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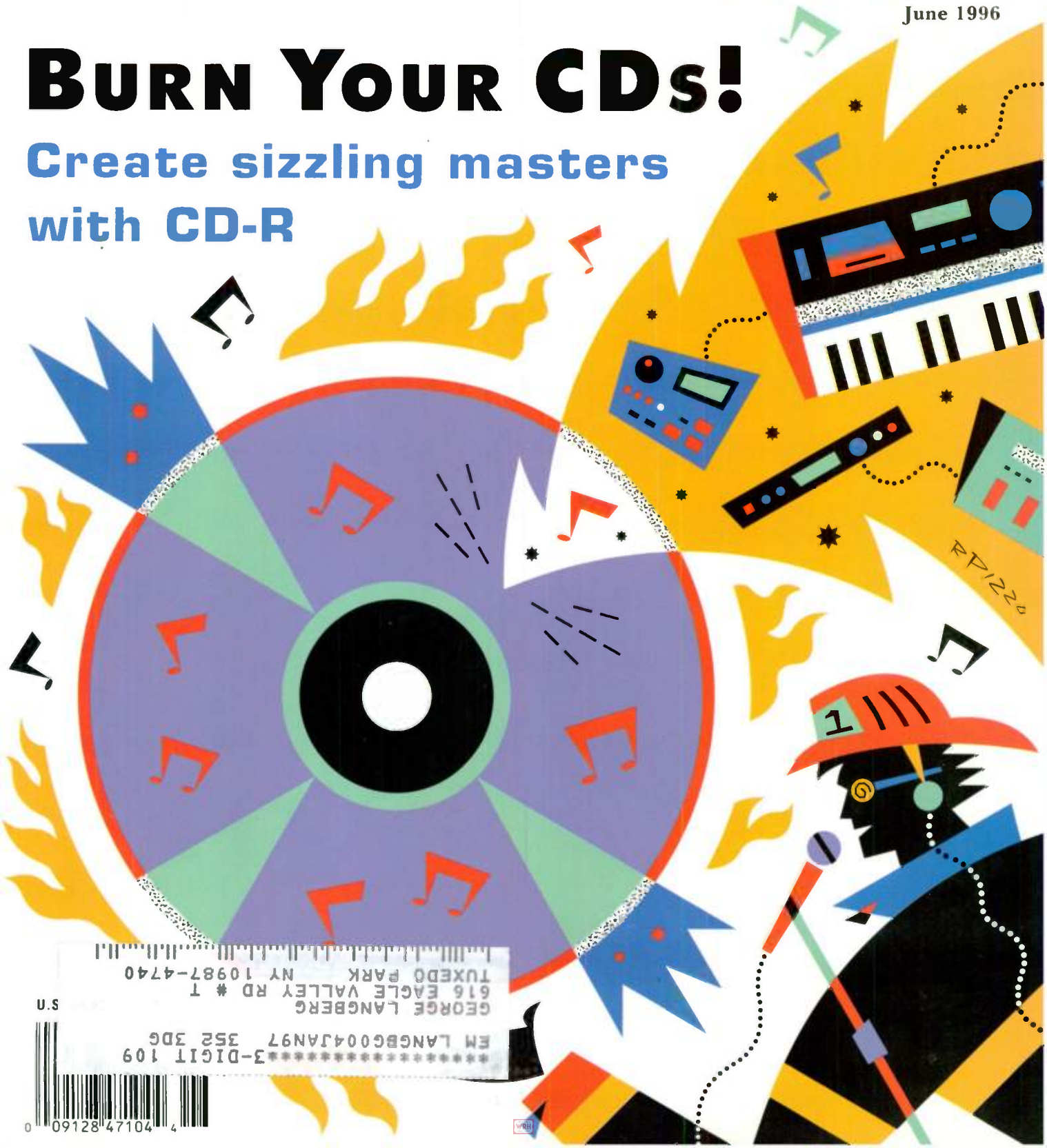

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1 **VLZ CIRCUITRY FOR ULTRA-LOW NOISE AND CROSSTALK.** *Did we just make up a fancy name for the same old circuitry? Nope. VLZ (Very Low Impedance) is a Mackie innovation based on solid scientific principles. Through the careful deployment of high operating current and low resistor values at critical points in our consoles, we're able to dramatically reduce thermal noise & adjacent-channel crosstalk. Open up all the channels, subs & masters on a Mackie 8•Bus console and compare what you hear (or rather don't hear) with any Brand X console. Because Very Low Impedance circuitry needs loads of high current, we ship a humongous, 220-Watt Triple-Regulated power supply with every 8•Bus*

[1] Mention in this ad denotes usage only, as reported to Mackie Designs, and is in no way intended to constitute official endorsement by the artists or groups listed.

*As compiled by a leading Independent Console Video Factoid Evaluation Laboratory. Your count of superior Mackie 8•Bus console features may vary.

2 **IT EXPANDS ALONG WITH YOUR NEEDS AND BUDGET.** *You'd be surprised just how many 8•Bus console setups like the one below are currently in use. But you don't have to start out this way. Start out with a 24•8 or 32•8 and then grow your 8•Bus console 24 channels at a time with our 24•E add-on modules. 1, 2 or even 3 of 'em connect in minutes. They come with their own 220-watt power supply; optional meter bridges are available.*

3 **IMPECCABLE MIC PREAMPS.** *A console can have motorized dooflammers and an optional MIDI espresso attachment, but if the mic preamps aren't good, you don't have a fully-useful production board. Our discrete preamps with large-emitter-geometry transistors have won a critical acclaim for their exceptional headroom, low noise (–129.5dBm E.I.N.) & freedom from coloration. VLZ circuitry in the preamp section also reduces crosstalk.*

4 **THIS CONSOLE JUST PLAIN SOUNDS GOOD.** *Sure, you may be able to buy a Brand X console for less. But you end up with a console that sounds like…well…a Brand X console. Granted, we're getting into a pretty subjective area here…but we have tall mounds of 8•Bus warranty cards that rave about our consoles' "clarity," "sonic purity," "sweet sound," "transparency," "lack of coloration" and a lot of other superlatives we wish we'd thought of first.*

Above: 24•E 24-ch. expander with optional MB•E meter bridge and stand.

6 **MAC® & WINDOWS® 95-BASED AUTOMATION THAT'S RELIABLE, PROVEN AND AFFORDABLE.**

Along with affordable digital multitrack recorders, the Mackie 8•Bus has made it possible to do world-class productions on a modest budget. But until now, Big Studios have still had one remaining and unattainable creative "secret weapon"… computerized level automation. That's why we developed the UltraMix™ Universal Automation System. It gives you fully editable and recallable control of input, channel and master levels — plus features not found on even the most expensive proprietary Mega-Console automation systems. Equally important, it doesn't degrade sound quality, introduce zipper noise or cause audible "stepping." UltraMix is currently being used to mix network television music themes and on several major album projects – by seasoned engineers who grew up on Big Automation Systems. Their verdict is that UltraMix is a serious automation solution – stable, reliable and frankly easier to use than more expensive systems. The basic system controls 34 channels and can be expanded to as many as 128 channels. UltraMix Pro™ software, for 030/040 & Power PC Macintoshes and PCs (Windows® 95 required), includes a wealth of features like editable fader curves, built-in level display, unlimited subgroups, SMPTE time code display, event editor with pop-up faders, optional control of outboard effects devices and the ability to play Standard MIDI files from within the program.

UltraMix™ includes the Ultra-34 Interface, UltraPilot Controller and software for $2797 suggested U.S.. retail. Macintosh® or Windows® 95-compatible PC not included.

SONS TO BUY OUR 8•BUS CONSOLE. VIDEO CONTAINS AT LEAST 71.5* MORE.

5 **PROFESSIONALS REALLY USE THEM.** *The members of Boyz II Men could have afforded any console they wanted for their studio's second room. They chose an 80-input 8•Bus with 102 channels of UltraMix™ automation. In the studios of artists as diverse as k.d. lang, Yes, Queensryche, Lee Roy Parnell, Aerosmith, Bryan Adams, Carlos Santana, Whitney Houston, Eric Clapton & U2, our consoles really are used to make great music.*

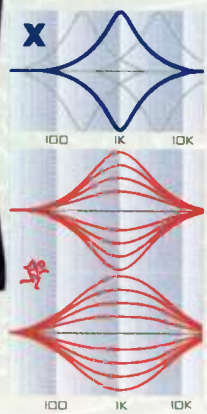
FREE VIDEO! *Choosing the right 8-bus console can be pretty confusing these days. That's why we've whomped up a free video that gives you some solid reasons to buy a Mackie 8•Bus. This eclectic compilation contains excerpts from our epic 8•Bus Video Owner's Manual, an introduction to UltraMix™ Automation System and an award-winning short subject, The 2nd Mackie Home Video. Watch all three parts before you part with bucks for any 8-bus console.*

FREE VIDEO FINE PRINT. *Visit your local Authorized Mackie Dealer for a real live 8•Bus demo, and then snag your free video. This handsome offer is good while supplies last, or until August 31, 1996, whichever occurs first. So, you snooze, you looze. Limit: one per customer. If you just can't seem to make it to a dealer, it's available from Mackie by phone or fax request – no reader response cards. Allow six weeks for delivery. You will also receive our 48-page 8•Bus and UltraMix™ Universal Automation System color tabloid. This video offer is available to respondents in the U.S. only. Canadian readers, call SF Marketing at the toll-free phone number below. In other countries, please consult your local Mackie Designs Authorized Distributor.*

Above: 24•E 24-ch. expander with optional MB•E meter bridge and stand. Above left: 32•8 with optional MB•32 meter bridge and stand.

Above: The SideCar, matching 8•Bus equipment rack.

7 **WIDE MID RANGE EQ.** *Whether you're tracking or mixing, equalization is one of your most important creative tools. We concentrated on important things like giving you Classic English Console EQ capabilities. By that, we mean extremely-wide-bandwidth peaking equalization that can be used to achieve effects that simply aren't possible with narrower EQ. Most Brand X midrange EQs have a fixed bandwidth of about 2 octaves (blue graph above right). You can sweep it up & down the frequency spectrum, but the "sharpness" of the EQ curve is always the same.*



This kind of EQ is good for some purposes...but if you've worked with it before, you know it's too drastic and localized for gentle changes in overall tonal coloration. The 8•Bus' true parametric Hi Mid lets you spread the bandwidth out to as much as 3 octaves (red curves at left). That extra octave of "width" gives you a whole new creative palette.

8 **LEGENDARY RELIABILITY.** *This is one of those factors you probably don't think much about – until your console goes down at in the middle of a critical session...at 2AM on a holiday weekend. Built with pride in Woodinville, WA, USA, 8•Bus consoles have an enviable 3-year track record for enduring continuous, round-the-clock use and abuse.*

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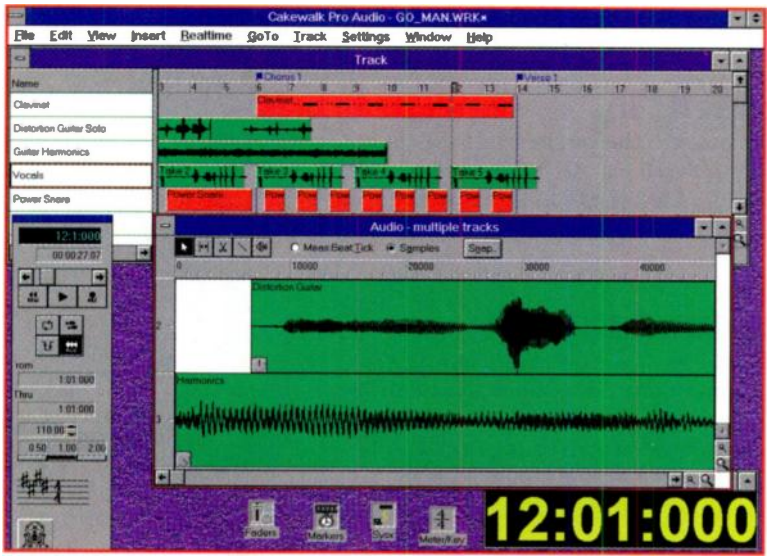

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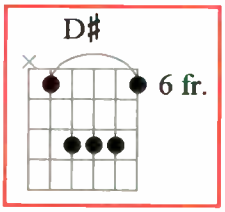

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I N S I

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D E Electronic Musician®
ten! years of hot tracks & big gear
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Cover: Illustration by Robert Pizzo.

Two roads diverged in a wood, and I—

I took the one less traveled by,
And that has made all the difference.
—*Robert Frost*

It usually signifies a transition whenever I take over Mike's column. This is no different, except the change involves me this time.

After ten and a half years at *Electronic Musician*, I am leaving to pursue a new, untraveled road. When I first joined **EM** in September 1985, a new industry was burgeoning, centered on the convergence of music, computers, and digital technology. It was undefined, exciting, and challenging. I enjoy facing these factors on whatever path I choose to follow.

Electronic Musician provided ample challenges and diversions as the information needs of our readers and manufacturers twisted and turned with the advent of every new technology. Our 10-year journey took us through an explosive growth of synthesizers, drum machines, sampling technology, digital signal processing, and, most recently, digital recording devices. We also passed many places where exciting new computer software was developed to let musicians record, edit, and print their music.

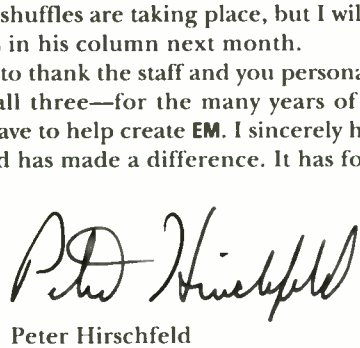
If you've followed this industry for several years, you might share my feeling that the new technologies and products, although innovative, are just not as exciting as they were ten years ago. Don't get me wrong: the gear produced now is some of the most dazzling and high-quality stuff that's ever been produced, but most of these products are better, cheaper versions of things that already exist rather than devices that blaze new equipment categories.

This brings up why now is an appropriate time for me to seek a different path. *Electronic Musician* has finally "grown up" to the point where our exceptional staff is able to continue producing **EM** without course corrections from me. **EM** has been able to develop an identity and momentum that are independent from any one person, so I feel comfortable that my leaving will not have an adverse effect on the magazine or on the many wonderful people I have hired.

Another concurrent event that beckons is the proliferation of electronic publishing. This field excites me the way that the music/technology combination did ten years ago. As a self-confessed Web Serf, I foresee the potential for this new medium to deliver certain types of information better and more appropriately than other established media. (It will never replace any existing media; it will exist as another entity.) As a publisher, the time is exactly right to wander down this new pathway and help define where it's going.

Where does this leave **EM**? In great hands. I'm happy to inform you that, effective next month, Mike Molenda will become the spiritual leader of **EM** as editor-in-chief. Several other internal shuffles are taking place, but I will leave Mike to introduce the various new roles in his column next month.

In my final commentary, I want to thank the staff and you personally—a reader, a manufacturer, a friend, or all three—for the many years of encouragement, feedback, and support you gave to help create **EM**. I sincerely hope that my efforts along this road less traveled has made a difference. It has for me.



Peter Hirschfeld

P.S. If you wish to reach me, my personal e-mail is elecmusn@ix.netcom.com.

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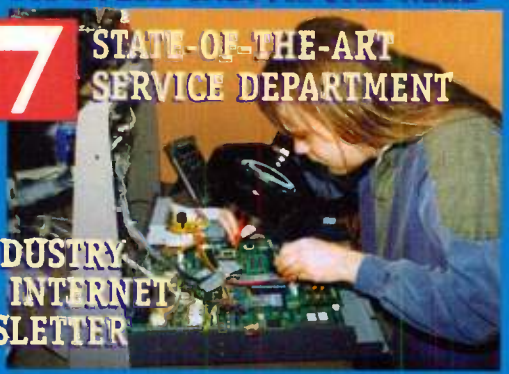

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9 LATEST INDUSTRY NEWS VIA INTERNET AND NEWSLETTER

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write your

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Until now. Meet the MR-61 and MR-76, new keyboards designed for the composer in all of us.

To start, we studied the songwriting process, learning from musicians at all levels, across all genres – people just like you. We learned what tools you needed. What frustrations you had using a workstation keyboard or a computer. Then we came back full of fresh, new ideas and built them into the MR Series keyboards.

Take the Idea Pad, for instance. Noodle around a bit. Try out a few ideas. Don't worry, your inspiration has already been captured – the MR always remembers what you play.

Need a groove? Play along with some of the most natural-sounding rhythms you've ever heard, thanks to the onboard Drum Machine. Send your ideas to the 16-track sequencer to develop them further. Use the Song Editor to quickly build your arrangement, and get the final mix just right with the Mixdown strip.

We wanted these great new concepts to be easy to use, so we put all the right controls on the front panel. Arranged in sensible groups so you don't waste time searching through complex menus.

Of course there's more – like support for Standard MIDI Files and General MIDI, an MS-DOS disk format, a powerful voice and effects architecture (the same as our MR-Rack), fast sound editing, 64-note polyphony, our SoundFinder™ interface, performance features, and much more.

ENSONIQ has always been known for making powerful features easy to use. The MR-61 and MR-76 raise that standard. They're great-sounding instruments that makes it easier than ever to write a song – right here, right now.

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Here's your drummer, complete with 8 variations and 8 fills. Load in new rhythms from disk and edit the patterns to try different drum kits or quantization feels. It can even be synchronized to the sequencer to save time and note memory!

next song here

Arrange it here. The Song Editor gives you a natural, easy-to-use interface for arranging your sequences into songs. Make a playlist by choosing the order of your sections. Trying a new arrangement is as easy as A, B, C (or A, C, C, B, D, or A, D, C, B, E, ...).

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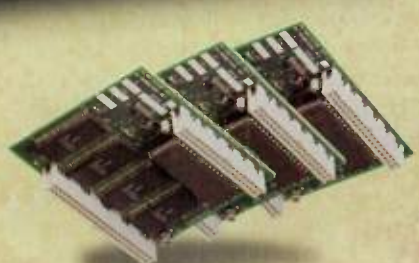

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SCRUB-A-DUB-DUB

Yeow! What an issue (April 1996)! There were so many goodies that it wouldn't surprise me if the next issue is just blank pages. Even though I had put a hold on any new purchases for my studio, I must have a SpaSynth ("Tech Page: In Hot Water").

Howard Segal
bsong@taconic.net

Just got the latest issue of **EM** and was very pleased! You guys are doing a great job. It was a joy reading every article, and when I got to "Tech Page" I was pleasantly surprised. A SpaSynth. Hmmmm...a very *deep* article. Good job, Scott Wilkinson!

Mark Sansoucie
msansoucie@aol.com

I was encouraged to read about the SpaSynth, as I'm currently fitting a Shelby Cobra with a MIDI steering-wheel controller. This allows film composers to really get the feel for a high-speed chase scene by composing the soundtrack while driving at 180 MPH. The gas, clutch, and brake pedals double as expression pedals while the gearshift sends a MIDI tempo change. There's also a sensor on the front bumper, which triggers sound effects through Current Resistance Amplified Signal Hashing technology (CRASH). A rack in the trunk houses the sequencer, effects, sound modules, samplers, and a MIDI Signal Tube Distortion box I picked up a year ago.

Tim Daniel
102133.1213@
compuserve.com

DON'T OVERDO IT

I enjoyed reading Michael Molenda's "Front Page" (April 1996) about mixing out music's edge in the studio. In my 42 years, I have gone through many stages of overdoing it by oversynthesizing, overlayering, overcompressing, over-stereo imaging, and just plain ol' changing of many of my compositions beyond their original personality. Now I realize the emphasis should be on better playing and technique more than on studio fix tricks. Keith Emerson said it best: "Every song should be written and recorded to be played live."

Lance Armstrong
cia@msg.ti.com

Two thumbs up for Michael Molenda's April "Front Page." As a subscriber for the last five years, I have to say that no other article or editorial has struck a nerve like that one did for me. I'm a session guitar player/vocalist, and nothing drives me up the wall more than a great take getting redone because of a small string squeak. It's a shame so many recordists have resorted to a strict method of recording during such a cool technological revolution.

Raynaldo Martine
raynaldo@cris.com

INTERACTIVE BOO-BOO

In reading "Desktop Musician: Making an Enhanced CD" (April 1996), I noticed that the article referenced the audio playback rates as 22 MHz and 44 MHz. Megahertz? Really? This must be a typo, and you must mean kHz for kilohertz, or there must be a new system out that can sample 22 or 44 million samples per second.

Dave Cramer
74542.47@compuserve.com

Dave—You're right, the unit of measurement should have been kilohertz (kHz). Parri Troy misspoke in his quote, and I didn't catch it. The error was not caught in the fact-check process either. Welcome to the wonderful world of publishing.—Mary C.

GOOD GUESS

Regarding "Master Class: Programming the Roland Super JV" (March 1996), I am confused about what *n/a* means on the patch parameter instructions. I know it means "nonapplicable," but what do I do with the parameters that are marked that way? My guess is to leave them as they are, but a guess isn't good enough.

Erik Goldberg
Meriden, CT

Author Clark Salisbury responds: *As you've surmised,* n/a *means "not applicable." Parameters marked* n/a *are not used in the patch in any way, and changing their value will have no effect on the patch. The simplest thing to do is just leave them set wherever they are.*

READING THE FINE PRINT

I am a soldier deployed in Bosnia, and I am having **EM** sent to me by my wife. This is the best way that I could think of to stay in touch with the electronic-music world. I was happy to read the article on musicians' rights ("Working Musician: The Fine Print," February 1996). My friend's group had some problems with a recording company about seven years ago. No contract was signed, and my friend's group lost all of the money they had invested in the project. I wish my friend had read your article.

SSG Eugene Williams Jr.
Chapel Musician
Bosnia

WHAT'S BACK THERE?

I appreciated Bob Moog's "Build the EM Theremin" (February 1996). According to the specifications,

MICHELE ALANIZ

Pro PC Power

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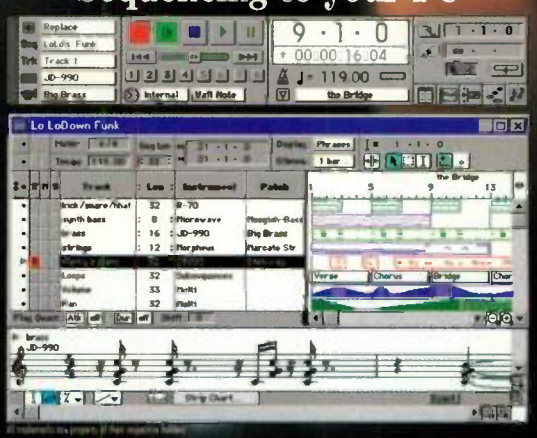

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it seems to be a serious instrument that has the characteristics of the original instrument of 1928. In looking over the plans and schematic diagram, it becomes apparent that an underside wiring diagram of the main circuit board should have been included for those of us who have limited ability to turn a schematic into a wired circuit. The top view of the main circuit board is very helpful for the placement of the components, but it gives no clue as to what is going on on the back of the board. Perhaps a printed circuit-board plan would solve this problem for a novice builder such as myself.

Ira B. Kraemer
ibkco@i-2000.com

Ira—Your point is well taken. Where it's appropriate, we'll be sure to include a back view of future DIY projects. Thanks for the suggestion.—Steve O.

JAZ IT UP

There have been several references in **EM** to the new and so-far-not-visible-in-retail-stores Jaz removable-medium 1 GB hard drive. The references suggest that the new drive can be used with digital hard-disk recording systems. My personal beast is an Akai DR4. My question for your indefatigable researchers is, Are the manufacturers saying these drives can be used as backup devices to archive digital audio data, or are they fast enough to be used as recording/playback media themselves?

Don Grant
dgrant@agora.rdrop.com

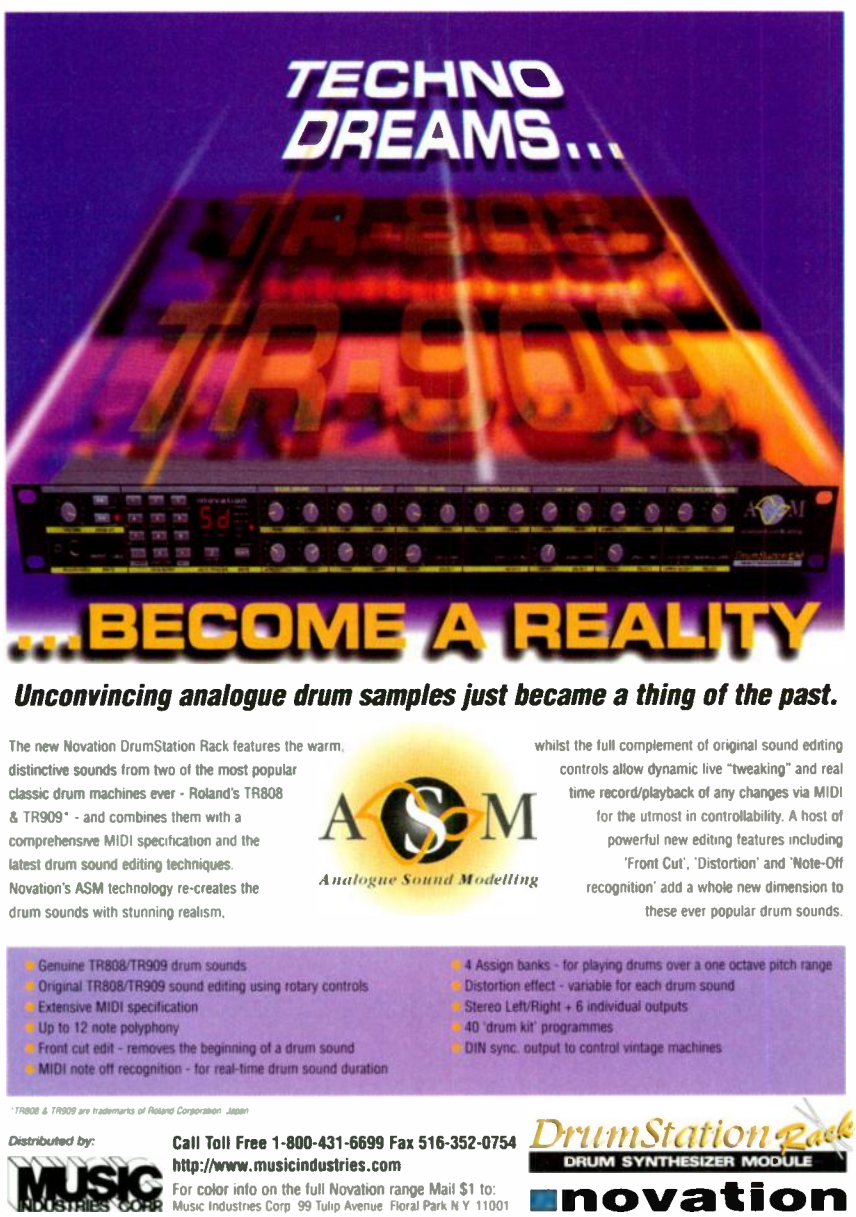
Don—The Jaz drive offers a 5.53 MB/s average transfer rate, 12 ms average seek time, and 17 ms average access time, which is good enough for hard-disk recording as well as archiving. Akai not only approves the Jaz for use with its systems, it offers optional, internal Jaz drives for its DR8 and DR16 hard-disk recorders. At the recent NAMM show, Roland announced that its new VS-880 hard-disk recorder would be available with a Jaz option, and E-mu said it would offer a Jaz-equipped version of its Darwin hard-disk recorder. Iomega will ship the Jaz later than expected; it still isn't available at this writing, but by the time you read this, you should have no problem finding one.—Steve O.

DOUBLE DIPPING

Which is the better procedure, to apply processing (e.g., compression, spectral enhancing) while I am recording or when I am mixing? I tend to believe that if I add it during recording and add it again during the mix, I might be overdoing it.

Prophecy77@aol.com

Prophecy77—Your instincts are correct: you'll produce cleaner mixes if you process a signal just once. However, many engineers view mixing as a "clean slate" procedure and often disregard any signal processing recorded to tape. In other words, if an engineer is seeking a particular sound, he or she will have no qualms about recompressing (or reequalizing) a vocal or bass track during the mix. My preference is to lightly compress a signal to tape—just enough to tame performance dynamics or dial in the desired "punch factor"—and then fine-tune the compression parameters during the mix. If applied judiciously, doubling up on dynamics processing (or spectral enhancement) should not compromise audio quality. —Michael M.



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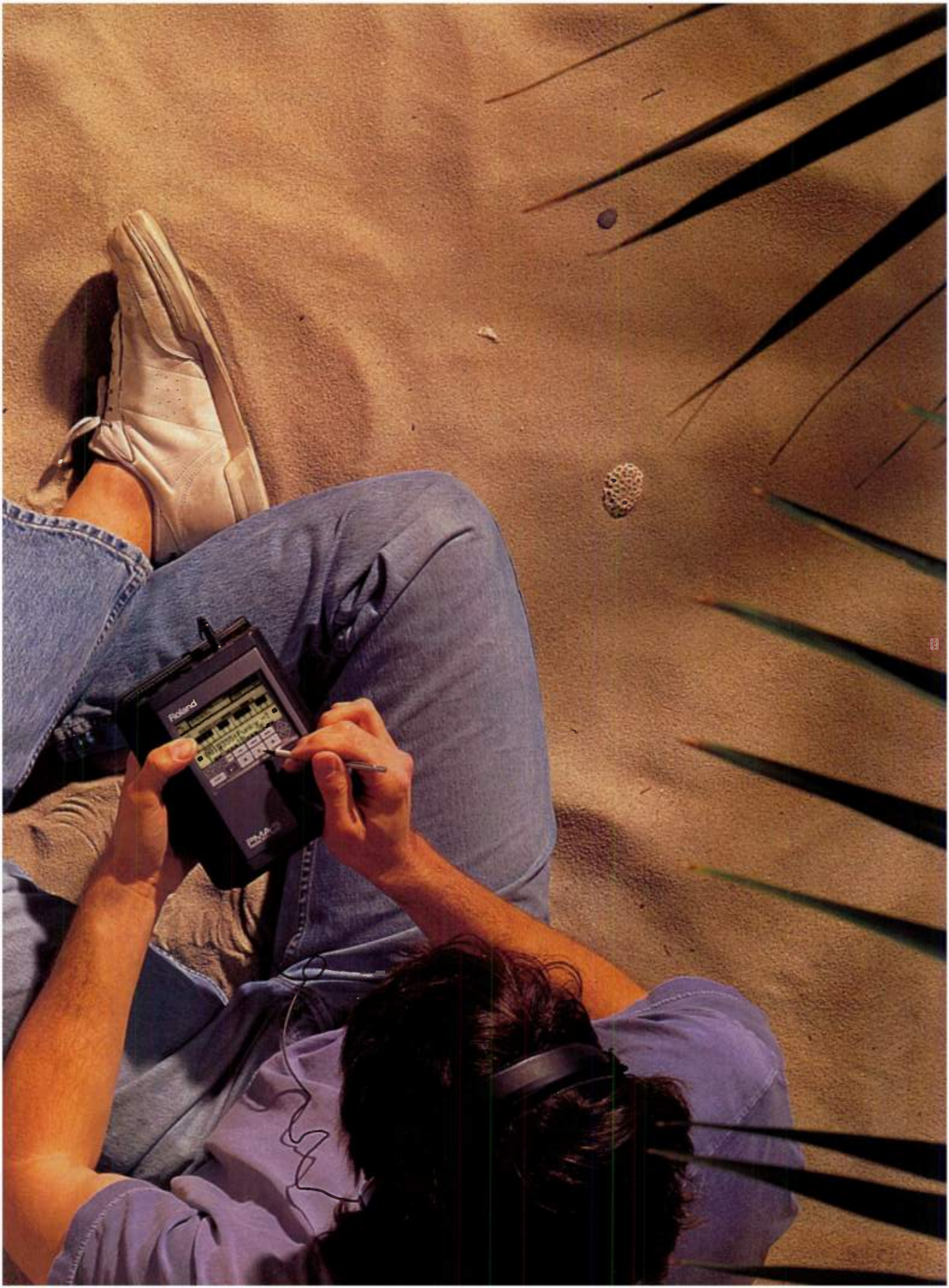

Roland

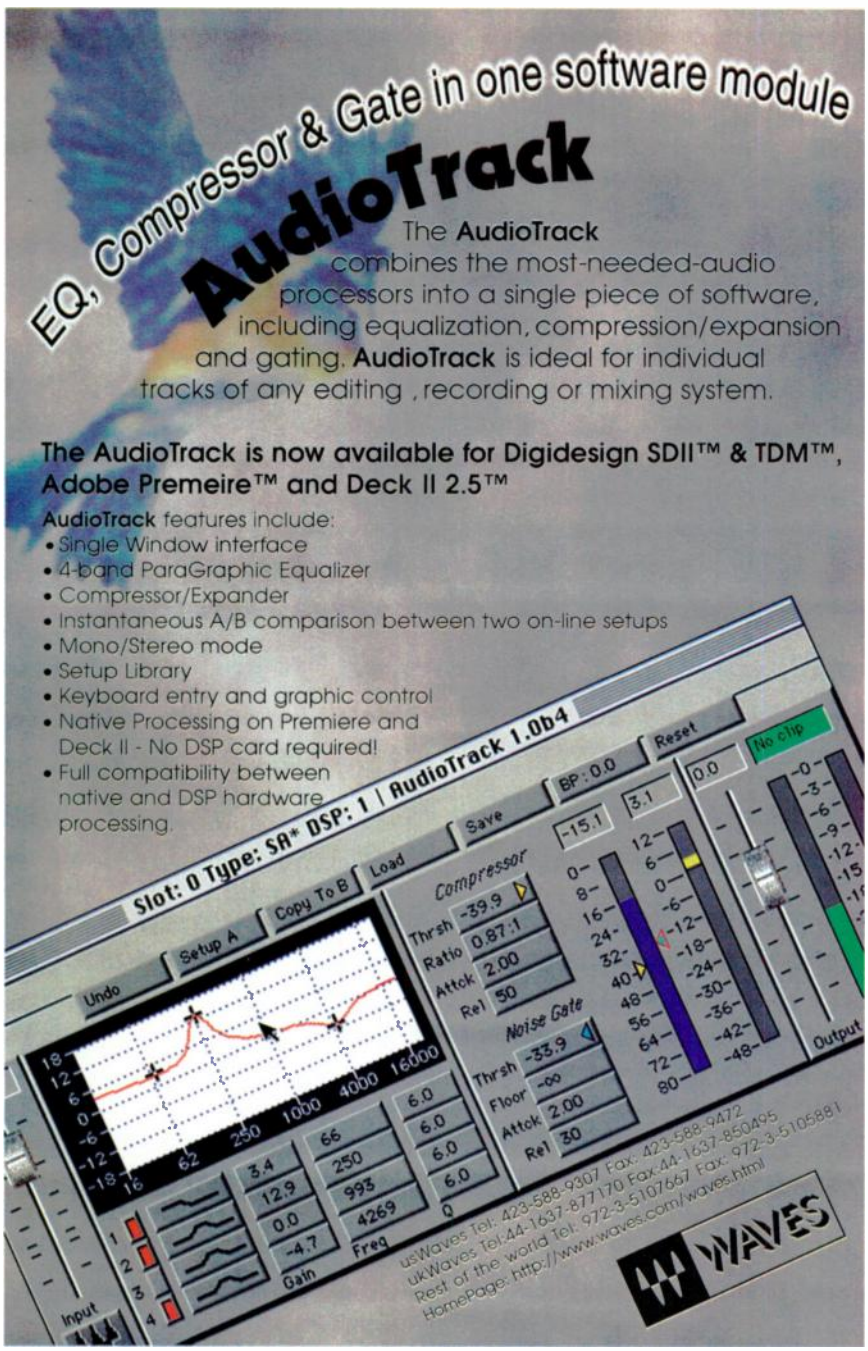
LYRICON REPAIR

In 1978 I bought a Lyricon from a company named Computone, but the company no longer exists. I can't use my instrument anymore. I tried to have it repaired here in Montreal, but no technician wants to touch it. Would you know of any musicians who play a Lyricon and could repair it or a company that could service it? Or is there somebody who has the schematics?

I would greatly appreciate any help you could give me. Having the instrument repaired and working would be a great moment in my life. The Lyricon is fantastic, and I don't think there is any other electronic wind instrument that comes close to being as expressive.

Jean-Pierre Gratton
Bedford, Quebec, Canada

Jean-Pierre—George Johnstone is an expert on Lyricons and has been repairing them for a long time. You can call him at tel. (617) 582-2456 or e-mail him at eng@massaprod.com.—Diane L.



INDEXING SOURCE

Recently a question came up about music-scoring software. I used your handy "index" from all the December issues and ended up tracing down other "in-article references." Suddenly I had a massive amount of information, answers, reviews, and specs—within minutes! It was then I realized that I'm not subscribing to just a magazine; I am building the *Encyclopedia Brittanica* of electronic music, software, and knowledge that can't be obtained anywhere else without exorbitant efforts. I also realized that the worst nightmare at that moment would have been to be referred to an issue that I did not have. Oh, pain of pains! So, needless to say, you'll be receiving my resubscription soon.

nullnoise@aol.com

WELL DONE

Congratulations on your efforts to make **EM** the best it could possibly be. Your reviews have fulfilled my needs both as a musician and as a sound enthusiast. Your columns are great.

Timmy Sawaya
New Orleans, LA

Reading your pages helps me produce better music and improves my English. I have subscribed for one year, and I'm really satisfied with your articles. Keep on doin' what you're doin'. *Va bene cosi!*

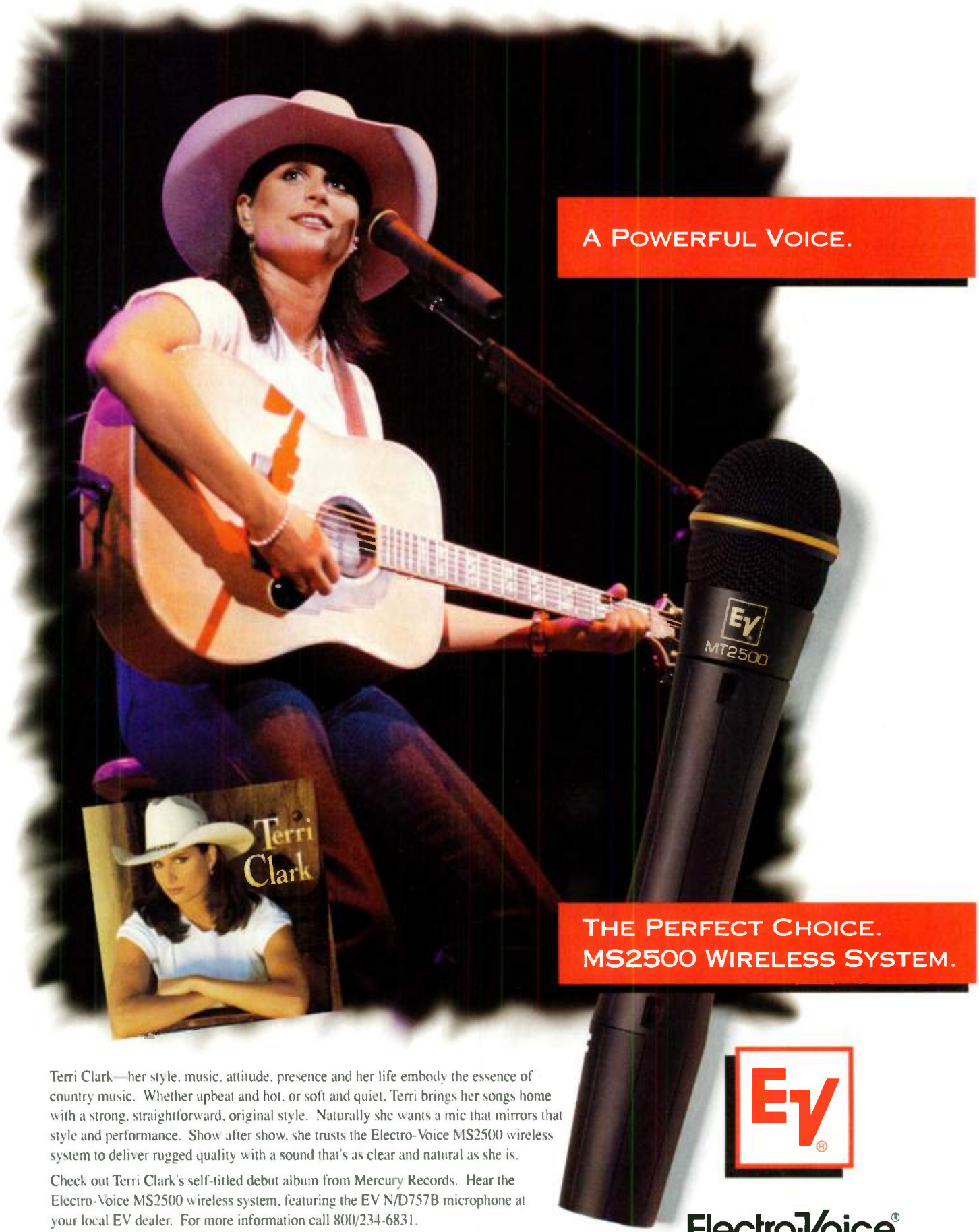
Agostino Carollo
Rovereto, Italy

ERROR LOG

March 1996, "What's New," p. 22: In the Terzoid NoiZe coverage, we inexplicably forgot that Sound Quest's *MIDI Quest* universal editor/librarian has been available for Windows—as well as Mac, Atari, and Amiga—for many years. *MIDI Quest* 4.0 for Windows was reviewed in the December 1994 **EM**. Sound Quest; tel. (604) 874-9499; fax (604) 874-8971; e-mail 76702.2205@compuserve.com.

WE WELCOME YOUR FEEDBACK.

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



Terri Clark—her style, music, attitude, presence and her life embody the essence of country music. Whether upbeat and hot, or soft and quiet, Terri brings her songs home with a strong, straightforward, original style. Naturally she wants a mic that mirrors that style and performance. Show after show, she trusts the Electro-Voice MS2500 wireless system to deliver rugged quality with a sound that's as clear and natural as she is.

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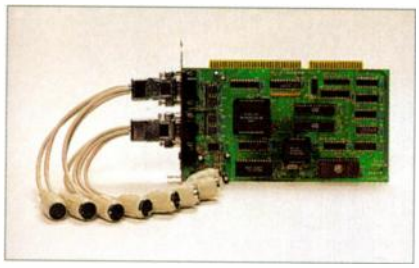
WHAT'S NEW

By Steve Oppenheimer



▲ MIDIMAN WINMAN 4X4/S

Midiman obviously finds collective joy in producing inexpensive gadgets that do essential tasks well. The new Winman 4x4/S MIDI interface card ($250) provides four independent Ins and Outs for up to 64-channel operation. Inputs can be merged and routed to any output.

The card's onboard synchronizer reads, writes, and regenerates 25, 29.97, and 30 fps drop and nondrop SMPTE time code and converts LTC to MIDI Time Code. It jam syncs in all modes and regenerates damaged code with a "fly wheel" that is adjustable from 1 to 60 frames or forever. Midiman includes software for controlling the sync section, including write-offset settings.

The 16-bit ISA card works with Windows 3.1 and Windows 95 and can be assigned any of nine IRQs and 32 addresses. Midiman; tel. (800) 969-6434 or (818) 445-2842; fax (818) 445-7564; e-mail midiman@midifarm.com; Web http://www.midifarm.com/midiman.

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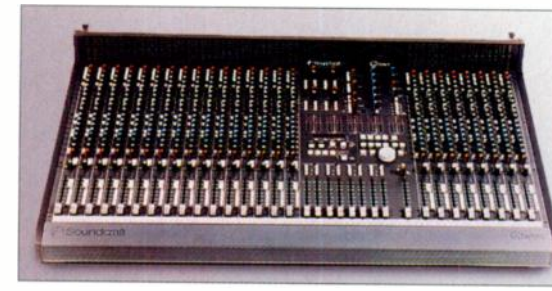
▶ SOUNDCRAFT GHOST



In the age of digital sound, one of the most significant breakthroughs has been the development of affordable, pro-quality, 8-bus analog consoles. Soundcraft's 24-channel Ghost console ($4,000) continues this happy trend.

Soundcraft has provided line and mic inputs, mic preamps, a phase switch, low-cut filter, and defeatable +48V phantom power on each channel. Each channel also includes a Mix B path (switchable between channel output and tape return). Both midrange bands of the defeatable 4-band EQ are fully parametric, and the high (12 kHz) and low (60 Hz) bands can be switched between the two Mix paths. All bands offer 15 dB of boost and cut.

You get six mono aux-send buses (on four level pots, as aux 3/4 cannot be used simultaneously with aux 5/6) and two stereo aux-send buses, for a total of ten aux sends. Auxes 1 and 2 are switchable pre/post-fader; the others are post-fader. Auxes 3/4 and 5/6 can be switched between Mix A and B, and there are four stereo aux returns.

Other audio features include two headphone buses, a talkback mic, and solo-in-place, PFL, and AFL monitoring.

Remote-control features are among the Ghost's strong suits. You get a Sony 9-pin connector for VTR control, MMC transport controls for audio and video decks, and a scrub wheel. There are up to four MIDI-controlled mute groups and storage for 128 snapshots, which can be recalled from the mixer or via MIDI. Four group faders double as data sliders that can send any MIDI Control Change message (0 to 127) on any MIDI channel. A time-code reader/generator is provided so you can automatically recall snapshots synched to SMPTE time code.

The console's frequency response is rated at 20 Hz to 20 kHz (+0/-0.5 dB) and crosstalk at -100 dB (mic input to line input @1 kHz). Harmonic distortion (THD+N, mic/line to direct out) is 0.0015% without EQ and 0.002% with EQ. Soundcraft USA; tel. (818) 227-1800; fax (818) 884-2974.

Circle #402 on Reader Service Card

▶ WHIRLWIND MIC ELIMINATOR

At some point, almost every musician uses a direct-injection (DI) box to convert an unbalanced ¼-inch, high-impedance instrument output to a balanced XLR, low-impedance output. This lets you send the signal over long cable runs, direct to the mixing board. A good DI box is an essential tool.

Whirlwind's palm-sized Mic Eliminator ($99) takes the direct box another step by emulating the sound of a miked, undistorted, 12-inch guitar speaker. To accomplish this, the product uses a combination of 24 dB/octave filters to roll off some frequency ranges and high-Q (narrow bandwidth) filters in other ranges. A switch lets you choose between a bright sound, as if the virtual mic has been placed directly in front of the speaker, and the darker sound of off-axis miking near the speaker's edge.

In addition to handling instrument and preamp signals, the Mic Eliminator can accept speaker-level (power-amp output) signals. An Amp/Instrument level switch sets the proper input attenuation, and a ground-lift switch is provided for isolating the output ground. The DI box is built for the road, with a heavy aluminum chassis. Whirlwind; tel. (716) 663-8820; fax (716) 865-8930.

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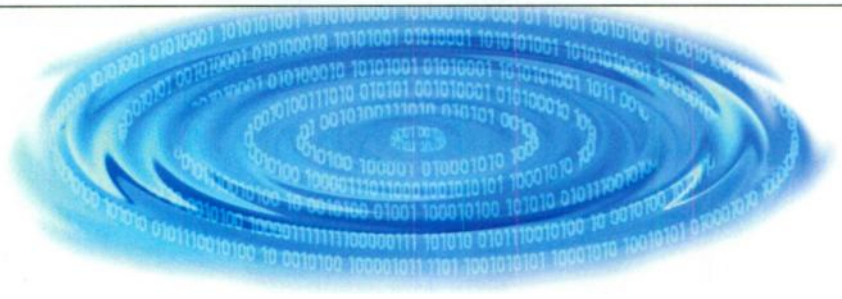

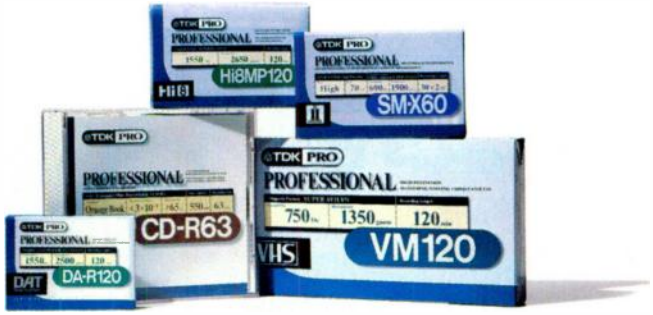

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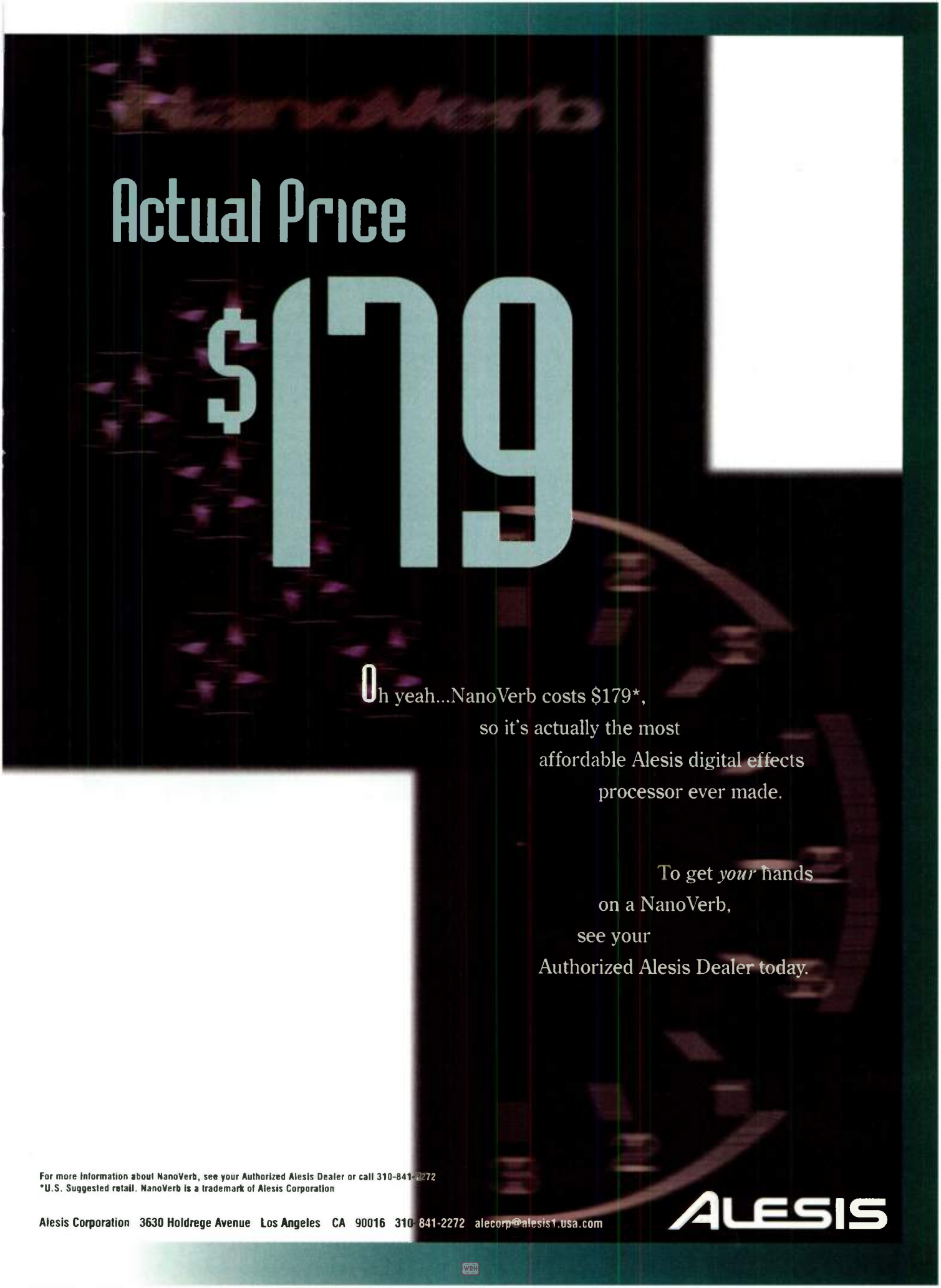
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SOUND ADVICE ▲ ▲ ▲ ▲

▲ NORTHSTAR PRODUCTIONS

If you're tired of the same familiar instruments, maybe you need fresh sounds from Russia and Asia. Northstar Productions' *Russian Masters* sample collection ($495) gives you 650 MB (over 55 banks) of Russian and Asian instruments on E-mu-format CD-ROM.

The disc includes instruments from all over Russia and the former USSR, including Byelorussia, the Ukraine, the Volga area, the Baltic republics, Caucasus, Kazakhstan, Gorny Altai, Tuva ASSR, the Far East, and Siberia. For example, check out the chordophones, such as balalaikas, domra, dutar, gusli, topshuur, and tar; aerophones, including the bayan, svirel, sopilka, pigangku, duduk, and nai; and membranophones, such as tablak, dhoki, and doira.

Many instruments have been multisampled in small intervals so that there is no pitch shifting; for example, the balalaika trills are performed in semitone and quarter-tone intervals.

Also new from Northstar is the *World X* CD-ROM set for Sample Cell ($199/volume). Volume 1 provides pitched, acoustic ethnic and folk instruments, including Scottish bagpipes, Bolivian pan pipes, Egyptian arghul, Moroccan reitah, Thai khene, and various kotos, lutes, and tamburas. Volume 2 features percussion instruments, such as rainstick, gamelan, Peruvian goat-hoof shaker, and various frame drums, gourd rattles, and tribal drums. All drum hits were recorded at several velocities. Northstar Productions; tel. (503) 760-7777; fax (503) 760-4342; e-mail nssamples@aol.com.

Circle #404 on Reader Service Card

▶ L² SOUND EFFECTS

Sound designer Frank Serafine's film and TV credits range from *The Addams Family, Star Trek I* and *III*, and *Hunt for Red October* to *Baywatch, Tron,* and *Field of Dreams*. Serafine has recently released *Platinum Sounds for the 21st Century* ($1,195), a 10-CD set of sampled sound effects from well-known films, TV shows, and other Serafine projects.

The sounds are organized into eight categories. *Animals* features jungle sounds, including birds, alligators, and insects. *Electricity and Static* gives you high-voltage electricity, airy static, sparks, and transformer hum. The 2-disc *Industrial* set provides power tools, a paint sprayer, and pneumatic effects. As expected, *Metal* comprises assorted metal hits, creaks, and crashes. *Science Fiction,* also a 2-disc set, offers spacecraft swoosh, robot effects, and computer sounds.

Supernatural is loaded with magic and horror sounds, and *Transportation* delivers jumbo jets, the Goodyear blimp, submarine wind-down, and M1

▼ FURMAN HA-6A

When you're rehearsing a band or tracking a live section, you need to put everybody on headphones. Unfortunately, most small mixers only have one or two headphone outputs. Attaching Y-cables (without level controls) to a headphone output obviously won't cut it; you need a headphone distribution system for this job.

Furman Sound's HA-6A headphone monitoring amp ($419 unbalanced, $453 balanced) puts six stereo headphone jacks, each with independent volume control, into a 1U rack-mount box. It has a built-in amplifier that delivers 20W per headphone feed, so all you have to do is connect the unit to any stereo or mono mixer line out and set the levels for each musician. The HA-6A uses a toroidal transformer, which helps minimize noise and magnetic leakage.

If six headphone feeds aren't enough, just add two more (with independent volume controls) using Furman's stand-mountable HR-2 headphone remote box ($79). Still not enough? No problem—you can daisy-chain multiple HR-2s and put them wherever you need them. Furman Sound; tel. and fax (415) 927-1225; e-mail furmansnd@aol.com.

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tanks. Finally, you can use *Water* to soak your recording with splashes, bubbles, hose leaks, and other wet stuff. L^2 Sound Effects; tel. (800) 779-L2FX or (310) 587-2100; fax (310) 587-2121; e-mail jaci@infint.com; Web http://www.infint.com.

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ILIO ENTERTAINMENTS

Producer John Boylan, engineer Paul Grupp, and drummer Michael Botts took a slightly different approach with Ilio's *Double Platinum Drums* sample library. The two CDs in the set contain the same performances, but one volume is sampled with room ambience and the other is presented dry. You get more than 500 loops and phrases at tempos from 66 to 203 bpm, organized by tempo. Styles range from rock, pop, funk, and dance to Latin, country, and zydeco, but the overall emphasis is on a hard-hitting rock feel.

Drum Workshop toms and bass drum, Tama Superstar toms and bass drum, and a Remo wood-composite bass drum were sampled, along with an assortment of Tama, Camco, W.F.L. (vintage 1940s), and Drum Workshop snares. Four sets of Zildjian cymbals are included (A, K, and Platinum series, plus effects cymbals), ranging from ping rides and thin crashes to rock rides and crashes, splashes, China Boys, and swish with rivets.

All tempo or groove styles include intros, time (main body), fills, and endings, most of which were edited from longer performances. Snare samples include choked or muted hits, accomplished with a plastic muffling ring on the head for stick hits or by holding the brush against the drum head after a brush hit.

The collection is available on audio CD ($129) or on CD-ROM ($299) for Akai S1000, Roland S series, Sample Cell, and Kurzweil K2000/K2500. Ilio Entertainments; (800) 747-4546 or (818) 883-4546; fax (818) 883-4361; e-mail ilioinfo@ilio.com; Web http://www.ilio.com.

Circle #406 on Reader Service Card

KID NEPRO

The self-styled Patch King has added the Roland JV-1080/XP-50 and Korg X3/X3R to his realm, offering ten new sets of patches for the former synth and five new volumes for the latter.

Each Roland set ($50/vol.) contains 128 patches on floppy disk in Mac, PC, Atari ST, or Alesis Data Disk format. Vol. 1 *(Techno/Dance Mix)*, vol. 2 *(Soundtrack/Film Mix)*, vol. 6 *(Classic Synths)*, and vol. 10 *(Performance Mix)* use the stock samples. However, vol. 3 *(Analog Heaven)* requires Roland's Vintage Expansion board, vol. 4 *(Pop/R&B Mix)* uses the Pop Expansion board, vol. 7 *(Ethnic Collection)* requires the World Expansion board, vol. 8 *(Bell Bottom Collection)* requires the "'60s & '70s" board, and vol. 9 *(Disco Duck Mix)* uses the Dance Expansion board.

The five Korg X3 volumes ($40/vol.) are *Classic Synths, Orchestral, Soundtrack/Film Mix, Mixed Bag,* and *Techno/Industrial*. Each one includes 100 Programs and 100 Combis. They are available on X-disk or floppy disk in Mac, PC, Atari, or Data Disk format. Kid Nepro; tel. (718) 642-7802; fax (718) 642-8385; e-mail kidnepro@aol.com; Web http://www.kidnepro.com.

Circle #407 on Reader Service Card

AKG K 333 IR

Traditionally, infrared headphones have been consumer products; no right-thinking professional musician would consider using them for serious studio monitoring. But it appears we right-thinkers could be left behind if we don't change our thinking. AKG's K 333 IR and K 444 IR wireless infrared headphones ($279 and $329, respectively) have been designed to deliver the same quality sound as the company's wired, professional-class headphones.

In addition to the convenience of wireless operation, these cans are built for comfort, weighing just 6.4 ounces and featuring ergonomically adapted, supra-aural earpads. The earpads are semipermeable and feature a special suspension and perforated grids on the outside for acoustic transparency. Four diodes help ensure good reception, and a mute function eliminates hiss if transmission is interrupted. You get a loudness/balance control and three types of connectors: ¼-inch TRS, ⅛-inch TRS, and RCA.

The K 333 IR can operate for up to four hours before you have to recharge its nickel/cadmium battery. The K 444 IR's rechargeable nickel/metal hydrite (NiMH) battery lasts for up to six hours. Because the NiMH battery doesn't have a memory effect, it can be fully recharged many more times than conventional batteries. AKG/Harman Pro; tel. (800) 878-7571 or (818) 227-1800; fax (818) 884-2974.

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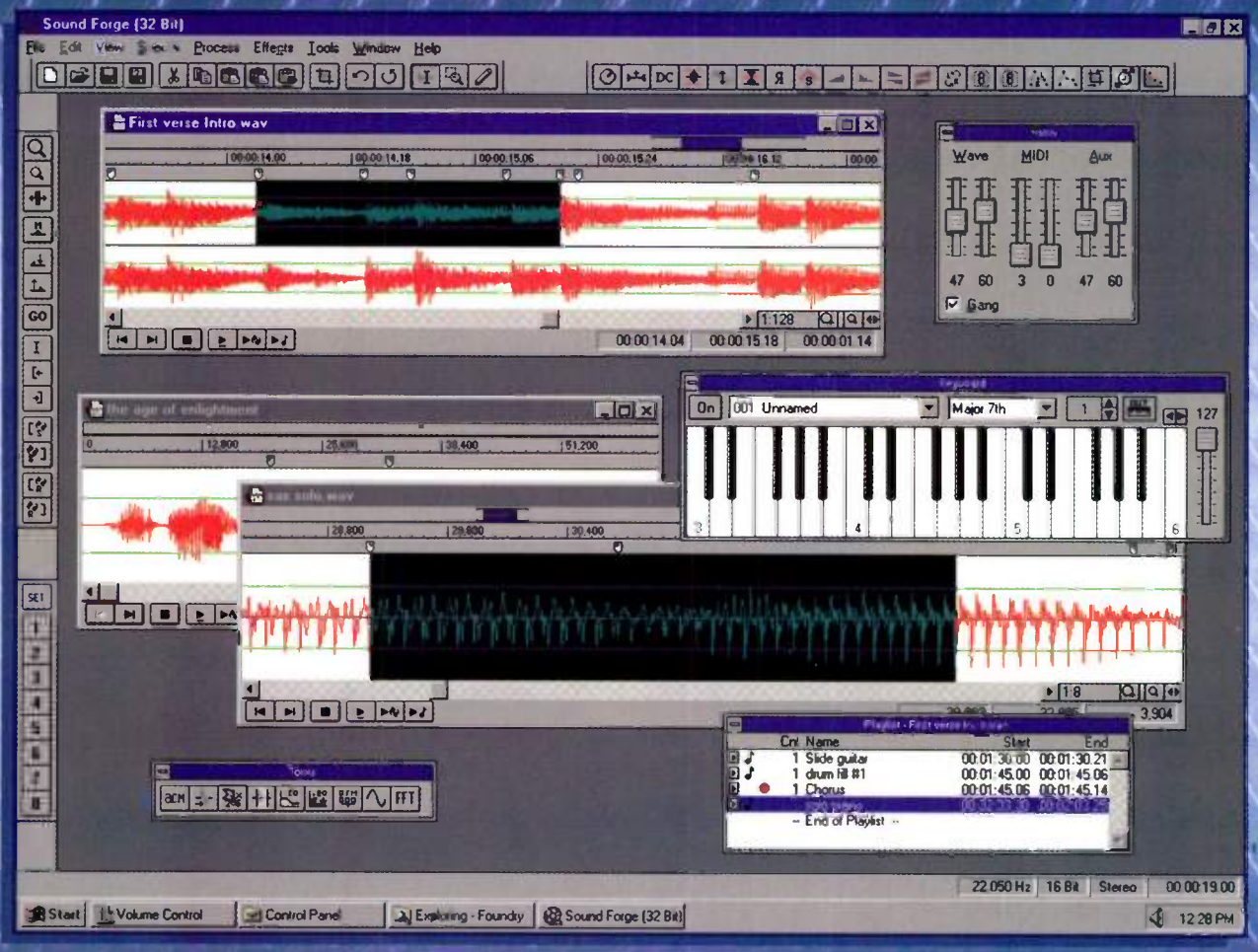

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Whether you're a musician, sound designer or multimedia developer, full-featured sound editing for Windows® has never been easier. The award-winning Sound Forge edits, produces audio-processing effects, creates loops and regions and generates playlists.

Sound Forge gives you access to the most extensive list of audio processing tools available on the PC. Processing features include: Graphic and Parametric EQ, Time Change, Dynamic Compression, Reverb, Synthesis, and Resampling. Sound Forge's multiple window environment allows more than 50 sound files to be open at once. External samplers and synchronization to MIDI and SMPTE time code are fully supported.

Both a 16 Bit (Windows 3.1 or Windows for Workgroups™ 3.11)and 32 Bit version (Windows® 95 and Windows NT™) are included for all software.

1995 TEC NOMINEE

ELECTRONIC MUSICIAN 1996 EDITORS CHOICE

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The Sonic Foundry Plug-Ins bring even more power to Forge's already extensive wave processing and effects capabilities. All Plug-Ins install within Sound Forge 3.0 and are accessed through the Tools selection of the menu bar.

WAVES L1-ULTRAMAXIMIZER PLUG-IN

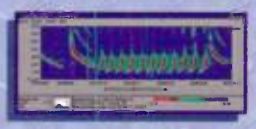
Combines an advanced peak limiter, a level maximizer, and a high performance re-quantizer in one powerful plug-in. The Waves L-1 requantizes digital signals based on the Increased Digital Resolution (IDR) noise-shaping re-dithering process system.

QSOUND QTOOLS PLUG-INS

(Set of 3: QXpander/SF, QSRC/SF, QSYS/SF) Applies QSound Virtual Audio 3D effects for speaker playback and delivers professional quality anti-alias filtering. QSound - 3D audio that works.

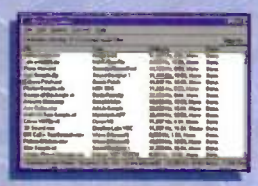
SONIC FOUNDRY NOISE REDUCTION PLUG-IN

Analyzes and removes background noise such as tape hiss, electrical hum and machinery rumble. A Vinyl Restoration tool, which detects and removes surface noise typically found in vinyl recordings, is also included.



SONIC FOUNDRY SPECTRUM ANALYSIS PLUG-IN

Identifies particular frequency components using Spectrum Graph or Sonogram display. Spectrum Analysis includes one or two channel FFT analysis and six different windowing functions.



SONIC FOUNDRY BATCH CONVERTER PLUG-IN

Converts tens, hundreds or even thousands of files to different formats automatically. The Batch Converter includes an Extract Regions tool which automatically creates independent sound files from marked regions within a single file.

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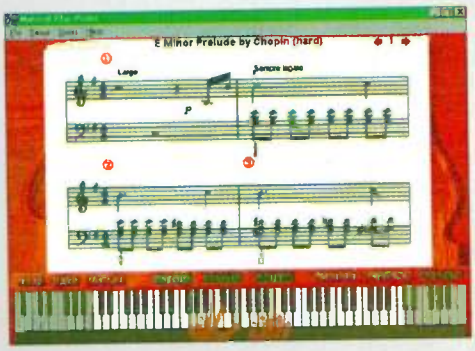
GET SMART! ▲ ▲ ▲ ▲



▲ MIDISOFT

Many students quit taking piano lessons during the first year because they hate the songs they have to learn. Too many of them are drivel, written for strictly pedagogical purposes, and playing them wounds the would-be musician's soul.

Fortunately, when choosing material for its *Learn to Play Piano* CD-ROM ($79.95), Midisoft was determined to avoid inflicting such atrocities upon unsuspecting students. Instead, the program uses 40 well-known tunes, including pop/rock ("Let It Be," "Candle in the Wind"), traditional ("All through the Night," "Au Claire de la Lune"), and classical (J. S. Bach's Invention in A Minor, Chopin's C Minor Prelude, and Schuman's "Happy Farmer"). Additional songs are available in Standard MIDI File format from Midisoft and other sources.

The songs are presented in sections, with difficult and easy versions of each song. The program analyzes the student's MIDI keyboard performance and gives feedback on how to improve without using standard drills. It can even tailor the lessons for and track the progress of multiple users. More than 400 theory lessons have been prepared by a former prizewinner of the Tchaikovsky piano competition in Moscow.

While each song plays, the Amazing Magic Hands feature uses animation to show proper fingering and hand position. Highlighted notes, labeled keys, and a synthesized voice explain problems and offer solutions. In twenty examples, video clips let you watch over a professional pianist's shoulder. Some selections have an optional orchestral accompaniment.

Learn to Play Piano requires at least a '486 PC with 8 MB of RAM, Windows 3.1 or 95, 18 MB of free disk space, a Windows-compatible sound card, a 256-color VGA graphics card, a double-speed CD-ROM drive, and a MIDI keyboard. Midisoft; tel. (800) 776-6434 or (206) 391-3610; fax (206) 391-3422; e-mail salesinfo@midisoft.com; BBS (206) 391-7966; Web http://www.midisoft.com.

Circle #410 on Reader Service Card

▶ OPCODE MIDI TRANSLATOR PC

The problem with small MIDI interfaces is that you eventually outgrow them. Many times, you end up giving away the old interface because it's not worth selling. But Opcode has taken the first step toward solving this problem for PC users by releasing the MIDI Translator PC ($99.95), which offers a docking port that lets you chain up to four units.

One MIDI Translator PC provides two independent MIDI Ins and two independent Outs for 32-channel operation. When you outgrow your starter system, just add more MIDI Translator PCs; with four interfaces, you can have an 8 × 8, 128-channel system. The docking port also acts as a pass-through printer port that can be controlled with software, so your printer can stay connected at all times. Opcode Systems; tel. (415) 856-3333; fax (415) 856-0777; e-mail info@opcode.com; Web http://www.opcode.com.

Circle #411 on Reader Service Card

▼ APHEX MODEL 109

Being an intelligent electronic musician, you read **EM** faithfully, so you already know about Aphex's Tubessence hybrid tube/solid-state technology. (If not, see "Hot Stuff" in the February 1996 **EM**.) Having applied this technology to mic preamps (the Model 107) and compressors (the Tube Expressor), Aphex has turned its attention to parametric EQ, introducing the Model 109 ($495).

The Model 109's mode switch lets you configure the unit as a stereo, 2-band EQ or a mono, 4-band EQ. Each channel offers ±10 dB of gain, and each band has ±15 dB of boost/cut, a center detent (flat), sweepable frequency and variable bandwidth. The filters can be peak or shelving (switchable). When the unit is in Bypass mode, the signal can still be run through the tube circuit, so you can "warm up" signals without applying EQ. There also is a hardwire bypass.

The unit offers ¼-inch TRS inputs and outputs that accept balanced and unbalanced signals. Aphex Systems; tel. (818) 767-2929; fax (818) 767-2641.

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THE LINE FOR AUDIO STARTS HERE.

These days, MIDI recording is standard in Windows® sequencer software. But integrating digital audio recording into these same applications can be a real blow to your budget. Until now.

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But that's only the beginning. **Cubase Score 3.0** is the next step. With all the Cubase 3.0 features included, Score 3.0 also integrates automatic guitar tablature and chord analysis, percussion scoring, and 60 staves of notation. The page layout mode gives you professional scoring and desktop publishing and proves that $549 never went so far.

If you want even more audio, and want to use other hard disk recording systems such as Digidesign's™ Session8™ and Audiomedia III™ or Yamaha's® CBX D3/D5™, look no further than **Cubase Audio 3.0 XT** – the top of the line. For only $799 you really can have it all.

Cubase 3.0. is available for Mac OS and Windows making digital audio a standard for everyone.

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Win Mac OS

▶ E-MU ORBIT

I can't remember a sound module with a longer name than Orbit the Dance Planet ($995). But if the techno/dance-oriented module's sound proves as distinctive as its name, E-mu should have another winner.

The 1U rack-mount device offers 32-note polyphony and 16-part multitimbral operation. Its 512 preset programs, which use 8 MB of ROM samples, include more than 60 internally sequenced drum loops and emphasize basses, synth sounds, percussion, and sound effects. The drum loops can be edited in a special Beats mode, where you can adjust the Beats tempo, preset, and transposition. The Beats are fully functional in Multi mode and can be synched to MIDI Clock.

The Orbit has 32 6-pole, resonant filters. Each of these resonant filters can be configured as any of seventeen types, including lowpass, highpass, bandpass, phaser, and flanger. Two filter types implement E-mu's morphing technology.

The LFOs can be synched to external MIDI Clock, which lets you modulate the filter, pan, volume, and more in time with the music. Tempo changes, program changes, transposition, and filter parameters can be set in real time from the front panel or via MIDI. Real-time panning can also be accomplished under MIDI control.

E-mu also announced the Launch Pad ($599), a MIDI controller that provides a 13-pad, Velocity-sensitive, polyphonic, drum machine-style pad set. Two transpose knobs are included: one transposes up to an octave, and the other has a range of -4/+5 octaves.

You also get five programmable sliders, a programmable thumb button, a pitch knob, a sustain pedal jack, a volume pedal jack, and a set of MMC transport controls. There are six programmable note-trigger buttons, each of which can be assigned to any note on any MIDI channel. These are latch triggers, so the first press triggers Note On and the second sends Note Off.

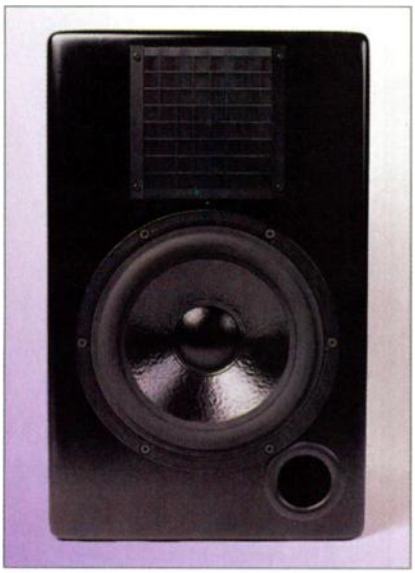
The Launch Pad can send Program Change, Bank Select, MIDI Clock, and Song Select, and setups can be saved and loaded via System Exclusive messages. In addition, the MIDI In port can merge incoming messages with the controller's data and route them to the Out port. E-mu Systems; tel. (408) 438-1921; fax (408) 438-8612; e-mail info@emu.com; Web http://www.emu.com.

Circle #413 on Reader Service Card

▼ BENSON LABS STUDIOSTAT 8.2

Professional-quality, electrostatic speakers are usually high-priced items, and they sound like it. With the StudioStat monitor-speaker line, Benson Labs has introduced a new approach that combines electrostatic and dynamic drivers into a more affordable hybrid system.

The StudioStat Model 8.2 ($1,399) is a 2-way system with an 8-inch, moving-coil, dynamic woofer and an electrostatic mid/high-frequency transducer. The speaker enclosure offers a black satin finish, and all joints are internally glued, screwed, and braced. Four recessed, ¼-20 threaded inserts allow flat or angled mounting.



The mid/high-frequency transducer is like a large-diaphragm condenser mic in reverse. According to Benson, the 5 × 5-inch panel offers a linear, narrow beam. This tightly controlled high-frequency dispersion results in an excellent ratio of direct to reflected sound, which helps minimize the smearing effect of off-axis reflections and signal diffraction. It also means that no acoustical horn, lens, waveguide, or other plumbing is required, which eliminates the sonic artifacts (e.g., horn-throat distortion and diffractional-lens time smear) that are sometimes associated with these devices.

The electrostatic transducer's diaphragm is made of an ultralow-mass, 0.1 mil, treated mylar film from DuPont. According to Benson, this extremely thin mylar helps reproduce mid and high frequencies with exceptional accuracy.

The woofer uses a 2-inch, round-wire, copper voice coil. The surround is low-damping, butyl rubber that is bonded to a treated-fiber cone body. The crossover network is a third-order, linear-transition type at 1.6 kHz. The low-frequency inductors consist of saturation-free, air-core litz wire, and connection is via gold-plated, 5-way binding post.

Here's a feature I haven't seen before: each StudioStat has a silicon carbide, blue LED housed in a custom light pipe and placed equidistant between the acoustical centers of the two drivers. This device optically guides the listener to the ideal flat listening planes for the horizontal and vertical axes! The LED also serves as a power indicator for the electronically regulated high-frequency bias supply, which is powered by an external DC adapter.

The Model 8.2's frequency response is rated at an impressive 40 Hz to 25 kHz. Recommended power handling is 200W (EIA) into 4Ω nominal, but the system can handle long-term average power levels of up to 250W.

The StudioStat Model 6.2 ($1,299) is also available. This smaller model features a 6.5-inch woofer but is otherwise almost identical to the Model 8.2. Benson Audio Labs; tel. (847) 860-3870; fax (847) 860-0375.

Circle #414 on Reader Service Card

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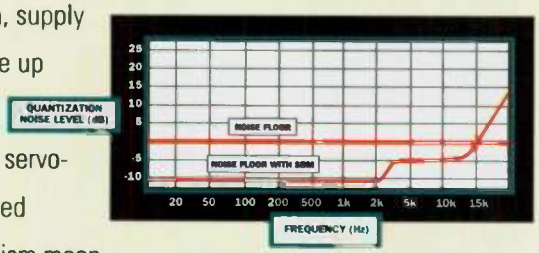

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And the PCM-2800 adds Read-After-Write (RAW) confidence monitoring for those critical recording situations.

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STICK IT IN YOUR EAR ▲ ▲ ▲ ▲

▲ CMCI ORACLE JR.

Circuits Maximus (CMCI) has been making earphone monitors for quite some time, but until recently, the products have been relatively expensive. With the Oracle Jr. ($879/ transmitter only, $989/system), the company has made its technology much more affordable.

The new system uses CMCI's Oracle Jr. stereo transmitter, which features a pair of balanced XLR line inputs, an input volume knob with L/R clip LEDs, and a front-panel headphone jack with volume pot. Power is provided by an internal supply with an IEC connector and rear-panel on/off switch.

The RF carrier is synthesized and tunable in 200 kHz steps from 87.9 to 107.5 MHz. Transmission range depends on operating conditions but is typically greater than 100 feet on a normal stage and up to 300 feet line-of-sight. The transmitter's frequency response is rated at 80 Hz to 15.5 kHz (±3 dB) and THD at <0.1%.

Although you can use other commercial FM receivers, Sony's SRF-M32 receiver is supplied when you buy a complete system. Powered by two AAA batteries, the lightweight (5 oz.) receiver offers a power on/off button, a volume pot, and a control-lock button that locks all controls except volume so you can't accidentally mess up your settings. Sony's receiver operates on any of 100 channels in the FM range, which are selected using front-panel up/down buttons. Output to the earpieces is a stereo, ⅛-inch minijack.

Sony's MDR-E575 earbud monitors are supplied with the system. However, you can use any type of earpiece or headphone, including CMCI's high-end ITE-20 earpieces ($279). CMCI; tel. (410) 381-7970; fax (410) 381-5025; e-mail CMC119@mail.us.net.

Circle #415 on Reader Service Card

▼ AQUILA WAM VHF 16

Aquila Systems is best known to our readers for its 1995 **EM** Editor's Choice Award-winning MR2 wireless MIDI system. With its new WAM VHF 16 wireless earphone audio monitors ($1,499), the company has expanded its scope.

The WAM VHF 16 operates on sixteen digitally synthesized VHF stereo channels for both the transmitter and receiver, so you should always have plenty of open channels. The transmitter can be switched between stereo and mono operation. The L/R audio inputs are balanced and use Neutrik's combination ¼-inch (high-Z)/XLR (low-Z) connector.

The transmitter features an LED channel indicator, a high/low impedance switch, a ground-lift switch, and a ¼-inch, low-Z, cue input. A limiter is built in to prevent hearing damage from audio spikes or P.A. feedback, and audio levels are displayed on left and right 10-segment LEDs.

The whip-style transmit antenna connects to a BNC terminal. Transmitter power is provided by an internal supply with a standard IEC connector. The operating range is rated at least 250 feet and up to 1,000 feet line-of-sight. Frequency response is rated at 50 Hz to 15 kHz (±1 dB), and THD is <0.5%.

The lightweight receiver is powered by a 9V battery and features a mini on/off switch, a stereo volume control, and an on/off indicator LED. The sixteen RF channels are selected with a hidden switch. Audio output to the earpieces uses an ⅛-inch stereo minijack.

Although the system comes with standard "earbud" earpieces, you can order custom ear inserts. Aquila Systems; tel. (800) 386-4554; e-mail asyst71715@aol.com.

Circle #416 on Reader Service Card

▲ GARWOOD MICRO MONITOR

Many musicians feel that custom-molded, earphone monitors give the best combination of comfort, performance, and sonic isolation. One of the specialists in this field is Garwood Communications, whose Micro Monitors ($575) attenuate ambient (e.g., stage and audience) sound by up to 26 dB so you hear the monitor mix and nothing else.

The monitors have dual sound ports and a resonator for extended high- and low-frequency response. Six selectable bass ports let you adjust the low-end response to taste.

The canal portion of the earpiece is flexible and extends into the shell portion of the ear for improved comfort. Each earpiece is custom made; the user has an audiologist take an impression of the ear, which Garwood uses to assemble the final product. The company usually can ship the custom monitor to the customer within two days of receiving the audiologist's mold. Garwood Communications; tel. (215) 860-6866; fax (215) 968-2430; e-mail 73210.41@compuserve.com. ❦

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PRO TOOLS

Introducing the coolest upgrade path in all of digital audio.

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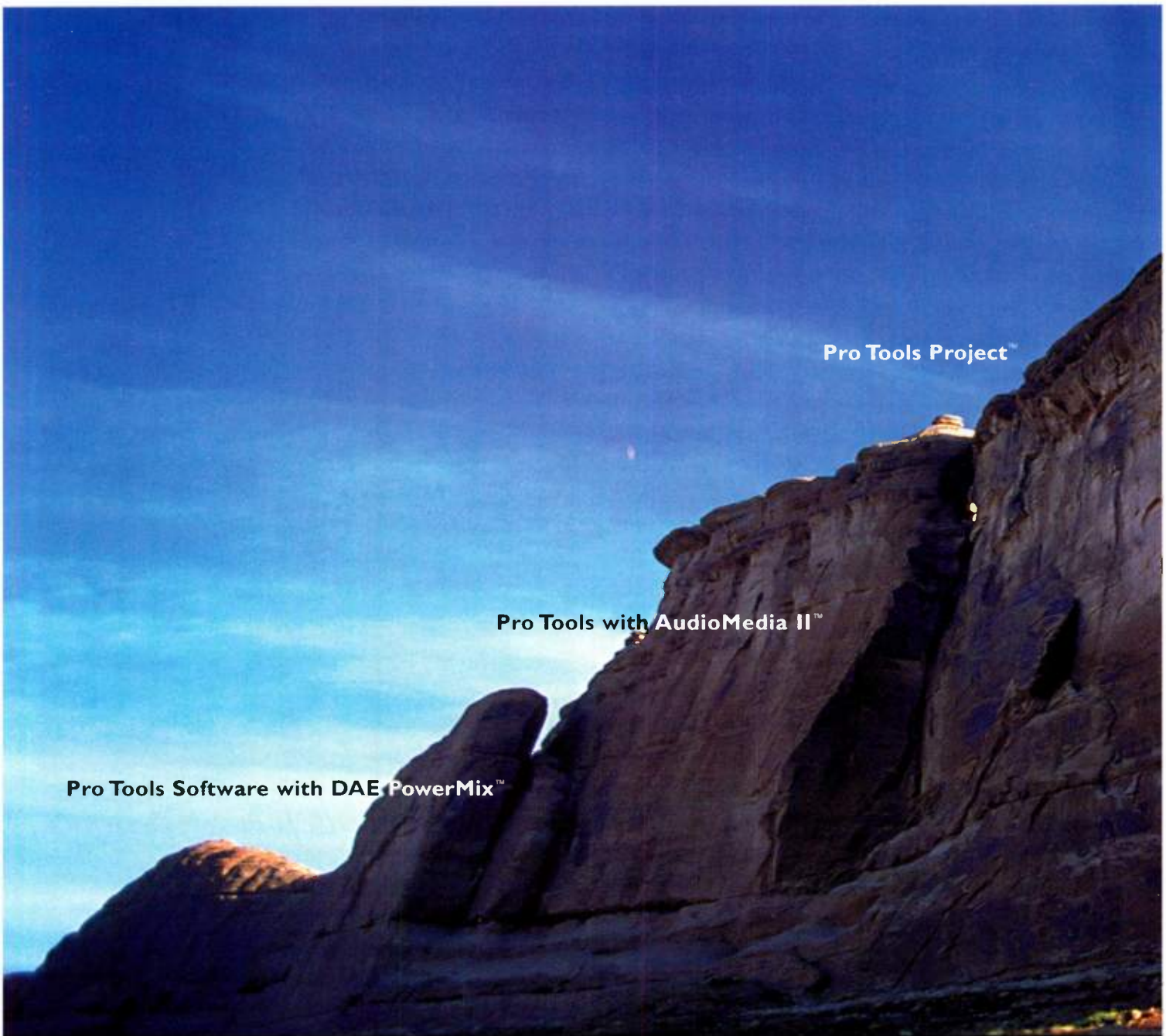

New. An amazing value that turns your Power Macintosh or Mac-OS clone into a multitrack digital workstation with no additional hardware. Pro Tools interface. Random access, non-destructive editing. Up to 16 tracks of playback. Automated digital mixing with 2 bands of EQ per track.

This audio card adds 2 channels of high-quality analog and digital I/O, and comes with industry standard Sound Designer II software and entree to its family of DSP Plug-Ins.

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workstation, Pro Tools III, with mountains of record tracks, I/O, and real-time effects and mixing. Each step of the way, you'll learn and grow with Pro Tools software, share work between systems, and take an upgrade path that lets you build on the value of your investment. Audio professionals now have more choices and flexibility than ever before. And getting started couldn't be easier. To learn more about the clearest path to the best in digital audio, call **1-800-333-2137 x206.**

The ultimate workstation. TDM virtual digital mixing and processing environment accommodates a wide variety of real-time Plug-Ins. 16-48 tracks of record/playback. 8-64 channels of high-quality analog and digital I/O. New for '96: ProControl,™ an advanced tactile control surface with dedicated controls for mixing and editing, plus high-quality moving faders.

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PRO FILE

Spooky Diva

Jill Tracy creates an eerie musical milieu.

By Diane Lowery

Jill Tracy is like the femme fatale in a classic film noir potboiler. You can't escape the haunting, seductive powers of her macabre torch songs. The resonance of her piano playing is cool, dark, and mysterious. And when you hear Tracy's lush, sultry voice and experience the spooky melanchony of her lyrics, you're hooked. As you listen, it's as if she is in the room spinning a web of music around you. Barbara Stanwyck would have been proud.

Tracy's cinematic songcraft stems from a number of influences, including Bernard Herrmann film scores, big bands, 1920's Greek and Turkish folk music, ragtime—even the sound track to *The Creature from the Black Lagoon.* Her album, *Quintessentially Unreal,* was recorded over a single weekend at Mobius Music in San Francisco. To document the intimacy of Tracy's performances, engineer Christian Jones positioned six mics around a Yamaha C-3 grand piano and recorded everything live to a Panasonic SV-3700 DAT. Two Telefunken 251s were placed directly over the Yamaha's bass and treble strings to capture a distinct stereo perspective. Then, a pair of Neumann KM 84s were set up three to four feet away, pointing in the same general direction as the 251s. Finally, two B&K 4006 omnidirectional mics were situated farther back to capture the natural ambience of the piano in the room.

"The piano has a very complex sound, so I felt that placing six mics in different places of the room and then mixing them together would provide the listener a better perspective of what a piano sounds like in an acoustic environment," says Jones. "I mixed the levels for the three mic positions through a Neve 8068 console and set the balances as follows: 70% of the final piano sound was the 251s, 10% was the KM 84s, and 20% was the ambient 4006s."

Because Tracy was singing and playing the piano simultaneously, Jones had to maintain separation between the vocal and instrument mics. To minimize signal bleed, he stretched a thick mover's blanket across the piano lid right up to the music stand. Then, he placed a large pillow on the music stand to "keep as much of the piano out of the vocal mic [a Neumann U 47] as possible."

All the trouble taken over mic positions produced an extremely articulate recording, but Tracy was initially uncomfortable with the clarity. "You could hear every squeak of the piano bench, the sounds of my foot on the pedals and my fingers on the keys," she explains. "However, I soon realized that the recording was more honest and more human than if those natural performance sounds had been somehow masked."

Choosing to record *Quintessentially Unreal* live-to-DAT obviously prohibited overdubs, but Tracy took that as a challenge. "I had to make my performances as perfect as possible because I couldn't go back and fix things," she says. "And yet, there was some beauty to recording this way. It was so intimate; it was like I was sharing all my secrets with somebody. I was completely vulnerable."

For more information contact Sleight of Hand Media, 1388 Haight St., Cabinet 45, San Francisco, CA 94117; tel. (415) 564-5512.

Jill Tracy

No Compromise CD Recording

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Thanks to MIDI and a group of hard-working volunteers, a small-town bell tower rings once again.

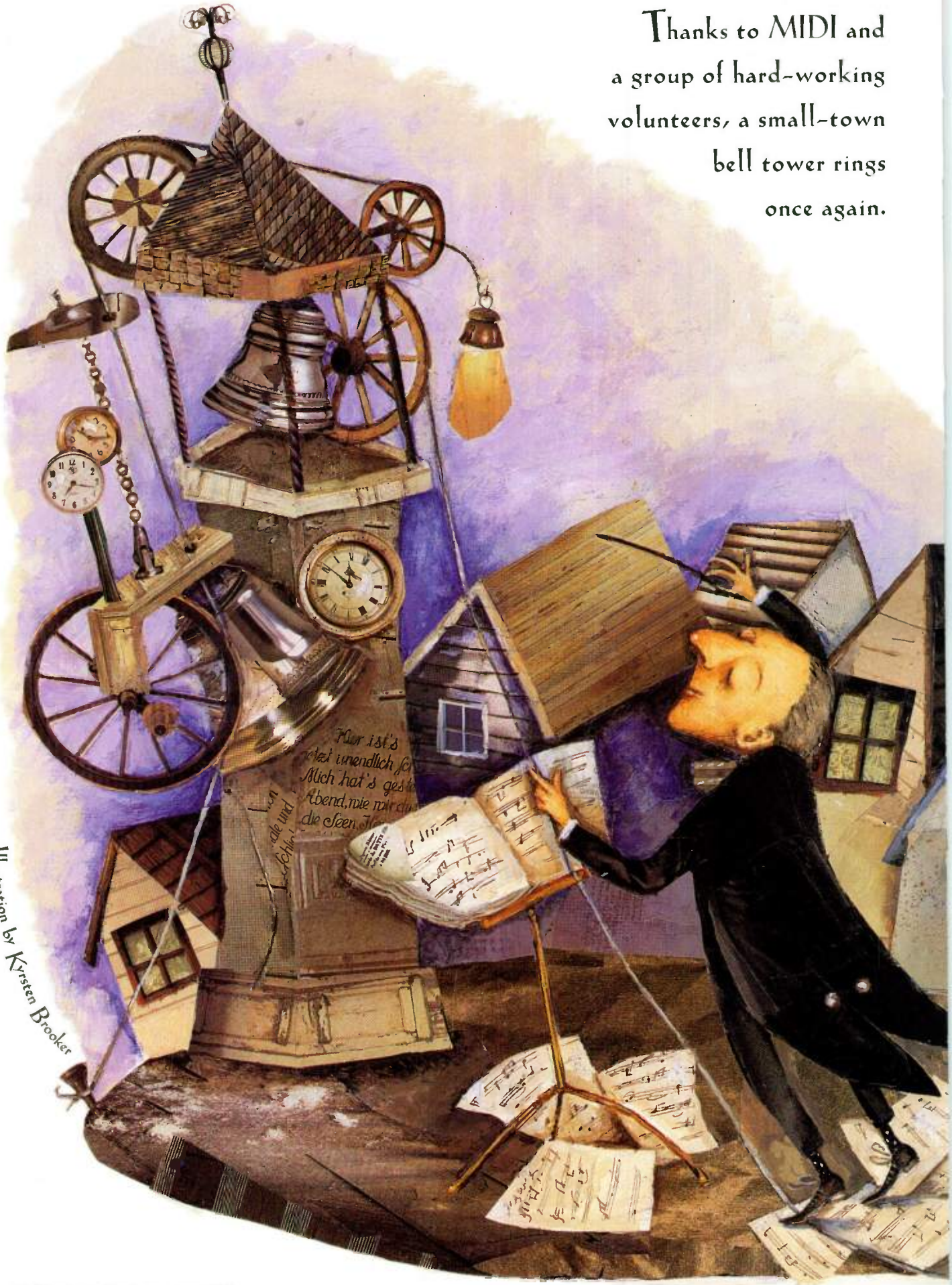


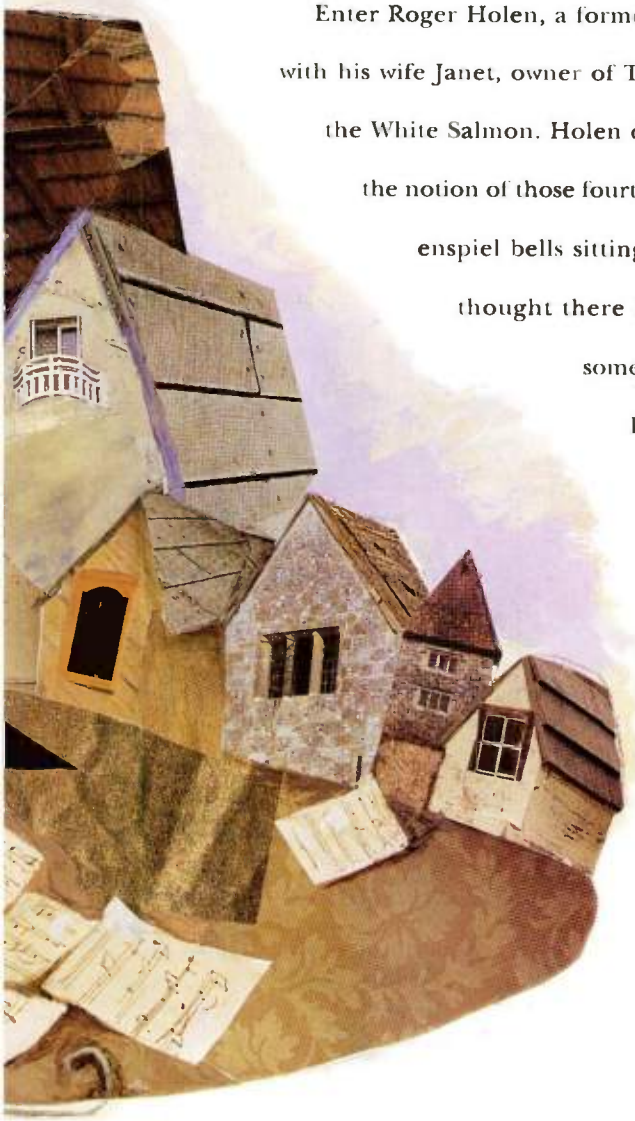
Illustration by Kyrsten Brooker

a Day in the LIFe

RING my BELL

Pick an instrument that *isn't* MIDI capable these days. There aren't many. You can retrofit your beautiful acoustic grand piano or buy a brand new MIDI accordion. Hell, leave a musician/programmer alone in your house long enough and your cat Fluffy will be equipped with In, Out, and Thru capabilities and the new moniker Five Pin.

You can now add small-town bell towers to the list of instruments you wouldn't normally associate with electronic music. This new MIDI heavy-weight champion graces the town of White Salmon, Washington, situated in the Columbia Gorge. Built in 1976 with special government matching funds as part of the Bicentennial celebration, the bells became too expensive to maintain and fell into disuse around 1979.



Enter Roger Holen, a former Intel exec and, with his wife Janet, owner of The Inn of the White Salmon. Holen didn't like the notion of those fourteen glockenspiel bells sitting idle. He thought there had to be some way to computerize the bells. He rang up his son-in-law, Phil Cochlin, a programming and computer guru, and the two brainstormed for affordable ways to get the town's bells ringing once again. A few months later, with the help of some other volunteers, the bell tower was playing Standard MIDI Files every hour on the hour.

By Mary Cosola

FOR WHOM THE BELL TOLLS

Cochlin headed up the project, assuming responsibility for the system design and programming. He thought he would have to do extensive programming in C and then find a way to get that program to trigger the bells to play SMFs. After making a few calls of his own, Cochlin got a hold of J. D. Sharp, owner of Bananas at Large (San Rafael, California), who provided the Leprecon ANG 50-R, a MIDI-to-CV converter by CAE, Inc. (tel. 810/231-9373).

"That was almost the perfect thing to find," says Cochlin. "The company didn't even list it in their catalog anymore, but they still manufactured it. It has two DB25 connectors on the back, and each pin is assigned to one of the MIDI notes. So when you hit a key on a MIDI keyboard or controller, that corresponding pin's voltage goes up proportional to Velocity. We were able to wire that output to the opto-isolator, which is like a solid-state relay, that controls a 220V AC bell-ringing circuit. So the Leprecon could control those opto-isolators to turn the 220-volt current on and off on the bells' strikers, meaning that any MIDI keyboard could play the bells. At that point, we knew it was possible for us to set up a MIDI bell tower."

Cochlin's next two hurdles were to figure out how to store songs and how to schedule them. The tower's old system was centered around a rotating drum-like device: it had prongs that would hit a switch as it rotated, triggering the bells to play, much like the mechanism in an old-fashioned music box (see **Fig. 1**).

Holen donated an old '386 running Windows to the project; he also purchased some additional hardware and Steinberg's Cubase MusicStarterPac, which included a MIDI interface card and *Cubase Lite* sequencing software. Bananas at Large helped out by offering discounts on the Cubase package and other necessary equipment. Cochlin and Holen installed the sequencing package, sequenced a few songs, and, via the Leprecon, they were able to play the bells. The first hurdle was cleared, and Cochlin braced himself for some serious programming.

White Salmon's now-famous MIDI bell tower.

PROGRAMMING WINDOWS APPLICATIONS WITH VISUAL BASIC

If people only knew how easy it is to create programs using Microsoft Visual Basic and add-on tools such as Sheridan Software's *Designer Widgets* and *VBAssist*, there would be a lot more Windows programmers.

When I started designing the bell-tower program, I assumed I'd have to write a lot of code in C. I called everyone I could think of trying to come up with an easier way. Richard Johnson at Big Noise Software suggested that I use Visual Basic and Microsoft's MCI player. He said, "I think all you'll have to write is something like 'Open MIDIFileName' and then 'Play MIDIFileName' to get it to work." Now *that* sounded like the right approach.

The day I took the shrink-wrap off the Visual Basic package, I had a working program that could schedule and play MIDI files. Of course I spent weeks playing with and tweaking the user interface, adding features, and so on. During this time, I sounded like a product evangelist for Visual Basic. I called people

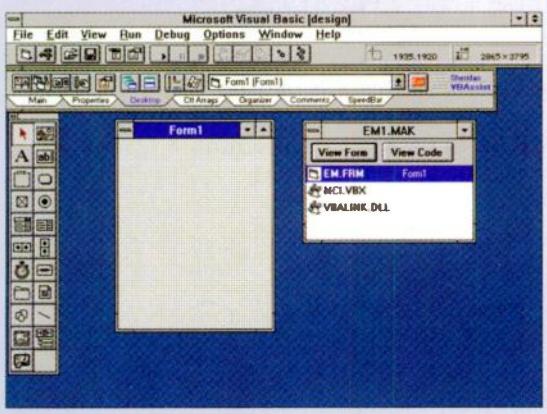


FIG. A: When you open Visual Basic, you are presented with a blank form (Form1) and a toolbar.

FIG. B: To change the Caption property of our command button, we've used the Property Assistant component of Sheridan's *VBAssist*.

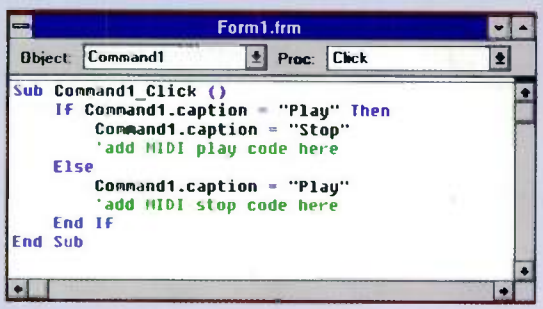


FIG. C: Here is the code we wrote to make our command button toggle between Play and Stop.

to tell them what an amazing thing it is and how easy it is to use. So quit waiting for some company to write that program you've been waiting for. Go get a copy of VB and write it yourself!

Let's look at an example of how easy it is. When you first fire it up, VB presents you with a blank form and some toolbars (see **Fig. A**). (In our example, we've added Sheridan Software's *VBAssist*, a powerful VB design assistant.) You create a program by dragging objects (command buttons, list boxes, etc.) from the toolbox to the form, sizing and positioning them as desired. These objects, called *controls*, have characteristics, called *properties*, that you can modify to change their appearance or behavior. The benefit of working with objects is that they eliminate a lot of code writing. You simply set the object's properties and invoke the object's methods to make the object perform various functions.

For our example, let's create a MIDI jukebox program that will play a MIDI Song File selected from a list. To start, we open a new project and add a command-button control to the blank form by selecting the control from the toolbar and dragging it in the desired position. Controls can always be repositioned and resized once they are on the form. Our new command button has a Caption property that determines the text displayed on the face of the button. Here we use Property Assistant, a component of Sheridan's *VBAssist*, to change the Caption property to read "Play" (see **Fig. B**).

Controls respond to events initiated by the user or triggered by the system. When the user clicks a button, its "click" event procedure is triggered. Adding a few lines of code to this procedure allows us to toggle the caption between Play and Stop. Double-clicking on the control (in design mode) displays VB's Code Window, where we can select the control's "click" event from a drop-down list and enter the appropriate code snippet (see **Fig. C**). If we test the Visual Basic program now (by clicking the Run button on the button bar), the caption should switch every time we click our Play/Stop button.

Next, we'll add our selection list and Multimedia control. Visual Basic comes with a File List control that displays a list of files in a specified directory. After positioning the control on the form, we set its Pattern property to display only MIDI (.MID) files. We set the File List control's Path property to the directory containing our MIDI files. We can place the Multimedia control anywhere on our form. Let's set its Visible property to false so the user won't see it. (We want the user to use only our Play/Stop button.) In the Click procedure for the File List control, we'll add a code snippet to set the Multimedia control's Filename property to the selected MIDI file whenever the user clicks a MIDI file in the list box (see **Fig. D**).

The Multimedia control can play audio files, MIDI files, CDs, and videos. From within our Play/Stop (Command1) button's Click procedure, we'll send commands to the Multimedia control to play or stop our MIDI file. We added four lines of code to accomplish this (see **Fig. E**).

Let's hear some music! You can now run the program, select a MIDI file, and click the Play button to hear your song. In order for this to work, though, you must have some kind of synth/sound card properly installed in your computer.

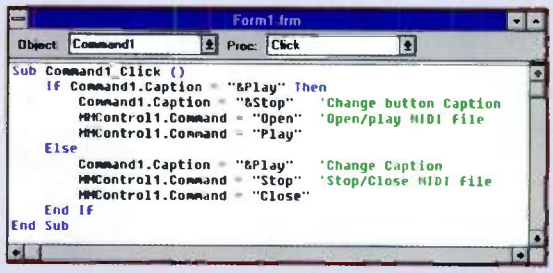


FIG. E: We had to write code for the Multimedia control to play or stop the MIDI file.

You could extend our simple project in any number of ways. You could add a playlist to allow multiple selections, add some artistic graphics to the form, or change its colors randomly. Third-party controls could add VU meters, volume, and fader controls. The sky's the limit.

Creating a program with these controls is like playing with building blocks. You don't have to make the blocks, but you can arrange them any way you want. This is a very easy way to create sophisticated programs. If you have even the slightest inclination to try programming applications like this for the Windows environment, I urge you to try Visual Basic and some of the third-party controls available. Even if you have never written a program in your life, you'll be amazed how quickly you can learn how to do it and do it well.

—Phil Cochlin (with Craig Pollock)

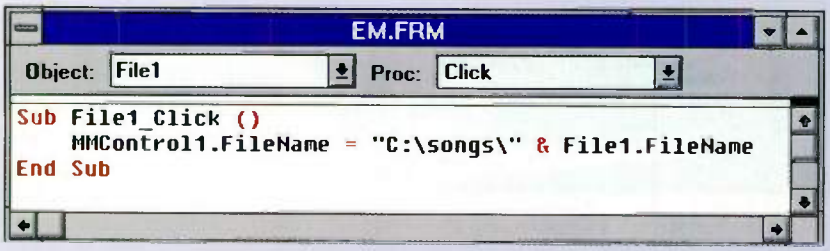
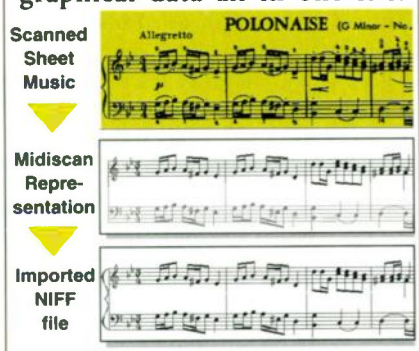


FIG. D: This is the code that sets the Multimedia control's Filename property to the selected MIDI file chosen by the user.

NIFFty.

For years MIDI files have been the only way music data could be shared between programs... with far less than perfect results. Beginning with MIDISCAN 2.5 the NIFF (Notation Interchange File Format) allows progams to transmit performance, layout and graphical data all in one file:



MIDISCAN & **PianoScan** v2.5 convert printed sheet music into playable (.MID) & readable (.NIF) files. Scan & Play means you can control your scanner, process, edit and playback your scanned music all in one easy-to-use application. And soon, most music software programs will support NIFF as well as MIDI files. That's nifty.

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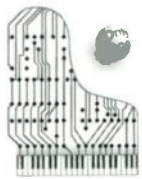

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RING my BELL

In the course of investigating some approaches to the programming aspect of the project, Cochlin spoke with Richard Johnson of Big Noise Software. Johnson suggested that Cochlin take a look at the Visual Basic programming language from Microsoft (tel. 800/426-9400 or 206/936-8661). Having been a serious programmer for years and having never seen Visual Basic, Cochlin initially dismissed VB as "probably a toy." As it turns out, Visual Basic was the perfect tool for the job. Cochlin had a bell-scheduling program written and running within a week. (For an overview of how to use Visual Basic for this type of project, see sidebar "Programming Windows Applications with Visual Basic.")

"Visual Basic is like a macro language or an object-oriented Basic," says Cochlin. "You can buy all kinds of third-party plug-in controls to automate certain tasks. You can just drag these controls from the toolbar to your forms, double-click on them, and start writing little code snippets in Basic to automate what you want the click procedure to do or what file you want it to access when clicked. The folks at Microsoft were great. They donated a copy of the program, and their ad agency did some PR work for the bell-tower project. They got us news coverage and everything; it ended up being a lot of fun."

TIMING IS EVERYTHING

More help came from Sheridan Software Systems (tel. 516/753-0985; fax 516/753-3661), a company that makes custom controls for Visual Basic. They donated some of their products to the bell-tower effort. Cochlin used their *Data Widgets* to create his form for scheduling the bells (see **Fig. 2**). He set up two different tabs on the Control Panel form: one for the regular bell schedule and one for special schedules. Each tab contains a "Play Schedule" area that lists the SMFs and the times they are to be played.

"Custom controls such as Sheridan's *Data Widgets* made it easy to write this program," notes Cochlin. "The control panel was designed using Sheridan's Tab and Grid controls. Users can select files from a list and assign them to be played at certain times in the schedule. The Visual Basic program is hard-wired to look only in a specific directory for the song files. We use *Cubase Lite* to save the songs as SMFs in that directory. The normal bell schedule is all Westminster Chimes, which is why all the file names start with 'WEST'. For example, WEST09.MID is the Standard MIDI File of Westminster Chimes that is played at 9 o'clock."

The program's special schedule comes in handy for holidays. Cochlin and his associate Craig Pollock programmed some Christmas carols to be played at the

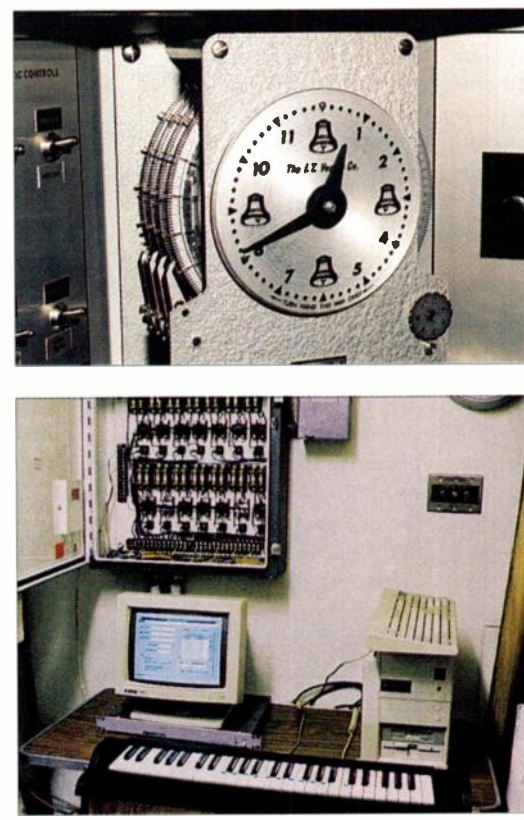

FIG. 1: The bell tower's old system (top photo) was centered around a rotating drum with prongs that physically triggered the bells. The new system (bottom photo) sports a slick MIDI design programmed in Visual Basic, sequenced in *Cubase Lite*, and triggered via the Leprecon.

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unveiling of the MIDI bell tower on Christmas Eve, 1994. Because the version of the program that was unveiled that Christmas still needed a few tweaks, they staged a second version of the unveiling the following Christmas.

The system also has a provision for a Sunday schedule, which locks out the bells during church hours so they won't interrupt services. It also has a Manual Override button so that special songs can be played at any time from the computer room or the bells can be locked at times other than during Sunday church services.

LOOK MOM, NO BUGS!

Cochlin and Pollock were able to get the bell-tower program up and running in about two weeks. Then they took a couple of months to tweak and test it to be sure they had it working just right. Just about the only implementation problem they encountered involved Windows MIDI Mapper.

"Initially, the MIDI files just weren't playing, even though we were sure that we had set up and programmed everything correctly," explains Cochlin. "We did some experimenting, playing the sequences on various channels and trying to figure out what channel Windows thought the sequence was on. Then we discovered Windows MIDI Mapper. It allows you to remap what channels MIDI files play on, so we were able to assign specific channels to the sequences. Other than that, we didn't run into any problems. Visual Basic and the Sheridan Software *Widgets* just worked. And even though we were totally unfamiliar with those tools, it was surprisingly easy."

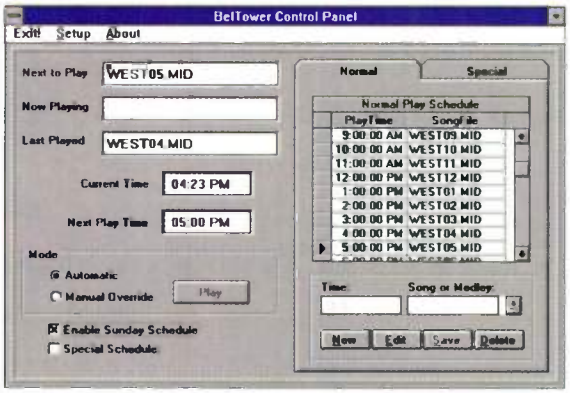

FIG. 2: Shown above is the main scheduling screen for White Salmon's MIDI bell tower.

Cochlin adds that the new bell-tower system hasn't broken down once. So, let's see if I have this straight: a bug-free programming project using unfamiliar tools that was done in half the time expected. It's a feat worthy of *Ripley's Believe It or Not*. Fortunately, we have the photos to prove it.

Associate Editor **Mary Cosola**'s *two 20-pound cats (Jake and Elwood) are so huge you'd never be able to find their MIDI plugs, even if they had them.*

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BURN BABY BURN

BY DAVID (RUDY) TRUBITT

Illustration by Robert Pizzo

My life is a blur of incompatible media formats. I trade floppy disks with friends, but floppies are too small to hold anything useful. I have an optical drive, but it's slow and not always compatible with drives from other manufacturers. I make audio cassettes for my car stereo and for my music-production clients who don't have DAT machines. My hard disks are full, so I'm eyeing the latest removable media products: Jaz drives, SyQuests, or perhaps a data DAT or Exobyte tape drive. And, true to form, none of these systems is compatible with the others, either.

Obviously, I have a problem. I'd be crazy to add another format, but I need to solve some of my back-up and archiving problems and meet my clients' listening needs. And I think I've found the answer: a CD recorder (CD-R). The cost of these computer peripherals has finally dropped to the point where average computer musicians can consider buying one if they only knew how to choose one.

Burn your own CDs for easy audio mastering and data storage.

1
RP1220

There's a lot to learn, so we'll take it a step at a time. We'll start with the basic advantages and disadvantages of the medium. Then we'll discuss how manufactured CDs work and how they're different from recordable CDs. Finally, we'll look at four recently released CD-ROM recorders and the software you'll need to make your own audio and data discs.

PLUS AND MINUS

A CD recorder is a convenient tool for both audio and data storage. When used as an audio-storage device, a CD-R is a great way to make one-off demos, create a master for CD duplication, or store libraries of favorite sound effects. Used as a data recorder, it provides a convenient way to backup files and burn CD-ROM versions of multimedia projects, home-brewed applications, and sample libraries.

The blank discs are less than ten bucks, and they are expected to last decades when properly stored. Best of all, CD audio and CD-ROM have become an almost universal delivery format; lots of people own CD readers and CD-ROM drives.

Of course, the format is not without drawbacks. Even the fastest CD-ROM recorders and players are very slow compared with hard drives. But although they're too slow to be used for multitrack hard-disk recording, they are big enough that you can move whole projects off your hard drives onto CD-ROM blank discs to make room for the next project.

CD-R discs can only be written once; the data is permanently stored and can't be erased or updated. Oh well—at least you won't waste time trying to figure out what you can erase from old, expensive cartridges!

IT'S THE PITS

It's time for a mini refresher course on CD technology. Commercial CDs are plastic, 12 cm discs on which data is stored in millions of microscopic indentations or *pits*. The spaces around the pits are called *lands*. The data on a CD is stored as a single, continuous spiral, as on a vinyl record, but playback starts from the inside and works its way toward the outer edge.

A laser reads the data from a CD. It's reflected off the pits and lands as the disc spins, and the change in reflected light is interpreted as bits. But why does the reflectivity change? Aren't the bottom of the pits shiny, too? Don't they reflect the laser as brightly as the lands?

They do, but there's a catch: the depth of the pits is a bit less than one quarter of the laser's wavelength. This means that it takes just under one quarter of the wavelength for the laser to reach the pit's bottom and the same distance to reach the top of the pit. When the light reflected from the pit joins the beam of light bounced off the lands, the light is almost a half-wavelength behind, or about 180° out of phase.

The result is a classic wave-interference pattern that greatly attenuates the amount of light reflected back to the reader. Essentially, the reflected laser light is canceled out when the two different path lengths are mixed. If the terms "wavelength-interference pattern" or "phase cancellation" sound familiar, you're right: this is the same phenomenon found in audio and acoustics.

The pits and lands are sandwiched within the disc, well away from the surface. Although the laser beam is narrowly focused on the pits and lands, the beam is diffused, or out of focus, at the surface of the disc. This means that a speck of dust or a little scratch on the surface is less significant because its effect on the diffused beam is less than if the obstruction was at the same focal plane as the tiny pits and lands.

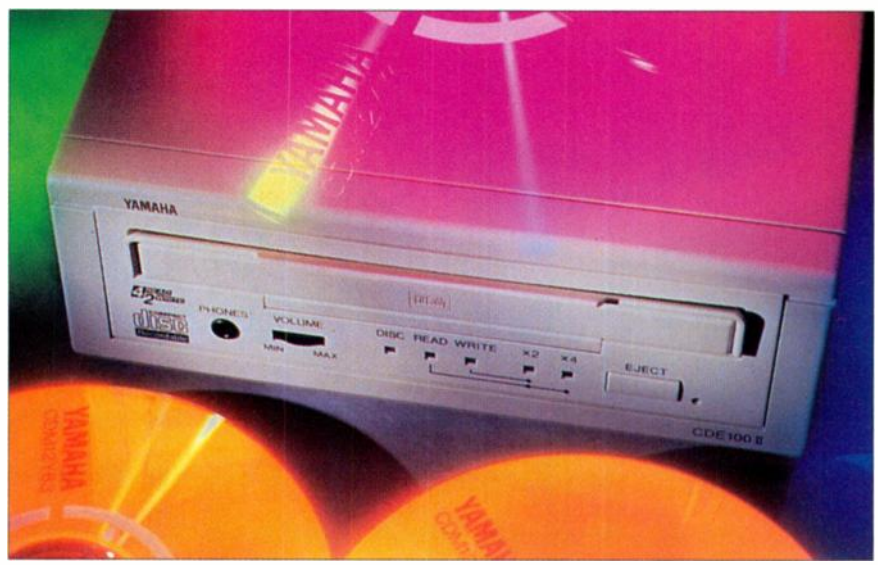
With that background on the physical nature of the medium, let's look at how information is stored on a CD.

MIND YOUR P'S AND Q'S

The original compact-disc specification was developed for audio applications, so again we're in familiar territory. The audio specs have become a buzzword: "CD quality" means stereo, 16-bit audio sampled at 44.1 kHz.

The CD specification also includes a great deal of error correction, making the format quite robust. If there's a problem with the data on the disc or some obstruction prevents it from being read, audio-CD players can fill in the blanks, interpolating across missing samples by connecting the dots before and after missing information. If there are so many uncorrectable errors that interpolation is not feasible, the CD player temporarily mutes its output.

Besides the audio stored on the disc, there is other important information: the P and Q subcodes. Among other things, the subcode information—including track selection, within-track indexing (not available on all players), and data for the timer display that counts the duration of each song—is necessary for user control of an audio-CD player. The P and Q subcodes also



Yamaha's CDE102 is an excellent 2X CD writer. It offers disc-at-once recording, and track indexes can be created with the right software.

FUNCTIONAL DENSITY

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- Internal Power Supply * Internal Power Supply
- UL approved * UL approved

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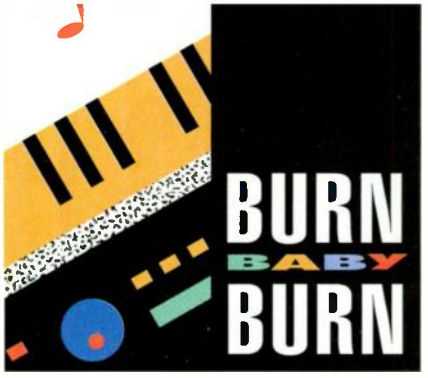


combine to determine the length of the pauses between tracks. You must be familiar with this subcode data if you want to create an audio CD that can be used as a master by a CD-duplication facility. Let's look at the subcode in more detail.

Track Numbers. Every CD has *track ID numbers* that identify the beginning of each selection. Although track numbers don't have to begin at 1, they do have to count up in sequence from the first track. CD players can search to the beginning of tracks, but some machines take an extra moment before they unmute the audio, so it's a good idea to leave a fraction of a second of silence before your audio starts. Otherwise, you may lose the first instant of the piece when skipping from track to track (for example, when Random Shuffle mode is used). Up to 99 tracks can be defined on a single disc.

Gaps. Between each track is an optional *gap*, which is usually the silence before the next song starts. (The first track must have a gap of between two and three seconds to conform with the Red Book spec.) If you watch a commercial disc play, you'll see that the timer display begins a little countdown (-0:02, -0:01, 0:00) during the gap before a new song starts. In the case of a live recording or a piece of music with sections that run into each other, the silence gap can be omitted.

However, some CD recorders and software can limit your gap choices. Some older CD-Rs (and even a few current ones) enforce a mandatory 2-second gap between songs. For reasons I'll explain later, these drives are a poor choice for professional audio. Even when the drive allows variable-length gaps, some simple CD-recording software may force you to choose a single default gap length for the entire disc. That's not nice.

Index Points. Even though not all audio-CD players support them, *track indexes* provide a way to jump to fixed points within a single track. For example, an audio CD containing individual samples can use index points to mark the start of individual snare hits that are part of the same track. The CD spec allows for each of the disc's 99 tracks to have 100 internal index points, which makes it possible to mark and locate to a large number of events. However, only the best CD-recording software gives you the ability to create index points.

If you can afford to spend a bit more, the Yamaha CDE100 4X recorder is an excellent choice.

A PLETHORA OF FORMATS

The original Red Book audio-CD specification was adapted for computer storage, which resulted in the birth of CD-ROM. In addition to creating audio discs, you can use a CD-ROM recorder to store images, computer video, and other multimedia files on a CD-ROM, including audio and data files (such as Pro Tools sessions) generated by a your hard-disk recording system.

The CD-ROM spec relies on much more stringent error correction than the audio-CD spec. Whereas an audio player can fudge over errors by interpolating over problematic samples, a single problematic, uncorrectable bit on a CD-ROM can render an entire program useless. Guessing isn't an option.

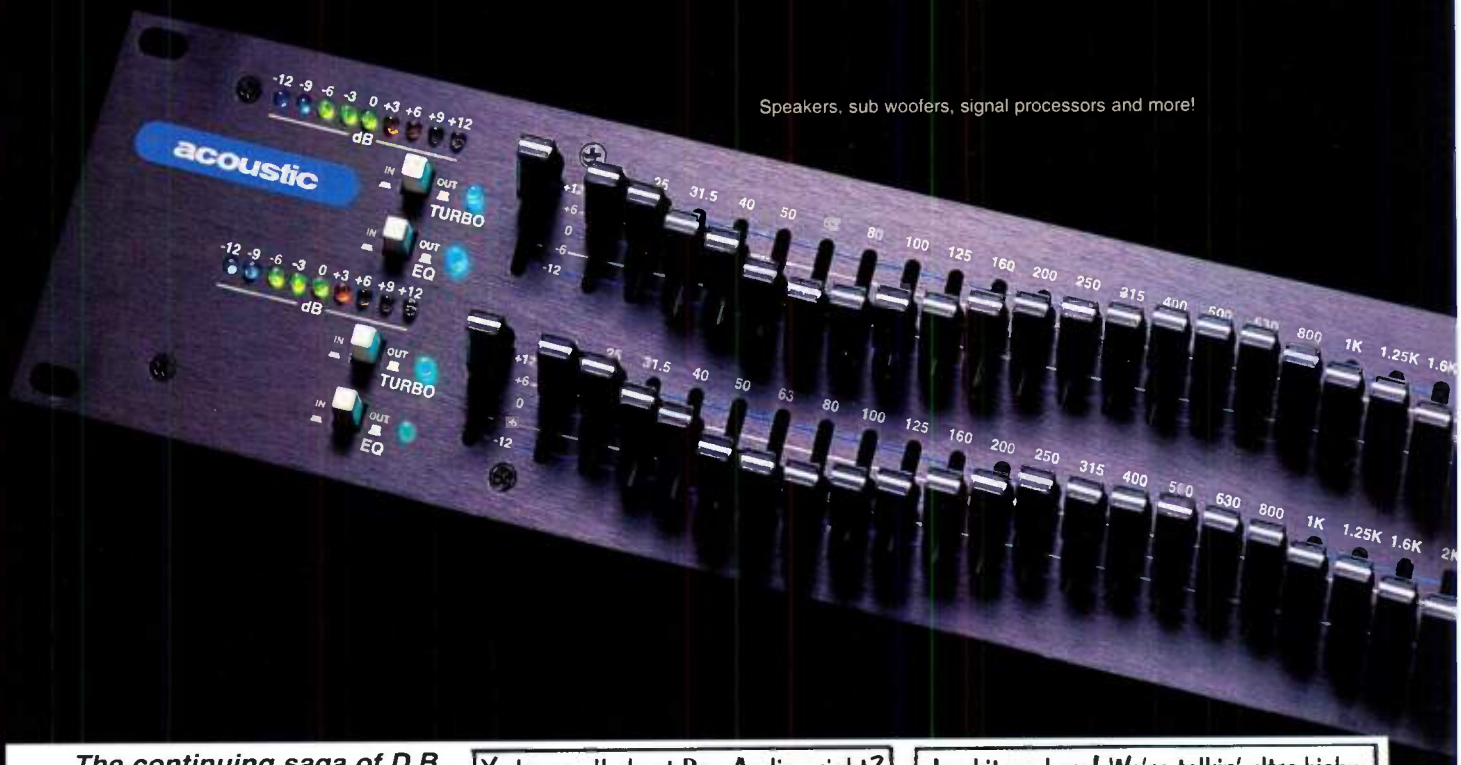
Data CD-ROMs can be recorded in a number of different formats, depending mostly on what computer system you will use for playback. I use Macs for nearly all my work, so the most convenient format for me is the Mac's Hierarchical File System (HFS). An HFS CD-ROM disc mounts on the desktop the same way as a big, slow, locked hard disk. You can access programs or files on the disc directly or copy them to a regular hard drive for faster access or editing.

HFS discs won't work on PCs or UNIX machines, but the more generic ISO 9660 data format was designed to work on all these systems. The most generic variant of 9660 limits you to the dreaded DOS file-name convention (eight characters plus a 3-character extension) and puts limits on how many levels of nested folders are permitted. If you're concerned about cross-platform data interchange, ISO 9660 is the way to go. With the appropriate software, all the drives we tested are capable of creating both HFS and 9660 discs.

MULTISESSION CD

It's possible to create a single disc that has a mix of audio data and computer data on it. For example, Blue Book (commonly called "CD Extra" or "Enhanced CD" and formerly called "CD Plus") titles let you hear the music on any standard CD player and allow access to a special data track when read by a computer's CD-ROM drive. (For details, see "Desktop Musician: Making an Enhanced CD" in the April 1996 **EM**.)

The topic of creating multimedia discs that actually work as intended raises a host of issues we won't get into here. However, I have found one simple type of multisession disc that suits my needs. When I'm finished with an audio project or know I won't be working on it for a while, I create a disc that starts with a regular audio CD track of the music so my client and I can listen to it anywhere. But if space permits, I



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Recordable CDs. These blanks don't use a special music-oriented formulation, but they incorporate a special status bit in the disc's lead-in section that enables consumer audio-CD recorders to go into Record. Without this bit, these devices simply won't record.

Sound familiar? Yes, it's the offspring of SCMS, the DAT copy-prevention scheme mandated by Congress at the behest of the record industry. When you buy one of these "music" blank discs, a small royalty surcharge is included in the price. This is eventually distributed to record companies, publishers, and who knows, maybe even a songwriter or two. Here's the bottom line: blank media labeled for industrial CD-ROM use are fine.

Does Faster Mean Better? As a rule, higher-speed CD recorders burn discs with fewer errors. This is explained by several factors. First, at higher speeds, the laser is operating for a shorter time, and its power level has less time to drift. Second, the laser is focused in each pit for a shorter time, and higher power is used to burn it. This quicker heating cycle results in cleaner, better defined marks, which in turn can lead to a more readable disc.

Finally, the stability of the laser's writing power is often constant, though the effective laser power at the recording surface can vary by about ±0.5 mW because of various systems issues, media uniformity, disc tilt, and so on. With 1× writing speeds, laser power is typically around 7 mW, and a half-milliwatt drift represents about a 7% tolerance. But at the nominal 12 mW used for 4× writing, the same 0.5 mW drift represents only a 4% deviation.

For these reasons, 2× recorders usually give better results than 1× recorders. In general, 4× recorders are a bit better than 2× machines, but the difference is less significant. However, 4× writing puts a greater load on your computer system, which must provide data as the burner needs it, and there is often extra preparation time required before the first 4× disc can be burned.

FOLIO SX

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- **Two sub-buses** allow you to record groups of instruments to multitrack, send them to additional speakers, or sub-group to mix. SX also has a dedicated Mono Out.
- **8 Direct Outs switchable pre/post fader,** equally useful when recording in the studio or at a gig.
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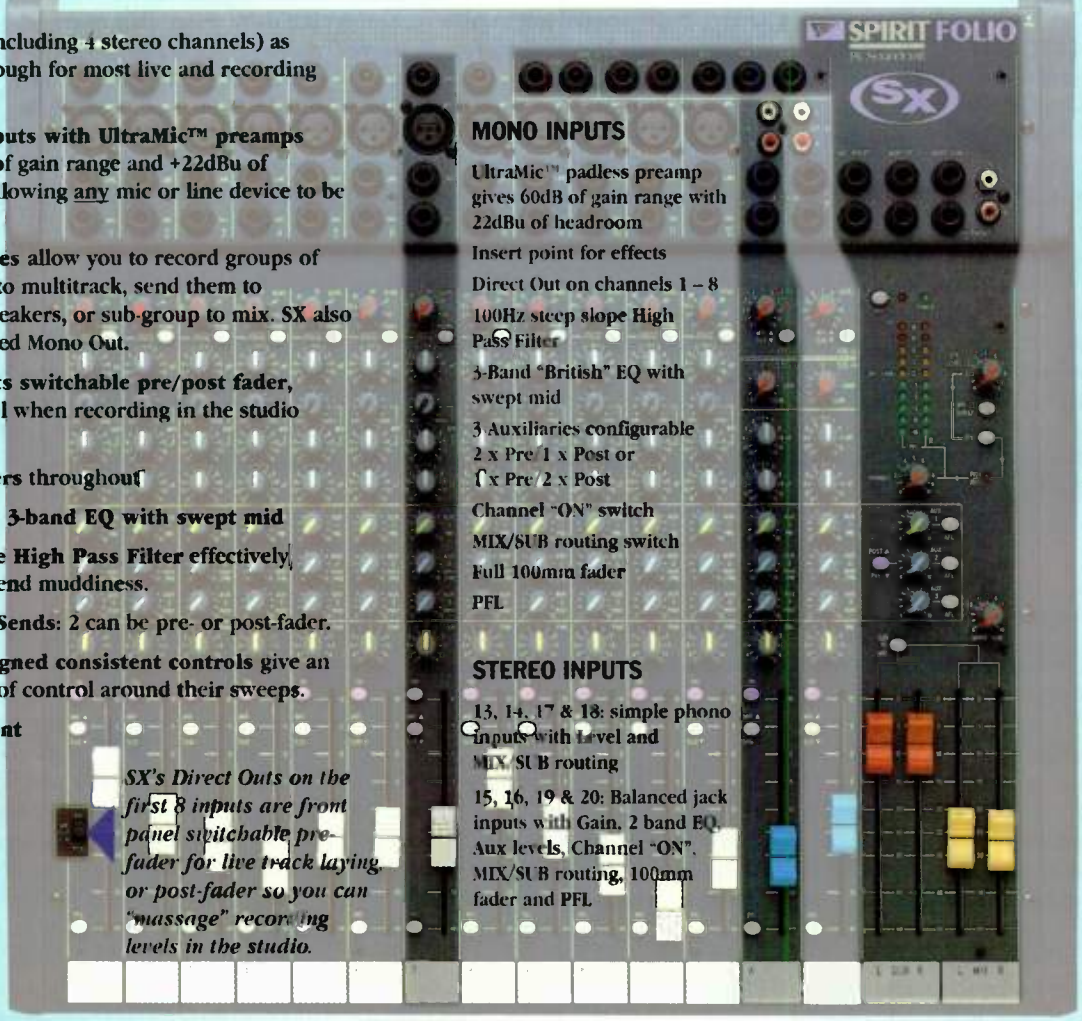
- **3 Auxiliary Sends:** 2 can be pre- or post-fader.
- **Custom-designed consistent controls** give an even spread of control around their sweeps.
- **Surface-mount technology**
- **Rack mount option**

SX's Direct Outs on the first 8 inputs are front panel switchable pre-fader for live track laying, or post-fader so you can "massage" recording levels in the studio.



MONO INPUTS

UltraMic™ padless preamp gives 60dB of gain range with 22dBu of headroom
Insert point for effects
Direct Out on channels 1 – 8
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Channel "ON" switch
MIX/SUB routing switch
Full 100mm fader
PFL

STEREO INPUTS

13, 14, 17 & 18: simple phono inputs with Level and MIX/SUB routing

15, 16, 19 & 20: Balanced jack inputs with Gain, 2 band EQ, Aux levels, Channel "ON", MIX/SUB routing, 100mm fader and PFL

APPLICATIONS

LIVE SOUND
Bands, small venues, conferences, schools, places of worship

STUDIO RECORDING
Digital and analogue multitrack (4 & 8 track), small or home studios, pre-production, video post production

SUBMIXING

LOCATION SOUND

TYPICAL SPECIFICATIONS

Mic EIN	-129dBu
Crosstalk (1kHz):	
Channel Mute	<95dB
Fader Cutoff	<90dB
Frequency Response (20Hz to 30kHz)	<1dB
THD	<0.006%

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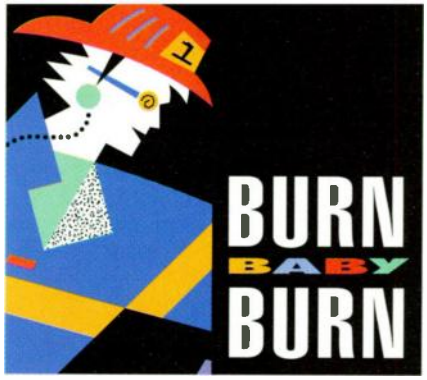

In addition, the high-speed capabilities of various media types can differ. Different dyes can have an intrinsically different response to high-speed marking. So use media that has been qualified for 4× recording, and either stick with the type of CD-R blanks recommended by the manufacturer or do preliminary testing before committing to alternative media.

BURNING CDS STEP BY STEP

With that chunk of background under our collective belt, let's step through the actual process of creating an audio CD. It's far more involved than just running a cassette dub off a DAT. For example, copying a 60-minute master DAT onto the first CD can easily take two hours or more, although subsequent copies can be made much more quickly, depending on the speed of your entire system.

Hard-Disk Preparation. These are SCSI devices, so all the normal precautions, procedures, incantations, and offerings to the SCSI gods are required. One of them must have smiled upon me: during this review, the only SCSI problem I had was that my computer wouldn't boot if the Pinnacle drive was connected but not powered up.

Burning CDs requires a continuous stream of uninterrupted data, so make sure the hard drives that hold the final CD data are optimized, especially if you're attempting 4× writes. I've been using Symantec's *Speed Disk* program, a part of *Norton Utilities*. By default, *Speed Disk* performs a full media verification before every optimization. If you're in a hurry, bypass this somewhat lengthy procedure by unchecking the Verify Media setting in the Options menu.

Audio Load-In. You need to have all your audio loaded before writing can begin. If the source material is coming off DAT, transfer the audio digitally using an audio card with digital I/O.

If you're simply trying to make a CD copy of a finished master DAT, better audio-CD recording software can speed up the job. Run-of-the-mill audio-CD software requires that each song be placed in its own file. This means you'll have to sit there and chop everything up, and you'll have to work harder to make sure the gaps between tunes don't grow or shrink. But if, for example, you're using a Mac with a Digidesign system, you can load the entire DAT into a single sound file and create *Sound Designer* regions or markers to define track IDs. Just make sure that the regions perfectly abut each other; then create the disc without any track gaps (assuming your recorder supports disc-at-once recording). The result will be pauses between songs that are identical to those on the master tape.

Once the material is loaded on your optimized drives, you use software to define the contents of the final disc. In the simplest case, each song will be in its own 16-bit, 44.1 kHz, Sound Designer II or AIFF stereo file (or WAV file on the PC), and you just have to pick the order in which they will appear on the final disc. Depending on the software, you may also adjust the space between the songs or perform more sophisticated subcode editing. (I'll talk about this more when we discuss specific software products.)

A data CD-ROM is usually thought of as holding up to 650 MB (and is labeled as such), so I thought I could assemble my audio CD project on a 700 MB hard drive. Much to my chagrin, I learned that the redundant information required for extra error correction requires additional storage space, so the contents of a full 74 minutes of music on CD-ROM is closer to 750 MB. My puny 700 MB drive was too small for the job. But you can learn from my mistake: when preparing your project, make sure your hard disk can easily hold the entire 750 MB of information.

YOUR ERRONEOUS ZONES

It's useful to measure two types of CD errors that are applicable to both CD-R discs and CDs stamped out by duplicators. These error types are called *BLER,* which stands for Block Error Rate, a count of all errors, and *E32,* which signals a serious problem.

BLER. BLER is a running average of the number of blocks per second that have errors (correctable or not). The CD format is designed to accommodate errors by using redundant data storage and sophisticated error-correction algorithms. The error-correction is quite good; CDs couldn't work without it. It's okay if the BLER is not zero; it practically never is. At one point, rates below 220 were acceptable, but rates of 50 or less are considered good today.

E32. Sometimes an accumulation of errors can be too great for the error-correction algorithms to reconstitute the original data. Audio-CD players try to interpolate, or fill in the blanks between samples. However, if you are sending a disc to a duplication plant, they may reject your CD-R master if it has uncorrectable E32s.

What to Do. Unfortunately, beyond following basic recording guidelines, there isn't much you can do about errors. In fact, you can't even tell how many are on your disc without special hardware.

You can do a byte-by-byte file comparison of the data on the disc with the data on your original hard drive, but that won't tell you anything about the condition of the pits on your CD-R because the comparison takes place *after* all the error-correction algorithms have taken their best shot on the burned disc. A more detailed test actually looks at the contrast between pits and lands, so it measures the success of the burn as a whole as opposed to checking individual files.

Clover Systems (tel. 714/499-9566; fax 714/499-4844; e-mail info@cloversystems.com; Web http://www.cloversystems.com), which manufactures disc analyzers, produced one of the first (relatively) low-cost units for what it refers to as "desktop quality control." For $4,995, Clover's model QA101 provides the information for one tenth the price of traditional disc testers and is mounted in a chassis the size of a typical CD player.

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3 AUDIO CDS $149.95

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Spawned from the colossal success of Industrial CD package "Mind Control," Noise Loops supplements the series with the most treacherous and enigmatic loops available. This CD is an absolute for the true Industrialist and anyone interested in delving into the unknown. ★★★★★ Review in KEYBOARD.

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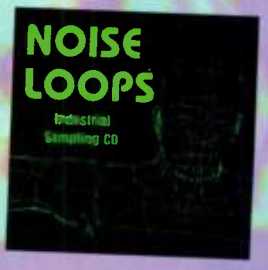

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Larry Washington brings you over 300 drum, guitar, bass and keyboard loops & fills, drums, percussion vocal EFX & hooks.

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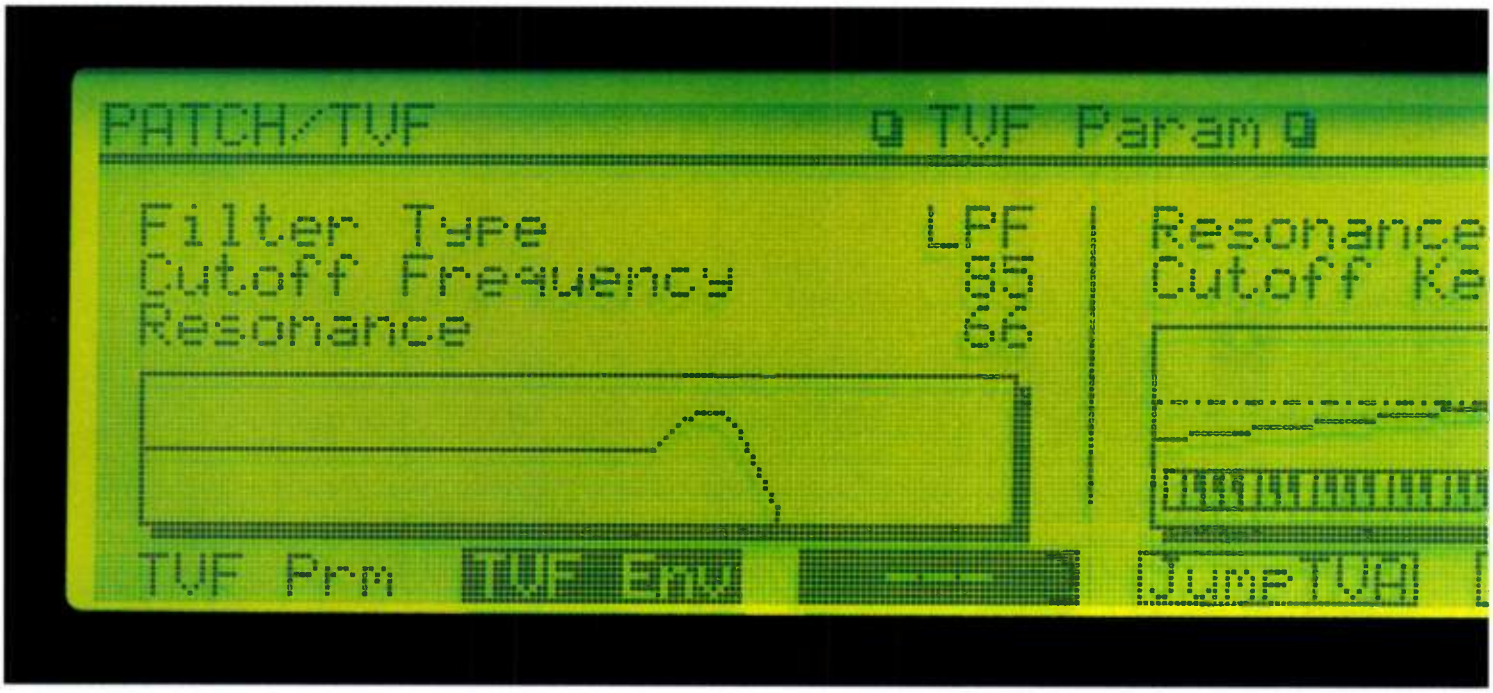
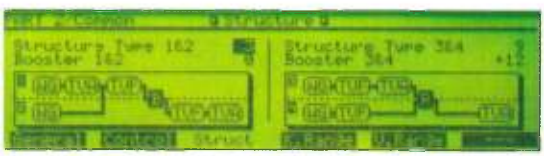
A shameless display

We'll never apologize to anyone for creating the ultimate performance synth. With a 76-note synth weighted keyboard, our renowned 64-note polyphonic synth engine, massive expandability, a full featured sequencer, extensive controller features and a big, friendly 320 x 80 backlit LCD





The architecture

RISC technology provides 64-note polyphony, 16 multitimbral parts, and lightning-fast response. The fully programmable synth has a flexible architecture which includes multiple filters, ring modulation, and a unique wave booster. 640 patches give you an incredible collection of acoustic instruments and dynamic synth textures.

The sequencer

An enhanced MRC-Pro integrated sequencer provides linear, loop, and pattern recording up to 60,000 notes, groove templates, unparalleled editing power, and the ability to sync SR-JV80 beat loops.

The control sliders

Onboard sliders provide a variety of useful functions including automated mixing, on the fly sound editing and more.

The effects

This graphic interface makes it easy to enhance your sounds using the three onboard effects processors. Select digital reverb, chorus and a multi effects processor which includes rotary, pitch shifting, auto wah, overdrive, delay and more.

# of power.

display that shows you everything except the evening news, what is there for us to feel sorry for? Except maybe, the competition.

Much more than filler

Easily accessible performance options include Roland's RPS which allows full-blown sequences to be triggered from individual keys. The programmable arpeggiator has 32 musically useful styles which can be synced to the sequencer, including guitar strums and picking, slap and synth bass patterns, all with variable accents and swing.

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Nine expansion boards are available for the XP-80. Each board contains 8MB and up to 255 patches of all new sounds. And you can access up to four expansion boards at once, including the new SR-JV80-09 Session board.

Driven to extremes

Play back songs directly from disk either singly or in chains with no load time. Save and load songs, Standard MIDI Files, and your patch banks.

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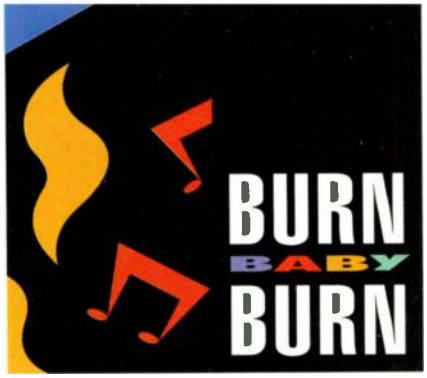


Speed Check/Write Simulation. Before attempting to write the disc, you may want to simulate the process. This is a good idea because if your computer isn't able to provide a continuous stream of data to the CD writer when needed, the blank disc will be ruined due to *buffer underrun*. (The recorder has a RAM buffer where it stores data before copying to the CD. If the computer doesn't keep up with the recorder, eventually the buffer runs empty, and a buffer underrun occurs. To avoid this, get a recorder with at least 1 MB of RAM; faster recorders should have 2 MB or more.) When you do a write simulation, you'll be testing the data throughput of your entire system, verifying that it's fast enough for the write speed you've selected.

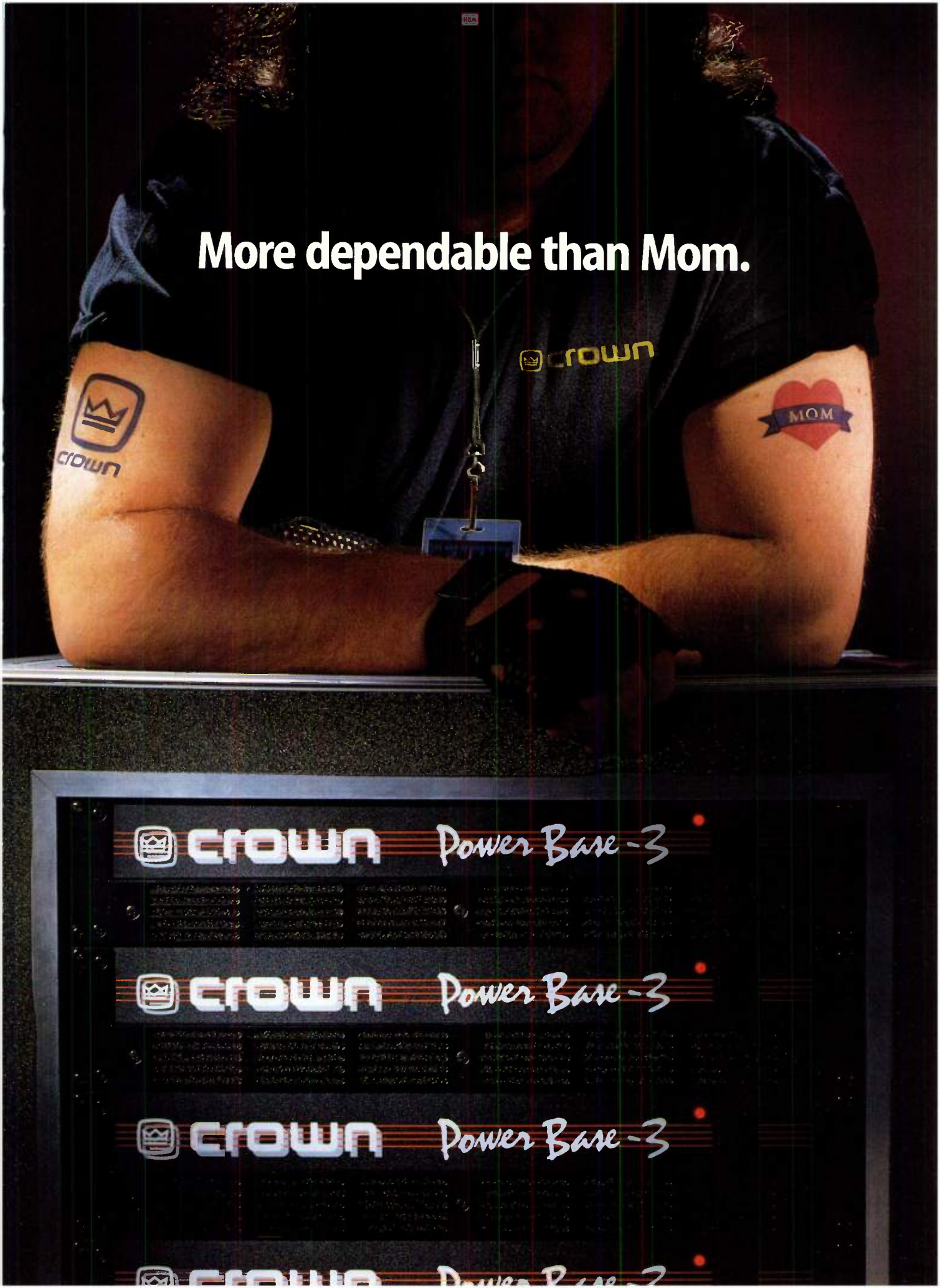
A full Write Simulation takes as long as actually burning the final disc, although the simulation can be halted without damaging the blank CD. Some software packages, such as Astarte's *Toast* and Digidesign's *MasterList CD*, also offer a simpler test of data throughput that will give you a rough idea of system performance, but a write simulation is a better indication of the likelihood of success. Sometimes, with borderline systems, data throughput errors might not show up until the end of the test, so make sure you do a complete test write.

Image Files. As mentioned earlier, different CD recorders can write discs at different speeds. Although all CD players play your disc at 1× speed (where one second of sound is played back every second), current recorders burn discs at least twice as fast. With a 2× recorder, a 60-minute CD is recorded in a little over 30 minutes because some extra overhead time is involved. A 4× recorder is twice as fast as a 2× machine.

So using a 4× drive will save you time—or will it? Once you are ready to hit Record, a 4× drive will get you there faster. But getting to that point with a 4× drive can take a lot longer because the margin between success and failure is much smaller. You'll almost certainly have to optimize your drive to ensure adequate data throughput. But more important, you may be required to create an *image file* of the final CD on your hard disk.

An image file is an exact copy of all the data that will be on the final CD. By creating this image file in advance, your computer system will be better able to keep a smooth stream of data flowing during the CD-writing process because your computer won't have to access individual files stored on different parts of your hard drive.

However, creating an image file is not a real-time operation (i.e., it takes 60 minutes to make a 60-minute image file). In addition, the image file *doubles* the hard-drive space required by the project, and you usually have to do more pointing and clicking. The bottom line is that preparing to write one 4× disc using an image file could take as long or longer than writing a single 2× disc without an image file (which is called *on-the-fly* recording). Nevertheless, if you're going to make several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copies of the same disc, it's usually worth the extra setup time to go with an image file, as you'll be able to amortize the time investment across a number of quicker individual burns.

Some of these issues are less critical if the writer has a large write buffer (say, 2 MB or larger) and has a burst rate at least twice the rated writing speed.

Recording the disc. At last, you're ready to make the disc. Turn off AppleTalk and any unnecessary system extensions, including screen savers and energy managers that put idle components such as monitors and drives to "sleep." Quit any applications that could access the disc or SCSI bus during the writing process. Insert the blank when requested, being careful not to get any dust or fingerprints on the surface. Click on Write, and take a break.

You'll get some sort of status report from the writing software as the process moves along. For instance, in addition to writing your audio tracks, there's a 2-minute lead-in section at the start of each disc and a 2-minute lead-out at the end. When writing has been completed, you'll get a message saying so or an error report explaining what went wrong.

MASTERING AT HOME

If you're burning CDs directly for duplication, don't overlook the mastering phase of the record-making process, where final level, EQ, and dynamic-range adjustments are made. Although I would never underrate the importance of a good mastering engineer, CD-R technology increases the temptation for us kids to "try this at home."

Creating a playable disc does *not* make you a mastering engineer, but it offers one benefit to do-it-yourselfers: you can listen to the final disc in the car and other listening environments to compare your work to other records you like. This means critical decisions won't be based solely on the playback environment of your studio, which is often a far cry from the sonic accuracy a real mastering facility can offer.

Finally, if you're going to master in your studio, investigate more sophisticated processing tools than those included with typical hard-disk editing systems. I rely on Waves' DSP plug-ins including the *Q10* equalizer, *L1* limiter, and *C1* compressor. AnTares' *MDT* is another useful dynamics-processing tool for mastering tasks.

DISC-AT-ONCE

Aside from the extra effort to make your audio sound exactly the way you want, there's a critical step in choosing the writing format for your master CD if you plan to use it for duplication. It's very important to create your discs using the *disc-at-once* (as opposed to *track-at-once*) method.

In disc-at-once mode, the entire CD is recorded in one pass, without stopping. This method lets you create different-length gaps between songs.

On the other hand, in track-at-once mode, the laser pauses, turning off between songs and stopping before writing lead-in and lead-out sections at the start and end of the disc. Between tracks, overlapping *linking blocks* are recorded to join one track to the next. These are prone to be flagged as errors when track-at-one discs are used to replicate CDs. And when the laser powers off and then on, it's far more likely to generate disc errors. Although these errors are in the silence between tracks, some duplicators will reject a disc with any unrecoverable E32 errors (see sidebar "Your Erroneous Zones").

In addition, most track-at-once CD recorders require (and write) a 2-second gap of silence between each song. If you want a longer pause, you'll have to pad your sound files with silence. If you were hoping for a shorter pause between selections, you're out of luck.

Most CD-R drives support both disc- and track-at-once. However, even if both modes are supported, your software may still create discs using track-at-once. One easy test is to see whether you can use a gap of more or less than two seconds between songs. If your software forbids it, you may be about to burn a track-at-once disc.

Duplicators usually have to retransfer your track-at-once master disc before duplicating it. Depending on your duplicator, this may cost extra. Keep in mind that track-at-once discs aren't useless; they are suitable for demos, promos, or other one-offs. Just be aware of their limitations.

THE PRODUCTS

Now that you're armed with more background information than you probably ever wanted, let's have a look at several CD-ROM recorders. The four products we examined have relatively few distinguishing characteristics at first glance. All four have such basic features as a headphone jack, volume control, RCA analog outputs, and user-selectable SCSI ID. But what's more important are the characteristics you can't see, such as how their internal software supports (or inhibits) the audio-CD creation process.

The criteria by which **EM** Senior Editor Steve Oppenheimer and I selected the Ricoh, Pinnacle, and Yamaha products are simple. At the time I began my research, these recorders were the only external, cross-platform (Mac- and Windows-compatible) drives that listed for less than $1,500. In addition, I tested one higher-end quad-speed recorder to

Ricoh's RS-1060C is well built and was the quietest drive tested, but it supports only track-at-once recording, making it a poor choice for musicians.

"most people are driven...

Geddy Lee, Rush

by the need to prove something to the people around them or to the public. But after achieving a certain measure of success, that need changes, and is focused more inward. You begin focusing on challenging yourself. I think that as your life changes, what drives you to create changes.

If in fact you decide you still want to have any drive at all... For me, there is no single way a song or musical piece is born. It's hard to trace the path back to that single moment of inspiration. It can be a lyric, or a powerful desire to express an emotion or anger in musical terms, an inspiring visual image, the dramatic arts... Once a musical image forms in my head, I need to get it on tape and run with it, exploit the moment so to speak, until the inspiration has passed, and then another side of the process takes over. That being the art of crafting what raw material you have, slowly and methodically, into a finished piece of music. This becomes the first version of a song. Where it goes from there depends on the strength of the original idea... I find all writing sessions to be highly charged, very creative times – my favorite times, in fact. These are the periods that make the work most worthwhile."

Geddy Lee

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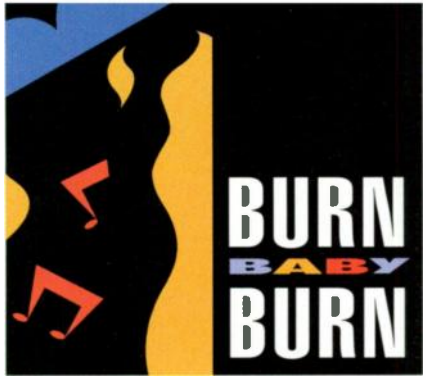

see whether its extra expense was warranted.

Predictably, just as I completed my research, products from Philips and Pioneer that would have met our criteria were announced or began shipping. Several other companies are also expected to release inexpensive CD recorders. Hopefully, **EM** will have the chance to examine these and other new competitors in the near future.

The test system was a Mac Quadra 950 with 32 MB of RAM and two external SCSI drives: a 1 GB Seagate ST11200N and a 700 MB Quantum Lightning 730S. The CD-R was always last in the SCSI chain. Active termination was used with the Ricoh and Pinnacle drives, and the Yamaha-supplied (presumably passive) terminator was used with the CDE102 and CDE100.

RICOH RS-1060C

The Ricoh RS-1060C 2× reader/writer looks like a standard computer peripheral and is just under a square foot in size—a standard case size that used to be called *zero footprint* because it fit perfectly under the early Macs (e.g., the 512k, Plus, or Classic). The RS-1060C is nicely finished in tactile beige and has a sturdy, well-constructed feel. And it exhibited far less fan noise than the three other drives I tested.

My only complaint about the external features of the RS-1060C regards its front-panel user-LEDs. There is only one multifunction light, which is green when powered up but idle and turns yellow when busy (reading *or* writing). I'd prefer separate read/write lights, as once writing has begun, aborting the process often ruins the blank. With the Ricoh, you'll have to depend on your computer's software to tell you what's going on, and this isn't always clear.

Included in the box are two blank discs. After sending in your product registration, you'll get four more. (Ricoh, unlike many manufacturers, makes its own media.)

The 1060C's biggest limitation when making audio CDs is that it supports only track-at-once recording, which means you're limited to fixed 2-second gaps between songs. You could work around this limitation by padding the end of the previous track with digital silence, but this only works if you want gaps that are longer than two seconds, not shorter. Also, the drive is limited to just 76, rather than 99, individual tracks, so it doesn't offer up to 100 track-index

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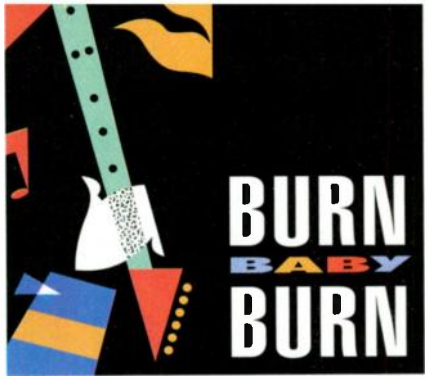

marks like other CD recorders do.

The Ricoh recorder is bundled with a version of Open Disc System's *CD-Print*. This software covers the basics for making CD-ROMs and audio discs, but it doesn't give you adequate control over the creation of audio masters or provisions for creating track indexes.

In addition, each track must be contained in its own individual sound file. There's no way to dump multiple songs from DAT into a single, large sound file and create multiple CD tracks from that. Only Digidesign's *MasterList CD* supports this kind of operation.

Even though the RS-1060C is supported by *MasterList CD*, it's not on Digidesign's recommended list. In addition to the track-at-once limitation, the drive doesn't support track Begin and End offsets. These offsets are used to pad the start and end times of each track so that when discs are played in Random or Shuffle mode, you won't lose the beginning of the track. Again, the workaround is to leave an extra fraction of a second silence at the beginning of each tune.

Despite its limitations, the RS-1060C can do useful audio work. For example, a pair of producers I work with needed a half-dozen singles for the Mexican radio market. Using Ricoh's *CD-Print* software (see **Fig. 1**), I was able to burn their single-song discs with no problem. Although I can't recommend this drive for CD premastering, it works as advertised and is useful for demos and backup tasks.

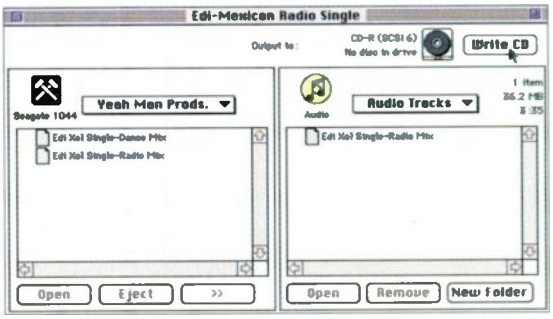

FIG. 1: Ricoh's *CD-Print* provides drag-and-drop creation of audio discs. Because the Ricoh RS-1060C is a track-at-once recorder, you are limited to a fixed 2-second gap between all selections.

Of all the discs I burned with this drive, I only had two problems. The first problem occurred when *MasterList CD* failed due to errors on a piece of Ricoh media. However, this was an isolated incident and wasn't repeatable. The other problem, which I'll discuss shortly, was the Ricoh drive's inability to read discs created on Pinnacle's CD-R drive.

Ricoh's newest drive, the RO-1420C $995), was not available in time for this article but looks like it will be a better choice than the RS-1060C for serious audio work, as it supports disc-at-once. In addition, the 1420C features Running OPC, which constantly adjusts laser power for optimum writing across the entire surface of a disc. The 1420C can also read at 4× speed and will be available with 2 MB and 4 MB internal RAM buffers, which should help ensure that the writer never runs out of data while recording a disc.

The Pinnacle RCD 5020 supports disc-at-once recording, track offsets, and intertrack index points. However, discs burned with the 5020 occasionally didn't play back properly on other machines.

PINNACLE RCD 5020

The RCD 5020 follows Pinnacle's penchant toward gray plastic decorated with turquoise trim. The 5020 is longer, narrower, and taller than the Ricoh RS-1060C. As with the Ricoh CD-R drive, only one status LED is present, but happily, this tricolor LED turns red when writing, green when reading at 1×, and yellow when reading at double speed.

However, where the Ricoh exuded a sturdy vibe, the 5020 feels less solid. The plastic drive door seems a little fragile, and the whole unit emits a disquieting "clunk" when flipped upside down as though the mechanism isn't firmly bolted to the case.

On the other hand, this drive is the only one I tested that gave special consideration to connecting the unit to an external audio system. The 5020's audio ground floats independently from the digital ground (which includes the SCSI shield and the ground pin of the AC line). A rear-panel audio-ground terminal is provided to reference the 5020's analog audio ground to that of your audio system. It's a nice touch.

The 5020 supports such critical features as disc-at-once recording, track offsets, and intertrack index points. I didn't have any problems creating discs with the 5020, but I noted some irregularities with discs made by it and Pinnacle's previous model, the RCD 1000. For example, if I played discs made by either Pinnacle model in an old consumer Yamaha CD player, a strange thing happened: when skipping to different tracks, my player paused and then started to "grind" away for about five seconds, as though trying to find its place. When playback finally started, it often did so from a point minutes into the song. This was the case when

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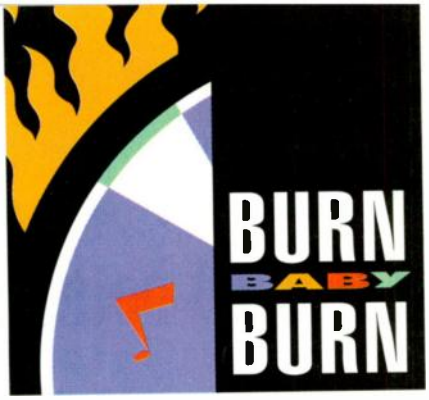

using Pinnacle-supplied DOT blank discs as well as several other manufacturers' media. Discs created on the Ricoh and Yamaha drives never exhibited this problem.

In a similar case, Mac HFS discs created on Pinnacle's RCD 1000 and RCD 5020 could not be mounted by the Ricoh RS-1060C, although other units read Pinnacle data discs without apparent difficulty. Frankly, I'm not sure whether this reflects more on Pinnacle or Ricoh—perhaps both. Aside from these interchangability problems, the Pinnacle drive worked fine. I created a variety of discs, both audio and data, without difficulty.

The 5020 ships with Pinnacle's *RCD* software (see **Fig. 2**), which provides the basics for data-CD and audio-CD creation. Unlike some programs (including Ricoh's *CD-Print*), *RCD* lets you specify the size, position, and view (by icon, name, etc.) of the folders on the final disc when writing Mac HFS discs.

RCD's audio support is also marginally better than that of *CD-Print*, with variable track gaps from 0 to 5 seconds in half-second increments. However, the same gap length is used for all tracks on the final disc, which is an unfortunate limitation. There are no provisions for creating track indexes. As with *CD-Print*, each track must be in its own sound file, which requires extra work on your part during the data-preparation stage.

The 5020 is recommended by Digidesign for use with *MasterList CD*. The only area where performance with *MasterList CD* falls short is write speed. In order to create audio CDs at double speed with the 5020, you have to create an image file, which slightly more than doubles your temporary storage requirements and doubles your preparation time before burning the first disc. This seemed odd because *MasterList CD* lets the other mechanisms I tested write 2× discs on the fly. According to Digidesign, one explanation could be a variation in the recorder's SCSI implementation; in addition, some CD recorders require "reverse byte" audio data, which adds more overhead.

If you're not using *MasterList CD*, you'll be relieved to know that the 5020 can write 2× audio discs when using Pinnacle's basic *RCD* software or the more sophisticated *Toast CD-DA* (described shortly).

As I was finishing this article, Pinnacle began shipping a new model, the RCD 5040. The main differences between the models are the 5040's support for 4× reads and its tray-loaded, rather than caddy-loaded, disc transport. At this writing, it's not clear whether the 5040 will be supported for 2× writing on the fly with *MasterList CD*.

FIG. 2: Pinnacle's *RCD* lets you drag and drop data and audio tracks from a source drive to the destination (in this case, an image file). However, there is no way to reorder audio tracks short of deleting and replacing them.

YAMAHA CDE102

The Yamaha CDE102 is a 2× writer that can read discs at 4×, which is certainly handy when restoring large backups. The drive is packaged in a long, narrow enclosure that is similar in size to Apple's external CD-ROM players. SCSI-2 high-density connectors are used for data I/O, rather than the usual (and larger) Centronics SCSI-1 connectors. Yamaha thoughtfully provides a high-density SCSI-2 terminator, but I had to buy an adapter cable to daisy-chain the drive to the end of my Centronics-style SCSI chain.

The CDE102's front-panel metering is much better than that of the Ricoh and Pinnacle drives, with five status LEDs, including disc status (no disc, disc loading, or ready), read, write, and speed indication (2× read/write or 4× read). Having a separate write LED is a real plus; there's no question about when writing starts.

Yamaha doesn't supply software with the unit, but a number of resellers bundle the drive with the required software. I used Digidesign's *MasterList CD* and Astarte's *Toast* extensively with this drive and experienced no problems with either program.

From a competitive standpoint, the CDE102 is my favorite of the three 2× writers I tested. It beats the Ricoh RS-1060C by offering disc-at-once and, therefore, variable-length gaps. With proper software, track indexes can be created. And in contrast to the Pinnacle RCD 5020, the Yamaha CDE102 can write audio CDs using *MasterList CD* at 2× without having to first create an image file. It also tops the Pinnacle drive by producing discs that worked more reliably in the players I tested.

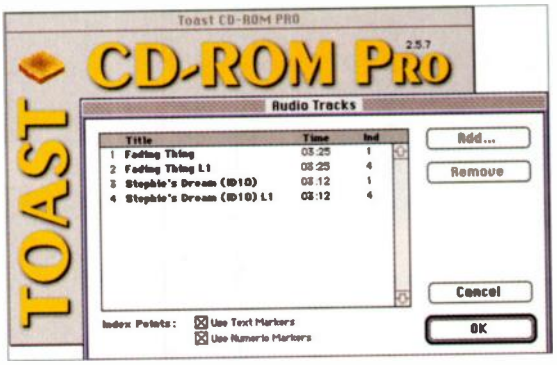

FIG. 3: Astarte's *Toast CD-ROM Pro* is the only consumer program that allows you to create track index marks, which are identified by creating text or numeric markers in the individual audio files.

YAMAHA CDE100

If you're prepared to spend just a little more money, check out Yamaha's CDE100, a popular, disc-at-once 4× writer. Its front- and rear-panel connections (including the SCSI-2 connectors) and LED status lights are the same as on the CDE102.

As mentioned earlier, creating a single 4× disc often takes just as long as making a 2× copy because of the additional preparation time required. However, the CDE100 works as advertised, and if you're making multiple copies, it won't disappoint you.

Like the 102, the 100 comes without software but is supported by third-party

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software. If you use *MasterList CD*, you'll have to create an image file for 4× writes. However, I was just barely able to make 4× discs on the fly using *Toast CD-DA*. Apparently, this performance difference is because *MasterList CD* performs real-time DSP (e.g., crossfading and gain changing), whereas *Toast CD-DA* does not.

The CDE100 I had for review was packaged in a large case that had room to mount an internal hard disk. I liked the basic design; my only complaint is that the review unit's fan was extremely noisy. It's too loud to have on your desk during critical listening. Fortunately, Yamaha has announced that external CDE100s are now being built into a smaller case with a quiter fan.

The CDE100 is the drive I'd choose, especially because recent price cuts have made it more competitive with typical 2× writers. There's one caveat: I only tested the CD recorders at their rated speeds. But sometimes (due to system throughput constraints, for example), a CD writer may drop down to a lower speed, and the results could be ugly. That just reinforces the need to optimize your system for CD-R.

MAC SOFTWARE

For practical purposes, a CD-R's user interface and feature set are dependent upon the software used with it. I've investigated some of the most common CD-R programs, but keep in mind that more are coming out all the time. Because I mostly work on the Macintosh, this section focuses on Mac software. If you're a PC user, see the sidebar "Tools for Windows."

Astarte *Toast CD-DA*. The *Toast* family of software includes three members: *Toast CD-ROM Pro* ($399), *Toast CD-DA* ($599) and *CD-Copy* ($249). *Toast* products are developed by Astarte GmbH in Germany and sold in the U.S. by Catalogic, which also bundles CD recorders with *Toast* software at much better prices than buying the two separately.

The *CD-Copy* utility lets you copy an image file of an existing CD (audio or data) to your hard disk. Then, using *Toast CD-ROM Pro*, you can create new copies of the image. This is convenient for making more copies of an audio CD as long as you don't want to change any of the material on it. In fact, if you are making an audio-CD image, you can do the whole thing in *Toast CD-ROM Pro*.

Toast CD-ROM Pro (see **Fig. 3**) is popular among users who record lots of CD-ROMs. I used the program for many Mac HFS discs, and it worked well. It is also capable of creating ISO 9660 and mixed-mode discs. When creating plain audio discs, each audio track must be contained in its own Sound Designer II or AIFF file, and there's no way to vary the gap between tracks. However, you can use this program to create track-index marks by placing numeric or text markers in the Sound Designer file. Two check boxes allow you to use either or both types of markers as track indexes. This would come in handy if you were making an audio sample CD and wanted a way to mark different hits within the same track.

Toast CD-ROM Pro 3.0 should be released by the time you read this article. Version 3.0 is PowerPC native and AppleScriptable, and it should make *Toast* much easier to use, especially for ISO 9660 and hybrid CD formats. Major new features include on-the-fly recording, optimization of HFS CDs on the fly, full support for CD Extra, and the ability to use the computer's

CD-R Specifications

Model	Ricoh RS-1060C	Pinnacle RCD 5020	Yamaha CDE102	Yamaha CDE100
Price	$995	$1,295	$859	$1,249
Write Speed	2×	1×, 2×	1×, 2×	1×, 2×, 4×
Read Speed	2×	1×, 2×	1×, 2×, 4×	1×, 2×, 4×
SCSI Connection	SCSI-2	SCSI-1	SCSI-2	SCSI-2
Status LEDs	single busy/idle	single 3-color	5-disc status, read, write, 2×, 4×	5-disc status, read, write, 2×, 4×
Transport Disc Loading	caddy	caddy	caddy	caddy
Bundled Software	*CD-Print*	*RCD*	none	none
Disc-at-Once?	no	yes	yes	yes
SCSI Audio Extraction?	yes	yes	yes	yes
S/N Ratio (analog outs)	>83 dB	>65 dB	>85 dB	>85 dB
Frequency Response (analog outs)	100 Hz–20 kHz (±3 dB)	20 Hz–20 kHz (±3 dB)	20 Hz–20 kHz (±3 dB)	20 Hz–20 kHz (±3 dB)
THD (analog outs)	<0.05% (@ 1 kHz)	<0.15% (@ 1 kHz)	<0.05% (@ 1 kHz)	<0.05% (@ 1 kHz)

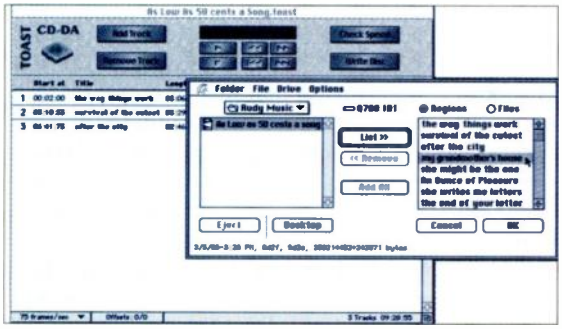

FIG. 4: Astarte's *Toast CD-DA* provides crucial access to *Sound Designer II* regions. In this example, a finished master was recorded into a single SD II file, and region names were used to identify tracks. Then each region was added to the list as an individual track.

RAM to supplement the recorder's buffer RAM. The new version can write video CDs from MPEG streams created with *M.Pack*, Astarte's new software MPEG compressor.

You don't get into the really useful features until you add *Toast CD-DA* to the picture. This program only creates audio discs, so you still need *Toast CD-ROM Pro* or a similar application to make backup CD-ROMs of your Mac files. However, *Toast CD-DA* gives you greater control over audio-CD creation than any other program does, except *MasterList CD*. You can independently adjust gap lengths between all tracks, and the program supports track indexing. I encountered one minor bug: the check boxes for turning text and/or numeric markers into indexes were labeled backward, though the indexes were created properly.

Best of all, *Toast CD-DA* lets you use *Sound Designer II* regions as individual tracks in the final CD (see **Fig. 4**). This means you can transfer an entire multisong DAT into a single sound file, create regions, and then make a CD from that rather then have to record each song into its own sound file. This reduces preparation time significantly.

As the tracks are assembled, you can preview the disc-to-be with tape-transport controls and a time display that simulates what the audio-CD player will show, including a countdown before the track starts. However, you don't have the ability to independently change the location of track IDs from actual file-start times, which is a limitation in some cases.

Additional PQ editing is provided. Besides being able to vary track gaps, you can select digital copy protection and preemphasis on a per-track basis. You also can define the optional reference numbers for your disc (ISRC track IDs and UPC barcode IDs).

The only things you might miss are support for *Sound Designer II* playlists (which would have been convenient), support for creating crossfades between tracks, and the ability to create a single track from multiple individual files. The latter feature is useful, for example, if you are making a sample CD and have individual hits as separate files but want to combine them in a single audio track. Fortunately, all of these "missing" features will be included in *Toast CD-DA* 2.0, which is scheduled for release in June. At that point, *Toast* should be an even more potent competitor for *MasterList CD*.

Although *MasterList CD* is a more flexible package overall, *Toast CD-DA* has one important advantage. Due to its DSP processing, *MasterList CD* requires creating an image file when writing 4× discs and even when using some 2× drives, such as the Pinnacle RCD 5020. However, *Toast CD-DA* can create 2× and even 4× audio discs without the need for an image file, assuming your computer and hard disks are fast enough.

In a final nice touch, *Toast CD-DA* provides a virtual audio-CD player display that counts track IDs, index points, and any pregap countdown preceding the start of each track. *MasterList CD* doesn't provide this information; you have to either infer it from the individual time-code numbers listed onscreen or burn a disc to see how the player's counter behaves.

Digidesign MasterList CD. *MasterList CD* is the most sophisticated and flexible program I tested, although *Toast CD-DA* would be a viable alternative for some users. *MasterList CD*'s basic user interface (and that of *Toast CD-DA*, for that matter) appeared previously in Digidesign's original *MasterList* program, which is an extra utility included free with the company's Mac-based digital audio workstations.

MasterList CD lets you collect a group of Sound Designer II files and assemble them in sequence with variable gaps between them. In addition to playing complete sound files, *MasterList CD* can play *Sound Designer* regions and playlists. This is especially useful because a single file can have many playlists, each representing a different edit of the audio in the file, with variable fade-ins and fade-outs. As a result, you can burn a CD that contains a number of variations on the same tune by simply placing different playlists in the Masterlist without having to create all the individual variations as individual sound files. That's very convenient.

Furthermore, you can create crossfades between tracks just as you can crossfade between individual regions in a *Sound Designer* playlist. The left and right levels of each track can be adjusted individually, with attenuation or up to 12 dB of gain (see **Fig. 5**). Note that this isn't gain with peak limiting, as in Waves' *L1;* excessive levels will still result in digital distortion. Fortunately, a pair of peak-hold meters will show you whether clipping is taking place. In addition, the program can automatically scan a single track, or the entire Masterlist, for the peak level (which is a maximum of 0 dB). It won't count the number of consecutively clipped samples, however, which would have been more useful.

MasterList CD provides more extensive subcode editing than *Toast CD-DA*

FIG. 5: Only Digidesign's *MasterList CD* lets you create crossfades between tracks—in this case, a 6-second overlapping fade between tracks 1 and 2 (top window). Thorough subcode editing is provided in the PQ window shown (bottom window).

does, including the ability to completely separate track indexing from the sound files' original start and stop positions. For example, this makes it possible to combine many small files (such as individual hits on an audio sampling CD) into a single track. The reverse is also true: it's possible to have a single sound file, region, or playlist appear as multiple tracks.

Depending on the model and desired speed of the CD recorder, you may need to create an image file before burning the disc. This is because extra features (such as real-time level adjustment and crossfades) can impact system performance to the point where data can't be supplied to the burner fast enough. Creating a disc image allows these tasks to be precalculated and stored in the image. Then the image is simply streamed off the hard disk while the blank disc is recorded. That's all fine, but if you're not using these extra features, it would be nice to perform 4× writes without the extra time and space required by an image file, as you can with *Toast CD-DA*.

Although *MasterList CD* is more flexible and offers more than any of the other programs discussed here, it isn't the be-all and end-all of CD mastering. For example, there's no link between Pro Tools sessions and *MasterList CD*. To get a Pro Tools project on a CD, you must first bounce the entire session to a stereo sound file. This extra step takes time and disk space.

In contrast, Sonic Solutions' Mac-based system can burn CDs directly from a multitrack edit session without having to first bounce the audio to a new stereo sound file. Better still, the Sonic system can perform mix automation moves as the disc is created, or make the disc in the background, without mix moves.

DECISIONS, DECISIONS

First, let's get down to choosing a CD-R drive. I can't recommend the Ricoh RS-1060C because it doesn't support disc-at-once operation. But keep an eye out for Ricoh's new model, the 1420C.

I'm on the fence with Pinnacle's 5020. The media-interchangability problems I experienced don't inspire confidence, and the requirement to create an image file when using *MasterList CD*, even at 2×, is a drawback. But if you're not planning on using *MasterList CD*, that's not an issue, as *Toast CD-DA* can burn 2× Pinnacle discs on the fly.

Still, this leads me to the Yamaha CDE102 or CDE100. I had no operational problems with either unit. They have better front-panel status indicators than the competition and are well supported by software. I feel confident recommending either model.

The software side is trickier. In addition to the bundled software with the Ricoh and Pinnacle drives, I evaluated Corel's *CD Creator* 1.0 for the Mac. Although Corel's Windows version is well regarded (see the sidebar "Tools for Windows"), the Mac program is at least one version behind, and it seems only average for creating audio CDs.

CD Creator for the Mac lets you create audio or mixed-mode discs. The audio tracks can be reordered simply by dragging a song to a new position in the list. Colored boxes in the "time line" show the space each item will occupy on the final disc. Although it has the ability to apply a single track ID to multiple sound files, the reverse—turning one sound file into multiple tracks—isn't supported. You can't adjust the gaps between tracks, and the Disc Wizard for creating enhanced CDs put my data track first. The jewel case-insert maker doesn't support *Adobe Type Manager*, resulting in ugly printouts on non-PostScript printers.

I did not test Elektroson's *Gear* for the Macintosh, which is often bundled with CD-R drives. But based on the promo material and discussions with one of its distributors, I have the strong impression that it offers little in the way of pro audio CD-creation features.

Toast CD-ROM Pro's ability to work with track indexes is a nice touch for a program not really designed with audio production in mind. But if you're serious about creating audio discs, plan on using either Astarte's *Toast CD-DA* or Digidesign's *MasterList CD*. If you're banging out a lot of discs and don't require fancy editing, *Toast CD-DA* might save you time (and therefore make you money) by burning 4× discs without the need for an image file. *MasterList CD* offers greater flexibility and more detailed control over the final result.

Making CDs is a lot more work then running off cassette dubs, but the benefits are clear. The format lets you create masters and reference copies, solve backup needs, and provide your clients with an accurate copy of their project that they can use anywhere. And you're not adding yet another incompatible format. With the overall improvements in recorders and media and the continually falling prices of both, this is an excellent time to consider CD-R.

CD-R SOFTWARE MANUFACTURERS

Catalogic (Astarte *Toast*) tel. (415) 961-4649; fax (415) 962-5333; e-mail sales@catalogic.com
Corel Corp. *(CD-Creator)* tel. (800) 772-6735 or (613) 728-3733; fax (613) 761-9176; e-mail custserv@corel.com; Web http://www.corel.com
Digidesign *(MasterList CD)* tel. (415) 842-7900; fax (415) 842-7999; e-mail digimkt@digidesign.com
Elektroson *(Gear)* tel. (800) 606-6116 or (610) 617-0850; fax (610) 617-0856; e-mail sales@elektroson.com; Web http://www.elektroson.com
Golden Hawk Technology *(DAO)* tel. (603) 424-0269; fax (603) 429-0073; e-mail jarnold@mainstream.net; Web http://www.mainstream.net/goldenhawk
Hohner MIDIA *(Red Roaster)* tel. (800) 330-7753 or (707) 578-2023; fax (707) 578-2025; e-mail 100772.1052@compuserve.com
Incat Systems/Adaptec *(Easy-CD Pro)* tel. (800) 774-6228 or (408) 957-4535; fax (408) 957-4554; e-mail 71612.1236@compuserve.com
Micro Technology Unlimited *(Micro-CD)* tel. (919) 870-0344; fax (919) 870-7163; e-mail info@mtu.com; Web http://www.mtu.com

David (Rudy) Trubitt *(trubitt@well.com) is a freelance writer and audio producer. His latest book,* Mackie Compact Mixers, *is published by Hal Leonard.* *Special thanks to Brian Bartholomeusz and Bill Mueller of Eastman Kodak.*

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–20dB SIGNAL PRESENT & SOLO *LED.*

SOLO. *In-place AFL or PFL.*

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MONO OUTPUT *(bal./unbal.) has separate level control.*

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DIRECT OUTPUTS *(bal./unbal.) channels 1-8.*

SUBMASTER OUTPUTS *(bal./unbal.).*

AUX SEND 1 & 2 MASTERS.

Stereo **AUX RETURNS 1 & 2** *with 20dB gain above Unity for boosting weak effects.*

EFFECTS TO MONITORS *controls fold Aux Return 1 & 2 back into Aux Sends 1 & 2 so that on-stage performers can hear effects.*

AUX SEND 1 & 2 SOLO *switches with LEDs.*

Stereo **AUX RETURNS 3 & 4.**

Aux Return 3 **ASSIGN SWITCHES** *to Main Mix, Subs 1 & 2 or Subs 3 & 4.*

Aux Return 4 **ASSIGN** *to Control Rm/Phones.*

CONTROL ROOM/PHONES *level control.*

TAPE INPUT LEVEL *control and* **TAPE TO MAIN MIX** *switch.*

SWITCHING MATRIX. *This fantastic creative feature lets you route any combination of Tape, Subs 1 & 2, Subs 3 & 4 or Main Mix to Control Room/Phones bus. Lets you create custom headphone or broadcast mixes, monitor 2-track output or route a cue/click track to phones, create a second stereo main output with its own level control & more (covered in the extensive manual).*

Global **SOLO** *level control.*

Global **AFL/PFL SOLO** *switch.*

SUB ASSIGN *to Left or Right Main Mix.*

**Suggested U.S. retail; higher in Canada.*

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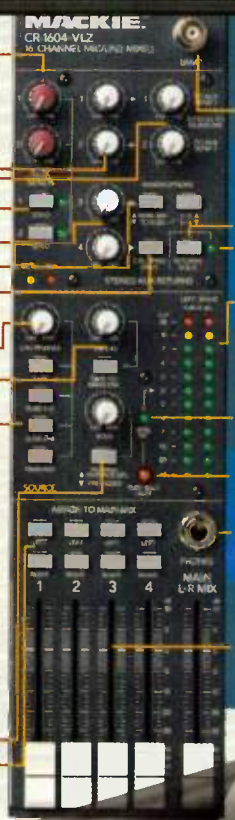

MAIN MIX FADER.

BNC *lamp socket.*

Global **AUX RETURN SOLO** *with LED.*

LED **METERS** *with –30 to +28 range &* **LEVEL SET** *LED.*

RUDE SOLO *LED.*

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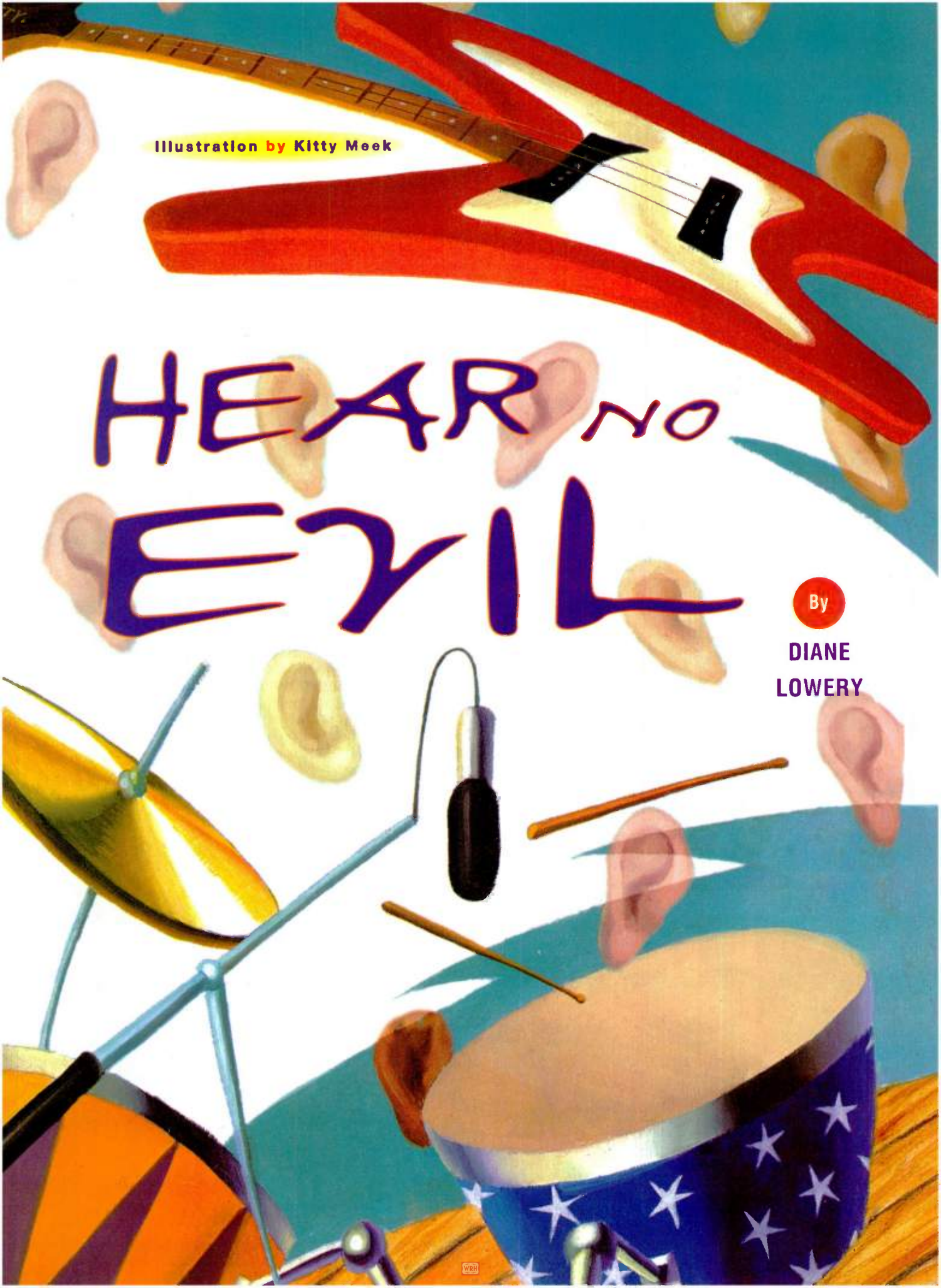


Illustration by Kitty Meek
HEAR NO EVIL
By
DIANE LOWERY

What? Excuse me, what did you say? Could you speak a little louder? As The Beatles once lamented in song, "Your lips are moving, but the words aren't clear." All of us are familiar with images of old people who have difficulty hearing. They tilt their heads or cup an ear with a hand to better hear what someone is saying.

But hearing loss isn't restricted to the elderly. Noise-induced hearing loss can happen to anyone, and, unfortunately, musicians and recording engineers are especially vulnerable because they're constantly exposed to loud sounds. The smart ones protect their ears from damage.

Fortunately, protecting your ears is relatively easy; and if you already have some degree of hearing loss, it's not too late to keep your ears from being damaged further.

Peter Erskine, 30-year veteran jazz drummer for bands such as Steely Dan and Weather Report, puts it best when he says, "The ears are small, fragile, wonderful things. It is important to protect them. Hearing is a gift."

LISTENING SKILLS

To understand how hearing can be damaged, it is important to visualize the structure of the ear, which consists of three distinct areas: the outer, middle, and inner ear. The outer ear's shape and position on the head are designed to scoop in sounds and funnel them into the middle ear, which mechanically transmits the sounds to the inner ear.

As sounds enter the inner ear, tiny hair-like cells oscillate in response to vibratory stimulation. If the inner ear is exposed to long and repeated loud sounds, these cells will lose their ability to respond. When this happens, the inner ear's nerve endings, which transmit signals from the hair-like cells to the brain, aren't stimulated and stop sending messages. Once these cells lose their ability to respond, they cannot be repaired (see **Fig. 1**). The damage is permanent. (For more information on how the ear responds to sound, see "Hear Today, Gone Tomorrow" in the June 1993 **EM**.)

Not all sounds are created equal. Sounds can be high and piping or low and booming; they can be loud or soft. These characteristics of sound are measured in terms of *frequency* and *amplitude*, also known in common parlance as *pitch* and *loudness*. Pitch is our perception of the rate—or frequency—of vibrations that constitute sound waves. The faster the vibrations, the higher the pitch of the sound. Conversely, the slower the vibrations, the lower the pitch. The rate of vibration is expressed in cycles per second (hertz, or Hz) or thousands of cycles per second (kilohertz, or kHz).

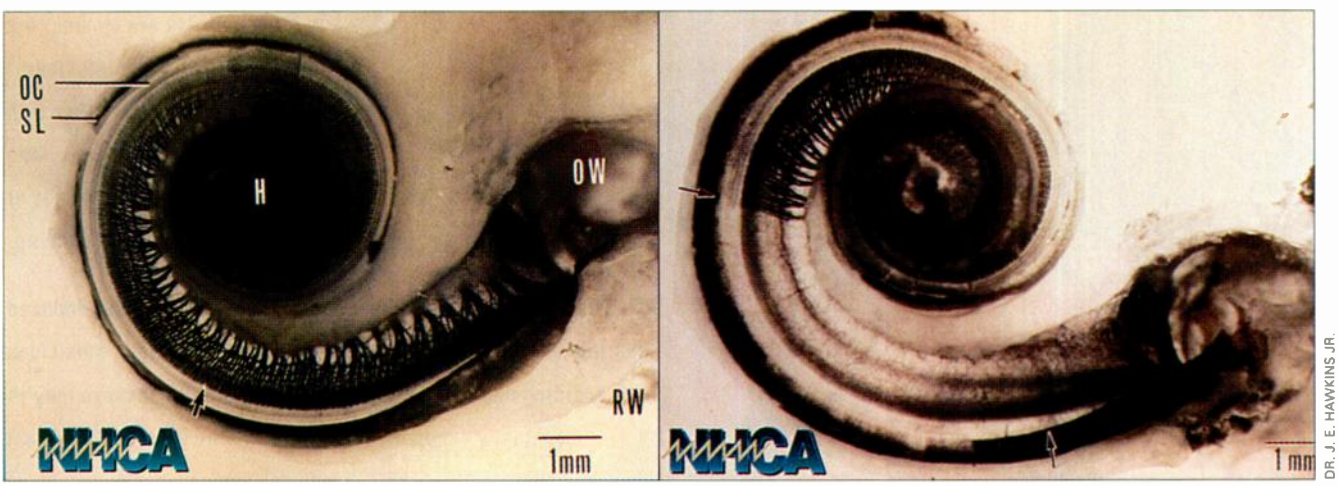
You don't have to get blasted by onstage monitors. Garwood Communications has designed the Micro Monitor custom-molded ear monitors, which fit into the ear canal, blocking out ambient sounds and making it easy to focus on a desired mix at a lower volume.

Loudness is our perception of the intensity of a sound: the greater the intensity, the louder the sound. The force a sound exerts on our eardrums is measured in units of sound-pressure level called *decibels* (dB SPL). A normal, healthy ear can comfortably hear a range from 0 dB SPL to 85 dB SPL.

However, the human hearing system is not equally sensitive to all frequencies. To compensate, the dB SPL scale is weighted. The most common standard of weighting is the *A scale*. Decibels measured with this scale are called *dB A*. Sounds registering around 120 dB A, such as some live music, can cause pain to our ears, and prolonged exposure to sounds over 90 dB A can lead to hearing loss (see "Square One: The Wizard of dBs Returns" in the May 1996 issue).

Anyone at any age can have his or her hearing damaged by loud sounds. Kathy Peck, executive director of H.E.A.R. (Hearing Education and Awareness for Rockers), gets queries from artists in all styles of music. "We see people who play rock 'n' roll or classical, who play in marine bands or the opera—the full spectrum," she says. "And we're starting to see more people with hearing damage who are in their twenties and thirties."

One promising trend to note is that



DR. J. E. HAWKINS JR.

FIG. 1: The left photo shows the inner ear with healthy cochlea and hair cells. The right photo shows the cochlea with damaged hair cells, the result of noise-induced hearing loss. The cochlea is about half as large as the nail on your pinky. (Courtesy NHCA)

musicians are becoming more aware of and are taking steps to protect their hearing. Michael Santucci, an audiologist and president of Sensaphonics (tel. 312/432-1714; fax 312/432-1738), remarks that "some big-name bands who have been around for a long time are starting to learn more about hearing protection. I've seen the members of 200 touring acts, from classic rock musicians to alternative, jazz, and country performers. Ten people from the Chicago Symphony come in regularly to get their hearing checked. It's a major concern today with a lot of these musicians."

RING RING RING

Hearing loss occurs gradually from everyday or frequent exposure, and the damage worsens over time. One of the more common symptoms is ringing in the ears, or *tinnitus*.

Erskine started his early years drumming in big bands with large brass sections. "I'd get back to my hotel room after a gig," he says, "and my ears would be ringing. I'd be kind of amused, thinking 'Wow, we were really loud tonight.' But after playing with these groups for a number of years, the ringing didn't go away."

You may also experience a *threshold shift:* after being exposed to loud sounds, you can't hear as well. Everything may sound like you're underwater or far away. Your hearing may come back after a day, but if a threshold shift occurs repeatedly, the hearing loss becomes permanent.

Diann Smith, an audiologist with EAR ProTech (tel. 714/646-2676; fax 714/646-4879), explains this further: "When testing someone who has noise-induced hearing loss, his or her hearing is normal from about 25 Hz to 2,000 Hz. But when it hits 4,000 Hz, hearing ability takes a nose dive. Then at 8,000 Hz, he or she can hear well again." The result of this loss is that, for example, if you go into a crowded room, you can hear people talking, but you can't understand what they are saying. You lose sounds from consonants such as *t*, *p*, *b*, and *k* because these sounds carry acoustic energy around 4,000 Hz. In this range, words involving such sounds are not heard with clarity. (For more information, see "Recording Musician: Vocal Acoustics," in the February 1993 **EM**.)

Charlie Lahaie, director of public relations and community outreach at the House Ear Institute, concurs: "You also lose the high end in music; it will just sound different. And a hearing aid won't help because it doesn't give back the fidelity you've lost."

Another symptom of hearing loss is a distortion of pitch perception. Sensaphonics' Santucci tested a keyboard player who had lost some hearing in his left ear. Santucci played a tone, alternating between the keyboardist's right and left ears, and asked him which tone was louder. "He said that I wasn't giving him the same tone," Santucci explains. "I asked him what he meant. He said that the tone in his left ear was half an octave lower than the tone played in his right ear. But it was the same tone."

Yet another symptom is *recruitment*, which is a change in your perception of loudness. The relationship between the two characteristics of sound mentioned earlier—pitch and loudness—is affected in this manifestation of hearing loss. The range of intensity you can hear comfortably is reduced: the soft sounds

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"Tubular Balls"

"Very versatile...." "The sound has a wonderful tube warmth to it....Tubeman performs beautifully." "It really does sound like a miked-up combo or stack." ©1993 Recording Musician

"Exceptional Bang for the Buck"

"For a final test, we...laid down a few tracks. The unit features the same cabinet simulation circuitry found in Hughes & Kettner's Red Box. Once again, the box shined, providing a wide variety of useful tones with little effort. Distorted sounds are especially impressive: rich, crisp but not brittle, with excellent note definition. The controls make it easy to quickly dial up the tones you want." ©1993 Guitar Player

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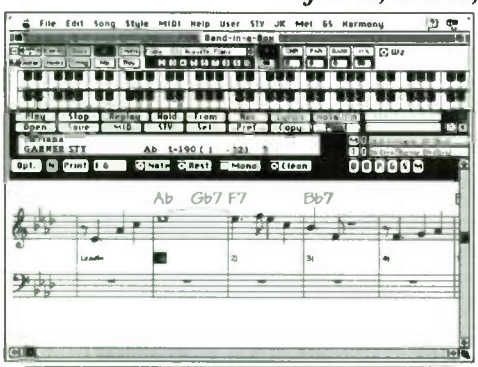
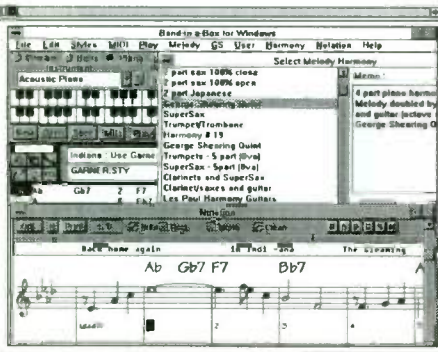
Type in the chords to any song, using standard chord symbols like C or Fm7b5, choose the style you'd like and Band-in-a-Box does the rest... Automatically generating professional quality five instrument accompaniment of bass, drums, piano, guitar & strings in a wide variety of styles.





100 STYLES INCLUDED WITH PRO VERSION. *Jazz Swing • Bossa • Country • Ethnic • Blues Shuffle Blues Straight • Waltz • Pop Ballad • Reggae • Shuffle Rock • Light Rock • Medium Rock Heavy Rock • Miami Sound • Milly Pop • Funk • Jazz Waltz • Rhumba • Cha Cha • Bouncy 12/8 Irish • Pop Ballad 12/8 • Country (triplet) • and 75 more!*

BUILT-IN SEQUENCER ALLOWS YOU TO RECORD OR EDIT MELODIES.

BUILT-IN STYLEMAKER™. *You can create your own 5 instrument styles using the* ***StyleMaker*** *section of the program.*

SUPPORT FOR OVER 70 SYNTHS BUILT-IN. *Drum & patch maps included for over 70 popular synths. General MIDI, Roland GS & SoundBlaster soundcard support included.*

NEW! Additional features in Windows/Mac Ver. 6

Band-in-a-Box 6.0 for Windows & Macintosh breaks new ground with over 50 new features including...

STANDARD MUSIC NOTATION *and leadsheet printout of chords, melody and lyrics. Enter your songs in standard notation & print out a standard lead sheet of chords, melody and lyrics.*

AUTOMATIC HARMONIZATION. *You can select from over 100 harmonies to harmonize the melody track, or harmonize what you play along in real time. Play along in "SuperSax" harmony, or harmonize the melody with "Shearing Quintet". Create your own harmonies or edit our harmonies.*

PLUS 50 MORE NEW FEATURES

OUR CUSTOMERS LOVE THE VERSION 6 FOR WINDOWS/MAC UPGRADE

"Wow !!... Version 6.0 is marvelous... I love the notation and harmonies... This is so much fun... You've added everything I wanted... The lead sheets look great... Bravo!... Congratulations"

"Band-in-a-Box is an amazing program"
Keyboard Magazine

"I am in awe. I didn't think that such an incredible program could even exist. This software is a dream come true."
PC Journal

– FINALIST –
PC Magazine Award for Technical Excellence

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Band-in-a-Box - PG Music

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"Band-in-a-Box is the most significant contribution to Jazz Education since Jamey Abersold Records."

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NEW CUSTOMERS (IBM/Mac/Atari*)

Band-in-a-Box PRO $88
(BONUS! IBM version now includes both Windows & DOS version for the same price!)
(NOTE: ATARI Band-in-a-Box available only in Version 5)*

ADD-ONS

Styles Disk #4 ..... $29
Styles Disk #5 *(Note: included with Version 6 upgrade)* $29
Styles Disk #6 *(Jazz & Latin)* $29
Styles Disk #7 *(Country & Pop)* $29
MIDI-FakeBook *(100 songs on disk)* $29
SUPER PAK *(Pro version + all 3 add-ons)* $147

UPGRADES

"Regular" Upgrade PAK to version 6.0 for Windows or Macintosh $49
includes version 6.0 upgrade + new Styles Disk #5, and Harmonies Disk #1. Order this if you already have the IBM or Mac PRO version 5.

"Complete" Upgrade PAK to version 6.0 for Windows or Macintosh $69
In addition to the regular upgrade PAK, this includes the 100 styles in the PRO version, & Styles Disk #4. Order this if you have an older version of Band-in-a-Box or a "bundled version", or are crossgrading (i.e. switching computer platforms).

MEMORY REQUIREMENTS: DOS (640K), Windows (3mb), Macintosh (4mb), Atari (1040)

HELP! *I Forgot to send in the Registration Card, but I want to upgrade now!! No problem. Since the upgrade checks for any previous version of Band-in-a-Box, you can order the upgrade even if you forgot to register!*

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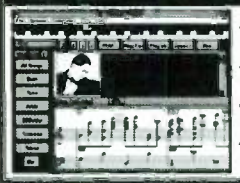
NEW! The Gospel Pianist™ $49



Over 50 Gospel style piano pieces played on MIDI keyboard by top Gospel Pianists Louise Rose, Davell Crawford, Henry Butler, Sam Berfect, Derrick Bethune, Joel Simpson & Jon Cleary. The "Gospel Piano" style underlies much of the blues, jazz & popular music played today. View or print out the notation – a great way to learn these virtuoso performances. Amazing Grace, By and By, At The Cross, Go Tell It On The Mountain, Will The Circle Be Unbroken, Sweet Chariot... over 50 pieces in all!

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***OUR CUSTOMERS LOVE THE PIANIST...** "Incredible... amazing... terrific... masterful... fabulous... love it... my favorite program!"*

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Volume II upgrade - $49 (requires The Pianist) • first time purchase Volume 1 & 2 - $98

Turn your Pianist into a "SUPER PIANIST" with Volume 2!! We've recorded 200 more fabulous pieces for Volume 2. There are new program notes, new biographies and improved listings. If you thought the quality of the performances was great in the original Pianist program, just wait until you hear these new world-class, live piano recordings – you'll have endless hours of listening pleasure!

The New Orleans Pianist™ $49

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This program makes it "too easy" to learn to be a great jazz PIANO player!

Top jazz/studio pianists play 60 jazz standards in a wide variety of styles.

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NEW! The Jazz Pianist Volume 2

Volume II upgrade - $49 (requires The Jazz Pianist) • first time purchase: Volume 1 & 2 - $98

60 more fabulous jazz standards for Volume 2, complete with new program notes and biographies!

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Over 90 ragtime & early jazz piano standards, played on MIDI keyboard by top Ragtime Pianists... and featuring world-renowned Ragtime performer JOHN ARPIN!

Hear virtuoso performances of every Joplin rag in this program, as well as many other rags, CakeWalks, waltzes & other Ragtime Era tunes by Eubie Blake, Joseph Lamb, Daniels and, of course, Scott Joplin. HEAR... The Entertainer, Maple Leaf Rag, Chevy Chase, Easy Winners, Elite Syncopations, Fig Leaf Rag, Pineapple Rag, etc. (total of 34 Scott Joplin Rags), Indiana, Meet Me In St. Louis, St. Louis Blues, Bill Bailey, For Me and My Gal, & more....

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The Jazz Guitarist™ (Windows, Mac, Atari) $49

A music program containing a huge collection of over 60 jazz standards, played on MIDI guitar by top jazz/studio guitarist Oliver Gannon

RECORDED IN REAL-TIME ON A MIDI GUITAR!
Hear the music with CD-quality through your sound card or MIDI system. Most pieces have bass/drums as well as guitar so you get a full sounding jazz trio for the tunes!

the Jazz guitarist

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On-screen fretboard shows you exactly what notes & chords are being played on the guitar. Slow down the performance or, better still, step through the music chord by chord, so you can learn every note as it's played!

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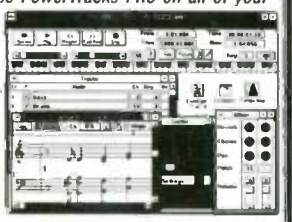

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MUSIC PRINTOUT (ON ANY PRINTER!!)
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NEWEST FEATURES...
✔Wave file record & playback, lyrics, drum pattern editor. Piano, Auto-Hand Splitting ✔Programmable using DLLs ✔Patch/Bank names ✔non-GM Drum mapping ✔Windows 95 friendly ✔over 30 new features in all (existing customers may upgrade for $15)

BUT POWERTRACKS GOES MUCH FURTHER... WITH EXCITING EXCLUSIVE FEATURES!
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POWERTRACKS FOR DOS VERSION INCLUDED FREE. Yes! We include the DOS version for FREE in the same package. NOTE: The DOS version doesn't support music notation, or other graphical features.

Other products...

Multi MPU401 Driver for Windows $19
Windows driver that allows 10 programs to use the MPU401 at the same time.

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***IBM (DOS versions)** require 640K, MPU401/MIDIATOR/SoundBlaster/SC-7, TG100*
***WINDOWS** versions require 2mb RAM + any soundcard or MIDI interface*
***MACINTOSH** versions require 2mb RAM, system 6 or 7*
***ATARI** versions require 1040ST or better*

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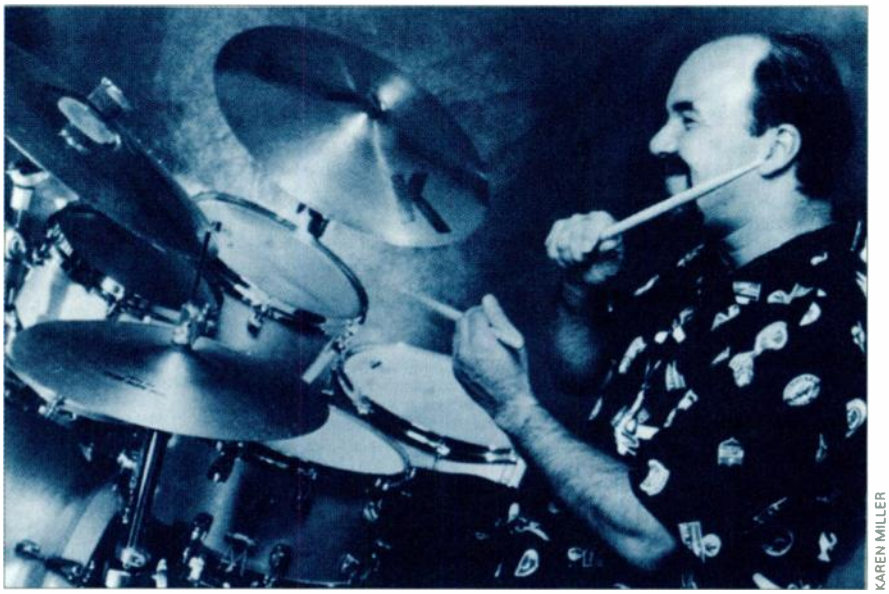
are difficult to hear, but increasing the volume quickly makes them too loud and painful. "Some frequencies will be excruciating," Santucci says. "If a certain note is played, it will feel like someone is sticking a knife in the person's head. It's been described as a brief, sharp pain."

WHO HELPS YOU HEAR?

Obviously, you must take steps to protect your hearing. One place to start is with a trained audiologist. Both the House Ear Institute and H.E.A.R. have audiology clinics where you can get your hearing tested, and they will help you get fitted with custom-made musician's ear plugs, if necessary (discussed shortly). If you don't live near either organization, they will recommend an audiologist in your area who is trained specifically in noise-induced hearing loss.

Nobody likes to go to the doctor, but you can be assured that a trip to an audiologist is a painless process. "We look at a person's medical and musical history," explains Santucci. "We examine other possible reasons for hearing loss: for example, caffeine or legal drugs,



KAREN MILLER

Peter Erskine, who has been performing for more than 30 years, didn't always use hearing protection in his early days. "I thought hearing loss was a price I had to pay for being a musician," he says. "I didn't realize I was risking serious and preventable damage."

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such as aspirin, can cause the ears to ring. This also helps us determine whether the hearing problems are related to other nonmusical causes, such as viral infections."

Santucci then demonstrates how the ear functions and how it gets damaged. A complete hearing test measures all frequencies up to 18 kHz. "We test not only the inner ear," says Santucci, "but also the responsiveness of the eardrum and the reflex in the middle ear that helps protect the inner ear from sudden loud sounds." This initial test data is called a *baseline*, and it is used for later comparison.

When you return to be retested (preferably after a year or when recommended by your audiologist), the baseline data is used to see whether there have been any changes. "There's no guarantee with any protection device that you still won't lose hearing," says Santucci. "In a year, if your baseline hasn't changed, obviously things are working. But if your hearing is worse, then there are the options of going to a stronger filter plug, adjusting the volume on your personal monitor, or prescribing something else. Another test a year later gives a full,

OSHA Guidelines

The following list from the Occupational Safety and Health Administration (OSHA) tells how long you can expose your ears to a specific volume before damage sets in. As a reference point, a shotgun blast or an airplane taking off is 140 dB A.

90 dB A	8 hours
95 dB A	4 hours
100 dB A	2 hours
105 dB A	1 hour
110 dB A	1/2 hour
115 dB A	15 minutes
120 dB A	avoid at all costs

ORBIT
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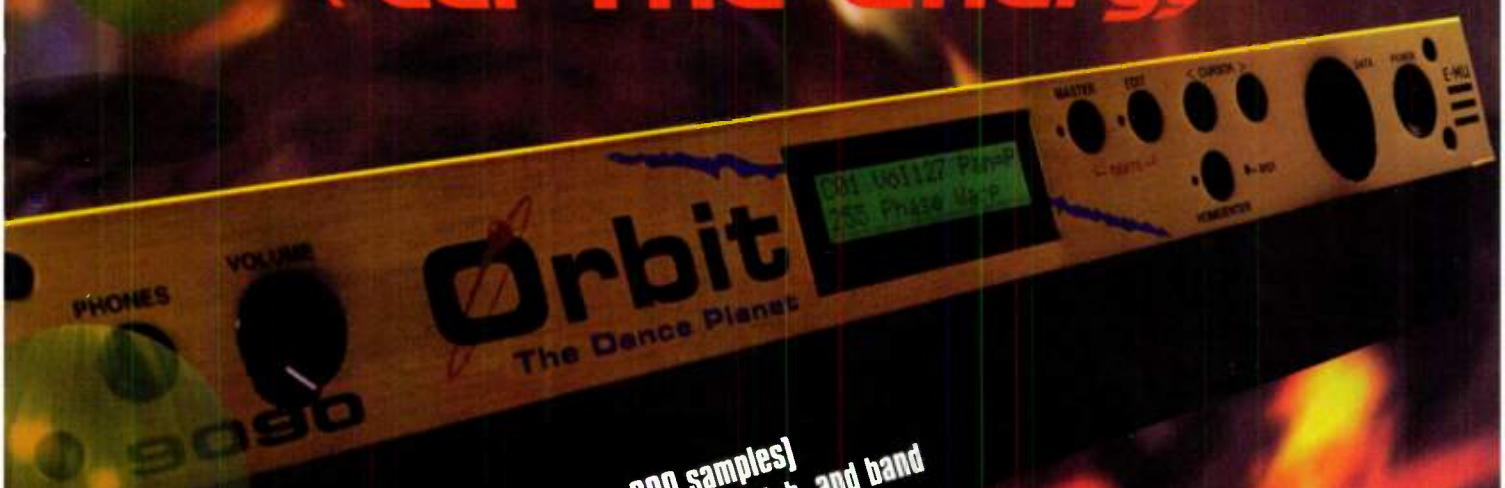
Feel The Energy



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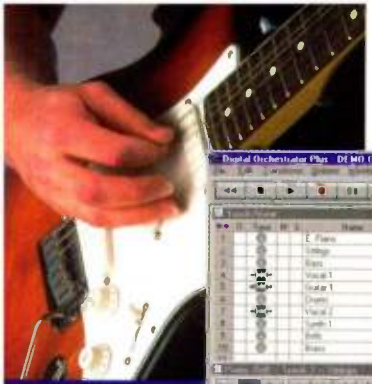
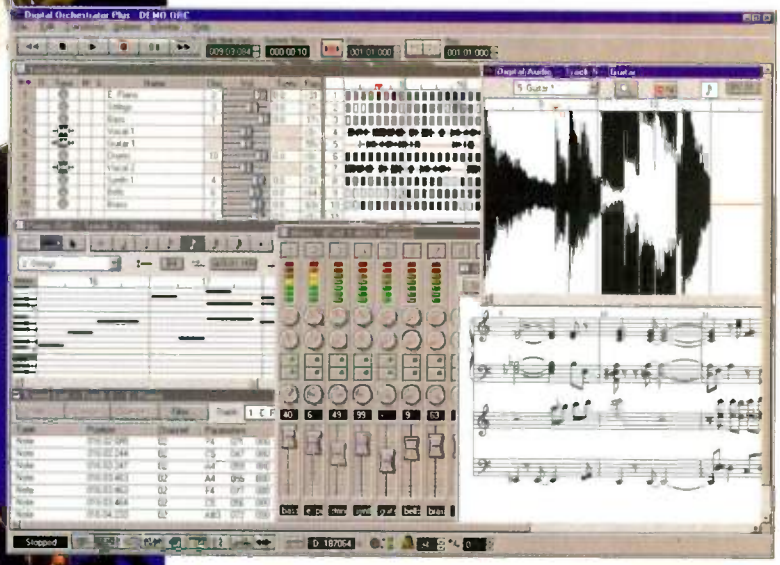


Awesome Features!



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Music Notation

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comprehensive view of things, and it helps give you choices."

When visiting an audiologist for a checkup, be sure he or she tests your hearing throughout the full audio spectrum—up to 20 kHz—so dips can be charted. Many audiologists don't routinely test up to 20 kHz because they're more concerned with the normal range of speech sounds, which fall in the 3 kHz to 8 kHz range.

HEAR YE! HEAR YE!

Even if a musician always plays and mixes at safe levels, he or she should use in-ear protection, too.

Foam plugs. These are a cheap and convenient way to protect your hearing. You just squish them up and stuff them carefully into your ear canal. Foam plugs are readily available at most drug stores, and you can carry them on a key chain or keep them in the glove compartment of your car so you're never caught without them. They attenuate up to 29 dB A, but you will lose some high frequencies. The main problem with foam plugs is that many people don't insert them properly. If the plugs aren't placed far enough into the ear canal, the level of protection is reduced.

"They'll do in a pinch," says the House Ear Institute's Lahaie. "They beat cotton, napkins, and cigarette filters, and they are certainly better than nothing."

Doc's Proplugs (distributed by International Aquatic Trades, Inc.; tel. 800/521-2982 or 408/462-5919; fax 408/476-5409). These are the next step up from generic foam earplugs. They are preformed, ready to wear, and come in eight different sizes, with a helpful sizing system. They come with

HEARING CONTACTS

H.E.A.R. (Hearing Education and Awareness for Rockers) has a 24-hour hotline to answer questions or concerns about hearing. Their Web site gives information on hearing protection, testing, and earplugs. They will also answer write-in questions.

Dr. Howard P. House, who started the House Ear Institute, was part of the team that set up the OSHA standards for safe decibel levels and exposure times 45 years ago. The House Ear Institute provides a brochure on hearing, information on custom earplugs, and a set of foam earplugs to get you started.

H.E.A.R. tel. (415) 773-9590 (24-hour hotline); fax (415) 476-7113; e-mail hear@hearnet.com; Web http://www.hearnet.com

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or without a vent in the filter, which changes the amount of attenuation.

"I like Proplugs," says Erskine. "If you're not in a high-volume situation, these plugs protect your ear to a certain degree. I used them on the last tour I did, and they were handy. I didn't feel completely closed off from what was going on, and they lessened the shock my eardrums would otherwise have suffered from the loud volume."

ER 15 and ER 25 (aka musician's earplugs). These plugs are custom-made by an audiologist to fit into your ears. The ER 15s have a flat attenuation (a decrease in volume but not in frequency range) at 15 dB A, and the ER 25s are flat at 25 dB A. These are perfect for performing and recording situations.

"I would recommend these," says EAR ProTech's Smith, "because they go down and around the curves of the ear canal. If I were a musician, I would wear the maximum protection I could when practicing, playing, or engineering."

Lahaie suggests that you start with the ER 15s if you haven't worn protection before. "If you go from no protection to maximum protection [the ER 25s], you are probably not going to be happy. It will be tough to get used to, and you'll end up not wearing the plugs at all."

Variations of these are available; ask your audiologist for more information. For example, a custom earplug designed by Pacific Coast Laboratories includes five filters that offer different amounts of attenuation. This allows you a choice of how much protection you want at any given time.

Personal monitors. More and more performers are using miniature, personal monitors instead of stage monitors. Like musicians' earplugs, these personal monitors are custom-molded to fit in your ears. However, they include tiny speaker elements that receive signals from the monitor mix. These give additional help to singers by letting them hear themselves over the mix without straining and causing damage to their vocal cords.

But there is a definite danger to using these monitors. "Don't let anybody kid you," Sensaphonics' Santucci explains. "The risk of hearing loss is as great from personal monitors as it is from stage monitors. I measured a musician's personal-monitor level at 119 dB A, way above what is considered safe. Because the sound's source is directly

Here's what one of H.E.A.R.'s Web pages looks like. You can access information on the various types of hearing protection, what famous musicians use when performing, and which audiologists are located in your area.

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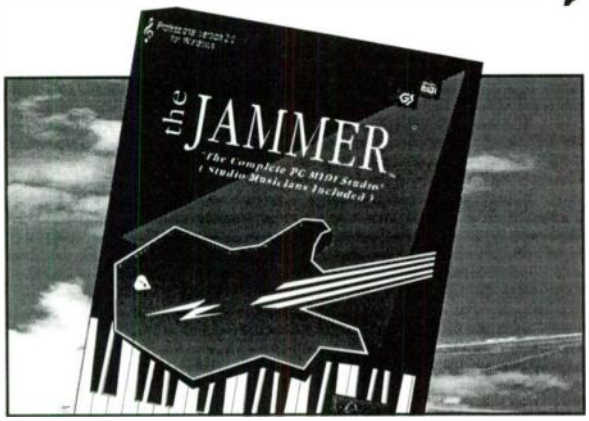

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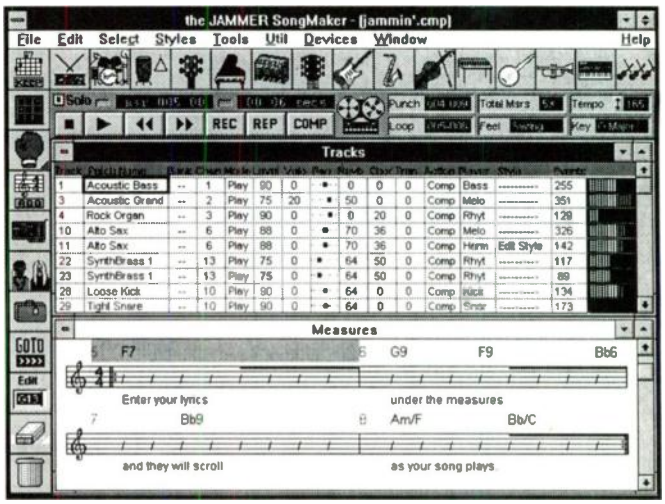

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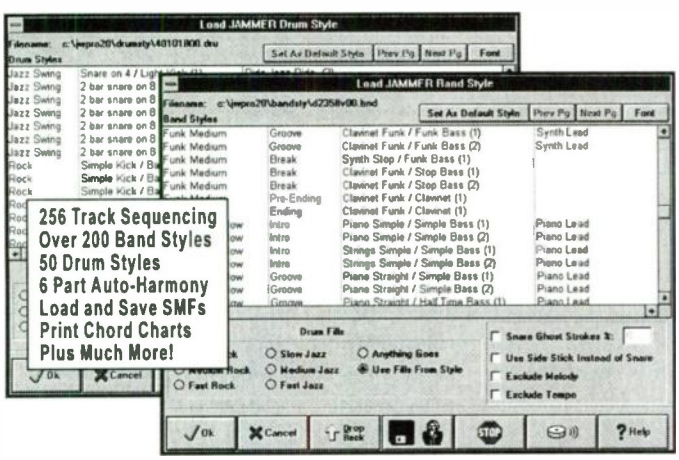

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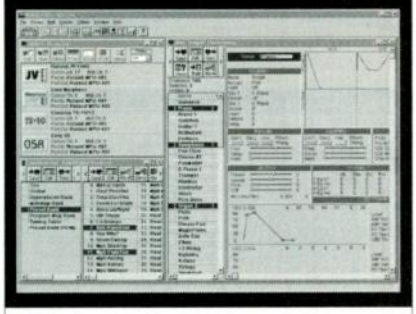

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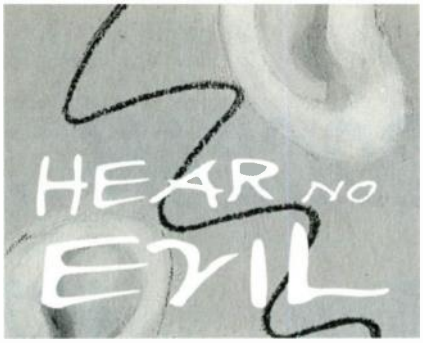

in your ear instead of coming from a wedge ten feet away, there is a definite risk of hearing damage if the personal monitor is turned up too loud."

If you are interested in getting personal monitors, ask your audiologist specific questions. How long and at what level can you use such a product before there is a risk of hearing damage? How do you measure the loudness of a personal monitor during rehearsals? Be sure your audiologist answers these questions to your satisfaction before you choose which products to use.

If you decide to use stage monitors, be careful about their loudness levels. Ozzie Ahlers, keyboardist and producer with guitarist Craig Chaquico, has a 14% noise-induced hearing loss in his left ear after 25 years of playing. Now when he's performing, he uses low levels onstage. "With Craig, we keep things at a safe volume so that we're comfortable. The house gets pumped, but it's not like a White Zombie concert. It's full and rich up front, while onstage we have a light mix. We can hear each other. When we come offstage, our ears aren't ringing anymore."

LISTEN CAREFULLY

Another thing to prepare for is recording situations in which audio accidents can happen. Feedback at high-decibel levels often occurs when someone pushes the wrong button. The House Ear Institute's Lahaie tells of one sound engineer who lost hearing in one ear as he was setting up for a show: "Feedback at a loud volume came out a speaker next to his head. He had to be picked up and carried off the stage because it was so loud."

Erskine shares the story of an accident that happened to him. He was in a recording studio ready to hit a cymbal crash. The talkback mic, which was next to the cymbal, was accidentally left on at high gain as they started to roll the tape. When he hit the cymbal, the sound blasted through his headphones and the engineers' monitors.

"I yelled out and became nauseated," says Erskine. "The engineers were reeling, as well. And I started to think how many more nerve cells in my ears were just destroyed. Now I make it a mission when I walk into a new work environment to explain that I can't risk many more of these kinds of accidents. If you aren't getting a signal, don't turn up the volume and start pushing buttons."

When you're recording, be sure to take breaks. If you're in a studio with no windows, the session can seem timeless. It's easy to end up recording for sixteen hours. "Take a 30- to 45-minute break every two to three hours," suggests Lahaie. "Don't go and play video games or put on a headset stereo. Go somewhere quiet. Ears get fatigued, so give them a rest."

You may also want to consider taking a sound-level meter to recording sessions. The meter tells you how loud the sound is when you're mixing. Refer to the OSHA guidelines, measure the dB A level you're being exposed to, and look at how long it's safe to be exposed to that level (see the table "OSHA Guidelines").

Finally, be aware of other things that may cause noise-induced hearing loss. Ted Nugent lost his hearing in one ear not just from performing loud music, but from shooting guns without hearing protection while hunting. Santucci treated members of a metal band who wore hearing protection when performing, but they didn't wear any riding motorcycles and shooting guns. It's a matter of thinking ahead to what your situation might be. If you're on an airplane or at a convention, the sound level can be unexpectedly high. If you are prepared, you'll always have protection for the unexpected.

LEND ME AN EAR

The experts emphasize the need for regular audiologist visits and hearing protection. It's foolish not to take these precautions to protect and preserve your hearing. "Go see a doctor, and find out what's going on with your hearing," recommends Lahaie. "You have to take care of your ears because you only get one pair."

"No matter what type of music you play," says Erskine, "your ears are the most vital part of your chops. It doesn't matter how good your hands are. You need to hear what you're doing."

Diane Lowery *is copy editor for* **EM**. *She hears very well, thank you.*

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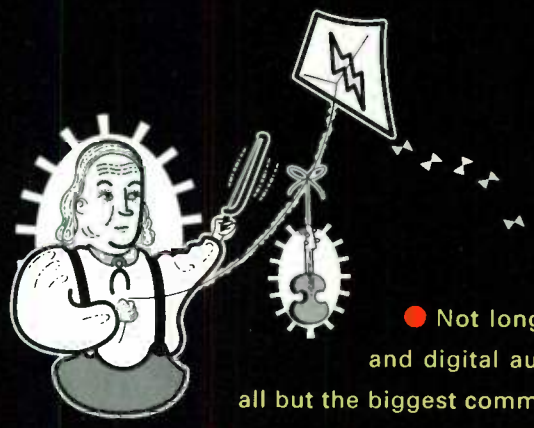


By Thor Jonsson

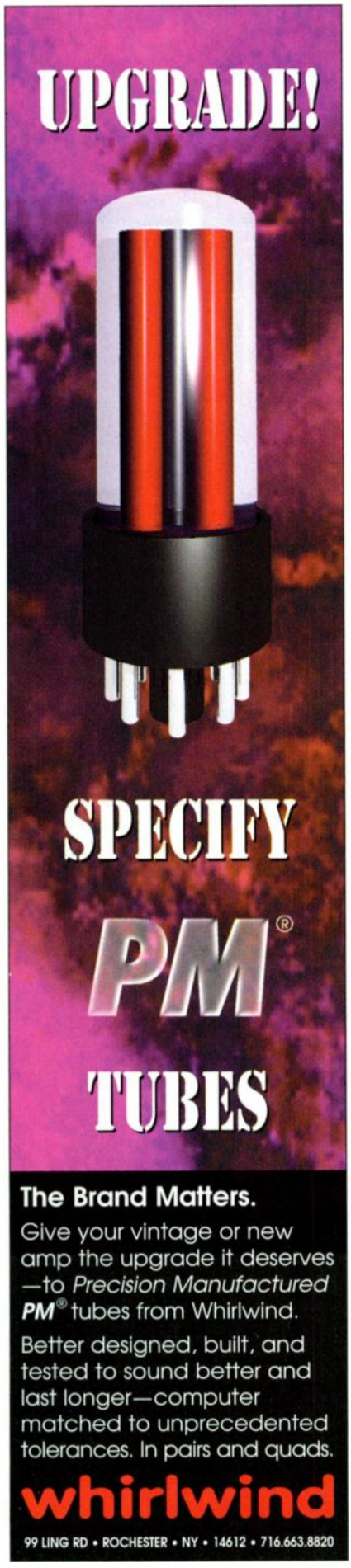
Not long ago, sequencers only recorded MIDI events, and digital audio recording was prohibitively expensive for all but the biggest commercial studios. These simple sequencers have evolved into comprehensive nerve centers for home and project studios around the world, and their capabilities have expanded tremendously to include machine control, mix automation, notation, and digital audio recording.

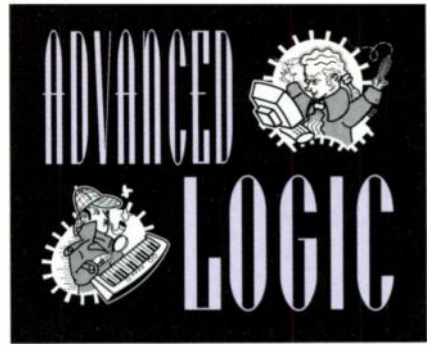
Emagic's *Logic Audio* is among the most advanced digital audio sequencers on the market. Its feature set is huge, and almost everything can be customized. Thanks to this high degree of flexibility, there are several ways to accomplish almost every task. The downside of all this power and flexibility is that it can take more time and effort to get up to speed, but we can cut through some of that with some special techniques, which apply to version 2.5.2 of the program.

I will assume you have owned the program for at least a short time and have some grasp of *Logic*'s vocabulary. Experienced users may also find it helpful to review some of these fundamentals just to make sure they got it right the first time. Hopefully, even power users will discover a few useful tools here.

Before we dig in, it's helpful to understand that all items within *Logic Audio*—MIDI devices, ports, inputs and outputs, faders, processing modules, etc.—are generally referred to as Objects. In some menus, Objects can be Audio Regions, sequences, or even individual events. In addition, the main menu bar across the top of the screen is supplemented with menus in each window that apply only to that window.

ILLUSTRATIONS BY JACK MORTENSBAK





SCREENSETS

As with most sequencer programs, you can arrange windows on the screen in any configuration. But *Logic Audio* lets you save up to 99 of these window configurations, which are called Screensets. Each Screenset can include multiple copies of the same editor window (see **Fig. 1**), each with completely different parameters (zoom levels, view filters, etc.). Screensets are easily recalled by pressing the number keys on the computer's keyboard. This saves you from constantly opening, closing, and sizing editor windows and allows you to create configurations for a given operation.

For example, say you wanted to quickly adjust the lengths and positions of a few notes in a given track. You can create a custom Screenset that contains a combination of an Event List and a Matrix (piano roll) window. You can even adjust these windows.

Screensets are saved automatically when you change the window configuration. However, they can also be locked with a user-defined key command. This allows you to temporarily open an edit window in that Screenset without worrying about the change becoming permanent.

MISSING LINK

All windows include a Link icon (which looks like a chain) in the upper left corner (see **Fig. 1**). This icon determines whether and how one window's view will be affected by the track and sequence selections you make in other windows.

To illustrate the need for this feature, let's consider this situation: Normally, when you highlight a sequence in the Arrange window and open an Event List editor, you see the MIDI data of that sequence. But what if you then selected another sequence object in the Arrange window? Would you want the contents of the open Event List to change? Link modes give you that choice.

There are three options: Link mode (pink icon), Show Contents mode (blue icon), or Off (gray icon). Clicking on the Link icon toggles between Off and the normal Link mode; double-clicking selects the Show Contents mode.

In Show Contents mode, the Edit window always shows the contents of whichever sequence is selected. The Arrange window and the Event List in this example could even be in two different Screensets, and linking would still occur. This is the most common link state for an Edit window.

With the Event List set to Link Mode, you can see the positions, lengths, and track location of the actual sequence Objects (sequences) in the Arrange window, rather than the data the sequences contain. This arrangement allows you to fine-tune the position and lengths of MIDI sequences or Audio Regions. For example, in **Figure 1**, note how the sequence Fill-2 starts one tick after Fill-1 ends. Double-click on one of the sequences in the Event List to reveal the data inside. To get back out,

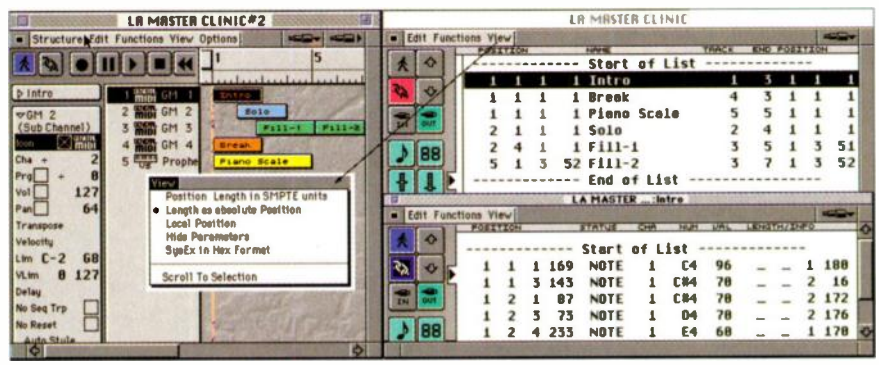


FIG. 1: In this Screenset, two versions of the same Event List editor are open (right). The upper editor uses Link mode (pink link) and includes the list of sequences in all tracks, which are graphically depicted in the Arrange window to the left. The lower editor uses Show Contents mode (blue link) and includes the list of MIDI events in the tracks.

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- **A total of three preset voice banks**, plus hot new techno, dance and other voices which add unprecedented sonic dimension and musical range.
- **Cue Play**, which lets you trigger-start a song or sequence phrase from a specified measure simply by pressing a Track button. Assigning a different phrase for each of the 16 Track buttons lets you cue up the right groove or music "hit" at the right time.
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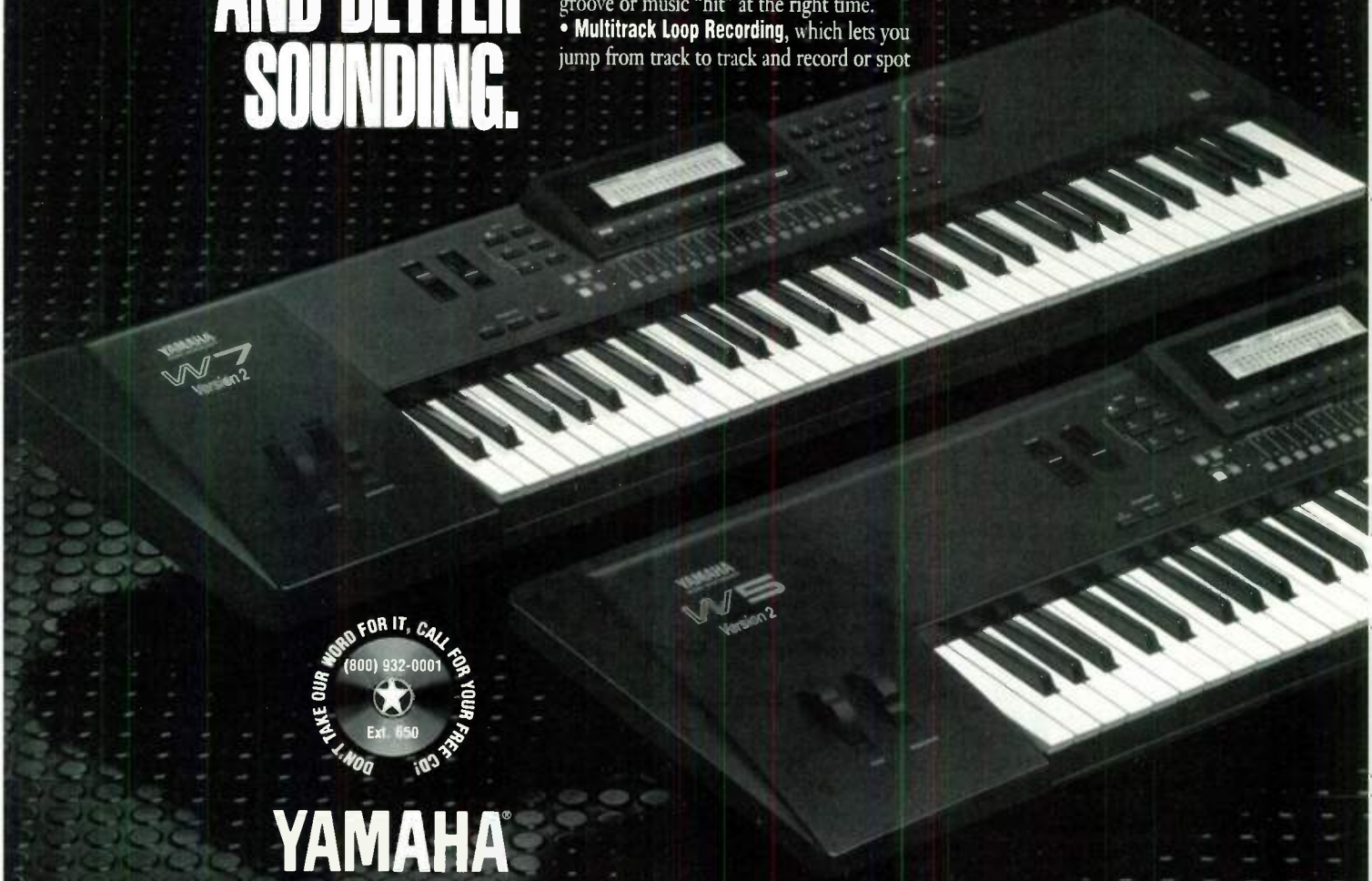

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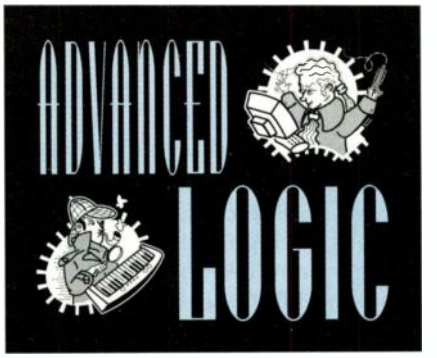

set the Operations to Fix/Control, Fix/1, Thru, Thru. The "to" line should read "Apply Operation and Let non-matching Events pass thru."

You can also process the MIDI data after it has been recorded. This is accomplished by patching the Instrument through a processing Object in the Environment (see **Fig. 5**). In this case, the processing Object is an Arpeggiator. You cannot use Direct Assignment here because the Arpeggiator is inserted between the JV-1080 synthesizer and the modem port.

Create an Arpeggiator from the New menu, and drag a cable from the synthesizer to the Arpeggiator. You might also see a dialog box that asks you, "Cable and Channel Port is set! Do you want to remove the channel's port setting?" Click on Remove; you want to remove the Direct Cabling assignment in the OPB and use Regular Cabling instead. The black output triangle on the JV-1080 Instrument icon will turn from black to white when you disable Direct Assignment.

Next, connect the Arpeggiator to the modem port. (You can create as many modem-port Objects as you need from the New menu.) This way of connecting is similar to patching a guitar into a delay pedal and then into an amplifier. The disadvantage to this approach is that all channels on the JV-1080 get arpeggiated, so you must bypass the Arpeggiator by recabling when you don't want to use it.

A better cabling path is shown in the lower half of **Figure 5**. Create an Instrument and call it Dummy 4 ARP. Assign it to channel 4 with no port or cable. (Line 4 in the OPB should read Cha 4.) Connect it to an Arpeggiator and then to the JV-1080. The Dummy 4 ARP Instrument will show up in your Instrument List. Choose the Dummy Instrument when you want to arpeggiate channel 4 on the JV-1080. You should also have a nonarpeggiated channel 4 in your Instrument List.

The Arpeggiator only functions while *Logic Audio* is playing. Try creating more dummy Instruments, and insert a Transformer before the Arpeggiator. If you want to record the Arpeggiator, as opposed to just using it as a playback effect, insert it between the Physical Input and Sequencer Input, and record.

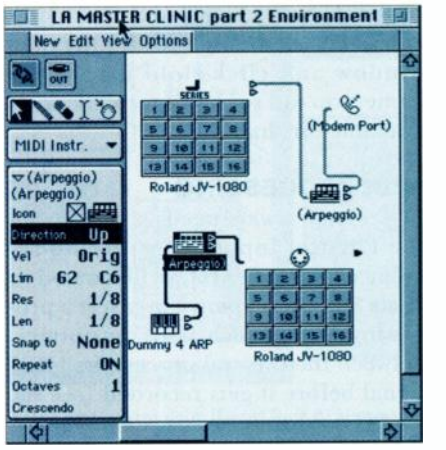

FIG. 5: A processing Object, such as an Arpeggiator, can be inserted between the Instrument and its MIDI port to affect MIDI data as it's played back. Creating a Dummy Instrument that runs through an Arpeggiator to the actual Instrument is more effective.

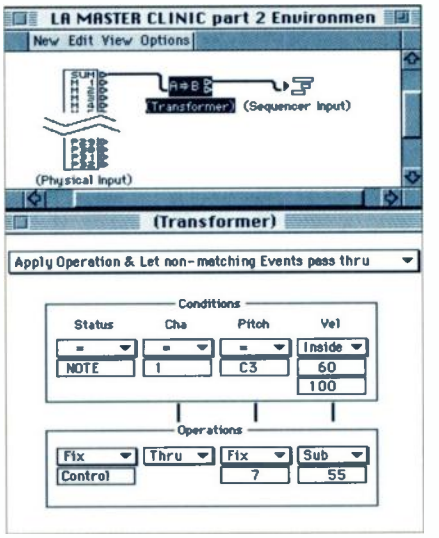

FIG. 4: A processing Object, such as a Transformer, can be inserted between the Physical Input and the Sequencer Input to alter MIDI information before recording (top). The Transformer dialog window (bottom) specifies how the data is processed.

FADERS AND AUTOMATION

Many sequencers offer software faders, and *Logic Audio* is no exception. This is another function of the Environment window. An important concept to remember when working with faders is

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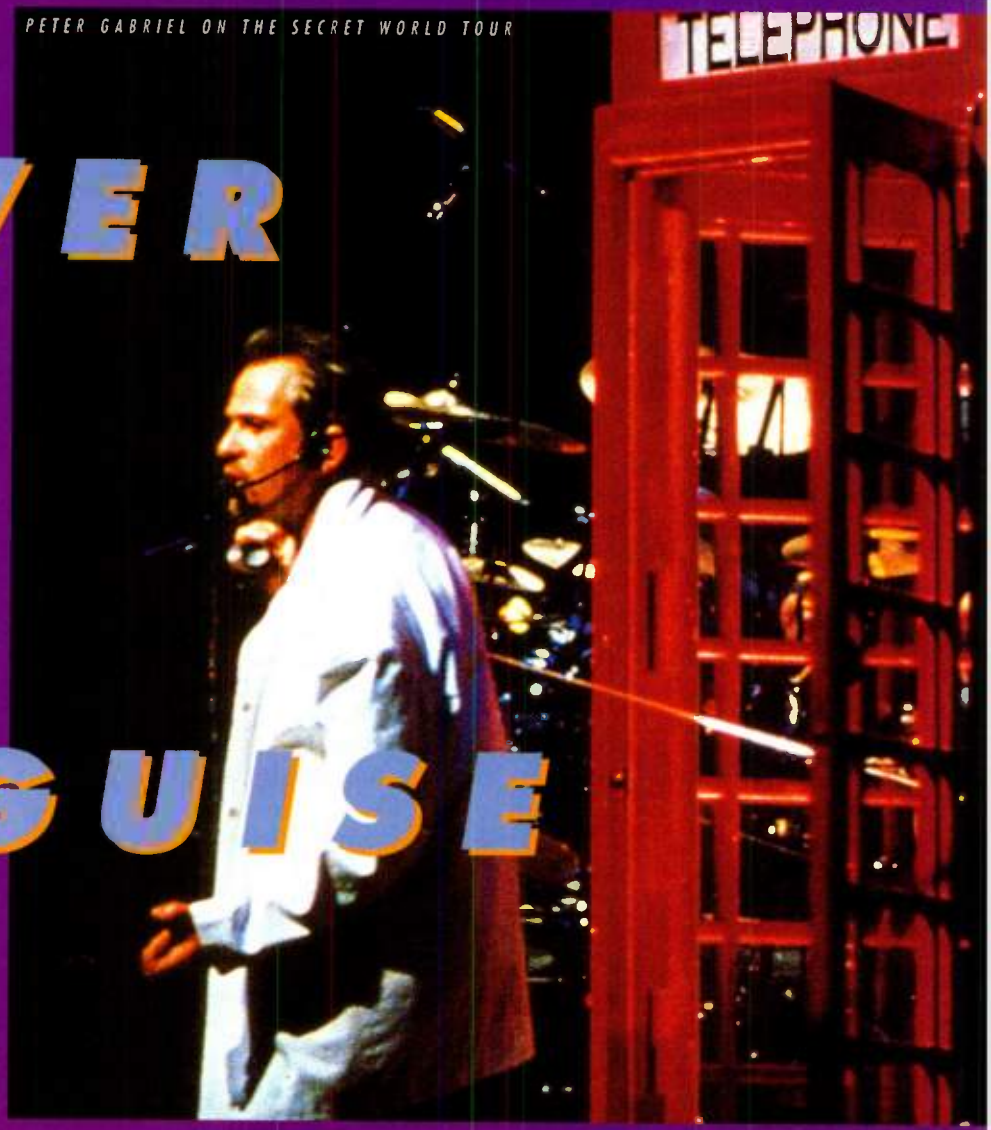

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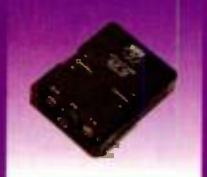
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that they must be cabled to a destination; there is no Direct Port Assignment option.

Typically, you would create sixteen volume faders for each port on your system. We can illustrate this with a simple set of sixteen volume faders to control a Korg 01/W synth (see **Fig. 6**). Let's assume the 01/W is connected to the first cable of a MIDI Time Piece that is hooked up to the modem port. Start by creating a set of faders from the New menu of the Environment window. In the IPB, configure each fader to send and receive Control Change 7, and set each fader to its own MIDI channel. Then cable the faders together serially.

Now you need to route the faders to a destination. Create a Modem Port Object, and assign it to MTP 1 in the IPB. Cable the last fader of the series to this Object. Alternatively, you could cable the last fader to an Instrument that has a Direct Port Assignment, such as the Multi-Instrument we created in the previous exercise.

The final step is to create an Instrument at the "front end" of this series of faders. We'll name this Instrument 01/W Automation. If you wish, you can change its icon in the IPB to the Mixer icon. Cable this Instrument to the first fader in your set, and assign it to a track in the Arrange window. You can record Volume fader automation on this track simply by pressing Record and moving the faders.

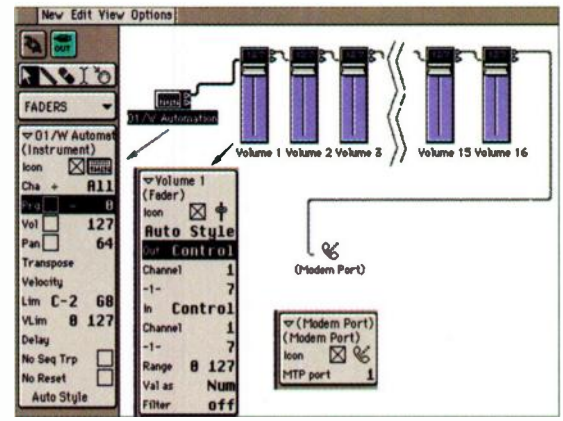

FIG. 6: This 01/W Automation Instrument feeds MIDI information through sixteen channels of Volume faders to automate the user's moves. The faders are connected to the modem port, cable 1. Note the OPB settings for all the Objects.

Assign this 01/W Automation Instrument to Cha ÷ All in its IPB. Pull down on the default setting of M0 in the Cha field of the IPB until you see a "divided by" symbol (÷). We want this Instrument to play back all MIDI channels so it can "animate" all the faders that are attached to it. The MIDI signal flows from the 01/W Automation, through the faders (each responds to its own channel), and out to the modem port, cable 1.

You can accomplish the same thing by hooking the faders directly to the Korg 01/W Multi-Instrument. To do this, chain all the faders, connect the 01/W output to the first fader, and connect the last fader's output to the 01/W input. The automation information will be recorded on several different tracks along with the regular MIDI information, and the faders will respond to the Volume setting in the IPB.

Logic Audio does not have a dedicated feature for storing and recalling snapshots of your fader positions, but there is an easy way to perform the same function. Select Key Commands from the Window menu, and assign "Send Selected Fader Values" (in the Environment Section of the Key Commands window) to a key on the computer keyboard (e.g., "g"). Click on the Learn Button, and hit the assigned ("g") key. Click the Learn Button again to protect your key commands from being changed inadvertently, and close the Key Commands window.

Go to the desired song position, and select all the faders you want to include in the snapshot. (Remember, you don't have to see the Arrange window as long as the correct track is highlighted.) Press the Record Toggle key. (This is usually the space bar, but it can be customized. Look in Key Commands window if you're not sure which key it is.) I call this Pause Record because you can

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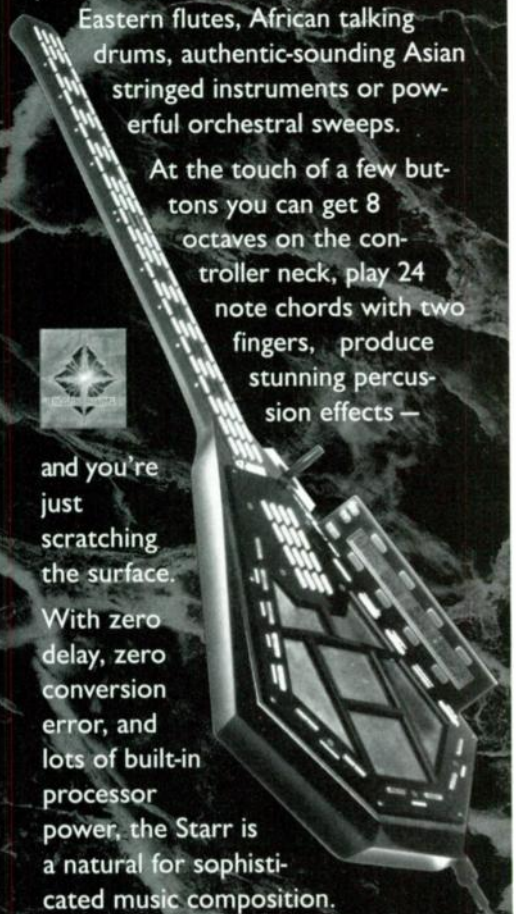

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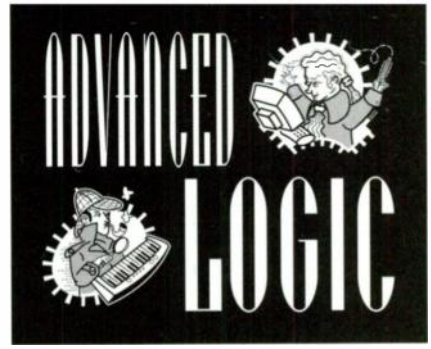

record while paused. Press the "g" key and then the Return key. *Logic Audio* will create a small sequence with the snapshot information, and the program will play this sequence back at that place in the song.

If you use this technique, be sure to include a snapshot at the beginning of the song. In addition, make sure the Chase Events dialog box (opened from the Song Settings submenu within the File menu) has at least boxes 1, 2, 3, 4, and 6 checked. That way, if you jump around in the song, *Logic Audio* makes sure the controllers jump with you.

If you want to take a snapshot of just one fader, you don't need the "Send Selected Fader Values" key command. Find the desired song position, hit Record Toggle, and move the fader. *Logic Audio* records only the final fader position before you exit Record mode, not all the steps while you moved it.

AUDIO REGIONS

Every time you press Record in an audio track, *Logic Audio* creates a new audio file. Only newly recorded audio files can be permanently deleted by deleting the associated Region from the Arrange window. (*Logic Audio* issues a warning when you do this.) When older Audio Regions are deleted from the Arrange window, they are still listed in the Audio window. As a result, after a session, you can have quite a few unwanted Audio Regions, or even whole audio files, cluttering up the song, not to mention your hard drive. Eventually, you will want to delete all unused Regions and audio files. You also should delete the unused portions of your audio files, which *Logic* refers to as Optimizing.

When you are sure all the Audio Regions you want to keep are in one of the audio tracks, open an Audio window and choose the Select Unused items in the Edit menu. This highlights all unused Audio Regions and audio files. Select Delete Files from the Edit menu to delete all selected audio files and their associated Regions from your hard drive. It is important that you choose Delete Files from the menu and do not simply press Delete on your computer keyboard. Doing the latter simply deletes the files and Regions from the song and not from the hard drive. To Optimize the remaining audio files, first press Command-A to select them, and then select Optimize File from the Audio window's File menu.

CUSTOMIZING YOUR SYSTEM

With all these customization options, you will want to save everything for later recall. The best way to do this is to make your changes and save them as a Song file named Autoload. When this file is stored in the same folder as the *Logic Audio* program, it will load automatically every time you start the program. If you update your Environment regularly and save it in your Autoload file, you can use the Import Environment item in the Environment window's Options menu to update all your other songs.

▼

Each Screenset can include multiple copies of the same editor window.

One important item not stored in the Autoload file is your set of key commands. This is stored in the Preferences file in your System folder, so if you want to keep a backup version of your key commands, save a copy of your *Logic Audio* Preferences file. That way, if your Preferences file gets corrupted or you lose it when changing Systems, you can use the Import Key Commands option in the Key Commands window to recall your key commands.

There is much more to cover, but we're out of space. Hopefully, you now have a better grasp of *Logic Audio*. This will help you create music faster and better when you hit those moments of inspiration. Isn't that what it's all about?

Thor Jonsson *is a freelance composer/producer in New York City who has trained more than 100 people to use* Logic Audio. *His e-mail address is thorthor@aol.com.* *Special thanks to Robert Hunt of Emagic.*

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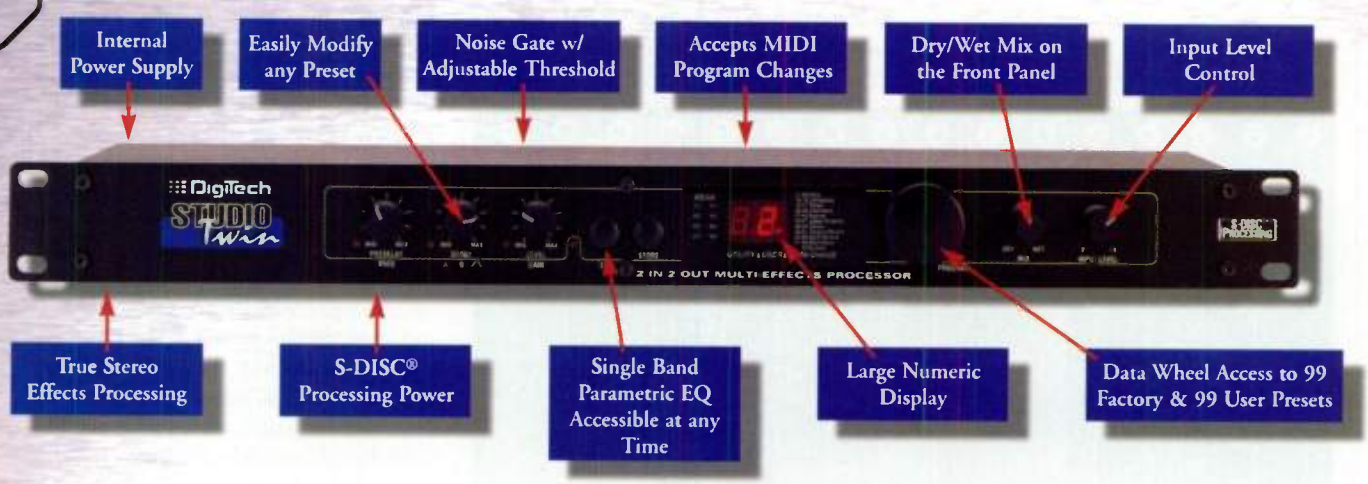

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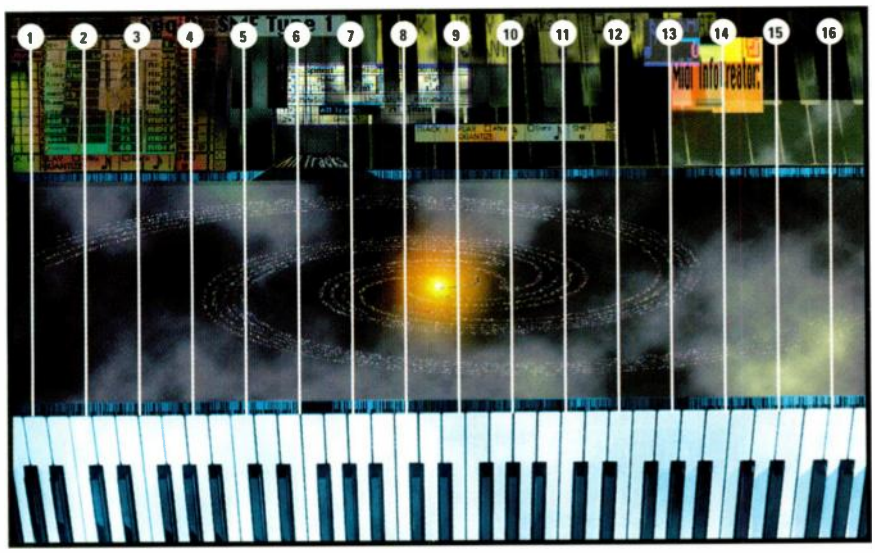
Genesis of a Standard

Standard MIDI Files allow musicians to share sequences.

By Scott Wilkinson

In the beginning, there was MIDI, and musicians saw it was good. And MIDI begat sequencing, which let musicians record their music into computers and easily manipulate it as they could never do with audio recordings. But there was a serpent in this high-tech garden: file incompatibility. The files that one musician created with a particular sequencer could not be shared with other musicians who used different sequencers, which was not good.

Then, out of the darkness, came a solution: Standard MIDI Files (SMFs). If a sequence is saved as an SMF, it can be opened by any sequencer that supports this standard file format, which is very good. This means musicians can share sequences, even if they use different sequencers on different computers. One musician might record the basic rhythm tracks into a Macintosh sequencer and send the file to a collaborator, who then records the lead lines and solos on a Windows machine.



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An SMF represents one or more sequences, which can include multiple channels of MIDI data on one or more tracks. The sequence data is divided into sections called *chunks*. The first chunk is called the *header*, which includes information about the entire file, such as the file's *format* (more in a moment), the number of tracks, and the rhythmic resolution (which is also called the *division*) in pulses per quarter note (ppqn) or SMPTE frame rate and pulses per frame.

Following the header are *track chunks*, which represent the sequence tracks and contain the actual MIDI data and other information. Track chunks can include three kinds of events: MIDI Channel messages (such as Note On, Pitch Bend, and Sustain Pedal), SysEx events (which can be of virtually any length), and *meta-events* (which are non-MIDI events; discussed shortly).

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Small Room	Phaser-DDL	Dynamic Tube Amp	De-esser	EQ-Tremolo-DDL
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NonLinear Reverb 1	Tunable Speaker 2	Guitar Tuner 2U	Vocoder 2U	ADSR Envelope Generator
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NonLinear Reverb 3	EQ-Gate	Fast Pitch Shift	Plate-Chorus	Distortion-Roto-Reverb
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previous event. This value ensures that each event is sent at the proper moment. Delta-time is expressed in pulses as specified in the header's division parameter.

All chunks begin with a type and length parameter. The type parameter specifies whether it's a header or track chunk, and the length parameter specifies the number of bytes in the chunk. The maximum length for each chunk is over 268 MB, which is larger than most sequences ever get.

FORMATS

All SMFs conform to one of three formats: Type 0, 1, or 2. Type 0 files contain a single track, which can include data on multiple MIDI channels (see **Fig. 1**). This is the most easily interchangeable format; it is often used with simple MIDI-file players, such as the Yamaha MDF2.

Type 1 files contain one or more tracks that are played simultaneously. Unlike Type 0 files, each track includes data on only one MIDI channel (see **Fig. 1**). This is the most common format for multitrack sequencers. In fact, most such sequencers can save and open Type 0 and 1 SMFs. If you save a multitrack sequence as Type 0, all tracks are merged into one multichannel track.

Type 2 files contain one or more tracks that are played sequentially, one after the other. This is useful for sequencers that chain several independent patterns together into an entire song, which is similar to the way many drum machines operate. However, this format is rarely used; a few sequencers can read Type 2 files, but I know of none that save sequences in this format.

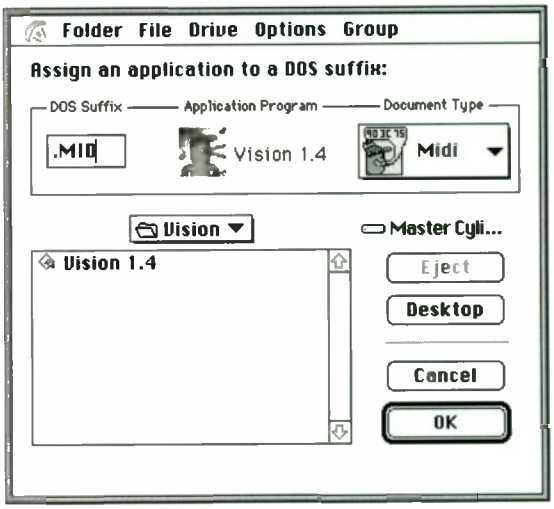

FIG. 2: The PC Exchange control panel's Add dialog box lets you specify the Mac application that will open a PC SMF and the type of document it will be, which correspond to the Creator and File Type parameters, respectively.

META-EVENTS

SMFs can include non-MIDI events, which are called *meta-events*. Like chunks, meta-events start with a type and length designator, followed by the actual data. Meta-events can be up to 268 MB in length, far more than any current application requires.

The SMF specification allows up to 128 different types of meta-events, but only fifteen are currently defined. This leaves the door open for future development, which is one of MIDI's strengths. Sequencers are not required to support all types of meta-events, but they should gracefully ignore any meta-events they don't support.

Many of the defined meta-events accommodate text within the SMF. There are several specific types of text events, including Copyright Notice, Sequence/Track Name, and Instrument Name. The Marker event also allows you to insert text that identifies different sections of the music (e.g., "Verse 1," "Chorus," "Bridge"), and the Cue Point event lets you notate onscreen action that corresponds with a musical moment in a film or video score (for example, "car crashes into wall" or "door opens").

Sequence Number, which is used mainly in Type 2 SMFs to identify different patterns in a song, is another meta-event. It can also be used to distinguish between several Type 0 or 1 SMFs transmitted as a single file. As you might surmise, the End of Track event identifies the end of a track chunk, and Set Tempo specifies the tempo in microseconds per quarter note. The SMPTE Offset event specifies the SMPTE time at which a track chunk starts; in Type 1 files, it must be stored with the tempo map in the first track.

Two fundamental meta-events, Time Signature and Key Signature, are particularly critical for opening SMFs in notation programs. There is also a meta-event called Sequencer Specific. This is the "SysEx" of SMFs: it represents information specific to a particular sequencer.

Among the new meta-events being developed is the Lyric event, which represents each syllable of the lyrics with a separate event. Other new meta-events include Audio events, which represent audio data from a digital audio sequencer, and Output Port, which identified the MIDI- or audio-port destination for a track.

If you want to learn more about SMFs, you can order *The Complete MIDI 1.0 Detailed Specification* from Mix Bookshelf (tel. 800/233-9604 or 908/417-9575; fax 908/225-1562) or from the

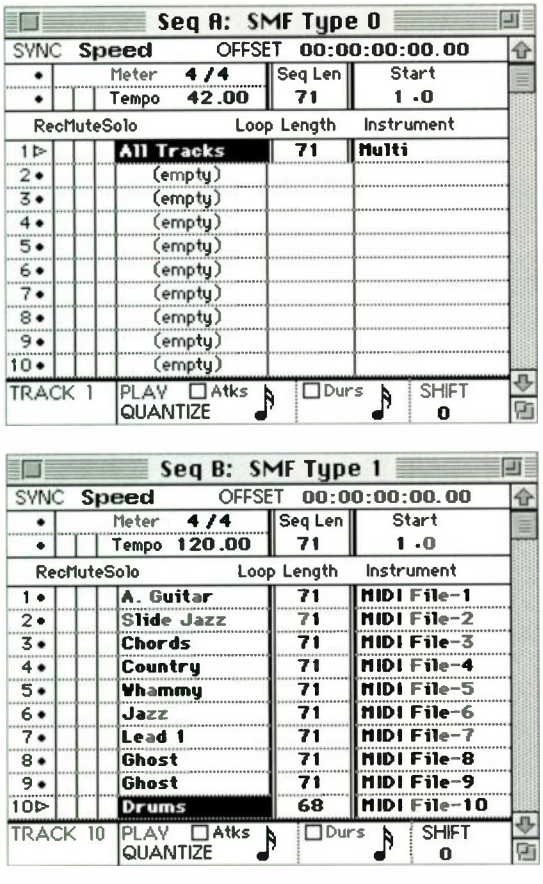

FIG. 1: Type 0 SMFs (top) include multiple channels of MIDI data in one track. In contrast, Type 1 SMFs (bottom) include multiple tracks, each with data on one MIDI channel.

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CROSS-PLATFORM TRANSFERS

The entire *raison d'être* of SMFs is to allow sequences to be shared among different programs and computer platforms. However, opening an SMF on a computer other than the type that created it is not always as easy as you might think. Most of the issues concern opening PC files on the Mac, so we'll focus on that first.

A Mac equipped a 1.44 MB (high-density) floppy-disk drive can recognize floppy disks and files from a PC by adding a system extension. If you have System 7.0 or later, for example, you can use Apple's PC Exchange Control Panel to mount PC disks and make them look and operate like Mac disks. Users of System 6.0.7 or later can use a third-party product such as Software Architects' *DOS Mounter 95* ($99.95; tel. 206/487-0122; fax 206/487-0467; e-mail sales@softarch.com), which lets you access a variety of DOS and Windows media, including removables, and offers several handy bells and whistles. Mac veterans may recall mounting PC disks or Apple II disks on the Mac using *Apple File Exchange,* but that program is outdated.

After the Mac recognizes the disk, you must change the File Type and Creator of SMFs that originated on a PC before they can be opened by a Mac program. There are several ways to accomplish this. PC Exchange can be set up to change these parameters as it copies an SMF (identified by a ".MID" extension) from a PC disk to a Mac disk. In the control panel's Add dialog box, you specify the application that will open the file (which establishes the Creator parameter) and the Document (File) Type (see **Fig. 2**).

Another commonly available utility called *ResEdit* can also be used to change the File Type and Creator of an SMF (see **Fig. 3**). It's important to open a copy of the file you wish to tweak with *ResEdit* rather than the original to avoid any possible corruption of the data. Select Get Info from the File menu. In the Get Info dialog box, you should change the File Type to "Midi" (be sure to type an upper-case *M* and lower-case *idi*).

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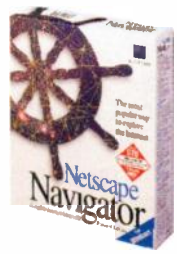

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letters. For consistency, you might specify the same Creator code used by the manufacturer of your software. For example, Mark of the Unicorn's *Performer* uses the Creator code MOUP, and Opcode uses OPCD. In *ResEdit,* open a copy of any file created by the software you want to use, and note the Creator code used by that software. Alternatively, you could use "MIDI" as a generic Creator code; just make sure it's all capital letters in this case.

A shareware utility called *Midi Typer* offers a slick way to make these changes: simply drag one or more SMF icons (or folders or even entire disks) onto the *Midi Typer* icon, and you're done. The files can now be opened with the Mac program you specify. *Midi Typer* is available on various BBSs and Internet sites, or you can e-mail the author, Peter Castine, at pcastine@prz.tuberlin.de.

Opening a Mac-created SMF on a PC is much easier, especially if the person with the Mac is considerate enough to copy the file onto a DOS-format floppy disk. If you then rename the file with a DOS-style name (up to eight characters followed by a 3-character extension), most PC programs should be able to open the file. Life will be much easier if you use a standard 3-character extension such as .MID.

To mount a Mac-format floppy disk directly on your PC, you need a third-party application. Software Architects' *Here & Now* ($99.95) essentially does for PC folks what *DOS Mounter 95* does for Mac users: it seamlessly reads Mac files on virtually any type of media. Another possibility is *MacOpener* ($49) from Data Viz (tel. 800/733-0030 or 203/268-0038; fax 203/268-4345; e-mail info@dataviz.com; Web http://www.dataviz.com).

If your transfer needs are simple, you also might want to check out shareware programs such as *Transmac,* which can be found on the World Wide Web. *Transmac* has a file-size limit of 1.4 MB, but that's more than enough to handle most SMFs.

TRANSFER ISSUES

If you want to transfer a file from one sequencer to another, you might be tempted to connect them via MIDI and simply play the file on the source machine while recording on the destination machine. However, this could possibly cause a variety of problems.

For example, if the sequence includes a tempo map, this information is not sent via MIDI in real time. If you slave the destination to the source and perform a real-time transfer, the music won't play back correctly on the destination machine, which uses its specified tempo, not the tempo map of the original sequence. If you don't synchronize the machines during the transfer, the music will play properly, but it will no longer correspond to the original bar lines. To avoid these problems, save the file as an SMF and open it on the destination machine.

In a few cases, however, transferring SMFs between platforms does not go as smoothly as expected. For example, if you save an SMF in *Sequencer Plus* on a PC and open it in *Master Tracks Pro* on a Mac, the track names disappear. In this particular case, you can open the SMF in *Performer* first, save it as an SMF, and open it with *Master Tracks Pro,* which then retains the track names. Quirks like this might require a bit of experimentation on your part.

One important issue to keep in mind is rhythmic resolution. If you record an SMF with a high resolution (e.g., 480 ppqn) and open it in a program that doesn't support resolutions that high, some events might be moved, destroying the rhythm. Most sequencers can accommodate 192 ppqn resolution, so that's a safe choice.

The issue of resolution is particularly important for Pitch Bend messages. If you record Pitch Bend messages with high resolution and then play them back with low resolution, several messages are likely to be moved to the same clock pulse. In this case, the last Pitch Bend message to be played might not be at the nominal value, which would affect the tuning of the following notes.

Another potential anomaly might appear when a sequencer tries to convert between Type 0 and Type 1 SMFs. If you load a Type 0 file (single track with multiple channels) into a multitrack sequencer that can accommodate only one channel per track, it must separate the file's channels onto separate tracks. Most sequencers can do this. One exception is the Kawai Q80EX; however, this dedicated sequencer accepts Type 1 files with no problem.

The Roland MC-50 mk II and Super MRC systems accept Type 0 or 1 SMFs, but they have only eight tracks. If the SMF includes more than eight channels, all channels between 9 and 16 are assigned to track 8, which could be confusing. Roland's MV-30 sequencer/sound module has sixteen tracks, but it only uses tracks 9 through 16 for SMFs.

Although the Roland Sound Brush is no longer manufactured, there are lots of these SMF players in the field. If you have one, keep in mind that it can play Type 0 or Type 1 files but no more than sixteen tracks; if the file includes more than sixteen tracks, it won't play. The Sound Brush also has trouble playing files that are close to this limit, so it's better to use Type 0 files with this device.

In addition, the Sound Brush and most Roland General MIDI products that include a disk drive can accommodate only double-density (720 KB)

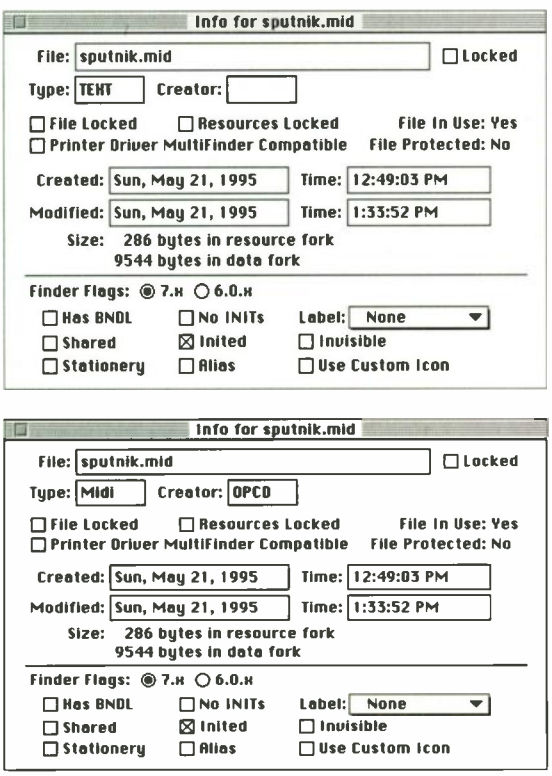

FIG. 3: If you open a PC SMF in *ResEdit* on a Mac, the File Type and Creator typically look like those in the upper window. Change these fields to look like the lower window before opening the file in a Mac program.

disks. However, the newer XP-50 and XP-80 can accept high-density (1.44 MB) disks. When in doubt, use double-density disks to store SMFs.

A NEW INDUSTRY

In addition to helping musicians share their musical files, SMFs have spawned an entirely new industry. A number of companies create complete SMFs of popular tunes, which musicians can use for rehearsal and on gigs. Any musical part in the tune can be muted, which lets you play along on the instrument of your choice. Other companies produce rhythm loops and other musical phrases in various styles. These SMFs can be used to inspire your own creative juices or enhance existing tunes.

Of course, SMFs can be used with any synthesizer or sound module, but the patches in a particular device's memory might not match the instruments intended by the creators of the sequence. For this reason, most commercial SMFs are designed for General MIDI sound modules, in which the specific sounds in each memory location are standardized (see "Tabletop Orchestras" in the March 1995 **EM**).

▼

One important issue to keep in mind is rhythmic resolution.

Standard MIDI Files are a big boon for people who want to share their music with other electronic musicians. They also allow commercial music to be distributed in a new way. (In Japan, people buy SMFs for dedicated MIDI players that include their own multitimbral sound module. These SMFs serve the same function as CDs, except for the fact that you can reorchestrate and otherwise tweak the music.) With a little understanding, you can use SMFs to create and/or preserve your music for generations to come.

EM *Technical Editor* **Scott Wilkinson** *thanks Tom White of the MIDI Manufacturers Association, Tran Whitley of Tran Tracks, and Julian Colbeck of Keyfax Software for their help with this article.*

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RECORDING MUSICIAN

Patch-Bay Profiles

Configure your studio's ins and outs for blissfully easy access.

By Brian Knave

You can warn a child not to touch a hot stove, but until the kid chars a finger or two, the concept of getting burned usually remains just that—a concept. For some of us, the same principle applies to audio concepts. Until we've seen—or better yet, *made*—the connections ourselves, textbook how-to's often go in one ear and out the other. That's why, when I set out to expand and reconfigure my patch bay recently, I first investigated the ins and outs of a few up-and-running patch bays to get some ideas. What I learned proved useful enough to share in this month's column. So whether you're setting up a patch bay for the first time or you're feeling the need to reconfigure your old one, perhaps the following profiles of patch bays will give you an idea or two, as well.

The Switchcraft TTP96 patch bay, which is rack-mountable and uses Tiny Telephone jacks, is ideal for home studios with space limitations. It features extra wide labeling strips and a tie bar in back that takes the weight of the cables off the jacks.

DOCK OF THE PATCH BAY

The purpose of a patch bay is to ergonomically simplify a studio so that all (or most) audio connections can be accessed and rerouted from a single easy-to-reach location. Ideally, once the patch bay is configured, you no longer have to crawl behind racks of gear to hook up a desired signal processor or preamp. The ability to make quick, easy connections reduces frustrating "find the hidden patch cord" assaults on your creative flow and can even inspire experimentation. (Want to see what it sounds like when you brutally compress the flanged reverb you've assigned to an effects return?) Furthermore, by providing extra points of entry into the signal path, a patch bay extends the functionality of your mixer and other gear.

Because every studio is different, there is no "correct" way to configure a patch bay. Instead, you set up the bay to accommodate the equipment you have and the way you like to work. Certain connections are pretty standard, such as the mixer's main stereo outputs being normaled to a 2-track recorder's inputs, but variations on the basic theme are endless. (For a detailed

OK, so you saved up your pennies and managed to get that Modular Digital Multitrack machine that you've had your eye one for what seems like forever. You eked out enough cash for a super-cool 8-bus console to feed your new deck, and if you were smart you even got an A R T MDM-8L Eight-Channel Limiter to keep the danger of digital clipping a non-issue. But after tracking your current opus, you can't help but think that there's something missing when listening back to your digitally-pristine new tracks. No smooth tape compression. No subtle coloration or mild distortion that accustomed to hearing. No warm fuzzies. And you wonder...

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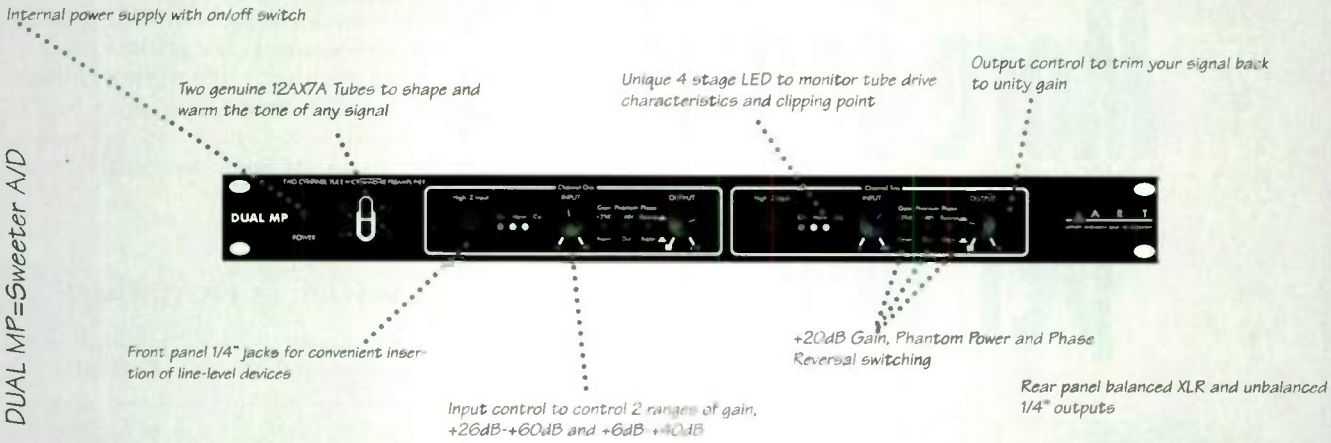

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explanation of normaling and an overview of patch bays in general, refer to Scott Wilkinson's "Square One: Patch Me Through" in the September 1995 issue of **EM**.)

There are a number of things to consider when setting up a patch bay: the type of instruments you record, the way your studio is laid out, your goals and techniques as a recordist, and how many audio inputs and outputs need to be addressed. Let's explore some signal-routing possibilities by looking at patch bays from three studios.

STORY OF O

Steve Oppenheimer (better known as Steve O.), senior editor at **EM**, is a keyboardist whose 8-track home studio is about as jam-packed as they come. Steve uses three 48-point patch bays to manage his gear, two of which we'll examine up close. The third is fixed in the back of a portable rig and was primarily developed for gigs and sessions at outside studios. (For a close-up on road-ready racks and patch bays, see "Racking Your Brain" in the November 1994 issue of **EM**.)

Oppenheimer's studio, a one-room operation with just enough space for the engineer and a guest artist, is typically used for sequencing and vocal recording. Synths, samplers, and drum machines dominate the productions. As an added requirement, Oppenheimer also needs to patch in new gear on the fly to accommodate his never-ending flow of **EM** equipment reviews.

Like many home studios, Oppenheimer's revolves around a Mackie CR-1604 compact mixer (rack-mounted with a Rotopod adapter so that the jackfield is situated just below the patch bays) and an Alesis ADAT. This is a powerful and proven duo, but as 1604 owners know, the match is not *exactly* made in recording heaven. For example, although versatile for its size, the 1604 doesn't have true subgroups or direct outs. You can obtain direct outs from a 1604 by plugging halfway in to the channel inserts, but a better solution is to "break out" the insert points onto a patch bay. Breaking out

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WHAT IS NORMAL?

Confused about normaled and half-normaled patch connections? Here's a minitutorial. A *normaled* patch connection passes any signal appearing at one rear jack directly to another one. For example, if your DAT recorder was normaled to your console's stereo bus, the stereo mix would automatically be routed to the mixdown deck. No patch connections need to be made. However, if you do patch into a normaled jack, you break the normal connection, and the signal will now be sent wherever you decide to route it.

A *half-normaled* connection lets you break the normal and have the signal go to both the normaled connection *and* whatever destination you choose to route the signal to. That is, you can split one signal and send it to two different places. (This application is commonly called *multing*.) A *denormaled* patch configuration means that no connection is made until you connect two patch points by plugging a cord into the appropriate jacks.

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the inserts is accomplished by running Y-cables to the back of the patch bay from TRS plugs inserted all the way into the channel inserts. The result is access to both the sends and returns for each channel.

As seen in **Figure 1a**, Oppenheimer has broken out the inserts for channels 3 through 8. The sends are then multed to the corresponding ADAT inputs. Note the Ys inside the patch points: that's where the mult cables are permanently inserted into the front of the patch bay. *Mult*, of course, is short for *multiple*. Because these jacks are half-normaled, the sends coming into the top rear of the patch bay go to multiple destinations: the ADAT tracks *and* the mixer's insert returns. This allows a signal to flow uninterrupted through a mixer channel from send to return so it can be monitored and still be routed to tape. For example, the signal from Synth 1 can be routed into mixer channels 3 and 4 and from there to tape via the mults.

Simultaneously, a submix from Alt 3 and 4 can be sent directly to ADAT tracks one and two. In addition, alt 3 and 4 outputs are multed to the inputs of Oppenheimer's sampler. This allows him to readily sample a layered patch constructed from any number of synths, effects processors, or tape returns. Finally, note that mixer channels 1 and 2 are *not* patched into the bay, as Oppenheimer prefers to leave those inputs dedicated for vocals and other miked instruments.

The middle section of the patch bay shown in **Figure 1a** provides access to the tape returns. This configuration not only gives Oppenheimer access to tracks 1 through 8 during mixdown (for patching in, say, a compressor), it also provides a handy place to plug into if he just wants to practice on one of his keyboards or try out some new gear.

Except for the four empty jacks on the left (which are free to accommodate new or visiting gear), the patch bay shown in **Figure 1a** is half-normaled. Most of the patch bay shown in **Figure 1b**, however, is *denormaled*. Denormaled means the normal connection from top to bottom has been broken; in other words, no signal gets through unless the two jacks are patched together. Denormaled patch points are typically employed to access effects processors and other outboard gear. Equally cool, they also allow you to connect a series of effects.

For example, with Oppenheimer's set up, you could bring a signal out of tape return 1 into FX 2, out of FX 2 into the parametric EQ, out of the EQ into FX 3, and out of FX 3 into Mackie channel 9. Obviously, such elaborate signal routing would be a hassle without a patch bay.

LIVIN' LARGE

The next patch bay we'll look at brings together the inputs and outputs of a sizable, 24-track home studio. The studio is owned by Jeff Campitelli, studio drummer and sometime rhythm guitarist for axeman extraordinaire Joe Satriani. As is common in larger studios, Campitelli's setup employs a custom TT patch bay. (TT is the abbreviation for Tiny Telephone, the professional-standard ⅛-inch jacks that make it possible for large patch-bay systems to fit into compact spaces.)

Campitelli's studio houses a Mackie 24•8, three Alesis ADATs, and numerous outboard mic preamps, signal processors, synths, and sound modules. To

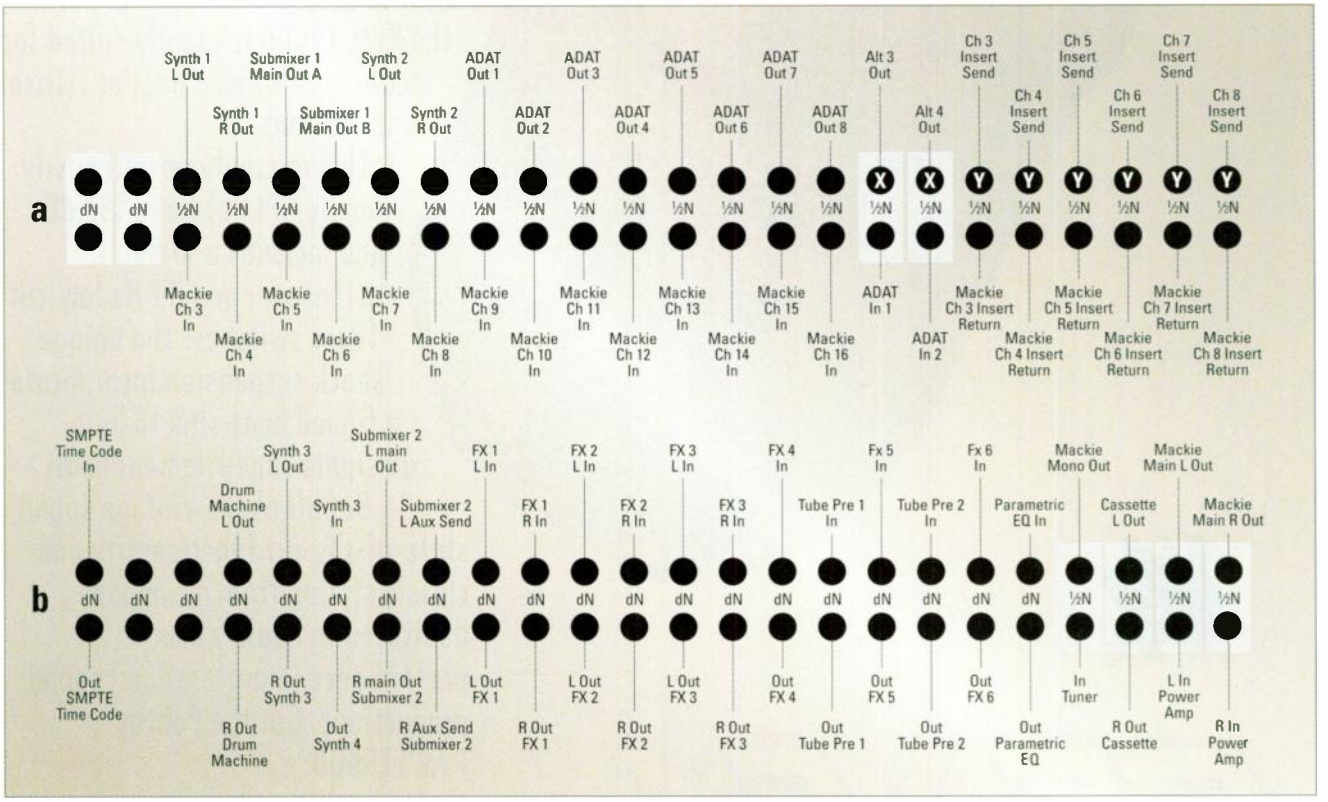

FIG. 1: EM Senior Editor Steve O.'s home studio makes use of two 48-point, ¼"-jack patch bays rack-mounted just above the jackfield of his rack-mounted Mackie CR-1604. The patch points marked with Xs and Ys (a) hold permanently inserted cables that act as mults. The X cables send Alt 3 and 4 signals to a sampler, and the Ys send mixer channels 3 through 8 to tape.

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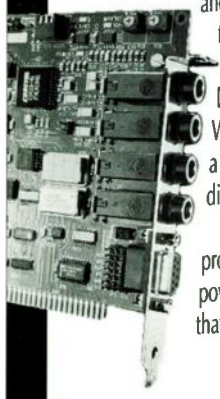

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(continued on next page)

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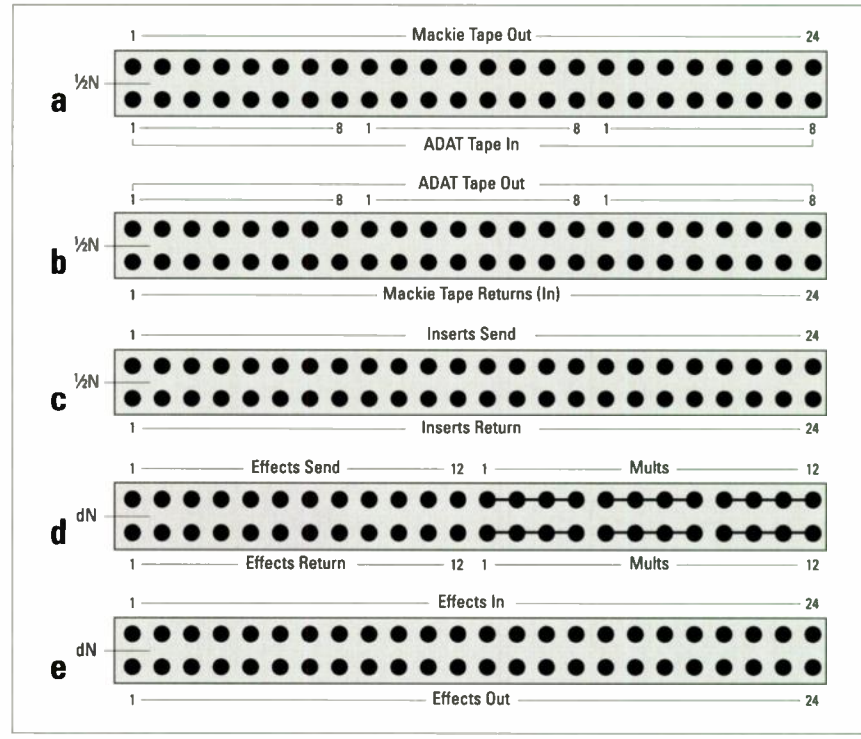

FIG. 2: Drummer Jeff Campitelli's 24-track home studio employs an extensive but relatively straightforward patch bay. Note the mult section (d). The horizontal lines identify the six groups of patch points that are multed together.

accommodate routing all these signals, the bays shown in **Figures 2a** and **2b** are half-normaled and cover every tape input and output and the corresponding channel sends and returns. The bay shown in **Figure 2c** is also half-normaled and covers insert sends and returns; the bay shown in **Figure 2d** is denormaled and is split between effects sends and returns and mults. Campitelli has configured six mults, each made up of one input and three outputs. Therefore, a

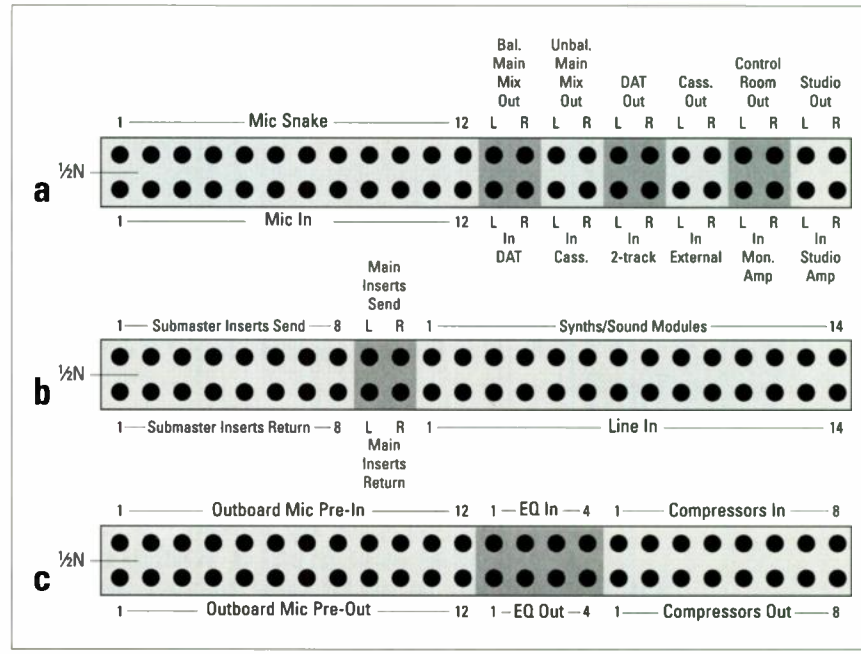

FIG. 3: The stereo output and input section shown here (a) has been configured to match the corresponding section of Campitelli's Mackie 24•8 mixer.

signal going into mult patch point 1 is output through points 2, 3, and 4. This provides considerable processing flexibility, allowing Campitelli to send, for example, a snare track to three different effects units.

Note that Campitelli's patch bay, though larger than Oppenheimer's, is actually more straightforward. In part that's because Oppenheimer uses his patch bay to get around the limitations of the CR-1604. But despite the differences, some connections are the same. Campitelli's patch bay shown in **Figure 2e**, for example, is denormaled to accommodate effects inputs and outputs—as is the case with Oppenheimer's effects setup. Campitelli's outboard mic preamps and compressors (see **Fig. 3a**) are configured the same way too, with ins and outs denormaled top to bottom.

In **Figure 3a**, we also see Campitelli's simple-yet-versatile main-mix input/output section. Balanced outputs are normaled into the DAT deck, and unbalanced outputs are normaled into a cassette deck. DAT and cassette deck outputs are normaled back into the board through the 2-track and External inputs. A final mix is automatically routed to DAT and cassette simultaneously.

The right side of the patch bay shown in **Figure 3b** connects seven synths and/or sound modules into the board's line inputs. Because the signal flow is half-normaled, it's no problem accommodating a guest musician's synthesizer: you simply plug into the bottom jacks. This breaks the half-normal and directs the new line-level signal to the board. Finally, the left side provides access to inserts for the mains and each of the eight buses (submasters). By patching all inputs and outputs into a central hub (not shown is a section covering the Mackie's 24 direct outs), Campitelli has configured a flexible patch bay that allows for easy rerouting of any signal.

DOWN THE PATCH

For a different take on patch-bay configuration, let's take a look at a section of the custom TT patch bay at Studio 684 in San Francisco, a commercial studio owned by **EM** contributor Buddy Saleman. Studio 684 is a 16-track facility centered around a Trident Model 65 16 × 8 × 2 console, a Tascam MS16 1-inch analog deck, and two ADATs. Sixteen routing switches

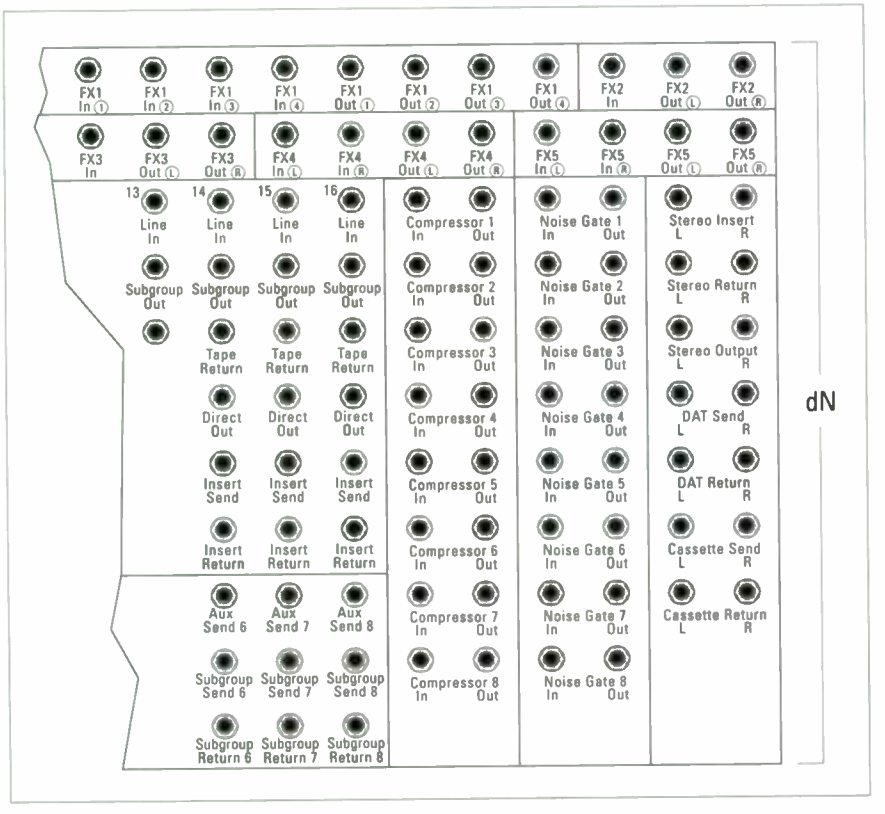

FIG. 4: On this section of the patch bay at Studio 684 in San Francisco, all patch points are denormaled. Patch cables are therefore required to connect any two points.

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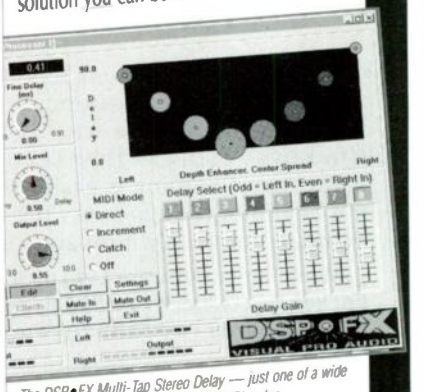

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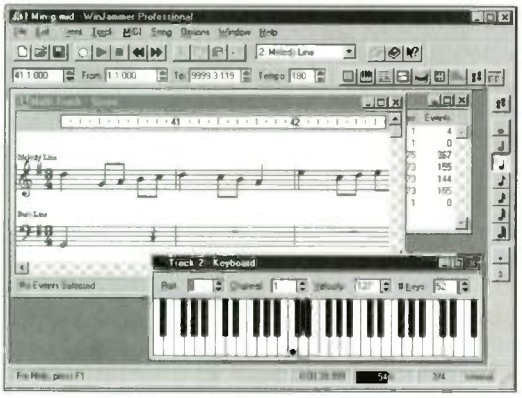

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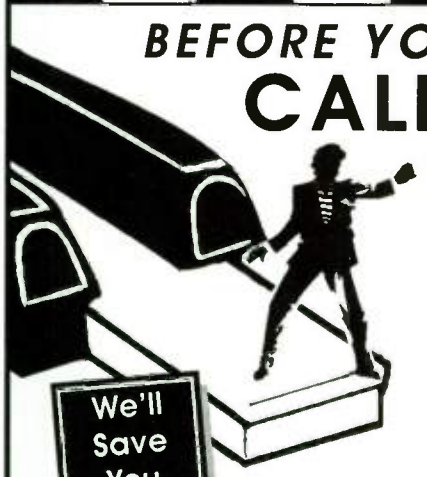

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The first thing you'll notice about Studio 684's patch bay (see **Fig. 4**) is a different layout: functions are grouped side by side as well as top to bottom. But a more important difference is that all the patch points are denormaled. The advantage of denormaling is that guest engineers are not constrained by what *you* consider normal. In other words, they can set up connections to accomodate their needs, desires, and quirks. And if they like to tote along a favorite mic preamp or pair of monitors, they can easily incorporate these into the system. That's why denormaled patch bays are more often found in large, commercial facilities—because on any given day of the week a different engineer may be at the helm.

▼

One advantage of denormaling your patch bay is that guest engineers are not constrained by what *you* consider normal.

The downside, of course, is that to mix or record in a studio with all denormaled patch points, it is first necessary to patch together all the gear you'll be using. For example, to print a final mix to DAT on Studio 684's patch bay, you first have to patch the L/R stereo outputs to the L/R DAT sends. To record a DAT mix onto a cassette tape, you have to connect the DAT returns to the cassette sends. It takes a bit more time and thought to use a denormaled patch bay; however, the slight inconvenience is offset by increased flexibility.

To get a feel for using Studio 684's patch bay, let's go through the steps of processing a vocal during mixdown. First, patch tape return 16 to line in 16 so that the vocal is returned on mixer input channel 16. (You could also choose to patch the vocal on tape

track 16 to *any* of the input channels on the mixer and effectively reconfigure all the tape tracks to a desired mix sequence on the console channel strips.) Next, turn up the gain on channel 16's aux send 1, and patch a cable from aux send 1 to FX 1, input 1. (Note that FX 1 is a quad unit with four discrete processing channels.) Now patch cables from FX 1 outputs 1 and 2 to the returns for subgroups 7 and 8. This puts the effect on subgroup fader controls 7 and 8—an excellent routing option in this case because the Trident Model 65 has 3-band EQ on its subgroups. (In other words, you can EQ the effect!)

If you want to compress the vocal a bit, simply patch from insert send 16 to compressor input 1 and from compressor output 1 to insert return 16. You could also create multiple effects by chaining the signal through two or more processors, or, for more control, by routing each effect to an individual subgroup. The possibilities are virtually endless, which is one of the reasons to use a patch bay in the first place.

PATCH 22

As we've seen, some commercial studios favor denormaled patch bays so visiting engineers can readily customize connections. But for configuring a home-studio patch bay, a more sensible approach is to determine the studio's "normal" setup. Finding this optimal arrangement may require a fair amount of trial and error, but once you've established what's normal, a patch bay that's mostly normaled (or half-normaled) allows you to "permanentize" that setup. Thereafter, you can easily deviate from the norm by inserting patch cables.

Like studios in general, most patch bays are works in progress. Therefore, keep in mind that the patch bays shown here are almost certainly not finalized, nor are they intended as recommended setups or models of patch-bay perfection. But, by examining them closely, you can see how other engineers have configured working patch bays for their studios and therefore develop some tangible plans for *your* routing needs. Hopefully, each drawing will be worth a thousand words.

While writing this piece, Assistant Editor **Brian Knave** *dreamed he was trying to patch input and output cables to his ex-fiancée.*

WORKING MUSICIAN

Taking It to the Street

Explore alternative ways of marketing your music.

By Sally Engelfried

For most bands, fifteen minutes of fame is no longer enough. Although your live show may get reviewed in a local 'zine or your music may be played on a college station, the chance of gaining lasting, national success is slim unless you gain the interest and support of a large audience. But how do you create a buzz when there are so many other bands and musicians trying to do the same thing? The answer is simple: Approach your marketing the same way you approach your music. Open your mind and get creative.

And Christ Wept is one of the bands involved in the Northwest Elektro-Industrial Coalition, an organization founded by Seattle-area industrial bands who wanted their music to be heard above the din of Northwest grunge.

PHOTO ENHANCEMENT BY DMITRY PANICH

THE POWER OF NETWORKING

With all the various factions that have split off into sub-subcategories of music, it can be difficult to feel like you're a part of any unified "scene." One solution is to create your own. That's what Seattle-based industrial bands Kill Switch . . . Klick, SMP, Journal of Trauma, and others did when they started the Northwest Elektro-Industrial Coalition (NEC).

In 1993, the media flocked to the Northwest looking for the next big thing, and it was pretty difficult for any Seattle band to generate interest unless they were flannel clad and distortion laden. Basically, if you had a keyboard, you were out of luck. Undaunted, some of the area's industrial bands pooled their resources. Chris Massey, vocalist for And Christ Wept, set up a multiband gig through a local visual-arts group that had a performance space available. The show drew about 500 people and gave NEC ammunition to approach other venues, spawning a couple of industrial-music series at local clubs. These shows, in turn, helped garner enough attention that industrial bands could be taken seriously and get gigs on their own.

NEC used a simple and basic strategy.

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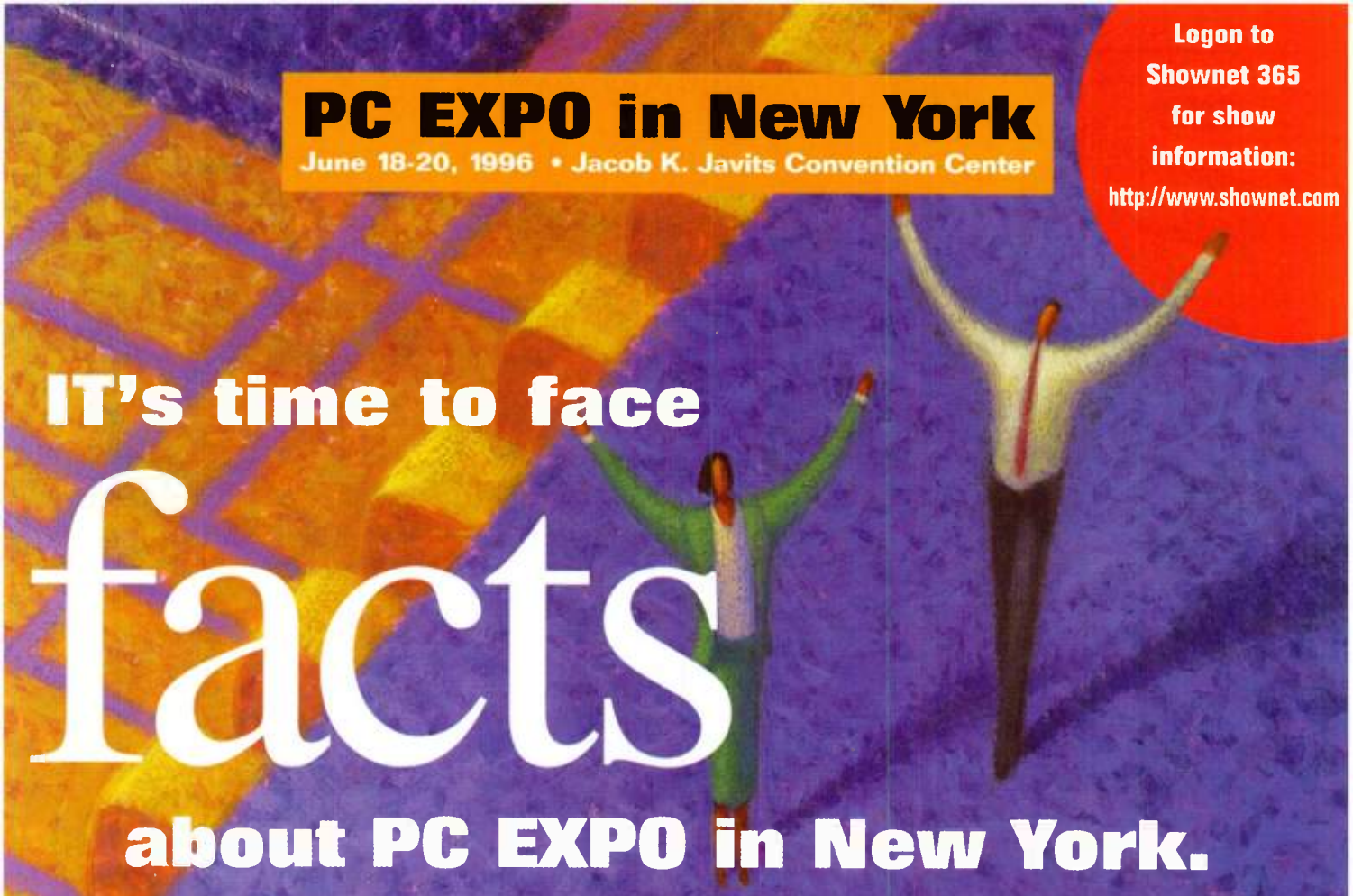

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They didn't form to help bands get record deals but rather to support one another. "It was a brotherhood thing," says Kill Switch . . . Klick's frontman, dA Sebasstian. "It was, 'Let's do this together.'"

Along with the gigs organized by NEC, bands pooled their mailing lists and created a mail-order catalog for selling their releases. The strategy worked: the industrial-music scene is now alive and kicking in Seattle clubs, and many of the original NEC members did end up getting signed.

At Derek Sivers' Web site you can download clips of Hit Me's songs or check out photos of the band. You can also learn about music-related topics such as trademarking band names.

Because the musicians who formed the coalition are now busy with their individual careers, NEC is not as active as it was at the outset. However, the group still puts out a one-page mailer of available releases, and they recently produced some compilation cassettes. And whether NEC continues or not, these bands proved that by presenting a unified front, musicians *can* make a difference to the local—and even national—scene.

But what if you feel like you're floating in a vacuum, playing difficult-to-classify music that doesn't fit into a particular scene? It's still important to keep in touch with other musicians, whether or not they play the same kind of music you do. Most musicians are willing and even eager to share their experiences and exchange ideas about marketing, and you don't necessarily have to join anything in order to benefit.

***Aftertouch* is the "catazine" from Creative Musicians Coalition that gives information on member musicians as well as advertisements for their music.**

Derek Sivers, for instance, is not part of any formal group or coalition, but in promoting his band, Hit Me, he has run the gamut of alternative marketing ploys. He generates ideas almost faster than he can talk. "I strongly encourage bands to read business books on guerrilla marketing," he recommends, "because there's a lot to be learned from those techniques, even if the author doesn't deal directly with music." Sivers has also set up a Web page for Hit Me that gives very specific, detailed information about subjects like how to trademark your band name, how to download forms for copyrighting songs, and how to make a full-time living in the college market.

Bob Baker is another musician who is a guerrilla-marketing advocate, and his book *101 Ways to Make Money in the Music Industry* (Rock Press) is a good way to familiarize yourself with some of the things that you can do on your own. As publisher of the St. Louis-based music magazine *Spotlight*, Baker comes into contact with lots of other musicians and always makes sure to pick their brains to find out how they gained success. "Consider me a clearing house of information," he laughs.

Baker voraciously reads music trades and other sources of industry news and compiles everything he learns into his

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GETTING GIGS

For those of you who are more interested in playing live, you might want to become an associate member of the National Association of Campus Activities (NACA). College gigs tend to pay quite a bit more than your average local dive club, and NACA gigs range from $750 to $4,000 a night per band. This is a great way to gain exposure and make some money while you're at it. Bands with a danceable repertoire have a good chance at getting gigs, and soloists and duos can do very well playing the college coffeehouse circuit. Don't forget that REM started out playing college gigs, so there's probably room for some of you introspective shoegazers, as well.

NACA hosts a few regional conferences and one national conference per year. These events allow representatives from colleges and universities to check out the associate members (like you) and plan their campus entertainment for the year. If you can get a showcase at one of the conferences, chances are it'll bring you lots of work.

THE PROMO PUSH

When you do get gigs, don't forget to publicize them! There are a few different ways to go about this besides just mailing out flyers (although that's definitely something you should do). If you've got gigs in New York City, Chicago, Boston, Washington, D.C., or Los Angeles, be sure to post your information on the Web to SonicNet. They will list—for free—any upcoming show in these areas and will even include a description of the music. The listings are user-updateable: you log on to the SonicNet site and input information about your band's upcoming gigs. SonicNet plans to expand their reach soon, so watch for more major cities to be added to this list.

An 800 number or band hotline is another way to promote gigs. Publish the number on your flyers, in ads, or in your monthly newsletter so people can call up to find out where you're playing. You could even let them hear a sample of your music.

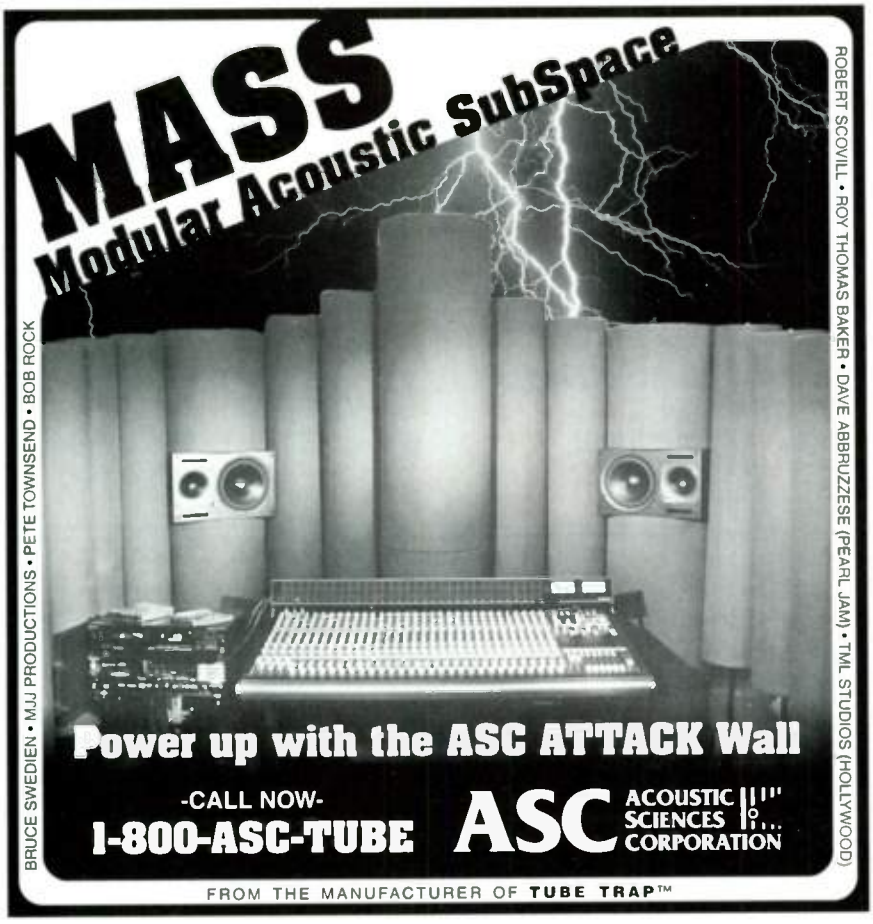
You can hire a service to set up an 800 number for you (look in the yellow pages under "Answering Bureaus"), but there are other options that might suit your needs more closely, such as Music View. Started by yet another musician wanting to help fellow musicians, this organization gives bands the ability to unite all the forms of automated-media advertising and marketing. "The idea is to empower bands," says Music View President Arturo Arredondo. "We allow people to take advantage of the technology that exists without having to do it all themselves."

Through Sonic Synopsis, one of Music View's three divisions, bands receive an 800 number that callers can use to get information about gigs or music samples. The advantage here is that Sonic Synopsis is able to offer lower rates because they get a volume discount. Subscribers also get a free

hour of calls through their Music 800 service.

Of course, it's up to the band to promote its 800 number on flyers and in print advertising, but Music View is trying to help with that as well: they are currently negotiating with the *University Reporter* to give members a quarter-page ad. The *Reporter* is a college newspaper printed in ten cities with a readership of 1.2 million students. That's a lot of exposure, especially for bands who can't afford national advertising on their own.

For artists who want to promote themselves on the information superhighway, Music View also offers the Musician's Network. If you have a page on the Web, they'll link your page to theirs; if you don't have a Web page, they'll create one for you. This is a good way to promote gigs and sell CDs, and you don't need to own a computer to take advantage of it. Of course there has be a price for all this, right? Yes, but Arredondo tries to make it reasonable: the rate is approximately a dollar a day, with the requirement that you pay for six or twelve months at a time.



MUSIC COALITIONS AND RESOURCES

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tel. (800) 882-4CMC or (309) 685-4843
fax (309) 685-4878
e-mail aimcmc@pan.com

Derek Sivers
tel. (800) 448-6369 or (718) 777-0913
e-mail derek@hitme69.com
Web http://www. panix.com/~bizy

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tel. (202) 298-8463
e-mail arturoar@ix.netcom.com

National Association of Campus Activities (NACA)
tel. (800) 845-2338 or (803) 732-6222
fax (803) 749-1047

Northwest Elektro-Industrial Coalition (NEC)
tel. (206) 233-8420
Web http://www.halcyon.com/mds/nec/index.html

SonicNet
tel. (212) 941-5912; fax (212) 343-9445
e-mail info@sonicnet.com

Spotlight Publications, Inc.
tel. (314) 781-0400; fax (314) 781-0287
e-mail bob101ways@aol.com

Another basic strategy for promoting shows is to make music journalists' jobs easy by providing them with a hook. It's not enough to tell them that your band has great songs and puts on a great show—trust me, they've heard it before. But if you give them a reason to push your show, you'd be surprised at how often they'll grab onto it. The most obvious and common hook is a CD-release party. Although not a highly original approach, it can make for a caption under a photo in the entertainment guide of your local newspaper.

But you can be even more creative. Warren Senders plays Indian classical music in the Raga Ensemble in Boston. As you can imagine, a large number of the population isn't even aware that there *is* such a thing as Indian classical music, but Senders uses that to his advantage. One aspect of this type of music is that its structures correlate with certain times of day, so the Raga Ensemble will play their midday set of music at midday or their midnight set at midnight. "The press loves that kind of stuff," Senders explains. The attendance of his shows reflects that: they had to squeeze 150 people into a tiny room at MIT for one of their recent gigs.

SELLING YOUR OWN PRODUCT

Once you release your own CD, you're on the road to being rich and famous, right? Guess again. Although putting out a CD is undoubtedly the best way to get radio airplay and press coverage, it can be difficult to actually *sell* those babies.

Of course you should always, always, *always* bring any product you have to your shows to sell to the audience. But in addition to having your CD available for sale, try giving out an inexpensive 1- or 2-song sampler to everyone who signs up on your mailing list. This is a no-risk way for people to sample your recorded music, and it will hopefully inspire them to come back to the next show and buy your CD.

Contacting record stores and independent distributors can be an arduous process, but it's something you'll have to do in order to unload those boxes of CDs that are sitting in your living room. However, don't overlook alternative ways to sell your CD. Maybe you and some friends can start up a mail-order catalog, like NEC did. Or you can look to established organizations, such the Creative Musicians Coalition (CMC).

CMC has various levels of participation, starting with an artist membership at $50 a year. That'll get you a copy of *AfterTouch New Music Discoveries* (a "catazine") and CMC's quarterly (more or less) newsletter, which is written by the members, for the members, and about the members.

Once you're a member, you can sell your music through *AfterTouch* for a $125-per-album fee, which buys you a full-page ad. CMC assigns a catalog number to your release and takes care of the entire ordering process.

"That's the beginning," says CMC founder Ron Wallace. "From there, a lot of other doors open." Those other doors include smaller catalogs that are mailed out for free to nonmembers (because of its bulk, *AfterTouch* is only mailed out to members); inclusion in CMC forums on AOL, CompuServe, and Performing Artists Network (PAN); access to their three different Web sites; and use of a toll-free telephone number.

Each of these additional marketing opportunities will cost you more money, and they're a bit pricey compared to other options. But, says Wallace, "All we want to do as an organization is recoup our costs. The more members we have, the less we need to charge. Right now we're doing a 20,000-piece mailing that artists can buy ads in for $35 to $60. Well, if we got our membership up high enough, we'd be able to offer those same ads for $10!"

Wallace is constantly exploring new ways to make CMC more effective. His latest brainstorm is a sampler CD that will be featured in issue no. 11 of *AfterTouch*. Members can purchase one minute of music on it, and the magazine will have a special section that describes each band featured.

DO IT!

The important thing for independent bands to remember is that promotion doesn't have to be complicated to be effective. However, self-marketing *is* labor intensive. You have to stay informed, keep in touch, and take action. You may not be on a major label, but you *can* make yourself heard!

Sally Engelfried *is a freelance writer and bassist in the San Francisco Bay Area band El Sob.*

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Alesis QS6

By Jim Pierson-Perry

The QuadraSynth's newest sibling offers lots of bang for the buck.

The Alesis QuadraSynth was one of the most eagerly awaited instruments of 1994. Musicians wondered how well Alesis could parlay its reputation for high-quality, low-cost, electronic-music products into a new keyboard synthesizer. The results were mixed (see the review in the July 1994 **EM**).

Fortunately, an enhanced model, the QuadraSynth Plus Piano, was introduced the following year. It included additional sample ROM and significantly improved on the original's keyboard action, operating system, and emulative sounds.

The Alesis QS6 corrects many of the problems in the original QuadraSynth and offers many expansion options including ROM and RAM cards and a bundled CD-ROM full of applications, demos, and files.

The QS6 employs the same synthesis engine as the QuadraSynth Plus Piano, but it has less onboard sample ROM (8 MB instead of 24 MB). Other differences reflect the QuadraSynth's streamlined physical features for the home and entry-level markets: a smaller keyboard, fewer knobs and connectors, a simpler display, and a built-in serial interface for PCs and Macs instead of the QuadraSynth's ADAT interface. Adding considerably to the QS6's value, Alesis bundles it with a sustain pedal and a CD-ROM full of Mac and Windows MIDI software with example patch and music files (discussed shortly).

PHYSICAL ATTRIBUTES

The 61-note keyboard responds reasonably well given its unweighted action, although a few keys on my review unit exhibited more mechanical noise than I liked. It generates Velocity, Release Velocity, and Channel Pressure (Aftertouch) messages. I was happy to see Release Velocity, especially at this price point; this message is generally underutilized as a real-time controller.

Aftertouch is easy to control, and it seems to require less finger pressure than it does on comparable synth keyboards I've played. Three global keyboard Velocity curves are provided: Weighted, Plastic, or none (keys always send maximum Velocity). Response can be further tailored with a keyboard sensitivity parameter that establishes minimum and maximum Velocities.

The front-panel controls are logically organized and easy to reach. The pitch wheel and the mod wheel are made of firm gray rubber with a wide thumb-sized indent and are quite comfortable to use. Next to these are two sliders: volume and Controller A, a real-time modulation source used by many of the preset Programs. It also provides fast data entry when editing.

The volume slider works smoothly over its entire range; this is better than the original QuadraSynth's volume wheel, which dropped out near the low end. Program names, Mix names, and edit parameters are displayed in a backlit, 16-character by 2-line LCD.

Three sets of buttons complete the front panel: Edit buttons, Play buttons, and Selection buttons. The Selection buttons serve two purposes. In Play mode, they select Programs or Mixes from the current Bank; in Edit mode, they jump to a specific set of parameters (called an Edit Job). They are labeled with both Program numbers and Edit Job names for fast, intuitive operation. Sustaining notes continue to sound when a new Program is selected, correcting the original QuadraSynth's flaw of cutting off notes when the Program changes.

The back panel includes the power button and a receptacle for a lump-in-the-line power cord, a pair of ¼-inch audio outputs, one ¼-inch stereo headphone output, MIDI In and Out ports, ¼-inch jacks for a sustain pedal and foot controller, a PC (formerly known as PCMCIA) card slot, and a serial interface port. There's plenty of signal in the headphone output, which is another improvement over the original QuadraSynth. There is no MIDI Thru port, but you can toggle the Out port to act as an Out or Thru, which should be fine for most setups.

The QS6 continues the popular trend of providing a serial port for direct connection to a Macintosh or PC. I connected it to my Mac IIci with an 8-pin DIN cable and had no problems running the bundled software or other standard MIDI applications. The direct interface also worked fine under Opcode's OMS 2.0.2 and Apple's MIDI Manager.

Unfortunately, the QS6 manual comes up short. It looks like an incompletely edited QuadraSynth Plus Piano manual. There are references to nonexistent Aux Output audio connections and many incorrect page-number references. Other problems include a lack of any SysEx information, an inadequate index, incomplete info on connecting the synth to a computer, and sporadic grammatical errors. These faults are especially annoying because QS6 users are likely to be relative novices, those who need accurate information the most.

▼

The effects are much more sophisticated than on most comparable synths.

PROGRAM ARCHITECTURE

The QS6 provides 64-voice polyphony via sample-playback synthesis. Additional samples, including user samples, can be added by inserting a PC card (see sidebars "In the Cards" and "SoundBridge"). Sound quality and dynamics are further enhanced by multi-effects processing and extensive real-time modulation capabilities.

The QS6 operates in one of two modes. Program mode provides a single sound on one MIDI channel, and Mix mode offers 16-part multitimbral operation. Programs and Mixes are organized in Banks, which hold 128 Programs and 100 Mixes each. The QS6 comes with four preset ROM Banks, including one that conforms to General MIDI, and one user Bank for a total of 640 Programs and 500 Mixes. An additional Bank of Programs and Mixes can be saved and accessed on a PC card.

Like the other QuadraSynth-family instruments, the QS6 uses Alesis' QS Composite Synthesis technology, a combination of additive and subtractive techniques. Each Program includes one to four independent Sounds, the fundamental synthesis unit.

A Sound consists of a sample waveform processed through a lowpass filter, amplifier, and effects processor, after which it is panned to the stereo output bus (see **Fig. 1**). You can build very expressive and dynamic Programs on the QS6 simply by combining different Sounds split and/or layered across the keyboard.

The sample ROM is the first complete project by Alesis' newly organized sound group and seems mostly geared for pop/rock and dance music. The 462 ROM samples are new, not recycled from earlier QuadraSynth models, and they include many pianos, guitars, basses, drums (full kits and individual drums), percussion instruments, synth waves, and rhythm loops. Strings, brasses, and voices get short shrift, however.

A number of sampled filter sweeps stand in good stead for the QS6's lack of a resonant filter. Interestingly, you will find several types of instruments

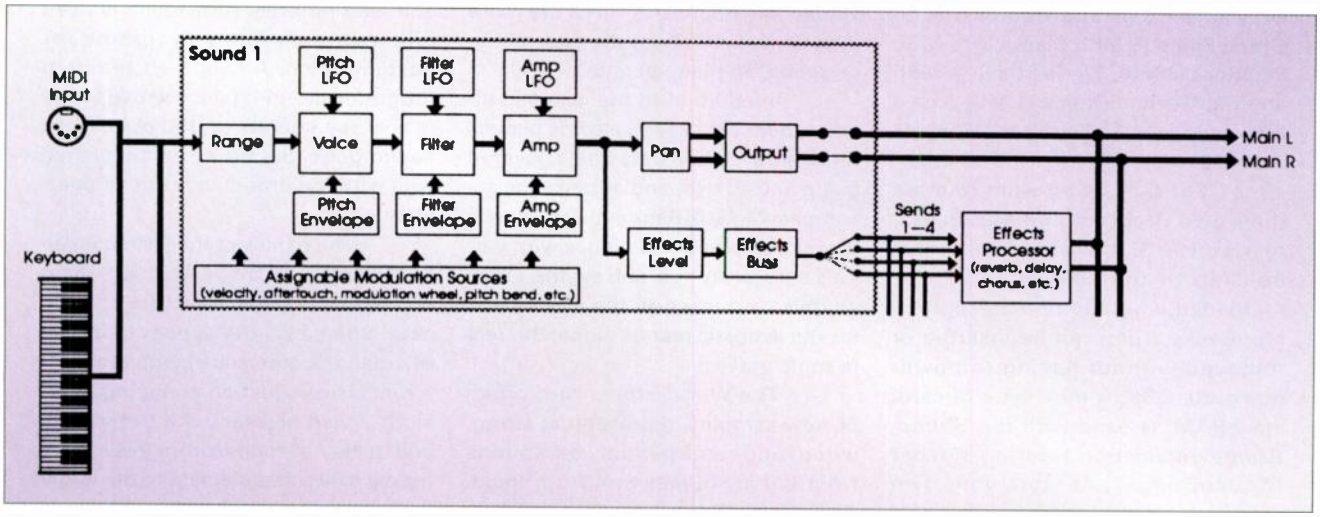

FIG. 1: Each Program consists of up to four Sounds, each with its own sample, filter, amplifier, and pan control. Many parameters can be modulated by dedicated envelopes, LFOs, and assignable real-time controllers. (Courtesy Alesis)

represented by more than one set of samples. For example, there are no fewer than five variations of the panpipe sample, each with different start and end loop points. Although some of these variations are useful, the overall number of instruments that can be represented is reduced. I would gladly give up some of the panpipes in favor of more brasses or strings.

Sounds can be split or layered in a Program by note range, Velocity, or both. The QS6 provides thirteen noneditable Velocity curves that include several groups designed to control Velocity crossfading between Sounds in a Program. For example, in a Program with two Sounds, you would apply the "1 of 2" curve to one Sound and the "2 of 2" curve to the other sound. This is a useful step up from simple Velocity switching.

Given the extensive user access and control of other synthesis parameters, the panning implementation is particularly disappointing. Only seven discrete pan positions are available, with no provision for modulation. The QS6 recognizes incoming Pan messages, but they only set the pan position for the next played note; it does not support dynamic panning while a note is held.

Drums can be handled in one of two ways. Several ROM samples provide full kits in a variety of styles premapped across the keyboard as standard synth voices. In this mode, all drum sounds are subject to the same pan, level, and other parameters.

A special Drum Mode lets you assign up to ten individual drum samples per Sound—a total of 40 drum sounds per Program—and create customized kits with control over key mapping, level, pan, tuning, filter and amp modules, and more for each drum. You can even combine normal synth Sounds with Drum Mode Sounds in the same Program for hybrid results.

EFFECTS

The original QuadraSynth maintained Effect Banks separately from the Programs that used them. This made it awkward to keep track of everything, and jumping between the two separate edit and storage modes was a pain. Happily, the two were merged in the QuadraSynth Plus, and this was carried into the QS6. Each Program has an associated Effects Patch that is stored and loaded with it. When editing a Program, a single button toggles between the Program and Effect parameters, which is intuitive and easy to manage.

Effects on the QS6 are much more sophisticated and controllable than those on most comparable synths. However, this is a two-edged sword. The effects sound great, but understanding how they work and getting the desired result is fairly complex, especially for newcomers expecting the Sound Canvas school of dialing up reverb and chorus values.

The QS6's effects processor is largely the same as that of the QuadraSynth Plus and is based on Alesis' successful QuadraVerb 2 effects processor. It offers a variety of algorithms within five multi-effects Configurations. Each

IN THE CARDS

One of the QS6's strengths is its expandability via PC cards. Several ROM expansion cards, called QuadraCards, are available from Alesis. Each one provides an additional 4 or 8 MB of new samples, along with new Programs and Mixes that use them.

QuadraCards can be used with any synthesizer or sound module in the QuadraSynth family. The currently available QuadraCards are Stereo Grand Piano (8 MB), Classical (8 MB), Pop/Rock (8 MB), World Ethnic (4 MB), and Rap/Techno/Dance (4 MB). The 4 MB cards cost $169; the 8 MB cards cost $229.

For those who want to store their own Program and Mix Banks, Alesis offers SRAM cards. These cards hold up to four Banks and come preloaded with additional Program/Mix Banks. They can be inserted or removed without having to power down the QS6. A third type of card, FlashRAM, is used with the *SoundBridge* application (see the sidebar "SoundBridge") to store your own samples.

I tried out the Stereo Piano and World Ethnic cards. The piano card provides eleven stereo pianos and few organs, basses, and analog synths. The Programs include several wonderful stereo acoustic pianos, which are much more full and less bright than the stock QS6 acoustic pianos. In addition, there are several good rock pianos, with timbres suitable for anything from "Great Balls of Fire" to "Benny the Bouncer." These are more than capable of filling the gaps in the original QS6 piano palette.

In addition to the acoustic pianos, there are several electric pianos, Rhodes emulations, clavinets, layered piano and strings, and organs. The accompanying Mix Bank consists mostly of splits and layers of pianos with various basses, strings, and synths. Overall, this card is worth the money just for the acoustic pianos alone; the rest is sonic gravy.

The World Ethnic card offers 96 new samples, representing string, woodwind, and percussion sounds from Celtic sources and from India, Asia, Africa, South America, and Australia. Examples include sitar, didjeridoo, psaltery, bodhran, and congas. The Programs use these samples for a variety of timbres, including acoustic emulations, rhythm loops, drum kits, layered combinations, and hybrid mixes of Western and ethnic instruments.

I really like a lot of these sounds, particularly the hybrid mixes with combinations of drones, loops, and lead timbres. Aftertouch is used effectively on many Programs for bending pitch. A couple of the harp Programs are too quiet relative to the rest of the sounds on the card. They sound good, but they aren't matched well with the others in terms of overall level.

The names of the last nineteen Mixes listed on the instruction sheet do not match the ones actually on the card. Some of these appear to be out of order, but others are completely different. This is just an annoying oversight. I was pleased with the variety and quality of sounds from this card. It makes a nice complement to the largely Western pop/rock native voices in the QS6.

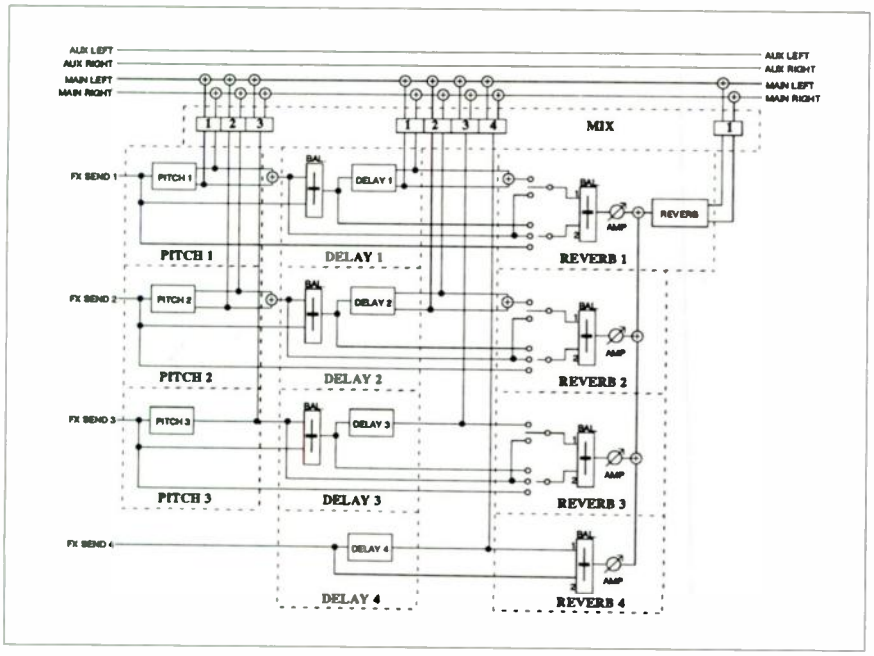

FIG. 2: Effect Configuration 1 provides four reverbs, four delays, and three pitch-shift effects on four send buses. (Courtesy Alesis)

Sound in a Program can be routed to any one of four effects buses. An effects Configuration defines the signal path for these buses through the applicable processing modules (see **Fig. 2**).

Each Configuration offers at least one reverb, delay, and pitch effect, and most support multiple types of each effect across the four effects buses in parallel and series combinations. Pitch effects include mono and stereo chorus, mono and stereo flange, pitch detune, stereo Leslie, and resonator. Delays are available in mono, stereo, and ping-pong formats. Seven flavors of reverb range from plate to large, with gated and reverse thrown in.

Configurations 4 and 5 also include a 2-band shelving EQ module at the end of the chain, and Configuration 5 has an overdrive effect at the beginning. All of the effects modules have lots of parameters to tailor the sound for your needs. Many of these parameters can be changed in real time with physical or MIDI controllers for additional texture and dynamics.

In general, the quality of the effects is high, and they contribute nicely to the sound. However, I did run into some glitches. Normally, the QS6 is silent when you press a Selection button to change the Program. But some Programs that use Configuration 5 produce a noticeable audio click when selected. Some of these also make a soft, repeating beep before pressing a key. Turning the mod wheel increases the beep's pitch, and it cycles faster, presumably tracking the Leslie speed.

The artifact stops when you play a note, but it reappears if you change Programs and select it again. This is more an annoyance than a concern, and it is mostly noticeable if you wear headphones. The other problem area is zipper noise during real-time changes in reverb delay time, which I heard in a few sounds.

MODULATION MADNESS

One of the QS6's strongest features is the ability to modulate a wide variety of synthesis and effects parameters. Up to six assignable modulation sources can control different parameters of each Sound in a Program. The effect of each modulator can be scaled and can go positive or negative, allowing customized crossfade behavior between Sounds in a Program.

There are 21 available modulation sources, including note number, Velocity, Aftertouch, physical controllers (pedals and wheels), LFOs, envelopes, and incoming MIDI messages, such as Volume and various pedal messages. In addition, any MIDI controller message can be assigned to Controllers A through D. Any parameter modulated by Controller A can be varied with the assigned MIDI message or directly from

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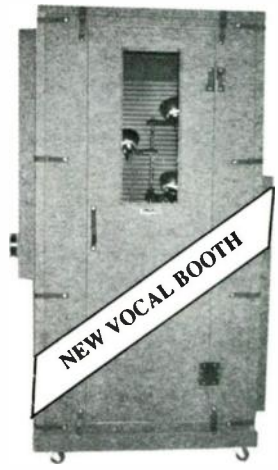

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JUNE 1996

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the Controller A slider on the front panel. In addition, the message assigned to Controller A is sent to the MIDI Out port when you move the slider. However, it is not sent to the computer interface; Alesis plans to correct this in a future software revision.

As in the original QuadraSynth, a Tracking Generator is available. The Tracking Generator reshapes the output of a modulation source through a user-defined, 11-point mapping. For example, you might use the Tracking Generator to give a linear controller, such as the mod wheel, an exponential curve.

Program modulation destinations include various LFO and envelope parameters, pitch, filter cutoff frequency, amplitude, portamento rate, and effects send. In addition, two separate effects modulation routings are provided. Possible sources include Aftertouch, pedals, mod and pitch wheels, MIDI Volume, and the four assignable Controllers A through D. These sources can be routed to any of 22 available effects parameters.

The same sources can be used simultaneously for both Program and Effects modulation. This lets you do such things as change filter frequency and Leslie speed with the mod wheel. Unfortunately, the effects routings do not have access to all Program modulator sources, and not all effects parameters are available as destinations. It would be cool to control reverb time with Velocity or use Aftertouch to vary the resonator effect's tuning or decay.

MIXES

Mix mode lets the QS6 respond to multichannel sequence data and/or serve as a master keyboard. A Mix includes Program assignments for each channel, which can be drawn from preset, user, or card Banks.

Additional Mix parameters let you specify each channel's note range, output level, effects-send level and bus routing, pitch transposition, and whether the channel receives and sends MIDI controller messages. The LCD shows the enabled channels and indicates which ones are playing internal voices, which is very handy.

There is no separate Effects patch for a Mix. Instead, you select one of the Mix's channels, and the Effects patch associated with that Program is used for the entire Mix. It is possible to "freeze" the Effects patch or allow it to change if a new Program is selected on that channel.

There are three options to manage the flow of MIDI data: The first option, Normal mode, turns the QS6 into a master controller; it sends MIDI and plays internal sounds on all active channels in the Mix. Channel Solo mode, the second option, plays and outputs MIDI on the channel selected in the display; all other channels can be played only with incoming MIDI data. This is useful when selecting or editing a Program to fit with the rest of a Mix.

The third option, Out 1—Out 16

SOUNDBRIDGE

You say you've blown through all the presets, checked out all the QuadraCards, and you still want more? No problem. Using Alesis' bundled *SoundBridge* software, you can download your own samples to a FlashRAM card.

Originally developed by Alesis for in-house ROM-card development, *SoundBridge* can import multiple individual sample files (AIFF or Sound Designer II format) or complete multisampled instruments (Sample Cell format) and save it all to a FlashRAM PC card. You don't need Sample Cell or *Sound Designer* to access the sounds. In fact, you can buy commercial Sample Cell CD-ROMs and download them through Alesis' *SoundBridge* onto FlashRAM cards.

Sample size is limited only by the card's capacity, which ranges from 256 KB to 8 MB, and these cards are available directly from Alesis or third-party distributors, including Radio Shack. Samples can use any sample rate, but they must be 16-bit mono; stereo samples are not recognized. However, you can save the left and right channels of a stereo sample as two separate mono files, download both to a card and use them panned hard left and right, respectively.

I tried *SoundBridge* with the Sample Cell organs from the Northstar demos on the bundled CD-ROM. *SoundBridge* read them quickly—sample data, keymaps, loop points, and all—into a Project Buffer. The Project Buffer's size is determined by the target card's capacity, and *SoundBridge* monitors the samples to ensure they all fit.

When you're ready, tell the program to compile the Project, and *SoundBridge* will download the information via MIDI at a rate of 100 KB per minute. Figure on about twenty minutes to complete a 2 MB transfer. Surprisingly, transferring samples via the computer interface didn't work. According to Alesis, this is a problem for some (but not all) Macs running System 7.5.1; wouldn't you know that mine is one of them. They assure me this works in most cases.

Once the new samples are on the card, you can select them and build Programs in the normal manner. Unfortunately, if you create a user Bank of Programs/Mixes based on these new samples, it cannot be saved to the same FlashRAM card. It can hold user samples or user Program/Mix Banks but not both.

Despite these few limitations, the software works well and provides yet another expansion option for the versatile QS6. Given the number and variety of available Sample Cell CD-ROMs, QS6 owners looking for new sounds ought to be happy campers for quite a while.

Even better, *SoundBridge* 2.0 is scheduled for release in June. The new version allows you to store samples, Programs, and Standard MIDI Files together on the same FlashRAM card. It also supports Opcode OMS and Apple MIDI Manager. The upgrade will be available on the next revision of the QS6 CD-ROM and on Alesis' Web site, which is scheduled to go online in May.

Alesis views *SoundBridge* as an extension of the QuadraSynth operating system rather than a simple accessory program. Long-range plans include the addition of sampling, sample editing, and incorporating *FreeLoader* into future *SoundBridge* upgrades.

mode, sends MIDI data only on the specified channel, including all notes regardless of the key-range setting. Internal voices are played only from incoming MIDI data, not from the keyboard. This is equivalent to Local Off, and it's the best way to use the QS6 with a sequencer if the sequencer's Echo or MIDI Thru function is on.

EDITING

The user interface is well designed for editing chores. Pressing the Edit button moves from Program Play to Program Edit mode. Unlike with the original QuadraSynth, you can't accidentally change Programs and lose your edits. The LCD always displays the current Sound number along with the software page number for the current edit job, which is handy visual feedback when you're working on multiple Sounds within a Program.

Pressing the selection keys jumps you directly from one Edit Job to another; the keys are labeled with the corresponding Edit Job names. A pair of buttons scrolls back and forth between different pages of an Edit Job, and—wonder of wonders—the pages wrap around from last to first and vice versa. This is a minor feature that is not widely implemented in many synths, but I find it a real time-saver. A Compare button offers easy A/B auditions of your edits with the original Program, which is very useful.

Effect Patches are called from their parent Programs by pressing the Edit button twice. The same Job:page system, including the Compare button, is available here. The QS6 also provides helpful routines to initialize a Program and copy Sounds and Effect Patches between Programs. Unfortunately, there is no simple way to bypass the effects; I want a dedicated Bypass button so I can hear the dry Program.

Editing Mixes follows the same process as editing Programs: just press the Edit button while in Mix mode to get started. You can also edit and save Programs from within Mix Edit mode, which is handy.

You can save individual Programs and Mixes to the internal User Bank or a RAM card, or you can save the entire User Bank itself. Alternatively, you can send individual Programs, Mixes, or the entire User Bank to an external storage device, sequencer, or another QS6 as a SysEx bulk dump.

SOUNDS

Overall, I'm pleased with the QS6's selection of sounds, particularly considering its price point. The audio quality is good; the output is clean and clear. Some of the best sounds are the synth waves and pads. These are generally complex, multi-Sound Programs with lots of internal dynamics and good use of modulation.

The analog-synth emulations are surprisingly effective, with resonant filter-sweep samples doing yeoman duty. A fair number of rhythm loops are present, either alone or split with a right-hand lead voice. These one-note jams make great dance beats; they're loud, energetic, bass and drum loops with an attitude.

The solo pianos seem a bit too bright, although "Solo Piano" would work fine for a piano-bar gig. In the electric-piano department, there are multiple Rhodes and FM variants as well as processed Wurlitzers. Many of the piano Programs are layered with strings or other sounds. There's not much in the way of straight-ahead rock pianos or honky tonks.

The organs sound great and cover the gamut from "Dist Organ" distortion through "Hoedown" classic rock to "Toccata&Fg" pipes. The Leslie effect comes off well. The hits continue with the guitars and basses, which provide a good selection of basic and processed sounds coupled with good playability.

The strings and brasses are a mixed bag. The ensembles are pretty useful, but several of the solo Programs just don't sound convincing (e.g., "2 Cellos" and "PizzViolin") due to lazy attacks, overly bright timbres, and a bit too much nasality for my taste. The "Orch. Hit" sound is okay, but it lasts too long for a hit. The woodwinds fare better; even the usually troublesome saxophones are respectable. A few Programs attempt heavily processed versions of strings and woodwinds that might work for Trent Reznor, but they left me cold.

Ethnic Programs, typically the weak siblings of synth voices, offer better-than-average quality. "World Sitar" is particularly nice, with a mix of sitar, tabla, and log drum. Vocals are the worst as a class, a common failing of less-expensive synths. The samples are adequate when layered with other timbres, but they are not very good alone.

Drums are loud and punchy, clearly intended for rock, rap, techno, and the like. Most drum sounds are good to excellent, with a number of kick, snare, tom, and cymbal variants. There aren't many orchestral or jazz sounds, though.

The General MIDI Bank exhibits average Program quality and above-average audio quality and effects relative to other GM instruments I've heard. Most of my previous comments apply to their GM counterparts, except for some of the synth effects. "EchoSweep," "Goblins," and "Metallic" lack the animation that these sounds achieve on other GM synths. "Sci-Fi" is a Celtic ensemble, which is quite nice but definitely not the expected special-effects sound.

VALUE ADDED

The QS6 is among the first synthesizers to ship with a CD-ROM full of applications, demos, and MIDI files, which enhances its value considerably. Designed to get beginners up and running fast, the CD-ROM includes full working versions of Steinberg's *Cubase Lite* sequencer, a special QS6-only version of Mark of the Unicorn's *Unisyn* patch editor/librarian (a QS6 Profile is included for current *Unisyn* owners), two applications from Alesis, 28 MIDI sequences, and three extra Banks of QS6 Programs and Mixes.

Both Mac and PC versions of the applications are included. For QS6 owners without a CD-ROM drive, *Cubase Lite* is available on floppy disk from Alesis at no extra charge.

Product Summary

PRODUCT:
QS6 keyboard synthesizer
PRICE:
$1,099
MANUFACTURER:
Alesis Corporation
tel. (310) 558-4530
fax (310) 836-9192
e-mail
alecorp@alesis1.usa.com
Web http://mozart.mw3.com/alesis
CIRCLE #437 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ◖
EASE OF USE	● ● ● ●
QUALITY OF SOUNDS	● ● ● ◖
VALUE	● ● ● ● ◖

FreeLoader is a simple program that can play Standard MIDI Files (SMFs) and download Banks to the QS6 in SysEx format. It does not capture MIDI data, which would be useful for saving SysEx data from the QS6. However, you can record the data in *Cubase Lite* and save it as an SMF. In addition, *FreeLoader* supports the MIDIEX file format as used by the *MacMIDIEX* freeware librarian program (available from many Mac BBSs and Internet file sites).

Other files provide demos of various MIDI software applications. I can't imagine why the *MIDI Quest* demo was included. The demo of this universal patch editor/librarian is two versions out of date and does not support the QS6. Overall, however, Alesis is to be commended for providing an excellent resource with the QS6.

WRAP-UP

I'm very impressed with the QS6's capabilities and performance. Many users will be happy with the onboard sounds, and the synth's depth of programmability and real-time modulation features should keep third-party developers busy churning out new Program Banks for a while.

I also applaud Alesis' emphasis on expandability with PC cards and the ability to import samples using *SoundBridge*. Virtually all concerns noted in the original QuadraSynth review have been met although, to be fair, most of these problems were corrected in the QuadraSynth Plus Piano and brought over to the QS6.

The QS6 competes well against other synthesizers in its class, such as the Ensoniq SQ-2, Korg X5, and Roland JV-35. It has more sample ROM, greater polyphony, and richer synthesis capabilities, and it's much better suited as a master controller. It would serve equally well at a gig or as the basis of a home-computer MIDI system, especially considering the free sequencer and editor/librarian software bundled with it. Alesis has done a very good job with the QS6. If you're looking for your first keyboard synth, put this at the top of your short list.

Jim Pierson-Perry *is the pseudonym for a group of malcontent dwarves of dubious pedigree. Fond of cheap sunglasses and cheaper beer, they can be found wiring MIDI ports to whoopee cushions and pranking the occasional troll.*

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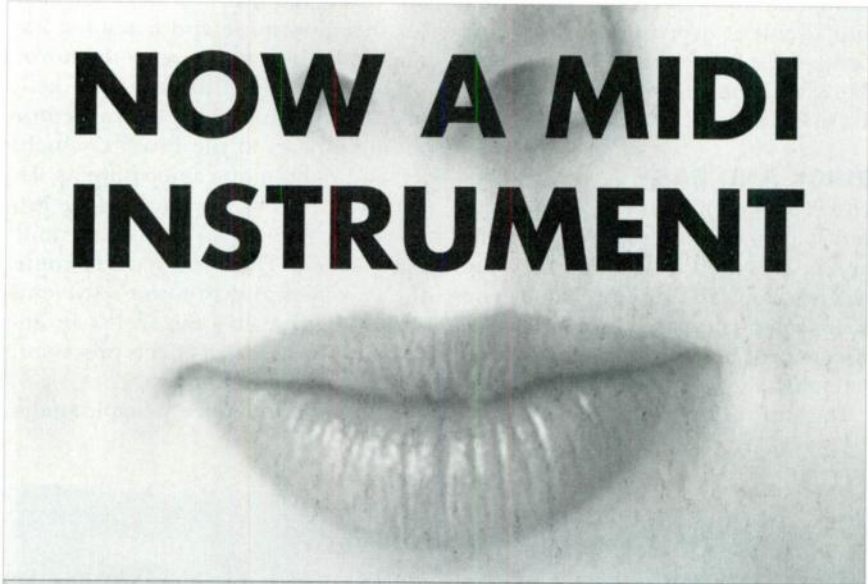

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Motion Sound Pro 3

By Peter Freeman

Get a convincing Leslie sound without straining your back.

The venerable Leslie 147 rotating-speaker system produces its famous sound by mechanical means: the input signal is reproduced by a rotating horn. Many companies have attempted to simulate the Leslie sound by purely electronic means, but none have convincingly achieved the distinctive, "air moving" quality of the genuine article.

Realizing this, the people at Motion Sound have developed a hybrid Leslie simulator with an actual rotating horn that processes the midrange and high-end portions of the sound (the input signals are actively crossed over at 800 Hz) and an electronic simulator that handles the low end. From a sonic standpoint, this represents a significant improvement over purely electronic Leslie devices because it more closely duplicates the acoustical behavior of the original Leslie.

QUICK AND EASY

The Pro 3's cabinet is roughly the size and shape of an average guitar-amplifier head (such as a Marshall) and weighs about 26 pounds. That seems heavy when compared to a 1U digital effects processor, but it's only about an eighth the weight of a Leslie 147.

The unit offers one ¼-inch, unbalanced audio input and a simple set of controls. Front-panel knobs attenuate the input volume and set the amount of limiting. The limiter helps control input-overload distortion in the Pro 3's preamp, so by reducing the amount of limiting and opening the input attenuator, you can dial in whatever amount of distortion you desire.

A ¼-inch TRS jack lets you control the horn's rotation speed via the supplied double footswitch. One switch determines whether the second switch will toggle between the slow and fast rotor speeds or between stop and the fast rotor speed. In the latter mode, the rotors "coast" to a stop, as with a Leslie 147 brake.

Thanks to the Pro 3's simple layout, setup takes five minutes or less. Initially, I set the unit up on my effects-switching network so I could experiment with processing signals from several sources and also send its output to a variety of destinations. In the end, I returned the Pro 3 outputs to my mixer in stereo, panned hard left and right.

The aerodynamic horn features a titanium driver and DC servo-controlled motor with brake. According to the manufacturer, the bearings were selected for their low noise and extended life span. A built-in amp powers the horn.

The horn is not internally miked; only the low-end (electronic) rotor sound appears at the Pro 3's ¼-inch, left and right/mono audio outputs. To amplify or record the sound of the Pro 3's rotating horn, you must do the miking yourself. Then you have to route the two mics and the unit's low-end "rotor" outputs to a mixer. It's an unusual problem for an effects processor, but this is an unusual device.

Although I found it a valuable studio tool, the Pro 3's features are better suited for live performance. The unit lacks XLR balanced outputs, acoustic isolation, and MIDI control, and the enclosure is designed for tabletop operation.

Fortunately, Motion Sound has announced the R3-147 ($1,099), a unit in which the rotating horn is acoustically isolated and suspended in a 4U rack-mount box. A tube preamp with pre- and post-preamp gain control precedes the horn. The top rotor is internally miked with two pairs of mics (left and right channels in close and distant miking positions). Mic-placement controls let you create a custom mix between the close and distant mics, and a built-in mixer lets you set the balance between the upper- and lower-rotor sounds for the left and right channels. You get XLR outputs and an effects loop. The R3-147 even includes MIDI control over the rotor speed. This new device should appeal to studio-oriented musicians.

Pro 3 Specifications

Inputs	(1) ¼-inch, unbalanced
Outputs	(2) ¼-inch, unbalanced
S/N ratio (horn)	75 dB
S/N ratio (low-rotor simulator)	80 dB
Frequency Response (horn)	800 Hz–10 kHz (±3 dB)
Frequency Response (low-rotor simulator)	30 Hz–800 kHz (±3 dB)
Dimensions	6.5 x 20 x 16.75 inches
Weight	26 lbs.

THE SPIN DOCTOR

I tried various microphones when working with the Pro 3 and got the best results with a pair of Shure SM57s. The SM57's relatively low sensitivity and presence peak make it well suited to capturing both the volume and frequency range of the rotating horn.

The Pro 3 sounded warm and wonderful with a wide variety of instruments, including sampled Hammond B3, electric bass, guitar, synthesizer, and voice. I used different limiting and volume settings for each source sound in order to achieve the best results.

Once I had things dialed in, I was surprised at how "lifelike" the Pro 3

No electronic signal processor has matched the Motion Sound Pro 3's excellent Leslie simulation. The Pro 3 uses a real rotating horn for the high and mid frequencies; only the lower Leslie rotor is simulated electronically.

sounded, even when I compared it to the Leslie-simulation programs in an Eventide DSP4000. The Pro 3's design puts it far ahead of its competition in terms of realism and musicality.

I was particularly pleased that I could get a convincing stereo image from the Pro 3 by employing the same miking techniques that I would use on a real Leslie 147. I also enjoyed creating the classic Leslie acceleration and deceleration effects using the footswitch. Incidentally, the fast and slow speeds of the horn are internally adjustable, as are the acceleration/deceleration rates and the fast/slow speed of the low-frequency rotor-simulation electronics.

This is the closest thing to a real Leslie I've heard. Sampled B3 sounds, bass harmonics, and guitars all fared particularly well with the Pro 3. More unconventional, sustaining synthesizer textures also benefited from the horn's swirly, airy quality.

It's not quite a perfect simulation, though. For one thing, the Pro 3 lacks some of the low-end "weight" and depth of character found in a genuine Leslie. That's not surprising considering that it doesn't have a large, dense cabinet in which the sound can reverberate.

In addition, the sound of the Pro 3's horn can be quite cutting and sharp, more so than that of a real Leslie horn. However, this can be an advantage for live situations where a player needs to cut through a mix. I found this to be the case particularly when overdriving the Pro 3's internal 30-watt power amp by increasing the volume and reducing the limiting; the resulting "edge" worked quite well on B3 and guitar sounds when more "cut" was required.

THE REAL THING

I was impressed by the Pro 3's sound in many different musical contexts and wholeheartedly recommend it not only for keyboards but for guitar and bass, as well. Although you have to mike the Pro 3's horn (as with a real Leslie), it sure beats lugging around and maintaining a Leslie 147. The product is well designed, well made, and reasonably priced. And if you want more studio features than the Pro 3 offers, the new R3-147 should fit the bill. Most importantly, it sounds closer to the real thing than any electronic simulator.

If you are a fan of the Leslie sound and you have too much good sense to carry a full-size Leslie around, check out the Pro 3. You will be pleasantly surprised.

Peter Freeman *is a freelance bassist, synthesist, and composer who lives in New York City. He has worked with such artists as John Cale, Jon Hassell, Chris Spedding, L. Shankar, Sussan Deihim, Richard Horowitz, and Seal.*

Product Summary

PRODUCT:
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PRICE:
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MANUFACTURER:
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fax (801) 265-0978
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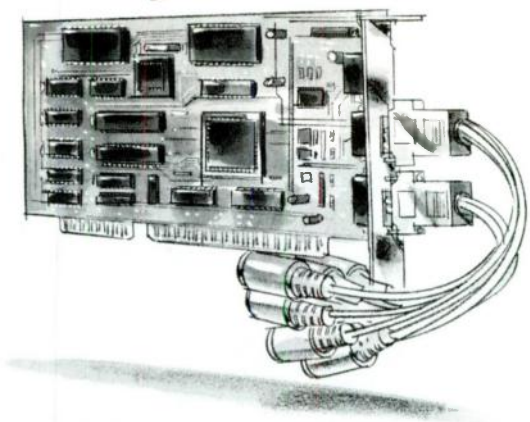

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Dynaudio Acoustics BM5

By Rob Shrock

Trustworthy monitors that don't cost an arm and a leg.

You could easily spend a fortune on quality reference monitors, but you don't have to. If you're about to plunk down cash on a new set of reference monitors, I have good news: Dynaudio Acoustics' BM5 close-field reference monitors provide excellent bang for the buck.

The Dynaudios employ a standard design with quality components. The 6.7-inch, magnesium silicate-impregnated, polypropylene woofer uses an extra-large aluminum voice coil. The thermally protected, 1.1-inch, soft-dome tweeter has a neodymium magnet and aluminum voice coil. Magnetically shielded drivers allow the speakers to be placed near video monitors without causing interference. Passive crossover is set at 2.5 kHz, and all connectors are gold plated. Included with the speakers are two foam plugs that fit in the bass ports, allowing you to adjust low-frequency output to suit the room.

POOR MAN'S BENCH TEST

I didn't have an accurate measuring system available, so I used a reference CD of tones and sine-wave sweeps to listen for sonic anomalies. After setting a loud reference level (bordering on uncomfortable), I listened to a variety of tones throughout the frequency spectrum. It isn't an especially scientific approach, I admit, but it helped give me a general idea of the BM5s' sonic capabilities.

I powered the BM5s with a Carver TFM-15CB 100W/side amplifier. Recommended power handling is 150W RMS, but I achieved good results with as little as 50W.

Overall, the high-frequency response is musical and smooth. There is a little peakiness in the 2 kHz to 4 kHz range centering around the passive crossover point of 2.5 kHz. This is not uncommon: perfectly smooth crossovers are difficult to design. After another slight rise in the output around 12 kHz, the frequency response settles back to nominal and then begins to mildly taper off above 16 kHz.

The low end is respectable, though not booming. Sounds at 50 Hz are strong, though they're a few dB shy of the manufacturer's claims. I could even hear 31.05 Hz signals, especially in the corner of my room where the bass wells up. These low notes appeared only about half as loud as the 100 Hz tones, however. Not surprisingly, the 15.525 Hz test tones were nowhere to be found.

The response tends to mildly taper off below 125 Hz, but the curve is gentle and musical; that is, there are no obvious holes in the sound to keep you guessing when you're trying to mix at three o'clock in the morning. I was particularly impressed by how smoothly the sine-wave sweeps (low to high) progressed, as there was only a hint of rippling in the low end. At 10 dB below reference volume, the overall balance of the various sine-wave frequencies felt the same, with the exception of the 2 kHz to 4 kHz peak.

The BM5s work particularly well with compact mixers that sport fixed EQ frequencies set at 12 kHz and 2.5 kHz, such as the Mackie CR-1604. Because the BM5s exaggerate these frequencies somewhat, they help discourage you from overequalizing mids and highs, a common problem in home studios with limited equalization capabilities.

FIELD TESTS

I have four main criteria for subjectively evaluating reference monitors: low-end response, stability of stereo imaging, smoothness and accuracy at loud and soft monitoring levels, and fatigue factor during long periods of listening. Here's how the BM5s fared in each of these areas.

The low-end frequency response is smooth without sounding hyped. Even at low to moderate monitoring levels, the bottom end is full, round, and natural sounding, which is all one could expect without adding a subwoofer. Of course, because the BM5s can handle so much bass, I initially wanted to pump a little too much bottom into my mixes. Fortunately, I overcame the temptation. By spending some time listening to a few favorite CDs (a necessary step with any new monitors), I was able to adjust my ears to the sonic nature of the Dynaudios.

The BM5s' imaging is stable and reminiscent of the Genelec 1030As. In only one frequency range—the crossover area—did the BM5s seem a bit touchy. This was most apparent as I moved my head widely from side to side. Otherwise, the BM5s display a consistently reliable sound field and frequency response without being too sensitive to exact monitoring position. This is an important point for me; a

Dynaudio Acoustics' BM5 monitors offer great sound and excellent value.

BM5 Specifications

System Type	2-way
Woofer	6.7 in.
Tweeter	1.1 in.
Frequency Response	50 Hz to 20 kHz (± 3 dB)
THD	<0.1% (100 Hz-20 kHz)
Crossover Frequency	2.5 kHz
Max. Output	102 dB SPL (@ 1.25m)
Sensitivity	88 dB (1W @ 1m)
Max. Power	150W
Impedance	4Ω
Dimensions	12.2 x 8 x 9.9 in.
Weight	12.1 lbs.

set of reference monitors should sound good to each person in the room, regardless of listening position.

While playing a CD of a classical quartet that was mixed fairly dry, I found it easy to pick out the individual players. The sound field was free of smearing, and I could really feel the depth of the ambient space. Similarly, while mixing my own material, I had no problems placing instruments exactly where I wanted them in the stereo field.

The longer I worked with the BM5s, the more I realized how honest they are. Their frequency response sounds flat and complete, with no frequencies missing and none jumping out. If something didn't sound right on the Dynaudios (too much mud in the low midrange, for instance), it was pretty safe to assume that the problem was genuine and would manifest itself on other listening systems.

This became especially evident while I was remixing some marginally recorded 8-track material. Previously, I had hastily recorded a female-vocal track that ended up suffering from sibilance. At first I tried to ignore the problem, thinking it wasn't really that bad, but the sibilance showed up on other speaker systems. So I listened to some CDs by Jann Arden and Mariah Carey to get perspective on the maximum dose of "ssss" I could tolerate. (To my ear, Carey mixes push sibilance to the extreme.) I then employed a de-esser and matched the overall vocal character of the Arden and Carey CDs. When the sibilance stopped being a problem on the BM5s, it ceased to be a problem elsewhere. All I had to do was trust what I was hearing on the Dynaudio BM5s.

As for fatigue factor, I can work with the Dynaudios for about seven or eight hours before my ears start to go. This is about twice the amount of time I can trust my ears with certain other monitors. I own a pair of monitors I can work on for three days straight, but they are too pleasant sounding; I wouldn't trust them for mixing as much as I trust the BM5s.

At times I felt the BM5s sounded a bit muffled in the midrange, but that was only because they are not very forgiving. When I finally got a really good mix, the sound was clear. At that point, I knew I had it right.

BUILDING TRUST

Probably the best test of a pair of monitors is the work done on them. I've had the Dynaudios for three months and have used them extensively for tracking and mixing my commercial and

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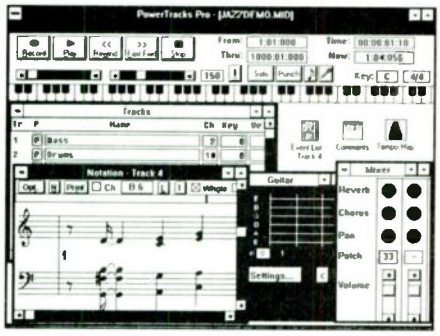

For starters... PowerTracks has all the Pro features found in sequencers costing hundreds of $$ more.

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MUSIC NOTATION & PRINTOUT (on any printer): Enter/edit/display music in standard music notation. Intelligent/automatic features such as: correct beaming/tying of notes/minimize rests option/ "Jazz eighth notes" option (this automatically allows jazz swing eighth notes & triplets to be notated properly!!). Reads in any MIDI file & displays it as notation!! Print any track in standard music notation. Selectable staves per page and bars per line. Selectable margins and paper size. Portrait or landscape (sideways) printing. Titles, composer, style, copyright information. Make your own lead sheets! You can also print the piano roll window for even more detailed analysis of a track!

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REQUIREMENTS: PowerTracks for Windows - Windows 3.1/Windows 95, IBM Compatible AT, 386 or higher, 2mb RAM. Supports any device compatible with Windows 3.1 including Roland MPU401, Music Quest MQX interfaces, Key Electronics MIDIATOR, SoundBlaster, AdLib, TurtleBeach, etc.
PowerTracks for DOS - DOS 3.3 or higher, 640K, XT/286/386 or better. MIDI interface (Roland MPU401, Music Quest MQX series, SoundBlaster MIDI and FM sounds, Midiator, Roland SC7, Yamaha TG100) or Adlib/SoundBlaster compatible sound card.

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personal projects. In particular, I just finished up an important bunch of original-song demos that had to be submitted under a tight deadline. I used the BM5s for most of the tracking and all of the mixing for five songs. I wouldn't have used them on this project if I didn't feel I could trust them.

I had to mix and package the five songs in one afternoon to make a 7:00 P.M. Federal Express deadline. At best, I had time to mix a song, check the cassette on my car's tape deck once, make any necessary changes, and then mix the final version.

To make matters worse, I was having trouble with a cassette deck that didn't play at the correct speed; searching for the pitch adjustment ate up more of my precious mix time. But I made the deadline, and everything tracked on the BM5s sounded great and translated well to the real world. I had a few problems with some earlier, submixed material that had been tracked on other monitors, but I was able to massage those tracks enough that they sounded good in the end.

The only problem, again, was my initial reluctance to fully trust what I was hearing on the BM5s. For one tune in particular, I was monitoring most of the time on my little mono cube. When referencing the male vocal sound to a Peabo Bryson CD, I felt that I needed more mids in the vocal and started boosting. I threw the mix up on the BM5s for a quick check right before printing. I had a nagging feeling that there was now too much midrange, but it sounded right on the little mono cube. I printed it and shipped it out.

Sure enough, when casually listening to my work the next day, I heard a mildly honking vocal on that one tune. Further listening on other systems confirmed a small but consistent flaw in the mix. If I find the time, I'll remix that song. And I'll trust the BM5s next time.

Of course, having a reliable reference monitor is as critical to tracking as mixing. I recently finished recording the bass parts for a progressive/metal album I've been producing. The band members and I were faced with the usual choices of pickup positions, preamp settings, picking versus fingered, and all the other variables that can make or break a bass track. We used the BM5s as our main reference for tracking, and we were very happy with the sound that went to tape. I can already tell that very little else will have to be done to the bass tracks for the remainder of the project. It sure helps to know what's going down as you hit the red button. I hope I still have the BM5s for the final mixes!

▼

The next time, I'll trust the BM5s.

CONCLUSION

The Dynaudio BM5s have become my favorite monitors in this price range. They're a great deal not only because of their relatively low price, but because they sound so good. In fact, they can easily compete with monitors costing twice the money. The frequency response is accurate, the imaging is solid, the bottom end is full, and they don't tear up your ears after two hours.

Equally important, the work I've done with the BM5s has held up over time. I had to learn to trust the BM5s the hard way (by working with them a lot), but it was definitely worth the effort.

Short of spending a lot—maybe two or three times as much—on a powered monitor system, the BM5s are a great way to go, especially if you already own a good amplifier. I wholeheartedly recommend you try them out.

Product Summary

PRODUCT:
Dynaudio Acoustics BM5 close-field monitors
PRICE:
$699/pair
DISTRIBUTOR:
Audio Exchange International (AXI)
tel. (617) 982-2626
fax (617) 982-2610
CIRCLE #439 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
AUDIO QUALITY	● ● ● ●
VALUE	● ● ● ● ◖

Composer/Producer **Rob Shrock** *is the keyboardist/arranger for Dionne Warwick and Burt Bacharach. His most recent production effort, a progressive/metal album entitled* Eleventh Hour, *is finally nearing the mixing stage.*

Artic Software AudioBase 1.0 (Win)

By Dennis Miller

Keep your audio files organized with this dedicated database.

Any musician who works with a computer knows the challenge of organizing audio and MIDI files. Which file includes that killer performance? Are all the files for a certain project in one directory? How do you find an old file that would work well in a new tune?

Artic Software has released a utility that addresses precisely these issues. *AudioBase* 1.0 for Windows catalogs all the music files on your system and provides extensive options for searching and sorting them. With a highly customizable interface and MIDI and WAV file playback capability, *AudioBase* has all the tools you need to put your audio desktop in order.

Like a traditional database, *AudioBase* lets you organize and work with your data in different ways. But unlike other programs, it automatically detects sound files on your hard disk and reveals a lot about the data they contain. The program can locate WAV, MIDI, Karaoke, and RMI formats. Once the files are cataloged, you can export your *AudioBase* lists into various types of non-music programs, such as Microsoft *Word* and Lotus *1-2-3*.

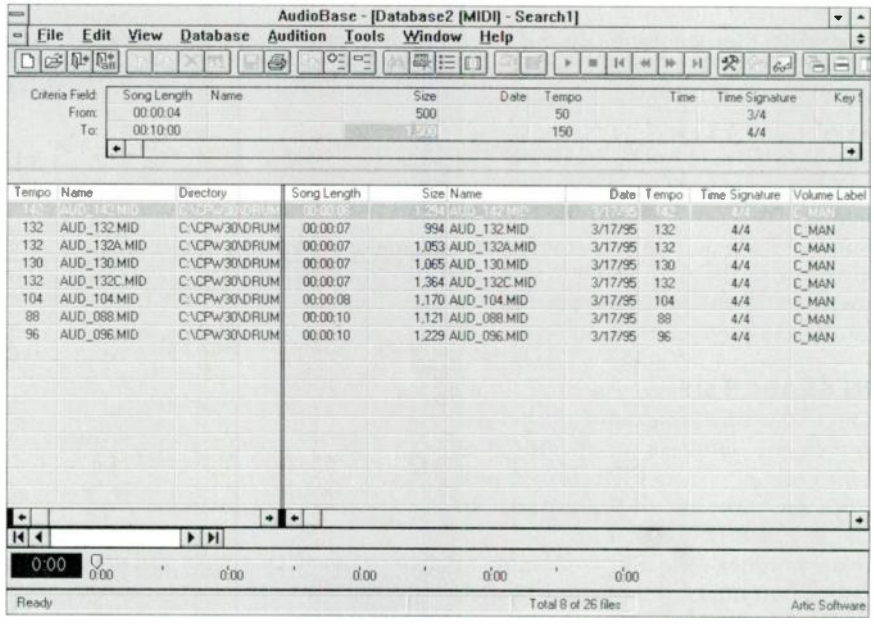

FIG. 2: *AudioBase* searches for files that meet your criteria and updates its report in real time.

HOW IT WORKS

To perform a search, select a file type; *AudioBase* will locate all files that match. You can only specify one file type and disk drive at a time, but you can easily add files of the same type on a different drive during a second pass. To mix different file types, you must save the database to disk and then reopen it and add the new file type.

After scanning the hard drive or CD-ROM, *AudioBase* presents a list of files with extensive information about each one (see **Fig. 1**). For MIDI files, this information includes date and time of creation, size, duration, tempo, number of tracks, whether or not they contain controller data, and many other attributes.

For WAV files, you get similar basic information, in addition to sample rate, number of channels, bit resolution, and more. The list of files is presented in a split-screen format, which tends to clutter the screen. It would be simpler if the data were shown in one large window.

Different manufacturers don't always implement file formats the same way (even so-called "standard" file formats), so there's no guarantee the program will correctly recognize every detail of every file. On my system (a '486/66 with 16 MB RAM, running Windows 3.11), *AudioBase* successfully cataloged all but one of 242 Standard MIDI Files (SMFs), even though they were created by several different programs and spread across numerous subdirectories. Even better, it did the job very quickly. The one file it couldn't handle contained nearly 500 tempo changes; according to the company, a bug in Windows choked the program in this case. A patch should soon be available from Artic that works around this problem.

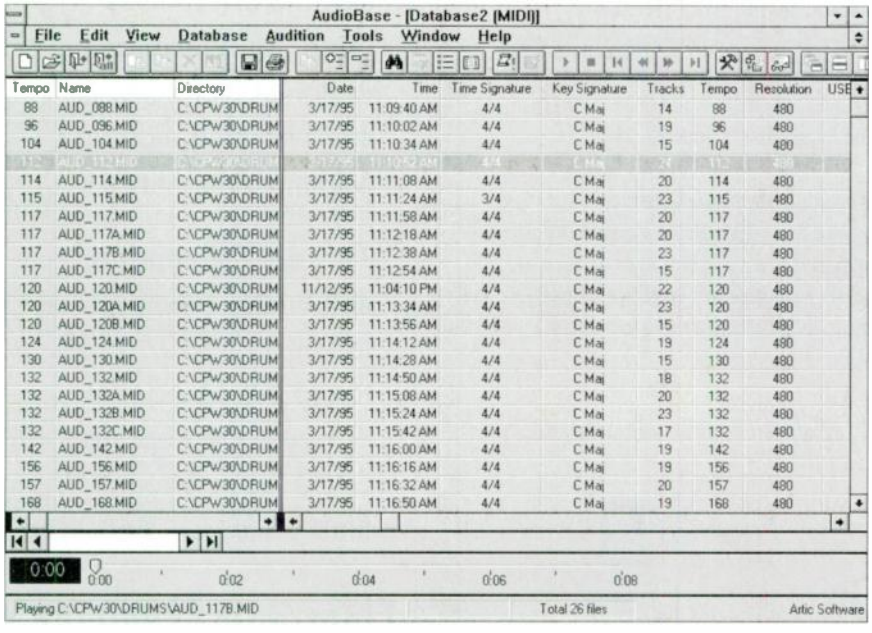

FIG. 1: After performing a search, *AudioBase* lists the files it locates and includes extensive information about the data they contain.

If you need more information about your MIDI files, you can open the Track View for a listing of parameters for every track in every file. This only works with Type 1 SMFs—Type 0 files merge all data into a single track—but it's useful when trying to hunt down specific information. You can't search for specific data on a track, nor can you change anything in the file. Nevertheless, it's useful to have so much information organized in such an efficient way.

IN SEARCH OF...

Once your files are cataloged, you can search the database for specific files and create reports of various types. Let's say you want to find all files in the key of B major that are less than three minutes long and contain from one to four tracks. Just open the Search dialog box from the View menu, and enter the required criteria. *AudioBase* reports back with a list of the files that match your specs (see **Fig. 2**).

In most cases, the Search criteria can include "from/to" ranges, which can be applied to such parameters as file-creation dates. However, most other conditionals are not available; for example, you can't ask for all files that are *not* in 6/8 time. Fortunately, it's easy to perform a search. Even if you have to search several times to narrow your selections, it's hardly a nuisance.

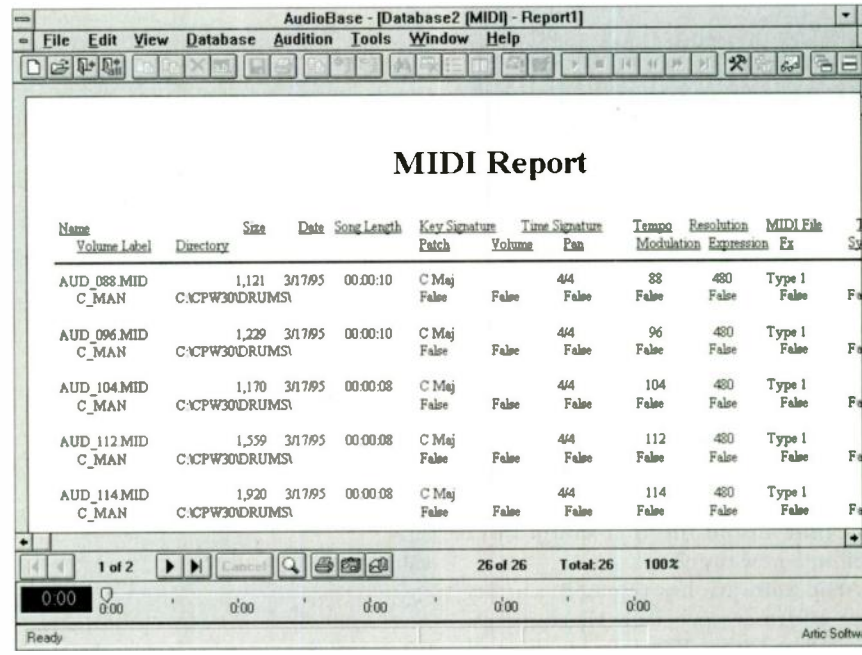

FIG. 3: Printouts of all or partial file listings are available, and data can be saved in numerous standard database formats.

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Electronic Musician

AudioBase works in real time. As you enter data into any of the search fields, the program instantly displays the matching files. Enter a new value, and a revised list appears. For certain criteria, *AudioBase* presents a drop-down list of choices, which is a major time saver. For example, when selecting a time signature, all the signatures of files in the current database are offered in a menu. Other fields require that you type in your criteria, which could be a single value, a selection range, or an either/or conditional. Overall, the options seem logical enough and are based on the types of searches you're likely to do most often.

Any of the column headings can be used to sort the list, which lets you arrange your files according to size, date of creation, name, or other attributes. You must be in the Search window to use this function, and you can only sort in ascending order. Even so, the sort implementation is excellent. Many database programs require that you highlight a range of rows before sorting, but with *AudioBase*, you simply drag any column heading to the left of the screen, and the program automatically sorts all rows by that heading. I only wish that you could sort from the main screen as well as in the Search area.

ROLL YOUR OWN

AudioBase includes all the bells and whistles of the newest Windows programs. A customizable toolbar displays only the icons you select and can be positioned anywhere on the screen. Floating Help balloons identify the function of the icons as you pass over them with the mouse cursor, and a thorough online Help file is also available. An extensive Options menu lets you control other program settings, such as how windows appear when they are first opened and whether or not the playback automatically loops.

Even more useful is the ability to add custom columns to your database. These five additional column headings are user-definable, but the columns themselves can only contain yes or no values. In other words, the file has the attribute in question, or it does not.

The program can't identify these custom attributes when it first scans your disk, but it can use them when searching and sorting the database. For example, I created headings to specify whether a file was original, whether it was used in a current project, and whether it contained GM instrument assignments. I was then able to search for all files that met any of these conditions. If five custom columns aren't enough, you can use the Comments field to add other information.

SUMMING UP

AudioBase produces attractive reports that you can print or save to disk (see **Fig. 3**). In addition, the data can be exported in many different formats, including comma-delimited, tab-delimited, and straight text, providing compatibility with dozens of other programs. You can also duplicate many of Windows' File Manager functions (such as cutting, copying, or moving files) from within the program. The manual is thorough, but a few tutorials would be useful.

As hard drives grow larger and more cluttered with files, organizing your data becomes an increasing problem. *AudioBase* provides a quick and efficient solution. Sooner or later, you'll need this program.

Product Summary

PRODUCT:
AudioBase 1.0 audio/MIDI file database
PRICE:
$49
SYSTEM REQUIREMENTS:
80486 or better PC, Windows 3.1 or later, 4 MB RAM (8 MB recommended), 4.5 MB of hard-disk space, VGA or better monitor, sound card
MANUFACTURER:
Artic Software
tel. (414) 534-4309
fax (414) 534-7809
e-mail 74777.2745@compuserve.com
Web http://execpc.com/~artic
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EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	●●●●
EASE OF USE	●●●●
DOCUMENTATION	●●●◖
VALUE	●●●●◖

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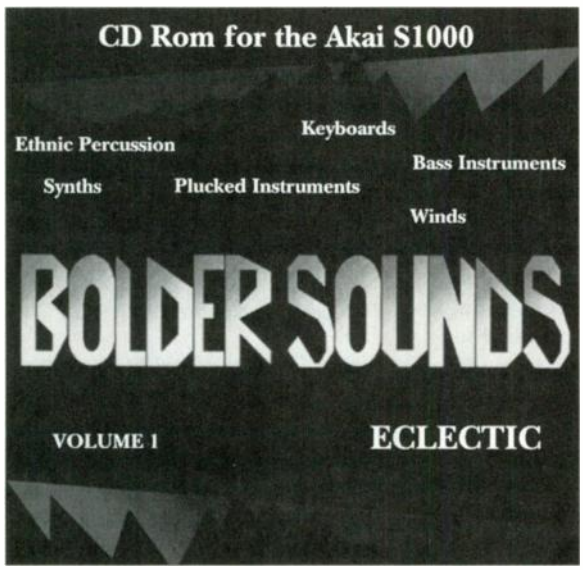
Bolder Sounds Eclectic, Vol. 1

By Dan Phillips

Serve up new sounds from this smorgasbord of CD-ROM samples.

Bolder Sounds is a one-man operation, and that man is sound designer and guitarist Dennis Burns. *Eclectic,* volume 1, evolved from Burns' personal library of sounds. The result is a curious mix of ordinary and extraordinary samples. Bolder's *Eclectic* library is available on CD-ROM in the Akai S1000 format. I auditioned the samples on a Roland S-760, using the S-760's ability to read Akai files.

Eclectic begins with a 30-minute audio demo of Burns performing original compositions (as well as a few pieces by other composers) using various samples from the library. This portion of the CD-ROM provides a glimpse of *Eclectic*'s diverse musical potential. For those who want to audition the sounds before committing to the CD-ROM, Bolder Sounds offers the same 30-minute demo on cassette for $5. The purchase price is deductible from the CD-ROM cost should you decide to buy *Eclectic.*



Bolder Sounds' *Eclectic,* volume 1, sample CD-ROM offers a potpourri of sounds from the personal collection of guitarist/sound designer Dennis Burns. The instruments range from the quotidian to the exotic.

PLUCKED INSTRUMENTS

Burns teaches guitar across the hallway from a local luthier, and particularly interesting instruments that come into the shop for repair sometimes take a detour through Burns' sampling studio. This fortuitous fact accounts for *Eclectic*'s first course: a wide selection of plucked instruments from around the world.

Perhaps the most exotic of these instruments is the monochord, a koto-like instrument responsible for some of the more stunning sounds on the disk. Its twenty or so unison-tuned, resonating strings, strummed at once, produce an incredible acoustic "zhhhoooonnng" that sounds like a cross between a bowed bass piano string and a resonant filter sweep. The ten monochord samples range from slow strums in which each string is articulated to wide, smeary, rolling textures. I immediately used these sounds to construct a bass line for a techno/industrial dance track. Very cool.

Mandolin samples are nothing out of the ordinary. This library, however, is the first I've come across that includes samples of the mandolin's lesser-known cousins, the mandola and mandocello. (Mandola is to mandolin as viola is to violin.) Bolder Sounds' mandola samples are strong, clear, and well matched across the multisample. Unfortunately, some of the mandolin samples exhibit unpleasant secondary resonances. These resources are especially noticeable when the samples are transposed.

Each instrument in the mandolin family includes a multisampled tremolo patch in addition to the single-pluck samples. There's also an octave mandolin with a timbre somewhere between that of a mandolin and sitar, chorused and twangy, with a strangely ethereal tremolo.

The stereo-sampled bouzouki has a rich tone and percussive attack, reminiscent of a hammer dulcimer (though the instrument is plucked). It comes with a patch of tremolo samples as well. The stereo hammer dulcimer uses only five samples across the keyboard, but it has a beautiful tone, distinctive and full of character.

Other plucked-instrument samples include saz, sarod, sitar, banjo, autoharp, dobrolin (a special mandolin played with a dobro slide), acoustic pedal steel (a modified pedal steel that uses an acoustic-guitar pickup rather than the original pickups), mountain (lap) dulcimer, Celtic and concert harps, bandola, and bandurria.

▼

The distorted Hawaiian lap guitar is highly successful.

GUITARS

Given that Burns is a guitarist, it should come as no surprise that guitar samples form a significant chunk of this library. The selection ranges widely and includes both electric (from clean to heavily processed) and acoustic guitars (6- and 12-string). Most impressive is "Electric Gtr. Volume Swells #2," an exquisite, stereo-sampled, chorused guitar with a long, soft attack. This floating, shimmering sound works wonderfully as a lush pad. It's definitely a real keeper.

The distorted Hawaiian lap guitar is also highly successful. This 6.8 MB oddity is painstakingly sampled with three variations at each of ten multisample split points: the straight note, a bend up to the note, and a bend down to the note. To further assist the user in piecing together a realistic-sounding lap-guitar part, *Eclectic* also includes a chromatic octave of chords and licks. It's whacky but well done.

Though they're not as unusual as the volume-swells or lap-guitar samples, the Taylor 6-string patches are also highly useful. One patch in particular, "STL.STR.XFAD," is set up as a Velocity switch between fingered and picked samples. It is eminently playable: soft, delicate, and responsive. "Guild Steel 1" is also a winner, with well-matched, bright samples and three groovy, chordal slides that are perfect for those Beck "Loser" covers.

Other guitar samples include National Steel, Ovation 12-string electric, Fender Stratocaster (picked and "soft"), Larivee classical, Bennedetto archtop, and both Baroque and Renaissance guitars.

BASSES

After working recently with the stellar Spectrasonics *Bass Legends* sample collection (reviewed in the April 1996 **EM**), I thought it would be a while before I was impressed by another sampled bass. But Bolder Sound's *Eclectic* CD-ROM surprised me with its bright, dirty, buzzy, thoroughly whacked-out Guild acoustic bass guitar. This is a distinctive bass sample with a huge amount of punch and enough high end to cut through a castle wall—definitely not for the timid composer. The main patch is a 3-way Velocity switch incorporating a pluck, a slap, and a pop. I only wish the CD-ROM included a few more multisamples.

Unfortunately, the handful of other basses—an electric fretless, a few other acoustics, and an electric with a 3-way switch and a complete set of harmonics and ghost notes on the side—pale in comparison.

WIND INSTRUMENTS

Eclectic's wind-instrument samples are serviceable but not outstanding. Included are South American and Lakota flutes, two shakuhachis (one authentic, the other labeled "PVC"), Quena flute, bansri, crumhorn, a decent oboe, three good bassoons, clarinet, solo flute, piccolo, soprano and tenor sax, chanter, and three different harmonicas.

Most impressive are the pan flutes. The samples are taken from several flutes, each boasting a variety of performance techniques. For example, there are patches with no vibrato, slow vibrato, fast vibrato, flutter-tonguing, chiffs (short, percussive blasts with no sustain), and even some strange, breathy effects.

SYNTHS AND KEYBOARDS

All of the dozen or more synths are sampled in stereo, but the quality of the samples is inconsistent. A few are really strong, such as "Big Analog" (a simple sawtooth pad) and "String Pad #1" (sampled from the Korg Wavestation). Others, such as "Lullaby Bells" and "Soft Bells," are relatively weak.

The acoustic keyboard sounds are somewhat better. The four main harpsichord patches take advantage of the different registers available, including 8-foot choir, 8-foot and 4-foot choir together, full choir, and lute stop (an effect created by a mute that rests on the

Product Summary

PRODUCT:
Eclectic, vol. 1, sample CD-ROM
PRICE:
$195
MANUFACTURER:
Bolder Sounds
tel. (303) 440-4297
fax (303) 442-2025
e-mail boldersnd@aol.com
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EM METERS	RATING PRODUCTS FROM 1 TO 5
AUDIO QUALITY	● ● ● ◖
DOCUMENTATION	● ● ●
VALUE	● ● ● ●

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strings). The "Harpsichord 8&4-ft. choir" samples suffered a bit from mismatching across the multisample, but I like the 8-foot and full-choir patches. One noteworthy variant patch uses the full-choir samples as the basis for a cool, slow-attack pad.

I really liked the baby grand, and I liked it even more after adding a bit of reverb. Its dark, warm, compressed sound creates a retro vibe reminiscent of something you might hear on a late-'60s record. Because of its distinctive sound, however, the baby grand is perhaps not a good general-purpose sample. Chords in the midrange tend to get muddy, for instance, which can spoil a ballad in a heartbeat.

In the funky/folksy keyboard department are a number of instruments including concertina, harmonium, two accordions, and sruti box. I like the character of these samples, but the sruti's loops are pretty obvious, and the timbres of the different harmonium samples don't quite match. These flaws are much less evident on chords than individual notes; depending on your taste, they might even add to the sample's appeal.

Rounding out *Eclectic* is a sizable collection of percussion patches. The selection includes frame drums, talking drums, two cool multisampled steel drums, a good set of finger cymbals, kalimba, dumbeks, tabla, some good chimes, a set of individual hand claps, and (most unusual) a pitched drainage pipe called "Backyard Tube."

CONCLUSION

As the name implies, Bolder Sounds' *Eclectic* is a mixed bag. That bag contains a lot of out-of-the-ordinary, over-the-top oddities as well as some more common sounds that are very well done. Unfortunately, it also contains a good amount of unspectacular stuff and samples that are marred by less-than-perfect loops or bad multisample matching.

As long as you don't expect all 127 sounds on this CD-ROM to be golden, the low price of admission and the handful of killer sounds make this an attractive and worthwhile package. I give it a thumbs up.

Dan Phillips *is a singer/songwriter in the San Francisco Bay Area and a principal in Touch Productions, which provides music for television, film, and multimedia.*

Viscount EFX-1

By Richard Chycki

A veteran keyboard manufacturer jumps into the multi-effects wars.

Who are these guys, anyway? Viscount is well known in some circles for its digital pianos, organs, and organ modules. In fact, its D9E module is sold in the U.S. as the Oberheim OB-3 and was reviewed in the February 1996 **EM**. But the Italian company is a newcomer to the U.S. and Canadian multi-effects markets. Getting established in this field is no small ambition; the stores and mail-order catalogs are already crowded with multi-effects boxes from more than a dozen manufacturers. (To get an idea of how many multi-effects boxes are available even within a limited price range, see "Multitasking Marvels" in the May 1996 **EM**.)

Viscount's first multi-effects offering is the EFX-1. (The company has already announced two more EFX-series multi-effects boxes, the EFX-10 and EFX-3000.) Primarily designed for guitarists, the unit offers a few interesting extras and suffers from some significant shortcomings, but its overall design looks solid. I am always searching for new signal-processing possibilities, so I was eager to give this new processor a chance to strut its stuff.

HARDWARE BASICS

A first glance at this half-rackspace processor shows a remarkable physical resemblance to the Boss SE-50. Like many effects processors, the EFX-1 sums its left and right ¼-inch, unbalanced inputs to mono. The direct signal maintains its stereo integrity when it is mixed with the generated stereo effects at the output. The input-signal level is adjusted with a single control and monitored by a peak LED. A switch maintains unity gain at nominal -20 dBm or +4 dBm levels.

A pair of jacks admit bypass and program-advance footswitches. The software bypass is click free and post-effect. It can be set to mute the output (mute everything) or just bypass the processed signal.

The 32-character by 2-line LCD presents information legibly but does not offer adjustable contrast and brightness. Pairs of buttons allow the user to scroll through and edit the parameters and navigate through the 128 programs. The first 22 programs are ROM presets; the remainder are in RAM and can be overwritten with user programs.

The input impedance of the unit is a medium 47 kΩ, lower than would be expected for a unit that is designed to match a high-impedance instrument signal. As a result, piezo pickups will probably suffer from impedance loading.

The EFX-1 uses 16-bit linear A/D and D/A converters and a 32 kHz sampling rate, providing an effects bandwidth of 12.5 kHz. Dynamic range specs out at 95 dBm, but I often had to drive the unit quite hard (sometimes a little

Viscount's EFX-1 multi-effects processor is fundamentally well designed and offers some innovative features. However, it suffers from several poorly implemented features and offers only a bare-bones MIDI implementation.

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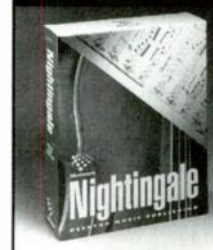

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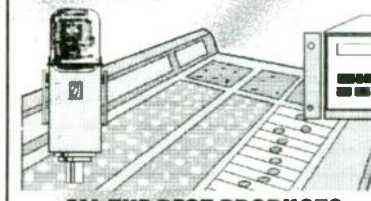

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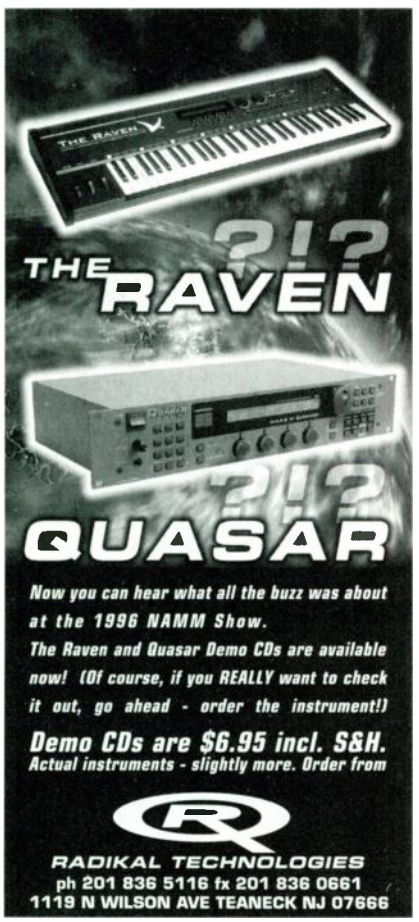

harder than I would have liked) to keep the noise floor down in critical studio applications.

The unit comes with a wall-wart external power supply operating at 10.5 VAC. Because this power rating is rather unorthodox, replacing the external supply on the road could pose a problem, so it might be wise to carry a spare.

OPERATION

Changing programs in the EFX-1 causes the unit to mute for about a quarter of a second as it loads the next program, which is common in many effects processors. An Exit button takes the machine out of Edit and Utility modes, but unfortunately, this returns the unit to the original, stored program. If you forget to store your changes somewhere before leaving Edit or Utility mode—an easy mistake to make—you'll lose your hard work. Fortunately, storing a program to memory is simple, and the EFX-1 asks for confirmation before overwriting an existing patch.

Nevertheless, I'd like to see some kind of Compare function to give the user a degree of protection and increase the unit's versatility. But the most important change I'd like to see is that, upon exiting the Utility function, the EFX-1 return to the previous mode with any previous user tweaks intact.

One useful Utility function allows you to scroll to a particular program and keep the new program on standby until the opportune moment to engage. It is also possible to scroll through programs in a user-definable order using the programmable footswitch's Advance function.

Manipulating the EFX-1 is relatively straightforward, so you only rarely have to refer to the manual. This is especially important because the manual is unrefined, filled with awkward phrasing, and short on technical content. The best part of the documentation is a supplemental booklet that lists the parameters available for each algorithm along with a brief description of each parameter. I wish Viscount had provided a quick-start "cheat sheet," whether on a plastic laminate or silkscreened to the unit's case.

EFFECTS CONCATENATIONS

The processor can apply various combinations of 22 effects algorithms, including delay, chorusing, flanging, reverb, ambience, phaser, Leslie simulation, pitch shifting, panning, distortion, compression, and noise suppression. The panning effects deliver the *summed* signal to the left and right channels. These algorithms can be used singly or combined into four preset multi-effects chains, which Viscount calls Effects Concatenations. Because the processing power is applied to an effects chain, fewer parameters are available for each effect than are available for a single effect. Programs consist of a single algorithm or Effects Concatenation and a set of control parameters.

Three of the four Effects Concatenations are intended primarily for keyboards but also for general applications. Keyboard Multi 1 provides delay, chorus, panning, and reverb; Keyboard Multi 2 delivers delay, chorus, flanger, and reverb; and Keyboard Multi 3 offers phaser, chorus, and noise suppression. Keyboard Multi 2 is my favorite for processing guitar when distortion is unnecessary; the reverb quality is markedly better than the ambience effect in the Guitar Multi.

The Guitar Multi Effects Concatenation, on which all of the guitar programs are based, comprises six chained effects: compression, distortion, noise suppression, chorusing, delay, and ambience. It is evident that the EFX-1 is aimed quite squarely at guitarists: more than a quarter of the unit's 128 programs are guitar oriented.

GUITAR EFFECTS

All of the 30-plus guitar programs are effects heavy, laden with delay and ambience. Delay parameters are limited to time, level, and feedback, with no filtering. High levels of feedback (greater than 80%) cause a faint shadow of the original input note to sustain infinitely in the background. The ambience algorithm is somewhat ringy and weak, allowing only predelay and brightness (presence) to be adjusted; the ambience decay time is about 0.7 seconds.

The distortion algorithm is particularly versatile, appearing in twenty programs. With the exception of the Rockman programs (which sound *very* Rockman-like), the distortion programs are more appealing when run through a guitar rig than when routed direct into the console. The unit lacks a versatile speaker simulator, so radical equalizing proved necessary (especially in the bottom end) to get usable results when running direct to the console.

The saturated guitar effects and Heavy Guitar programs provide the most palatable distortion. On-the-edge distortion settings produced a somewhat harsh tone as the unit began to clip the guitar signal. Slightly overdriving the connected guitar amp—I used a Marshall and an old Fender Harvard—eased the effect's harshness.

A special User distortion program offers cutoff-frequency and Q (resonance) parameters for each of four filters. You get independent lowpass and highpass filters for the predistortion section. The Q control on the predistortion filters proved especially handy for really intense stuck-wah and searing Telecaster effects. A post-distortion lowpass filter rolls off the highs to mellow out guitar-amp simulation programs. Additional timbral modification is supplied by a lowpass filter for the Line Driver, which is an ersatz speaker simulator for recording directly through a mixer. Sadly, no conventional equalizer is available. You must rely on a guitar amplifier's EQ, console EQ, or external EQ.

The noise suppressor creates an obvious gate open-and-close artifact as the echoes fade. Reducing the ambience and delay effects to judicious levels limits these undesirable artifacts to respectable levels. Although scrolling through a Guitar Multi Concatenation indicates that the noise gate is post-distortion and before the time-based effects, the programs sound like the gate is placed at the end of the effects chain.

PHASE PROBLEMS

The EFX-1 uses a common technique for creating a stereo field with time-based effects: combining the dry signal with an inverted-phase, delayed signal in one channel and an in-phase, delayed signal in the other channel. This creates a powerful, stereo sensation that is cost-effective to produce (only one delay line is needed). However, it has the distinct disadvantage of being completely mono incompatible because the positive and negative phase effects combine to equal zero.

When listening in stereo to the programs based on the Guitar Multi Concatenation, I immediately noticed a powerful out-of-phase sensation, even with all the effects bypassed. A phase meter and scope confirmed that the *direct* signal is out-of-phase relative to the left and right outputs in all the Guitar Multi programs (programs 22 and 97 through 128). This condition occurs when Stereo mode is selected from within the chorus portion of the algorithm, even with the chorus bypassed. Phase cancellation causes the direct guitar to disappear in mono situations, leaving only the processed (wet) signal.

Unlike many effects processors, the EFX-1 does not sum its left and right outputs to mono at the left output. Even though the left output is marked "mono" in parentheses, plugging into the left output jack only outputs the left channel. The advantage is that using only the left input and output doesn't create phase problems. Leaving the stereo/mono switch in the chorus switched to mono doesn't invert the direct signal's phase, but stereo chorusing would not be possible. This complication is restricted only to the Guitar Multi algorithm and doesn't affect any of the other 21 algorithms.

Viscount has acknowledged this software *faux pas* and indicated that a ROM update to repair it will be available by the time you read this.

REVERBS AND DELAYS

In addition to testing the EFX-1 with a guitar rig, I brought it into the control room to evaluate its performance as a studio device. All of the programs have the direct level set high, which is somewhat inconvenient for connection to a console's aux send, but it's easy enough to update this setting and store the modified programs.

A variety of reverbs and ambiences are offered, including two halls, three rooms, two early reflections, a plate, a gate, and an ambience algorithm. In general, the reverbs sounded more realistic when set fairly dark; a metallic "zing" became prevalent as I opened up the high end.

Programs based on the "Hall 1" algorithm provide the most satisfying reverb effects. Although some flutter is apparent, this algorithm exhibits substantial thickness and stereo imaging suitable for vocals and moderate to long snare reverbs. The flexibility of the early reflections and extensive filtering controls make this the most responsive and versatile of the reverb

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algorithms. Particularly worthy of note is the HF Gate parameter. Conservative settings yield an authentic frequency decay; radical settings produce interesting, synthesizer-like, swept-filter effects.

"Spring Reverb" was so realistic I was tempted to tap the top of the EFX-1 to listen for the "sproing" of reverb springs hitting together. However, the rooms and plates fell short. Flutter and looping was obvious and unmusical; the algorithms' scant density was exacerbated by the bright EQ added to emulate a plate.

Both the early reflection and ambience algorithms proved useful for widening drums and guitars. They sound metallic, but this added more "cut" to these instruments, yielding an increasingly industrial quality as the effect level was raised in the mix. Panning and reverse reflections are available in addition to the basic hall reflection.

A variety of straight, tapped, and modulated delay algorithms are offered, with up to one second of delay time. You also get a so-so Leslie emulation called "Rotary," which sounds like a combination of chorus and phasing and offers control over the simulated upper- and lower-rotor speeds, including rate of speed change. Because the EFX-1 is performing a single function in these algorithms, extra filtering and panning parameters are available. Using the unit in mono for delays was awkward; as previously mentioned, it does not sum its left and right outputs for mono use, so extra care must go into programming for optimum results.

The chorus is reminiscent of the Boss SE-50's Space Chorus program, including a mode selector for chorus intensity and diffusion to augment the stereo spread of the chorus. The EFX-1 is no slouch here. Chorus effects were clean, fat, and satisfying on guitars and background vocals in a mix.

The flanger comes with an interesting modulating gate for tremolo-plus-flange effects. The modulation between the left and right delays can be offset up to 180 degrees. The positive-flange programs provided a healthy flange effect. However, the negative flanging was weak, as the EFX-1 inverts only the phase of the feedback signal and not the phase of the entire delay signal (which would be a better way to achieve intense, inverted-phase flanges).

The pitch-shifting algorithm provides a pitch shifter for each stereo channel. Pitch shift is variable over a 4-octave range. The mode selector sets the splicing, which cuts the audio into sections for better pitch shifting. The longest splice (number 4) offers the truest pitch shift, but the signal is seriously delayed and the initial transient of the input signal is obviously compromised. The shortest splice (number 1) is dissonant when used for anything other than microshifting, but it offers the best transient response. In any case, splice selection is critical, and pitch shifts greater than a fifth create dissonant artifacts regardless of splice selection.

MIDI IMPLEMENTATION

The EFX-1 sports MIDI In and Out ports (but no MIDI Thru), and a front-panel LED indicates MIDI data is being received. Unfortunately, the MIDI implementation is surprisingly meager for a unit in this price range. Of course, it supports MIDI Program Change and SysEx bulk dump/load, and programs can be mapped to MIDI Program Change numbers in the utility area. So far, so good.

But when it comes to real-time parameter control, the Viscount box offers no more than the bare minimum. Many algorithms have one parameter that can be assigned to any standard MIDI continuous controller. However, the parameter is not user-selectable, and the ballistics of the parameter modulation are fixed. Some algorithms don't even offer this much control.

IN THE END

Potential is the key word to summarize the EFX-1 multi-effects processor. Sure, the documentation and the operating system in areas are kludgy, the force of economics reared its head in odd places (such as the weak MIDI implementation and lack of discrete-stereo processing), and there is that nasty phase bug in the Guitar Multi algorithm. But essentially, the concept and direction of the product are solid.

There are some interesting innovations in this unit, such as the way cool filtering system before the distortion in the Guitar Multi algorithm. Hopefully, the Viscount engineers have their ears perked toward EFX-1 users; refinements based on feedback from real-world applications would go far to improve future versions. There are many superior effects processors on the market, and Viscount will have to work hard to catch up.

Richard Chycki *is a producer/engineer/guitarist in Toronto, Canada, who has recently completed recordings with the Four Horsemen and the Jeff Healey Band.*

Product Summary

PRODUCT:
Viscount EFX-1
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InVision CyberSound FX (Mac)

By Larry the O

Add effects to desktop projects with this DSP plug-in for Adobe Premiere.

InVision began as a sound-design company that created sounds for samplers and plug-in boards for the E-mu Proteus series and Korg M1. Since then, the company has broadened its horizons considerably. *CyberSound FX* represents one of InVision's new directions, which is to add value to existing music and sound technologies.

CyberSound FX is a set of plug-in audio signal processors for Adobe's popular *Premiere* video-editing program for the Macintosh. Because Macromedia's *Deck II* 2.5 audio recording/editing program also employs the *Premiere* plug-in architecture, *CyberSound FX* also works within *Deck II*. The program requires a Mac with a 68020 or later processor and runs in native code on Power Macs.

Fifteen separate effects modules are included in *CyberSound FX*. There are chamber, small-hall, and large-hall reverbs, and three EQs (parametric, shelf, and dynamic filter). Delay-based effects include a 2-tap delay (without feedback), multitap delay, flanger, phaser, and chorus. You also get three dynamics/level processors—compressor, tremolo, and normalizer—and a pitch shifter. Upon receipt of your registration card, InVision will send you a disk containing two more modules: Echo (a single-tap delay with feedback) and Wahwah.

Perhaps the most exciting thing about *CyberSound FX* is that it brings into a nondestructive editing program effects typically achieved with outboard signal processing or separate effects software. (*CyberSound FX*'s processing is destructive, though it supports one level of undo.)

THE HOST WITH THE MOST

CyberSound FX is a plug-in and runs within a host program that supports the Adobe *Premiere* plug-in architecture, such as *Premiere* 3.0 or later or Macromedia *Deck II* 2.5 or later. It seems clear InVision is aiming squarely at the much larger *Premiere* video and multimedia market than at the professional audio market, although *Deck II* and *CyberSound FX* have appeared together in advertisements. Because I am a sound designer, I evaluated *CyberSound FX* in an audio-only environment with *Deck II* 2.5 and a 4-channel Digidesign Pro Tools II system (without TDM).

Premiere's audio capabilities are, in general, more limited than those in *Deck II* (which, after all, is oriented exclusively toward audio editing), but Adobe's program nonetheless offers some features when using *CyberSound FX* that are not available in *Deck II*, such as the abilities to configure the size of the buffer used for previewing, specify multiple processes to be executed

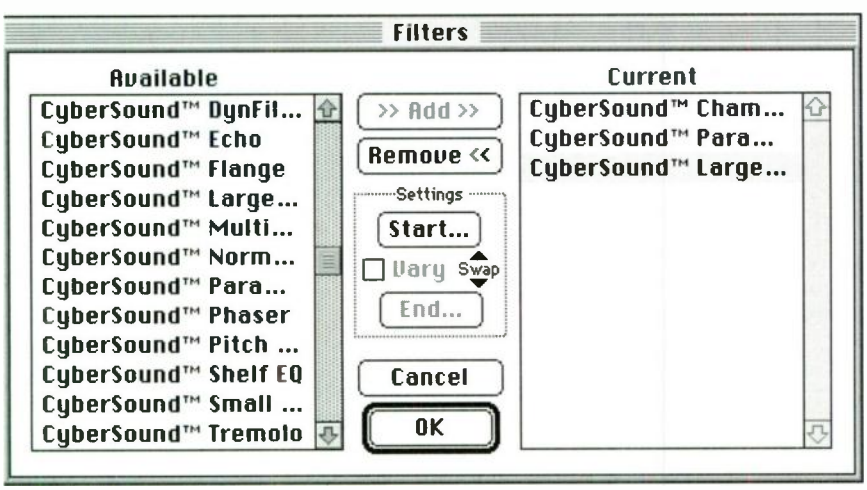

FIG. 1: When using InVision *CyberSound FX* with Adobe *Premiere* 3.0, you can execute multiple processes successively in a single pass, a feature not available in Macromedia *Deck II*. This *Premiere* Filters window shows several "stacked" *CyberSound FX* modules.

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successively in a single pass (see **Fig. 1**), and perform stereo processing.

PLUGGING IN

Installation of *CyberSound FX* onto my Macintosh Quadra 650 with 32 MB of RAM was a breeze. The software is not copy protected, but you must enter the serial number before the program will become functional.

The only glitch I encountered was that plug-in modules for *Deck II* or *Premiere* 3.0 must be placed directly in the Plug-Ins folder, but the InVision installer put them into a new folder called CyberSound FX. The manual, although not mentioning *Deck II* (the information is contained in a Read Me file on the disk), duly noted that users of *Premiere* 3.0 would have to go in after installation was complete, select the modules, drag them out of the CyberSound FX folder, and drop them into the *Premiere* Plug-Ins folder. Dragging the modules into *Deck II*'s Plug-Ins folder installed them properly. *Premiere* 4.0 can recognize the plug-in modules in the CyberSound FX folder if the latter also resides in the Plug-Ins folder.

Once installed, the modules showed up in *Deck II*'s External Effects pop-up list in the Process menu. To process audio, you simply select a waveform range or one or more regions and choose the desired effects module from the pop-up list. This brings up the main window, which is a simple and unambiguous interface (see **Fig. 2**). To the left of the window is a scrolling list of presets, called *templates*. InVision includes up to a dozen or so templates for each effect, and it is easy to store your own templates or edit the list using the Save, Save As, and Delete buttons that appear below it. The supplied selection of templates was one of *CyberSound FX*'s high points. Most of these presets are eminently usable as is, and they provide good jumping-off points for creating custom versions.

The right side of the main window contains sliders that adjust the effects parameters. Compared to the typical outboard signal processor, there are only a small number of variable parameters for each effect, but all the basics are covered. For example, you won't find a diffusion parameter for the reverbs, but "Large Hall" offers predelay, brightness (high-frequency rolloff), and decay time. Parameters are changed by dragging a slider with the mouse; unfortunately, there is no MIDI control.

Beneath the parameter sliders are Preview and Bypass check boxes (more about these in a moment), OK and Cancel buttons, and a Help button. Overall, the main window is about as nonthreatening as it could get.

EARLY REFLECTIONS

After installing the modules, I opened a *Deck II* session, selected some audio, and chose an effect. The first thing I noticed when the main window opened was that all parameters are simply numbers between 0 and 100 (or, in some cases, such as feedback, between 100 and -100), with no units of measure. For example, the equalizers do not show frequencies in hertz or boost and

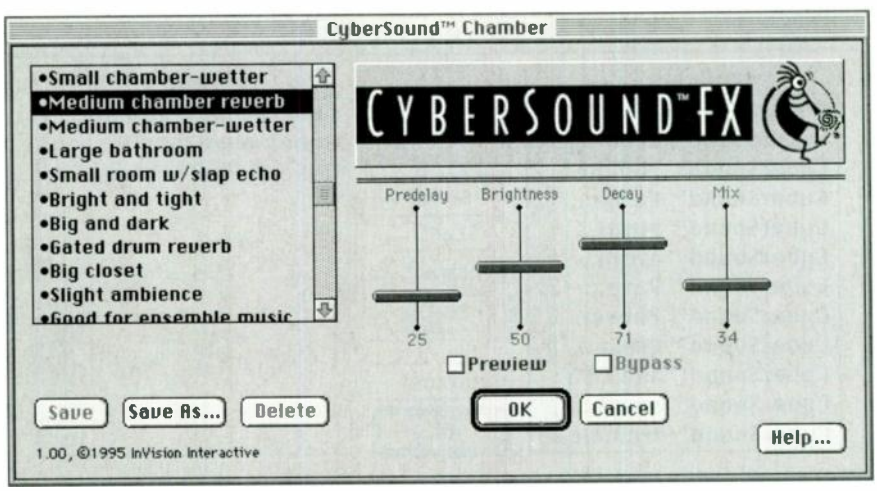


FIG. 2: *CyberSound FX*'s main window (used here with Macromedia *Deck II* 2.5) is simple and straightforward. The preset Templates (left) can be edited, and you can add your own. You get just a few parameters (right), but they're the critical ones.

cut in decibels, and the delays and reverbs do not show time in seconds or milliseconds.

Perhaps those who work in *Premiere* but are not audio specialists don't care about such things; maybe they just rough things in by ear and let it go at that. For me, this omission was a severely damaging blow to the program's usefulness. How could I EQ a voice to

▼

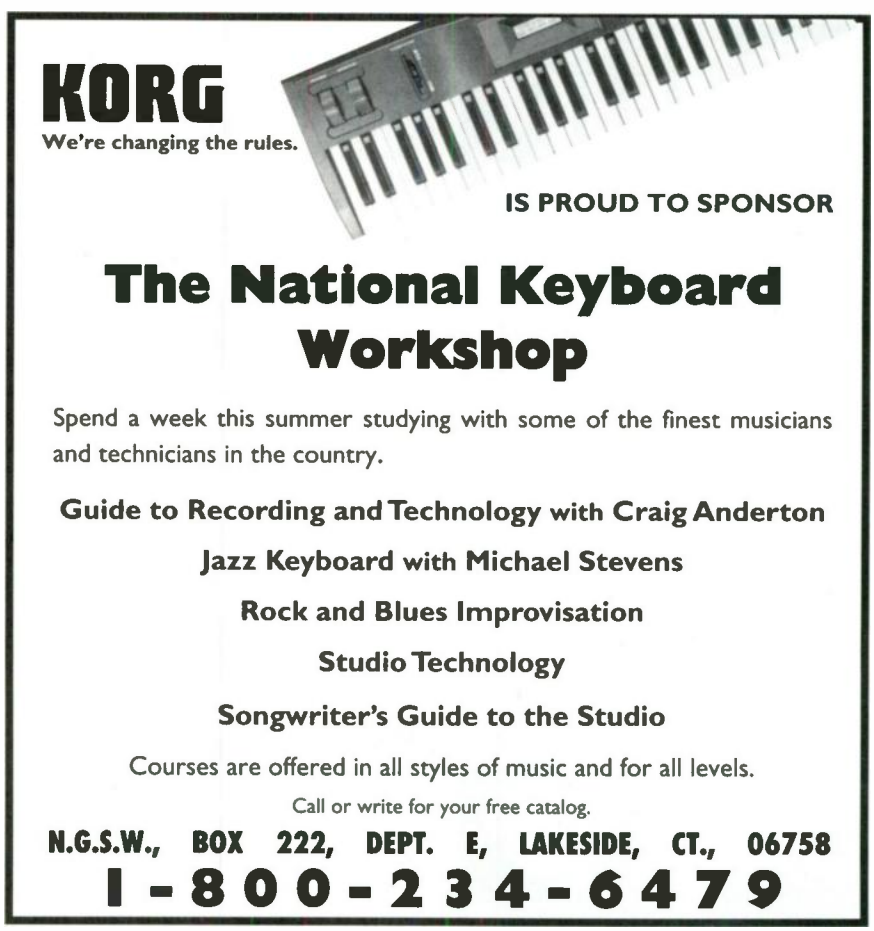
All parameters are numbers with no units of measure.

reduce a sharp, nasal quality without knowing what frequency I was equalizing? The only answer is to EQ with extensive trial and error while monitoring the result. This brought me to my second problem with *CyberSound FX*.

The first time I attempted to preview material, I heard absolutely nothing. As it turns out, *CyberSound FX* previews only through the Macintosh Sound Manager. (This was not mentioned anywhere in the manual.) After opening the Sound Control Panel and assigning the Sound Manager to play through my Pro Tools hardware, I was able to hear the *CyberSound FX* preview. However, as a result, all of my Macintosh system sounds also came through that hardware into my main monitoring system (sigh).

The preview itself is somewhat unusual. After I clicked the Preview checkbox, the program began a sort of stuttering process in which it made repeated attempts to play the processed sound, with each attempt playing a slightly longer piece of audio. After a period of time often exceeding 30 seconds, the preview finally managed to play through its entire buffer. (As with other software preview functions, the buffer size may or may not be large enough to hold all of the selected audio. *Premiere* allows this buffer size to be set, whereas *Deck II* does not.)

Each time any parameter was adjusted, *CyberSound FX* went through this process again. This delay even occurred when unchecking the Bypass box, which made immediate A/B comparisons impossible. On a fast Power Mac, this process would likely be much



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faster, perhaps even in real time, but on my workhorse Quadra 650, it made previews painful, especially given the amount of trial and error dictated by the lack of meaningful parameter values.

Under the time pressure often associated with production environments, the convenience of having processing built into my editing program was rather heavily offset by the difficult nature of previewing *CyberSound FX* effects on my Mac. Consequently, I found myself relying heavily on the generally very good templates and using more of the less "tweak critical" modules, such as the flanger.

One feature that helped compensate a little in some situations was that *CyberSound FX* maintains the last effect you used, along with its parameter settings, at the top of the pop-up list. If you have just applied a certain flange to a piece of audio and wish to apply the exact same processing to another piece, selecting the new piece and choosing the last effect from the top of the list immediately applies that effect to the newly selected audio without opening the main window.

The biggest problem I experienced when using *CyberSound FX* was a discouraging number of nasty crashes that required the Mac to be rebooted. This could have been the fault of *Deck II*, which I've found to be touchier than other audio programs I have worked with. (My guess is that this is related to how critically *Deck II* must work the Mac to achieve the extended number of tracks and continuous resync that are its hallmarks.) This supposition is somewhat supported by the fact that I experienced many more crashes at the beginning of the evaluation, when I was using a beta version of *Deck II* 2.5, than during the latter period, when I had the final release version. Because a plug-in works within a host program, it can be difficult to point the finger at either plug-in or host. Nevertheless, the crashes occurred when using *CyberSound FX* within *Deck II* but not with *Deck II* alone.

MANUAL LABOR

The manual is a mere 23 pages long. Its orientation is consistent with that of the program: some information an audio professional would want is not included, such as whether the compressor used peak detection, RMS/average detection, or some combination of the two. The issue of stereo is never addressed, either. The description of the Delay program mentions processing and monitoring in stereo, but this is the only time I could find stereo discussed in the manual.

As it turns out, though audio editing programs generally deal with stereo audio as multichannel mono, *Premiere* is able to actually treat it as stereo material. If you select a stereo Clip (the *Premiere* term for a region) in *Premiere* for processing, the Delay program and the reverbs are applied in discrete, dual-processed stereo; the channels are not summed to mono first. This capability is not available in *Deck II*.

On the other hand, the program and parameter descriptions, though brief, are clear and to the point. After the descriptions of each effect, there are a handful of tips that are excellent for nonaudio specialists. For example, the tips for normalization point out that the process amplifies not only the source signal, but any noise in the audio. If that results in unacceptable noise levels, the best solution, when possible, is to redigitize the signal at a

Product Summary

PRODUCT:
CyberSound FX
effects-processing software
PRICE:
$129
SYSTEM REQUIREMENTS:
68020 or better Macintosh with 4 MB of RAM (6 MB for Power Macs), System 7 or later, QuickTime 1.6 or higher, 1.2 MB of hard-disk space, host program with the *Premiere* plug-in architecture
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VALUE	● ● ● ● ◖

higher level. This is eminently sensible advice that would be obvious to an audio professional but not necessarily to a video or multimedia editor. The online Help function is simply a duplication of the manual available from within the main window.

THE TELLTALE TAIL

Sonically, *CyberSound FX*'s modules vary in quality and usefulness. The reverbs, for example, do not have the smoothness in the decay one would expect from an outboard signal processor. Another problem with the reverbs is that they cannot generate a decay longer than the audio selected for processing. For example, let's say you want to add a large room reverb with a 3-second decay to a half-second-long snare drum hit. After processing, the result is a half-second snare hit with reverb.

InVision explains that this is a limitation of *Premiere* and *Deck II,* and it is certainly reasonable not to replace a region in a session with a much longer region, which could overwrite other regions in the track. However, I would find it acceptable if the program generated a new file of the snare hit with a full reverb tail. Ideally, this would simply appear in the audio bin, but I would even be willing to load the new audio manually. This solution might also make it easier to accommodate a mono-in/stereo-out reverb in *Deck II.* InVision's only suggestion for dealing with this is to create a file containing the sound to which you wish to add reverb and sufficient blank space after the end of the sound to accommodate the reverb tail. This would work, but it seems inefficient at best.

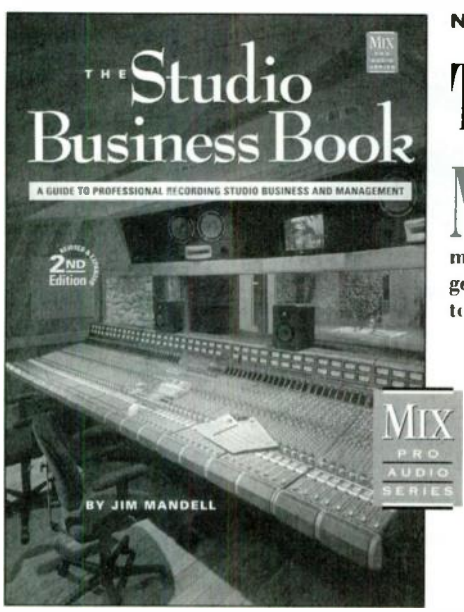
CHOOSING THE RIGHT TOOL

In the end, *CyberSound FX* was a mixed bag for me. It was extremely convenient to have such a variety of processing available in my editing program, and there's no arguing with the price tag. Given my hardware and production demands, the distilled parameter set and problematic previewing reduced *CyberSound FX*'s usefulness and caused me to turn to more specialized software tools (such as *Sound Designer II* with Waves' *Q10* EQ plug-in) or outboard devices. I ended up using *CyberSound FX* mostly for flanging, chorusing, normalizing, noncritical EQ, and delay effects.

I think it a significant enough point to merit reiteration that many of my criticisms might be muted if I were working on a Power Mac and just wanted to add sound in a noncritical fashion to a multimedia title. In that situation, *CyberSound FX* represents an irresistible enhancement to an editing program. (I have seen some offers that make *CyberSound FX* available at an absurdly low cost with the purchase of *Deck II.*) In a professional audio environment, it is still worthwhile and very inexpensive, but it is useful for a more limited set of applications.

Here's the bottom line: after weighing *CyberSound FX*'s merits and price against its limitations, I find it easy to recommend the program to anyone using *Premiere* or *Deck II* for sound work.

Larry the O *dutifully meets his deadlines as a sound designer for computer games at LucasArts Entertainment, yet somehow he still manages to continue performing and engineering sound on outside projects.*



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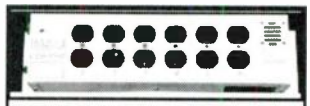

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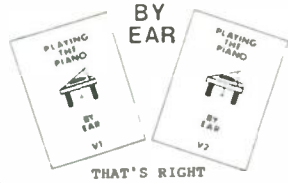

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TECH PAGE

Nanocomputers

The ultimate in miniaturization is at hand.

By Scott Wilkinson

It seems inevitable that computers will continue to decrease in size as they increase in power. But there's a limit to just how small computer elements can become. At the current rate of miniaturization, individual circuit elements within a chip will reach the atomic scale in about twenty years. What then?

This question might become important even sooner than that. Lately, there has been a lot of buzz about the concept of *nanotechnology*. This refers to the construction of objects that are on the order of one nanometer (nm, or one millionth of a millimeter) in size. One of the prerequisites of practical nanotechnology is the ability to position individual molecules and atoms at room temperature.

Among those working on this problem are scientists at IBM. In fact, the company's Zurich Research Laboratory recently announced that they had successfully positioned individual molecules at room temperature using the tip of a scanning tunneling microscope (STM). Normally, the STM is used to image surfaces at the atomic level, but it can also be used to manipulate certain molecules.

Many molecules tend to stick to the target surface and the tip of the STM, making it difficult to place them precisely. Molecules that are not sticky tend to jump around at room temperature. Earlier work at IBM's Almaden Research Center in San Jose, California, solved this problem by cooling the sample to -270 °C, which allowed them to spell *IBM* with 35 xenon atoms. However, cryogenic techniques are impractical for most applications. Scientists at the company's Watson Research Center in Yorktown Heights, New York, were able to position silicon atoms at room temperature using strong electrical pulses, but most molecules would be torn apart by such pulses.

Mechanical positioning requires a molecule that sticks to a surface tightly enough to remain in place but not so tightly that it can't be moved. In addition, the bonds within the molecule must be strong enough to remain stable when the molecule is moved around. The scientists in Zurich selected a molecule called Cu-TBP-porphyrin. This molecule exhibits just the right degree of stickiness and strength needed for mechanical manipulation.

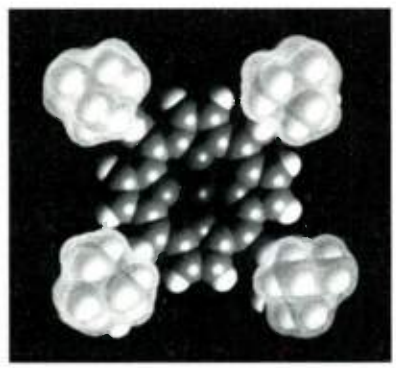

FIG. 1: A Cu-TBP-porphyrin molecule consists of a central ring, known as a porphyrin, with a single copper atom at its heart. Four hydrocarbon groups are attached to the porphyrin, forming "legs" that lift the ring above the target surface. (Courtesy IBM Zurich Research Laboratory)

At its core is a stable ring of atoms, known as a *porphyrin,* that has a single copper atom in the center. Four hydrocarbon groups are strongly but flexibly attached to the porphyrin (see **Fig. 1**). These hydrocarbon groups form "legs" that lift the "body" of the molecule above the atomically flat surface of a copper sheet. When pushed with the tip of the STM, the molecule "walks" across the surface in a "slip-stick" fashion, not unlike the way a violin bow causes a string to vibrate.

This research opens the door to some incredible possibilities. Of course, it represents the ultimate in miniaturization. IBM scientists speculate that molecular storage devices could achieve up to 100,000 times the capacity of today's most advanced disk drives. Conductive wires that are one molecule thick could be used in ultrasmall electronic components. Microprocessors could become nanoprocessors, offering much greater speed and power in much smaller packages.

This potential has obvious implications for electronic music and multimedia, which gobble up as much bandwidth, storage capacity, and processor power as possible. In one of my favorite applications, new orders of complexity could be achieved in physical-modeling synthesis. For example, we could have highly polyphonic, multitimbral modules that are much smaller than current designs and simulate the behavior of acoustic instruments with much greater accuracy. That day is at least a few years off, but I look forward to it with great anticipation.

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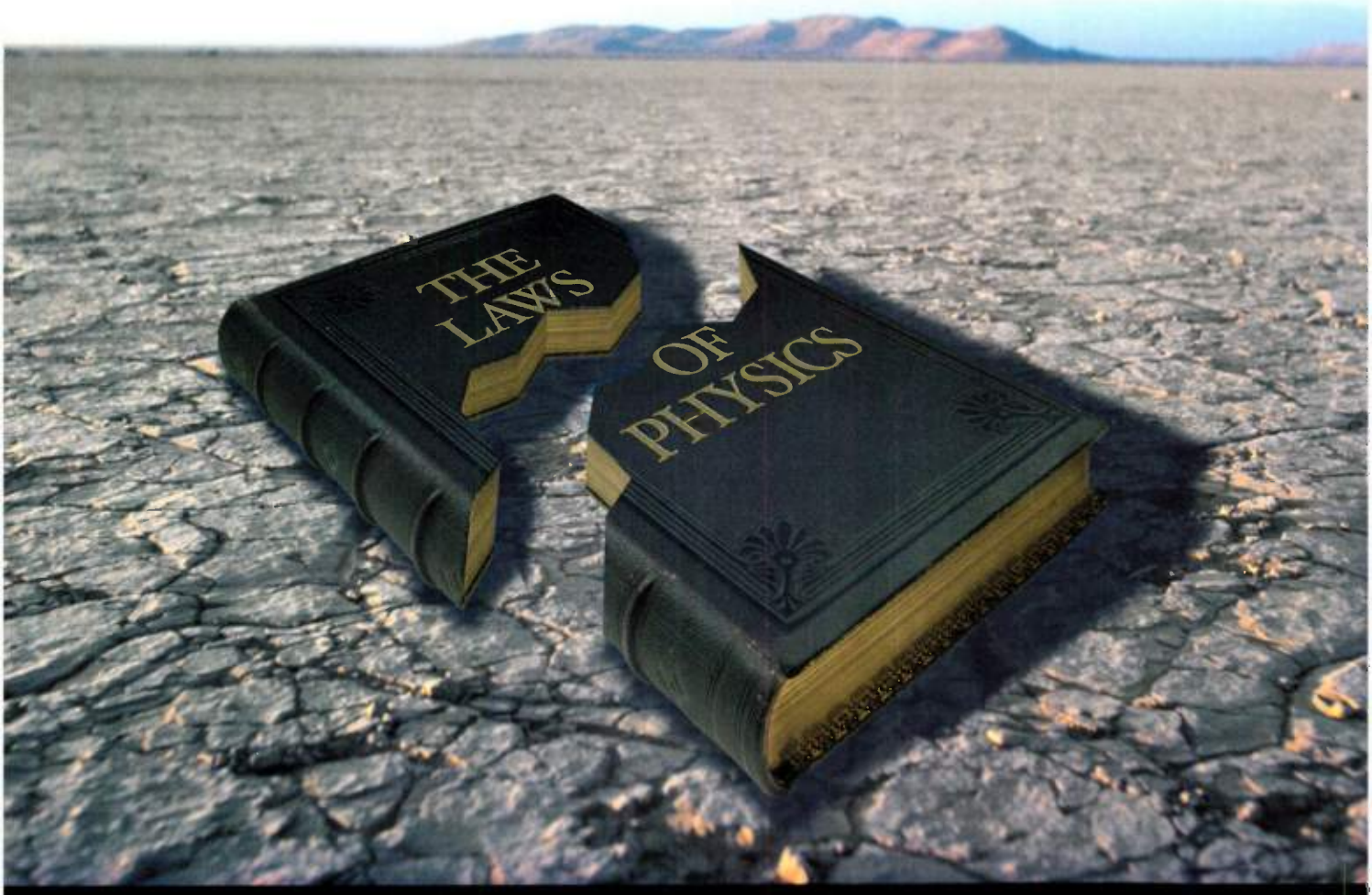

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