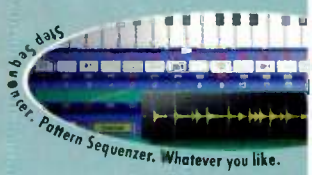

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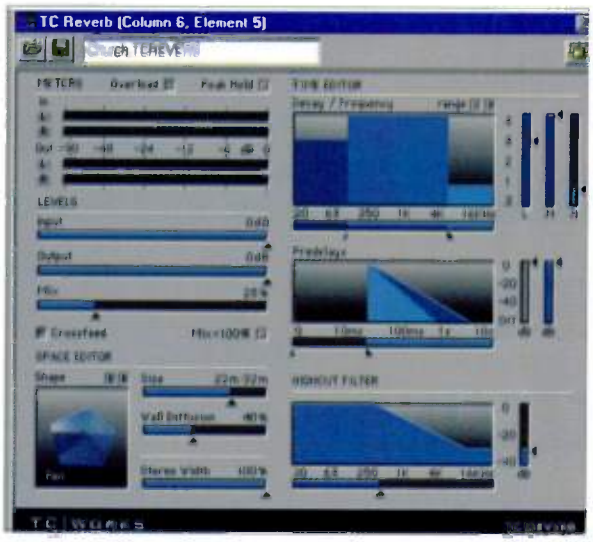

FIG. 3: Some of the real-time effects displays are impressive. This *TC Reverb* component is an optional add-on to the Soundscape system.

each for the left and right channels. The system doesn't use WAV files but can convert its own format to WAV. It will also create a stereo WAV file from two monophonic Takes. (The Soundscape hardware cannot, however, be used to play back WAV files from other Windows audio applications.)

Take files are recorded in the Arrange window (see **Fig. 4**). This window puts time along the horizontal axis and tracks down the vertical. Technically speaking, you don't really see a Take in the Arrange window. Instead, you see a Part, which is a reference to a Take. These Parts are represented as one or more nonoverlapping blocks within a row on the Arrange window. By using this scheme, the system avoids redundant audio files on the hard disk. If you copy a Part, only a new reference to the original audio file is created. If you change the audio in a Part (by editing or applying effects to it), the software will automatically create a new Take file and then update the Part's file reference.

Recording is easy. In the Arrange window, you create mono or stereo recording tracks, which correspond to one or two of the twelve physical tracks available on each unit. You then arm them for recording and hit the Record button. The Arrange window knows if recording is possible on the tracks you've created. For instance, if you create recording tracks 11 and 12 but nothing is connected to those tracks in the Mix window, the tracks will be disabled. Once you make the connections, the tracks automatically become enabled.

Soundscape Editor includes several other recording goodies. You can set up left and right locator points and punch in between them. You can specify separate preroll and postroll times if you like. You can also set up a recording "stack" and enable loop recording. When you do so, *Soundscape Editor* will cycle through up to nine Takes per track, giving you plenty of chances to nail that killer guitar solo. All nine Takes appear in the Arrange window,

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allowing you to mix and match the best sections of each Take.

EDITING TOOLBOX

With the Parts laid out in the Arrange window, you can now use the tools in the toolbar pages to edit them. Even though a Part was recorded to a specific track on the SSHDR1-Plus, it doesn't have to stay there. You can reassign each Part to a different physical track, even if the Parts are in the same row. You can't, however, have multiple

▼

The system gave me a wide variety of digital audio formats running around my system.

Takes playing on the same physical track at the same time. *Soundscape Editor* colors each Part to indicate the track it's assigned to. The same colors are used in the Mix window, which makes for a really intuitive display.

All of the tools you'd find in a basic audio-editing package are available in *Soundscape Editor*. You can move Parts in time or change the Arrange window row they're in. You can copy Parts,

EDL PROCESSOR AND CD-WRITER

Those doing video post-production will want to check out *Soundscape EDL Processor* ($750), a plug-in that automates the process of creating Takes and Arrangements from video edit decision lists. Support for standard EDL, D-Vision, and Lightworks projects is provided.

Also available is *Soundscape CD-Writer* ($599), which burns Red Book–compatible audio CDs from *Soundscape Editor* arrangements and Take files. You can specify the pauses and fades between each CD track, build track subindexes, and configure the CD's PQ code settings. This plug-in doesn't run under Windows NT, so NT users must find a different CD-burning solution.

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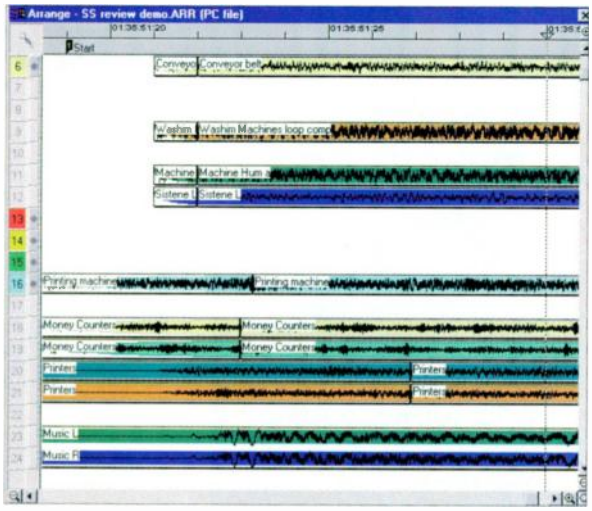

FIG. 4: *Soundscape Editor*'s Arrange window lets you record Takes and edit your material. Zooming in brings up each Take's waveform for precise editing.

mute Parts, delete Parts, split Parts, and stick them back together again. There is a Part drawing tool, a Trim tool, an Info tool, and a Repeat tool. You can solo Parts or scrub them with your mouse. Unfortunately, the Scrub tool emitted an ear-piercing digital burst through my speakers each time I released the mouse button. I also noticed this after some of the edit operations. It turns out that the sync configuration I was using caused this, and by changing my master unit to internal sync, I got rid of the problem.

To use the editing tools, you have to deprogram yourself from the normal ways of using a mouse in Windows. Typically, you left-click to select, left-drag to move, Ctrl-left-drag to copy, and right-click to open a context-sensitive menu. Not here. In *Soundscape Editor*'s Arrange window, there are no context-sensitive menus, and you can't click on a Part to select it. To perform an operation, you change to the tool you want and click on a Part you want to edit. Unlike most Windows programs, none of the tools have pop-up descriptions, so it'll take you a while to memorize what tool each button represents. (You can find a list of their functions in the Custom Tool page.)

Now, you may be thinking that you can only choose one tool at a time. Nope, you get four. You have a chosen tool for each of the mouse buttons and tools for use with each Alt-key-plus-mouse-click combination. So to configure and use your Alt-right-click tool, you'd Alt-right-click on the tool you want and then Alt-right-click on the Part you want to change. The chosen tool settings are persistent, so you can keep Alt-right-clicking on things to execute that operation multiple times.

I can see how this scheme would be very efficient, once you got used to it. But I never did. I'm so used to the normal Windows way of doing things that I found myself accidentally executing operations by clicking on things and forgetting that four editing tools are always "live." *Soundscape Editor*'s Undo feature bailed me out, but unfortunately, only the most recent editing operation can be undone. (Version 2.02 will support ten levels of Undo.)

MAGIC MARKERS

Many of the editing tools can snap to the nearest marker. Markers can be dropped on the fly during playback or recording and can be manipulated using a Marker Directory window. You can also snap to the Arrange window itself, which has snap resolutions ranging from one bar to one hundredth of a SMPTE frame. For very precise editing, you can zoom way in, and the audio waveform will appear inside the Part's boundaries.

THE SS8IO-1

For those of you without gear that speaks TDIF, Soundscape has you covered. Its new SS8IO-1 unit provides eight channels of 20-bit D/A and A/D conversion in one $1,995 box. The analog ins and outs appear on balanced XLR connectors, and the digital side appears with both TDIF and ADAT optical formats. All connections are made on the rear of the unit. The front panel has eight LED peak/level meters and buttons that let you determine the unit's sample rate (44.1 or 48 kHz), clock source, audio routing, and meter source. Handy LEDs light up to show you the current configuration at a glance.

The SS8IO-1 is actually quite versatile, even without an SSHDR1-Plus attached. Any of the three sets of inputs (analog, ADAT, or TDIF) can be routed to any output using buttons on the front panel. The only thing you can't do is send two different inputs to the same output, because the SS8IO-1 has no mixing capability on its own. Also, all eight channels are routed at once, so you can't send analog inputs 1 through 4 to the ADAT interface and inputs 5 through 8 to the TDIF port. (You could send all the analog channels to both ADAT and TDIF if you wanted.)

The analog inputs/outputs are configured as +4 dB connections at the factory, and most of my equipment operates at -10 dB. The input gain adjustment for the SS8IO-1 appears as eight hard-to-reach "trimpots" *inside the unit*. I wanted each of the eight channels calibrated the same, so I had to connect a test tone to each input one at a time and watch the audio meters as I turned the channel's trimpot. Obviously, sticking a screwdriver into a live circuit is not a very practical way to adjust input gain, so I'm giving Soundscape a big "boo-hiss" for not providing trim controls on the outside of the unit.

You have complete control over the SS8IO-1's audio-clock source. It can be driven from either the ADAT or TDIF inputs, be internally generated, or be synched to an external word-clock source. (Word-clock input and output appear as RCA connectors on the unit's back panel.) Both the word-clock input and output can be configured as a Superclock signal (256 x word clock) if necessary. The SS8IO-1 also has the capability for sync signal jitter attenuation and phase shifting, which is configured using DIP switches on the back of the unit. I didn't mess with these settings.

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TESTA INTERACTIVE

The Fade-in, Fade-out, and Volume tools are really nice. You can create fades that use one of eight preset curves and assign any start or end volumes. (There are no user-definable curves.) You can automatically adjust the Part in front of or behind the Part you're editing so their volumes will precisely match during playback. All of the volume settings are reflected in the Part's coloring. A Part at 100 percent volume, for example, is fully colored. A Part at low volume only has a thin colored line. A fade-in is represented by a ramp or curve in the color going from thin to thick. I found *Soundscape Editor*'s Part coloring to be an excellent "big picture" view of my song. You can even change a Part's volume by dragging the colors!

Rounding out the editing operations are tools for phase reversal, Part reversal, normalization, stereo linking (which makes a stereo Part out of two mono Parts), DC offset removal, and noise gating. Also available is a Mixdown tool, which can create a new track out of as many as ten existing ones. Because you can include the real-time effects in your mixes, it's possible to circumvent the limits in DSP processing that I described earlier. I could set up complex effects chains, record the "wet" signal with the Mixdown tool, and then reconfigure the real-time effects to do something else.

If you buy add-in processing modules, the non-real-time effects will appear in the tool bar. (Real-time effects are applied in the Mix window as described above.) I had extra tools for pitch and time shifting, sample-rate conversion, and reverb. Again, only Soundscape-format effects are supported.

MORE GOODIES

Most of *Soundscape Editor*'s functionality is manifested in the Arrange and Mix windows. But there are a few other bells and whistles in the system. *Soundscape Editor* provides an SFile Manager, which operates much like Windows Explorer. But instead of manipulating the files on your hard disk, the Manager manages the files on the SSHDR1-Plus (which, as you might have guessed, are called SFiles). You can drag Take files from the SFile manager and drop them onto the Arrange window. You can also back up your SFiles to a DAT recorder.

The system can control and be controlled by external hardware devices. Up to four Remote Device Controller windows can be opened simultaneously,

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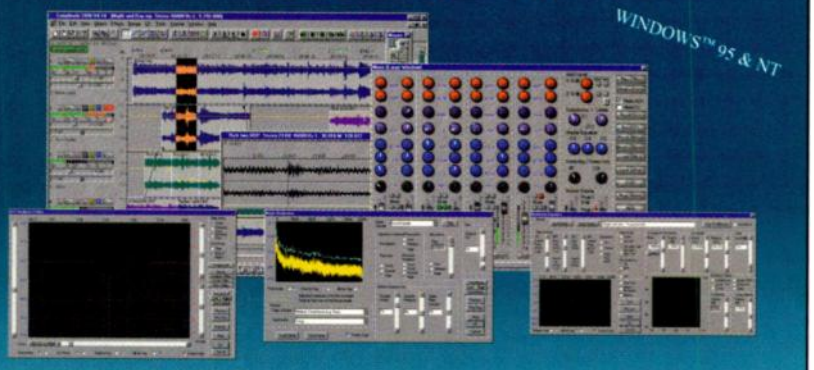

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EASE OF USE ■■■■
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VALUE ■■■
1 2 3 4 5

PROS: Comprehensive audio features. Real-time mixing and effects. Places minimal burden on your PC.
CONS: A bit pricey. User interface not always intuitive.

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providing transport and track arming control of any device that can respond to RS-422 or MIDI Machine control. Soundscape's support for JLCooper (MCS-2 and CS10-2) and Penny & Giles (MM16 and DC16) devices allows you to use external hardware to control the SSHDR1-Plus.

There are a number of windows that provide useful display information as you work. A Big Time window shows a large representation of the current SMPTE time (but not the Measure and Beat), and an AVI Player enables you to display video information in sync with your audio. Finally, there are system utility windows that show the current audio buffer activity and disk utilization.

THE SOUNDSCAPE SCOOP

All in all, the SSHDR1-Plus platform represents a comprehensive tool set for audio production. There isn't much that you can't do on this system. The audio quality is excellent. Other than the sync-related audio bursts mentioned earlier (which did not affect my recordings), I noticed no audible artifacts in my music. My studio's monitoring environment is less than pristine, and I didn't do any scientific A/B comparisons. But suffice it to say that the Soundscape system's sound quality is as good as, or better than, any other similar system I've used.

SSHDR1-Plus
Minumum System Requirements
80486 or Pentium PC; Windows 95, NT 4.0, or better; one free ISA or EISA expansion slot.

I mentioned a few quibbles with Soundscape's user interface, but overall the system is quite usable, especially when you consider everything it does. The SSHDR1-Plus almost always operated without a problem, although I did experience some disk errors that crashed the system. (To be fair, the disk errors appeared to be due to a failing hard drive.) The product's documentation adequately describes its use and is available in printed, PDF, and HTML formats. Unfortunately, there is no online help.

The SSHDR1-Plus system is quite pricey but not necessarily out of line. The fully loaded, 24-track system I reviewed carries a list price of over $15,000, not including hard drives or a computer. But if you compare this cost to 3 MDMs, a digital mixer, and a wide variety of effects, you still come out ahead. And of course, even a low-end Pentium 100 with inexpensive IDE drives is an adequate platform. Nonetheless, you can't get started on the version 2.0 platform for less than $4,495.

So who should buy this system? If you do video post-production, definitely give the SSHDR1-Plus a good look. And if you already have an underpowered computer, you may appreciate the system's ability to record and mix several audio tracks without bogging down your computer. Others may find the cost of entry too high, especially given the abundance of affordable digital audio products entering the market. But one thing is certain, the SSHDR1-Plus provides a comprehensive and powerful platform for digital audio production.

Allan Metts *is an Atlanta-based musician, software/systems designer, and consultant.*

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circle #605 on reader service card

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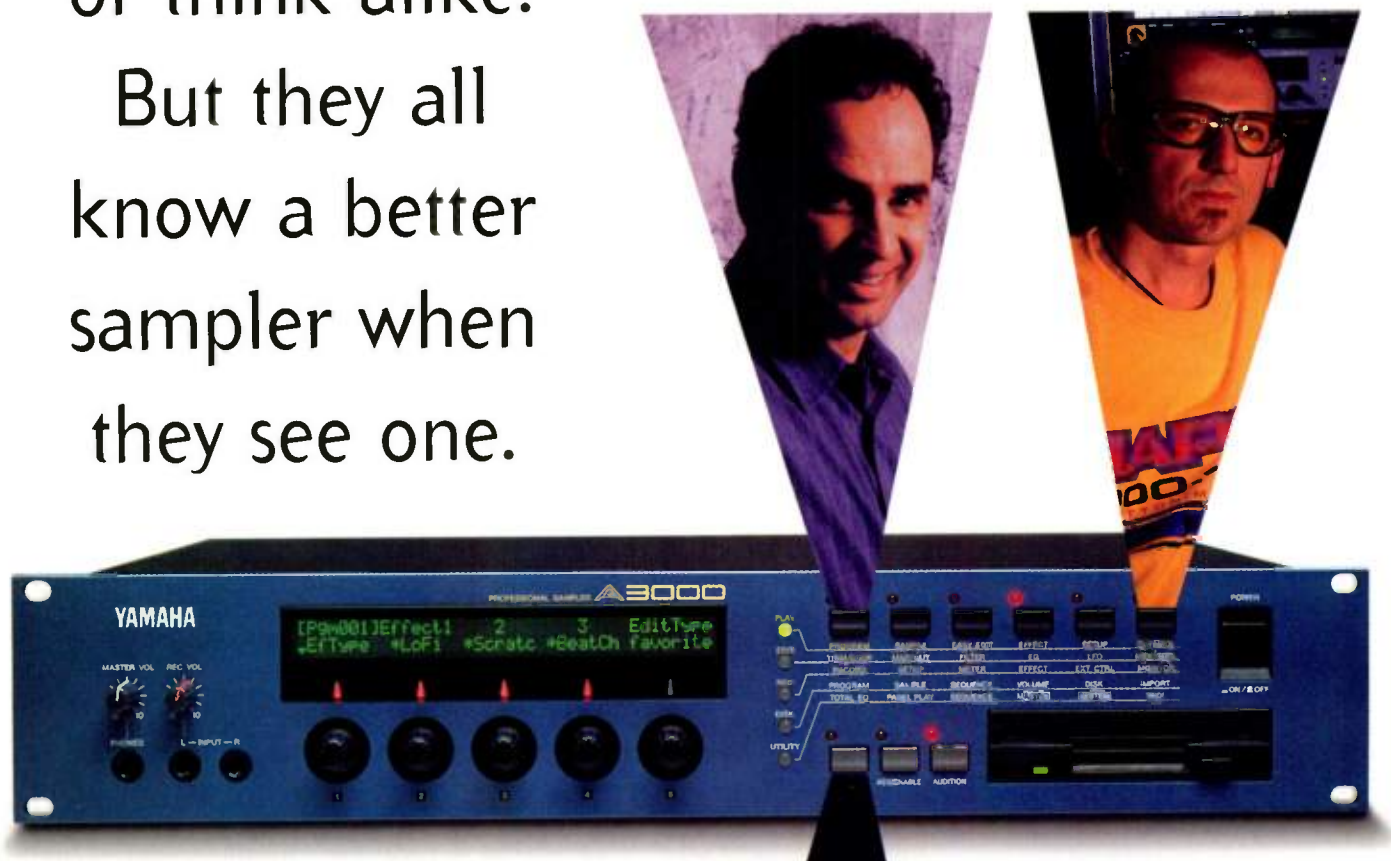
Recording artist/composer/producer for ethnicrobot, Nervous Records



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circle #606 on reader service card

D B X

MC6 MINI-COMP

Portable compression made easy.

By David Ogilvy

Over the last twenty years, the dbx 160-series dynamics processors have established themselves as industry mainstays, earning a place in studios around the world. These units deliver impressive, clean dynamics processing without any hassle.

However, with a price tag of $459 for a single channel of compression, it's a little impractical for the typical personal studio to have more than one of these boxes. But now, by trimming out ancillary features such as sidechains and gates, dbx has made its compression more affordable with the $139 MC6 Mini-Comp.

EFFECTIVE ERGONOMICS

Crammed into a tabletop box the size of a portable CD player, the MC6 employs all of the essential circuitry of a dbx 160A compressor. The company has combined its standard op amps, VCA, and peak detection system into a single, low-distortion microchip. The result is the very small, yet powerful, MC6.

At first glance, the MC6's size and shape may lead you to pass it over in favor of something rack-mountable. But for location recording or gigging, the Mini-Comp is a lot easier to fit into your bag than a 19-inch rack unit. The MC6 even has a clip for attaching it to the handle of a guitar amp, the side of a rack case, or the edge of a console.

Left and right inputs and outputs allow the MC6 to process stereo program material.

The front panel has five slider controls (Threshold, Ratio, Attack, Release, and Output Gain), two LED meters (Input/Output and Gain Reduction), and six switches that control various performance parameters. The Threshold slider is sensibly located right below the gain-reduction meter, and all of the sliders operate smoothly and seem to be well insulated. Surprisingly, the latching switches felt more solid than those on some processors that cost ten times as much.

The MC6 can operate in Manual mode (giving you attack and release control) or Auto mode (which overrides the Attack and Release sliders). Auto mode has two presets: an Instrument setting and a faster Vocal setting. The easy-to-understand manual points out that the two Auto presets can be used for applications other than vocals or instruments; these are just labels to provide a good starting point for first-time users. An OverEasy switch takes the unit out of Hard-knee mode and provides smoother compression for hard-to-predict signals, such as vocals or guitars.

BRINGING UP THE REAR

The back panel is straightforward. Audio connections are made via ¼-inch TRS jacks that accommodate balanced or unbalanced line signals, or unbalanced instrument-level signals, as determined by a rear-panel switch. A footswitch jack allows you to put the unit in Bypass mode from a distance—quite handy for guitarists wanting to stomp in some sustain.

Although the MC6 features stereo inputs and outputs, there are not two separate sets of parameter controls. In other words, you cannot send two different signals through it with separate compression settings. But the MC6 performs very well on stereo signals, such as a L-R mix, a stereo synth, or stereo drum overheads.

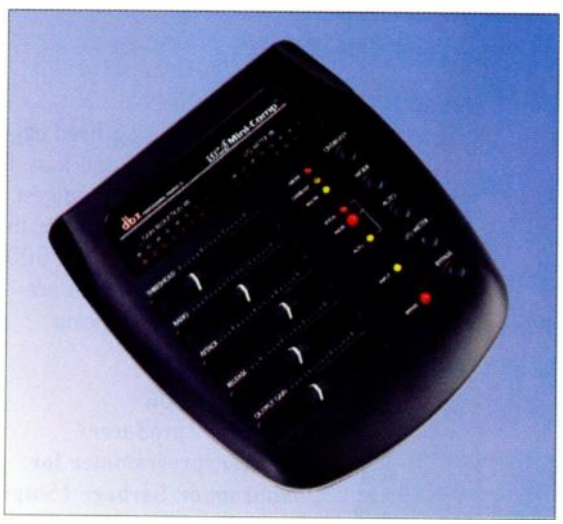
The Mini-Comp employs True RMS Power Summing, which links the threshold detectors and responds to the sum of the energy from each channel. It uses two RMS detectors, thus eliminating inaccurate level detection due to phase cancellation, a problem that often occurs with 2-channel compressors that use a single detector when in Link mode. With dbx's design, not only does the stereo separation remain true but peaks on one channel will not trigger compression on the other.

The left input jack doubles as the unit's mono input. Instead of opting for a mono output, dbx took an ingenious approach, sending the signal to both the left and right output jacks using a dual-buffered splitter. With this feature, you can run the signal to two separate instrument amps or send one signal to an amp and the other to the console. With proper gain-staging adjustments, this feature will allow you to do without a direct box.

THE MAIN SQUEEZE

In general, the pre-EQ insert is the most common point in the signal path to introduce dynamics control. Most compressors tend to remove some high frequencies from the signal, and having an EQ after the dynamics processor allows you to compensate. The MC6 shares this common fault, but in general I was surprised at its high-frequency performance.

I tried out the MC6 when mixing a 24-track rock song through a Neve 8048 console. First, I tried the MC6 on individual tracks, starting with electric bass. It evened out the direct-box track nicely, and it didn't remove as much low-frequency energy as I had anticipated. I was more surprised by the performance of the MC6 on the miked cabinet track, which is often harder to control due to a wider dynamic range. Again, the Mini-Comp smoothed out the track without much fuss.



Shoehorned into a compact, ergonomic package, the MC6 Mini-Comp offers classic dbx compression at a low cost.

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MC6 Specifications

Audio Inputs	(2) ¼" TRS (switchable balanced/unbalanced line or unbalanced instrument level)
Audio Outputs	(2) ¼" TRS (switchable balanced/unbalanced line or unbalanced instrument level)
Maximum Input Level	+16 dBu, line; 0 dBu, instrument
Maximum Output Level	+21 dBu (into >50 kΩ), line; 0 dBu (into >50 kΩ), instrument
Frequency Response	<1 Hz–60 kHz, (+0/-3 dB)
Noise	<-97 dBu (1 Hz–60 kHz), line; <-105 dBu (1 Hz–60 kHz), instrument
THD	0.008% at -10 dBV, line; 0.08% at -20 dBV, instrument
Interchannel Crosstalk	<80 dB at 1 kHz
Dimensions	1.65" (H) x 5.75" (W) x 6.4" (D)
Weight	2.1 lbs.

Depending on the nature of the song and performance, the MC6 can be very effective on snare drum tracks, even though, in my tests, some of the signal's top harmonics disappeared. As with most compressors, the Mini-Comp had trouble keeping up with snare rolls, and it caused too much attenuation of the kick drum's low end. Keep in mind, though, that few compressor/limiters do justice to kick and snare; these drums have such a fast attack that the only boxes I find effective cost over $2,000.

Hi-hat and percussion fared well through the MC6, again proving that it takes out very little top end. It also sounded surprisingly good on the room mics, giving an even sound to a very dynamic recording.

Since drums and bass sounded better to me in Hard-knee mode, I didn't use the OverEasy feature much. However, I found it very pleasing on the stereo mix of acoustic guitar and vocals, with very light gain reduction (less than 3 dB). The guitar sounded fuller and more in line with the voice.

Lead guitar benefited from the additional sustain provided by this compressor, and I only had to use the slightest amount of high-frequency EQ to compensate for unwanted filtering. Rhythm guitars gained a bit of "oomph" when passed through the Mini-Comp, and they attained a crunchy evenness in the OverEasy mode.

The MC6's performance on the rock vocal track left a bit to be desired but was acceptable in OverEasy mode with minimal gain reduction. I could see using the MC6 to smooth out vocal tracks after a faster peak limiter had been employed. Stereo group vocals sounded great, even without having the OverEasy switch engaged.

One of the best ways to test a stereo compressor is to use it on overhead drum tracks. Overall, I was impressed by the stereo separation and the smoothing effect of the Mini-Comp. The signal retained so much of the top end that I was able to run the MC6 post-EQ, allowing me to filter out some snare, which had been triggering the compressor and squashing the cymbals.

In the final mix, the MC6 performed amazingly well on the stereo tom tracks. The toms sounded beefy and warm and retained their accented attacks. After using it for this review, I will always think of the MC6 when it comes to quick and easy compression for toms, especially when my other

DBX
MC6 Mini-Comp stereo compressor
$139

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

PROS: Compact, portable design. Stereo capabilities. Classic dbx sound. Affordable.
CONS: No sidechain or gate. Wall-wart power supply. Not rack-mountable.
CIRCLE #441 ON READER SERVICE CARD

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

stereo-linkable compressors are needed for applications such as the console output, drum overheads, or percussion tracks. That is not to say that the Mini-Comp performed poorly at these tasks; I was more than satisfied with its overall performance, even on the stereo mix.

TRIVIAL ISSUES

There's not much to quibble about with this new box from dbx, but a few things are worth noting. The fact that the unit is not rack-mountable was a nuisance in my particular setup. But keep in mind that the MC6 was designed not as a dedicated studio processor but as a solution for gigging musicians and small studios. If you are out of rackspace, the MC6 presents a fine option because it can be easily attached to a vertical surface using the clip and screws.

Many compressors have sidechains that aid in keying and ducking effects; the MC6 does not. Of course, to be truly effective at these tasks, the Mini-Comp would probably have to be larger and cost more. I prefer to duck the volume using automation, anyway, which allows more precision.

The sliders on the Mini-Comp all have center detents, even though they're only necessary for the Gain and Threshold controls. I'm also dismayed to see only hash marks along the sliders, which makes it difficult to log and recall settings. The Ratio slider especially should have numeric ratios listed along its length. Finally, the MC6 also gets somewhat hot if left on for extended periods, and there is no power switch.

MC6 Compressor Settings

Threshold Range	60 dB
Ratio	1:1 to ∞:1
Attack Time	3 dB/ms to 0.04 dB/ms
Release Time	250 dB/sec to 5 dB/sec
Program-Dependent	vocal: 15 ms for 10 dB, 5 ms for 20 dB, 3 ms for 30 dB
Auto Attack Time	instrument: 45 ms for 10 dB, 15 ms for 20 dB, 9 ms for 30 dB
Program-Dependent	vocal: approx. 125 dB/sec
Auto Release Time	instrument: approx. 40 dB/sec
Output Gain	-22 dB to +22 dB

A SENSIBLE SOLUTION

This box is incredibly good for its price. It looks cool and sounds great, and its portability and ease of use should please just about anyone. Although its appearance might not impress clients in a major recording studio, I definitely recommend the MC6 to personal-studio owners who would like to have more channels of dbx compression.

David Ogilvy *is a freelance engineer and producer who enjoys remote recording of sound effects and music.*

JOMOX

XBASE 09

This analog drum machine resurrects the venerable TR-909.

By Rob Rayle

In the world of techno music, nothing beats the sound of a good analog drum machine, and the Roland TR-909 is among the most sought-after instruments of this genre. Unfortunately, Roland stopped making the TR-909 long ago; until recently, devotees had to hunt down a used one or find some good samples.

Recognizing a potentially large market, a few companies started making products that emulate the TR-909 sound. These products include Quasimidi's Rave-o-lution 309 (reviewed in the February 1998 **EM**), Steinberg's *Re-Birth RB-338* software (reviewed in the May 1998 issue), and Roland's own MC-303 Groovebox.

However, if you're a real analog purist, these products all fall short because they are based on digital simulation or sampling. The only product that provides true analog emulation of the TR-909 sound is the XBase 09 from the German company Jomox.

FIRST GLANCE

The XBase 09 can play three different sounds at once: kick drum, snare drum, and hi-hat. Actually, the hi-hat voice is split into Closed and Open Hi-Hat, but these two sounds cannot play simultaneously. The two "hi-hat" sounds can play several different samples in addition to closed and open hi-hat, including rim shot, hand clap, crash cymbal, ride cymbal, and highpass-filtered white noise. The crash, ride, and noise samples are played with a short envelope when assigned to Closed Hi-Hat and with a long envelope when assigned to Open Hi-Hat. The hi-hat, crash, rimshot, and hand-clap samples can also be played in reverse.

Like the TR-909, the XBase 09 is an analog/digital hybrid instrument; the kick and snare sounds are generated by analog synthesis and the other sounds are samples with analog processing. These samples are quite faithful to the original TR-909 samples. The Jomox engineers were so determined to make an accurate copy of the TR-909, they used extremely low sample resolution (6-bit), just like the TR-909.

The case is a tabletop box with (mostly) single-function knobs and buttons in addition to several LED indicators and a 3-digit, numeric, LED display. The controls are well organized into groups of related parameters, which I'll describe as we go.

The back panel includes the power switch and power-supply connector. (Unfortunately, the XBase 09 uses a wall-wart power supply.) MIDI In, Out, and Thru jacks are joined by a DIN sync jack, which accommodates Roland-style synchronization signal as implemented on the TR-909 and other drum machines. Each of the three voices has its own mono output (both hi-hats are played from the same output) in addition to a mono mix output; all audio outputs are unbalanced ¼-inch jacks.

SOUNDS LIKE

The best thing about the XBase 09 is also the best thing about the TR-909: the kick drum can sound fantastic. The kick sound is a combination of a pitched tone (which can be very low and include various harmonics) and an attack consists of two different parts: a single cycle of a pulse wave (which produces a click) and a burst of highpass-filtered white noise.

The unit offers eight knobs to control the kick drum sound. As you might imagine, the Pitch knob controls the frequency of the pitched tone. The Tune knob determines the amount of a quick, downward pitch sweep that is applied to the sound, and the Decay knob controls how long the kick drum takes to die out. These features are the same as on the TR-909, except that the XBase 09 can accommodate much longer decay times than the TR-909.

The Harmonics knob applies distortion to the pitched part of the kick drum sound. If the Harmonics parameter is set to 0, the pitched sound is pretty close to a sine wave. As you raise the Harmonics value, the sound approaches a distorted square wave. The Pulse and Noise knobs control the volume of the pulse/click and noise-burst portions of the sound, respectively, and the Attack knob controls the volume of the mixed pulse and noise-burst sounds. Finally, the EQ knob attenuates the high frequencies in the final sound to simulate the softer kicks of the Roland TR-808.

When the parameters are set just right, this kick really knocks me down. You can definitely create a kick drum with a top end that cuts through any mix and a low end that hits you hard in the gut.

The snare drum also sounds almost exactly like the snare on a TR-909, which is unfortunate in my opinion. I've never been crazy about the TR-808 or TR-909 snare sounds, and I'm not wild about the XBase 09's snares, either. They tend

The Jomox XBase 09 is the closest thing to a Roland TR-909 you're likely to find (unless you stumble across a used TR-909).

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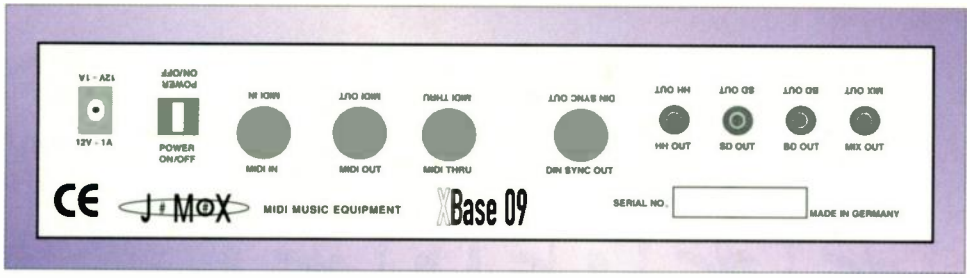

The XBase 09's rear panel includes discrete mono outputs for each voice as well as a mono mix output and a DIN sync jack for connection with Roland's TR-909 and other drum machines. Note that the jacks are labeled both upside down and right side up for fast, convenient viewing during setup and tear-down.

to be very thin sounding and lack the impact of a real snare or even a good snare sample. On the other hand, this type of snare sound is very common in techno music; lots of producers use it, and lots of people like it. The fact that it's synthesized also provides expressive opportunities that you don't normally have with a sampled snare.

Under the hood, the snare sound consists of two pitched tones that are pretty close to sine waves, combined with bandpass-filtered white noise. The five snare controls include the Tune knob, which is equivalent to the corresponding knob on the TR-909: it adjusts the tuning of both pitched tones. As expected, the Detune knob detunes the two pitched tones with respect to each other. The XSnapp parameter is equivalent to the Snappy parameter on the TR-909, which controls the level of the noise component. The Decay knob determines the decay of the noise portion only; the pitched tones have a fixed decay. The Noise Tune parameter controls the cutoff frequency of the lowpass filter that is applied to the noise component. Although this voice doesn't generate an excellent snare sound, it can produce quite a wide variety of sounds, from snares to tom-toms, congas, or cowbells.

The hi-hat voice offers four controls. The Tune knob controls the pitch of the voice and the HH Balance knob determines the relative levels of the open and closed hi-hat sounds. These two sounds have their own separate Decay controls, as well.

The sampled sounds are also quite faithful to the TR-909's, which is also unfortunate, in my opinion. The hi-hat samples exhibit the TR-909's 6-bit graininess, which I find truly annoying, and the other samples don't sound much better. But again, these sounds are widely used and very popular.

The bottom line is this: the XBase 09 sounds almost exactly like a TR-909. If that's what you want, this is as close as it gets. If you were hoping that someone would replace the 6-bit samples with clean, 16-bit samples, you won't find them here.

The XBase 09 does have something that the TR-909 never did: two LFOs. These LFOs can be routed to any of five modulation destinations (kick pitch, snare pitch, XSnapp, snare-noise tuning, hi-hat pitch), and they can use one of four waveforms (sawtooth up, sawtooth down, triangle, rectangle). In addition, LFO1 can modulate LFO2. Both LFOs can run free or be retriggered with each note; they can also be synched to MIDI Clocks. I didn't use the LFOs much, but they can be instrumental in mutating the drum sounds into other synthetic sounds.

You might think that three voices is pretty skimpy, but this is much less of a limitation than it seems. After all, a live drummer can only trigger four voices at any given moment (one stick in each hand and a pedal at each foot), and even that is quite rare; most of the time, the hands are alternating in a right-left pattern, and the hi-hat foot pedal is used as a tone control more often than as a trigger. I find that limiting the number of voices used in a drum part on any drum machine or sampler often results in better-sounding drum tracks.

However, the 3-voice limitation does present a problem for creating a stereo image. As mentioned earlier, the XBase 09 has individual outputs for each voice, which means each one can be processed separately through an external mixer. But with only one output for all the cymbals and percussion, it is impossible to assign these sounds to different positions in the stereo field. Most producers these days tend to put the kick and snare dead center while placing the cymbals and toms in different positions, so this is a pretty serious limitation.

PROGRAMMING INTERFACE

The XBase 09's pattern-programming interface is pretty similar to the TR-909's. The controls include sixteen LED buttons that normally represent 16th-note steps in a pattern. (They can also be adjusted, using the Scale function, to represent 8th notes, 8th-note triplets, 16th-note triplets, or 32nd notes.) These buttons also provide access to a variety of editing and system functions when you press the Shift button.

To program a drum to sound on a particular step, first make sure the desired drum (kick, snare, closed hi-hat, open hi-hat) is selected by pressing the drum's button until the corresponding LED lights up. Then, press the LED button representing the desired step until it is lit. To remove a drum hit, push the step button until it is dark.

Like the TR-909, the XBase 09 has only two "velocity" values—accented and unaccented—and the accent status of

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

XBase 09 Specifications

Synthesis Type	analog (kick, snare); sample-playback (hi-hat, etc.)
Polyphony	3 notes
Kits (RAM/ROM)	100/0
Patterns (RAM/ROM)	64/0
Songs (RAM/ROM)	10/0
Audio Outputs	3 individual and 1 mix, all ¼"
Dimensions	13.2" (W) x 9.6" (D) x 3.0" (H)
Weight	9.9 lbs.

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each drum hit is controlled with the Accent button. Also like the TR-909 (but unlike the TR-808), the XBase allows each drum to be accented independently; for example, the kick drum can be accented on different notes than the snare drum.

The XBase 09 offers a Song mode that lets you arrange patterns in a specific order. The interface for this is pretty rudimentary; it's not significantly easier or more difficult to use than the same controls on the TR-909 or TR-808. The onboard memory can store up to 64 patterns and 10 songs. Patterns are assigned to as many as 100 steps in each song, and the pattern in each step can be repeated up to 255 times.

Unlike the TR-909 or TR-808, the XBase 09 offers some very interesting facilities in its Pattern mode for manipulating the sounds at each step in a pattern. Specifically, you can program a different sound for each instrument at each step, which can result in some remarkably expressive patterns. Here, the XBase 09 shines.

Entering this mode requires a strange combination of multiple, simultaneous keypresses. Once you have performed this contortion, you can select one drum hit, tweak the knobs that affect the sound for just that hit, then move on to another hit and repeat the process. It's very easy to come up with patterns that never repeat the same sound twice. This is extremely cool. It sounds great, and it's quite difficult to elicit this kind of expressiveness from sample-based drum machines.

Performance mode will be familiar to those who have worked with a TR-909 and a tape deck. In this mode, you tweak the controls as the patterns play. Unfortunately, any programming of the individual sounds for each note is ignored. Performance mode is oriented toward playing the knobs live. I find Pattern mode much more exciting.

The XBase 09's user interface is pretty difficult to work with, at least initially. With only a 3-digit numeric display and over 30 buttons and LEDs, it is definitely an early 1980s–style interface. You must figure out which mode you're in by remembering what you did last and looking at which LEDs are on, which are off, and which are blinking.

There isn't any kind of edit-compare, write-confirm, or undo function in this box. In Write mode, every action you take overwrites whatever was already in memory. For example, if you enter the mode that programs sounds for the entire pattern, but you think you're in the mode that programs sounds for each note, you can easily wipe out all the individual sounds you've programmed for each note of the pattern.

On the positive side, once you get used to the interface, you can get around it pretty quickly. If you've already used vintage gear, like TR-808s and TR-909s, you'll probably get used to this box fairly quickly.

MANUAL LABOR

When learning to work with a device that doesn't provide clear user feedback (such as the XBase 09), a good manual is essential. Unfortunately, the manual for the XBase 09 is absolutely the worst I've ever read. It seems to have been translated literally from a foreign language (presumably German). Here are a couple choice quotes.

Describing the XSnapp parameter of the snare drum: "XSnapp equalises (sic) the Snappy and the 909 to one value and is then intensified in the sound part."

Explaining how to hook up the audio connections: "Connect the desired sound exit via the 6.3 mm pawl wire with the audio exit of your mixer."

JOMOX
XBase 09 drum machine
$1,050

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

PROS: Excellent kick drum sound. True analog emulation of TR-909. Easy to achieve lots of variation/expressiveness in all the drum sounds.

CONS: Stereo imaging of cymbals and other percussion sounds is impossible. Hi-hat section is weak. Interface is quirky with long learning curve. The manual is ridiculously bad.

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WRH

The second quote is really special to me because it not only mangles the English language in a novel way but is also wrong. To the extent that I can understand it, I think it's telling you to connect the audio output (exit) of the XBase 09 to an audio output on your mixer.

Fortunately, the American distributor for the XBase 09, a company called SoundBox, has written a quick-start guide—a short tutorial that is fairly clear and easy to understand. Anyone getting started with the XBase 09 should use this guide first and then dig through the manual only if absolutely necessary. Also, SoundBox says it is working on a new manual.

MIDI IMPLEMENTATION

The MIDI implementation of the XBase 09 is better than that of the TR-808 or TR-909. (The TR-808 didn't have MIDI at all, and the TR-909 was a very early MIDI device.) The XBase 09 can be controlled via MIDI in a couple of different ways. The most obvious approach is to use the XBase 09 as a sound module and ignore the internal pattern/song sequencer. The module responds to all MIDI Velocity values; as mentioned previously, the internal sequencer supports only two Velocity levels. In addition, all the knobs are mapped to MIDI Control Change messages. You can do everything via MIDI that you can do with the internal sequencer and then some.

However, it isn't as easy to change the sound settings for every note using a MIDI sequencer as it is using the internal sequencer, and this is the key to getting interesting stuff out of the XBase 09. Using a MIDI sequencer, you'd need to record about eight Control Change messages before every Note On to achieve the same effect. The unit transmits a unique Control Change message when you move each knob, so it can be used as an input device for this purpose. But you really want to send a snapshot of all the control settings just before sending each Note On for that drum. This isn't easy to do with any MIDI sequencer I know of.

The other option is to use the internal sequencer and sync it to your MIDI sequencer using MIDI Clock. This works pretty well, as long as you always start the song from the beginning. The XBase 09 doesn't seem to support MIDI Song Position Pointer (the manual doesn't include a MIDI implementation chart, so it's difficult to know for sure). If you try to start the song from somewhere other than the beginning, the XBase 09 tends to get lost. (According to SoundBox, the software has been updated since we got our review unit and the new version supports Song Position Pointer.)

Perhaps you'd like to do most of your sequencing with your computer and dump the sequence to the XBase 09 to take advantage of the things its sequencer does well. This is possible but not without some pain. Using real-time recording and MIDI sync, you can transfer sequences from your computer to the XBase 09. But you must do it one bar at a time, because the unit can only record individual patterns, not entire songs. The XBase 09 can save and restore its internal memory using MIDI System Exclusive dumps, but there is no facility for recording an entire external MIDI sequence into it.

A UNIQUE APPEAL

The XBase 09 is a specialty box for a certain type of producer. If you're looking for a good, general-purpose drum machine, the XBase 09 is not for you. However, if you want the true analog sound of the TR-909 and digital emulation or sampling is not an acceptable option, then the XBase 09 is exactly what you need. If working with a quirky, old-fashioned, analog interface appeals to you, then this box will, too.

The XBase 09 does some things particularly well: it has a fantastic kick sound, and it's easy to vary all the drum sounds. However, it falls down in some areas that I consider essential. In particular, it can't place the cymbals and toms in a stereo field. In addition, the XBase 09 is a bit overpriced relative to current competing products (e.g., the Rave-o-lution 309, *ReBirth RB-338*, and the MC-303 and MC-505), but I doubt you can find a used TR-909 for any less, and it is superior to the original TR-909 in many respects.

Rob Rayle *is a founding member of San Francisco's Sacred Dance Society; trance dancing is a spiritual practice protected by the First Amendment. For more information, see www.ccc.org/sds.*

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DAKING

52270

A great mic preamp may be within your reach.

By Rick DiFonzo

My personal studio, like many others, features an MDM locked to a digital audio sequencer. These digital recording devices do not make tracks sound cold in and of themselves, but unlike analog recorders, they don't impart "warmth" or any distinctive sonic signature to the sound they record. If you want to add warmth to digital audio, you have to do it *before* the music is committed to tape or hard drive.

The most sensible place in the audio chain to add a distinctive sonic character when recording an acoustic source is the microphone. A good mic selection is invaluable, as is the patience to place a mic correctly to capture what you want. The next place for adding warmth is with the mic preamp. This stage of the chain is critical, and it's here that most personal studios (and some major leaguers) fall down. In most personal studios, you don't need the best mic preamp on every console channel; one or two quality mic preamps will do the job nicely if you bypass the console entirely when tracking.

Over the last few years, a boatload of new mic preamps and other gear featuring tube or other "retro" technology has appeared. In general, the best of this crop use higher-quality, costlier components instead of cheap, nasty-sounding transistors or IC chips. The Daking 52270 mic preamp is one such piece of professional equipment, using high-quality transformers; all discrete, Class A and AB1 circuits (no ICs); and mostly name-brand, American-made electronic parts. (Class A circuits typically use more current and produce more heat, but their sound is widely considered superior.) With good source material, a decent mic, and the 52270 in the chain, you can make your recordings sound better than if you use your mixer's onboard preamp.

FIRST GLANCE

The stainless-steel 52270 is striking in appearance and is built like a truck. It is available as a horizontal 1U rackmount unit or as a vertical module. An optional, rugged flight case ($225) holds up to four vertical or horizontal modules and the 48V power supply ($195). The front panel features large, sturdy, cast-aluminum knobs and a classic, British green finish that has a definite vintage look.

The unit's level, filter, and EQ controls are in the form of six dual-concentric knobs. These feature a sweepable inner pot and a switched outer ring. Other controls include mute, phase reverse, -20 dB pad in/out, and bypass switches.

The outer ring of the level-adjustment control selects mic and line levels; the inner control provides fine-tuning. A second dual control adjusts the high- and lowpass filters: the lowpass filter frequencies are selected with the inner control and the highpass frequencies using the outer ring. The other four concentric controls switch the unit's 4-band, fixed-frequency EQ. Here, the outer ring selects among four fixed frequencies (hence, the unit is not fully parametric), and the inner switch boosts or cuts by 17 dB.

The unit's faceplate has frequency markings, but there are no designations for boost and cut values. You can see the boost and cut position easily, but the combination of the faceplate and font colors makes it difficult to read the frequency values in low light. However, once you've used the 52270 for a while, this shouldn't be a problem.

The rear panel features transformer-balanced XLR mic and line inputs, an XLR output, and a TT insert jack. The insert jack is ideal for adding a compressor or noise gate to the chain. It is positioned after the highpass filter, which allows you to get rid of unwanted rumble before you compress or gate the signal. Bypassing the EQ also bypasses the insert loop.

AC power is delivered by an external supply that can power up to four modules. The supply connects via a DB25 serial cable.

IT'S ALIVE!

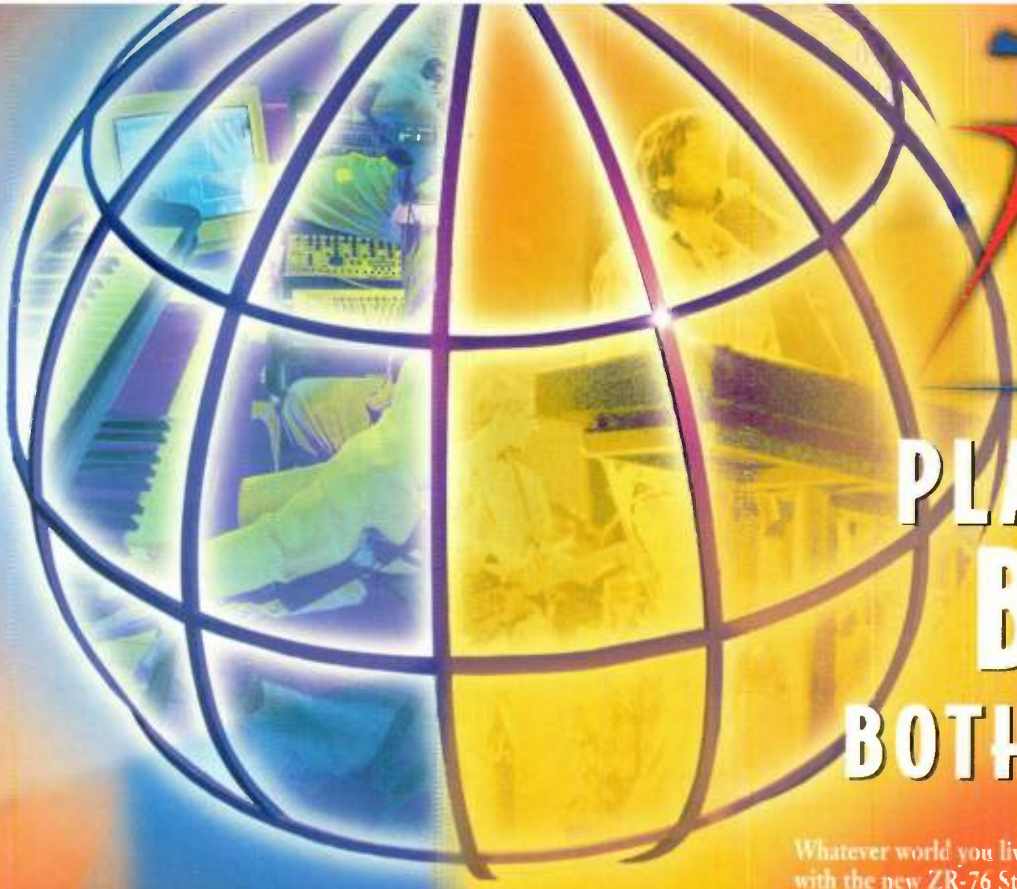
"Transparent" is a word often used to describe audio gear. Digital recording devices, compressors, and mic preamps are often described in this way. But where do you get your "colors"? Sure, black and white works but not all the time. Would you buy a vintage console if it didn't add its own distinctive character to the audio? It's doubtful. The Daking 52270 is *not* transparent: what goes in comes out sounding better.

I recorded the output of the 52270 directly to the balanced inputs of a TASCAM DA-88. The sound was open and alive, and everything was clearly positioned in the stereo field. My tracks seemed to jump out at me and were extremely punchy, extraordinarily clean, and warm.

The real thrill came when I kicked in the EQ, which is patterned after the rare and highly valued Trident A-range console EQ. (Only 50 of these units

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

The Daking 52270 mic preamp/EQ is available in two configurations; shown here is the 1U horizontal configuration. The vertical, "lunchbox" version holds up to four modules. The six dual-concentric controls adjust the input levels, high- and lowpass filter cutoff frequencies, and EQ center frequencies.



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were made and only 13 are thought to still be in existence.) This is where the 52270 really excels. I was able to radically shape things or just tweak a little. The switched outer ring allows you to easily recall settings, and I assure you that the fixed frequencies are in the right places: I never felt the need to get between them.

MAKING TRACKS

I tested the 52270 on clean and grungy electric guitars, acoustic guitars, male vocal, bass, mandolin, Dobro, tambourine, maracas, and harmonica. Over the course of the evaluation period, I recorded a wide variety of music ranging from soft acoustic stuff to mind-numbing thrash. Unfortunately, I was not able to test the 52270 on drums in my own sessions, but I was a part of a recording date where it was used on kick and snare, and I loved the results.

I used Shure SM57s for much of my early testing. These mics are common fare in a lot of personal studios, and I wanted to see how much of a difference the Daking unit would actually make. I was very impressed: in spite of the expected limitations of this workhorse dynamic mic, electric guitars were clear and distinct, acoustic instruments kept their woody quality, and percussion came through nice and bright. There seemed to be more space around everything; it seemed like the lid was lifted and the sound came pouring through.

Although an SM57 is useful in many applications, a great condenser mic can allow much more detail and personality to come through. So after completing my tests with the budget dynamic mic, I moved on to better mics. For these tests, I used an AKG C 414, Sennheiser MD 421, and Microtech Geffel UM70 and M300. All of these mics naturally imparted their own character to the sound, but all were significantly improved by the use of the 52270. For instance, vocals recorded with the 52270 and a condenser mic were present and airy and easily cut through a dense mix without being sibilant.

GUITAR MAN

One of the more difficult tasks for an engineer is getting truly monstrous electric guitar sounds. It takes a good guitar and amp, good ears, and patience. Plugging a variety of guitars into Marshall, Vox, Fender, and HiWatt amps, I found it easy to dial up raw sounds that blew me away. The 52270 yielded chunky, but distinct, power rhythm guitar sounds and blazing solo guitar sounds. The clean, jangly guitars also benefited from some very subtle tweaking, and they seemed *louder*, somehow.

Daking 52270 Specifications

Main Inputs	(1) balanced XLR mic, (1) balanced XLR line
Main Outputs	(1) balanced XLR
Other Connections	TT insert jack; DB25 power-supply jack
Frequency Response	20 Hz–20 kHz ±1 dB (1 dB down @10 Hz and 56 kHz)
Noise	-92 dB (1 Hz–25 kHz)
THD + N	0.0033% @ 1 kHz
IMD	0.004% @ 50 Hz/8 kHz
Input Level	mic: -15 to -60 dBv; line: -10 to +10 dBv
EQ Center Frequencies	low: 50, 80, 100, 150 Hz; low mid: 250, 500,1,000, 2,000 Hz; upper mid: 3, 5, 7, 9 kHz; high: 8, 10, 12, 15 kHz
EQ Q	varies from 0.5 to >3
EQ Cut/Boost	±15 dB
Lowpass Filter Cutoff Frequencies	25, 50, 100 Hz (12 dB/oct.)
Highpass Filter Cutoff Frequencies	8,10,15 kHz (12 dB/oct.)
Dimensions	rack version 1U x 10.5" (D); vertical version 1.75" (W) x 12.25" (H) x 10.5" (D)
Weight	rack version 8 lbs.; vertical version 7 lbs.

To try the 52270 with acoustic guitar tracks, I used a 1968 Gibson acoustic and two Microtech Geffel mics. With careful microphone placement and some subtle EQ, I found the best acoustic sounds I've ever gotten at home. I was stunned! The rich harmonic structure of the guitar was well defined, and I could dial in some extra sparkle while retaining the natural warmth of the instrument.

For bass guitar, the signal was split to both sides of a 2-channel (i.e., 2-module) unit so that I could take the direct and miked signals. The mic signal was punchy, deep, and tight, and the direct signal was edgy and clear as a bell. When mixed, they produced a truly sensational sound that pounded like an outhouse door in a hurricane.

MIX MASTER

When I patched the unit across the stereo bus during mixdown (with two Daking 91579 compressors connected via the insert jack), my mixes took on a new dimension. I found that I could set up a mix and then punch up the bottom, add some shine, and enhance the overall sound.

A lot of my mixes end up being broadcast "as is," without being tweaked by a mastering engineer, so the ability to get this extra sonic quality in my mixes made the 52270 a doubly welcome addition to my studio. The unit just made everything sound *better.*

In addition to balanced XLR audio I/O and a TT insert port, Daking's 52270 has an unusual DB25-pin connector for the power supply that powers all four modules.

WHY NOT THE BEST?

Other than having to squint to see the faceplate markings in dim light, I have no gripes. I would like to see a mic preamp–only version, with no equalization, just so everyone could afford to see what a difference this great preamp can make.

At $1,545 (without the road case), this unit won't be within everyone's budget. But all things considered, you get more than you pay for; to my ears, the 52270 favorably compares with, or surpasses, other units costing upward of $2,000. When we tracked the Joan Osborne album *Relish,* the 52270s were put up against quite a few big-name, vintage mic preamps, and they won the comparison battle every time.

The questions are, in these critical first stages of the audio chain, can you settle for adequate, do you want good, or do you insist on amazing? To a large extent, those questions will be answered by the size of your wallet. There are certainly less expensive mic preamps out there that do a fine job, and almost all are improvements over the typical personal-studio console's mic preamps. But if your budget allows, this unit will take your studio to a new level.

DAKING
52270 mic preamp/EQ
$1,350
power supply (powers four modules) $195
road case $225

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

PROS: Sturdy construction. Quality electrical components. Great preamp sound. Exceptional EQ with well-chosen center frequencies.

CONS: Moderately expensive. Difficult to read frequency values in low light. No boost/cut markings.

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July 1998

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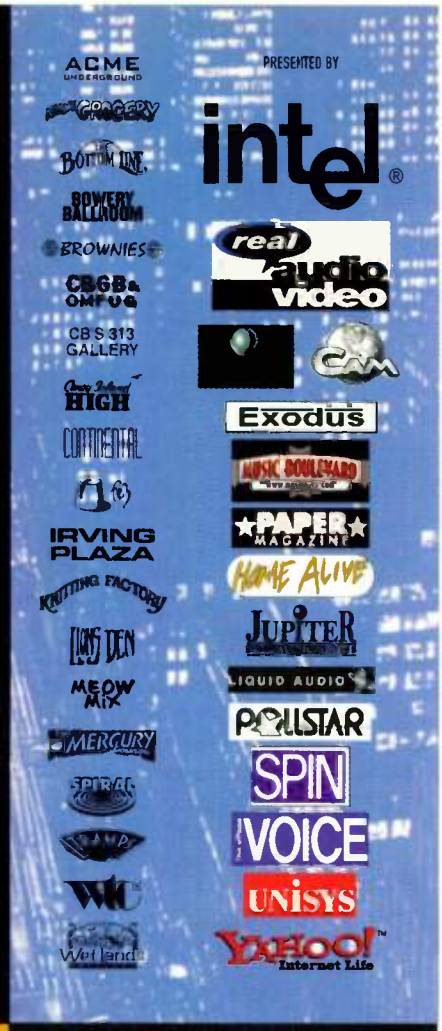

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INTEL NEW YORK MUSIC FESTIVAL

JULY 15-18

MAGIX ENTERTAINMENT

MUSIC STUDIO DELUXE 3.0 (WIN)

Powerful music production tools at a bargain-basement price.

By David M. Rubin

Expensive, high-end sequencers have always pushed the "wow" factor to new heights. But now that MIDI and digital audio have begun to appear together in entry-level music production software, high-end features have finally trickled down to be within the grasp of the financially strapped, aspiring desktop musician. This amazing trend represents a technological milestone in desktop music.

Magix Entertainment has entered this entry-level market in a significant way with the release of *Music Studio Deluxe* 3.0. For well under $100, this package provides a digital audio sequencer, called *MIDI Studio,* that supports 256 MIDI tracks (with resolutions of 48 to 720 ppqn) and 16 audio tracks. As a bonus, the *Music Studio Deluxe* CD-ROM also includes a separate multitrack audio recording and editing program called *Audio Studio.*

You won't find any ground-breaking features or stunning new design elements in *Music Studio Deluxe.* In fact, this software will probably give you a heavy dose of *déjà vu.* The derivative nature of the user interface and the overall architecture seem immediately familiar, especially when compared to sequencers from other German companies such as Steinberg. But innovative technology is not what *Music Studio Deluxe* is all about. More bang for the buck is the name of the game, and in that realm, this program delivers.

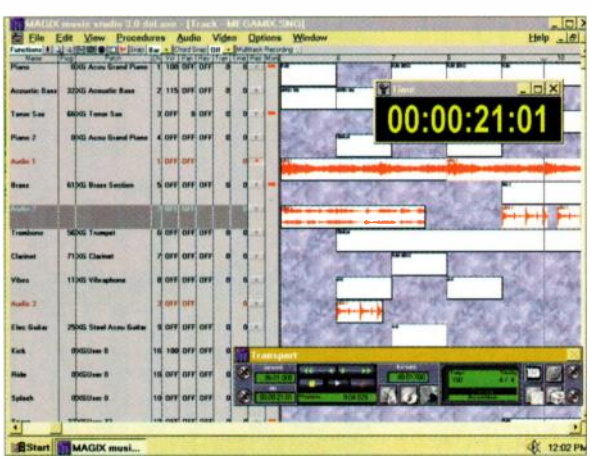

FIG. 1: The *MIDI Studio* part of *Music Studio Deluxe* offers a clearly designed, familiar-looking user interface that does a good job of integrating audio and MIDI data. The separate counter display can expand to fill the whole screen.

TRANSPORTATION

When you first open *MIDI Studio* (the main program in the package), you're presented with a traditional-looking Track window and a floating Transport window (see **Fig. 1**). The Transport window provides the usual buttons for recording, playing, and shuttling around the sequence. In addition to Step recording, the program offers two real-time record modes: Overdub and Replace. An LCD-style panel in the Transport window provides information on the current sequence, such as tempo, meter, and record mode. I found the display to be too dark and unnecessarily hard to read. Fortunately, the same can't be said about the Counter display. You can resize its window any way you want and make it large enough to read easily from 30 feet away. That can come in handy when you're working with microphones and other musicians.

Four buttons on the right of the Transport provide direct access to the primary editing windows: Event List, Piano Roll, Score, and Drum Editor (more on these a little later). Other boxes show left and right locators, elapsed time, and the current position. The remaining buttons enable and disable the Conductor track, the metronome, and a record/playback looping function.

ON THE RIGHT TRACK

MIDI Studio's Track window provides a standard 2-part display with a graphic representation of MIDI (and audio) data on the right and related track parameters on the left. The program allows you to show any or all of seventeen parameters, including track names, patch names, channels, ports, Volume, Pan, Reverb, Velocity, and transposition. A Time parameter lets you offset an individual track relative to the other tracks. And you can select patches from patch lists (a General MIDI set and several others are provided) instead of having to type in numbers.

Speaking of numbers, the program lets you edit numbers with the mouse as well as the keyboard. Clicking the right or left mouse button increases or decreases most parameter numbers by one. Holding the Shift key and clicking changes values by ten (or by twelve in the case of transpositions). However, effectively entering numbers with the mouse takes some practice, in part because pressing the mouse button too long causes the numbers to race up or down. Once you get used to it, though, mouse-button entry can speed up many editing tasks.

The right side of the Track window is called the Pattern Display area. As the name reveals, *MIDI Studio* takes a pattern-based approach to sequencing. Each time you enter MIDI data, the recording appears as a rectangular box, called a *pattern,* along a horizontal timeline. A pattern can be cut, copied, pasted, deleted, and dragged around the display to change its position in time or its assigned track. Because patterns can be any length, you can treat *MIDI Studio* as a linear-style sequencer by simply recording a single, long pattern for each track. But the program is clearly oriented toward combining and rearranging individual measures, phrases, and other chunks of music to form larger works.

One of the program's most powerful features—especially in view of its pattern-based orientation—is its ability to designate copied patterns as being either Parents or Children. When you copy a pattern as a Parent, you simply create a new, discrete pattern with the same material as the original (just like Copy and Paste in a word processor). When you copy a pattern as a Child, however, the new pattern does not contain its own events. Instead, it refers back to the Parent pattern for its data. Therefore, if you change the events in the Parent pattern, all of its Child patterns are instantly updated to use the new events (as in changing a Style format in word processing). The Child

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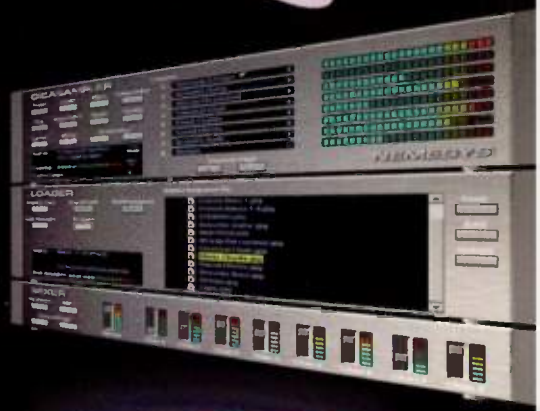

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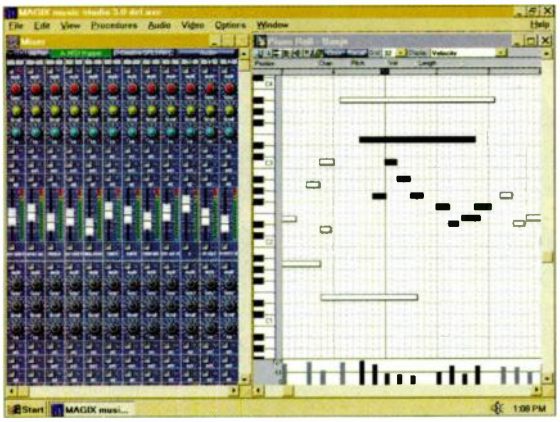

FIG. 2: *MIDI Studio*'s collection of editing windows includes a great-looking mixer and a typical piano-roll display with a bar graph at the bottom for controller data.

does have some independence, though. It can play back on a different MIDI channel than the Parent, for instance, and you can transpose it up or down relative to the Parent.

This Parent/Child approach to working with patterns provides a powerful tool for developing rhythm-section parts or for composing in popular styles that depend heavily on repetition. By copying and pasting with Child patterns, you can easily modify a 16-measure bass track, for example, by simply altering the original pattern. That encourages experimentation and speeds up editing considerably.

MORE WINDOWS

Aside from the Track window, *MIDI Studio* provides a standard complement of MIDI-editing windows. A great-looking 3-D Mixer window (see **Fig. 2**) includes separate sets of faders for MIDI and digital audio tracks. Onscreen knobs let you adjust the pan position and add reverb and chorus to any MIDI track. A Snapshot button allows you to record current fader and knob configurations to automate the mix.

The Piano Roll window is unremarkable but nonetheless clearly designed and easy to use. You can adjust the Grid resolution from 1-measure to 64th-note-triplet divisions. Two sets of Zoom buttons make it possible to zoom in or out vertically and horizontally. Notes can be dragged around and stretched or shortened, and the program allows you to select noncontiguous notes for editing. You can also drag a lasso around a group of notes to select them for editing.

At the bottom of the window, a narrow strip graphically displays Velocity, Pitch Bend, or other controller data. You can add or edit data directly in the display with the Pencil tool. When Velocity is shown, you can move notes horizontally by dragging the corresponding Velocity bar left or right. That comes in handy because you can move a note in time without accidentally changing its pitch.

The Event List window in *MIDI Studio* allows you to view and edit MIDI events in a familiar chronological format. You can change the Velocity, length, pitch, or position of MIDI notes with the keyboard or with the mouse buttons as described earlier. Working with the event position numbers (e.g., Note On times) is often frustrating, however, because as soon as you change the number, the event snaps to its new location before you have a chance to confirm the change. Often the event disappears completely from sight and you have to scroll through the list to find it again. It would be better if you could make the changes and then confirm them by hitting Enter or clicking outside the number field with the mouse.

One feature that I especially like in the Event List window is a row of buttons called the Display Filter. It lets you select which types of MIDI Events will appear in the list. If you only want to see notes and Pitch Bend data, for example, you just click the appropriate buttons. That makes it easy to edit specific types of events without resorting to dialog boxes or drop-down menus to change the display. As in the Piano Roll window, the Event List window allows you to select noncontiguous events.

I was pleased to discover that *MIDI Studio* includes a specialized Drum Editor window for creating drum-machine-style rhythm parts (see **Fig. 3**). The graphic display includes a vertical list of percussion sounds on the left and a grid (with adjustable resolution) on the right for depositing hits along a time line. The setup is similar to the Drum Edit window in Steinberg's *Cubase VST*. Large and small Drumstick tools allow you to add notes with two different user-defined Velocities. After the notes are in place, the Velocity Modifier tools allow you to increase or decrease Velocity values (in increments of ten) by clicking on the hit markers.

The program color codes the drum hits according to their Velocity values (with eight colors), so it's easy to see where the accents are. Interestingly, but confusingly, the colors don't correspond to absolute values. Instead, for each instrument they represent values relative to the setting for that instrument in the Velocity column. A red indicator may therefore represent a value of 127 for one instrument and 100 for

A LITTLE MORE LITE

Magix *Music Studio Deluxe* packs a good many features into an entry-level package. Its most noteworthy feature is how little the whole thing costs in the first place. Nevertheless, if you're working with a severely restricted budget, you might be interested in the nondeluxe version of the package. It's called simply *Music Studio* 3.0, and it includes most of the important features found in the deluxe version for an amazing $49.99.

For this modest price, you get the same *MIDI Studio* and *Audio Studio* combination but with trimmed-back versions. *MIDI Studio* (nondeluxe) provides eight instead of sixteen audio tracks, 128 instead of 256 MIDI tracks, nonrecordable mixer controls, and single-staff instead of multiple-staff score displays. The program also lacks patch lists other than GM and can't import AVI files.

Even with its missing features, however, Magix *Music Studio* 3.0 is worth considering if you want to get started combining MIDI with digital audio. The most important MIDI and audio-editing features are still in place, and the price is really hard to beat.

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

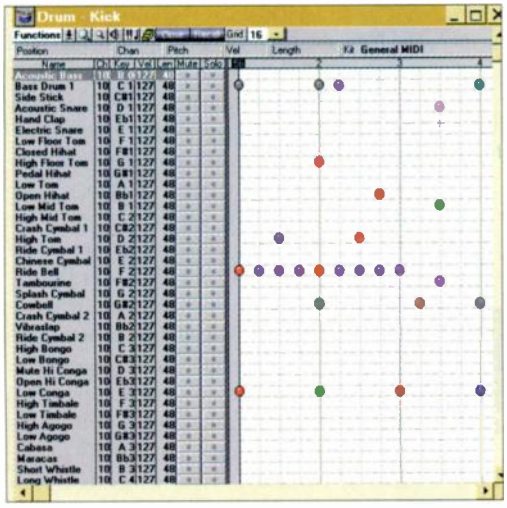

FIG. 3: The Drum Edit window enables you to create rhythm parts by placing hits on a grid. Different colors represent different relative Velocities.

another. Still, the varying colors allow you to see the changing Velocities within a given instrument's pattern. And the relative-value system lets you balance instrument volumes before you start creating your rhythm parts, which is helpful.

MIDI Studio also includes a Score Editor window where you can view your sequence in standard notation, add lyrics, and print the music. The page-layout capabilities are minimal, and most changes to the score do not affect the MIDI data. You can, however, correct note pitches by dragging the note heads up or down or by clicking on them with the Sharp or Flat tool. And you can change note positions along the staff by dragging notes left or right.

AUDIO TRACKING

In addition to its MIDI tracks, *MIDI Studio* can record and play back as many as sixteen audio tracks (depending on your computer and hard disk). The program supports mono or stereo audio with sampling rates of 11.025 kHz, 22.05 kHz, and 44.1 kHz. You can record one mono or one stereo track at a time (recording is always 16-bit), and if your sound card supports full-duplex operation, the program lets you record and play back simultaneously. A set of VU meters helps you adjust recording levels, but the program doesn't provide any input level controls. In addition, you can import as many as 100 WAV files into a sequence where they appear as patterns in the Track window along with the MIDI patterns.

The imported WAV files are viewed and edited in the Audio window, which provides a typical waveform display but, unfortunately, without any vertical or horizontal scale markings. Clicking the left mouse button sets the playback start point; clicking the right button sets the end point.

As an alternative, you can also set region boundaries by entering numbers in the Information line above the waveform. Beyond that, there is little wave editing available within the program. When you close the window, any changes that you've made are reflected in the corresponding audio patterns in the Track window.

MORE AUDIO TRACKING

Magix *MIDI Studio* comprises the main part of *Music Studio Deluxe,* and the company assumes that this is where most of your creative activity will take place. But the other part of the package, Magix *Audio Studio,* is a surprisingly powerful companion piece. With *Audio Studio* you can record, play back, and edit up to eight tracks of audio with sample rates of up to 48 kHz (16-bit only).

When the program first opens, you're presented with a large multitrack project window where recorded and imported audio files appear as waveforms along a time line (see **Fig. 4**). Settings are assigned in a separate Record Parameters dialog box that also displays a pair of amusingly retro-looking, analog-style VU meters. For another view of the incoming audio, you can open a simple oscilloscope display. Recordings can be made directly to hard disk or to RAM. They are then nondestructively edited to form Virtual Projects by simply dragging and dropping selected regions into as many as four tracks. (You can also record directly into a Virtual Project.)

Music Studio Deluxe 3.0
Minimum System Requirements
100 MHz 80486 or Pentium PC; 16 MB of RAM (32 MB recommended); Windows 3.1/95/NT; 10 MB of disk space; 16-bit sound card; CD-ROM drive.

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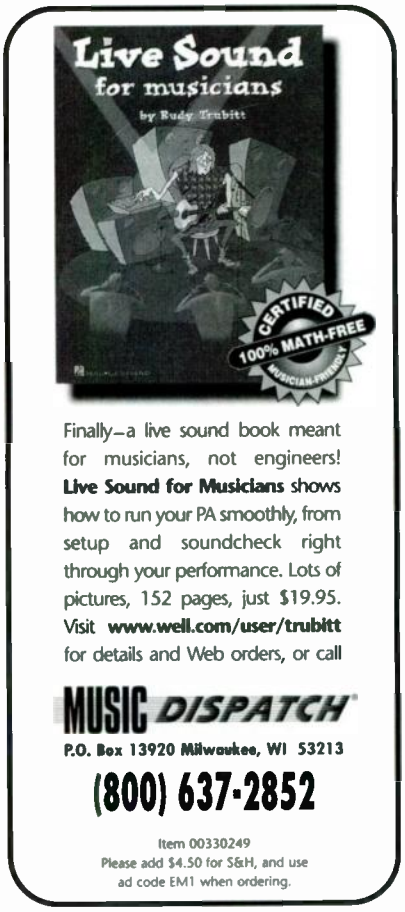

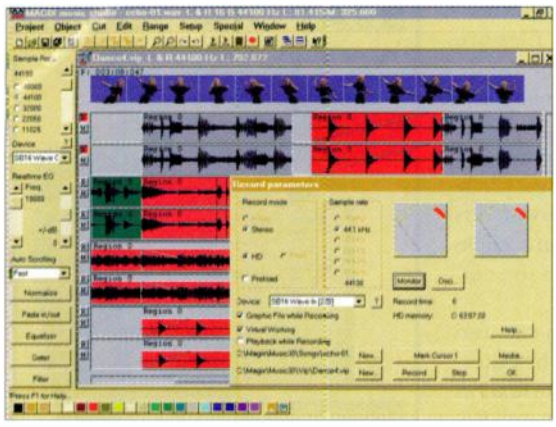

FIG. 4: The *Audio Studio* part of *Music Studio Deluxe* allows you to record and edit up to eight tracks of audio. In the top track, you can see the individual frames of an imported AVI movie clip.

For an entry-level program, *Audio Studio* boasts some impressive features, including 100 levels of Undo and the ability to synchronize audio with MIDI files and onscreen AVI movies. In fact, with *Audio Studio* you can extract the soundtrack from an AVI video clip, convert it into a WAV file, edit the music or create your own synchronized score, and lay the new soundtrack back onto the video clip. You can even view the individual video frames as a series of thumbnails above the audio tracks.

Although *Audio Studio* doesn't provide any MIDI editing capabilities, it does fill in many of the audio editing functions that are missing from *MIDI Studio*, including normalize, crossfade, crossfade loop, invert, reverse, and fade in/out (linear, exponential, or logarithmic). The program includes a 5-band graphic equalizer with real-time preview; adjustable reverb and echo effects; pitch shifting; time stretching; and highpass, bandpass, and lowpass filters. A Noise Reduction command attenuates the high frequencies, and a Hum Reduction command suppresses frequencies around 50 and 100 Hz. (Actually, the filters are centered on 55 and 110 Hz as a compromise between European and U.S. requirements.) The program does not currently support plug-ins.

If you right-click on one of the waveform displays, a set of grab handles appears around the waveform. By dragging the handles in the lower corners left or right, you can lengthen or shorten the playback area of the audio file. The handles in the upper corners enable you to create fades in and out for the waveform. In addition, a single handle at top center allows you to adjust the overall amplitude of the waveform. Unfortunately, you can't add more handles to create multiple fades with the mouse. More extensive editing is done by double-right-clicking on a waveform to open a separate editing window. In this enlarged display, however, edits are done mainly through dialog boxes.

MAGIX ENTERTAINMENT
Music Studio Deluxe 3.0
music production software
$89.99

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

PROS: Sequencer provides easy-to-use interface and good assortment of MIDI-editing tools. Includes dedicated drum editor. Good integration of audio and MIDI in the sequencer. 100-level Undo command and support for editing AVI audio tracks in the audio editor.

CONS: No connection between *MIDI Studio* and *Audio Studio* components. Inadequate hard-copy documentation. Audio editor less user-friendly than sequencer. Does not support plug-ins.

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QUIBBLES AND BITS

Audio Studio boasts a number of useful features, and it serves *Music Studio Deluxe* well by providing important audio editing functions that are missing from *MIDI Studio*. But *Audio Studio* isn't the ideal partner for *MIDI Studio*. The two programs employ completely dissimilar user interfaces and aren't integrated in any meaningful way. For example, Virtual Project files from *Audio Studio* must be saved as WAV files and imported into *MIDI Studio* before they can be used. And WAV files in *MIDI Studio* must be exported to *Audio Studio* for editing and then imported back into *MIDI Studio*, which breaks the MIDI/audio sync. Furthermore, *Audio Studio*'s user interface and overall architecture seem overly complex and unintuitive for an entry-level package. The drop-down menus alone present the user with well over 200 often bewildering options, many on cascading lists.

The biggest shortcoming with the *Music Studio Deluxe* package, however, is in the nature of its documentation. The software includes a hard-copy owner's manual that contains about 100 pages of introductory material, mostly in the form of tutorials. The tutorials do an adequate job of introducing you to *MIDI Studio* and getting you started, but they fail to cover dozens of important areas in the program. For example, specialized Chord Track and Chord Wizard features, which can generate simple auto-accompaniment parts (in sixteen styles), are completely neglected. The *Audio Studio* half of the package is also given short shrift; the manual offers a mere 8-page introduction to a program that clearly needs much more.

In fairness, a complete manual that thoroughly covers both programs is available, but it's provided only in electronic form as an Adobe *Acrobat* file. (The CD includes *Acrobat Reader*, which must be installed to read the manual.) Of course, you can print out the document if you have lots of paper and you're not in a hurry: the 360-page manual (which lacks an index) can easily take up to six hours to print. (*Acrobat* files generally print more slowly than text-only files.) With documentation so inconvenient to access, exploring the nooks and crannies of this software is more difficult than it should be.

Nevertheless, in spite of a few shortcomings, Magix *Music Studio Deluxe* has a lot to offer the budding desktop musician. Intermediate users, too, will likely find this software combo capable of their most challenging music production tasks. *Music Studio Deluxe* offers a solid set of MIDI-handling tools in a package that integrates MIDI with multitrack digital audio and video. It all adds up to a pile of powerful production tools for less than a hundred bucks. And that means you don't have to sell your car just to add vocal parts to your MIDI tracks.

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

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LIQUID AUDIO

WAVES

MAXXBASS 2.3 (MAC/WIN)

Satisfy your bassist instincts with this powerful plug-in.

By Bill Whitehouse

Making a mix portable enough to sound balanced in speakers of all sizes is one of the most difficult and time-consuming exercises in audio engineering. It requires a trained ear and lots of experience in the finer points of using equalizers, limiters, and compressors. Days can be spent fine-tuning a balanced mix on the flat-response monitors in the personal studio, only to have that balance destroyed when the mix is played through the smaller speakers of a car stereo. Conversely, a mix that has been specially tailored to the limited frequency response of car stereo speakers can sound muddy when played through the larger speakers of the home stereo.

With *MaxxBass* (see **Fig. 1**), Waves has created a plug-in that offers a distinctive solution to the portability problem. It creates the psychoacoustic illusion of an extended bass frequency response by adding harmonics to the source mix. The software can therefore be used to enhance the bass response of any mix, making it more listenable at lower volume levels, and to correct for the narrow frequency response of smaller speaker systems, such as car or theme-park loudspeakers. Moreover, *MaxxBass* supports a number of Mac and Windows formats, including TDM, Sound Designer II, VST, Premiere, and DirectX.

CREATING THE ILLUSION

Instead of attenuating or amplifying harmonics that already exist in the mix (as equalizers and compressors do), *MaxxBass* analyzes the frequency spectrum and computes a new set of harmonics. These harmonics create the psychoacoustic illusion that you are hearing bass frequencies lower than the speaker can actually produce. In effect, they are constructed to suggest the existence of a fundamental tone that does not exist in the output, although it must exist in the input for *MaxxBass* to work.

The bass harmonics that originally existed in the mix can be lowered in amplitude below a selected cutoff frequency so that the addition of the computed harmonics does not change the perceived amplitude balance. Finally, the computed bass harmonics are added to the attenuated original bass harmonics at the output (see **Fig. 2**).

ON THE SCREEN

MaxxBass's main screen is another of Waves' cleanly constructed plug-in interfaces. The screen is dominated by a large Cartesian graph on the top left, which contains two superimposed curves, one light blue and one yellow. The blue curve represents the frequency curve of the bass harmonics in the original mix. The yellow curve represents the frequency curve of the *MaxxBass*-generated harmonics.

MaxxBass enables you to define both the shape and the intersection of these two curves, which determines the mix of the original bass harmonics and the software-generated harmonics in the output. Setting the intersection (the "crossover frequency," as Waves calls it) is quickly done by moving the Frequency slider located below the graph. The exact frequency in hertz is displayed to the right of the slider. Next to the graph, two faders labeled Bass and MaxxBass define the shape of the two curves by setting their overall amplitude. The amplitude settings (in decibels) are displayed below the faders.

As with other Waves plug-ins, such as *TrueVerb*, the curves in the graph window can be selected and moved directly with the mouse. This is a well-conceived, intuitive feature of the interface; it incorporates the functionality of the Frequency slider and amplitude faders into a single control. While using *MaxxBass*, I generally found it easier to make approximate settings with the graph and fine-tune the settings using the Frequency slider and amplitude faders.

A Monitor button provides for separate monitoring of the original bass harmonics, the *MaxxBass*-generated harmonics, or the mixed output. This feature is a real help if you aren't sharp-eared enough to distinguish between two mixed sets of bass harmonics.

Beneath the Frequency slider, there are two additional sets of controls called the Harmonics and Dynamics sections. The Harmonics section consists of two buttons that offer a choice of operations on the harmonic signal generated by the *MaxxBass* algorithms. The first is a toggle button that sets a highpass filter to any of three modes. In one mode, the filter removes frequencies below 16 Hz, with a 24 dB/octave rolloff, a setting designed to remove DC signals and other very low frequencies; in the second mode, you can remove frequencies below a cutoff determined by the Frequency slider, with a 12 dB/octave rolloff; and the third mode allows you to remove frequencies below the Frequency slider's setting, with a 24 dB/octave rolloff.

The second button determines the rate at which the *MaxxBass*-generated harmonics decay. Longer decays increase

FIG. 1: The *MaxxBass* user interface is clear and easy to use. A large graph shows the relationship between the original bass frequencies and the newly generated harmonics.

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

the harmonic content of the output, and they tend to make the output sound more full in smaller speaker systems. In larger speaker systems, the enhanced harmonic content can reduce the clarity of the signal, which makes it sound blurry.

The Dynamics section also contains two buttons: the Ratio control and the Response control. The plug-in includes an upward compressor that is applied only to the *MaxxBass*-generated harmonics; the Ratio control determines the compression ratio applied to the software-generated harmonics. When the ratio is 1:1, the harmonics are approximately the same as in the original. The *MaxxBass*-generated harmonics are increased as the ratio is raised.

When you change the Response value, the compressor responds faster or slower to the original bass signal, simultaneously controlling the attack and release. Together, these controls further enhance the character of the *MaxxBass* effect by allowing the user to either blend the effect more seamlessly into the mix or bring it out to change the overall character of the low end.

All of this functionality adds up to a considerable, if perhaps unorthodox, level of control over the bass frequencies in a mix. The need for this degree of control becomes obvious when one realizes that *MaxxBass* essentially creates harmonic artifacts in the low end of the frequency spectrum. Although these artifacts are computed to be as compatible as possible with the rest of the signal's frequency content, the fact remains that the computed harmonics are not a natural part of the original signal.

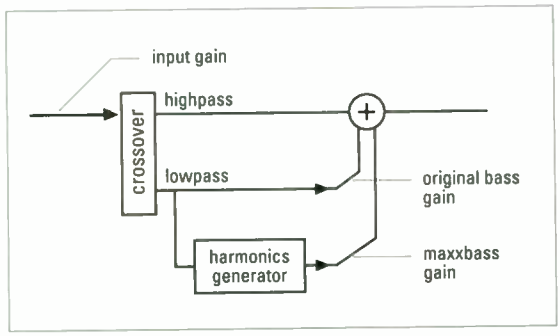


FIG. 2: This diagram shows how *MaxxBass* splits and then remixes the input signal during processing.

MaxxBass, therefore, isn't as straightforward as audio processing such as equalization and compression, where alterations in the harmonic content and dynamic range are limited to the signal already present in the mix. The harmonics generated by *MaxxBass* are different for every mix, so using *MaxxBass* necessarily involves a certain amount of trial and error to determine the right amount and character of the effect to apply.

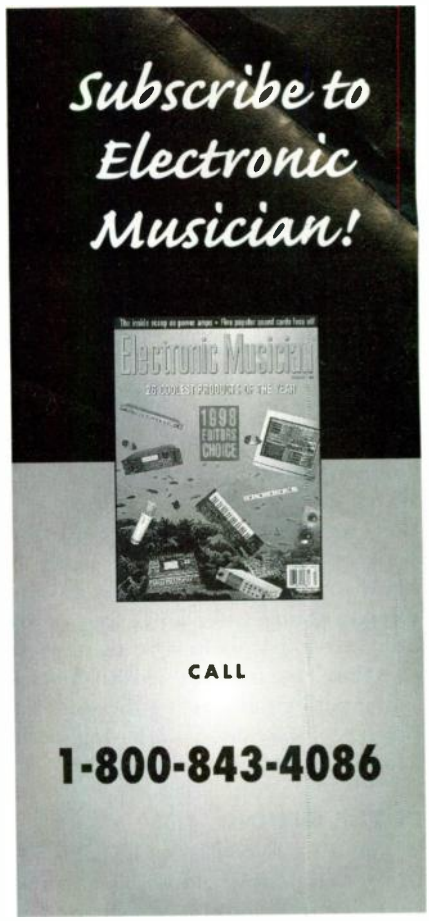
Fortunately, Waves provides the user with a number of starting points in the form of several subtle, and a couple of not-so-subtle, presets. The not-so-subtle presets, such as "Dies Bassum," involve some of the more exaggerated settings to illustrate unnatural effects. These presets are useful in training the ear to identify the software's effect on a variety of mixes. Ambient artists and engineers may also find these exaggerated effects useful for producing booming low ends in their mixes.

BY THE BOOK

The documentation is perhaps a little too concise. Very little space is devoted to describing *MaxxBass* beyond its basic controls. This isn't a major problem, however, because the plug-in's interface is so clearly laid out that it's almost self-explanatory. Brief guidelines on using *MaxxBass* in mastering situations are provided, but more detailed information on specific mixing and mastering situations would have been even more useful. Still, the information is thorough enough to give the new user a good starting point for experimentation.

When the plug-in is installed, the purchaser must contact the Waves dealer (or Waves directly) for a password that will enable the plug-in. Although

MaxxBass
Minimum System Requirements
PC: 80486; 16 MB RAM for basic processing, 24 MB for multitrack applications; Windows 95 or NT; 16-bit sound card.
Mac: 68040 or Power Mac; 24 MB RAM for basic processing, 32 MB for multitrack applications; Mac OS 7.5 or higher. If used with *Cubase VST:* 110 MHz CPU with L2 cache (150 MHz with L2 cache recommended).



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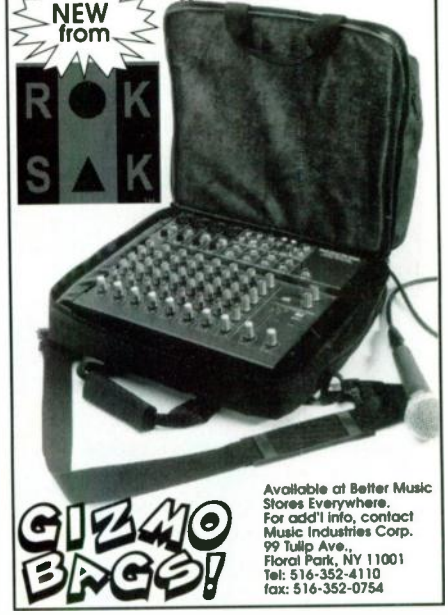
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this isn't terribly convenient, the process isn't as painful as it sounds. Enabling my copy of *MaxxBass* took only a couple of minutes. Waves also provides a means of obtaining the password through the company's Web page, although you must have Microsoft's *Internet Explorer* version 3.0 (PC) or 3.01 (Mac) to use this method.

The authorization process assumes, however, that you already have a WaveKey hardware dongle installed. If you purchase *MaxxBass* as part of a Waves "bundle," the package includes a WaveKey. If you already own other Waves plug-ins, you will probably already have a WaveKey installed. Only one is required per CPU. But if you don't have a WaveKey, you'll have to purchase it separately ($100) and install it before authorizing the software. Buying software and then having to buy a key separately is pretty strange.

IN THE STUDIO

When using *MaxxBass* and *Cubase VST* to remaster some old ambient tracks that needed cleaning up in the low end, I found that *MaxxBass* was most effective when placed just before Waves' *Q10* equalizer in the effects chain. That allowed me to balance the high and middle frequencies with the increased presence of the low end. As a test of *MaxxBass*'s ability to make mixes more portable to smaller speaker systems, I played the processed tracks through a set of 3-inch JVC speakers plugged into a Walkman.

The result was a clearer, more colorful overall sound. Not only did *MaxxBass* enhance the sharpness of the low end, but the enhanced low end gave more presence to the higher frequencies. Those tiny JVCs never sounded so good.

Next, I used *MaxxBass* alone (*Q10* was not in the effects chain) to process a techno demo song that was produced with Steinberg's *ReBirth*. Interestingly, the effect of *MaxxBass* on the punchier Roland TB-303–style bass lines was not as pronounced as on the smoother ambient bass.

A noticeable *MaxxBass* effect occurred only when I attenuated the original bass harmonics nearly to silence and amplified the *MaxxBass*-generated harmonics with *Q10*. The resulting bass enhancement was thin and unnatural-sounding, however. A quick check in the *MaxxBass* manual confirmed this; *MaxxBass* works best on mixes with a spectrally balanced low end. In other words, if the low end of the mix consists of a narrow band of frequencies that are much louder than the rest, Waves recommends using equalization instead of *MaxxBass*. Techno artists who might expect *MaxxBass* to further deepen those low, resonant TB-303–type basses should probably reconsider.

Users of other Waves plug-ins will not be surprised to learn that the effect of *MaxxBass* on source mixes is clean and transparent, with no discernible coloration.

IN THE END

Can this plug-in create mixes that have the same full bass response when played on car stereos and studio monitors? To an extent, yes. The psychoacoustic effect that *MaxxBass* produces is subjective, though. Potential users of *MaxxBass* should not consider it a panacea for the portability problem.

As with all effects, this plug-in works best when it is applied only as much as is absolutely necessary. If used judiciously, *MaxxBass* can be a valuable addition to the audio engineer's arsenal of tools.

Musician and software engineer **Bill Whitehouse** *is currently working with the University of Illinois's Computer Music Project on what will eventually be a parallelized, real-time additive synthesis program.*

WAVES
MaxxBass 2.3 (Mac/Win)
bass enhancement plug-in
MaxxBass $300
WaveKey $100

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

PROS: Easy-to-use interface. Effect does not color the source.
CONS: Documentation needs more examples. Inconvenient copy-protection mechanism. Quality of effect is source-dependent.
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ALTERNATE MODE

DRUMKAT TURBO

This KAT hasn't used up its nine lives yet.

By Steve Wilkes

DrumKAT lovers are a loyal legion. Those of us who have pledged our fealty believe we use the finest MIDI percussion controller on the planet. Now it's time to meet the new drumKAT Turbo, which works like the old drumKAT, only better.

Despite KAT's popularity among percussionists, the economics of the music-manufacturing industry forced the company out of business two years ago. Like a phoenix, however, the product line has risen from the ashes in the form of a new company called Alternate Mode, headed by former KAT VP Mario DeCiutiis.

The latest version of the standard drumKAT, version 3.7, is available at dealers around the country. In addition, a "power user" upgrade called Turbo 4.0 is available directly from the factory; just send your drumKAT (any version) to Alternate Mode. Alternately, you can special order a drumKAT 3.7 with the Turbo 4.0 upgrade from a dealer.

FROM THE TOP

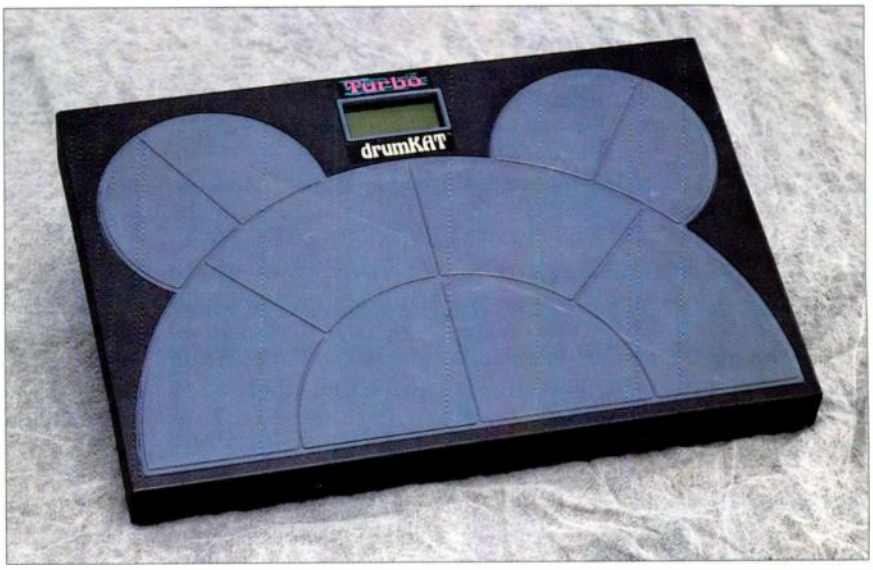
The physical structure of the drumKAT has not changed; it has the same pad layout, pedal and trigger connections, and small but effective LCD screen as before. One look, and you'll know the KAT is back. I would have liked to see a larger screen, though; it would have made the user interface even more user friendly.

Like its predecessors, the drumKAT is a MIDI percussion controller (with no onboard sounds) designed primarily for drum-set players and percussionists. Its ten gum-rubber pads use force-sensing resistors (FSRs) to detect hits (see **Fig. 1**). The pads are intended to be hit with sticks, but they respond fairly well to being struck with hands.

In addition to the pads, there are nine inputs on the back for external trigger sources (see **Fig. 2**). In addition, the unit provides ¼-inch inputs for four

footswitches. These footswitches allow you to access editing functions, cycle forward or backward through stored Kits (patches), execute MIDI performance and controller functions, and control external sequences and internal Motifs. (The drumKAT comes with only one KF1 footswitch.) The two remaining ¼-inch inputs accommodate a breath controller and foot controller (which is intended to simulate a hi-hat pedal).

The back panel also sports two MIDI In jacks and four MIDI Out jacks, and its locking power cord is infinitely preferable to any wall wart. You can bang on this baby for hours with the heaviest sticks you have, and the power cord will stay locked in place and keep you plugged into the juice—a very important feature for any electronic-percussion controller.



The drumKAT Turbo retains the physical appearance of the original drumKAT, but it includes many new features, such as expanded Kit memory, Notation mode, and Event Slice.

WHAT'S OLD?

The drumKAT offers two primary modes: Play and Edit. Within Edit mode, Kit Edit lets you specify the parameters of a specific Kit, and Global Edit lets you adjust all settings that are not Kit-specific (MIDI data send and receive, MIDI note mapping, etc.).

As in previous drumKATs, edits are performed using your feet and drumsticks on the footswitches and pads, respectively; there are no buttons to push or knobs to twirl. Drummers can edit using their hard-earned skills of stick mastery, which is one of the reasons the original drumKAT was so attractive in the first place. This might seem to be old news to some readers, but it cannot be overstated.

As a teacher, I know that drummers can be more than a little intimidated by electronic percussion. If you have never tried it, the drumKAT is a great place to start because you use familiar motions and actions in both performance and programming. The pads perform specific functions in Kit Edit mode, letting you navigate to different edit screens, change the parameter values, save your edits, and so on.

The wide variety of submodes available in Kit Edit is one of the reasons why the drumKAT is so popular. These submodes include Simple (one note per pad), Multi (up to four layered notes per pad), and Alternate (up to four sequential, cycled notes per pad). In addition, Note Shift sends different MIDI note numbers within a user-definable range according to your dynamic attacks, and Gate Shift changes the gate time (the time between Note On and Note Off) according to your attacks.

Velocity Shift is similar to Note Shift in that it triggers different sounds as you play with different Velocities, but you can program only four different note numbers. However, the Velocity ranges for these four notes can overlap. Note Shift is intended for melodic applications, while Velocity Shift works best with a specific type of sound, such as a snare sound. This submode lets you play different versions of the sound with changing Velocity, which helps foster more realistic drum performances.

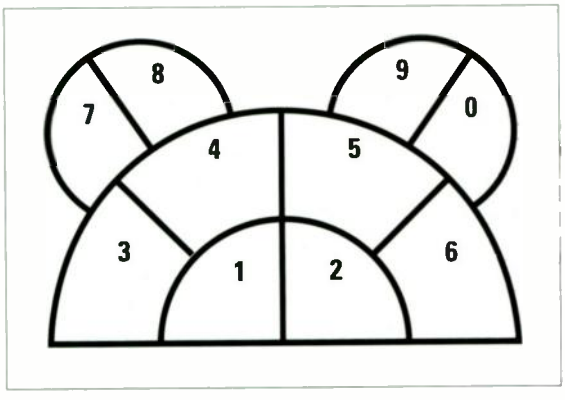


FIG. 1: The ten drumKAT pads are numbered from 1 to 0.

Several submodes are dedicated to the hi-hat pedal. For example, HiHat lets you play different sounds on a given pad by changing the position of the foot controller, and fcGATE lets you change the gate time by the position of the controller. ALT8 is an update of the Alternate submode; up to eight different user-specified sounds can be triggered by consecutive attacks. RAN8 is similar to ALT8, except that the sounds are randomly selected for each attack.

In addition, there are five Melodic submodes. In melMUL, chords or layers on a given pad are determined by a user-specified root note and chord structure. MelALT is similar to melMUL, but the root note and chord structure provide the outline for eight alternating notes. MelRAN is similar to melALT, except that the triggered notes are random. In melNSH, your dynamics produce different notes as determined by a preprogrammed root note and chord structure. MelVSH is similar to melNSH, but the variations in your dynamics produce different chord structures, not single notes.

I had an excellent chance to test drive the drumKAT Turbo on a tour of Asia with the Empire Brass Quintet. My first opportunity to try some of the "old standby" editing and performance functions arose in the group's arrangement of Gustav Holst's "Jupiter" from *The Planets*. We needed a segue, and we all agreed that an atmospheric loop was the way to go.

I decided to create a real-time loop that I performed live each night. Triggering my Kurzweil K2000, I assigned individual notes to four pads in Simple mode, and I sustained these notes using footswitch 3. Then I programmed a single pad to produce four sequential, ascending notes with each strike in Multi mode. These four notes created a shimmering, repeating arpeggio over the droning sustained notes. The result was a spacey, ambient texture that created an interesting moment of anticipation before the very dramatic "Jupiter." The drumKAT answered the musical need here perfectly.

WHAT'S NEW?

The Turbo version answers the prayers of many drumKAT users. For one thing, it provides more memory for Kits and Motifs. (More on Motifs in a moment.) Instead of 30 Kits, the Turbo version can store up to 48 Kits in internal memory (depending on the complexity of your Kits).

Alternate Mode claims that this upgrade is 40 percent faster than older versions; according to the company, the Turbo version sends a MIDI message within 1.2 milliseconds after you hit a pad. However, I honestly didn't notice a significant difference in tracking speed between the Turbo version and my old drumKAT 3.5. Of course, the response time of an electronic-percussion system depends on several factors, including the response time of the controller and sound modules as well as the distance from the monitor speakers. (Sound travels approximately one foot per millisecond, so if your monitors are ten feet away, the sound will be delayed by about 10 ms.)

This has never been so obvious to me as on my tour with the Empire Brass. When you are playing with some of the finest performers in some of the best concert halls in the world, you know when your attacks are a fraction of a second behind the beat. I had to get in the habit of playing ahead of the beat on many tunes. Even then, I would continue to hear comments from my band mates about tempos dragging when I used electronic percussion; this did not happen when I played acoustic drums or other percussion.

The Turbo version offers other cool enhancements. For example, the Alternate 128 submode lets you assign up to 128 sequential notes to a single pad. The popular Link mode has also been updated: In previous versions, you could link any pad or trigger to any other pad or trigger. This let you create an "Alternate 16" submode by linking two pads or triggers together. Now, you can link up to three pads, triggers, breath controller, or hi-hat foot controller together.

Perhaps even more important, the Turbo version lets you send Bank Select messages in addition to Program Changes. This is critical for sound modules that include more than 128 patches, such as the K2000. Along with an initial Volume message, a preprogrammed Bank Select and Program Change can be sent on any MIDI channel when you change Kits. In addition, you can send these messages without changing Kits; each pad and trigger input can be programmed with values for these messages, which are sent each time you strike the pad or trigger.

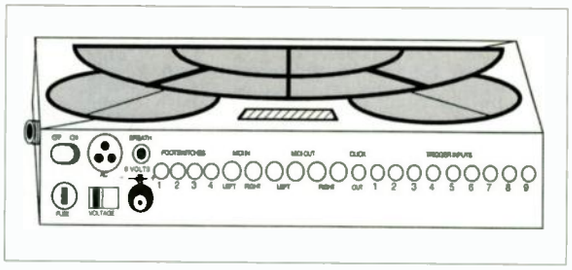


FIG. 2: The rear panel of the drumKAT sports nine independent trigger inputs, a line-level Click output, four momentary-footswitch inputs, a breath controller input, and a locking power receptacle. The two pairs of MIDI In and Out ports offer 32-channel operation and data merging.

Drummers can edit using their hard-earned skills of stick mastery.

Another interesting feature of the Turbo version is Notation mode. In this mode, the two MIDI Outs labeled Right send a fixed MIDI note number for each pad and trigger and for the hi-hat pedal (see **Fig. 3**), while the MIDI Outs labeled Left continue to send the user-programmed notes and other MIDI information. This establishes a consistent note-to-pad/trigger relationship that can be used by a notation program to transcribe your performance.

Although I like Notation mode, I'd prefer that either MIDI Out could send both notation information and regular note messages simultaneously. The current arrangement is particularly inconvenient for those who have simple MIDI interfaces like my 1-In/3-Out Opcode MIDI Translator 2. In order to simultaneously use the Notation capability and hear sounds, I had to send the KAT's right MIDI Out cable to the lone input on the MIDI interface (routing the data to my PowerBook) and send the left MIDI Out directly to the sound source. This seems unnecessarily complicated.

MOTIFS

Like previous versions, the drumKAT Turbo has onboard sequencing capability. However, this is certainly not superpowered sequencing. Think of it as a kind of looping tool you program by playing the pads; the loops you record are called Motifs.

There are four ways to record Motifs. Standard Record lets you record a Motif by playing the pads in real time, and Step Record uses a standard step-recording process (i.e., one note at a time). External Record lets you record a Motif from an external controller or sequencer in real time, and Ready Record plays the Motif immediately after you record it in real time, which is great for creating real-time loops in live performance.

When recording the Motifs, you can set the count-off length (four or eight beats), the count-off sound (any MIDI note number on any channel), tempo, length of the Motif (from 1 to 96 beats), and quantization setting (the resolution of which has been improved from 16th to 32nd notes in the Turbo version). You can record and store up to 32 Motifs, depending upon the length of each one.

Once you've recorded a Motif, you can play it back in a variety of ways. The Infinite setting plays the Motif endlessly after you strike a user-selected

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

pad; you can turn it off by striking the same pad again. Looped playback repeats the Motif a user-specified number of times, and Once mode plays the Motif only one time when triggered by striking the appropriate pad.

The drumKAT Turbo goes where no KAT has gone before with its new Event Slice capability. This lets you play sequential beats of a Motif by striking a pad or trigger. When using this function, the user also has the option of setting the gate time and dynamic range of the Motif. The gate-time setting doesn't seem to make much difference in the overall effect, but otherwise, this is an exciting performance option for those drummers who wish to get into some real-time breakbeats and drum 'n' bass.

There is no question that Motif mode is greatly improved over previous generations. Some early versions of the drumKAT were a little finicky in Motif mode, and the quantization resolution always seemed a bit unpredictable to me. However, I was extremely impressed by the recorded results and the ease of use of this function in the Turbo version.

During the Empire Brass tour, I needed a frenetic sequenced groove to close the show. Using the Ready Record capability, I was able to quickly and smoothly record a techno drum Motif, set the playback function to Infinite, and then trigger that Motif flawlessly from pad 10 of the Kit I was using. The time it took to do this was little more than half an hour, and I successfully used the Motif in that evening's show. I look forward to exploring this aspect of the drumKAT Turbo further.

TRIGGERS

The drumKAT Turbo has one of the best external trigger interfaces I've used. The nine trigger inputs give you plenty of options, and as with the old versions of the drumKAT, all triggers can be "trained" for optimum performance: You can set the headroom, threshold, and gain of all triggers individually. The drumKAT Turbo lets you set these using a bar graph that registers your hits from soft to loud on any trigger.

After you have determined the best settings for each trigger, you can set the entire dynamic range by playing your softest and loudest hits. The drumKAT Turbo "remembers" this range, giving the you the widest possible dynamic expression on each trigger.

The drumKAT Turbo also lets you minimize any cross-triggering problems through its Trigger Interaction Matrix. This screen shows you graphically whether your hardest hits on any trigger will cross-trigger another one. If your hits do begin to cross-trigger, the unit automatically suppresses the problem.

I used my trusty fatKAT and hatKAT pedals in trigger inputs 1 and 2 for the entire tour, and the unit responded beautifully. Playing everything from concert bass drums to triangles to shakers to grand piano on these pedals, the triggers provided all the right attacks at all the right times.

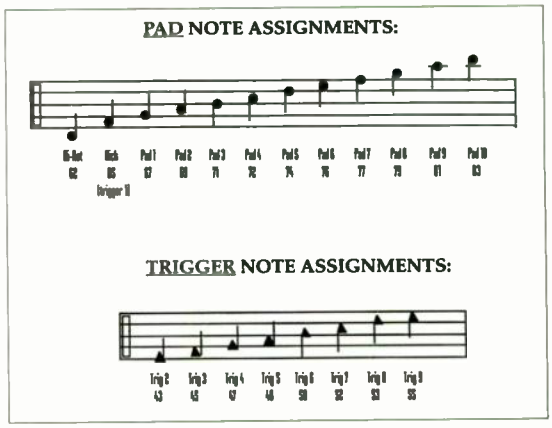


FIG. 3: In Notation mode, the pads and triggers are assigned to fixed MIDI note numbers from the Right MIDI Outs to facilitate data entry into a notation program.

ROAD WARRIOR

I would be remiss if I did not compliment the folks at Alternate Mode on the roadworthiness and durability of this machine. I used it on a tour that included twenty concerts in 23 days in Japan and Taiwan. I cannot possibly recall how many planes, trains, and automobiles on which this unit was shipped or how many different people handled (or mishandled) it. Nevertheless, it performed admirably every night.

It even survived a preshow near-disaster at the National Concert Hall in Taipei. Short on drum-set hardware, I placed the drumKAT on what appeared to be a sturdy music stand. About two hours before the concert, I heard a loud crash on stage and turned around to see the drumKAT lying on the floor. Running over to the scene, I discovered that trigger input 1 was badly maimed. (There was a cable plugged into trigger input 1, and the unit had landed on the ¼-inch connector.) After setting the drumKAT back in place, I found that trigger input 1 had ceased to work. Arrrrgh!

To my amazement, the entire electronics staff of the National Concert Hall ran on stage and began dismantling the unit. They patiently diagnosed the problem and soldered the trigger-input sensor back to its connecting wire. The drumKAT Turbo responded flawlessly at the concert that night and continued to perform well for the rest of the tour.

I have no doubt that the drumKAT Turbo is the best MIDI percussion controller available. In addition to its drummer-friendly interface, durability, and long track record of success, there are so many performance and programming capabilities that I have only provided a tip-of-the-iceberg glimpse at its true potential. I, for one, am glad the KAT is back.

ALTERNATE MODE
drumKAT Turbo MIDI percussion controller v. 3.7 $849
Turbo 4.0 upgrade $260

FEATURES ■■■■
EASE OF USE ■■■■
DOCUMENTATION ■■■■■
VALUE ■■■■■
1 2 3 4 5

PROS: Extremely durable and roadworthy. Excellent array of control features. Easy to program. Great compositional tool.
CONS: Gate Time function did not significantly alter Event Slice capability. Notation Mode requires two MIDI Outs. Very limited internal sequencer. Backlit screen display is quite small.
CIRCLE #446 ON READER SERVICE CARD

Steve Wilkes *is percussionist for the Empire Brass Quintet and plays drums for the Boston production of the Blue Man Group's acclaimed show* Tubes.

QUICK PICKS

SOUNDS GOOD AB

Roots Reggae

By Alex Artaud

With an eye on the multimedia market, Sounds Good AB has introduced *Roots Reggae* ($59.95, CD-ROM; $29.95, mixed-mode CD), one of seven CDs in its Sampling Sound System (SSS) series (which also includes *Popped*, reviewed in the November 1997 EM). The disc is available as a CD-ROM in Akai S1000 format and as a mixed-mode CD with audio samples and WAV and AIFF files. For this review I checked out the audio CD.

Re-create the rich, bubbling rhythms of Jamaica with *Roots Reggae* by Sounds Good AB.

Quick and Easy

Designed for those with a minimal setup of computer, sound card, and sequencer, *Roots Reggae* provides loops, licks, fills, chords, and plenty of bass so that even those of us with the most Spartan setups can create grooves. Because hard-disk recording is the main objective here, a PowerPC is recommended to get the most out of this CD. Sounds Good even tosses in a demo version of Steinberg's *Cubase VST* so that you can get a taste of how to optimally use these samples.

Interchangeable Parts

One of the unique features of the CD is the Loop Connector, a system that allows you to interchange loops from any of the CDs in the SSS series. To mix and match parts easily, strict bpm templates for all loops (e.g., 60, 70, 80, or 90 bpm) are in place. Also, the common need for pitch-correction algorithms is bypassed by providing a selection of keys that correspond to the tones (bass, guitar, organ, Hohner Clavinet). Think of this approach as sonic Lego blocks for your hard-disk recorder. You import the blocks into your recorder, busy yourself creating an agreeable interplay of parts, and move on to your next adventure.

Roots Reggae provides roughly 40 sections devoted to riffs, licks, and loops of drum kits, percussion, guitar, bass, Clavinet, and Hammond B-3. You also get a selection of drum fills, kick- and snare-drum hits, hi-hats, cymbals, toms, and timbales. Sampling quality is good, though I did run across a few questionable spots of distortion and hum. This wasn't a big deal, but it clearly indicates that this product is oriented toward the multimedia market. All the loops are structured to minimize hassle, and while this may seem restricting to some, the disc's producers squeeze in enough options to make it worth having.

Rasta Primer

The included documentation is quite good. Its organization is clear and a brief primer on arranging reggae rhythms is included, along with a list of recommended artists and producers.

This type of cut-and-paste approach may not be for everybody; after all, reggae evolved as an organic and spiritual form of music. But the disc could offer a solution to some folks out there, and at less than $30, the cost of entry into the playground is pretty reasonable.

Overall EM Rating (1 through 5): 3.5

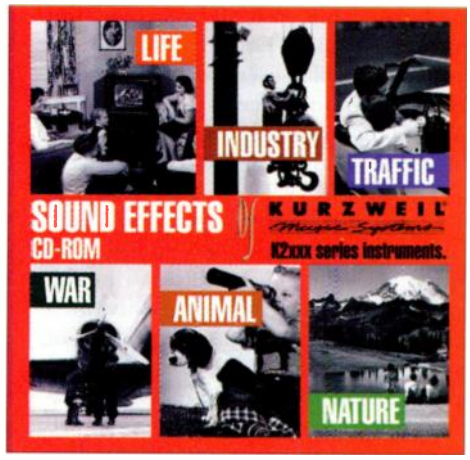
CIRCLE #447 ON READER SERVICE CARD

DISCOVERY FIRM

Sound Effects

By Jeff Obee

There's no doubt about it, sound-effects CDs are a gas, and with Discovery Firm's *Sound Effects* CD-ROM ($199.95) you'll delight to the strains of frogs, flies, rockets, cheering, thunder, boats, and yes, even belches. The disc is programmed for Kurzweil K-series synths and contains 600 MB of samples. Most of these take up around 2 to 4 MB of memory, although some use over 10 MB, such as the Battles and Seabirds files. There are six main categories: Animal, Industry, Life, Traffic, War, and Nature. Within the main categories are more specific groups; for example, in the Animal category you'll find the Barnyard group with samples of cows, horses, pigs, and roosters.



Realistic rockets, cheering, thunder, boats, and burps can be found on Discovery Firm's *Sound Effects*.

Listening In

The sounds were thoughtfully recorded using a Sennheiser MD 421 mic through a preamp to a portable DAT recorder, and the samples are very realistic. "Train Passing" comes from the right side and moves across the stereo spectrum as if the train were moving past you. The Airplane effects also have this stereo movement.

"Airport" seems like a hybrid of natural and synthesized sounds. It is a long, natural-sounding collage of samples blended to re-create the ambience you experience while waiting for a flight. All the Household noises are excellent, from various doors to the shower and sewing machine samples. The same goes for the Bird and Insect sections.

Some of the Space sounds are taken from the Apollo 11 moon flight, which I have heard elsewhere, but most are synthesizer creations of robots and the like. The synthesized sounds were generated using an array of classic analog synths from Moog, ARP, Roland, and Oberheim. Ambient samples such as "Forest" also use a synthesized approach to create their environments.

Although I'm decidedly antiwar, I liked the War sounds. The Tank is convincing, and the gun sounds all work well. The four Explosions are especially good—quite the bomb, so to speak. The realism of the Submarine's torpedo and sonar sounds was particularly pleasing, and I would have liked more sounds in this area.

Final Thoughts

With *Sound Effects,* you get a diverse collection of high-quality, stereo samples from widely different sources. (Still, I must admit, I was disappointed by the absence of sheep.) The next time you want to create the sound of a stream filled with crickets and frogs, or you're on a tight deadline and you've really got to have that belching-baby sound, or you even just want your own personalized laugh track to trigger after you tell a joke, consider this disc.

Overall EM Rating (1 through 5): 3

CIRCLE #448 ON READER SERVICE CARD

EVENT ELECTRONICS

DSP•FX Visual Pro Audio 3.2 (Win)

By Dennis Miller

Event Electronics has released a software-only, DirectX version of the acclaimed *DSP•FX* effects system: *Visual Pro Audio* ($299) for Windows 95 and NT. Power Technology, developer of *DSP•FX,* has teamed up with Event to market these products. Like the original version (reviewed in the January 1997 issue of **EM**), which requires a proprietary DSP card, the new bundle includes configurable autopan, chorus, delay, flanger, parametric EQ, pitch shift, reverb, and tremolo plug-ins, all of which operate with 32-bit precision. Unlike the card-based version, however, the software version does not process an external audio signal. Instead, the plug-ins work in real time on sound files that you've recorded onto your hard drive.

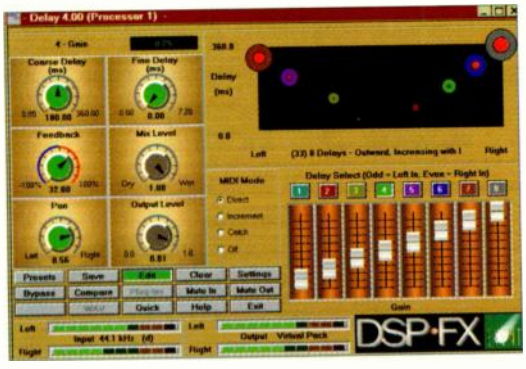
The *DSP•FX* plug-ins are easy to install and will show up under the DirectX menu of any compatible host application. Hats off to the program's designers for what appears to be very efficient coding: with my Pentium II 266 under Windows NT 4.0, I was easily able to chain all eight effects at the same time on a 44.1 kHz, mono sound file. Using a beta version of SEK'D's *Samplitude 2496,* I ran single effects on four stereo files simultaneously before the program reported that I was over the limit of processing power. Reports online indicate that IQS *SAW 32* users are able to process eight stereo files at once, but I wasn't able to confirm that.

Get the Picture

Event calls its effects "visual" with good reason: a colorful window displays the effects parameters in a clear and logical manner. On the right side of the screen, the elements you are working with are displayed graphically. As you increase the gain of a delay element, for example, you'll see an expanding circular image that represents the delay. This immediate visual feedback makes setting parameters a very intuitive business. And because all the effects have the same interface design, it's easy to move from one to the other. There's hardly any learning curve.

You can control all effects parameters in real time using your mouse, which means that, as a file plays, you can tweak settings and twist knobs just as you would with a hardware device. On my system, there were no glitches or gaps in the audio as I moved the controls. You can also use MIDI control data to automate effects settings. It's a bit of a pain to create your own controller mappings, but the default mappings are perfectly useable and should be adequate for most users.

Each of the effects comes with a number of presets, and you can also save your own and access them with a single mouse click. Presets can be shared between the hardware-based and DirectX versions of the program. It's very easy to compare an edited preset with the original version or to bypass the effect entirely.



The *DSP•FX* effects parameters can be controlled in real time using a mouse or MIDI controller. As you adjust a parameter, the program displays an image that represents the effect you are editing.

Surprisingly, there's no way to start or stop playback of a file directly from the *DSP•FX* window. You must start playback from the opening screen when you load a plug-in.

All of the bells and whistles wouldn't mean much if the sound of these plug-ins wasn't up to snuff, but these effects are among the best sounding I've heard. I especially like the extremely smooth tails on very long reverbs, and I was able to produce crisp and well-focused EQs with very little work. No doubt the 32-bit, floating-point processing contributes to the effects' quality. And speaking of reverb, I was amazed to see that the *DSP•FX* reverb used only half as much of my system resources as the DirectX version of Waves' *TrueVerb* used in a similar configuration.

Though I haven't tried the hardware version, I find it hard to imagine that it could be any more responsive or efficient than the software version. This is one system that I recommend for anyone doing serious audio work on the PC.

Overall EM Rating (1 through 5): 5

CIRCLE #449 ON READER SERVICE CARD

UNIVERSAL SOUND BANK

Mediterranean Instruments

By Dan Phillips

Universal Sound Bank's *Mediterranean Instruments* ($299) is a set of two CD-ROMs in Akai S1000 format devoted to stringed instruments and percussion from Turkey, Greece, and the Middle East. The first disc presents loops and phrases from the baglama, bouzouki, tzouras, saz, oud, and cümbus; the second contains multisamples of the same, as well as percussion loops and multisamples.

Organic Performances

The stringed instrument phrases are well organized. There are 27 "Chromazones," each based on a traditional dance rhythm, in which a single phrase is recorded in all twelve tonics. In addition to alleviating transposition hassles, this also provides a slightly different performance in each key, injecting some welcome, organic variation. All of the Chromazones are duets, with different parts in the left and right channels; typically, one is more chordal, and the other more melodic. The parts are also available separately.

(continued on p. 216)

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MIXING BOARDS

Panasonic RAMSA

Stop dreaming about your digital future, it's here! The Panasonic/Ramsa WR-DA7 digital mixer features 32-bit internal processing combined with 24-bit A/D and D/A converters as well as moving faders, instant recall, surround sound capabilities, and much more. Best of all, it's easy to use, and it's available NOW!

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8 Bus Series Mixing Consoles

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FEATURES-
- Each channel includes Mackie's well-known Mic preamp and a -10/+4 switchable tape return
- 8-assignable submasters and a L/R mix master
- 4-band EQ with true parametric (3-control) Hi Mids, Lo Cut filter
- Extensive routing capabilities
- Available in 16,24 & 32 channels
- Optional Meter Bridges available
- Optional 24•E Expander console available
- Rugged all-metal chassis
- In-line monitoring effectively doubles your input channels

MS1202VLZ
12-Channel Compact Mic/Line Mixer
- Gain control, pan, 3 band EQ, and 2 Aux sends.
- 4 mono, 4 stereo channels (12 inputs total).
- Great for "extra inputs" on the fly.
- Phantom power.

MS1402VLZ
14-Channel Compact Mic/Line Mixer
- Mic preamps w/Trim control (channels 1-6)
- 60mm "long" faders.
- Mute switch routes to alt 3&4 bus.
- Low-cut filter • Phantom power.

CR1604VLZ
16 x 4 x 2 Mic/Line Mixer
- 7 Aux sends, 3 band EQ.
- Large 10-segment LED meter.
- Lowest noise/Highest headroom.
- 16 studio grade mic pre's.
- 3 different setup positions.
- Low-cut filter. • Phantom power.

The MS-1202, 1402, 1604 & SR Series all include VLZ (Very Low Impedance) circuitry at critical signal path points. Developed for Mackie's acclaimed 8•Bus console series, VLZ effectively reduces thermal noise and minimizes crosstalk by raising current and decreasing resistance.

SPIRIT
LX7 Professional Mixing Console

The LX7 was designed by Soundcraft co-founder Graham Blythe. Built in the UK, it uses surface mount technology to ensure accurate, consistent insertion of all components into LX7's PCBs. Roadworthy construction and 25 years of audio console experience put this newest addition to the Spirit line at the top of the heap.

FEATURES-
- 24 Ultramic preamps
- 100mm ALPS faders
- 7 bus outputs
- Comprehensive 4 band EQ includes 2 swept mids and 15dB of boost or cut
- Separate stereo input section
- Use in FOH applications as well as studio recording
- Internal power supply

MONITORS

MACKIE.
HR824

These new close-field monitors from Mackie have made a big stir. They sound great, they're affordable, they're internally bi-amped. "What's the catch?" Let us know if you find one.

FEATURES:
- 150W Bass amp, 100W Treble amp
- Full space, half space and quarter space placement compensation
- Frequency Response 39Hz to 22kHz, ±1.5dB

SPIRIT
Absolute Zero

Absolute Zero monitors maintain a wide frequency response at high and low listening levels, both on and off-axis for consistent results every time.

FEATURES-
- High definition linear phase design
- Wide, controlled dispersion
- CAD optimized, low loss crossover
- Custom designed drivers
- Long throw 170mm LF driver
- 25mm soft dome HF unit on proprietary waveguide

TANNOY
PBM 6.5II

The PBM 6.5 II is the industry standard for studio reference monitors. They provide true dynamic capability and real world accuracy.

FEATURES–
- 6.5" low frequency driver and 3/4" tweeter
- Fully radiused and ported cabinet design reduces resonance and diffraction while providing deep linear extended bass.

JBL
4206 & 4208

The 4206 & 4208 studio reference monitors are 6" and 8" respectively. Both offer exceptional sonic performance, setting the standard for today's multi-purpose studio environments.

- Multi-Radial baffle ABS baffle virtually eliminates baffle distortion.
- Superb imaging & reduced phase distortion.
- Pure titanium diaphragm high frequency transducer provides smooth, extended response.
- *Magnetically shielded for use near video monitors.*

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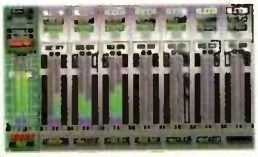
MUSIC SOFTWARE

Steinberg
CUBASE VST
Virtual Studio Technology



Steinberg's Virtual Studio Technology (VST) turns your PowerPC or Windows based computer into a music production powerhouse featuring digital audio, real-time effects, automation, MIDI and scoring in one single program. Expandable with software Plug-Ins and an audio bus system for use with the latest generation of multi I/O audio cards, Cubase VST delivers.

FEATURES–
- Up to 32 channels of digital audio
- Complete mixer with up to 128 EQs
- 2 full-featured effects racks
- All Realtime. Every action can be automated
- ***CUBASE SCORE*** adds professional score printing and layout functions
- ***CUBASE AUDIO XT*** adds support of Digidesign DAE compatible interfaces such as the ProTools System

emagic
LOGIC AUDIO 3.0
For Mac or Windows

Logic Audio integrates Digital Audio Recording & Editing, MIDI Sequencing, and Professional Scoring into a leading-edge music composition and production system. The new Version 3.0 features extended real-time editing and manipulation options along with numerous detailed solutions for use in professional studio environments.

FEATURES–
- Custom window setups can be assigned to keys for instant recall, up to 90 screensets per song.
- Interactive Editors such as Event, Hyper, Score, Matrix, Arrange and Environment are all linked.
- Realtime DSP effects
- Highest resolution available, 960ppq
- Environment window provides knobs, faders, buttons and other virtual objects that can be defined to send out any type of MIDI data.
- New bus system. Punch on the fly, & Cycle Mode
- Support of Adobe Premiere and Digidesign Audiosuite plug-in formats

Mark of the Unicorn
Digital Performer 2.11
MIDI Sequencer for Mac

Digital Performer contains all of the sequencing capabilities of Performer V.5 and adds Digital Audio to the picture. Apply effects such as Groove Quantize, shift, velocity scaling and more- ***All IN REALTIME.***

FEATURES-
- MIDI Machine Control, Quicktime Video playback
- Sample rate conversion
- Spectral effects, pitch correction
- Real-time editing and effects processing
- Full featured Notation section
- Virtual automated mixing

HARD DISK RECORDING

digidesign / AVID
A Division of Avid Technology, Inc.

ProTools Project™
Digital Audio for Macintosh

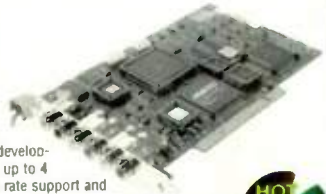
With Pro Tools Project you get 8 tracks of digital audio & 64 virtual tracks! The Pro Tools Project system includes an audio card as well as award winning Pro Tools software. You choose either an 888 or an 882 I/O to complete the package. Random access, non-destructive digital editing keeps your precious recorded material in its original form as you process and play with it, allowing you to take chances on tweaking a performance without risk. Project also features MIDI recording and playback as well as Quickpunch™ punch-on-the-fly & a direct upgrade path that lets you move to a full Pro Tools system when you're ready.

REQUIRES–
- Qualified NuBus or PCI Macintosh CPU
- Hard Drive, system software 7.1 or greater
- 24MB RAM minimum
- 14" monitor (17" recommended).

888 & 882 I/O Audio Interfaces

The 888 and 882 I/Os each provide 8 channels of high quality A/D, D/A I/O for connection to Pro Tools Project and Session 8 PC systems. Choose the 882 and get an affordable audio interface featuring 1/4" balanced/unbalanced ins and outs in a single rack space. For more high-end applications, the 888 provides features such as XLR balanced analog ins and outs, 8 channels of AES/EBU I/O for direct digital transfers of tracks, high resolution LED metering & individual input/output level trims.

Audiomedia III
Digital Audio Card



Available for both Macintosh and Windows OS systems, Audiomedia III will transform your computer into an powerful multitrack workstation. Compatible with a wide variety of software options from Digidesign and Digidesign development partners, Audiomedia III features 8 tracks of playback, up to 4 tracks of recording, 24-bit DSP processing, multiple sample rate support and easy integration with leading MIDI sequencer programs.

HOT HOT HOT

WAVES
TDM BUNDLE

If you're already familiar with the Waves TDM bundle, you'd better take another look! This great package is now even fatter with the addition of 5 new processors, at the SAME PRICE! TDM owners can now maximize their power with plug-ins including the famous TrueVerb virtual-space reverb, the Q-10 EQ, C1 Compressor/Gate, S-1 Stereo Imager, PAZ-Psychoacoustic Analyzer, L1-Ultramaximizer as well as MultiRack, WaveConvert and TrackPac Pro applications.

DIGITAL MULTI-TRACK RECORDERS

TASCAM
DA-38
Digital Audio Recorder

The DA-38 was designed for musicians. Using the same Hi-8 format as the highly acclaimed DA-88, the DA-38 is an 8 track modular design that sounds great. It features an extremely fast transport, compatibility with Hi-8 tapes recorded on other machines, rugged construction, ergonomic design and sync compatibility with DA-88s.

FEATURES–
- Hi-8mm tape format.
- Next generation 18-bit A/D and 20-bit D/A converters with Delta-Sigma oversampling
- Digital track copy for simple assembly composite edits
- Built in Digital patchbay
- Track advance and track delay
- Easy to use interface

ALESIS
ADAT XT20
Digital Audio Recorder

20-Bit

The New ADAT-XT20 provides a new standard in audio quality for affordable professional recorders while remaining completely compatible with over 100,000 ADATs in use worldwide. The XT20 uses the latest ultra-high fidelity 20-bit oversampling digital converters for sonic excellence, it could change the world.

FEATURES–
- 10-point autolocate system
- Dynamic Braking software lets the transport quickly wind to locate points while gently treating the tape.
- Remote control
- Servo-balanced 56-pin ELCO connector
- Built-in electronic patchbay
- Copy/paste digital edits between machines or even within a single unit. Track Copy feature makes a digital clone of any track (or group of tracks) and copies it to any other track (or group) on the same recorder.

MIDI HARDWARE

Mark of the Unicorn
MIDI Time Piece™ AV
8x8 Mac/PC MIDI Interface

The MTP AV takes the world renowned MTP II and adds synchronization that you really need like video genlock, ADAT sync, word clock sync, and even Digidesign superclock!

FEATURES–
- Same unit works on both Mac & PC platforms.
- 8x8 MIDI merge matrix, 128 MIDI channels.
- Fully programmable from the front panel.
- 128 scene, battery-backed memory.
- Fast 1x mode for high-speed MIDI data transfer.

Digital Time Piece™
Digital Interface

Think of it as the digital synchronization hub for your recording studio. The Digital Timepiece provides stable, centralized sync for most analog, digital audio, and video equipment. Lock together ADATs, DA-88's, ProTools, word clock, S/PDIF, video, SMPTE, and MMC computers and devices flawlessly. It ships with "Clockworks" software which gives you access to its many advanced features and remote control of some equipment settings such as record arm.

OPCODE
Studio 64XTC
Mac/PC MIDI Interface

The Studio 64XTC takes the assorted, individual pieces of your studio-your computer, MIDI devices, digital and analog multitracks and even pro video decks, and puts them all in sync.

FEATURES–
- 4 In / 4 Out, 64 channel MIDI/SMPTE interface/patchbay with powerful multitrack & video sync features
- ADAT sync with MIDI machine control
- Simultaneous wordclock and Superclock output, 44.1kHz or 48kHz for perfect sync with ADAT, DA-88 and ProTools
- Video and Blackburst in (NTSC and PAL)
- Cross-platform Mac and Windows compatibility

MIDI Translators
MIDI Interfaces

The MIDI Translator II™ and MIDI Translator Pro™ are the next generation portable interfaces. The MIDI Translator Pro™ provides twice the processing power of the MIDI Translator II and both let you switch between MIDI or peripherals with a flip of the THRU-switch - NO CABLE SWAPPING!

TRANSLATOR II FEATURES–
- 1 IN and 3 MIDI OUTs • 16 MIDI channels
- Small size fits anywhere - no power supply required!

TRANSLATOR PRO FEATURES–

- 2 MIDI INs x 6 MIDI OUTs. Supports 32 MIDI channels
- 2 MIDI OUTs accessible on front panel
- Self powered - no power supply required

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KEYBOARDS AND SOUND MODULES

Roland® A-90EX Master Keyboard Controller

The A-90EX is an 88-note, weighted master controller with one of the best keyboard actions currently on the market. It offers incredibly realistic piano sounds, powerful controller capabilities and 'virtual' programmable buttons which can be configured to operate your software and other devices. The A-90EX combines the majestic sound of a concert grand, the expressive action of a fine acoustic keyboard and the comprehensive MIDI functions of a master controller—all in a portable stage unit.

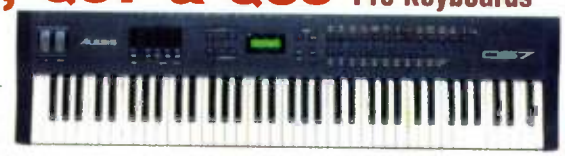
FEATURES–
- Master Volume Slider and Global Transpose features
- Proprietary 88-note hammer-action, velocity sensitive keyboard with aftertouch
- 2 types of stereo sampled grand pianos, various acoustic and electric pianos (including a great classic Rhodes)
- Stores up to 64 Performances

JV-2080 64-Voice Synth Module

Roland resets the standard with the incredibly expandable JV-2080 64-Voice Synthesizer Module. This amazingly powerful package offers unprecedented expandability, digital signal processing, and remarkable operational ease, all housed in a 2-unit rack-mount design.

FEATURES–
- 64-Voice / 16-part multitimbral capability
- 8 slots for SR-JV80 Series wave expansion boards
- 3 independent effects sets plus independent reverb/delay and chorus
- 6 outputs, Main Stereo and 4 assignable
- **NEW** patch finder and Phrase Preview functions for easy access to all patches
- Large backlit graphic display
- Compatible with JV-1080, XP-50, & XP-80

ALESIS QS6, QS7 & QS8 Pro Keyboards



Alesis QS synthesizers all provide true 64-voice polyphony, and a huge sound library that is constructed of 16-bit linear samples. With their powerful computer and digital audio interface capability, built-in 4-bus Multi-effects and expressive performance features, there is sure to be a QS synth perfect for you.

FEATURES–
- 16-bit 48kHz sample ROM
- 64 voice polyphonic
- 512 preset, 128 user internal program memory
- 400 preset, 100 user mix memory
- RS422, RS232 port formats • ADAT interface*
- 16MB internal, 16MB expansion memory (32MB total possible)*
- 4 outputs (2 main, 2 aux)*
- SoundBridge Sample software for importing almost any sample from your Mac or Pc

QS6 - 61 key synth, **QS7** - 76 key synth
QS8 - 88 weighted keys

*Available on QS7 and QS8 only

NanoSeries Modules

The NanoSynth is a 64 Voice Sound Module featuring 512 presets and 128 user definable patches within 8MB of internal ROM. Like the QS series of synthesizers, the NanoSynth's sounds are constructed from non-compressed 48kHz, 16-bit linear samples for great sound quality. General MIDI compatible, 1/3 Rackspace.

The 64 Voice NanoBass features 256 bass sounds designed for Dance, Pop and Rock. Each program features an adjustable parameter that you can change using the convenient front panel controller. Factors like Attack, Decay, Brightness, and more let you customize the NanoBass's programs for your specific needs.

KORG SGproX Stage Piano/Controller

The SGproX features newly-sampled stereo pianos recorded with attention to every detail. Carefully crafted velocity switching provides tonal changes and dynamics that come alive under your fingers and the 88-note weighted keyboard has been designed as both a stage piano and master controller.

FEATURES–
- 88-note, weighted action keyboard
- 64-voice polyphony, 24MB ROM
- 64 user-definable programs
- 12-types of stereo digital multi-effects
- Master Controller functions, Backlit LCD display

KURZWEIL K2500 Series Music Workstations

Building on the same features that made the 2000 series popular, the 2500 series utilizes Kurzweil's highly acclaimed V.A.S.T. technology for top-quality professional sound. Available in 76-key (K2500), 88 weighted key (K2500X) and rackmount (K2500R) configurations, the K2500s combine ROM based samples chosen from the best of Kurzweil's collection, on-board effects, and full sampling capabilities on some models (K2500S, K2500RS & K2500XS).

FEATURES–
- True 48-voice polyphony
- Fluorescent 64 x 240 backlit display
- Up to 128MB sample memory
- Operating system stored in flash ROM (for software updates via floppy disk and SCSI)
- Full MIDI controller capabilities
- 32-track sequencer • Dual SCSI ports
- Advanced file management system
- Sampling option available
- Optional **DMT**i Digital Multitrack interface for data format and sample rate conversion with ADATs/DA-88s

MicroPiano™

The MicroPiano is a half-rack sound module featuring Grand Piano and other sampled sounds, plus built-in digital effects. Altogether there are 32 available presets, chosen from Kurzweil's highly acclaimed sample library, making the MicroPiano the ideal sound module for any player who demands great sound quality at an unprecedented price.

FEATURES–
- High quality, full-bandwidth 20-20KHz sampled sounds
- Full Digital Multi-Effects
- Easy to use front panel functions
- 32 presets including Grand Pianos, Hammond Organ, Strings, Dual Cross-Faded Rhodes and more
- 32-note poly, half-rack, MIDI In/Thru, Stereo outputs

SAMPLING

E-mu Systems, Inc. e-6400 Emulator

The e-6400 offers the power of E-mu Systems' renowned Emulator Operating System (EOS) and superb audio quality in a package perfect for the budget-minded professional. The e-6400 comes with stereo sampling, 4MB of RAM and is fully upgradeable to E-mu's top of the line Emulator sampling synthesizers, the E4X, and E4XTurbo.

FEATURES–
- 64 voice polyphony (expandable to 128)
- 4MB sound RAM
- 2 CD-ROM's included (400MB of sounds)
- 8 balanced analog outputs
- Onboard graphic waveform editing
- Load while play
- Stereo phase lock time compression

THE NEW MPC!

AKAI MPC2000 MIDI Production Center

Whether your producing rap or hip-hop, sequencing a rack of MIDI modules, or performing live, the MPC2000 gives you powerful tools to make your music shine. Its the NEW MPC!

FEATURES–
- Large 248 x 60 LCD Graphic display
- 64-track, 100,000 note sequencer with linear drum machine style programming
- 16-bit, 32-voice stereo sampler
- Standard SCSI interface
- Soft keys, Data/Digit wheels, cursor control and more
- Keypad for directly entering sample points
- Note variation slider gives you realtime control of any sound's tuning, attack, decay, or filter frequency
- Floppy Disk Drive
- Powerful expansion options turn your MPC2000 into an MPC2000 STUDIO, the ultimate MPC!

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PORTABLE DAT

TASCAM DA-P1

- Rotary 2 head design, 2 direct drive motors
- XLR mic/ line inputs (w/phantom power)
- Analog and S/PDIF (RCA) digital I/O
- 32/44.1/48kHz sample rates & SCMS-free recording
- Built in MIC limiter and 20dB pad.
- TRS jack w/ level control for monitoring
- Includes shoulder belt, AC adapter, & battery

HHB PDR1000/PDR1000TC

- 4 head Direct Drive transport
- XLR mic & line analog ins, 2 RCA line outs. Digital I/O includes S/PDIF (RCA) and AES/EBU (XLR)
- L/R channel mic input attenuation selector(0dB/-30dB)
- 48V phantom power, limiter & internal speaker
- Illuminated LCD display shows clock and counter, peak level metering, margin display, battery status, ID number, tape source status and machine status.
- Nickel Metal Hydride battery powers the PDR1000 for 2 hours, AC Adapter/charger included.

PDR1000TC Additional Features–

- All standard SMPTE/EBU time codes are supported, including 24, 25, 29.97, 29.97DF, & 30 fps.
- External sync to video, field sync and word sync.

MS1000 Master Sync module
ensures drift will be no more than 1 frame in 10 hrs.

HM1000 Headphone Matrix
provides a rotary switch for selection of Stereo, Mono Left, Mono Sum, & M/S (mid-side) Stereo modes.

SONY TCD-D10 PROII

A reliable, high-performance DAT recorder, the portable TCD-D10 PROII has many enhanced features for professionals including absolute time recording. Maintenance and servicing are also quick and easy due to the simple signal routing combined with separate board construction.

FEATURES–

- Backlit LCD Multi-Function Display
- 100X Search with up to 99 start IDs
- 140X High-Speed Spooling • Limiter/Mic Attenuator
- Built-in Speaker • RF End Search • Wired Remote Control
- AC/DC Operation • Hours Meter

SONY TCD-D8

This is the least expensive portable DAT machine available. It features 48kHz, 16-bit sampling, automatic and manual recording level, a long play mode for 4 hours of recording on a 120 minute tape, & an anti-shock mechanism. It includes a carrying case, a DT-10CLA cleaning cassette and an AC-E60HG AC adapter.

PORTABLE HARD DISK RECORDING

Roland VS-880 V2 Hard Disk Recorder

The VS880 V2 is a stand alone hard disk recorder designed for musicians looking for great sound in a flexible package. Record basic tracks at home, then take it to your saxophonists place for overdubs, then off to the percussionists for that needed tambourine, then to the singers... It's powerful software and familiar tape-transport style interface allow you to get the most out of this baby's incredible creative potential, and with the optional CD Recorder and software, you don't even need to get a record deal.

FEATURES–

- Auto Mixing Function records and plays back realtime
- Easy recording with an inserted effect in "INPUT-TRACK" mode.
- Process the master output with a specific inserted effect such as total compression.
- Scene change by MIDI program change message.
- Simultaneous playback of 6 tracks in MASTER MODE
- Digital output with copy protection.
- 10 additional effect algorithms (30 total) including Voice Transformer, Mic Simulator, 19-band Vocoder, Hum Canceler, Lo-Fi Sound Processor, Space Chorus, Reverb 2, 4-band Parametric EQ, 10-band Graphic EQ, and Vocal Canceller.
- 100 additional preset effects.
- Use MIDI program & control change messages to edit and change effects.
- Over 20 powerful features in editing/sync sections have been added. Some require the optional effects expansion board.
- Upgrade existing VS-880s to V2 software via Zip disk.

FOSTEX DMT-8 VL Hard Disk Recorder

The latest in the Fostex HD recording family, the DMT-8 VL truly brings the familiarity of the personal multi-track to the digital domain.

FEATURES–

- 18 bit A/D, 20 bit D/A conversion.
- Built in 8 channel mixer, Ch 1&2 feature mic & line level.
- 2 band EQ and 2 AUX sends per channel
- Cut/Copy/Move/Paste within single or multiple tracks
- Built-in MIDI Sync., 6 memory locations.
- Dual function Jog/Shuttle wheel provides digital "scrub" from tape or buffer without pitch change. 1/2X to 16X.
- Divide the drive into 5 separate "virtual reels", each with it's own timing information.
- **NO COMPRESSION!**

MINIDISC MULTITRACKS

TASCAM 564 Digital Portastudio

The Tascam 564 Digital Portastudio combines the flexibility and superior sound quality of digital recording with the simplicity and versatility of a portable multi-track. Using MiniDisc technology, the 564 has many powerful recording and editing features never before found in a portable 4-track machine.

FEATURES–

- Self-contained digital recorder/mixer.
- Uses low-cost, removable MiniDiscs.
- 2 AUX sends / 2 Stereo returns. • 4 XLR mic inputs
- Channel inserts on inputs 1 & 2.
- 5 takes per track, 20 patterns, 20 indexes per song.
- Random access and instant locate.
- Non-destructive editing features with undo capability include: bounce forward, cut, copy, move.
- Full-range EQ with mid-range sweep.
- S/PDIF digital output for archiving.
- MIDI clock and MTC

SONY MDM-X4 MD Multi-Track Recorder

MD recorders are here! Offering up to 37 minutes of high-quality 4-track digital recording, the MDM-X4 is truly the next generation of personal multi-tracks. With a built-in mixer, exclusive Track Edit system, and a Jog/Shuttle wheel for sophisticated editing with ease, the MDM-X4 will encourage you to flex your creativity.

FEATURES–

- Records on high quality, removable MD data discs
- 3.5-gen. ATRAC LSI for wide dynamic range.
- 10 Input / 4Bus mixer
- 2 AUX sends, 3-band EQ. • 11-point locator.
- Random access memory for quick playback and record from anywhere on the disk.
- Editing features include Undo, Redo, & Section/Song editing for flying material between different tracks.

STUDIO DATS

Panasonic SV3800 & SV4100

The SV-3800 & SV-4100 feature highly accurate and reliable transport mechanisms with search speeds of up to 400X normal. Both use 20-bit D/A converters to satisfy even the highest professional expectations. The **SV-4100** adds features such as instant start, program & cue assignment, enhanced system diagnostics, & multiple digital interfaces.

FOSTEX D-15

The new Fostex D-15 features built in 8Mbit of RAM for instant start and scrubbing as well as a host of new features aimed at audio post production and recording studio environments. Optional expansion boards can be added to include SMPTE and RS-422 compatibility, allowing the D-15 to grow as you do.

FEATURES–

- Hold peak readings with a choice of 5 different timings
- Set cue levels and cue times
- Supports all frame rates including 30df
- Newly designed, 4-motor transport is faster and more efficient (120 minute tape shuttles in about 60 sec.)
- Parallel interface
- Front panel trim pots in addition to the level inputs

D-15TC & D-15TCR

The D-15TC comes with the addition of optional chase and sync capability installed. It also includes timecode reading and output. The D-15TCR comes with the further addition of an optional RS-422 port installed, adding timecode and serial control (Sony protocol except vari-speed).

SONY PCM-R500

Incorporating Sony's legendary high-reliability 4D.D. Mechanism, the PCM-R500 sets a new standard for professional DAT recorders. The Jog/Shuttle wheel offers outstanding operational ease while extensive interface options and multiple menu modes meet a wide range of application needs.

FEATURES–

- Set-up menu for preference selection. Use this menu for setting ID6, level sync threshold, date & more. Also selects error indicator.
- Includes 8-pin parallel & wireless remote controls
- SBM recording for improved S/N *(Sounds like 20bit)*
- Independent L/R recording levels
- Equipped with auto head cleaning for improved sound quality.

TASCAM DA-20

Suited for personal project or broadcast studios, this high performance durable DAT recorder is a great value in a digital mastering deck. It features multiple sampling rates, SCMS free recording and a full function wireless remote.

Minimum Shipping USA (Except AK & HI) $6.95, up to 1 lb. Add 75¢ for each additional lb. For ins. add 50¢ per $100. © 1998 B&H Photo - Video. Not responsible for typographical errors. Prices valid subject to supplier prices.

(continued from p. 211)

In addition to the Chromazones, there are 21 other groups of phrases, most of which are organized by both key and tempo. The actual tempos often seem to be slightly slower than the listed tempos, but that's admittedly a minor point.

Strong Rhythms

The phrases are all strongly rhythmic and are evenly divided between happy, folksy, major keys and driving, aggressive, minor keys. I prefer the more exotic flavors of the minor-key phrases, such as "Tzouras & Saz Tsifteteli" and "Bouzouki Rumba." With a little help from some percussion, these rhythms should get dancers on their feet as surely as any four-on-the-floor house loop.

The stringed-instrument multisamples are expertly done and typically feature a separate sample for every note. All instruments are sampled both with and without tremolo, and many also have pizzicato samples and/or note bends. Only the acoustic bouzouki features multiple dynamic levels with velocity switching, however. The tuning has not been altered, so some notes are slightly "out" in comparison to equal temperament, which generally adds to the instruments' already rich harmonic character. Many of the sounds have timbral complexities reminiscent of a cross between a Dobro and a hammer dulcimer. My favorites are the rich, twangy tzouras and the deep, punchy oud.

Varied Percussion

Like the stringed-instrument phrases, the drum and percussion loops are based on traditional dance rhythms. The fifteen groups of percussion loops are outstanding, with soloed parts and multiple variations on the basic patterns. I only wish that there were more! The small selection of drum hits is also well done. Worth noting is the daires, with its complex, hollow, jangly tone. I don't like the drum kit loops as much. I'm sure that they are authentic, but they're a bit bland for my taste.

For composers looking to give their music a Greek or Middle Eastern flavor, for film or television music, or for Dead Can Dance–style pop, this collection offers a solid set of building blocks. Give it a listen!

Overall EM Rating (1 through 5): 3.5

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DAN DEAN PRODUCTIONS

Dan Dean Bass Collection, vol. 2

By David M. Rubin

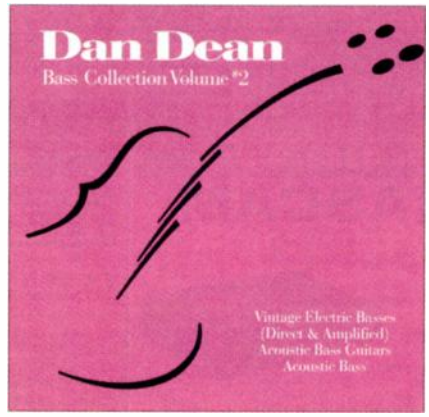
Some people are just fanatics when it comes to the bottom end of the musical spectrum. Dan Dean, an accomplished bassist, composer, educator, and sound designer, is clearly one of those people. His *Dan Dean Bass Collection,* vol. 2 ($199), is a unique treasury of bass sounds created by sampling classic electric basses from the '60s and '70s in addition to several acoustic bass guitars and a wonderful 100-year-old German double bass.

The CD-ROM, which is programmed for use in E-mu EIIIx and EIV formats, contains 546 MB of samples. Each folder's 21 banks range in size from 9.9 to 23.7 MB and include low-memory presets. EIV users gain full support for the Thumby button, which produces a muted or damped effect, and MIDI sliders, which control chorus amount, glide (portamento), and filter frequency and resonance. Each bank also includes presets with octave doublings and chorusing.

Rounding the Basses

The 10-instrument collection includes a Fender Jazz (using various pickup combinations), Fender Precision, and Rickenbacker 4001, played both finger style and with a pick. Also included are a vintage Hofner Violin bass, a Gibson Thunderbird, and an Alembic 5-string Spoiler, all played with a pick. The last group, played fingerstyle only, includes a Washburn AB-20 acoustic fretless, a Guild Ashbory "Rubberband," a Hohner acoustic fretless, and the century-old double bass (in both stereo and mono).

The electric basses were recorded both direct, using either a stereo tube preamp or a direct box, and by miking various amp setups. Mics such as the Neumann U 47 and the Electro-Voice RE20 and various tube processors were used to reproduce the recording techniques of the '60s and '70s. Apogee A/D converters (UV-22 process) digitized the source material, and Digidesign's DINR was used to remove residual noise. Every note on each instrument was individually sampled to eliminate transposition and pitch-shifting problems, and vintage-style flatwound strings were used on the Fender, Rickenbacker, and Hofner basses.



The *Dan Dean Bass Collection,* vol. 2, has samples so smooth you'll have a hard time telling them from the real thing.

Good Old Sounds

Clearly, a lot of effort went into capturing the instruments just as they were recorded in the past. The presets are all exceptionally clean while retaining the warmth and vintage sound of each instrument. The fingerpicked Fender Precision, for example, is silky smooth with no perceptible grunge. The Gibson provides a wonderful retro picked sound, and the Washburn retains its uniquely acoustic quality as sustained notes evolve and gradually decay. My favorite, unquestionably, is the 23 MB stereo Acoustic Bass bank. With every note sampled, the true, idiosyncratic character of the old upright bass comes through, and it's a joy to play. As with many of the instruments on this disc, it can be hard to distinguish a track that uses these samples from a live performance.

If you're picky about your bass sounds, you really should check out this collection. Although the documentation is scant, the sounds are great. You'll find it truly invaluable for a great many projects.

Overall EM Rating (1 through 5): 4.5

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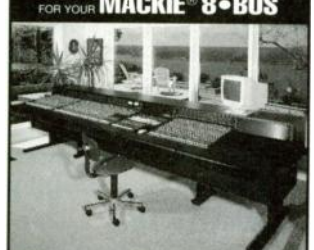
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FINAL MIX

By Larry the O

Whither Ghost Apple?

I love my shiny new G3 Macintosh; it rocks. Given that it's the fourth Macintosh I've owned (starting with a Mac 512k!), I guess I'd have to say I'm a Mac enthusiast. But when I recently purchased the G3, I had a dark foreboding that it may be the last Mac I buy. Not that I think Macintosh will disappear by the time I need to upgrade, nor do I expect it to have fallen out of favor with me by then. No, what I fear is that I will have fallen out of favor with it.

I have always liked Macintosh technology but have always felt confused by Apple's direction with the line. Certainly, I am not alone in this; in fact, a case could be made that bafflement over Apple's marketing strategy has been a primary cause of the company's woes. The recent brief experiment with licensing third parties to produce Macintosh clones is a perfect example. It seemed like such a good idea: more powerful and cheaper Macs were coming along at a good clip, with clone makers vying to one-up each other. Then Apple pulled the plug on it all.

The explanations issued by Apple were logical but complex, boiling down to an argument that even though consumers might be benefiting from the clone market, Apple was losing money, which it could ill afford. And indeed, it's hard to argue with the company's decision, considering the great G3 sales and Apple's recent return to profitability.

Then Apple announced it was scrapping plans to produce G3 machines with six PCI slots. In one report I read, the need for more than three slots was dismissed by Apple as limited to those doing digital video. A disturbing question arose in my mind: What exactly does Apple think their strong markets *are?*

Clearly, they're a blip on the screen in mainstream business and office use; that market is owned by the Wintel platform. Scientists? Well, maybe, but my impression was that Sun, Hewlett-Packard, and other workstations of that ilk were the tools of choice in that community. Even the education market seems to no longer be dominated by Macintosh the way it once was.

So which markets are still heavily involved with Macintosh? It's those who, in the parlance of the '90s, generate content: desktop publishing (long a Macintosh stronghold), multimedia production, digital audio, and lest we forget, digital video.

And what do those people need to do their jobs? Lots of slots for plugging in their various accelerator and interface cards, fast SCSI buses, onboard digital I/O for audio and video in standardized formats. These things are all lacking in the current G3 machines. (Don't even mention the DAV connector.) Of course, this is good news for Adaptec, ATTO, and other SCSI accelerator-card makers, as well as manufacturers of expansion chassis; after all, adding an accelerator card leaves only *two* slots.

The contact I've had with Apple engineers leaves me with the impression that they have a clue and are looking to get more of one. Which leads me back once again to wondering about Apple marketing.

Strong support of developers by Apple is also needed, and to that end, there certainly is substantial effort being focused on QuickTime. But we in digital audio have other needs, such as a multichannel Sound Manager and a standardized plug-in architecture that will do for Macintosh what DirectX has done for Windows machines. Reportedly, some of these things are being worked on; let's hope these developments actually see the light of day before they lose their relevance.

At this past Winter NAMM show, I saw fewer new products for Macintosh and booths demoing with Macintoshes than I'd ever seen before, although Apple's booth was wonderful. Frankly, you have to go where the tools are that will get your work done. I hope I don't have to go any further than my Macintosh dealer, but after all these years of loyalty, my eye is wandering.

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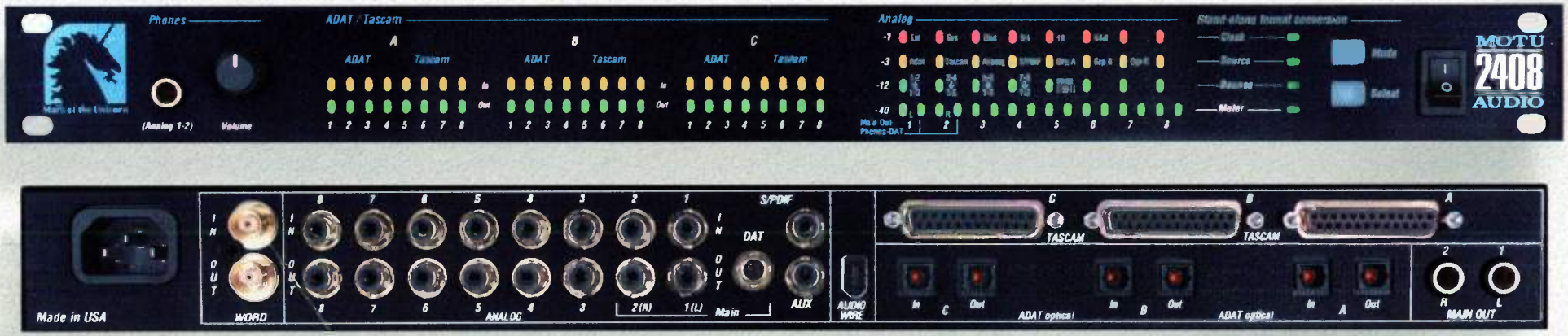

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