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Electronic Musician®

January 1997

Editors' Choice Awards

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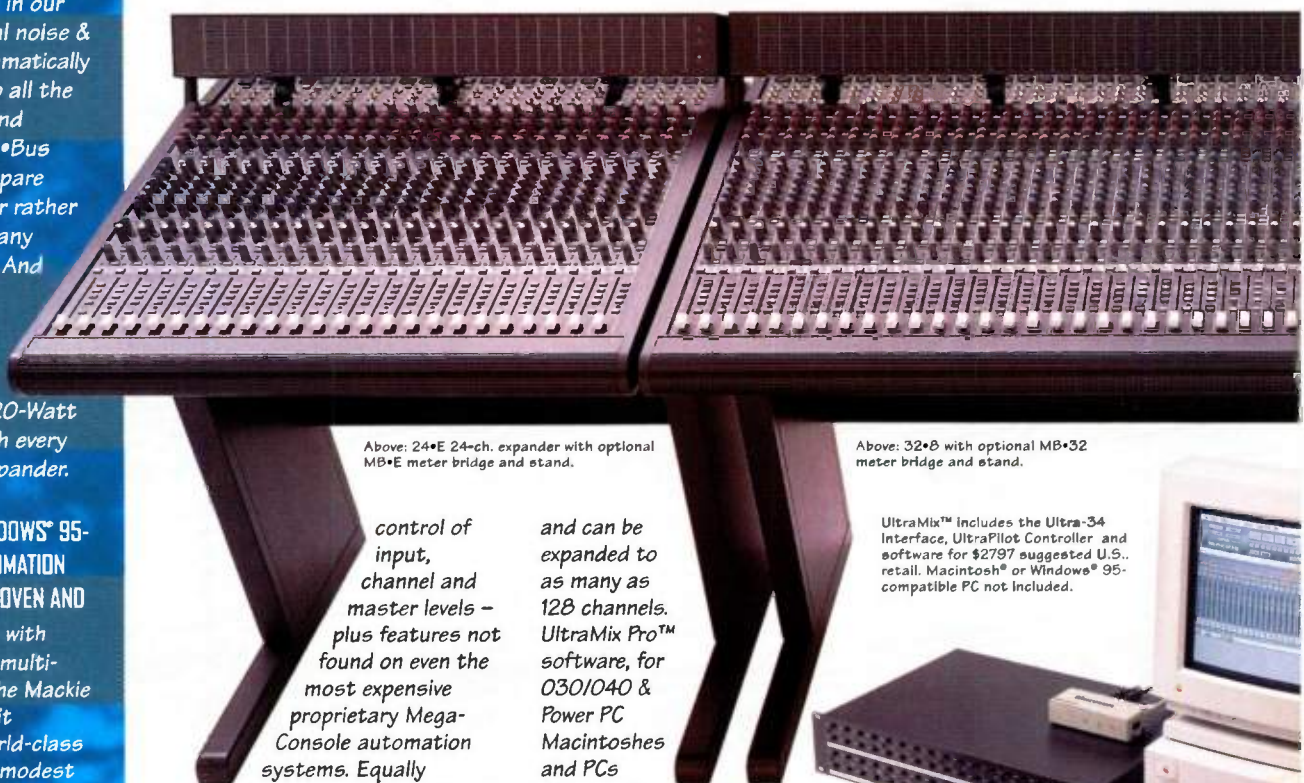
7 REASONS TO BUY OUR TO MIX MORE CREATIVELY,

1 VLZ CIRCUITRY FOR ULTRA-LOW NOISE AND CROSSTALK. *A fancy new 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, thermal noise & crosstalk are dramatically reduced. Open up all the channels, subs and masters on an 8•Bus console and compare what you hear (or rather don't hear) with any Brand X console. And because VLZ circuitry needs loads of high current, we ship a humongous, 220-Watt power supply with every 8•Bus & 24•E expander.*

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.

Above: 32•8 with optional MB•32 meter bridge and stand.

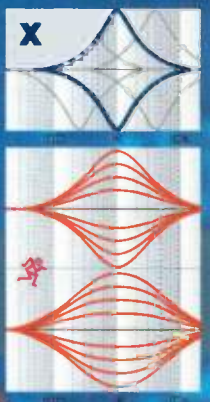
7 MAC® & WINDOWS® 95-BASED AUTOMATION THAT'S RELIABLE, PROVEN AND AFFORDABLE. *Along with affordable digital multi-track recorders, the Mackie 8•Bus has made it possible to do world-class productions on a modest budget. But until now, Big Studios have still had one remaining and unattainable creative "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, up to eight 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.

8-BUS CONSOLE... AND 2 TIPS ON HOW EFFICIENTLY AND, WELL, MORE FUNLY.*

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 setup with 102 channels of UltraMix™ automation. In the studios of artists as diverse as k.d. lang†, Yes, Queensryche, Aerosmith, Lee Roy Parnell, Bryan Adams, Carlos Santana, Whitney Houston, Eric Clapton & U2, our consoles really are used to make great music.*

6 WIDE MID RANGE EQ. *Whether you're tracking or mixing, equalization is one of your most important creative tools. Mackie's 8•Bus consoles feature extremely-wide-bandwidth peaking EQ 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 at 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 above). That extra octave of "width" gives you a whole new creative palette.

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

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

8 WHAT ULTRAMIX AUTOMATION CAN DO FOR YOU:

- *Hone a complicated mix one track at a time with every fader move recorded*
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- *Automute unused sections of your tape tracks or noisy MIDI sound modules*
- *Via automated mute or fader cuts, make a composite mix ("comp track") from the best moments of several tracks of the same vocal or instrument*
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- *Make six voice-over versions of a jingle mix – and then easily make the inevitable nitpicky client changes three days later*
- *Step up to big-league automation without breaking the bank!*

9 LEGENDARY RELIABILITY. *One of those factors you probably don't think much about – until your console goes down in the middle of a critical late-night session. Built with pride in Woodinville, WA USA, Mackie 8•Bus consoles have an enviable three-year track record for enduring continuous, round-the-clock use and abuse.*

* Poetic license applied for.

† 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.

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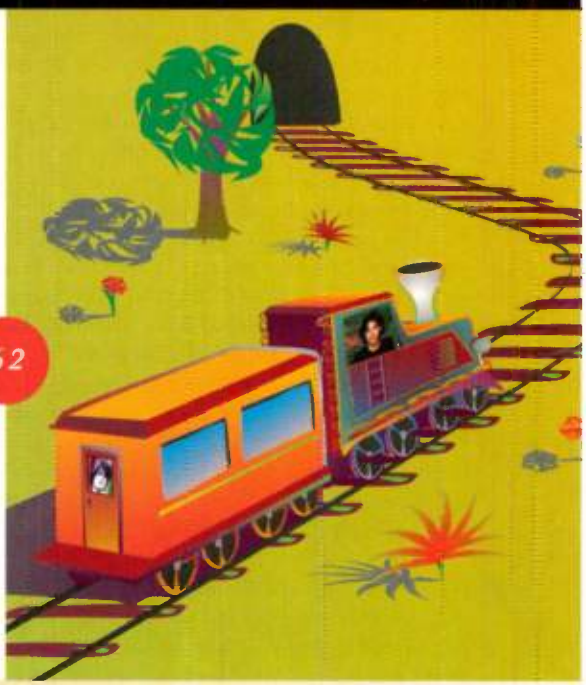

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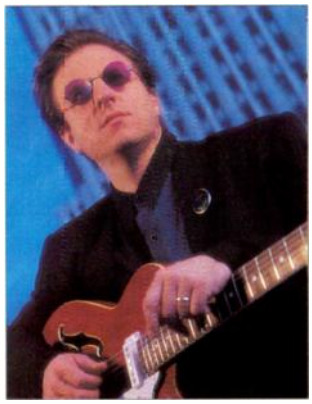
Cover: Illustration by David Bishop.

Obsessive Behavior

Gear lust fuels our Editors' Choice Awards.



ROBERT PERRY

For the gear addict, there is no greater joy than being pummeled by an endless deluge of exciting new music products. Such constant stimulation dooms one's chances of being cured, of course, but most tech heads could care less about being saved. They blissfully surrender to their desires. And I'm sure you can imagine that working at **EM** plays havoc with even the most disciplined editor's restraint. Picture a chocoholic sweeping floors in a Hershey factory and you'll have some idea of the exquisite torture of walking into this office every day. ("Oh look, we just received the Focusrite Green Series, the new Yamaha 03D, and tons of the latest Pro Tools plug-ins!")

Unfortunately, the dreaded R-word—Responsibility—looms large in our little corner of paradise. We can't just play idly with all the new toys, because you expect us to report on these fruits of music technology. To this end, we have willingly accepted a tremendous accountability to our readers, and we preserve trust the best way we know how: by publishing fair, unbiased, technically astute, and probing evaluations of all the gear that's fit to grace your studio or live rig.

So, whether you live many, many miles from a music store and need **EM** to be your eyes and ears or simply want a "learned opinion" on a piece of equipment, you can rest assured that we have put the product in question through its paces. At their best, our reviews and features can help you exploit a product to its maximum design potential and beyond. They can also reveal a piece of gear's quirks *before* you suffer the frustration of discovering them in the middle of an important project. We can consistently offer this level of analysis because our fine editors and freelance authors are *users* themselves. Our "test benches" are actual studio sessions and live performances. Putting a product under the gun in a real-world situation—where anything can, and will, go wrong—is the ultimate stress test of the unit's function, overall design concept, and reliability.

And this brings us to our 1997 Editors' Choice awards. As in previous years, none of the winners were honored due to their popularity with consumers, the advertising expenditures of their parent companies, or the past achievements of their manufacturers. Every "Editors' Choice" product had to stand on its own merits as a musician's tool and survive the scrutiny of those persnickety **EM** editors and freelance reviewers. And I don't use the term *scrutiny* loosely. Under the direction of product guru and Senior Editor Steve O., we bullied each nomination ruthlessly until only the very finest, hippest, and most innovative gear received awards. We've done our very best to ensure that these awards *mean* something—that the products honored can be relied upon to be stellar partners for your creative endeavors and that an **EM** editor stands behind every kudo.

Now, do you mind if I slip into a tone of conspiratorial vagueness? (Hey, it's my birthday month, and I should be able to do whatever I want!) Here's the cryptic communiqué: Next month, **EM** is unveiling a surprise that will hopefully expand your reading pleasure. Our little secret will be included in these pages, so whether you're a subscriber or a newsstand buyer, you'll receive this groovy premium *gratis*. We're very excited about **[censored]** and can't wait to hear your reactions. See you next month!

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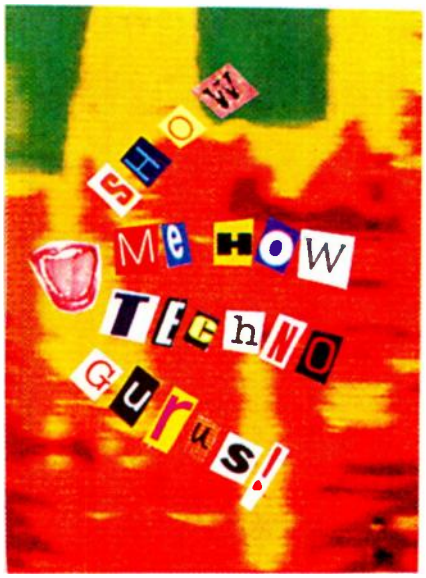

A HERO REVEALED

I was quite interested in the article on producers by Michael Molenda ("Production Values: Shop Talk," November 1996). In the first paragraph, he stated that there would be no justice until the unsung studio technician who recorded the Troggs tape was inducted into the Rock and Roll Hall of Fame.

I agree, and because I just had dinner with him, I'd like to get the induction proceedings rolling. Clive Franks was an engineer on that session, and he was the one who left the microphone on and the tape rolling to capture those "golden" moments. He also edited the tape afterward.

Clive has been the front-of-house soundman for Elton John for many years as well as a soundperson for Peter Gabriel, Robert Plant, The Who, Toto, and others. Having played with Elton John and a few other British bands, I believe that Clive is one of the best in the business. Unfortunately, working on a sound crew is sometimes a thankless task. So I hereby nominate Clive Franks for his place in the Hall of Fame, based on his humble contribution of humor to all of us, in the form of the legendary "Troggs tape"!

Fred Mandel
address withheld

GRAND ILLUSIONS

I really enjoyed Jim Miller's article on sampling pianos ("Simply Grand," November 1996). Clearly, he has worked through the myriad problems presented by what may be the most difficult of musical instruments to sample satisfactorily.

However, I would like to add two further notes to what Jim said. First, he didn't mention the very high degree of interaction between the strings and the piano's other mechanical components and how manipulating those elements affects the sound—such as when a piano is played with the sustain pedal held down. For example, E-mu produced a bank of CD-ROM samples for the Emulator III that was recorded with the sustain pedal depressed. Although they're still not as nice as the real thing, the difference between arpeggiating and holding these samples, as opposed to playing a standard piano sample and depressing the hold pedal on a keyboard controller, is quite striking (if you'll pardon the pun).

Another critical criterion in piano sampling that Jim didn't include is quiet. A good piano sample requires extremely quiet mics and mic preamps and an extremely quiet room. His suggestion of sampling in a piano showroom is quite clever but should only be viewed as a path of last resort. Even commercial studios can suffer from ventilation noise or low-level traffic leakage—especially low-frequency rumble from passing trucks—that would compromise recording the long decay of a single note.

Unfortunately, most readers can't afford high-end studios designed to produce near-silent recording environments. Therefore, it is important to note that home sampling sessions may produce less-than-useful results unless you do them at a very quiet time and make whatever kludges you can to shut out the outside world. Even the sound of the kitchen refrigerator turning on can spoil a piano sample in the living room!

Larry the O
larryo@lucasarts.com

BROADER HORIZONS

In the November 1996 "Front Page," Michael Molenda talked about your growing pains and how the magazine is getting bigger. It thunks when you throw it on your desk and all.

Well, let me be one of the first to congratulate you. It couldn't happen to a nicer mag. That's because there aren't any nicer mags. You do what you do very well, and I have no complaints.

Still, Molenda did ask for suggestions, so I do have one. You guys are great at reviewing and working the hardware and the software, but I'd like to see more about the liveware. In the article, Molenda called **EM** "an exceptional gear mag." And that's true. But if you have extra space to fill, I'd like to see it filled talking about composition, theory, and musical philosophy. Where are you coming from, and how does that translate into sounds? How do you make a melody? What are your harmonic structures? How do you make that work? How can I use consonance and dissonance? Why am I making music anyway? We are, after all, electronic *musicians.*

Mark Hansen
mark.hansen@privy.com

Mark—Thanks for your kind words. I've always guided **EM** *to promote the human face of technology, which is why we've expanded our interview features and career coverage. Obviously, we can do even more, as you've pointed out. I'd like to encourage other readers to e-mail me (emeditor@aol.com) with their thoughts on how much we should cover nonequipment issues, such as the ones you've identified in your letter. Our staff is open to publishing whatever information helps readers attain their creative goals.—Michael M.*

WHAT ABOUT US?

Your November issue was the best yet. I found the article on hard-disk recorders ("The Magnificent Seven") especially helpful.

I work for a small studio that does mostly classical music and jazz. I realize that I probably represent a minority of your readers, but I wonder if you might

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humor me for a moment. What if, in your reviews of equipment such as reverbs, mixers, various recorders, and mics, your reviewers occasionally did some testing with acoustic instruments other than guitars, pianos, and drums? I'd love to know how an oboe or a bass clarinet fares with a particular reverb or effects processor. Or how well a microphone fares when recording a French horn or violin. I realize that for the vast majority of your readers, guitars and drums are where the (acoustic) action is. But I wonder how many out there crave a bit more variety?

Ben Miller
ben@liben.com

Ben—I'm surprised at your query because we do *strive for instrumental variety in our evaluations. For example, I produce and engineer for a diverse community of musicians, so I always try to include violins, flutes, tablas, saxophones, and other instruments in my mic and signal-processing tests. I would agree, however, that our multi-effects reviews have stayed within the conventional guitar-bass-drums-voice arena. We'll try to be more broad-based in the future, because I agree that a reverb algorithm that sounds great treating a guitar might sound less than wonderful when processing a cello.*

The breadth of a review's "test field," of course, depends on the instruments and players available to the reviewer. We're not consciously trying to exclude classical and exotic instruments from these pages. (Just recently, in fact, Assistant Editor Brian Knave dedicated his entire September 1996 "Recording Musician" column to recording South American wind and string instruments.)

And, by the way, according to the 1996 Reader Profile compiled by our stellar marketing department, readers interested in jazz make up 59 percent of our total audience, and classical lovers hit the 57.8 percent mark. (Obviously, there is a fair amount of overlapping interest.) So, Ben, you actually represent a majority *of our readers. Congratulations!—Michael M.*

SHARE AND SHARE ALIKE

Thank you Jim Pierson-Perry and Dennis Miller for the excellent article on music shareware ("Cool Tools," October 1996). As a student and musician, I can't always afford to fork over big bucks for expensive software. Because I must often turn to shareware alternatives, I was glad to see that other people do the same. **EM** is such a valuable resource that I can't imagine being a musician today and not having your magazine.

Chad Seay
mcseay@student.berklee.edu

PROGRAM CHANGE

Thanks for your review of *Virtual Waves* 1.01 in "Cool Tools." However, as author of this software, I would like to specify some points: (1) This is not shareware—it is commercial software; (2) The French firm Fretless is no longer allowed to distribute this software; and (3) We are now ready to ship the 2.0 version with new modules (spectral draw, cellular sound automata, morphing, flanger, etc.). You can get information or buy *Virtual Waves* 2.0 at the following address: Synoptic, 26 bis bd P.V. Couturier, 93100, Montreuil, France; Web www.synoptic.com.

Nicolas Fournel
fournel@worldnet.fr

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SPEAK OUT

I've been producing some spoken word shows for a local radio station, and I'm interested in contacting some labels and producers specializing in spoken word. Any suggestions?

Also, in Brian Knave's article ("Recording Musician: Recording Spoken Word," October 1996), he suggests that dynamic mics are preferrable to condensers when recording spoken word. I've *only* used condenser mics, such as AKG's C 3000 and C 414, for my projects. Do you recommend any particular dynamic mic for this application?

Pedro Costa
jopeco19@macau.ctm.net

Pedro—You can find contact information for the producers and labels mentioned in my article in the Recording Industry Sourcebook, *available from Mix Bookshelf at (800) 233-9604 or (908) 417-9575; fax (908) 225-1562. Be sure to request the Mix Bookshelf catalog, as well, which contains many other resources for making contact with producers, labels, etc.*

Now, I did not say that dynamic mics are preferable *to condenser mics for recording spoken word, only that they are generally less sensitive and exhibit better off-axis rejection—which may or may not help with the recording, depending on the situation. I did say, however, that dynamic mics may sound better than condensers on certain voices. The only way to know for sure, of course, is to experiment. I got great results with the Sennheiser MD 421, Electro-Voice RE20, and the original AKG D 12 (which has long been a popular bass-drum mic).*

For example, last year I recorded a female singer whose voice is rather thin and sibilant. We tracked first with an AKG C 414 and then with an Audio-Technica AT4033, but not until we tried a Sennheiser MD 421 did we get a warm tone that best complemented her voice.—Brian K.

WHERE ART THOU, JACK?

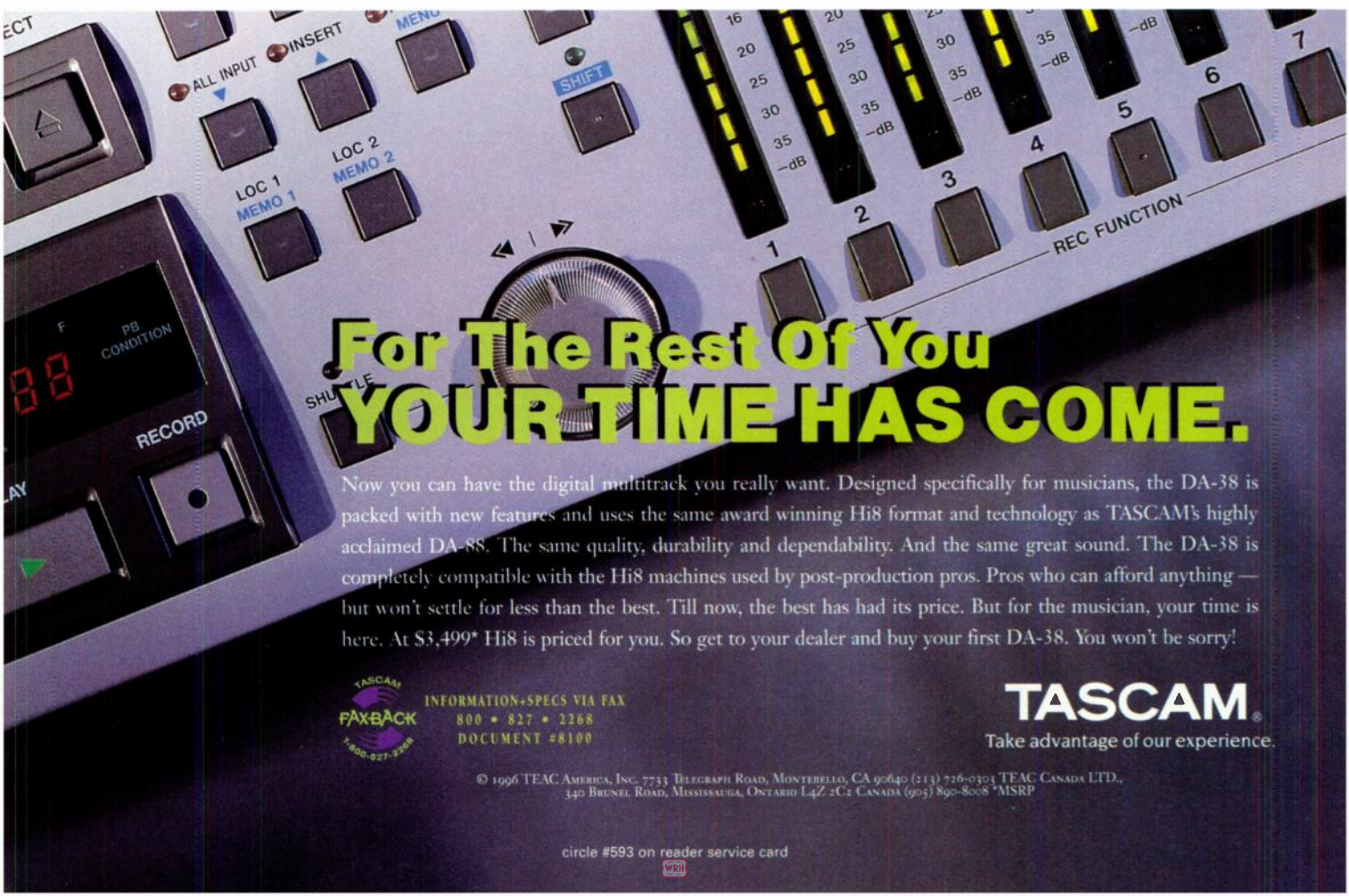
I have been with you since 1989. You have taught me a lot over these years, and I have watched my studio grow at the same time. But when I read the October 1996 issue, I noticed that the picture on "Service Clinic" was made by another person than the one, for example, in the August 1996 issue. Sorry, but I prefer the pictures made by Jack Desrocher and would like to see more of them, please!

j-p
jp@kkoski.pp.fi

J-P—Surprise! Both illustrations were done by our own illustrious (sorry) Jack Desrocher, who has been drawing for us for almost nine years. His style varies depending on whether he's using a quill pen or rapidograph, whether detailed characters or simpler shapes better convey the concept, and, by his own confession, the weather. (We also notice that his characters' noses and necks have been gradually shrinking over the years.) Jack sends us illustrations from the Flying Goat Ranch atop an Arkansas mountaintop, where his daughters go crazy riding the go-cart he built for them.—Linda B.

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.*



COMPOSE YOURSELF.

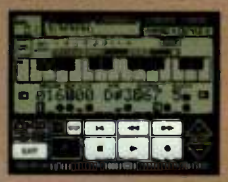
You never know when or where inspiration will strike. But with the PMA-5 palm-held Personal Music Assistant, at least you know where you can put it.

The PMA-5 is the most intuitive creative tool for anyone with a musical thought. Utilizing advanced pen computing technology, the PMA-5 is the ultimate portable music workstation. It's as simple as touching a pen to a screen. You can perform all operations and even play individual notes from the on-screen keyboard. You can access 600 backing patterns and 100 styles ranging from Monk to Funk and Sting to Swing. And, for on-the-spot improvisations, you can use the ad-lib function to play solos or melodies without knowing anything about music. Choose from over 300 Roland sounds and assign them to any of the 8 tracks in the built-in sequencer. Then add on-board effects including eight types of digital reverb and chorus. The PMA-5 can even function as a 16-part multitimbral GM/GS sound module.

Realtime faders give you control of volume, panning, reverb and chorus levels for all 8 tracks.

Intro, fills, verse, chorus, ending—the Style Track lets you lay out your song visually.

27 different chord types to choose from in any key with any bass note—even a different chord on every beat.



With step editing you can go deep. Change the velocity and duration of one note, move it a few clock pulses ahead, or insert individual events.

When you're ready to get back to less comfortable surroundings, the PMA-5 has a built-in computer interface. And, because it's MIDI compatible you can play or record into the PMA-5 from a MIDI controller. You can even exchange Standard MIDI File data with your computer for freedom you never had before using the optional PC Communication Kit.

When traveling with a band won't work, the PMA-5 will. Since the PMA-5 is battery powered, you can have a band at your side anytime or anywhere. Choose from up to 20 songs, select bass and drum parts, transpose to any key at will, choose a preset style or create your own. It even has a built-in start/stop jack.

Try the PMA-5 at your nearest Roland dealer or call 1-800-386-7575 to receive a PMA-5 demo video for $5.00.

PERSONAL MUSIC ASSISTANT

Roland®

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Roland Canada Music Ltd., 5480 Parkwood Way, Richmond, B.C. V6V 2M4 (604) 270-6626
http://www.rolandus.com Fax-Back Information: (213) 685-5141, ext. 271 COMPUSERVE®: GO ROLAND

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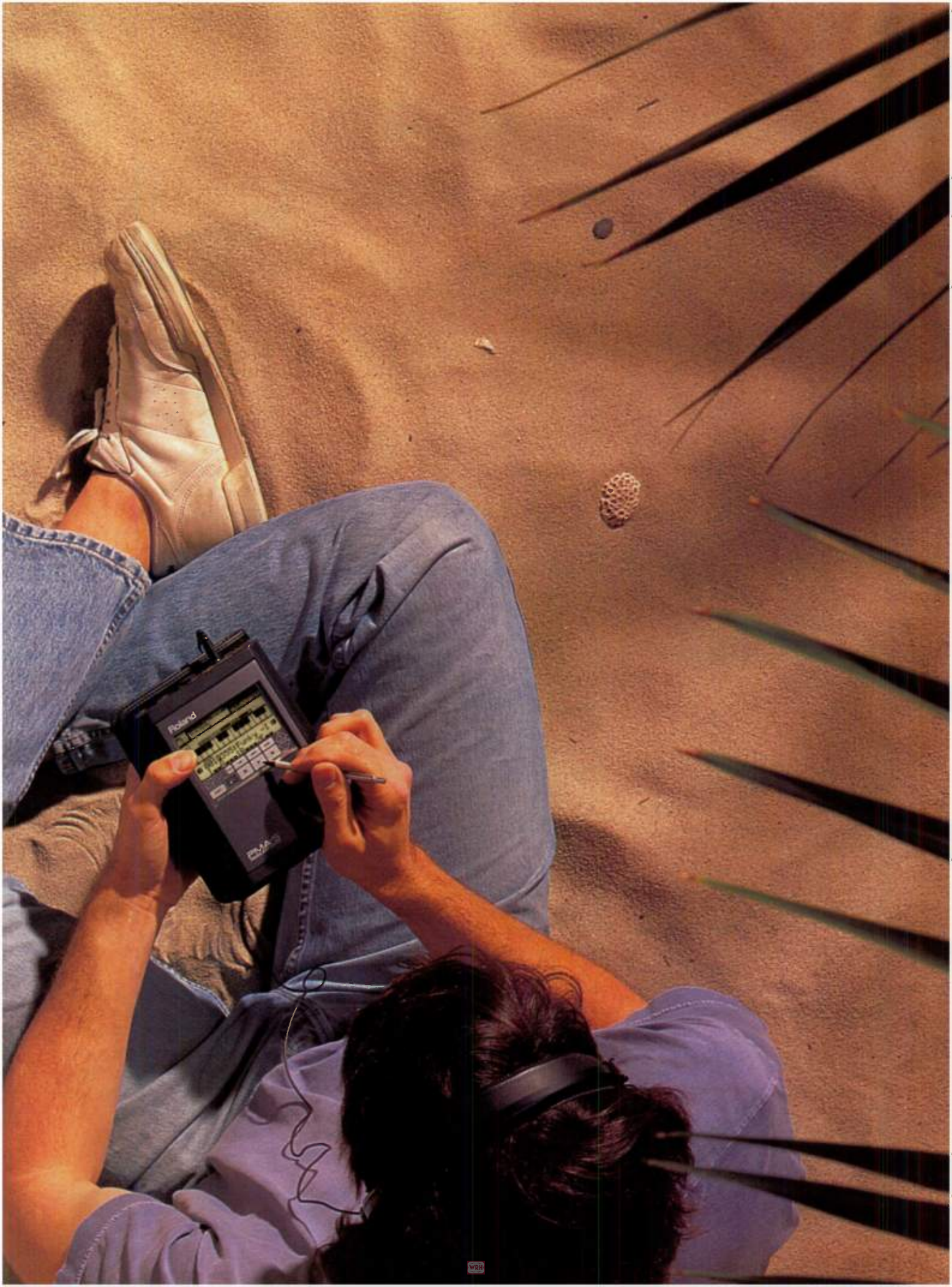
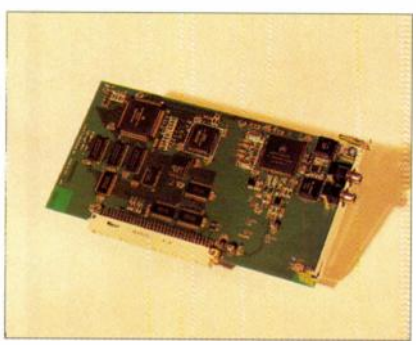

Roland

WHAT'S NEW

By the EM staff

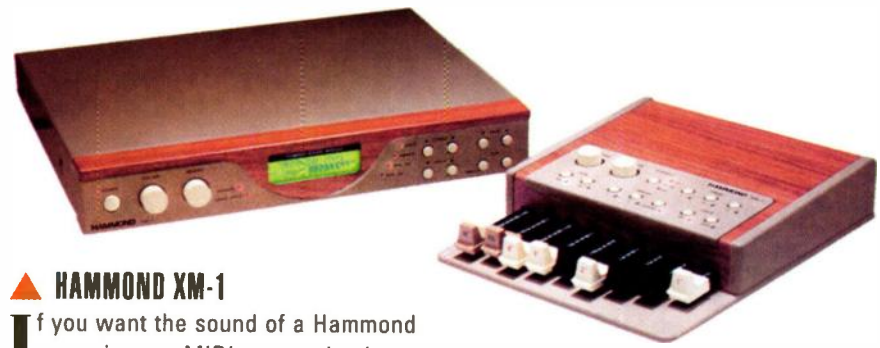


▲ LUCID NB24

Although newer Power Macs are armed with the faster PCI bus, many musicians continue to use NuBus-equipped machines. Lucid Technology's NB24 NuBus digital I/O card ($399) provides S/PDIF digital I/O on RCA connectors and a 24-bit DSP chip for Power Mac owners. According to Lucid, the NB24 will work with any program that uses Apple Sound Manager, and they have confirmed its compatibility with BIAS *Peak*, Macromedia *Deck II* and *SoundEdit 16*, Steinberg *Cubase VST*, and Digidesign *Session*.

Sound Manager is limited to 16-bit signals, but the NB24 handles resolutions up to 24-bit, so you'll be ready if Sound Manager's resolution improves. The card accepts any sample rate from 22.05 to 48 kHz. Output sample rate can be 22.05, 32, 44.1, or 48 kHz. Lucid Technology; tel. (206) 742-1518; fax (206) 742-0564; Web www.lucidtechnology.com/lucid.

Circle #401 on Reader Service Card



▲ HAMMOND XM-1

If you want the sound of a Hammond organ in your MIDI setup, check out the Hammond XM-1 sound module with XMc-1 drawbar controller ($1,416). The 1U rack-mount module uses Hammond's VASE II sound engine and 1 MB of Hammond B-3 samples. It is 32-note polyphonic and 3-part multitimbral (for upper manual, lower manual, and pedal keyboard parts) and responds to Pitch Bend, Modulation, and Channel Pressure. The unit has 128 user patch locations in RAM, 100 of which are filled with editable factory presets.

The XM-1 lets you set drawbar voicing and foldback, attack (key click), second- and third-harmonic percussion, and overdrive. Its digital Leslie simulator lets you set parameters such as mic placement, distance, and angle; rise, fall, and brake time; and speed. These can be set independently for the upper and lower rotors. You can choose from five preset and five user-editable Leslie programs. Other effects include room, live, hall, and chorus reverbs with adjustable depth and a vibrato/chorus effect with five speed settings.

Editing can be done on the XM-1's front panel, or you can use the XMc-1 drawbar controller. In addition to nine drawbars, the XMc-1 has knobs for overdrive and volume level and buttons for Leslie on/off and slow/fast, second- and third-harmonic percussion, vibrato/chorus select, preset select, and part (upper, lower, or pedal).

In addition to MIDI In, Out, and Thru jacks, the XM-1 has unbalanced ¼-inch L/R and headphone outs, a footswitch jack, a mini-DIN connector for the drawbar controller, and a Leslie Driver jack for attaching an external Leslie speaker via an adapter. (Adapters are under development; release dates and prices tba.) Hammond Suzuki USA; tel. (708) 543-0277; fax (708) 543-0279.

Circle #402 on Reader Service Card

▼ MOTU MIDI EXPRESS XT

Mark of the Unicorn's MIDI Express XT ($395) is a MIDI interface, synchronizer, and 8-In, 9-Out MIDI patch bay. All inputs can be routed and merged to any outputs, and data can be rechannelized at the input and output. You can connect a Macintosh and a Windows (3.1 or 95) computer to the MIDI Express XT at the same time via PC parallel and Mac serial ports. Controller software is provided for both platforms.

The MIDI Express XT receives and generates SMPTE (LTC) at frame rates of 24, 25, 29.97 drop and nondrop, and 30 fps. It supports jam sync and adjustable freewheeling. A front-panel SMPTE stripe button is provided along with two ¼-inch SMPTE jacks. The XT also converts between LTC and MTC and supports MIDI Machine Control as master or slave, which lets it serve as a time-code hub, distributing the commands it receives via MMC.

A footswitch jack doubles as an audio click-to-MIDI input. The unit has sixteen presets with eight editable, battery-backed memory locations. Setups can be recalled via MIDI patch change. Mark of the Unicorn; tel. (617) 576-2760; fax (617) 576-3609; e-mail info@motu.com; Web www.motu.com.

Circle #403 on Reader Service Card

YAMAHA G50

The G50 guitar-to-MIDI converter ($749.95) detects pitch, picking position (proximity to the pickup), and amplitude envelope. The converter can send Control Change messages that correspond to changes in the picking position and/or envelope. In addition, you can play two parts with a horizontal split based on picking position or a vertical split that divides strings into top and bottom groups, or you can assign a different part to each string. The converter requires Yamaha's G1D guitar pickup ($199.95).

ROM presets are provided for use with Yamaha's MU50, MU80, VL70-m, and VL1-m tone generators, and there is room for 128 user programs, which can be saved and loaded via SysEx. The G50 also serves as a pitch-to-MIDI converter for any signal patched into its ¼-inch input. A Direct Out jack outputs the dry guitar signal. There's also a footswitch jack and a built-in guitar tuner. Yamaha Corporation; tel. (714) 522-9011; fax (714) 739-2680; e-mail info@yamaha.com; Web www.yamaha.com.

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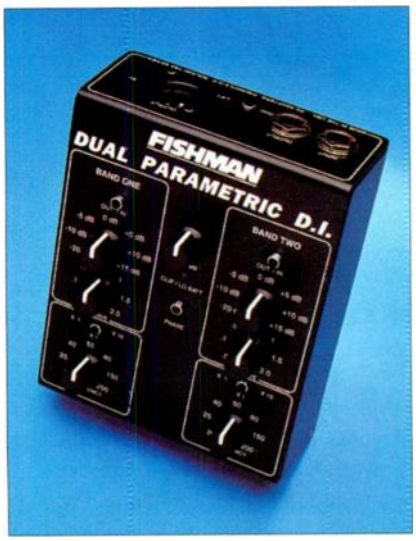

FISHMAN DUAL PARAMETRIC D.I.

Fishman's Dual Parametric D.I. ($239.95) is an active direct box and instrument preamp with a built-in 2-band, parametric EQ. The box has one ¼-inch input and ¼-inch and XLR outputs. A volume knob lets you cut the input level or boost it by up to 6 dB. A clip LED doubles as a low-battery indicator. (The unit uses a 9V alkaline battery or optional 910-R AC adapter; $26.95.) Ground-lift and phase-inversion switches are also provided.

Each band in the EQ section has a bypass switch, cut/boost knob with a range of -20 to +15 dB, bandwidth control (0.07 to 2 octaves), and frequency controls. The frequency knob is marked 20 to 200 Hz, and a 3-position switch multiplies the frequency by 1, 10, or 100. Fishman rates the unit's frequency response as 20 Hz to 20 kHz, THD at 0.03% (@ 1 kHz, -14 dB input), and S/N at 89 dB. Fishman Transducers; tel. (508) 988-9199; fax (508) 988-0770.

Circle #405 on Reader Service Card

JUSTONIC PITCH PALETTE

Although some synths have adequate tuning resolution to allow for pure harmonic scales, proper intonation in these scales requires constant retuning in response to changes in key or chords within a key. The *Pitch Palette* software ($199, Mac or Windows) from Justonic Tuning takes care of these adjustments as you play. *Pitch Palette* provides you with a menu of international and historic scales and allows you to create and save custom scales. These are 12-tone scales, but *Pitch Palette* actually creates a 12 × 12 × 12 matrix of pitches in each octave based on note, key, and root. Whenever you play a chord, the program analyzes the tonal structure, determines a root, and retunes the notes on your synth in relation to it. If you wish, you can specify the root yourself, either in a sequence (using the built-in sequencer) or in real time using a separate controller.

Pitch Palette also includes an onscreen piano keyboard, an onscreen oscilloscope, and a calculator that converts scale units between ratios, decimals, hertz, and cents. Currently supported synths include the Ensoniq MR series, Kurzweil K2000 and K2500, Roland SC series, and microtunable Yamaha synths. The program allows new synth definitions to be added.

Justonic has also released its own rack-mount synth with the *Pitch Palette* tuning algorithm embedded. The *Tone Palette* ($4,500) is an additive, DSP-based synth with a tuning resolution of 0.01 Hz. It is 32-part multitimbral and features dynamic polyphony up to 128 voices, depending on the complexity of the sounds being played. The unit includes an Iomega Zip drive for adding new sounds. Justonic Tuning; tel. (604) 682-3456; fax (604) 669-3301; e-mail info@justonic.com; Web www.justonic.com.

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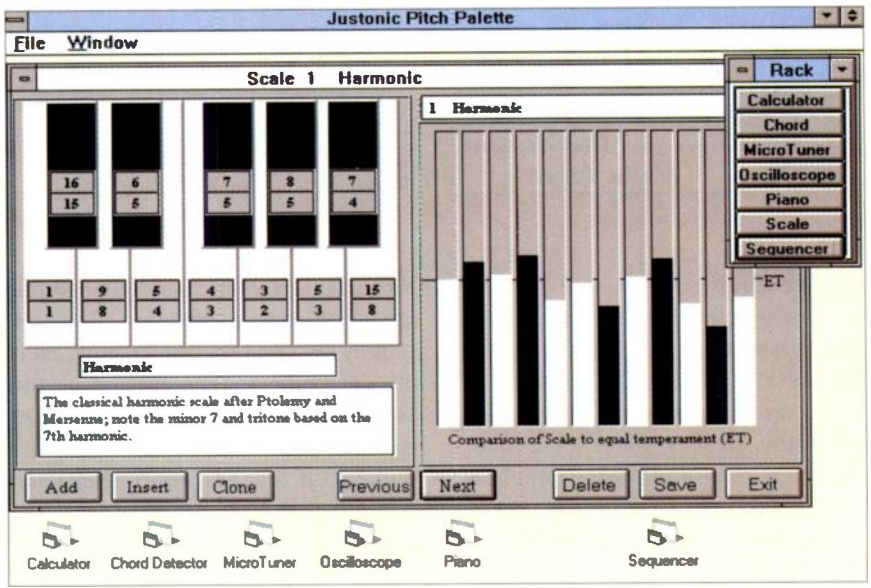

SOUND ADVICE ▲ ▲ ▲ ▲

▼ 3D SOUNDS

3D Sounds, a Canadian company not to be confused with 3D Sound of California, produces *The Wave Bank* ($29) and *The Sampler Bank* ($49) CD-ROMs. The PC-format *Wave Bank* comprises 640 MB of 44.1 kHz, 16-bit, multisampled WAV files containing 1,950 stereo and mono instrument sounds organized by instrument. The library contains a wide variety of instruments, including analog and digital synths; rock, dance, rap, jazz, and ethnic drums; orchestral instruments; brass; strings; woodwinds; pianos; organs; and more. The sounds were recorded using an Ensoniq ASR-10 sampler and processed in Sonic Foundry's *Sound Forge* with EQ, compression, limiting, and/or reverb.

The Sampler Bank is available in either Ensoniq format or as a PC-format disc that includes a utility for transferring files to floppy disks for use in samplers. It contains enough material for more than 550 Kurzweil K2000 or Ensoniq ASR-10, TS-10/12, or MR-series disks.

Sampled sounds include analog and digital synths, hundreds of drum kits, basses, sound effects, vocals, pianos, brass, woodwind, strings, and more, sampled at 44.1 kHz with 16-bit resolution. 3D Sounds; tel. (519) 747-0282; fax (519) 746-2198; e-mail robotron@in.on.ca; Web www.in.on.ca/~dwhite /3dsounds.

Circle #407 on Reader Service Card

▶ LEMON SKY LABS

The Rhythm Guitar Project ($399) is the debut offering from Lemon-Sky Labs. This 2-disc CD-ROM set, available in SampleCell and Kurzweil formats, contains over 1 GB of chords and single-note samples of Martin D-18 6-string and D-28 12-string guitars. The samples are designed to be played in real time from a MIDI keyboard, and an innovative mapping scheme allows you to play upstrokes and downstrokes with the left and right hand, respectively. Minor chords are selected with the sustain pedal. For each chord, two upstroke and two downstroke samples are provided to add realistic variety, and some sample sets include rakes (slow downstrums), squeaks, slides, and so on.

Looped and unlooped samples are provided with and without EQ (to remove boominess and add high-end sheen for increased presence in a mix). Alternate performances are also included for creating a simultaneous live "double" (two-guitar) sound. These 16-bit, 44.1 kHz samples were recorded through Groove Tube and Neumann microphones, a Summit TPA-200B preamp, and a Symetrix 620 20-bit A/D converter. Big Fish Audio (distributor); tel. (800) 717-3474 or (818) 768-6115; fax (818) 768-6115; e-mail sherman@lemonsky.com; Web www.lemonsky.com.

Circle #408 on Reader Service Card

CLAVIA

Hundreds of sounds for Nord Lead synthesizer are available for free downloading from the company's Web site, www.clavia.se. To use these sounds, your Nord Lead must be expanded to 12-voice polyphony and have the S RAM PCMCIA card. Both single sounds and layered performances are offered, and a separate table of contents is provided for each bank. Some of these sounds were created by Clavia, and others were made by such sound designers as Zon Pyles, Rob LaVaque, and Ron Reinhardt. Also included on the site are instructions for submitting your own sounds for possible inclusion in new banks.

Circle #409 on Reader Service Card

▶ BGW 24SS

If you have more small tabletop units than tables, the solution might be the 24SS ($199) or 16SS ($137) from BGW. These rack-mount sliding shelves are made from solid 14-gauge, cold-rolled steel and feature full-extension, ball-bearing slide rails; fixed-position latches; and integral pull-handles for one-handed operation.

The 24SS is 24 inches deep and the 16SS is sixteen inches deep. Both are slightly over one rackspace high. With the standard rear-support brackets, the 24SS can sustain weights up to 220 pounds and the 16SS up to 100 pounds. Without the rear brackets, the shelves can support 40 to 50 pounds. BGW Systems; tel. (800) 468-2677 or (310) 973-8090; fax (310) 676-6713; e-mail sales@bgw.com; Web www.bgw.com.

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Note:

Every few years
home studio technology
takes **a leap in quality**
and **a drop in price.**

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EMAGIC
Technology with Soul.

TDM PLUG-IN BONANZA! ▲ ▲ ▲ ▲

▼ DIGIDESIGN/FOCUSRITE D2

The *Focusrite d2* plug-in ($995) for Pro Tools III/TDM systems was engineered by Digidesign and Focusrite to emulate the operation and sonic signature of the Focusrite Red 2 EQ designed by Rupert Neve. The plug-in's graphic interface is even designed to *look* like a Red 2 front panel. Six-band, 4-band, and dual/single-band modules are provided so you can use only the DSP power you need. *D2* allows up to 24 bands of EQ per DSP chip on PCI-bus systems and sixteen bands on NuBus systems, and you can run multiple *d2* modules up to the limits of DSP availability.

The program includes 18 dB/octave highpass and lowpass filters with adjustable cutoff, high-cut and low-cut (±15 dB) shelving bands with adjustable threshold and boost/cut, and two parametric bands with overlapping frequency ranges.

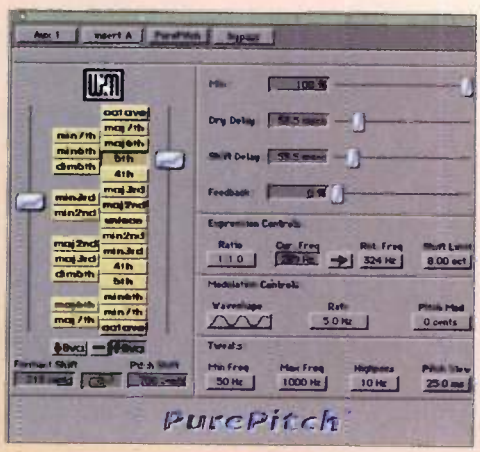
Parameter settings are displayed on-screen next to rotary knobs. Values can be input directly from the keyboard. Settings can be edited independently for left and right channels and then linked to retain the offset. L/R input and output level controls are provided along with dual plasma meters and a Cartesian graph that displays EQ settings as they're adjusted. Digidesign; tel. (415) 842-7900; fax (415) 843-7999; e-mail digimkt@digidesign.com; Web www.digidesign.com.

Reader Service Card not available

▲ STEINBERG REDVALVE-IT

Warmth and distortion from tube-driven amplifiers have come to practically define the sound of electric guitar. Steinberg's *RedValve-It* ($399) is a plug-in designed to give that sound to tracks recorded in a TDM system. Twelve presets emulate different amplifier models. Most presets aim at creating rock or blues guitar sounds, but a Clean Tube Amp setting is provided, as well. The package also comes with a *Virtual Speaker 1* plug-in that simulates the sound of a signal run through a speaker and then picked up by a microphone.

RedValve-It works in real time and gives you control over input level, wet/dry mix, gain (amount of distortion), and a 3-band EQ with specs that vary depending on the preset. There's also a noise gate (you determine its threshold with a calibration function), a bypass button, and a clip indicator.



Virtual Speaker 1 lets you choose combo or stack cabinets. *RedValve-It* and *Virtual Speaker 1* each use one DSP chip. Steinberg North America; tel. (818) 993-4091; fax (818) 701-7452; e-mail steinberg@aol.com; Web www.steinberg-na.com.

Circle #411 on Reader Service Card

▼ WAVE MECHANICS PUREPITCH

New from Wave Mechanics is *PurePitch* ($500), a TDM plug-in that performs real-time pitch shifting on a mono track with a range of ±2 octaves. *PurePitch* is designed to shift the pitch while preserving the formant frequencies so you can shift vocals over a wide range without changing the character of the voice (e.g., no chipmunk or robot voices). If you *want* to change the sound's character, *PurePitch* lets you shift the formant frequencies up or down by as much as one octave, independent of pitch. The program also contains a tool that compresses or expands the vocal pitch envelope with a ratio between 3:1 and 1:3; this can make a spoken voice more monotone or more expressive.

PurePitch gives you control over wet/dry mix, dry-signal delay, feedback effect, and pitch-modulation amount, rate, and waveshape. A library of more than twenty effects presets is provided. The program uses one DSP Farm chip. Wave Distribution; tel. (201) 728-2425; fax (201) 728-2931; e-mail info@wavemechanics.com; Web www.wavemechanics.com.

Circle #412 on Reader Service Card

FOLIO SX

SPIRIT

THE FACTS (& no Bull)

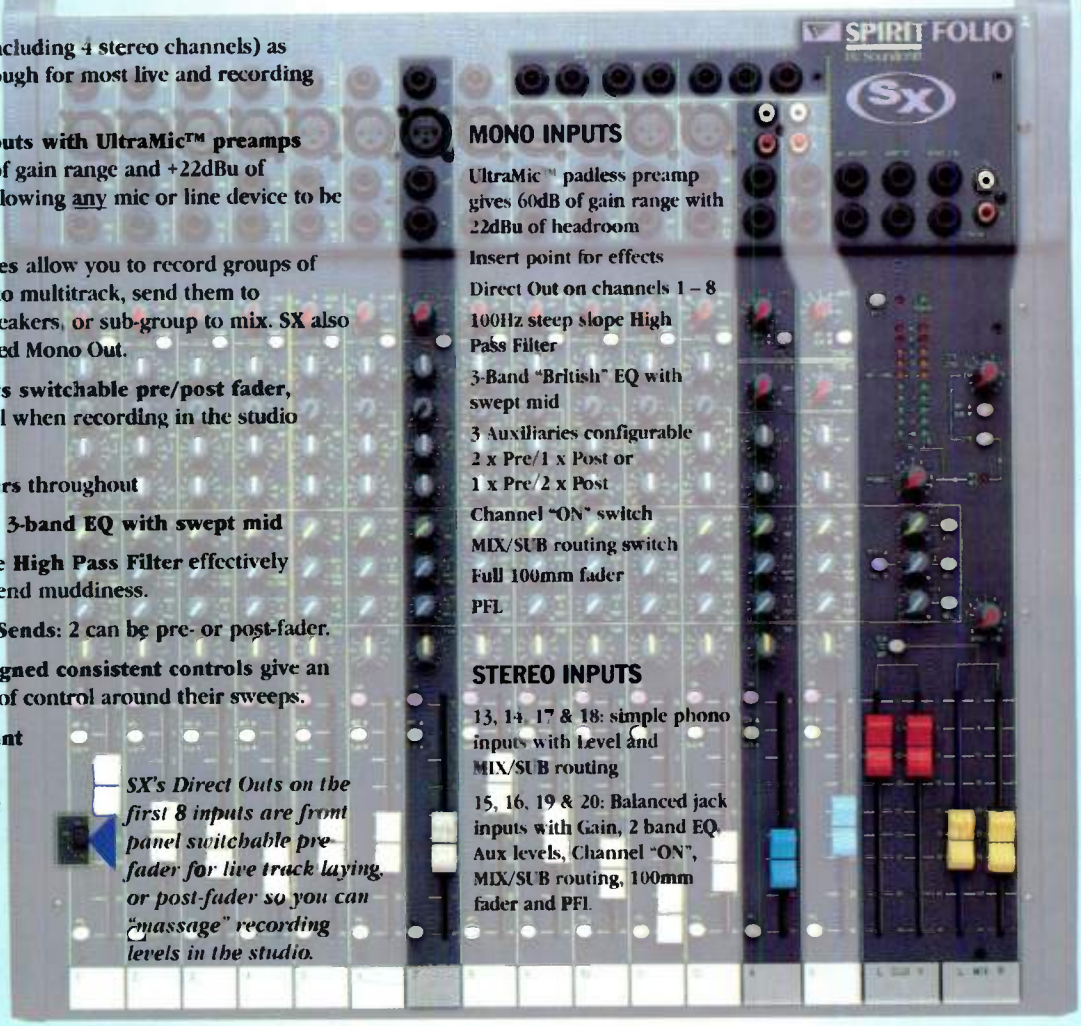
At Soundcraft, designing the mixing consoles people actually want has been a serious business for over 22 years. We've listened to our customers – from budding musicians to world-renowned artists and sound companies – and we've built their wish-lists into our mixers. We don't hype our new features and we don't go in for gimmicks. When you listen to SX you'll realize we listened to you.

NO HYPE NO GIMMICKS NO BULL.

FOLIO SX is a powerful, multipurpose mixer with DAT quality sound, housed in a freestanding frame with carry handle.

$769.95
Suggested Retail in USA

- **20 inputs** (including 4 stereo channels) as standard, enough for most live and recording situations
- **12 mono inputs with UltraMic™ preamps** giving 60dB of gain range and +22dBu of headroom, allowing any mic or line device to be plugged in.
- **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.
- **100mm faders throughout**
- **Real British 3-band EQ with swept mid**
- **18dB/Octave High Pass Filter** effectively reduces low end muddiness.
- **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

100Hz steep slope High Pass Filter

3-Band "British" EQ with swept mid

3 Auxiliaries configurable
2 x Pre/1 x Post or
1 x Pre/2 x Post

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%

SURFACE MOUNT TECHNOLOGY BREAKS THE FEATURES/PRICE BARRIER

As one of the world's largest mixing console manufacturers, Soundcraft has invested in the most advanced production systems available. Leading edge circuit construction using Surface Mount double-sided glass epoxy PCBs means lower manufacturing costs without any downside. The result: much more mixer for your dollar.

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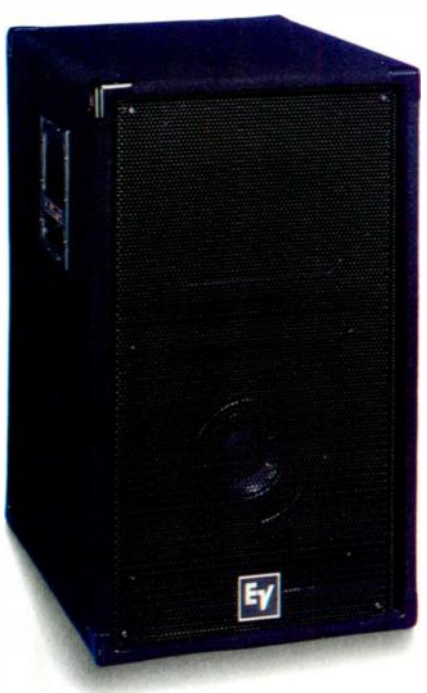
So Much Fidelity, So Much Power, So Little Competition.

T18 18" SubScoop™ | **T22** 12" Two-Way | **T52+** 15" Two-Way | **T53** 15" Three-Way | **T55+** Dual 15" Two-Way | **T180** 18" Subwoofer | **T221** 12" Two-Way | **T251** Biampable 15" Two-Way | **T252** Dual Biampable 15" Two-Way | **T351** 15" Three-Way | **MTH-1** Two-Way | **MTL-1** Dual 18" SubScoop™

In today's professional music store, you can't buy a stage speaker system with more fidelity or power than our new T-Series. Each of the twelve models was designed for a specific application and budget, and offers the very highest performance value. And, given a serious listen, the full-range fidelity will at least impress you, if not make you fold your arms, grin, and say, "Wo." Compared to any speaker line, the T-Series is lighter, better-sounding, and more powerful. And we can prove it.



T351: The world's smallest high-Q 15-inch three-way speaker.

If you can imagine a full-range speaker system with the clarity of a studio monitor and the muscle to push concert levels, that's the T351. The T351's New Generation Midrange speaker has a 16 lb. magnet structure and control device that gives you warm, even mids. The 60° x 40° horn provides the even, constant coverage most often preferred in mid-sized systems. About the same size as a typical two-way, the T351 three-way speaker by far out performs any competition we could find. But you'll have to hear for yourself.

See your Electro-Voice dealer for a real demonstration and we'll send you a T-Shirt. For the dealer nearest you, call 1-800-234-6831

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T-Series

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▲ AVM APEX

The new Apex audio card ($299) from AVM offers wavetable synthesis and four independent channels of digital audio on an ISA-bus card for DOS and Windows machines. Apex's onboard synth is 16-part multitimbral and provides 32-note polyphony. It uses the Kurzweil MA-1 chip set, 2 MB of Kurzweil ROM samples, and a set of synthesis algorithms taken from Kurzweil's VAST engine, which include multiple resonant filters. Apex also features a 24-bit effects processor that handles reverb, chorus, delay, flange, and distortion.

Up to 64 MB of sample RAM can be added using 72-pin SIMMs. You can load your own samples, WAV files, or Kurzweil .KRZ files into the sample memory, and translators are provided for many other sample formats.

The full-duplex card can record and play 16-bit stereo audio at sample rates between 5 Hz and 55.2 kHz in 1 Hz intervals. It has ⅛-inch jacks for input, CD/Aux input, synthesizer output, and audio output. The synth output uses a 20-bit D/A converter and has an S/N ratio rated at >98 dB. The regular audio inputs and outputs use 16-bit D/A and A/D converters with S/N ratio rated at >89 dB. Apex rates the card's frequency response at 10 Hz to 22 kHz (+0/-1 dB) and THD at <0.005%.

An optional daughtercard ($80, expected in the first quarter of 1997) will provide two channels of S/PDIF I/O on RCA jacks and will include two nonstandard jacks that will provide two additional channels of AES/EBU I/O via optional adapters (price and release date tba).

Apex is hardware-compatible with Creative Labs' Sound Blaster Pro and also offers a proprietary 3-D sound algorithm, which can be bypassed. It is bundled with *Cakewalk SE,* proprietary patch and wave editors, and a Windows control console. An 80486/33 or better with 4 MB RAM is required. AVM Technology; tel. (801) 571-0967; fax (801) 571-3634; e-mail sales@avmtechnology.com; Web www.avmtechnology.com.

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▶ WALDORF 4-POLE

Waldorf Electronics has made the lowpass filter from its Wave and MicroWave synths available as a separate, tabletop module for use with any sound source. The 4-Pole lowpass filter ($520) provides 24 dB of attenuation per octave above the cutoff frequency (which is selectable from 20 Hz to 25 kHz) with variable resonance up to self-oscillation. Cutoff frequency, resonance, volume, and pan can be controlled via MIDI.

The unit has fifteen modulation sources, including an envelope follower, sample-and-hold, and an LFO that generates triangle, sine, sawtooth, and pulse waveforms. Other features include VCF and VCA ADSR envelopes, a manual trigger button, and a 3-character LED display.

The 4-Pole supplies one trigger input, one audio input, and L/R outs on ¼-inch connectors. The unit has twenty ROM presets and twenty user RAM locations. Waldorf rates the 4-Pole's dynamic range at 95 dB and the signal-to-noise ratio at 87 dB with the VCA closed or 83 dB with the VCA open. GSF Agency (distributor); tel. (310) 452-6216; fax (310) 452-3886; e-mail gsfa@netcom.com; Web www.waldorf-gmbh.de/waldorf.

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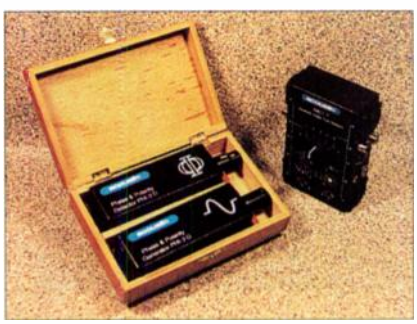
▼ ACOUSTIC CONTROL PHI-3/MCT-7

Whatever an engineer's specialty—studio recording, sound reinforcement, or sound installation—troubleshooting is part of the job. To assist in the operation, Acoustic Control introduces two new portable testers: the PHI-3 Absolute Phase and Polarity Test System ($300) and the MCT-7 Cable Test System ($190).



The PHI-3 is a dual-component system designed to perform tests for absolute phase on amplifiers, equalizers, processors, speakers, drivers, tweeters, cables, or a complete sound system. The PHI-3G pulse generator transmits signals (from 20 Hz to 20 kHz) through the device or sound system while the PHI-3D pulse detector reads the pulses. The PHI-3D also features circuitry for screening distortion and loudspeaker preshoot, which is helpful for eliminating potential false-polarity indications.

The MCT-7 tests for continuity, configuration, cross-wiring, shorts, and grounding on any cable. Tests can be performed on cables with any combination of the following connectors: XLR (male or female); ¼-inch (mono or stereo); ⅛-inch (mono or stereo); BNC; RCA; Neutrik Speakon (4-pole); and 5-pin MIDI.

The PHI-3 and MCT-7 are encased in metal housings and feature multiple LEDs and pin-assignment diagrams. Acoustic Control/Samick Music Corporation; tel. (800) 592-9393 or (818) 964-4700; fax (818) 964-8898; e-mail samick_music@earthlink.net; Web www.samick_music.com.

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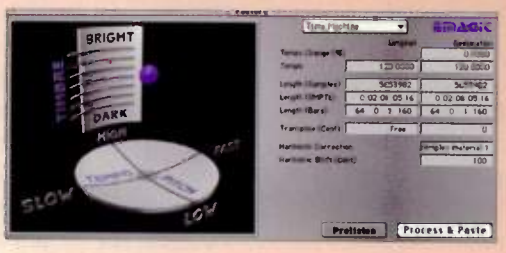
EMAGIC



Emagic has released several upgrades to its *Logic* line. *Logic Audio* 2.6 for the Mac ($799; users of version 2.5 upgrade for $79) includes *Time Machine II*, a redesigned version of the *Time Machine* pitch-shifting and time-stretching/compressing DSP editor. The new version provides formant shifting for manipulating the timbre of audio material. This lets you avoid some of the artifacts that can occur with simple pitch shifting, and it lets you create effects such as making a male voice sound female without changing the pitch. *Time Machine II*'s interface is a 3-dimensional graphic with Timbre, Time, and Pitch axes. It works on mono or stereo files. Although it does not function in real time, the destructive operation can be performed while the audio file is playing from disk.

Logic 2.5 for Windows ($399; users of version 2.0 upgrade for $99) is optimized for Windows 95, although it will run under Windows 3.1. It includes almost all of the new features found in *Logic* 2.5 for the Mac, such as Hyper Draw, Markers, and enhancements to the Score Editor. The program now includes an integrated Waveplayer and support for Video for Windows. Emagic; tel. (916) 477-1051; fax (916) 477-1052; e-mail emagic@emagicusa.com; Web www.emagicusa.com.

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DIGIDESIGN

Digidesign has now released PCI-compatible versions of *Sound Designer II*, *MasterList CD*, and SampleCell II. *Sound Designer II* 2.82 ($495; free upgrade from Digidesign's Web site to registered users of v. 2.8 or 2.81; $75 upgrade to registered users of v. 2.6 or earlier) is fully compatible with both PCI and NuBus Digidesign hardware. When used with PCI-based hardware, *Sound Designer II* 2.82 can record, edit, and play back 24-bit digital audio files and includes destructive editing tools such as normalize, time compression/expansion, invert, and gain change. Support for non-native file formats, including WAV and SND, has been added. Note that Sound Designer plug-ins are not supported on PCI systems.

MasterList CD 1.3 ($495; $49 upgrade to registered users of earlier versions; free upgrade to registered users upgrading to PCI-based Digidesign systems) is also fully compatible with both PCI and NuBus systems. In addition, the program now supports several new CD-R recorders, including Philips CDD-2000, Hewlett-Packard CD-Writer 4020i, Marantz CDR 620, Studer D741, Sony 924S, Pinnacle Micro RCD 5040, JVC XRW-2010, and Ricoh 1420-C.

The SampleCell II PCI card was released with the new *SampleCell II Editor* 2.1 ($1,295), a native PowerPC program featuring a new loop editor and full integration with Opcode's OMS. *SampleCell II Editor* 2.1 is compatible with NuBus systems and a version is available for 680X0 Macs. Digidesign; tel. (415) 842-7900; fax (415) 843-7999; e-mail digimkt@digidesign.com; Web www.digidesign.com.

Reader Service Card not available

MARK OF THE UNICORN

MOTU has released *Performer* 5.5 ($495). The new version has been tuned up and tricked out with native-Power Mac and optimized 680X0 code, new capabilities, and an improved interface. *Performer* now sends MTC, supports QuickTime Musical Instruments, and lets you import any QuickTime movie. The new Mixing Board window lets you create fader groups and has channel strips for volume, pan, solo, mute, and MIDI effects inserts. Nondestructive, real-time effects include Shift, Quantize, Velocity Compression, Echo, and Transpose (by interval or pitch map). All five are available at once on each track and can be changed or bypassed at any time. You can record and save mixer snapshots and an unlimited number of automated mixdowns.

The new Tracks Overview window groups MIDI data into phrase blocks and features MIDI scrubbing and drag-and-drop markers. A selection made in any *Performer* window is reflected in all other windows and maintained even if the edit window is closed. The SmartSelection feature extends or narrows the selected area to include data that belongs with it (such as a first downbeat that was played a few ticks before the bar where the selection starts). Other improvements to the interface include soloing that is independent of track selection and an unlimited number of takes per track. Mark of the Unicorn; tel. (617) 576-2760; fax (617) 576-3609; e-mail info@motu.com; Web www.motu.com. ●

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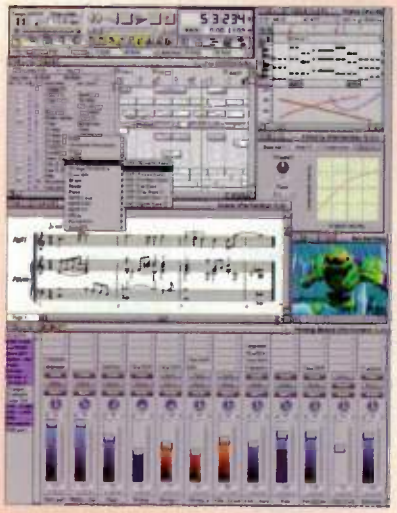

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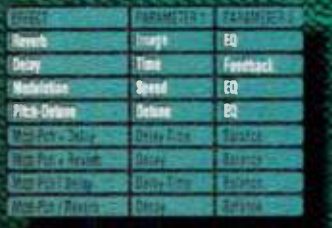

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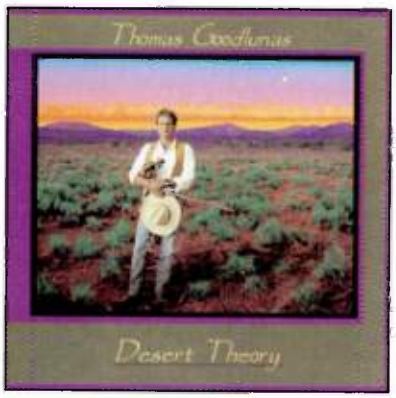

PRO FILE

Desert Song

Thomas Goodlunas makes his classic violin sing.

By Diane Lowery

The biggest disturbance Thomas Goodlunas has to contend with in his desert-based personal studio is the sound of wild horses clattering down the hillside. The quiet bliss of the violinist's tranquil environment is beautifully captured by the melodic, new age instrumentals on his CD *Desert Theory*. But, despite the idyllic surroundings, documenting the sweet, warm tone of his 217-year-old Anton Jais violin proved to be a struggle.

"When positioning a mic to record a violin," explains Goodlunas, "it's critical to get close enough to capture the bow noise—that grainy sound of the rosin on the strings. This sound is what's unique about the violin. If you don't have that, the violin just sounds like a synth pad."

In the past, to capture a pleasing balance of tone and bow noise, Goodlunas miked the violin from the front and the back. But this method was problematic because it was too hard to play freely without bumping into one of the mics. So for *Desert Theory*, he cut back to a single mic: an AKG C 414 set to its hypercardioid pattern.

"I aimed the violin at a bass trap I had built into a corner of the ceiling to reduce low-frequency reflections and positioned the C 414 two-thirds of the distance between that corner and the face of the violin," he says. "I angled the mic somewhat off-axis to the violin and kept moving around until I could hear just enough of the grainy sound without it being too scratchy. Typically, at a distance of about three or four feet, I'd start to lose the scratch and the resonant tones of the violin body would blossom. If I placed the mic too close, however, the tone would get lost and the bow noise would become pronounced."

Goodlunas recorded the violin flat through a dbx 760X mic preamp and then directly to Digidesign's Session 8. To help the tone of the violin stand out from the wash of background violins and synth tracks, he employed a technique used by the great vaudeville musician Paganini.

"Paganini would write compositions in the key of D and have the entire orchestra tuned a half-step lower," says Goodlunas. "Then he'd play in D and make good use of open strings when he soloed. The other violinists actually had to finger the notes in E-flat—a difficult flat on violin—to sound like they were playing in the same key. This made their violins sound muted, while Paganini's tone would have all this brilliance. I used the same sort of trick on *Desert Theory* by layering and EQing the background violins so that their edge was not as pronounced and then panning the violins left and right to create a wash. This created an 'aural amphitheater' that allowed the solo violin to take center stage."

Goodlunas doesn't hesitate to use synth pads for other instruments, but he resists the temptation to use violin samples because he feels he can't obtain the rich nuances of his classic violin. "This 217-year-old violin was the ultimate in music technology for its era, and it proves there are some things that modern technology just can't improve upon."

For more information contact Range of Light Productions, PO Box 757, Minden, NV 89423; tel. (702) 782-3552; e-mail thomas@music.minden.nv.us; Web www.greatbasin.com/~music or kspace.com/goodlunas.

Thomas Goodlunas

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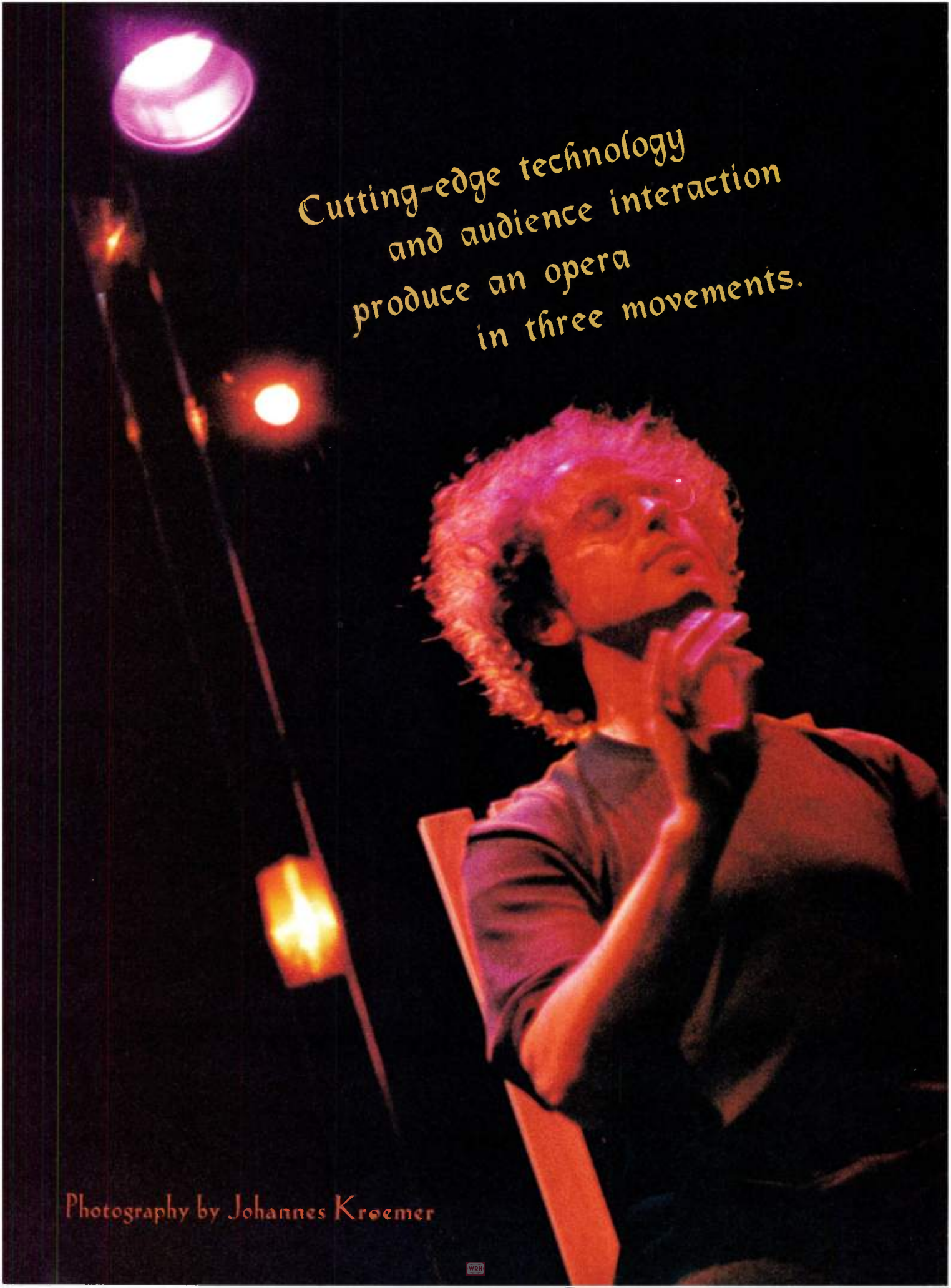

Cutting-edge technology
and audience interaction
produce an opera
in three movements.
Photography by Johannes Kroemer

Phantom of the Brain Opera

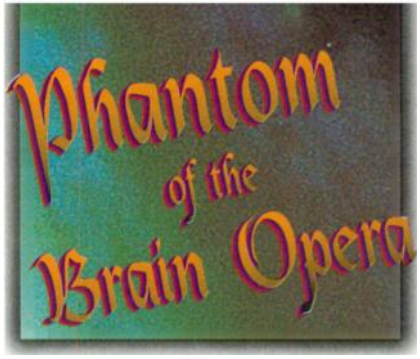
The Opera Ghost really existed. He was not, as was long believed, a creature of the imagination of the artists, the superstition of the managers, or the absurd and impressionable brains of the young ladies of the ballet, their mothers, the box-keepers, the cloak-room attendants, or the concierge. No, he existed in flesh and blood, though he assumed all the outward characteristics of a real phantom, that is to say, of a shade.

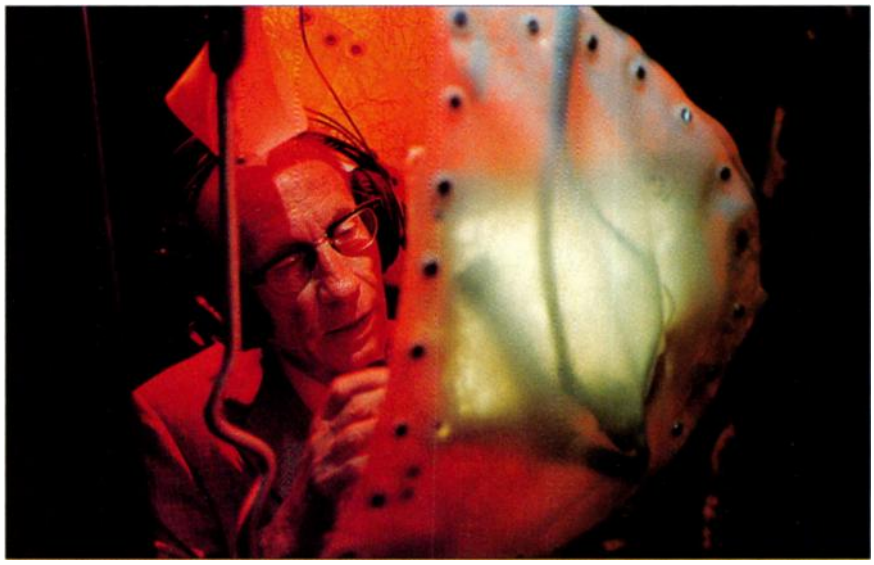
Gaston Leroux
The Phantom of the Opera (1911)

These words speak of a half-crazed musician hiding in the labyrinth beneath the Paris Opera House at the turn of the century, causing strange and mysterious events to further the career of a beautiful young singer. But they could just as easily apply to another unusual but contemporary impresario. This modern phantom certainly stimulates the imagination of artists and everyone else who is fortunate enough to attend a performance of his latest work, *Brain Opera*. And although he doesn't assume the outward appearances of a real phantom, he does work much of his magic using shade of a sort, as we'll see.

The phantom of the *Brain Opera* is Tod Machover, associate professor of Music and Media at the famed MIT Media Lab. Of course, this phantom isn't half-crazed or in hiding. However, he is causing strange and wondrous events to further the musical experience of any and all who care to participate—no matter what their musical background or physical location in the world.

By Scott Wilkinson





JOHANNES KROEMER

FIG. 1: The Singing Tree produces a vocal timbre based on the purity of the pitch you sing into its microphone. (Courtesy MIT Media Lab)

THE PHANTOM

Machover found his primary inspiration for the *Brain Opera* in the work of Marvin Minsky, a pioneer in artificial intelligence (AI) and one of the guiding lights of the Media Lab. According to Machover, "Minsky is a great thinker about music and the mind and is also a great psychologist. He views the mind as decentralized, without a central consciousness or 'conductor' in front of the 'orchestra.' Rather, the mind is a collection of specialized brain centers or 'agents' that act together to do more and more complex things."

Machover decided to apply these ideas to music. "I wanted to create an opera about how the mind works and, more specifically, about what it feels like to develop coherent ideas from a mass of fragmented sensory inputs. Unity from diversity has been a theme of mine for a long time. In addition, I wanted to create an artistic work that reflects the new culture emerging in places like the MIT Media Lab, which blends art and science, theory and practice."

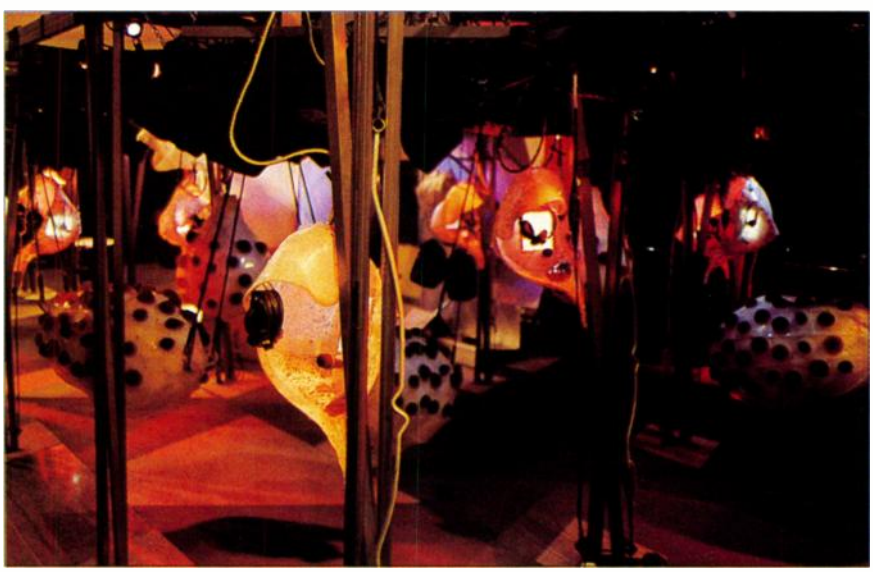
Another important thread in the tapestry Machover wanted to weave is the concept of "active music," in which anyone—regardless of their musical ability—can actively participate in the creation of a satisfying musical experience. Glenn Gould wrote about this in an article on the future of music recording in the April 1966 issue of *High Fidelity* magazine: "In the best of all possible worlds, art would be unnecessary. Its offer of restorative, placative therapy would go begging a patient. The professional specialization involved in its making would be presumption. The audience would be the artist and their life would be art."

Despite his professional credentials, Machover agrees with Gould. His own work at the Media Lab has been evolving in precisely this direction. As he recounts, "I believe that music has become too much of a professional specialization over the past century. For most people, it is now a background activity rather than a participatory one. The goal of my work is to try and lift the general level of public participation in music as well as the level of sensitivity and intelligence in listening, performing, and composing."

This brings up two questions: How can nonmusicians generate satisfying music? And if active music becomes widespread, what happens to professional musicians? Machover is committed to developing technology-based answers to the first question. During his first forays into this realm, he developed the concept of the *hyperinstrument,* which is a musical instrument with enhanced sensing mechanisms to measure and expand upon the subtle nuances of a performer's expressive gestures. However, it soon became clear that the same idea could be applied to instruments intended for nonmusicians.

As to the second question, Machover says, "I think those who are already talented will benefit from this direction and will only increase their skills. There will be a place for professionals with open minds and lots of flexibility as well as for amateurs willing to take the responsibility of being collaborators in creating new works and experiences."

And so the *Brain Opera* was born. The



JOHANNES KROEMER

FIG. 2: The Rhythm Tree is the world's largest percussion controller, with 320 separate pads mounted on seven large "pods." (Courtesy MIT Media Lab)

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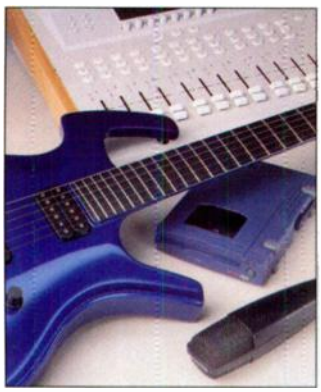

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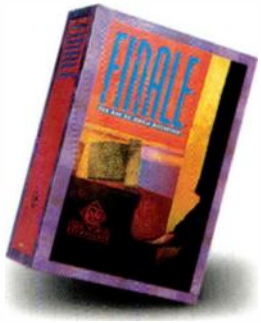

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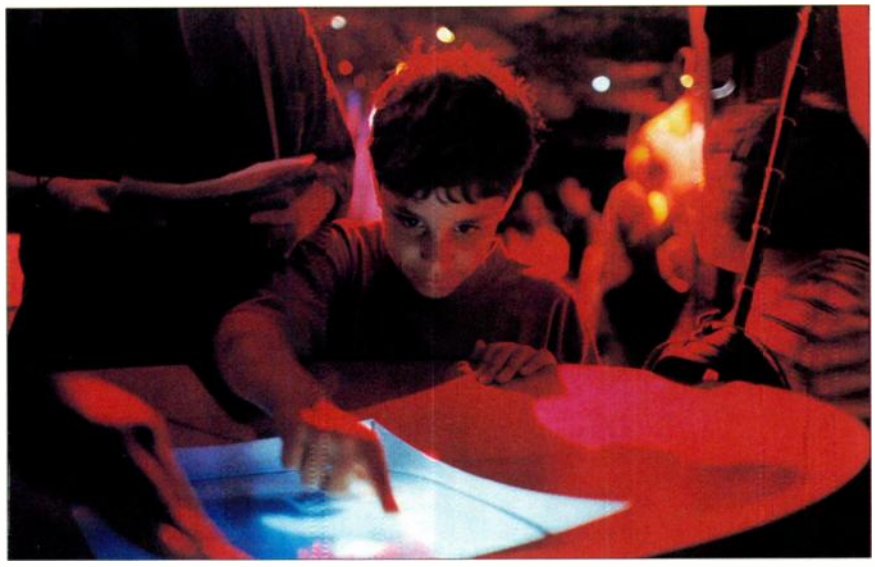
work is very vocal, although it has no fixed libretto or story line. In addition, it allows anyone to participate in its creation, becoming the "agents" that create individual, disparate elements, which are then combined into a cohesive whole. This mimics the behavior of the brain as described by Minsky and naturally leads to a different performance each time. (For more on the underlying technology of the *Brain Opera,* see the sidebar "Behind the Curtain.")



JOHANNES KROEMER

FIG. 3: The Melody Easel lets you "draw" a melody with your finger on a touchscreen. (Courtesy MIT Media Lab)

OF THE BRAIN

Before the actual performance, the audience enters a lobby called the Mind Forest, which is filled with strange and exotic structures that appear positively organic. These are the hyperinstruments that the audience members play with to generate some of the musical material that will be used in the performance. (For more on the technology of these hyperinstruments, see the sidebar "Hypertechnology.")

According to Machover, the organic quality of the instruments is intentional. "The experience and form of the *Brain Opera* is an attempt to make people feel like they're walking into a giant musical brain and becoming an 'agent' collaborating with others to help make each performance of the opera." This "look" was created by architect Ray Kinoshita, visual coordinator Sharon Daniel, and production manager Maggie Orth.

Among the hyperinstruments in the lobby are the Speaking and Singing Trees, which provide an interactive experience for one person each. The Speaking Trees are the only nonmusical hyperinstruments in the *Brain Opera,* but they provide perhaps the most direct expression of the ideas behind the production. The Speaking Trees play recordings of Marvin Minsky talking about his thoughts on music and the mind, and participants are invited to record their own thoughts in response to Minsky's words.

The Singing Trees are also intended as a solitary experience (see **Fig. 1**). Participants are instructed to sing a steady, single pitch into a microphone, which is fed into a computer. The signal is analyzed, and the pitch is determined as soon as the computer sees something that looks stable. This analysis includes a measurement of the "purity" and "calm" of the voice, which influences the resulting music.

"This is my favorite of the hyperinstruments," says Machover. "It's the most sophisticated in the way we tuned it, and it's incredibly responsive when you sing into it. You really get the feeling that it is responding to you. The slightest change in your voice sends the thing rippling. It's responsive without being literal. It doesn't mimic precisely what you're doing; it seems like it's expanding or intensifying whatever you put into it. It feels the most immediate and satisfying to me."

The Rhythm Tree is the world's largest percussion controller, with 320 pads designed to be played by 10 to 50 people at once (see **Fig. 2**). Seven big sacks that look like bean bags each have many attached pads made of molded polyurethane rubber. Each pad has a different shape; some look like weird plants, noses, or ears.

If there is a lot of pounding in a particular area, the system might turn on some lights or play a big percussive

JOHANNES KROEMER

FIG. 4: Harmonic Driving lets you "drive" along a computer-generated "road" on a screen while it modifies the music in response to your maneuvers. (Courtesy MIT Media Lab)

INTRODUCING

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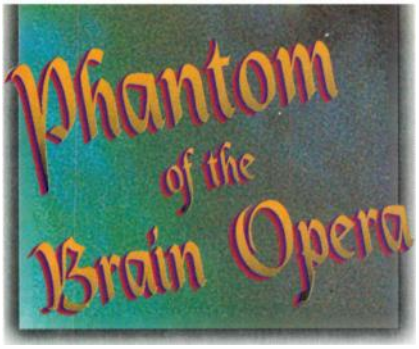

bang. If there's a definite rhythm emerging in an area, the system might quantize it or play a pattern to reinforce the rhythm. The collective behavior is analyzed to produce the final result. In addition, the Rhythm Tree can actually debug itself. If it sees several pads out of commission, it can turn itself off and on again to reset without human intervention.

The Melody Easels can each accommodate one participant and two observers (see **Fig. 3**). This hyperinstrument generates a single-line melody based on what the participant "draws" with a finger on the pressure-sensitive touchscreen. The melodies are core melodic fragments from precomposed *Brain Opera* material, which are manipulated in terms of the complexity of the melody and timbre.

Another hyperinstrument in the Mind Forest is called Harmonic Driving (see **Fig. 4**). From the start, Machover wanted to create a hyperinstrument that feels like a driving-simulation game; anyone walking up to this device would immediately recognize it as such. However, he ended up with a hyperinstrument that goes beyond a straightforward driving game.

You sit behind a "steering bar" and face a projection screen, which displays a computer-generated "road." If you drive skillfully, the road becomes more difficult to navigate. In addition, each fork in the road is marked with red and blue flags; if you take the red fork, the music becomes more intense with sharper attacks and more layers. If you take the blue fork, the music mellows out and becomes more legato.

Finally, there are five Gesture Walls in the Mind Forest (see **Fig. 5**). A large screen displays images from a video projector behind it. Gestures by the person standing in front of the screen are used to manipulate the sound and video image.

OPERA IS HERE

After the audience has provided its input from the Mind Forest, this material is incorporated into the final 45-minute performance. Information from the lobby computers is downloaded into a master control computer, after which three performers select and manipulate precomposed and audience-generated elements using their own hyperinstruments.

One performer plays a Rhythm Tree pod with some Gesture Wall sensors (see **Fig. 6**), while another performer plays a Sensor Chair. This is the only hyperinstrument that was already mature before the *Brain Opera*. (It was originally developed for magicians Penn and Teller.) When the performer sits in the chair and waves his or her arms and legs around, a lot of control information is generated, which is applied to the music. Anyone touching the seated performer can also affect the receivers, which makes for some interesting collaborations. The third performer uses a Digital Baton, a hand-held device that is sensitive to hand and finger pressure as well as motion in space (see **Fig. 6**).

A large screen behind the performers presents images that are coordinated with the music. These images are used to illustrate Minsky's ideas, highlight

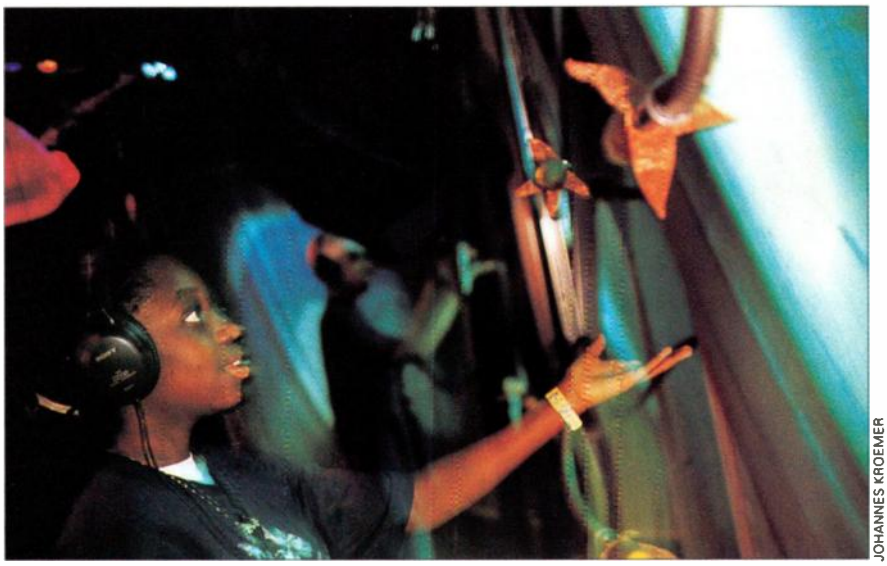
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FIG. 5: The Gesture Wall detects your movements with four sensors that resemble flowers mounted on goosenecks at the corners of a large rear-projection screen. (Courtesy MIT Media Lab)

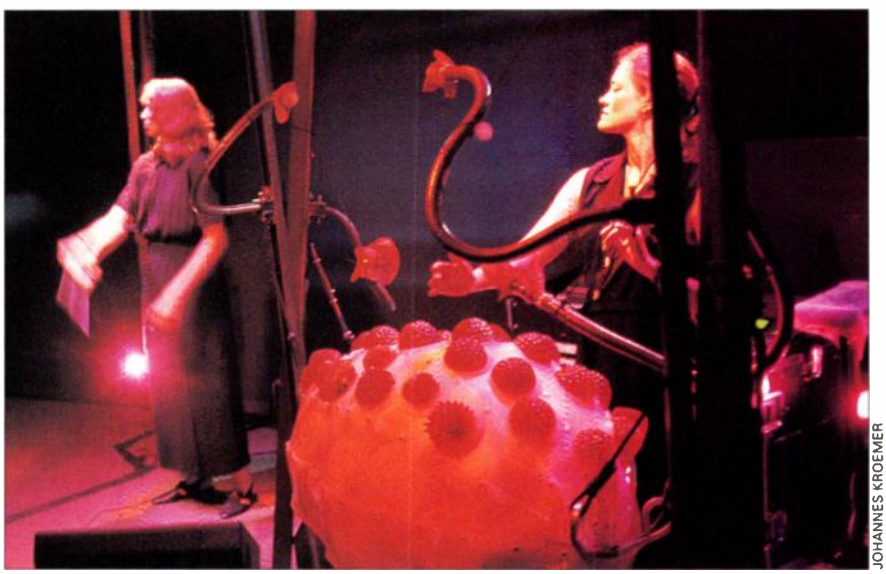
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FIG. 6: The nearer of these two performers, Maribeth Back, is playing a Rhythm Tree pod and Gesture Wall sensors, while the other performer, Teresa Marrin, is playing a Digital Baton. (Courtesy MIT Media Lab)

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the actions of the performers, and provide a visual counterpoint to the music. The images come from several laserdisc players and graphics computers.

The performance of the *Brain Opera* includes three movements. The first movement is the most improvisational, beginning with a cascade of sounds collected from the audience. It then develops into a mélange of Minsky's comments and reactions to them from the Speaking Trees, providing one of the threads that tie the movement together.

The musical throughline is Machover's treatment of Johann Sebastian Bach's 6-part "Ricercare" from *The Musical Offering* as well as fragments of music selected by the audience. After the climax, sounds from the Singing Trees are used to bring the music to a point of calm and repose. This movement generally develops from words to sound to music, which represents a transition from everyday life to transformed experience, from free association to more structure.

The second movement is a continuous piece of music that highlights the performers and their hyperinstruments. Much of the music is precomposed with different degrees of possible alteration in each section, and the tempo tends to accelerate.

Each section of this movement is related to one of the Mind Forest experiences. It begins with melodic fragments from the Melody Easel, which are woven into longer phrases, becoming themes that are used in the rest of the piece. This is followed by "Minsky Melodies," which uses Minsky's comments as a "libretto" for the music and graphic images on the screen. The next section is the "Brain Opera Theme Song," a wordless melody that combines the disparate motifs from the Mind Forest in a lively, upbeat piece. Music from Harmonic Driving provides a galloping climax to this movement.

The third movement begins with music generated by participants on the Internet. The *Brain Opera* system is connected to the Internet with a T3 line. Netnauts with Streamworks' *Xing* client software, a real-time streaming audio and video application for PC, Mac, and UNIX platforms, can see and hear the performance live in real time by visiting the *Brain Opera* Web site (brainop.media.mit.edu). This site also has a link to the Streamworks Web site (www.xingtech.com), from which *Xing* is available for free.

Those with Java-equipped browsers can also participate in real time by manipulating an onscreen hyperinstrument called the Palette, which drives the same compositional algorithm used in the Singing Trees. Internet participants can also upload sound and graphic files to the *Brain Opera* system, which are played and displayed during the performance.

This movement ends with the Finale, which brings everything together. The onstage performers play along with Internet participants, and many of the previously heard elements return. The intensity builds, leading to a recapitulation of the "pseudo-Bach" heard in

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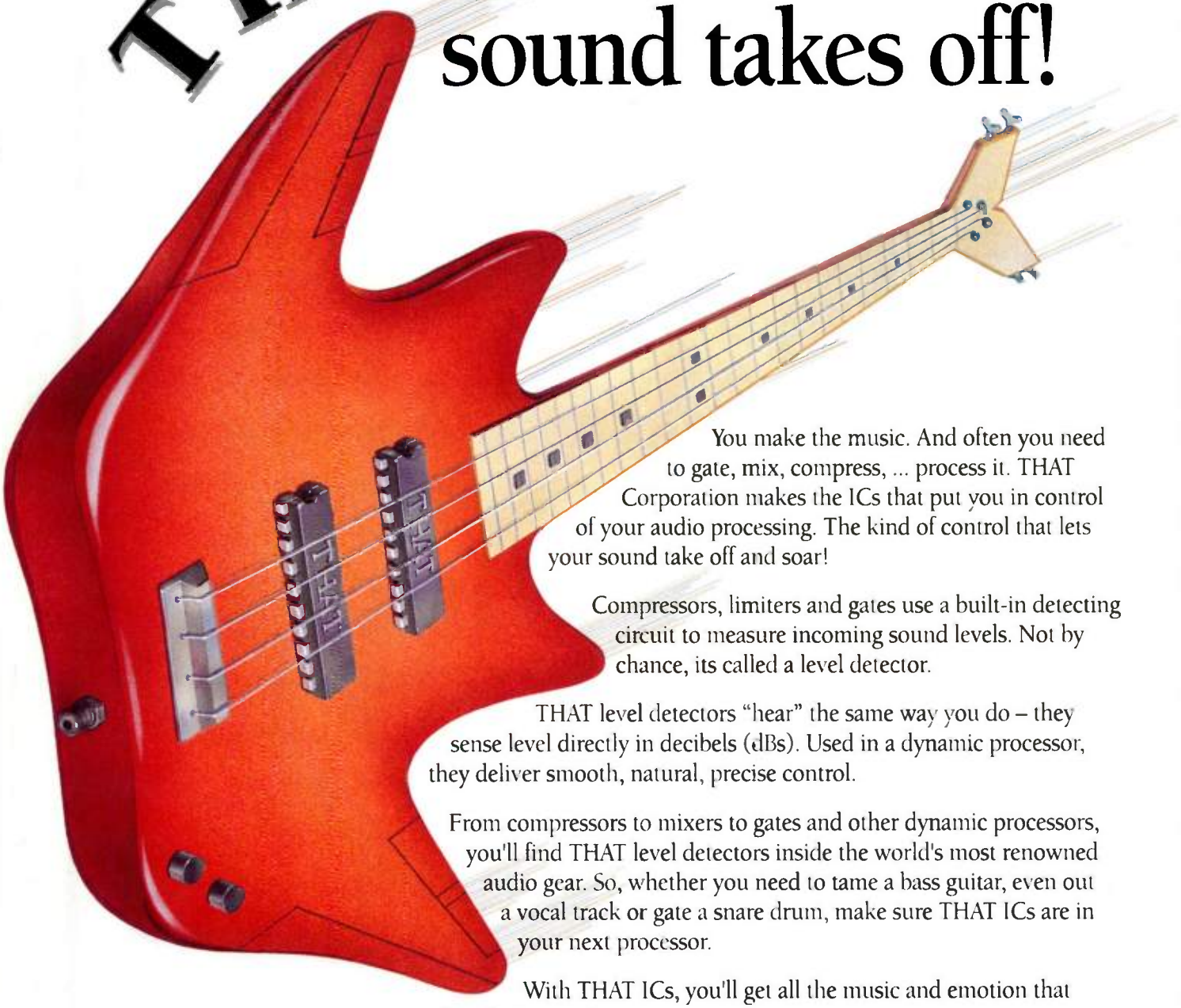

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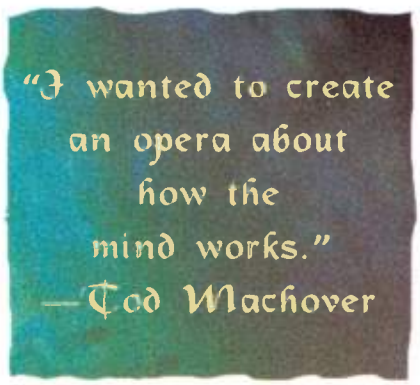
artistic experience more palpable and visceral to each active person as it underlines the collaborative nature of the project as a whole.

"It is this kind of audience involvement—not the mere manipulation of our hyperinstruments—that makes the *Brain Opera* truly an 'opera.' Although the work does not have a linear narrative, which I have avoided at every step of the design process, it certainly has *lots* of voices—professional and amateur, singing and speaking, individual and communal—and the texture is very vocal, even operatic.

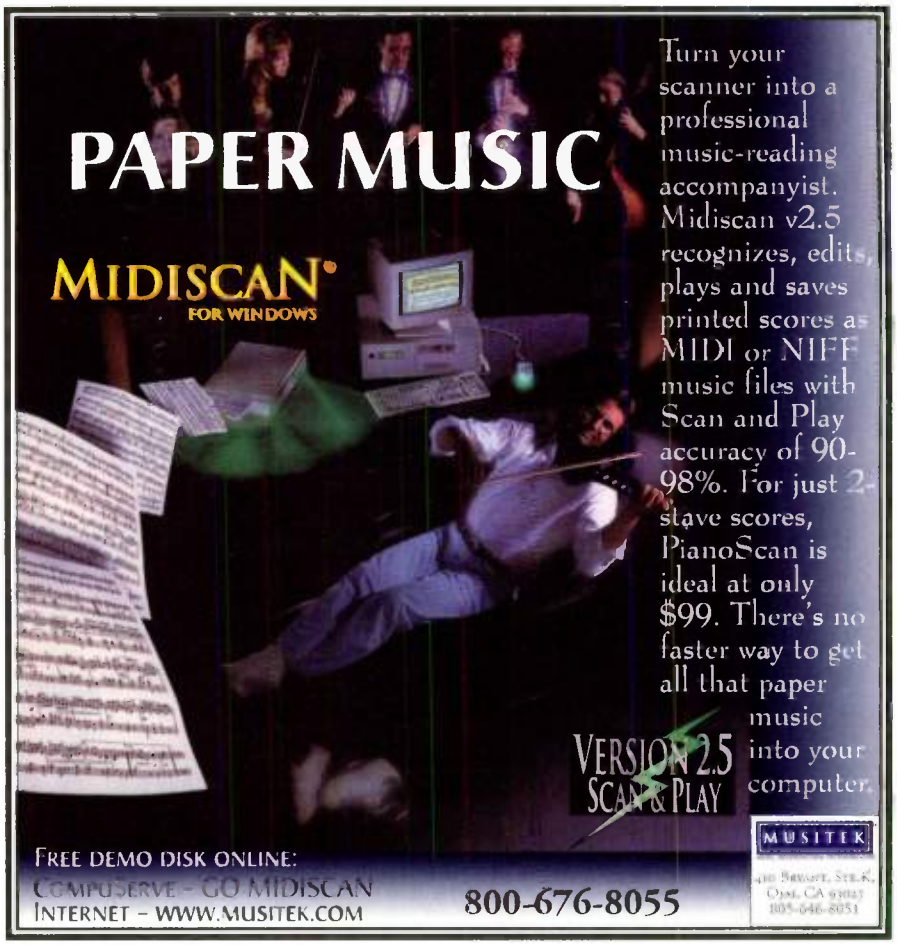
"More significantly, the *Brain Opera* does have a significant dramatic pro-



gression, which is the voyage of each audience member through the maze of fragments, thoughts, and memories to collective and coherent experience. Just the process of understanding the scenario of each instrument—how it is played and what it means—and seeing how these turn into full musical structures in the performance, is a very rich and involving story in itself. One of our deepest hopes is that the *Brain Opera* will encourage people to be excited by the desire to, as Minsky puts it, 'look inside and hear what is going on.'"

Or, to paraphrase Andrew Lloyd Webber's lyricist Charles Hart, the phantom of the *Brain Opera* is there inside your mind.

EM *Technical Editor* **Scott Wilkinson** *looks forward to attending a performance of the* Brain Opera.



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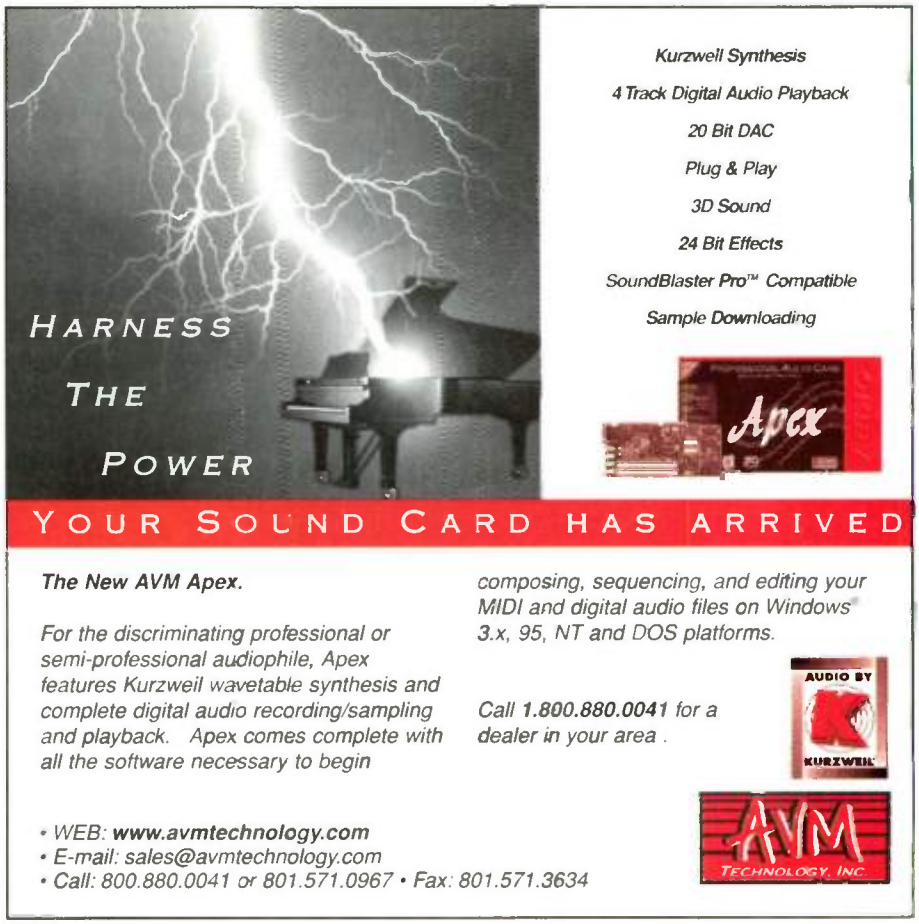


Editors' Choice 1997

EM's editors pay homage to the finest new products of the past year.

By the EM Staff

You might not think we're tradition-minded folks at EM. After all, we are enthusiastic proponents of cool new technology, fresh music, and progressive ideas. But the beginning of a new year is traditionally a time for reflecting on the past year and counting our blessings. And given that we do indeed get hot and bothered about cool new technology, we have a lot of blessings to count because 1996 was a great year for new gear.

One of the relatively new traditions we enjoy maintaining here at EM is the annual Editors' Choice awards for the best products released in the past year. These awards are not based on press releases and manufacturer hype; with rare exceptions, we have field-tested every one of these products.

To be eligible for our 1997 Editors' Choice award, the product must have initially shipped between October 1, 1995, and October 1, 1996, which is when we start editing our January issue. Upgraded software was considered only if the upgrade was major and significant.

No product is perfect, nor is any product ideal for every user and application. We think our winners are terrific products, but that certainly doesn't mean they have no limitations. And the products that didn't win are not necessarily losers. If it were that simple, we wouldn't bother to publish approximately 100 reviews plus assorted product face-offs each year! So, we editors struggled and strived, reflected, conflicted, and genuflected, and at last we agreed on our 24 categories and 24 winners.

Now it's time to open the envelopes and identify our new champions. And the winners are...

Photography by David Bishop

ANCILLARY HARDWARE

Mark of the Unicorn MIDI Timepiece AV ($595)

If you need a traffic manager for your MIDI and sync signals, take a look at MOTU's MIDI Timepiece AV. Like earlier MTPs, the single-rackspace unit serves as an 8-in, 8-out MIDI patch bay with merging and rechannelizing.

But the AV does much more. Previous MTPs served as Mac serial interfaces; if you wanted a PC interface, you went with a separate unit, such as MOTU's MIDI Express PC. The MTP AV not only has serial and parallel ports for connecting both a Mac and a PC, but it also lets you use both computers at the same time. To our knowledge, it's the first MIDI interface that lets you do that. As with the MTP and MTP II, multiple units can be networked. Editing can be done on the front panel's 2-line × 16-character LCD display with four programmable knobs, or you can use the Mac or Windows editing programs.

Mark of the Unicorn MIDI Timepiece AV

So far, the MTP AV sounds like a useful, dual-platform version of the good ol' MTP and MTP II. But that's just the warm-up; the really good news is that this is one heck of a versatile synchronizer, too—much more so than the earlier models. The MTP AV receives MTC or SMPTE (LTC frame rates of 24, 25, 29.97 drop/nondrop, and 30 drop/nondrop) and genlocks to video or blackburst. Of course, you get jam synching and freewheeling. The unit outputs LTC, MTC, word clock or Digidesign Superclock (via a BNC out), as well as ADAT sync (via 9-pin D-sub connector). A pull-up or -down of 0.1 percent is available when synching digital audio to video. The MTP AV can also serve as MMC master or slave.

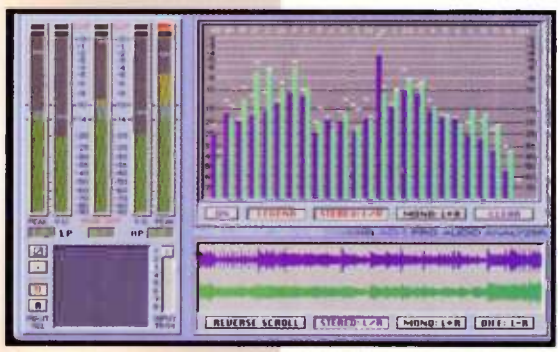
Panasonic SV-3800

With its MIDI routing, merging, processing, and sync features, the MIDI Timepiece AV is much more than an interface. It's an easy-to-use, multiplatform, multiproblem-solver. Mark this one as another winner from Mark of the Unicorn.

ANCILLARY SOFTWARE

Intelligent Devices *AD-1 Pro Audio Analyzer* (Mac; $349)

One drawback to most digital audio programs is that their level displays are only moderately accurate at best, and their spectral displays are static rather than dynamic. Intelligent Devices' *AD-1 Pro Audio Analyzer* for the Mac provides a variety of meters and tests that show you the instantaneous levels and spectral content of digital audio files with much greater accuracy and precision than is possible with other digital audio software, or even with hardware devices, because it uses the power of your computer. The program is available as a stand-alone application and as a TDM plug-in ($449). Our award goes to the stand-alone version because it doesn't require the high-priced TDM bus and is therefore accessible to a higher percentage of **EM** readers.



Intelligent Devices *AD-1 Pro Audio Analyzer* (Mac)

You get multimode level metering, instantaneous displays of the relative levels of different frequency bands, and 2-dimensional displays of the relative phase of stereo signals using Apple's Sound Manager and the Macintosh's built-in audio hardware or a Digidesign audio card. The results are shown on fast, multicolored, easy-to-understand displays.

Aside from the obvious hard-disk recording applications, you can use it to tune your room, find hot spots and feedback points in performance spaces, and look for anomalies and imaging problems during mastering. We're confident you'll find myriad other uses for this program once you get into it.

DAT RECORDER

Panasonic SV-3800 ($1,599)

For years, Panasonic's SV-3700 has been a fixture in professional studios. The SV-3800 lets home recordists benefit from the older model's undeniable, battle-tested quality while enjoying an easier-to-swallow price tag and a bountiful menu of features.

The 16-bit machine offers a choice of 48 kHz or 44.1 kHz recording in the analog realm and adds the capability of recording at 32 kHz in the digital domain. At the CD-standard sampling rate of 44.1 kHz, frequency response is rated at 10 Hz to 20 kHz with a dynamic range greater than 92 dB.

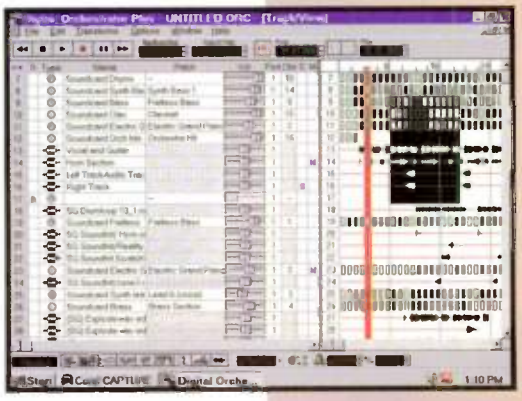
You get all the ID writing and renumbering functions essential to pro audio production, along with little perks such as end-of-program search (a lifesaver for checking those unlabeled DATs to ensure you're not recording over a forgotten masterpiece), fade in and fade out, music scan, and a huge shuttle knob. You also get a spiffy wireless remote control.

Features aside, the SV-3800 is a rugged machine that sounds absolutely wonderful. We've been testing a unit in a pro studio for months, and it has never logged a failure of any kind. In addition, no CD duplication plant to which we've shipped an SV-3800–recorded DAT master has complained of bizarre signal levels, phasing, or dropouts. This DAT recorder is a reliable workhorse, and when it comes to your precious masters, the SV-3800's work ethic can be extremely comforting.

DIGITAL AUDIO SEQUENCER

Voyetra *Digital Orchestrator Plus* (Win; $159.95)

Voyetra is one of the oldest and most respected names in the music-software industry. The company's latest offering for Windows 3.x and 95, *Digital Orchestrator Plus*, combines MIDI sequencing and hard-disk recording in a powerful yet easy-to-use and affordable package. The user interface is a model of clarity, and editing is fast and smooth thanks to the program's excellent drag-and-drop capability.



Voyetra *Digital Orchestrator Plus* (Win)

On the MIDI side, *Digital Orchestrator Plus* offers an adjustable resolution up to 960 ppqn, a Mixer window with sixteen channels per MIDI port, full editing capabilities, MIDI scrubbing, and a SysEx editor. The program can sync to various external sources, including SMPTE, MIDI Time Code, MIDI Clock, and Song Position Pointer. MIDI tracks can also be transcribed into standard notation, although this view can't be edited directly. Already this doesn't sound like a budget program, but it is. And we're not done yet.

Each of the more than 1,000 tracks can accommodate either MIDI or audio data, and both types of data are visible in the same window. Voyetra estimates that you can play about eight mono audio tracks at 22.05 kHz or four tracks at 44.1 kHz on a 90 MHz Pentium. A complete suite of audio-editing features includes cut, copy, paste, merge, reverse, and normalize. You also get tap tempo and fit time. A number of effects round out the audio capabilities, including reverb, delay, chorus, flanging, compression, and gating.

Aphex 661

At this price, of course, there are a few omitted features that professionals might miss. But *Digital Orchestrator Plus* is a superb value that gives you more for the money than anything in its class.

DYNAMICS PROCESSOR (Over $1,000)

Fletcher ElectroAcoustics Joe Meek SC-2 ($1,999)

Occasionally, a piece of audio gear caresses your ears with such tenacity that you can't help but be hopelessly entranced. The Joe Meek SC-2 from Fletcher ElectroAcoustics is like one of Ulysses' sirens in that regard: plug it in and you're doomed. You will not be able to live without the aural majesty that this stereo compressor bestows upon signals.

Fletcher ElectroAcoustics Joe Meek SC-2

What the SC-2 delivers is attitude. It is not transparent—not by a long shot. It imposes an aggressive sheen on signals routed through its solid-state circuitry and ends up sounding more "retro" than most tube compressors. The musicians we recorded for our tests became almost giddy with delight after hearing how the SC-2 enhanced their vocals, guitars, basses, drums, and everything else they played. Instruments exploded off the tape with exquisite detail and punch. It wasn't a surprise, then, that all the studio pros (and semipros) who bought an SC-2 after reading our face-off in the July 1996 EM contacted us in advanced states of euphoria.

Not bad for an idiosyncratic device that turns its back on conventional controls such as Ratio and Threshold and instead dares the user to experiment with huge knobs identified as Slope and Compressor. (You just twist the controls up for more stuff and down for less stuff.) The SC-2 is an expensive, no-frills compressor that does one thing well, but that one thing is so tremendous you'll soon forget about your savaged bank account.

DYNAMICS PROCESSOR (Under $1,000)

Aphex 661 Expressor ($749)

As glisteningly clean and transparent as the Joe Meek SC-2 is ill-mannered and brutish, the Aphex 661 Expressor also crams more features into a single rackspace than most of us deserve. (I mean, the 661 Expressor is such an incredible gift that you'll think it's the holiday season every month—so you'd better be *real* good!) The monaural tube compressor also includes a Spectral Phase Refractor that phase-aligns bass frequencies up to 150 Hz, a choice of auto or manual operation, a low-frequency cut for the sidechain input, a Soft Knee switch that activates a more gradual onset of compression, and an expander that replaces the high end typically lost at high compression settings. Whew!

Obviously, the precise level of audio control, matched up with the unit's sterling sonic quality, makes the Aphex 661 the perfect compressor to use for home mastering. Of course, you will have to purchase two and link them together, but at a retail cost of approximately $1,500 for the pair, that's still a sweet deal. For the price, there is not a cleaner-sounding, more versatile compressor currently on the market.

48-track capability and punch-on-the-fly are only part of the many professional features which make Pro Tools the best selling digital audio workstation in the world.

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WRH

EFFECTS PROCESSOR (Over $1,000)

TC Electronic M2000 ($2,000)

If the great philosopher John Stuart Mill were alive and producing records today, he would love TC Electronic's M2000 processor. Utilitarianism was obviously the company's guiding philosophy in the effects processor's creation.

TC Electronic M2000

The M2000 has two independent processors so it can run two mono-in, stereo-out, single-effect algorithms simultaneously. You get plenty of parameters, all of which can be controlled in real time via SysEx and Control Change messages. It comes with all the right I/O hardware, too: XLR analog inputs and outputs with 20-bit digital converters and AES/EBU (XLR) and S/PDIF (coax) digital I/O.

Practical box that it is, the M2000 covers most of the major effects except distortion. You get an assortment of reverbs (including gated reverbs), pitch shifting, delay, phasing, flanging, chorusing, 3-band parametric equalization with high and low shelving bands, de-essing, compression/expansion, and stereo enhancement. You're not going to find a lot of innovative algorithms; if you want resonant effects, vocoding, and so on, forget it. We're talking practical, everyday effects that are well done.

In general, we thought the reverbs sounded good, especially on guitars and synths. The choruses are outstanding and offer phase, high-cut, and delay controls in addition to the usual rate and depth. The unit did a solid job with flanging and phasing, though we'd like some slower LFO speeds for sweeps. The parametric EQ is precise, effective, and distortion-free, even when you really crank up a frequency band. The dynamics algorithms are unobtrusive and effective. The compressor, in particular, sounds smooth and clear, and it provides a wide range of control.

If you are familiar with pro effects processors, you will have no problem getting around this box, even without the manual. With the unit's single-layer user interface, no parameter is more than one page away. Again, we're talking utilitarianism; the M2000 interface gives you what you need simply and effectively. Adding to the unit's appeal are its four Snapshot locations and a feature that automatically measures the analog input signal's amplitude and sets the correct input level.

Especially cool is the dynamic morphing feature, which allows the input level to determine which of the two effects is heard. It works as if it were a crossfade controlled by an envelope follower. And if you aren't sure which algorithm is best for a certain type of material, the M2000's Wizard feature can suggest an appropriate ROM program. We can offer an appropriate suggestion, too: give this unit a listen!

EFFECTS PROCESSOR (Under $1,000)

Alesis NanoVerb ($179)

More powerful effects processors have hit the market this past year, but for the musician on a budget, the Alesis NanoVerb is hard to beat. At $179, it qualifies as one of the least expensive digital-effects units known. And thanks to new-generation, 18-bit converters and quality algorithms, this baby sounds great, as well.

Alesis NanoVerb

Then there's the size: not only is the NanoVerb small enough to fit in the back of your amp, but you could squeeze *three* of them side by side in a single rackspace. That makes it ideal for the home recordist who plays weekend gigs and needs a single, small processor for both studio and stage. Short on rack space? You could easily keep a NanoVerb perched atop a monitor speaker while mixing and then, when the weekend rolls around, slip it into your gig bag.

For its diminutive size, the NanoVerb boasts a healthy menu of essential effects: three halls, three rooms, three plates, two chorus rooms, delay, flange, chorus, nonlinear, and rotary-speaker emulation. It's easy to use, too: just dial up an effect, set the input and output levels (there's a mix control, as well), and use the rotary knob to dial in the parameters. Presto! Eighteen-bit sound for less than eighteen ten-spots. The only problem is that the NanoVerb is so popular you may have to wait in line to get one.

CAD E-300

MICROPHONE (Large-Diaphragm Condenser)

CAD E-300 ($999)

Recording a singer with the E-300 is tantamount to inviting a performance therapist into the vocal booth. This large-diaphragm condenser has to be one of the best "feel good" vocal mics ever produced. It bathes the voice in such a sensual shimmer that every vocalist we tracked with the mic instantly fell in love with the sound and relaxed into cutting an evocative track. It was like magic. The E-300 is not what you'd call an exceptionally accurate mic—the main element of its "sex appeal" seems to be a sharp presence peak in the high mids—but when it can inspire singers to such artistic

We made the console,

...you wrote the ad.

● "I just sold my Mackie 8-bus and purchased the new Ghost console. The difference is amazing. The Ghost is the warmest sounding board I've ever used." - Mike Perkin (The Lab Recording Studio, Emmaus, Pa)

● "I replaced a console that was more than 3 times the price, and got a quieter, more transparent, and sweeter sounding console! Big console feel, with an amazing price!" - Kurt Bevers, Brownell Sound, Oregon.

● "An incredibly musical console, ultra flexible with a real usable EQ. It is absolutely the best sounding project studio board that I've heard". - Howard Givens, Spotted Peccary Studios."

● "I love the desk, the EQ is just marvellous. Ghost is the best 8 bus recording desk on the market." - Lee Hamblyn, Engineer.

● "Intuitive handling, flexible routing, great Soundcraft sound." - Melvin Fernandes, Recording Engineer, CMM Studios, India.

● "I use the Ghost for several radio shows doing live performances. The EQ is amazing, I'm on air in 5 minutes! Doing dance stuff is one, doing live stuff is another. But I use only one board for both of them, The Soundcraft Ghost." - Barney Broomer, Sonic One Rotterdam.

● "Ease of operation and the numerous in-line inputs for my synthesizers and samplers is why I purchased the Soundcraft Ghost console." - says President of Saban Entertainment and producer of Mighty Morphin Power Rangers Shuki Levy.

● "I didn't know how useful mute groups could be and how good the EQ had to be until we used the Soundcraft Ghost." - Stefaan Windey, La Linea Musicproductions b.v.b.a., Belgium.

● "It sounds great and the EQ is very precise which makes it very easy to pin-point the frequencies I need to work on. Ghost enables me to finish mixes on the console at home, without having to use any other studio." - Phil Kelsey (Remix Engineer)

● "The console is very user-friendly and is constructed so well that it can easily withstand the rigors of even the most hectic of production schedules." - Corey Dissin, Producer at Paul Turner Productions.

● "Both myself and our Production Director Jeff Thomas used the console for PowerStation and were equally very, very impressed. For the money, the console is fantastically versatile, has good headroom and a very impressive EQ." - Alex Lakey (Engineer for PowerStation)

Ghost

"Let us know what you think about the Soundcraft Ghost by visiting our web site at **http://www.soundcraft.com** or via e-mail to **info@soundcraft.com**"

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heights, it's simply not worth fretting about whether you're getting precise documentation of the source sound.

Happily, the E-300 isn't solely a cheerleader for vocalists. The mic also adds a beautiful, sparkling quality to many instruments—most notably acoustic guitars, violins, and grand pianos.

Feature-wise, the E-300 is no slouch, either. You get a choice of three polar patterns (cardioid, figure-8, and omnidirectional), a 20 dB pad, a bass rolloff at 80 Hz, a plastic carrying case, and a functional swivel mount. Frequency response is 10 Hz to 20 kHz, and the E-300 has a maximum SPL rating of 148 dB. From the subjective (sound quality) to the objective (specs), the E-300 has the chops to prove its mettle as an award-winning microphone.

Earthworks TC30K

MICROPHONE (Small-Diaphragm Condenser)

Earthworks TC30K ($500)

A microphone is the first and arguably most critical piece of gear in the signal path of your studio (that is, unless you make music solely from synths and third-party samples), but too often the mics found in home studios only contribute to the chasm between pro and amateur productions. With the release of the superlative Earthworks TC30K condenser microphone, that chasm could narrow considerably.

Admittedly, the TC30K is not an extremely versatile mic. It offers only one polar pattern (omnidirectional), and its sleek, brushed stainless-steel body features only sleek, brushed stainless steel (i.e., no switches for attenuating signals or filtering low frequencies). But when it comes to transparency and audio realism, this jewel can spar with mics costing ten times the money. From 9 Hz to 30 kHz, the TC30K exhibits a frequency response flatter than California's Central Valley. It can handle shredding SPLs, too—up to 151 dB, in fact.

Buchla Lightning II

The mic's biggest plus is its stunning clarity and detail. Using a TC30K positioned about two inches from the strings, we recorded some remarkably natural-sounding acoustic-guitar tracks. Ditto for lap dulcimer, saxophone, and even backup vocals. Furthermore, the TC30K didn't bat an eye when pressed up to the grill cloth of an amp cranked all the way up to eleven.

We found only one drawback to using such a hot mic (pun intended): because of its extreme sensitivity, the TC30K may prove too "open" for use as a room mic or for live 2-track recordings in a noisy venue. But what it does well, few mics do better. Oh yeah; did we forget to mention the elegant cherrywood case that comes with a matched pair of TC30Ks? Definitely a class act.

MIDI CONTROLLER

Buchla Lightning II ($1,995)

Ever since the theremin made its debut in the 1920s, electronic musicians have loved to make music by waving their hands in the air. However, even modern theremin designs offer little if any MIDI control. Fortunately, there is an alternative: the Lightning II from electronic-music maverick Don Buchla.

The system combines two handheld, battery-powered wands that emit infrared (IR) light with an IR detector that is connected to a half-rack base unit. The detector tracks each wand's position, trajectory, and velocity within a sensing region that is divided into eight zones. Red and green LEDs on the detector provide visual feedback about exactly where the wands are in the sensing region at any time.

The base unit monitors the wands' movement in these zones and distinguishes between up, down, right, and left striking motions. It then sends different user-selectable MIDI messages in response to each type of movement. You can trigger additional MIDI messages by clicking, double-clicking, or releasing the button on each wand and by stepping on two footswitches.

Presets within the base unit let you store configurations of MIDI message assignments, including several ways to dynamically modify the messages, which allows you to tailor the response to your particular needs. In addition, you can define the scale to be played by Note On messages, and a Conduct mode counts beats and generates MIDI Clocks in response to a user-definable pattern of motion. Finally, the base unit includes a 16-part multitimbral, 32-voice polyphonic, Kurzweil M.A.S.S. sound chip.

The Lightning II is a gas to play, and it offers expressive possibilities that few MIDI controllers can match. It's simple enough to use immediately but deep enough to make mastery a challenge. What more could you want in a musical instrument?

MODULAR DIGITAL MULTITRACK TAPE RECORDER

TASCAM DA-38 ($3,499)

There were two contenders for this prize—the TASCAM DA-38 and the Alesis ADAT XT—and clearly, both units made big splashes in 1996. Less clear, though, was which to call the winner. In short, this was one tough call. But we stuck our necks out and picked the DA-38 because it delivered an impressive one-two punch of outstanding features and reliability.

Until recently, musicians in the market for an MDM understandably gravitated toward the ADAT's less-expensive

S-VHS format. But at $3,499, the DA-38 levels the playing field by putting the Hi-8mm, DA-88 technology within reach of the personal studio budget. With price no longer a critical consideration, either format is up for grabs, and a recordist can select an MDM based solely on features and performance.

TASCAM DA-38

And the DA-38 definitely breaks ground in the features department. Along with what has become standard MDM fare—selectable sample rates, an electronic patch bay, individual track delay, and adjustable pre- and postroll—the DA-38 also offers a shuttle wheel, an onboard oscillator tuned to A-440, and a dithering function that provides a different-sounding recording mode. But most useful is a track-copying function that, combined with the digital patch bay, lets you build "best of" composite tracks from alternate takes. This is an awesome feature for the recordist who owns only one DA-38, because it keeps composite tracks in the digital domain.

The DA-38 ranks high in performance, too. In fact, thanks to 18-bit converters, it sounds even better than its big cousin, the DA-88. Specs are impressive throughout, and the transport is as fast as they come (100 times play speed). It's whisper quiet, too, so if you're stuck playing and recording in the same room, you won't have to build a machine closet to stash your MDM in. And if you already own one or more DA-88s, you'll be happy to know that the DA-38 is fully compatible with your existing setup.

Roland's VS-880 was the talk of the 1996 Winter NAMM show, and the more we checked it out, the more we were convinced that the reality was as good as the promise. This ministudio-style M-HDR is a tremendous value, offering a mixer with a physical control surface, fully automated digital mixdown with EQ, 64 well-implemented virtual tracks, and a strong MIDI implementation. The operating system can be updated by means of SCSI or SysEx. Options include an exceptional effects processor. The VS-880 usually records audio with compression, but the compression doesn't seem to noticeably damage the sound. Besides, the compression is defeatable, although recording without it cuts the number of recordable tracks from eight to four.

Why didn't we classify the VS-880 as a "pro" unit when it obviously can record high-quality sound and has a ton of great features? To begin with, it lacks multiple dedicated track outputs and has only four audio inputs. It syncs to MTC but not directly to ADAT, and because it lacks external expansion slots, you can't add this feature or multichannel digital I/O later.

Roland VS-880

That said, the Roland VS-880 is the reigning monarch of the personal modular hard-disk recorder world, delivering killer features and excellent sound at a very good price. As a composition workstation, it is unparalleled. The unit outperforms other ministudio-type hard-disk recorders, and it thoroughly destroys multitrack cassette and MiniDisc recorders. That makes it an easy Editor's Choice winner.

MODULAR HARD-DISK RECORDER (Personal)

Roland VS-880 ($2,495)

Last year, we presented our first Editor's Choice award for modular hard-disk recorders, which were just starting to make waves (so to speak) in the market. Although several quality models were available, we had no problem picking a winner (the Akai DR8). But 1996 was a big year for M-HDRs, and choosing a winner got a lot tougher. Complicating matters, the category more or less split into pro-style units with external expansion slots and ministudio-style machines that feature physical mixing surfaces but lack certain pro features. In the end, we decided to give two awards: one to the best personal (cassette ministudio-style) M-HDR and one to the best "pro" M-HDR.

MODULAR HARD-DISK RECORDER (Professional)

E-mu Darwin ($3,195)

On the pro side, we opted for E-mu's Darwin M-HDR. With its great user interface, solid complement of analog inputs and outputs, switchable AES/EBU and S/PDIF digital I/O, and slick implementation of virtual tracks, the stock Darwin has plenty of strong features, and E-mu is hard at work adding more. True to its name, Darwin is continually evolving.

E-mu Darwin

Its expansion slots push Darwin firmly into the pro arena, allowing you to add such options as direct ADAT sync, SMPTE sync, ADAT Lightpipe 8-channel digital I/O, and 32-bit, floating-point DSP effects. Audio files are saved as WAV files, and disks are formatted as MS-DOS volumes, so you can edit the audio with

ELEPHANT EARED MAN

HAS HEARD IT ALL!

A freak birth defect left Orman Lobeking with monstrous, pendulous ears better suited to an African elephant and superman-style hearing. Even as a baby, he responded to a dog whistle. At 32, his ears were so large he wore a padded helmet to avoid aural overstimulation and prevent foreign objects, such as birds, from entering his skull!

Yet even with his astonishing ability, he can't hear any noise or sonic flaws with the MD4. "To my ears, cassette multitracks sound like there's a meteor shower in the background. So I bought the MD4 because it's virtually noise-free, 0% wow and flutter, and 20-20 kHz frequency response. Take it from someone whose eardrums are the size of kiwi fruit: the MiniDisc format is sonically excellent," the odd-io expert told this reporter. "But can you please breathe through your mouth? The wind rushing through your nose hairs sounds like a hurricane!"

Orman's hearing is so acute, he can detect an off-key note by the second violinist of the Boston Pops -- clear from New Hampshire! "That's why I like the MD4 -- the sound doesn't degrade one bit when I bounce track. And I can even bounce to the same track. You don't have to keep an open track like you do with cassette multitrack recording," he enthused, then added, "Hey - can you just keep your eyes open? The clanging of your blinking is like a jackhammer into my brain!"

People recoil in horror at the sight of Orman's abnormal appendages. "Musicians don't usually like to hang out with me after recording," he says. "That's why it's a good thing the MD4 has all these trick editing capabilities. I can record a tune, save the best segments and re-arrange them instead of making a scared singer take it from the top. No drummer will set foot in my studio, so to supply percussion, I slave MIDI instruments to the MD4, which generates MIDI time code. Orman just recently began his studio career and was short of cash. "I needed the lowest cost digital multitrack recorder available and my MD4 is it. I love my new job," he said. "It sure beats working as a body double for Prince Charles in made-for-cable movies," he said.

MD4

Musicians Give Top 10 Reasons They Love Yamaha Tone Generator

Since its introduction, the Yamaha VL70m virtual acoustic tone generator has become an enormously popular musical tool with our readers. In a special poll, The Inquisitioner has uncovered the top 10 reasons why.

VL70m

10) It sounds better than blowing on a baloney sandwich

9) Women dig it

8) Other musicians hate you for it

7) It weighs less than a tuba

6) It's gold and black, very stylish

5) It fits in a half-rack space or a bread box

4) It can be played from a keyboard with a breath controller, from a wind controller, from a guitar with a MIDI converter or from a gorilla-to-MIDI converter*

3) It has a big display with lots of neat pictures

2) It has a lot of buttons that help you do things

1) It's a virtual acoustic tone generator so it uses computer models of instruments instead of samples for true acoustic sound; it's a melodic lead instrument so your solos smoke; you can double up to 326 times in one session without lugging a truck full of instruments; it's XG compatible and you can invent your own "acoustic" instruments using editing software and your Macintosh™ or Windows™ based computer.

***Gorilla requires special accessories**

FOR MORE INFORMATION ABOUT ANY OF THE PRODUCTS SHOWN IN THIS ISSUE PLEASE Call (800) 291-4214 ext.805 or visit us at www.yamaha.com.

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TOP SECRET PENTAGON PROGRAM LEAKED

A source inside the Pentagon has revealed exclusively to the Inquisitioner that the nation's military HQ is working on technology that not only defends the country's airspace but actually makes a reliable guitar-to-MIDI converter.

"The problem with converting guitar playing to MIDI signal has always been tracking speed. It's easy to launch a missile but it's not easy to convert guitar and bass performance to MIDI. However, we have a breakthrough," said the source, an Admiral involved with the clandestine project. "We have devised a method, using a neural network (an artificial intelligence system), that is extremely advanced at tracking and detecting pitch, velocity and expression with unprecedented speed and accuracy. In fact it doesn't require the guitar or bass player to learn a new playing technique."

The Inquisitioner asked experts outside of the military industrial complex to evaluate the G50. "Yamaha has helped the government build this G50 MIDI converter and it works like a charm," said one music technologist. He demonstrated the system by attaching the Yamaha GID pickup to an electric bass and connecting it to the G50. He ran the G50 output into the Yamaha MU80 tone generator. "Now I can get my guitar tone AND any other instrument I want. Or I can play just the other instrument. But watch this," he said, wailing on the bass. "It doesn't miss a thing."

Joey Friday, guitarist with Hard Iron, agrees. "I just cranked on my Strat and out comes this harp sound. It matches my every move. It was beautiful, man. And when I ran the guitar and the harp at the same time, they just grooved perfectly. The MU80 pulls it all together, dude."

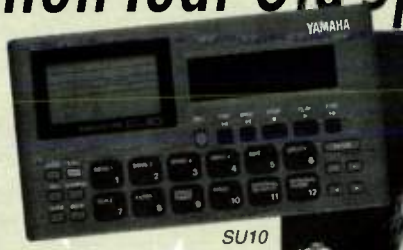
The MU80 has 729 realistic XG voices, plus on-board effects for the internal voices and the guitar. "I plugged my guitar into the MU80's A/D input to use the MU80's internal amp and speaker simulation effects. And, layered with the guitar, the MU80's overdrive on the harp sound was wicked, man," said Friday.

Admiral X at the Pentagon further points out that by adding the Yamaha MFC10 foot controller—with its programmable foot switches and pedal controller—to the G50 system, you can have instant access to any program. "It's an extremely powerful system and the most technologically advanced of its kind. The Russians have nothing like it."

G50

NATIONAL
The Inquisitioner
Nobody Expects The Inquisitioner. Vol.30 Issue 1452

ASTROPHYSICIST CREATES
180 Million Year Old Space Music



SU10

Photo by Sunny Bak

Some people play the guitar. Others play the piano. Fiorella Terenzi plays the radio telescope. While it makes a unique and musical instrument, it proves extremely difficult to take on a gig.

Terenzi, a one year old (in Saturn years) Italian doctor of astrophysics explains: "I start with radio waves collected from a radio galaxy located between the constellations Virgo and Leo, 180 million light years from Earth. Those waves originated in our Jurassic era! I take this raw radio and, using some enormously big and fast computers and cutting edge sound synthesis, turn the radio waves into sound."

Terenzi's problem, however, is that she travels constantly. "If NASA calls me for a mission specialist gig on the space shuttle, the Yamaha SU10 is my only possible choice of sampler."

The one pound Yamaha SU10 sampler records and replays up to 48 mono and stereo waveforms at up to 44.1 kHz. At a lower sampling rate, the SU10 can sample up to 54 seconds of wave data, which makes it extremely convenient for Terenzi. "When I want to fit the galaxy into my backpack, or a subway car or an airplane to be played live for my listeners, the Yamaha SU10 has a size advantage that makes all the difference."

The SU10 includes a ribbon controller and advanced editing features for controlling the filter cutoff frequency, "scratching" out a sound segment, sliding the pitch or controlling the crossfading of local playback and external inputs. "In all cases, any time I'm away from my studio, any time I need portability, the SU10 is the only choice," says Terenzi in a luscious Italian accent.

Terenzi's latest CD from Island Records, "Music From the Galaxies", is probably the first album by a major pop label created by a doctor of astrophysics. Her other galactic work includes a collaboration with Thomas Dolby, her own CD-ROM "Invisible Universe" published by Voyager and the obligatory web site: http://www.fiorella.com.

Whenever Terenzi travels, on Earth or off, the Yamaha SU10 sampler is her only choice for cutting galactic tracks.

Tips For Sending Your Teen To College

Your teen can benefit from a college survival kit that has all the essentials, including a Yamaha acoustic guitar startup package and a case of macaroni and cheese, according to the Manongahala Institute of Dining Commons Administrators. "This is a great guitar kit for aspiring folkies. It comes complete with the F310 acoustic guitar, a tuner, strings, picks, polish, cloth and a beginner's guide to playing guitar," says the Institute.

"The macaroni provides nourishment for the body, the guitar provides nourishment for the soul," says one happy, strumming freshman.

REV500

circle #607 on reader service card

GOOD NEWS FOR MEN and their desperate wives!

REV500 REVERB THERAPY IMPROVES LOVE LIFE!

Love doctor Otto Dexter says he can rev up a guy's sagging sex drive in a flash, with the Yamaha REV500 Digital Reverberator!

Dr. Dexter says he's used his reverb therapy on hundreds of men who'd lost their knack in the sack, and everyone has marched away ready for action!

"We simply have the patient perform a series of vocal exercises while he listens through the REV500," said Dr. Dexter. "The superb sonic performance and tremendous reverb quality of this unit creates the illusion of vocal machismo, restoring confidence and increasing bloodflow throughout the body."

The doctor claims that the unit's potency is derived from a third-generation, 32-bit DSP chip responsible for the highest possible resolution and quality of decay imaginable.

The REV500 also offers a great selection of 100 editable reverb programs such as hall, room and plate reverbs and most importantly, special programs which are time-proven aphrodisiacs. In addition, the REV500 has built-in drum samples which allow patients to hear and set the programs without an external sound source. The internal sound, available by a flick of a front panel button, is being utilized at Dr. Dexer's advanced reverb therapy sessions.

Another valuable feature discussed in the advanced therapy is the REV500's large LCD screen. The REV500 allows the user to make changes to any program via front panel knobs. The huge LCD gives patients a complete and graphic indication of all changes so they can make the most subtle, or dramatic, modifications.

"We've also experimented with the room-simulation programs and found them to be very effective," said Dr. Dexter. "Our patients have come up with some very creative solutions, as you might imagine! The optional foot switch capability for muting has also been used with success." Overall, it's the superior accuracy of the REV500 that makes this treatment more effective than with other reverb units.

But patients like Ralph Reder, 38, don't care what makes reverb therapy work – they're just glad it does the trick. "Before I went to Dr. Dexter, I'd become a real flop in the bedroom," said the grateful Reder. "Now my wife and I both have the doctor and his wonderful REV500 to thank for the memories!"

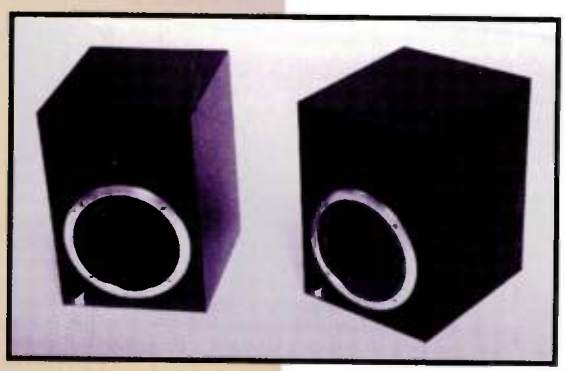
any Windows editing software (albeit you can't change the file's timebase). To top it off, you can add an optional, internal Iomega Jaz removable-cartridge drive.

In our November cover story, "The Magnificent Seven," author Erik Hawkins states that the E-mu Darwin "may be the HDR of the future." Maybe so, but we think it does an excellent job right now.

MONITOR SPEAKER

Event Electronics 20/20bas ($999)

Powered monitors are the sexiest type of studio reference speaker, but they've long carried a high price tag with their sex appeal. The 20/20bas is one of the few professional-quality active monitor systems to sneak just under the $1,000/pair price barrier.



Event Electronics 20/20bas

More importantly, the 20/20bas delivers the goods on audio performance. In fact, the sound of the home studio–friendly 20/20bas rivals that of the excellent Genelec 1030A system, which costs approximately twice as much. It's hard to argue with that kind of a price-versus-performance ratio.

In addition, the 20/20bas system's stereo imaging is so superb that you don't even have to sit in the optimum "sweet spot" to hear a well-defined soundstage. That's practical, thoughtful design; after all, the many tasks inherent in running a personal studio can throw you into a number of bizarre listening positions. The 20/20bas' internal amps can operate at painful volumes without driving the speakers to clipping or audible distortion, and you can monitor for long stretches without succumbing to ear fatigue.

On the spec side of the story, the whisper-quiet internal amps in these powered marvels are rated at a continuous 130 watts for the 8-inch woofer and 70 watts for the 1-inch tweeter. Frequency response is rated at 45 Hz to 20 kHz. The 20/20bas is an absolutely amazing reference monitor system for the price. In fact, don't be surprised if these outstanding speakers start popping up in pro studios where price is *not* a factor.

MOST INNOVATIVE PRODUCT

Power Technology DSP•FX (Win; $799)

Signal processors are a blessing and a curse. Although they allow engineers to simulate various acoustic environments and mangle an audio signal in many different ways, their effect on the sound is notoriously difficult to conceptualize, thanks to their small displays and cryptic controls. Computer-based signal processors can alleviate

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After developing a CD player with Legato Link Conversion S, twin D/A converters and a stable platter mechanism, we realized one thing was missing. The record button.

What lies before you is the most refined, most sophisticated and most uncompromising idea to be thought of in years. a CD player that records CDs, the Elite® PDR-99.

A CD recorder engineered not only to record CDs, but to play them back with the highest standards possible. A CD player that has Legato Link Conversion S which effectively re-creates the music as it was originally conceived by the artist. The PDR-99 also has the extraordinary ability to record from any source.

The Stable Platter Mechanism—another astounding advancement—helps to suppress resonance and vibration of the disc. This ensures more accurate playback and recordability.

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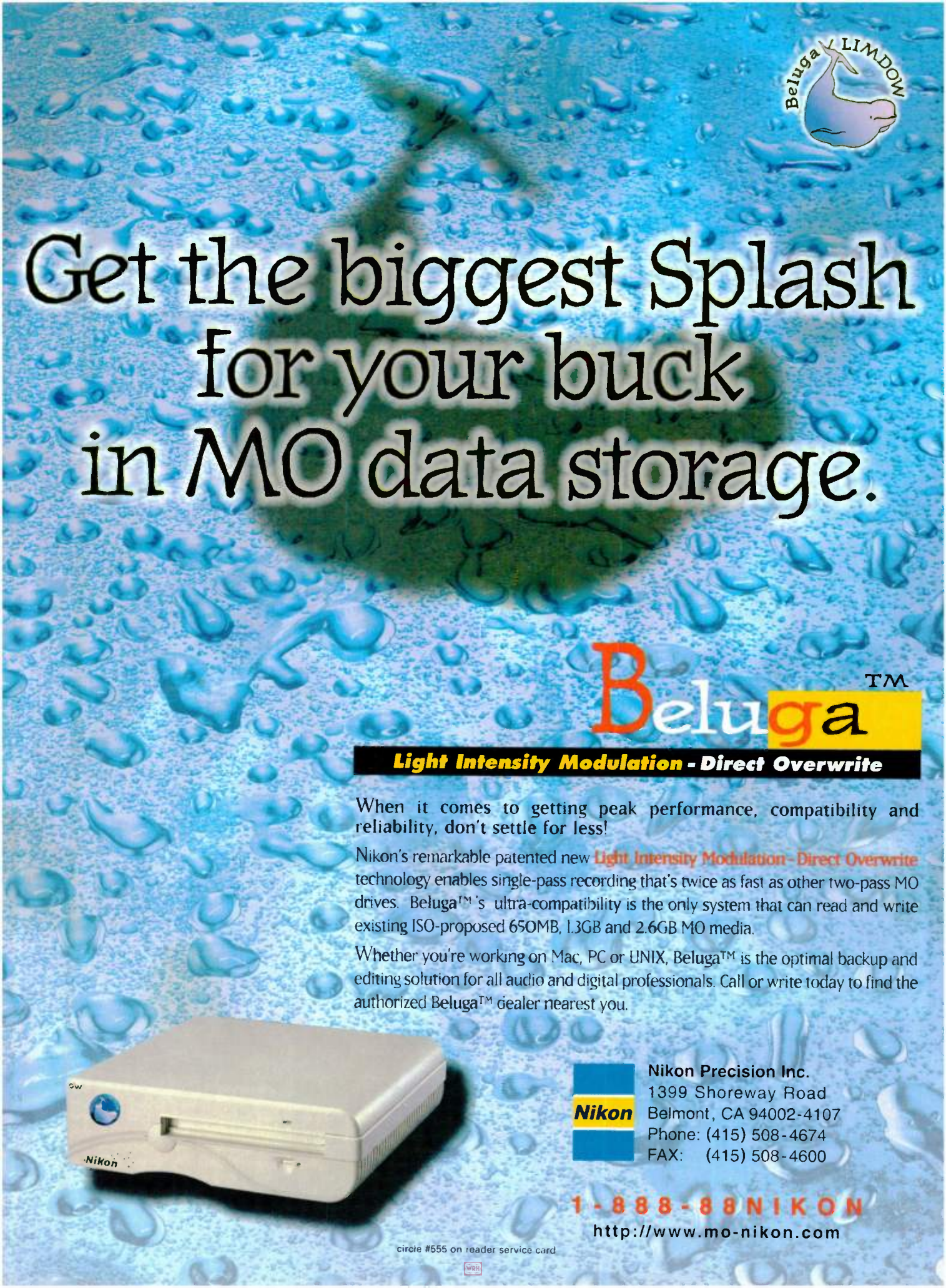
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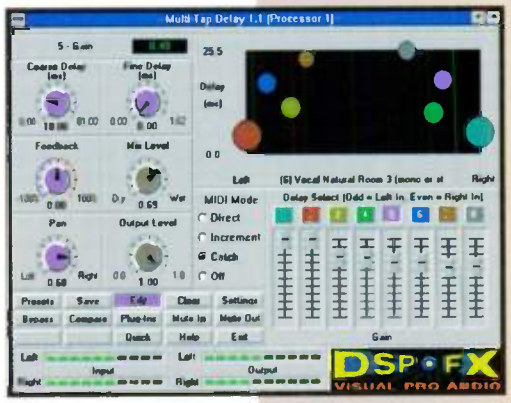
this problem to some degree by taking advantage of the computer's large, color monitor.

The current state of this art for the Windows platform is embodied in Power Technology's DSP•FX system. The package includes a half-length ISA card with unbalanced ¼-inch, analog I/O and a collection of software modules that provide various effects. Five modules are currently available: Room Reverb, Multi-Tap Delay, Multi-Element Chorus, Analog Tape Flanger, and Full Stereo Pitch Shifter. More modules are planned, including a multiband parametric equalizer.



Power Technology DSP•FX (Win)

The coolest aspect of DSP•FX is its user interface. Each software module presents straightforward onscreen controls and a unique visual representation of the control settings. For example, the reverb module displays a rectangular box that represents the simulated room. The size of the box corresponds to the size of the room, and colors on the box's sides indicate "liveness" and high-frequency damping. Other graphic indicators reveal stereo separation, diffusion, and the intensity of early and late reflections.

The other modules offer similarly intuitive graphic displays that help you anticipate the sound of the effect before hearing it. You can even manipulate the controls in real time and watch the graphic representation change along with the sound. This provides superb feedback that helps you tailor the sound to your needs.

Yamaha MD4

In addition, the DSP•FX system uses 32-bit, floating-point arithmetic, which uses all 32 bits to represent all signals, instead of 24- or 32-bit, fixed-point calculations. As a result, quantization noise is reduced during low-level signals and headroom is increased for high-level signals. This approach offers better sonic detail and clarity than many pro signal processors.

Of course, the proof is in the output, and DSP•FX sounds great. In fact, Innovative Quality Software has agreed to develop a direct connection between *SAW Plus* and DSP•FX, and Spectral recommends using DSP•FX with its Prisma digital audio workstation. With this kind of support, this innovation may soon become the standard against which others are judged.

MULTITRACK MINIDISC RECORDER

Yamaha MD4 ($1,199)

This is a new award category for a new type of product that was announced in 1996. Several companies are working on similar devices, but only the Yamaha MD4 actually started shipping within the eligibility period, so it wins by default. Don't get us wrong—this is a really cool product. If we didn't think so, we would have waited to introduce the category until next year, when several more such units will be available.

The MD4 is the first of a new breed of ministudios that combine a mixer and multitrack recording medium in one compact, affordable package. The difference between it and conventional ministudios is the recording medium: MiniDisc, a rewritable optical disc developed by Sony for the consumer market. MiniDisc uses compression to achieve up to 37 track-minutes of record time, and it offers the advantages of random access to the data.

Like most cassette-based ministudios, the MD4 records up to four tracks of audio. The analog mixer provides four main inputs, one stereo sub input, and four buses with flexible routing in addition to one mono effects send and stereo return. Each input offers a 3-band, fixed-frequency EQ and direct outs.

One of the big advantages offered by the MD4 over cassette-based units is its editing and arranging capabilities. You can cut, copy, paste, and move audio segments at will and use markers to create a cue list, which lets you easily try (and save) different arrangements of a song. You can even submix all four tracks to one or two tracks and continue to add parts with the newly empty tracks, and you can make backup copies of each version if there's enough room on the disc.

The MD4 outputs MTC or MIDI Clock, and you can create a tempo map for a sequencer to chase. However, it does not respond to any form of sync, so it must be the master in a system. Nevertheless, the MD4 heralds a new era in portable, affordable, integrated recording environments that should soon replace cassette ministudios.

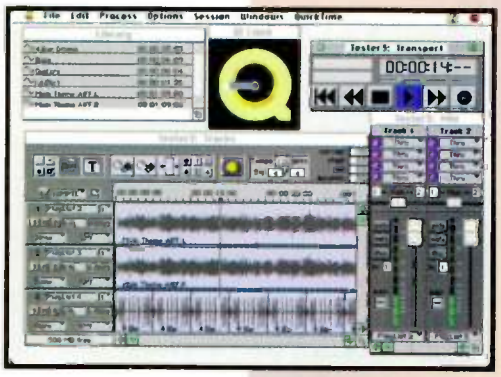
MULTITRACK RECORDING SOFTWARE

Macromedia *Deck II* 2.5 (Mac; $399)

The competition in this category was fierce between *Deck II* 2.5 for the Macintosh and Innovative Quality Software's *SAW Plus* for Windows. We could have argued over this award for days, but ultimately we had to pick one winner, and *Deck II* has plenty of points in its favor, including a sweet list price. Original developer OSC released version 2.5 too late to make the cut for last year's awards competition. In the interim, little OSC was swallowed up by a much bigger fish, Macromedia, which offers an excellent bundle of *Deck II* and the company's *SoundEdit 16* for $499. The latter program supplies the in-depth waveform editing and Shockwave support *Deck II* lacks.

One of *Deck II*'s strengths is the number of audio tracks

it offers: anywhere from eight to 32 tracks with a Power Mac, six to eight tracks with a Quadra AV, and four tracks with most other 680X0 Macintoshes. The program runs in native code and supports Sound Manager audio on a Power Mac, though you're better off using a Digidesign Audiomedia II card. (Sound Manager imposes some unfortunate limitations.)



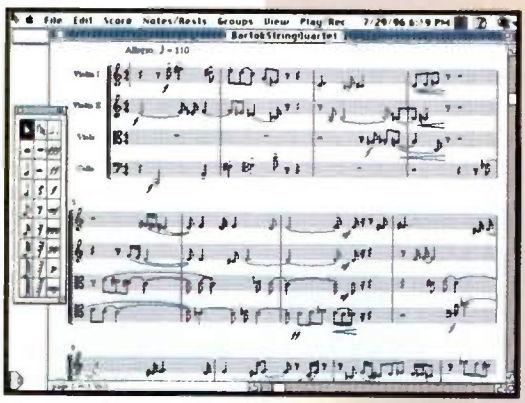
Macromedia *Deck II* 2.5 (Mac)

Deck II offers mixer snapshots, virtual mixes, solid automation features, and audio scrubbing. Its MIDI controls, keyboard commands, and shortcuts help speed up your work. Beginning with version 2.5, it includes limited real-time effects (Power Mac only), which can be any combination or multiple instances of delay, EQ, or chorusing.

One reason we chose Macromedia's program is its support for Adobe *Premiere* DSP plug-ins. We feel that over the long haul there will be more extensive support for the mighty Adobe's format than for a proprietary format from a small company (such as IQS), regardless of who has the technologically better approach.

We also liked *Deck II*'s ability to view and extract audio from QuickTime files, export audio in QuickTime format, master audio tracks with existing QuickTime movies, and keep track of the many files involved in multimedia work. An easy-to-use, intuitive, and ultrahandy feature lets you spot audio to picture by simply scrubbing along the timeline in the QuickTime movie window; when you release the mouse, the selected Region stops in place.

If you mostly want to work with multitrack audio, as opposed to integrating audio with MIDI sequencing, this is a great program. You can create stereo masters, score multimedia productions and QuickTime videos, sync audio tracks to MIDI files, and much more. That sounds like a winner to us.



Musicware *Nightingale* 3.0 (Mac)

Macintosh and comes from a forward-looking company that continues to innovate. Yet that is exactly what you get in Musicware's *Nightingale* 3.0.

Musicware's WYSIWYG scoring program might not have absolutely every feature its top competitors have, but the program has the most important ones, and more features are being added with each new version. And thanks to the program's excellent design, friendly tutorial, and online User's Guide, you can get up and running very quickly and can dig deep without getting lost.

As far as the basics, a score can have up to 64 staves and 100 voices. You get real-time MIDI playback and recording with overdubbing, PostScript output, a wealth of symbols, and layout controls that approach engraver quality. Allegedly, *Nightingale* 3.0 will run on a Mac Plus. We weren't brave enough to try that, but it was impressively fast and stable on 68030, 68040, and Power Mac machines.

Several features and options indicate that Musicware also is thinking about the future. The newest addition to the *Nightingale* 3.0 package is *NoteView* 2.2, a freeware version of *Nightingale* with all save and print functions disabled that lets you post, view, and listen to *Nightingale*-created scores on the Web. In addition, *Nightingale* 3.0 reads Coda *Finale* ENIGMA Transportable Files (ETF). Finally, for $149.95, the company offers *NoteScan* 1.04, an optical character recognition (OCR) program that allows you to import scanned sheet music in the form of TIFF files and then convert them into editable notation.

Nightingale 3.0 allows you to create attractive, complex scores quickly and with relative ease. We're particularly impressed that Musicware actively pursues ways to expand the program's capabilities by looking in new directions. (Musicware claims there are yet more ground-breaking features to come.) The program—and its creators—are clearly worthy of EM's seal of approval.

NOTATION SOFTWARE

Musicware *Nightingale* 3.0 (Mac; $495)

Creating music-scoring software is a tough job because the rules of musical notation are many and complex. If you find a program with a lot of well-implemented features, it might have a brutal user interface, and you're very lucky if it's relatively bug free. It's entirely too much to ask for well-implemented features in a friendly, easy-to-use program that runs like a dream on almost any

Yamaha 02R

RECORDING MIXER

Yamaha 02R ($8,695)

Home and project studios are increasingly dependent on digital technology, thanks to the proliferation of affordable digital multitrack tape decks (such as MDMs) and hard-disk recording systems. But what about the mixer, through which all those digital tracks flow? Yamaha's

REALITY FOR $1500* A PAIR. INTRODUCING THE HR824 ACTIVE MONITOR.

If you've been trusting the quality of your creative product to passive monitors costing $400-$600 a pair, there's an astonishing revelation waiting for you. In our opinion, the active, biamplified HR824 is the most accurate near-field monitor available — so accurate that it essentially has no "sound" of its own. Rather, Mackie Designs' High Resolution Series™ HR824 is the first small monitor with power response so flat that it can serve as a completely neutral conductor for whatever signal you send it.

Mackie acoustic engineer David Bie uses scanning laser vibrometry to map HR824 tweeter dome vibrations. Film at 11.

SCIENCE, NOT SNAKE OIL.

Internally-biamplified, servo-controlled speakers aren't a new concept. But to keep the cost of such monitors reasonable, it's taken advances in measurement instrumentation, transducers, and electronics technology. In developing the HR Series, Mackie Designs sought out the most talented acoustic engineers and then made an enormous commitment to exotic technology. The HR824 is the result of painstaking research and money-is-no-object components, not to mention thousands of hours of listening tests and *tens* of thousands of dollars in tooling.

FLAT RESPONSE ON OR OFF-AXIS.

One of the first things you notice about the HR824 is the gigantic "sweet spot." The detailed sound field stays with you as you move back and forth across the console — and extends far enough behind you that musicians and producers can hear the same accurate playback.

The reason is our proprietary exponential high frequency wave guide. Without it, a monitor speaker tends to project critical high frequencies in a narrow beam (Fig. A) — while creating undesirable edge diffraction as sound waves interact with the edges of the speaker. Imaging and definition are compromised. The "sweet spot" gets very small.

Like biamped speakers, wave guides aren't a new concept. But it takes optimized internal electronics and a systems approach to make them work in near-field applications.

The HR824's wave guide (Fig. B) maximizes dispersion, time aligns the acoustic center of the HF transducer to the LF transducer's center, and avoids enclosure diffraction (notice that the monitor's face is perfectly smooth.) The exponential guide also increases low treble sensitivity, enabling the HF transducer to handle more power and produce flat response at high SPLs.

CLEAN, ARTICULATED BASS.

Seasoned recording engineers can't believe the HR824's controlled low bass extension. They hear low frequency accuracy that simply can't be achieved with passive speakers using external amplifiers. Why?

First, the HR824's FR Series 150-watt bass amplifier is directly coupled in a servo loop to the 8.75-inch mineral-filled polypropylene low frequency transducer.

It constantly monitors the LF unit's motional parameters and applies appropriate control and damping. An oversized magnet structure and extra-long voice coil lets the woofer achieve over 16 mm of cone excursion. Bass notes start and stop instantly, without "tubbiness."

Second, the HR824's low frequency driver is coupled to a pair of aluminum mass-loaded, acoustic-insulated 6.5-inch passive drivers. These ultra-rigid drivers eliminate problems like vent noise, power compression, and low frequency distortion — and couple much more effectively with the control room's air mass. They achieve the equivalent radiating area of a 12-inch woofer cone, allowing the HR824 to deliver FLAT response to 42Hz with a 38Hz, 3dB-down point.

Third, the woofer enclosure is air-displaced with high-density adiabatic foam. It damps internal midrange reflections so they can't bleed back through the LF transducer cone and reach your ears. The typical problem of small-monitor midrange "boxiness" is eliminated.

A TRUE PISTONIC HIGH-FREQUENCY RADIATOR.

We scoured the earth for the finest high frequency transducers and then subjected them to rigorous evaluation. One test, *scanning laser vibrometry*, gives a true picture of surface vibration patterns. Two test results are shown in the upper right hand corner of this ad. Figure C is a conventional fabric dome tweeter in motion. You needn't be an acoustic engineer to see that the dome is NOT behaving as a true piston.

The Mackie HR824 Active Monitor. ±1.5dB from 42 to 20kHz.

Figure D shows our High Resolution metal alloy dome at the same frequency. It acts as a rigid piston up to 22kHz, delivering pristine, uncolored treble output that reproduces *exactly* what you're recording.

INDIVIDUALLY OPTIMIZED.

We precisely match each transducer's actual output via electronic adjustments. During final assembly, each HR824 is carefully *hand-trimmed* to ±1.5dB, 42Hz-20kHz. As proof, each monitor comes certified with its own serialized, guaranteed frequency response printout.

Fig. C. Uneven fabric dome tweeter motion distorts high frequencies.

Fig. D. HR824 alloy dome's uniform, accurate pistonic motion.

The HR824's front board has "radiused" edges to further eliminate diffraction; an "H" brace bisects the enclosure for extra rigidity.

Mackie is one of the few active monitor manufacturers that also has experience building stand-alone professional power amps. Our HR824 employs two smaller versions of our FR Series M-1200 power amplifier — 100 watts (with 150W bursts) for high frequencies, and 150 watts (200W peak output) for low frequencies. Both amps make use of high-speed, latch-proof Fast Recovery design using extremely low negative feedback.

TAILOR THEM TO YOUR SPACE.

Because control rooms come in all shapes, sizes and cubic volumes, each HR824 has a three-position Low Frequency Acoustic Space control. It maintains flat bass response whether you place your monitors away from walls (*whole space*), against the wall (*half space*) or in corners (*quarter space*). A low frequency Roll-Off switch at 80Hz lets you emulate small home stereo speakers or popular small studio monitors.

CONFRONT REALITY AT YOUR MACKIE DESIGNS DEALER.

We've made some pretty audacious claims in this ad. But hearing is believing. So bring your favorite demo material and put our High Resolution Series monitors through their paces.

If you've never experienced active monitors before, you're going to love the unflinching accuracy of Mackie Designs' HR824s.

If you've priced other 2-way active monitors, you're going to love the HR824's $1498/pair price* AND its accuracy.

*$1498 suggested U.S. retail price per pair.

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HR824 Active Monitors accept balanced or unbalanced ¼" and XLR inputs. Jacks & removable IEC power cord face downward so that the speaker can be placed close to rear wall surfaces.

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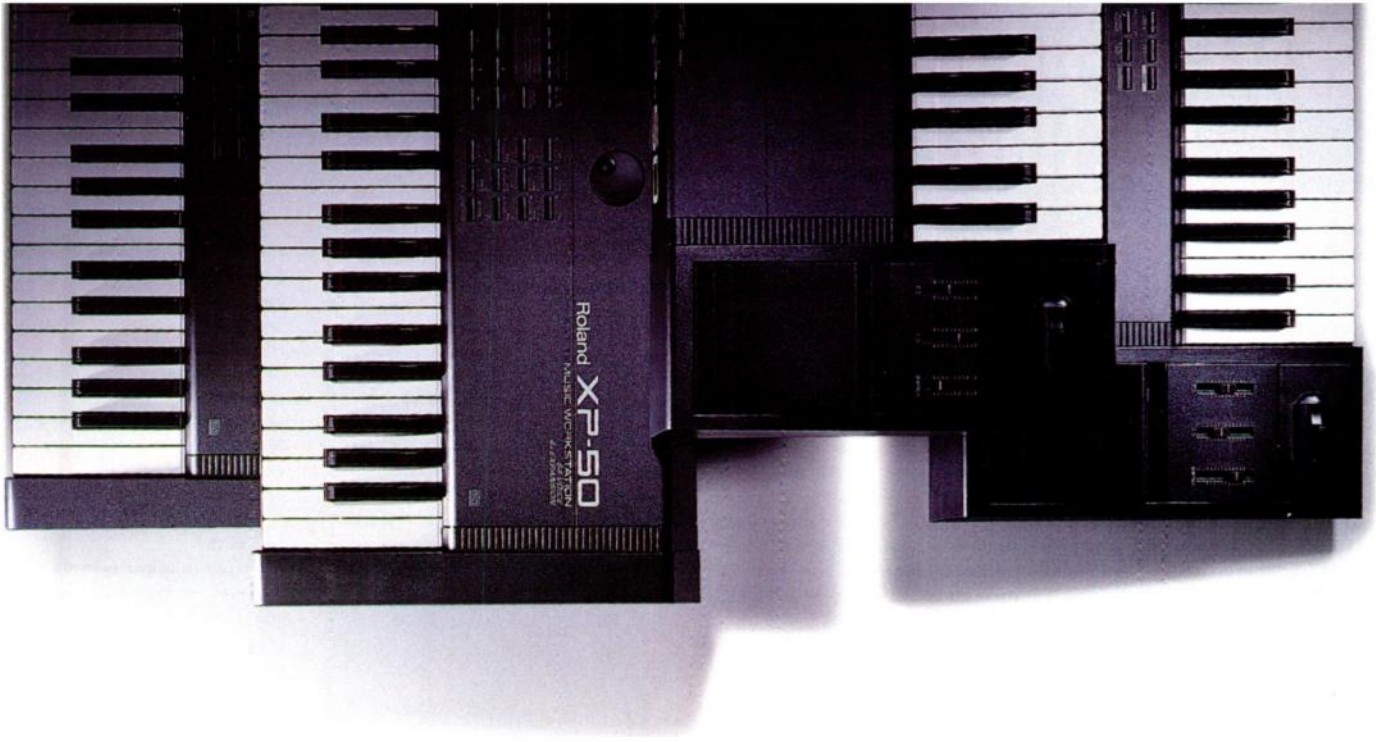

There are a lot of powerful workstations in the world. Most of them are XP-50s.

In the short time since we introduced the XP-50, it's gone on to set quite a few standards. Like innovative performance features, value, and sheer expressiveness to name a few. And then, of course, there's popularity. Last year the XP-50 was the top choice of musicians around the world. Makes sense, though, because from Real Time Phrase Sequencing (RPS) to 640 onboard patches to its powerful sequencer, this workstation has it all. Plus, it comes with 4 expansion board slots, the most in the industry. And to fill them, our ever-expanding library now has 9 unique expansion boards for the ultimate in expandability. So stop by your nearest Roland dealer today and see the new standard in workstations.

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XP-50 Music Workstation

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circle #577 on reader service card

answer for 1996 was the amazing 02R digital mixer.

The 02R offers many incredible capabilities. The base model provides 40 analog inputs, each with its own independent dynamics processor and 4-band parametric EQ. Eight aux send/return loops include two internal paths that are routed to a pair of internal effects processors, which are based on Yamaha's powerful SPX900. The analog outputs include eight buses and a main stereo bus. All have their own dynamics processors, and the main stereo bus has its own 4-band, parametric EQ.

Akai S2000

On the digital side, the base model provides one stereo AES/EBU input and output and two stereo S/PDIF stereo inputs and outputs. However, these digital connections can be augmented in a big way by adding various expansion cards, which fit into four slots. Most of the available cards provide eight channels of digital I/O in various formats, including Alesis ADAT ($299), TASCAM TDIF for DA-88/38 ($299), AES/EBU ($359), and Yamaha's proprietary format ($299). You can also add extra analog I/O ($799) and cascade several 02Rs ($999) with the appropriate cards.

The 02R is fully automated, complete with motorized faders. In addition, complete scenes and dynamic moves can be saved in onboard memory and synchronized to incoming SMPTE or MTC. The user interface is centered around a huge LCD display that reveals a wealth of well-organized information. Tweaking most controls automatically brings up the appropriate screen.

But the bottom line is this: the 02R sounds fantastic. And with one or more expansion cards, you can keep your digital tracks in the digital domain where they belong. Yamaha has brought the dream of an automated, all-digital studio much closer to many musicians' reality, for which we are all grateful.

BIAS *Peak* (Mac)

SAMPLER

Akai S2000 ($1,195)

Often, when a manufacturer revisits and improves a product, we discover to our dismay that it's going to cost us a lot more than before. But Akai went in the right direction with the S2000 sampler, which replaces and improves on the company's S2800 and S2800 Studio yet costs less. We're stoked about it.

The S2000 requires just two rackspaces and uses the same sound engine as the original S3000, which is one step up from the S2800. It offers a 25-pin SCSI port, a 2-line × 16-character LCD display, and one stereo pair of balanced ¼-inch analog outputs. The stock unit comes with 2 MB of sample RAM, which can be expanded to up to 32 MB. If that isn't enough for you, you can use its two ROM card slots to add up to 16 MB of nonvolatile Flash ROM.

A new Multi mode lets you set up sixteen multitimbral Parts, each of which can be assigned to a different Program and respond on a different MIDI channel. Each Part includes user-selectable level, pan, tuning, transposition, and output routing. If you add the optional SampleVerb expansion board ($399), you can also control each Part's effects-send level.

The SampleVerb is just one of three expansion boards you can add to the S2000 via its three slots. This versatile board includes a 2-channel multi-effects processor and two additional channels that are dedicated to reverb. Each independent multi-effects channel can have up to six simultaneous effects, with extensive parameter editing. You also can add the ProFilter expansion board ($399), which supplies highpass filtering, bandpass filtering, or 2-band graphic EQ and adds a second multistage envelope generator. Finally, if you need digital I/O or want more outputs than the stock S2000 supplies, you can add the Multi-8/D expansion board ($299), which adds eight assignable, analog outputs on ¼-inch jacks and S/PDIF digital I/O on RCA (coax) connectors.

To sweeten the deal, Akai throws in its *M.E.S.A.* sample-editor/librarian software for the Mac, which accesses all the sampler's parameters, provides basic waveform editing, organizes the samples, translates between Akai, AIFF, and SDII file formats, and much more. A Windows version should be available sometime in January.

Akai offers the stock unit for twelve C-notes, list. The S2000 Studio version ($1,799) includes the Multi-8/D and SampleVerb boards, which saves you a C-note. That's one of the best deals we have seen all year. A friend of ours who produces major TV and film scores liked the sound and price of the S2000 so much that he bought a whole rack of them. We would gladly settle for owning just one.

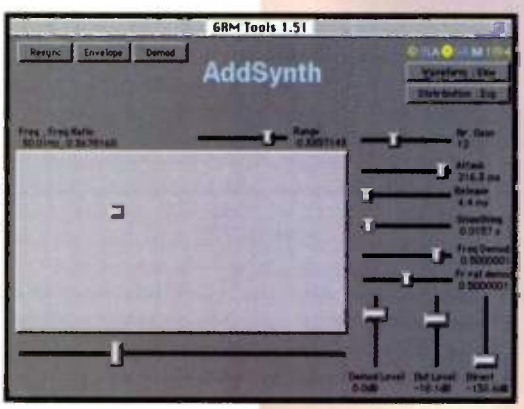
SAMPLE-EDITING SOFTWARE

BIAS *Peak* (Mac; $499)

Peak is the first completely new 2-track audio editor that has been released for the Mac in several years. Perhaps because its vintage is so recent, it implements a number of fresh features along with most of the expected ones. The program is hard disk–based and nondestructive, unlike such stalwarts as Passport's *Alchemy*. It gives you unlimited levels of Undo, and edits are saved in a list so that you can revert to any previous version of a file. You get unlimited zoom (with zoom memory), and waveforms are redrawn in the background. There are three types of audio scrubbing.

The software can send and receive sounds to and from an Ensoniq EPS/ASR-series sampler and to any sampler that supports SMDI (for example, the Kurzweil K2000/K2500 series, Peavey SP, and E-mu e-64, ESI-32, and E-IV). We would like to see direct support for more samplers, but this is certainly a good start. It can also import audio CD tracks in the digital domain and convert them to sound files. You can adjust sample-loop start and end points on the fly, which is way cool.

BIAS has incorporated a ton of powerful waveform-editing and processing features. For instance, you can combine the spectral characteristics of two different sounds, apply a type of resonant dynamic filtering that reduces a waveform to its basic rhythmic elements, reverse a waveform and mix it with the original, and even remove clicks from old recordings. You also get phase vocoding, pitch change, gain changing, normalizing, sample-rate conversion, time compression and expansion, and batch region processing. And if that isn't enough, the program supports the Adobe *Premiere* plug-in architecture, so you can add third-party DSP plug-ins.



INA-GRM *GRM Tools* (Mac)

And lest we forget, *Peak* reads and writes all the most important 8- and 16-bit, mono and stereo file formats at any sample rate, including AIFF, QuickTime, Sound Designer II, WAV, and Red Book audio. (RealAudio support is coming in version 1.5, which should be shipping by the time you read this.) It supports Apple Events, too, so you can catalog and audition sounds from Apple Event–capable database programs such as Claris' *FileMaker Pro*. Did we leave anything out? You bet; there's plenty more to this program. But you get the picture, and BIAS gets the award.

SIGNAL-PROCESSING SOFTWARE

INA-GRM *GRM Tools* (Mac; $799)

If your idea of a good time is to experiment with mangling sounds in a variety of wild ways, *GRM Tools* might be just what you're looking for. The program offers fourteen sound-twisting filtering and time-manipulation algorithms along with a user-friendly interface. The processing can be applied to a Sound Designer II file or to a real-time audio stream.

There's a limited form of additive synthesis intended for sound design rather than performance. The sophisticated ring modulator has a gate on the output that is adjustable in real time. (Try it for adding some metallic grit to rhythmic material!) You get a real-time bandpass/band-reject filter whose mode is switchable on the fly, in real time. Another algorithm provides seven independent, high-Q comb filters per processing channel with individually tunable filters and adjustable resonance. A very cool algorithm provides up to 23 fixed-frequency filters with up to 100 dB of cut and 12 dB of boost for each band, which lets you create radical filtering effects.

There's a multitap stereo delay with adjustable tap-spacing and level relationship, a Doppler algorithm, and a smooth-sounding, multichannel harmonizer with individual delay and level controls for each harmony. For nifty chorusing and thickening effects, you can randomly alter the input signal's pitch by means of an LFO. The input signal can also be cut into small fragments that are randomly spliced back together, delayed, and then played back at different speeds to create a chaotic, unpredictable effect.

The time-stretching isn't sonically pristine, but it allows you to create interesting sound transformations. A Time Freezing algorithm loops a portion of the input signal in a buffer using multiple loops positioned at different times. To top it off, *GRM Tools* includes a good-sounding sample-rate converter, input meters, and phase-correlation meters.

GRM Tools is available as a stand-alone application that works with any Digidesign card (from the Sound Accelerator up to Pro Tools II) and as a TDM plug-in ($499). We haven't yet added an award for plug-ins (maybe next year!), so this year's award goes to the stand-alone version. But we understand that the TDM version is even better. If you enjoy manipulating and processing sound, you must check out this program.

SYNTHESIZER/SOUND MODULE

Kurzweil K2500 ($4,960)

In a year that saw a surprising number of new synths make their debut, Kurzweil led the way with the K2500. This do-all machine gives you more of everything from the venerable K2000 and then some. Although retaining the same basic Object hierarchy and VAST synthesis architecture as its predecessor, the K2500 doubles the polyphony to 48 voices and increases the maximum sample RAM to 128 MB. The base model offers an exceptional 76-note, semi-weighted keyboard, and the K2500X ($5,520) has the same fully weighted, 88-note keyboard found in the PC88. As with the K2000, a sampling option is available ($842) that turns the K2500 into one of the best sound-design machines on the market.

Kurzweil K2500

In addition, there are now eight drum channels instead of one, and each Program on these channels can include up to 32 Layers. Setups can include up to eight Zones instead

Reviewing the Winners

All but two of our Editors' Choice winners—the Panasonic SV-3800 and Akai S2000—have been or will soon be evaluated in our pages, either in reviews or in "face-off" feature stories. (We also reviewed the S2000's predecessor, the S2800.) Five of these stories are still in progress and will appear in upcoming issues.

Dates outside of parentheses indicate reviews of the award-winning version. Dates in parentheses refer to reviews of earlier versions. Dates with article names in parentheses indicate detailed coverage in a feature story. Back issues are available from Mix Bookshelf; tel. (800) 233-9604 or (908) 417-9575; fax (908) 225-1562.

Akai S2000	(S2800, 12/93)
Alesis NanoVerb	coming soon!
Aphex 661	7/96 ("Squeeze Boxes")
BIAS *Peak* (Mac)	1/97
Buchla Lightning II	8/96
CAD E-300	12/96 ("An Economy of Scales")
E-mu Darwin	5/96 and 11/96 ("The Magnificent Seven")
Earthworks TC30K	11/96
Event Electronics 20/20bas	12/96
INA GRM *GRM Tools* (Mac)	1/97
Intelligent Devices *AD-1 Pro Audio Analyzer* (Mac)	11/96
Fletcher ElectroAcoustics Joe Meek SC-2	7/96 ("Squeeze Boxes")
Kurzweil K2500	5/96
Macromedia *Deck II* 2.5 (Mac)	coming soon!
Mark of the Unicorn MIDI Timepiece AV	coming soon!
Musicware *Nightingale* 3.0 (Mac)	coming soon!
Power Technology DSP•FX (Win)	1/97
Roland VS-880	9/96 and 11/96 ("The Magnificent Seven")
TASCAM DA-38	11/96
TC Electronic M2000	1/97
Voyetra *Digital Orchestrator Plus* (Win)	12/96
Yamaha 02R	7/96
Yamaha MD4	coming soon!

of three, and the Setup editor has been completely overhauled. As in the K2000, the base K2500 includes 8 MB of sample ROM, and the same 8 MB ROM Blocks are available. However, the daughterboard that holds the ROM blocks now includes a stunning 4 MB stereo piano sample.

Although the Kurzweil K2500 still uses the original DigiTech effects processor, the effects are completely revoiced from the K2000. Better yet, the new KDFX ($895) custom digital effects chip should be available soon. In addition, the new DMTi digital multitrack interface ($1,495) allows digital signals to be transferred to and from the K2500 via AES/EBU, S/PDIF, Alesis ADAT Lightpipe, and TASCAM TDIF for DA-88/38.

Also new to the Kurzweil K2500 are two well-implemented ribbon controllers, eight programmable control sliders with associated mute/solo buttons for each Zone, and two fully program-mable buttons near the pitch and mod wheels, all of which make this instrument one of the best master controllers you can get. The system software and ROM Objects are now stored in Flash ROM, which can be updated from floppy disk. This approach to software updates is far superior to swapping chips, as was required with the K2000. All in all, this is a smokin' synth that provides just about everything you need to make beautiful music.

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The Little Demo That Could

by Brian Knave

This is the story of a demo tape that was recorded while both the artist and the engineer were busy with other, presumably more momentous projects. But as it turns out, this humble demo tape, which was never meant as anything more than an appetizer, ended up being the main course.

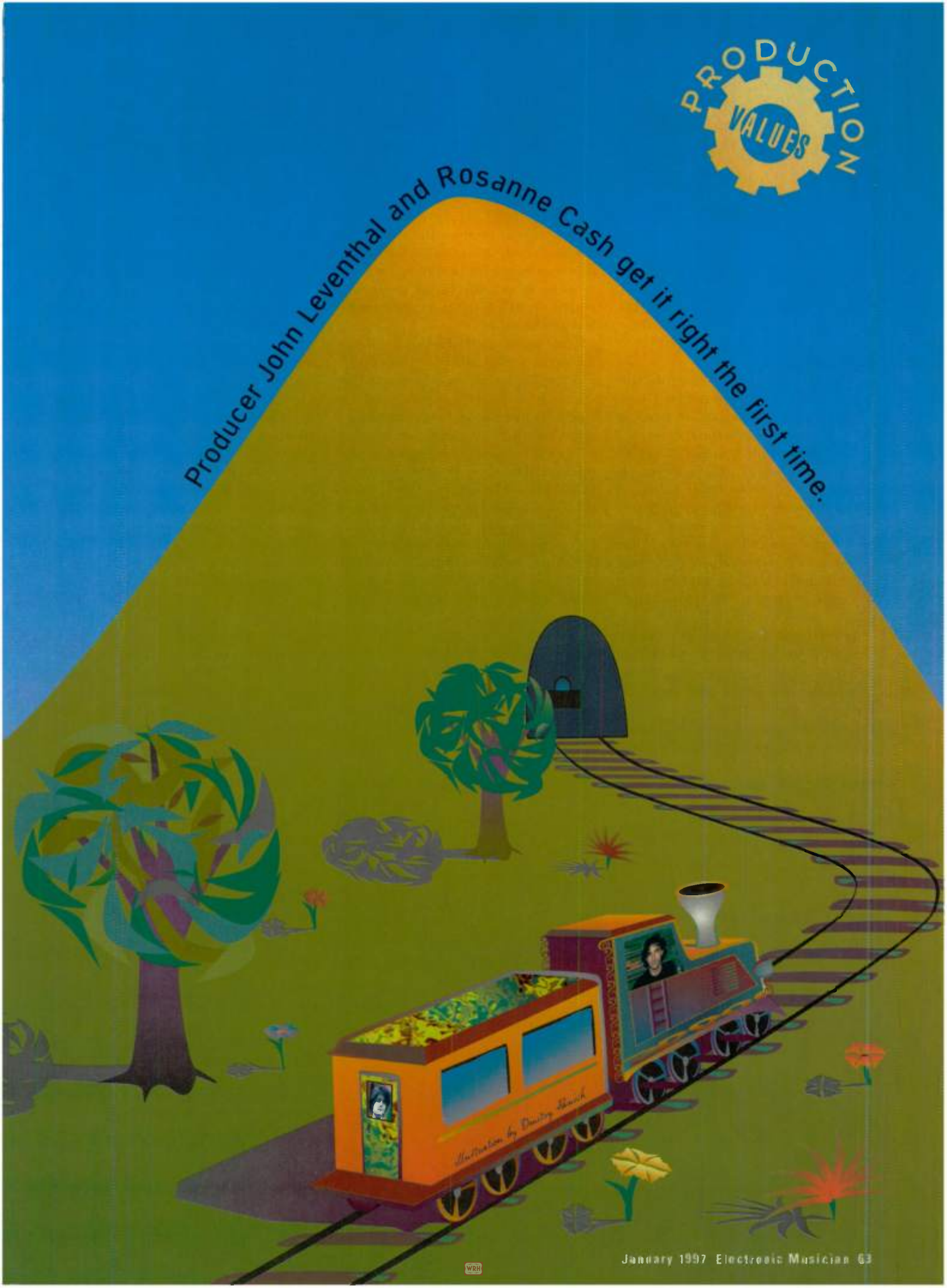
The artist is Rosanne Cash, daughter of country-music legend Johnny Cash. The engineer is her husband, John Leventhal, a guitarist-songwriter who made his mark by producing Shawn Colvin's highly acclaimed 1989 record, *Steady On*. (The versatile Leventhal also cowrote and performed on much of the material for that album as well as Colvin's latest release, *A Few Small Repairs*.)

Okay, you're asking yourself, so why on Earth would a big star like Rosanne Cash need a demo tape? The answer is that Capitol Records president Gary Gersh, who had just signed Cash after her departure from Columbia Records, simply wanted to hear her new material. In addition, both Cash and Leventhal were eager to get Gersh's input to determine whether he liked the tunes and the artistic direction they were taking.

Gersh was very happy with the songs, but he also fell in love with the rawness and intimacy of the demos, so he proposed that the duo release them "as is." Cash asked, "Can we do that?" Gersh answered simply, "Why not?"

PRODUCTION VALUES

Producer John Leventhal and Rosanne Cash get it right the first time.



The result is *10 Song Demo,* a refreshingly honest CD that offers an unadulterated glimpse of the artist, her craft, and the emotion that suffuses both.

GLITZ FREE

Leventhal was understandably surprised when he learned that Gersh wanted to release the demo tapes as the tracks on a legitimate, commercial album. "My first thought was, 'You *can't* be serious,'" he says. "I wasn't even remotely thinking about making a record when we were recording the demos." Naturally, Leventhal was tempted to go back and fix every little mistake. "The musician-engineer-producer part of me was a little nervous," he explains. "But the part of me that just loves music said, 'You know what? It's cool.'"

In keeping with the demo concept, Leventhal trod lightly while preparing the final tapes for mastering. He rerecorded some out-of-tune vocals on two songs, remixed four songs, and replaced a lame-sounding acoustic piano track with a sampled piano. Not only did he refrain from adding more instrumentation, but he actually removed some tracks from one of the tunes.

"The original demo for 'Just Don't Talk about It' was pretty fleshed out, and it already sounded like an album cut," Leventhal explains. "But when they decided to release the album as a demo record, it seemed more appropriate to take a lot of stuff out and remix the song. The funny thing is, I ended up liking the track better with less production."

After years of producing primarily songwriters, Leventhal has come to appreciate the less-is-more approach. "My theory is, if the song is great and the singer is great, the track should be great, whether you add almost nothing to it or dress it up with extensive production. The song is either going to work or not. The degree of production shouldn't affect how people are moved by the song. The production may affect how commercially viable the work is but not how emotionally true the songs are. Fortunately for this record, Gersh wasn't overly concerned with the commercial aspect."

12TH STREET STUDIO

Although it's located in a one-bedroom apartment rather than his home, Leventhal's 12th Street Studio is in many respects a typical home studio: two ADAT XTs, a Mackie 32•8 console, Yamaha NS-10 monitors, MOTU's *Performer* 4.2 running on a Powerbook 180, and an assortment of synths, signal processors, and microphones. (For a complete listing of Leventhal's gear, see the table, "Demo Tools.") The recording equipment is situated in the living room; the bedroom is reserved for tracking electric guitars and storing Leventhal's collection of amps and axes.

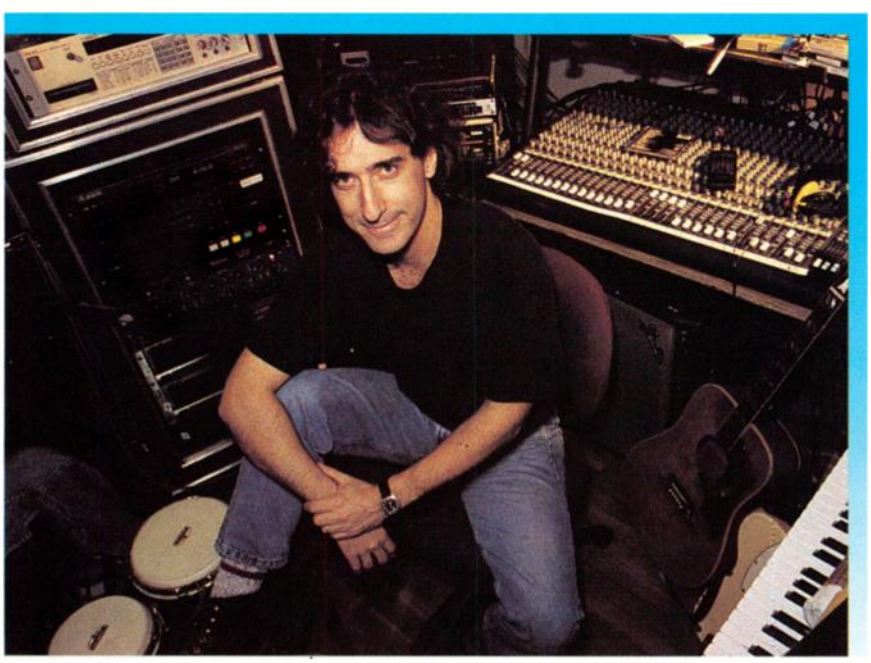
Leventhal has hung pieces of acoustic foam here and there on the walls, but acoustically, the room remains less than ideal. "In the beginning, I'd mix the bass to where I liked it, only to discover that 60 Hz was booming off the walls when I played the mix back on other systems," he says. "So I always have to question the room's bottom-end response, but I've learned to compensate." Leventhal's studio also gets its share of street noise. "If I have to, I'll throw some Sonex [acoustical foam] over the windows, but generally I don't go too nuts about that stuff. I'm not a purist."

Despite the acoustic limitations of the space, Leventhal is in no hurry to fix something that isn't broken. "Evidently, there's something that's working here. The people I work with like it because they don't feel they're in a studio. They're comfortable, so they can take chances. It's real loose. Technically speaking, I can't track drums, but I can record pretty much anything else."

QUICK SKETCHES

Under normal circumstances—that is, if he's "recording for real"—Leventhal positions the singer in a carpeted part of the living room to minimize reflections. However, the demos he recorded with Cash were often done hurriedly and tracked less than ideally because the sessions were crammed between paying gigs. "I'm very busy, and so is my wife. Rosanne would say, 'Can I come over and put down a song?' If there was time, we'd do it. So I was usually working very quickly and not really taking the time to be careful about the recording process."

On all but two of the cuts, Cash played acoustic guitar and sang simultaneously. For those songs, Leventhal tracked her voice and guitar with two separate mics. Initially, he used an Audio-Technica AT4033 for Cash's voice and an AKG C 460 for her guitar. "But as the thing progressed," he explains, "I realized I wasn't happy with those mics. So I borrowed a Neumann



SCOTT MORGAN

John Leventhal in the producer's seat at 12th Street Studio. "It gets pretty chaotic in here," says Leventhal, "but once every four months or so, I try to clean it up."

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The Little Demo That Could

COLLEEN HIXENBOUGH

Flanked by a lamp and an amp, John Leventhal and Rosanne Cash take a breather outside the apartment building where Leventhal installed his personal studio.

U 47 for Rosanne's voice. That allowed me to use the AT4033, which was a little warmer sounding than the C 460, on the guitar."

Because he was working quickly, Leventhal positioned the guitar mic where he knew it would capture a decent sound. "The sweet spot I always start with is between the twelfth fret and the sound hole, angled a bit toward the sound hole," he explains. "That position provides a basic, all-purpose guitar sound that articulates the strings and brings out the low end without being too boomy. But if I have more time and I'm honing in on something specific, I might do anything—use two mics, mike the guitar from the back, place the mic over someone's head, and so on—to get the sound I need."

On the demo project, however, scrutiny and experimentation were the last things on Leventhal's mind. "Had I known I was making a record, I would have been much more critical about mic placement, compression ratios, how I positioned the artist, and all that," he says. "But Rosanne and I were just kind of crunched up by the console, focusing on the performance. There were nasty room reflections and tons of mic bleed, but I didn't care

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about that stuff because these were just demos. I didn't think anyone was ever really going to hear them."

Of course, the brisk pace allowed little slack for catching errors. "The energy was, 'Okay, honey, here's the mic. Let's do it,'" says Leventhal. "There were times during the first sixteen bars of a tune that I'd look over at the compressor and see that we were slamming the hell out of it, at which point I'd quickly back off the input level. Then, when we were done, Rosanne would say, 'Yeah, I liked that one. Let's keep it.' She's a very spontaneous performer, and you typically get only one or two takes out of her, so it wasn't really an option to say, 'Well, I overcompressed it in the beginning. Can we do it again?'"

Demo Tools

Here is an inventory of the gear John Leventhal uses to produce demos in his personal studio. His vast instrument collection also includes a prized Univox acoustic with 25-year-old strings, mandolins, bazoukis, harmonium, accordions, and a Wurlitzer electric piano.

Mixing Console	Mackie 32•8
Recording Media	Alesis ADATs (2) with BRC, Technics SVDA-10 DAT recorder
Microphones	AKG C 460 and C 60, Audio-Technica AT4050 and AT4033, Shure SM57 (2)
Signal Processors	Alesis MicroLimiter, MicroVerb, and 3630; Lexicon Alex and JamMan; Tube-Tech LCA-2B compressor; Yamaha SPX90; Maestro EchoPlex
Monitor Speakers	Yamaha NS-10; Radio Shack Optimus 7
Power Amp	Hafler 1200
Computers/Software	Macintosh Powerbook 180; MOTU *Performer* 4.2
Synths/Sound Modules/Samplers	Akai S900, Kurzweil MicroPiano, Oberheim Matrix 6, Roland JV-80, Yamaha DX-7
Guitars and Basses	Fender Bass 6, Precision, Stratocaster, and Telecaster; Gibson J-45; Gretsch 6120; Jerry Jones 6-string bass; Martin 0018
Guitar Amps	Fender Champ, Deluxe, Deluxe Reverb, Princeton, and Super Reverb; Vox AC30

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Enthusiastic as he is about state-of-the-art gear, Leventhal is the first to downplay its significance in the greater

President of Capitol Records Gary Gersh liked the demo tapes of Rosanne Cash's new songs so much that he decided to release them as her new album. The production is minimal, but the sound quality is high.

scheme of things. "Ultimately," he says, "the song and its arrangement have much more to do with the success of a recording than the gear that was used to record it. That's why it's the producer's job to listen with broad ears and not get too bogged down in details. Believe me, that can be a really hard lesson to learn for the musician aspiring to become a producer. It's too easy for the musician to hear only what he or she is playing instead of the whole record."

Assistant Editor **Brian Knave** *recently mixed the same song twenty times and still didn't totally nail it.*

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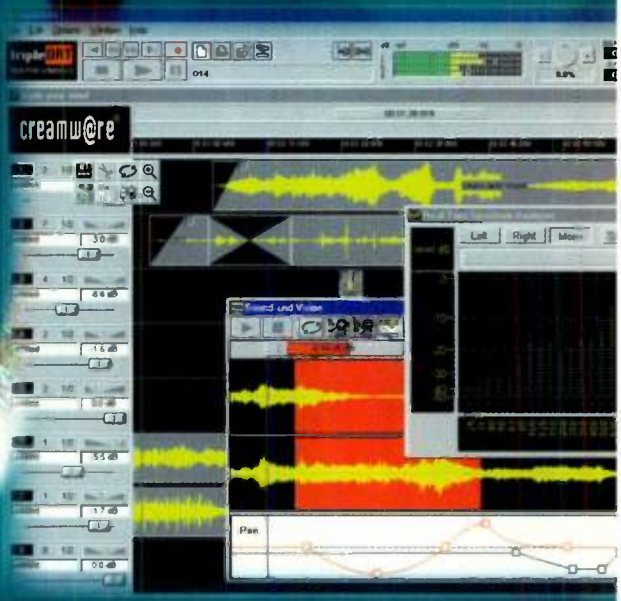

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Illustration by Jaime Hogan

Polishing your IMAGE

By Jim Miller
&
Tish Eastman

Spiff up drab samples with the excitement of true stereo sound.

In the early 1980s, samplers were limited to recording monophonic sounds because the technology was not sophisticated enough to handle stereo. For one thing, there was the polyphony issue: stereo samples eat up voices at twice the rate of mono samples, so 8-voice samplers, such as the E-mu Emulator or Ensoniq Mirage, could have produced only four notes of stereo information. In addition, there was (and still is) the problem of sample memory. Stereo samples use twice as much RAM as mono samples, and the sample RAM in a Mirage was limited to a measly 128 KB.

It wasn't until E-mu unveiled the Emulator III in 1987 that samplers were actually able to record in true stereo. Other samplers, such as the popular Akai S1000, could reproduce stereo samples only by linking two phase-locked monophonic samples. (Many current samplers, in fact, still use this scheme to produce stereo sounds.)

Today, state-of-the-art samplers, such as the E-mu E4X Turbo and the Kurzweil K2500, can be loaded with up to 128 MB of RAM, which is 1,000 times the amount of memory that was available in the Mirage. The K2500 offers 48-note polyphony, which yields 24 stereo voices, and the E4X Turbo is available with 128-note polyphony, which produces 64 voices of stereo. As a result of these breakthroughs, we thought it would be useful to present some thoughts on the art of stereo sampling.

TRY IT!

Let's start with a few simple experiments that illustrate the effect of true stereo sampling. In a typical room, position a pair of mics in a right/left configuration at ear level and connect them to a stereo sampler. A living room works well. The room we used was about 14 × 18 feet, and we placed a Crown SASS-P stereo mic (rather than two regular mics) midway along the wider side and about five feet into the room. Set the sampler to record a stereo sample of approximately two seconds. If your machine lets you set a threshold for automatically triggering the sampling process, set it for about -18 dB. (If it doesn't offer this function, buy one that does—just kidding!—or simply ask a friend to assist you by manually triggering it.)

Move to the far right side of the room and clap your hands, shout, or otherwise make a fairly loud, sudden, obnoxious sound. For the purposes of this experiment, you don't need an optimized sample, just one at a reasonable level. Once you've acquired the sample, listen to it on headphones or studio monitors. You should hear the sound coming quite clearly from the right. Now, listen to only the left side of the stereo sample. If you've never done something like this, you'll probably be surprised at how much sonic information there is in the left channel, despite the fact that the sound originated on the far right side of the room. Much of this signal bleed is due to reflections off the left wall.

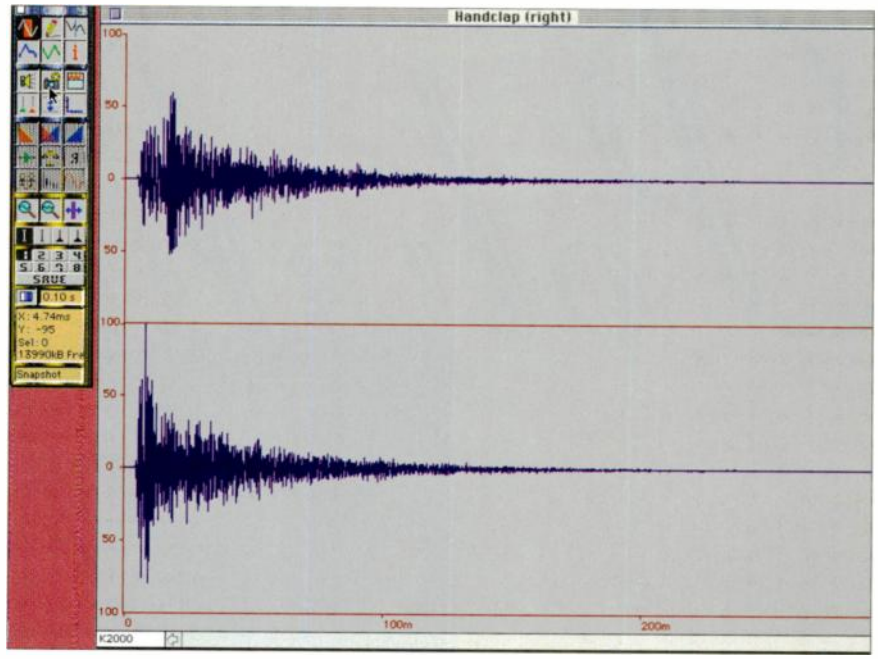

FIG. 1: This is a stereo sample of a hand clap recorded to the right of a stereo microphone. The right (lower) side is louder, which provides an amplitude cue as to which direction the sound is coming from, but there is still plenty of signal present on the left (upper) side.

This acoustic phenomenon is further clarified in an *Alchemy* waveform display of the sample (see **Fig. 1**). Note that the left (top) waveform has almost as much energy as the right, although the right waveform does exhibit a louder signal, particularly at the peak that occurs about 10 milliseconds into the sound. When we zoom in on the start of the sound (see **Fig. 2**), it is also apparent that the left part of the sample is slightly delayed.

For a final test, listen only to the right side of your sample for a while and then bring up the left side. There should be a rather dramatic improvement in the overall punchiness and detail when you hear both sides of the stereo sample together. This is a somewhat unexpected benefit of using stereo samples that arises because you are providing the listener with twice the aural information found in mono samples, meaning twice the detail, clarity, and richness.

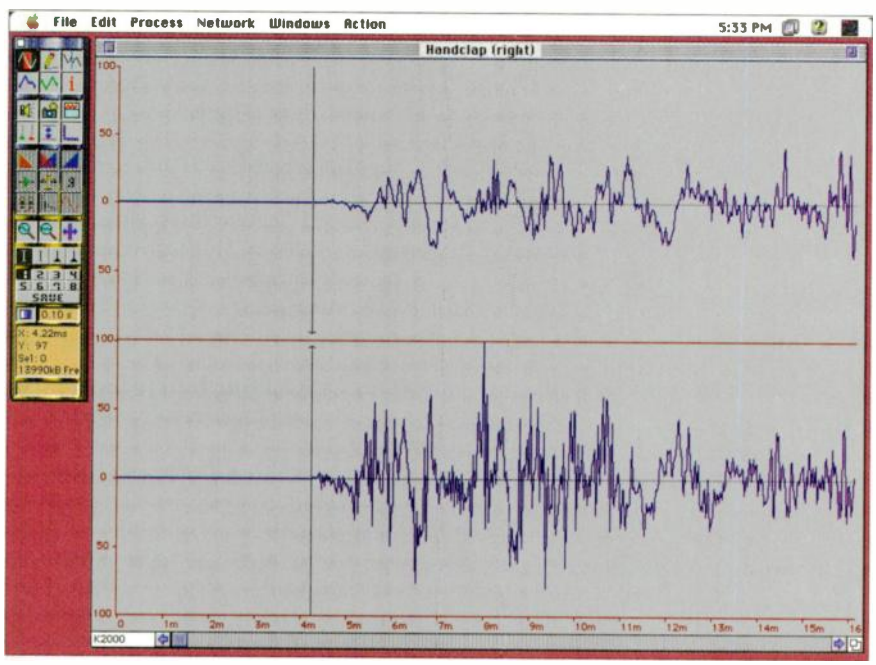

FIG. 2: When we zoom in on the stereo sample in Figure 1, we can see that the right (lower) half starts a few milliseconds before the left (upper) half, providing a time cue that identifies the sound as coming from the right.

STEREO CUES

These experiments illustrate two important factors that determine how accurately a human listener can sense the

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direction from which a sound is coming. These factors are *amplitude cues* and *time cues*, and they are essential to stereo perception.

If a sound comes from the right, it is naturally louder in the right ear, as illustrated in **Figure 1**. This is an amplitude cue. Similarly, if a sound comes from the right, it will reach the right ear first, as illustrated in **Figure 2**. This time cue confirms that the sound is indeed originating from the right.

Now, if you pan mono samples in a stereo field, you are using amplitude cues alone to simulate the location of each sound source. This is fine as far as it goes, but without time cues, the human auditory system can discriminate between only five general directions in a stereo sound field: hard left, center left, center, center right, and hard right (see **Fig. 3**). In addition, a monaural sample does not bleed across these finite locations, as would the sound of a true stereo sample.

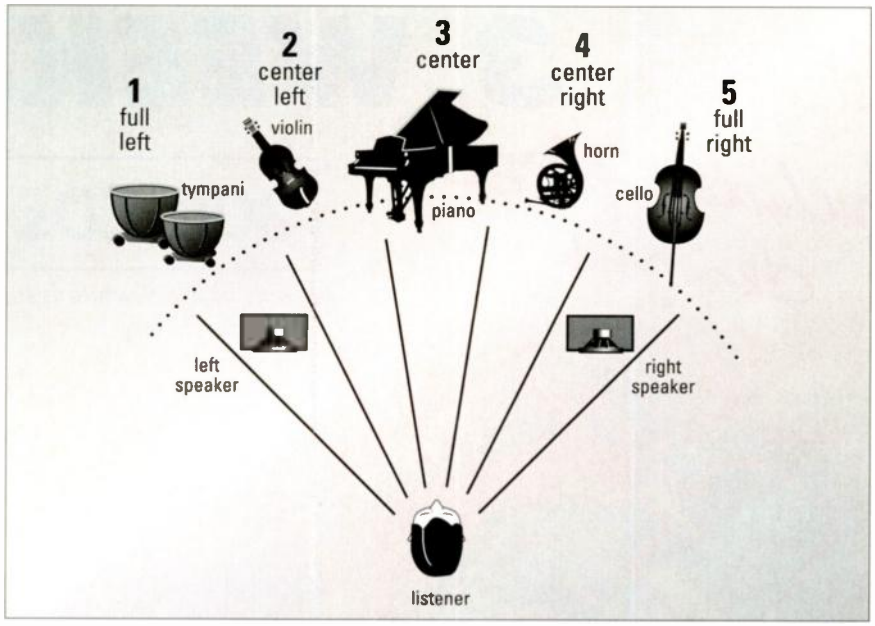

FIG. 3: Panning a mono sample in the stereo field allows you to place the sample in one of only five locations because this method of stereo placement uses only amplitude cues.

However, stereo samples provide amplitude *and* time cues, which offer a much more precise image of where a signal sits in the sound field. A stereo

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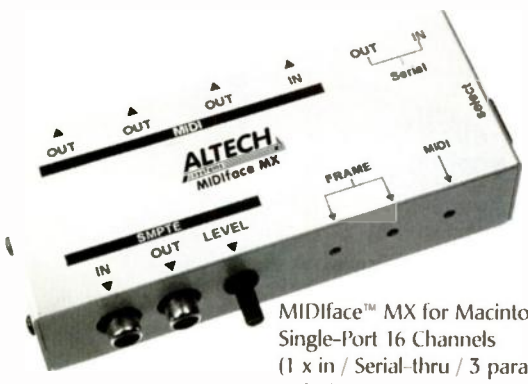

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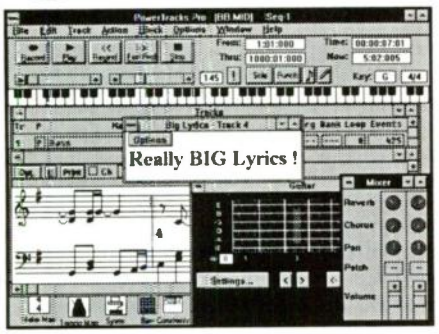

For starters... PowerTracks has all the Pro features found in sequencers costing hundreds of $$ more.

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WAVE FILE SUPPORT: Record and Play WAVE (audio) files inside the program (to 48kHz). Record an audio track of your singing or guitar playing along to a MIDI Sequence – all stored on disk!

PROGRAMMABLE: Programmers can extend the features of PowerTracks using the language of their choice (C, Basic, Delphi) using .DLL files. Customize PowerTracks to your needs, or purchase third-party add-ons for your synthesizer/sound card.

NEWEST FEATURES: We've added over 20 new features to Version 3.5 – Karaoke-style lyrics window • Notation scroll-ahead • Intelligent accidentals • Extended patch support • Rapid resume • Scoring enhancements • over 20 new features in all (existing customers upgrade for $15)

DELUXE WINDOWS INTERFACE: Multiple Windows – Staff Roll, Event List, Tracks, Bars, Meter, Tempo, Piano keyboard, Guitar fretboard.

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POWERTRACKS FOR DOS VERSION INCLUDED FREE
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Requirements: PowerTracks for Windows - Windows 3.1/Windows 95, IBM Compatible AT, 386 or higher, 2 mb RAM, Supports any device compatible with Windows 3.1 or 95 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).

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Upgrade to PowerTracks 3.5 for Windows $15

New features in Version 3.5... Enhanced Notation Window • Karaoke lyrics window • Notation scroll ahead • Notation clean mode • Music alignment to click track • Force all files to PPQ option • Improved hand splitting • Intelligent enharmonics

In the past, PowerTracks has offered powerful features such as music notation, wave file support, lyrics, chord symbols and score printout. Now we've added even more! PowerTracks 3.5 has a big "Karaoke Style" window to display lyrics up to "full-screen". The notation is greatly enhanced with support for finer resolutions such as 32nd notes. You can also now align a rubato piece to a click track. We've improved the intelligent piano hand splitting routines. The enharmonics are intelligently chosen based on the chord symbols, and more – Read on for more details.

Big Lyrics window lets you view song lyrics in the font of your choice in a full-screen window. Select your own font style, size, and color. Great for singing along with the music!

Notation Scrolling Ahead. If you're sight-reading the music off of the screen, you'll be pleased to note that the music can now scroll ahead. This is how we normally read sheet music! You can set the notation to scroll 1 or 2 bars ahead of the music *without* interfering with your view of the current notation. A great feature for sight-reading practice.

Rapid Resume. PTW can now automatically save the window positions of all opened windows and restores them the next time the program is used. You can optionally store and recall setups with a ".WS" file. Have PTW start out with your favorite setup every time you run the program by simply saving a file called FAVORITE.WS to your PT directory.

Save Your Patches. The enhanced patch select dialog now lets you select the patch list from within the dialog. PowerTracks 3.5 will remember the patch list used for each track and will save the name of the patch list used for each track to a ".SEQ" file. A "must have" for people who own multiple sound modules.

SysEx Input Buffer Size setting is now adjustable within the Options | MIDI. In dialog to help the people who normally have SysEx-input problems. The Buffer Amount can also be set.

Notation Enhancements:

- supports finer resolutions which allows you to enter notes such as 32nd and 64th notes
- "bars per line" markers which allows you to adjust the bars per line on a screen by screen basis
- "hard rests" which will be in effect even if you have minimize rests set to false, as well as the option to make notes invisible.
- a special mode for autodetection of finer resolution and/or multiple chords. PowerTracks can now "clean up" the kinds of notes & chords that can otherwise look like a bunched up mess.
- the Chord Note Separation and Chord Total Separation settings are now fully adjustable
- "Clean Mode" which automatically "cleans up" grace notes and any unwanted glitch notes from the notation. Glitch Velocity and Glitch Duration settings are fully adjustable.
- transpose setting will now transpose the key signature *and* the chords.
- improved Guitar Tablature draws the note and fingering exactly like your favorite magazine.
- improved Lyrics editing makes it possible to cut and paste using the Windows clipboard.

Align Music To Click Track command will align the music you've entered or recorded to a click track. This is very useful for songs that were recorded rubato or without using a metronome.

Improved hand splitting. Instead of arbitrarily splitting the keyboard into two parts, PowerTracks can make intelligent hand-splitting decisions which results in a highly accurate depiction of how the song should be actually played on the piano. These parts are also put on separate MIDI channels so that you can play or edit them individually.

Intelligent accidentals (enharmonics). sharps(#) and flats(b) are now context sensitive to the key *and* the chord its in. For example, if you are in the key of Eb and the chord is a D7, a F# note will show up as an F#, and not a Gb. This means that the notation accidentals will automatically show up correctly.

Convert loaded files to specific PPQ. Regardless of what PPQ a song was recorded in, you can work with it at the PPQ that is most familiar to you. For example, set this to 480 and all files will be set to 480, regardless of their original PPQ.

Forced Channels. channels that you normally use for different instruments (e.g. Bass on Channel 2) can be embedded in a midi file in addition to .SEQ files.

New Tips of the day. We have added some new tips of the day to keep you informed of the new features of version 3.5.

Hot Keys. Common procedures such as "Select all" and "Run DLL" can be performed with a single keystroke.

Other Enhancements such as a new setting to prevent PowerTracks from sending an "All Notes Off" command when synched to MIDI or SMPTE. This is important if you're using a lighting controller or other device that has a tendency to 'misbehave' when receiving an All Notes Off command.

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sample—one in which an instrument is well recorded in an acoustic environment with a pair of mics positioned to capture an accurate right/left perspective—faithfully reproduces the instrument's position in the stereo field when the sample is played back on a pair of monitors or headphones.

Amplitude and time cues also play an important role in conveying information about the size of an acoustic environment (are you standing in a warehouse or a small kitchen?) and how far away the listener is from a sound's point of origin (is the sound emanating from twenty yards down a long alleyway or is it resounding five feet from your ear?). Of course, you can't change the apparent position of an instrument once it has been sampled within a stereo field, but this limitation is a small price to pay for enhanced localization and the other benefits of stereo sampling.

STEREO PERCUSSION

Let's put what we've learned to use by creating some killer percussion samples. Drums and other percussion instruments always sound much more powerful when sampled in stereo. There are almost as many different approaches to miking drums as there are people willing to take the time to do so, but the most organic method of documenting a trap kit is *in-position* sampling.

The main focus of in-position sampling is preserving the stereo spread and producing the punchiest drum sound possible. Because most home studios are not equipped with a vast mic collection, we'll go with a minimalist approach for this example.

Select two matching mics to capture a consistent stereo image, and set them about four to eight feet away from the front of the drum set. (Our favorite mic for this application is the AKG C 414, a large-diaphragm condenser.) If you desire a sound with more impact, you can also place an additional mic close to each element of the kit (the snare, rack tom, etc.) as you record it. A studio standard (and one that we have used often with great success) is the Shure SM57. It easily handles explosive transients, and it has a frequency response that favors the high end "snap" of a drum as it is struck.

The two main mics, however, should provide an accurate stereo image of the entire kit, with the kick and snare at center, the toms spread realistically across the middle, and the cymbals surrounding the rest of the kit. For a wider—and wilder—perspective, you can place ancillary percussion (congas, shakers, tambourine, etc.) to the left and right of the main drum kit to increase the illusion that a group of musicians is playing in front of the listener (see **Fig. 4**).

It is possible (albeit difficult) to record a tight drum sound in a small space, but to really capture a killer swack, a fair-sized room is required to add some ambience to the source sound. However, it is essential that you decide how "live," or reverberant, you want each sound to be and place the mics accordingly. Remember that you can always add reverb later with signal processing, but it's almost impossible to remove ambience from your finished sample. When you have a pleasing sound with just the right amount of direct and reflected sound, record the drummer's performance to DAT or another archival medium and critically listen to the playback to assess your work. When you're happy with the sounds, you can later transfer the audio data into your sampler and tweak and loop to your heart's content.

As you may have guessed, documenting an accurate spatial image is a lot more complex than simply having access to two high-quality mics. For example, placing the mics too close together can collapse the stereo field whereas placing them too far apart can create a "hole in the middle" effect.

Another dilemma that can arise from poor placement of multiple mics is phase cancellation, an audio anomaly that produces a thin sound in which certain frequencies are literally canceled out. Always listen critically to ensure that the sample sounds are as full and robust as the actual sound of the instrument in the recording environment. If anything sounds hollow or weak, try moving the mics around until the tone improves. (Of course, some engineers purposely track things out of phase to produce certain tonal effects, so there is no ultimate right or wrong here; just stick with whatever sounds best to *your* ear.)

Now, if you're totally intimidated by the pressure of finding optimum, problem-free, stereo mic positions, there is an alternative: use a stereo mic. Dedicated stereo models, such as the Crown SASS-P, are specifically designed to reproduce an ultrarealistic stereo sound field with a minimum of effort.

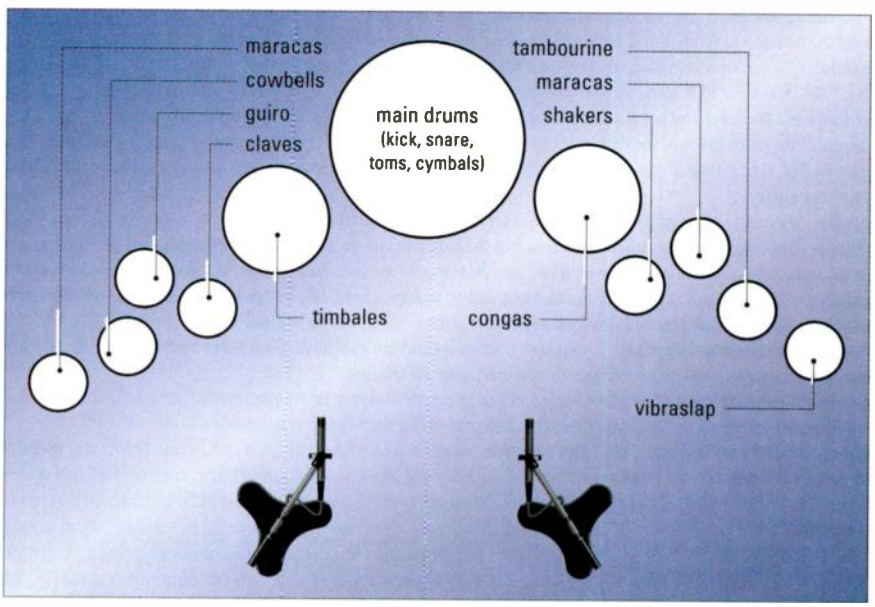

FIG. 4: If you set up an array of percussion instruments and sample each one with a pair of fixed-position mics, the precise location of each instrument in the stereo field is retained. This is called *in-position* sampling.

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STEREO PIANO

Like percussion, pianos really benefit from stereo sampling. The piano, being a very large instrument, sends out a lot of acoustic energy that bounces off walls in the form of reflected sound. These reflections are an important part of the sound we associate with a piano. The farther your mics are from the piano, the greater the amount of reflected sound that will be recorded and the more distant the instrument will seem from the listener. But remember, very few music lovers sit with their heads a foot above the piano's strings, so don't be afraid to move those mics out a bit into the room.

Another interesting thing happens when you make stereo samples (or even stereo recordings) of a piano: some notes may appear at unexpected locations across the stereo field. Many synths pan a set of piano samples so that the low notes emanate from the left output and the high notes from the right, but this is not the case with a real piano. Even notes that are right next to each other on the keyboard may appear to be in very different locations in the stereo image. For example, C5 seems to come from the right side of the sound field, while C#5 may appear to be dead center.

The reason for this phenomenon is that a piano is not a square box. It has unusual curves and a massive sounding board, as well as a lid that opens upwards from the treble end of the instrument. As a result, various frequencies (both fundamentals and harmonics) bounce around a bit and end up reaching our ears at different times. Thus, we have time and amplitude cues galore for each of the 88 notes, which makes the piano a very animated instrument acoustically. We could spend an entire article discussing the ins and outs of sampling grand pianos. (As a matter of fact, we have; see "Simply Grand" in the November 1996 **EM**.)

SHINING THROUGH

The most important thing to keep in mind with stereo samples is that humans evolved with two ears. By providing complete audio information for both ears, we can satisfy a basic need for some sort of spatial imaging. What type of environment is this experience taking place in? Where are the musicians located within this acoustic environment in relation to each other and the listener?

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Tish Eastman *has been a composer and sound designer for over twenty years. She holds a master of arts degree in electro-acoustic music.* **Jim Miller** *is a frequent contributor to* **EM** *and a sound designer whose credits are too numerous to print here.* *Thanks to Kevin Monahan and Mike Barnes of E-mu Systems for their help with this article.*

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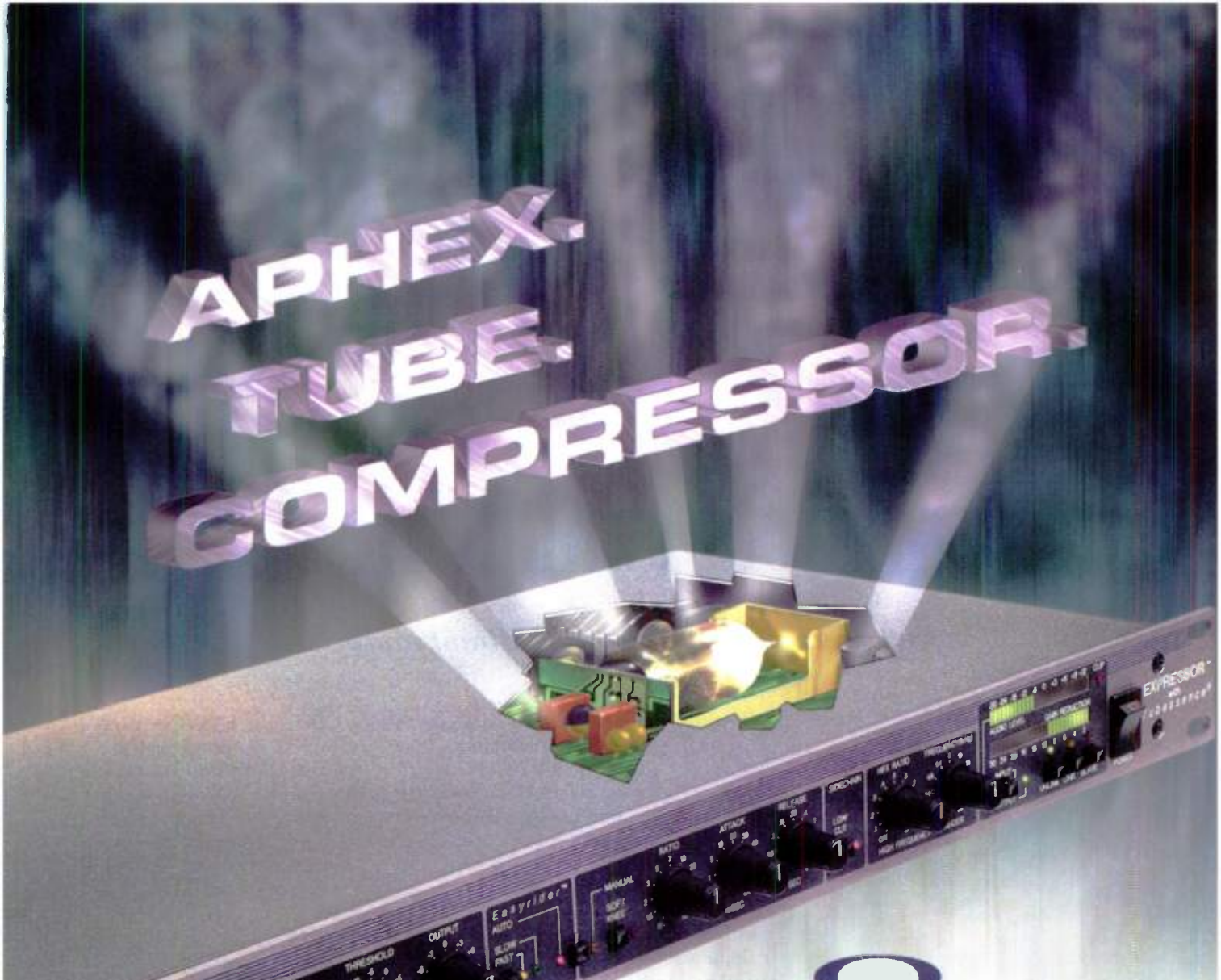

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RECORDING MUSICIAN

Mixing Background Vocals

Construct a wall of vocal sound from minimal materials.

By Brian Knave

If you're lucky enough to hire a group of singers as talented as the Jordinaires, the Temptations, or Take 6 to sweeten your tracks with some luscious background vocals, you can kiss any worries goodbye. It's pretty near guaranteed that the blend of voices will be silky, the pitch dead on, and the parts inspired.

Unfortunately, those of us working in home and project studios often have to make do with less talent—and fewer singers—than the aforementioned groups. In fact, it's pretty typical for home recordists to multitrack one singer for all of a song's vocal parts. This approach works great if you have a good singer and plenty of tracks to spare, but sometimes the former is merely adequate and the latter are nonexistent.

There are ways, however, to skip merrily around track and talent limitations to produce background vocals that really pop out of a mix. A few handy mixing strategies—along with some signal processors that you probably already own—can add density and punch to sonically weak vocal tracks. Let's look at some of the techno tricks you can use to transform vocal blandness into Beatlesque magnificence. (And the Fab Four, by the way, had just four to eight tracks to work with throughout most of their career.)

PAT JOHNSON

Engineer-producer Mark Needham (left) with Chris Isaak in Studio D, Sausalito, California. Needham sometimes gets vocal mixing ideas from the artists, who often have strong opinions about how they want their background vocals to sound.

AVOIDING PAN "ICKS"

How you position background vocals within the stereo spectrum can greatly affect their dramatic impact on a song. People typically pan the backups hard right and hard left to produce a balanced stereo spread. But why run with the pack? An *unbalanced* sound stage can often highlight the dynamic tension of the lead vocal against the background harmonies. So to create an attention-grabbing effect, simply pan the lead vocal hard left (or right) and

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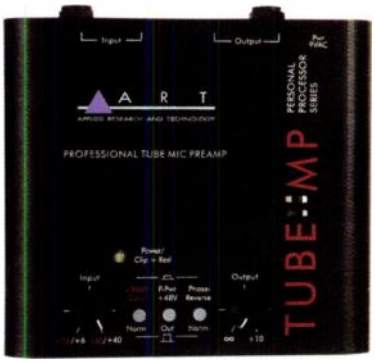

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-Michael Molenda, as reviewed in the February, 1996 issue of ***Electronic Musician***

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*-John Armstrong, Engineer-****Travis Tritt***

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-John Mattick, Keyboardist currently performing and touring with ***Alabama***

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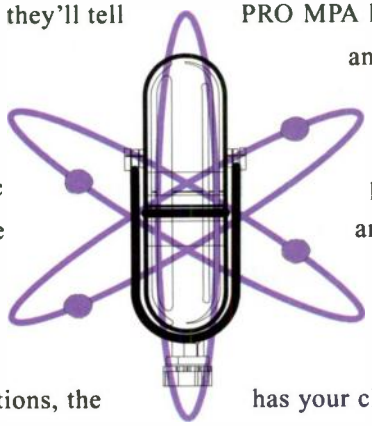

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Technical specifications:

Compatible to:
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- Roland SCC1 / RAP-10 / SCD-15 (soundcompatible)
- General MIDI
- Roland MT32 (via PatchMapping)
- General Synthesizer Standard (GS)
- Roland MPU-401 (UART mode)
- Soundblaster™
- Soundblaster™ Pro
- Adlib™
- MPC level II
- Microsoft Sound System™ 2.0

Wavetable:
- 32 MBit (4MB) Rom
- GM/GS Wavetable with 32 voices and Multieffectprocessor
- 393 Sounds, 8 Drumkits (incl. 1 SFX-Kit)
- 8 Reverb- and 8 Chorus-types
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- Latest DCC DAC technology
- Roland MT 32 (via PatchMapping

Audio features:
- 8/16-Bit audio Stereo/Mono for record and playback up to 48 kHz samplefrequency
- High-quality CODEC with simultaneous Full Duplex record and playback
- 4 bit hardware compression ADPCM
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pan the backups to the opposite side. Hey, it worked for the Monkees!

But whether you decide to get wacky with the stereo spectrum or stay relatively conservative, you should pan the backups where they do not interfere with other elements of the mix. In a best-case scenario, signals with similar frequency ranges should not be positioned within the same areas of the sound stage.

For example, you can safely pan the bass guitar and lead vocal dead center because these two elements generally occupy different tonal ranges. On the other hand, panning a backup vocal to the same location as a rhythm guitar may clutter the mix if the two elements share the same sound components (sharp and thin, warm and smooth, etc.). After placing each element in the mix, check for tonal clashes by soloing voices and instruments in groups of two, groups of three, groups of four, etc. to see how each element works with the others.

Also keep in mind that panning background vocals severely to one side or the other may pull attention away from the lead vocal. Be sure that the panning scheme matches the overall effect you want the listener to experience when he or she hears your song.

"Chris Isaak likes backup vocals to sound kind of fuzzy and warm to complement his voice rather than call attention to themselves," says engineer Mark Needham, who often works with the sexy crooner as well as artists such as John Hiatt and Bruce Hornsby. "On the song 'Wicked Game,' for example, I mixed the background vocals down low and soft and panned them dead center. To set them even further back in the mix, I also wet them down with a bit more reverb than usual. The background vocal mix changes from artist to artist, however. John Hiatt likes his backups more dry and up front."

VAPOROUS VOX

A cool trick for creating an ethereal vocal sound is to increase the volume of the effect return while diminishing or outright muting the dry signal. You can easily accomplish this feat by switching the appropriate effect send on your mixer to prefader, muting the input channel with the source sound, and raising the effect return level to taste. The result is often a smooth, washy timbre with little or no attack, depending on the type of signal processing employed.

A rather hip example of this effect can be found on keyboardist Joe Zawinul's latest release, *My People*. On the song "Voices of the Danube," Zawinul sang through a Vocoder to create a background bass line.

"To enhance the effect of the 'vocal bass,' we used very little of the original vocal in the mix, opting to push the Vocoder effect instead," says Zawinul's son, Ivan, who helped mix the album. "We also used the console EQ to cut the midrange frequencies, leaving mostly the 150 to 200 Hz range present to beef up the low end."

IT'S ONLY NATURAL

If you want an organic vocal blend, use the exact same reverb on the backup vocals that you use on the lead vocal. This method increases the perception that all of the singers are performing in the same space and minimizes timbral and spatial contrasts between the voices caused by throwing different types of reverb (or other effects) on the lead and background vocals.

Subtle variations, however, can be produced by playing with the *amount* of reverb assigned to each vocal track. For instance, the background vocals can be mixed extremely wet while the lead vocal is left predominantly dry. The Jeff Lynne production of Tom Petty's song "I Won't Back Down" is a fine example of this vocal mixing technique.

PLAYING DOUBLES

To thicken background vocal parts, engineers typically double (or triple or quadruple) unison takes on separate tracks. This is a time-honored, eminently successful way to produce creamy smooth vocals, but it often requires additional tracks that most home recordists don't have available. Although it's rarely as effective as the real thing, you can create a faux doubled vocal with an MDM, M-HDR, or DAW by copying the track, offsetting the copy by a millisecond or so, and mixing it in with the original.

This technique will add some density to the part, but it will not have the wonderful chorus-like sound produced by natural doubling. (Few, if any, singers can replicate a performance exactly, so the slight pitch and timing imperfections between the original track and the double actually help thicken the overall tone.) To further approximate

REISIG AND TAYLOR

When recording a tight vocal group such as En Vogue, it's not unusual for the multipart vocal blend to sound absolutely perfect as is.

the shimmering sound of true doubled vocals, process the offset track until it sounds very different from the original track.

"Think of the second vocal track, the copy, as your utility track," suggests Zawinul. "You can change the EQ on the utility track, adding to it whatever frequencies or tones are missing from the original. You can also add effects to the utility track alone or put different effects on the two tracks. And to thicken the sound even more, you can pan the two tracks a hair apart."

If you want to beef up some background vocals but can't spare *any* tracks for faux doubling, New York freelance engineer Benjamin J. Arrindell recommends sending the tracks to a stereo effect that will let you pitch one side up a few cents and the other side down an equal amount. Then, pan the effect returns to the left and right sides of the lead vocal.

"The trick is to bring up just enough of the return to produce a slight chorusing effect but not so much that the effect itself is too apparent," says Arrindell, who has mixed Kool & the Gang and Ladysmith Black Mambazo, among others. "It's like cooking: you don't want to overdo the spices."

CLEAN IT UP

A common side effect associated with stacking and doubling background vocals is a loss of tonal clarity, especially if you're bouncing tracks on an analog recorder. The thicker the parts get, the less detail may be apparent in the vocal blend. For rock 'n' roll, "soccer cheer" type parts (*à la* Def Leppard, AC/DC, et al.), the lack of sizzle is okay—it may even add to the sense of power—but if you want to hear articulation in the chord being sung, muffled sound is not a good thing.

Luckily, judicious use of console EQ can help "thin out" the sonic stew. For vocals, a boost at 10 or 12 kHz can add some sparkle, and a boost anywhere between 2 kHz to 7 kHz (depending on the vocalists and the parts they are singing) can increase articulation. Unfortunately, EQ tweaks can also introduce audible hiss to the mix, so be careful not to overdo your tone shaping. If the high-end enhancements are simply too hissy, bail out on the equalizing and try a spectral enhancer, such as the Aphex 104 or the dbx Model 296. These devices can clarify signals without the risk of smeared high frequencies.

WILD SYNC

Want to evoke the mile-high vocal stacks produced by Roy Thomas Baker for Queen—most notably on the song "Bohemian Rhapsody"—but don't have 48 tracks available? No problem. If you have a single 8-track MDM, simply do a monaural mix of your rhythm tracks to DAT. Now bounce that reference

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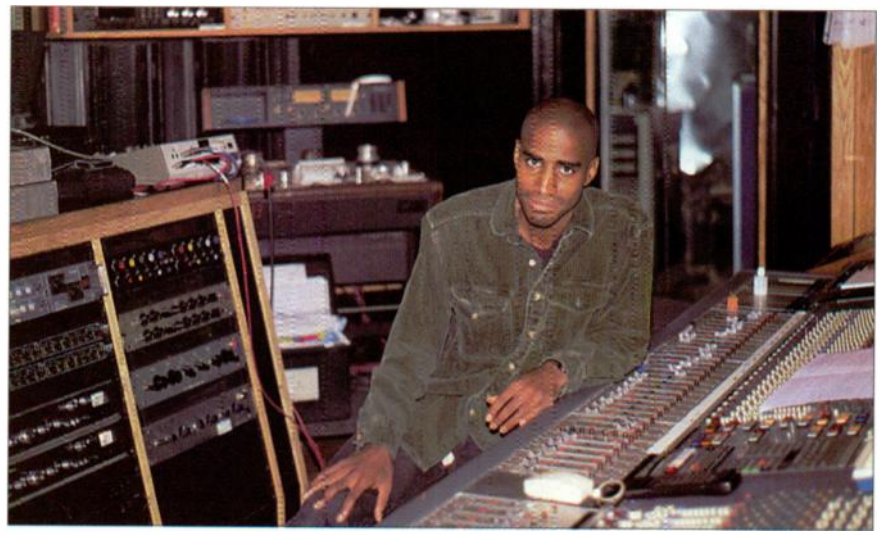
track onto a fresh 8-track tape, and use the remaining seven tracks to stack up vocals. When you're done, mix those seven vocal tracks back to DAT (mono or stereo).

Okay, *now* transfer the mono or stereo background vocal mix back to MDM, and use the remaining open tracks to continue stacking up parts. This procedure can go on until you're either finished or exhausted. However, when you *are* done, you'll need to do a final mix to DAT so you can transfer your mega-vocal track (or tracks) to your original multitrack master. This is the difficult part because you'll have to "fly in" the vocal section to the proper location on the multitrack. (That is, unless you're rich enough to own a timecode DAT machine and had synched the MDM tracks to the DAT before you started this whole process.) For most choruses and brief harmony parts, it should only take a few tries to adequately line up the DAT background vocals with the original track. Trust me: I once used this technique to build a 48-voice chorus on a 4-track cassette recorder!



ISABELLE GRANET

Engineer Benjamin J. Arrindell in Soundtrack, Studio A, New York, New York. Arrindell works primarily with rap and R&B but has also mixed large vocal groups such as Ladysmith Black Mambazo.

RIGHTEOUSNESS

Of course, the most foolproof method for creating thick, sumptuous background vocals is no mix trick: simply record a chorus of great singers crowded around a single mic. No matter where you mix that kind of vocal lushness, it will sound marvelous. And if you have to spend more time during the recording process to get the vocals right on, the extra effort will be worth the trouble it saves you on the mix. It's rather like that old muffler ad on the telly: "You can pay me now, or you can pay me later." ●

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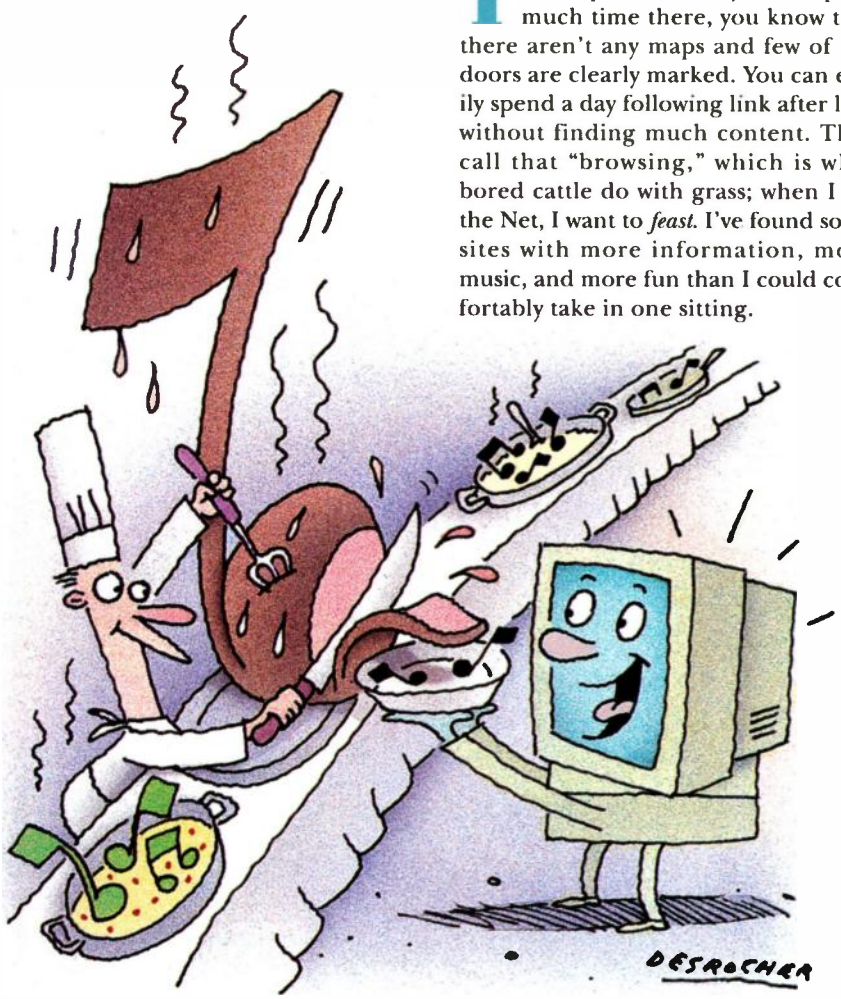
DESKTOP MUSICIAN

Tasty Web Sites

EM serves up some meaty music offerings from the Internet.

By Joe Humphreys

The World Wide Web is part library, part cafe, and part amusement park, but if you've spent much time there, you know that there aren't any maps and few of the doors are clearly marked. You can easily spend a day following link after link without finding much content. They call that "browsing," which is what bored cattle do with grass; when I hit the Net, I want to *feast*. I've found some sites with more information, more music, and more fun than I could comfortably take in one sitting.



JACK DESOCHER

The Web is a mix of commercial, governmental, educational, and individual sites, and we'll hit some of each on our trip today. Addresses to all of the sites mentioned are given in the sidebar, "Around the Web in 30 Seconds." So limber up all eight legs and I will lead you to some of the juiciest flies in the Web.

IN A STATE

Many larger sites still have the feel of the old BBSs that preceded them. These sites have a broad focus and include several independent subject areas. The better ones encourage interaction and often provide forums where visitors can read and post bulletins.

Sonic State. UK-based Sonic State bills itself as a "music and pro audio theme park," but it's essentially a bulletin board–style site. Some of its material is fan-oriented, and you may find the site's "personality" grating at times, but there are definitely some useful pages here. For example, there is a "Tweak of the Week" section (and an archive of past tweaks) where engineers can submit their recording tips. The "Computer Corner" has music-software industry news and reviews. The microphone database is a good idea, but it could use some work: it includes only a few specs for each listed mic.

The "Synth Site" section, however, is an outstanding source of specs and

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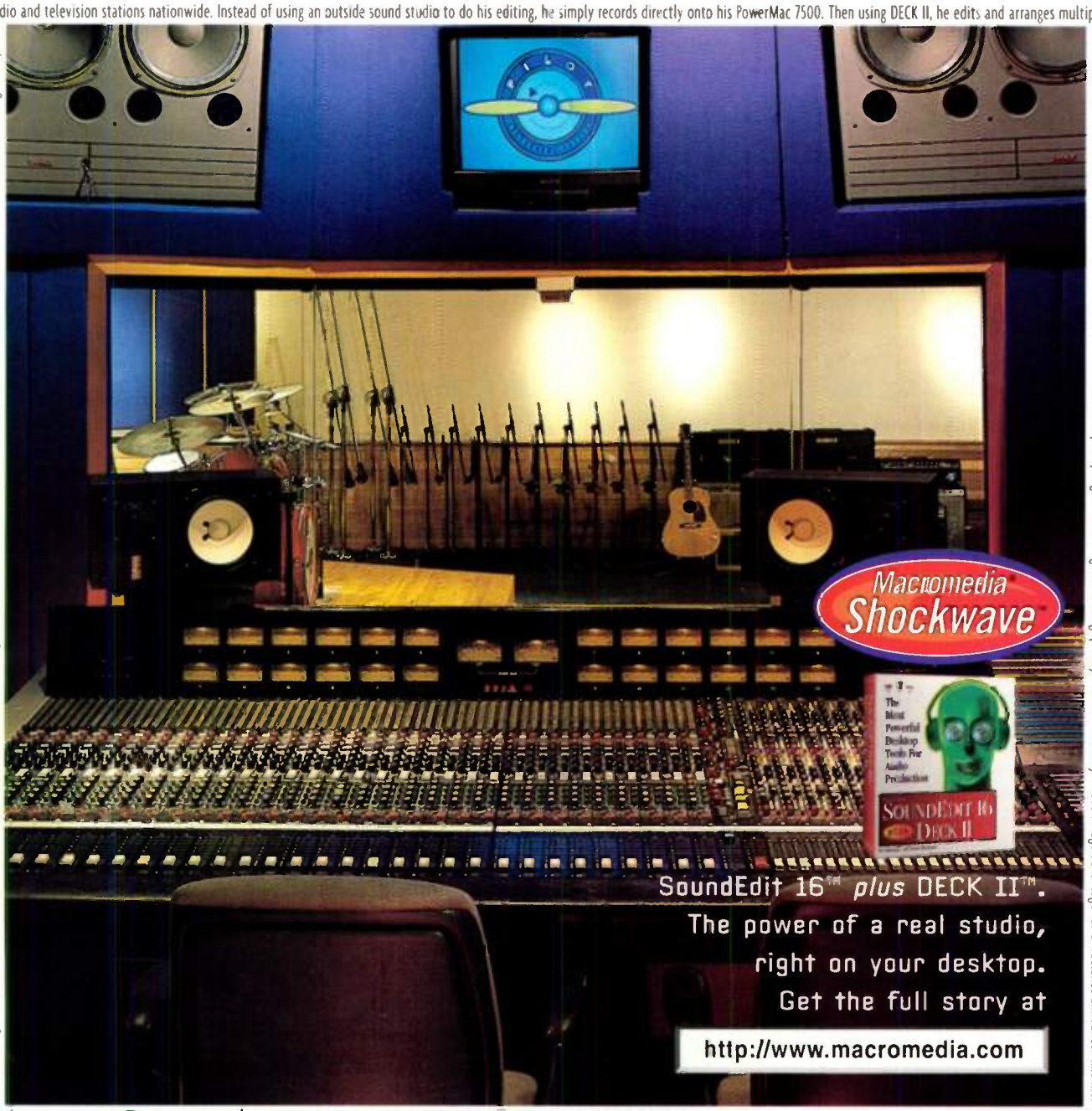
radio and television stations nationwide. Instead of using an outside sound studio to do his editing, he simply records directly onto his PowerMac 7500. Then using DECK II, he edits and arranges multiple tracks with the click of a mouse. "DECK II allows me to do true broadcast-quality digital recording and editing quickly and economically. That's a huge advantage for a freelance announcer like me. will do, straight out of the box. That's very unusual when it comes to sound editing software." Jim is an Atlanta-based freelance voice talent, whose clients include Turner Broadcasting, Disney, and



▶ Professional voice talent Jim Rich on Macromedia SoundEdit 16 *plus* DECK II: "It does what it says it

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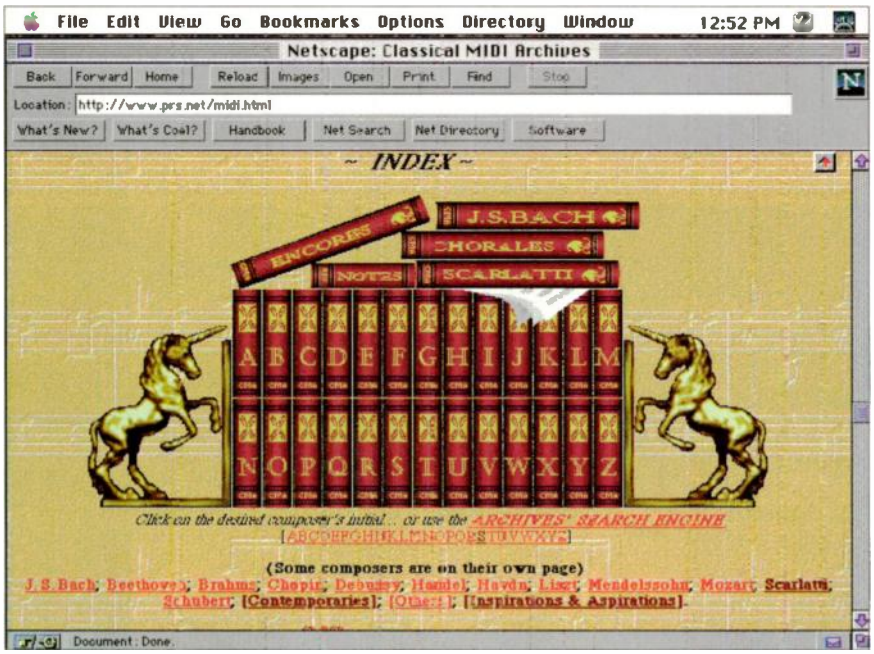


The Classical MIDI Archives contain more than 80 MB of MIDI files.

opinions on various synthesizers. A thoughtfully composed form is provided so that visitors can give both technical and subjective information on the synths they own or use, and the completed forms, along with pictures when available, are grouped by manufacturer and accompanied by pertinent links. Each entry includes information such as type of synthesis, number of polyphonic voices, quality of different patches, and much more. This is very smart use of the interactivity offered by the Web. So stop by, check it out, and take a few minutes to rate the synths you own.

INSTRUMENT PAGES

Somewhere on the Web there's a site for just about every instrument that has ever existed. Obviously, I can't list them all, but I would like to point out a few sites that stood out both for the quality of their information and the way it was presented.

The Piano Technician Guild's Piano Page. I've seen several good piano sites. What attracted me to this one, aside from its uncluttered layout, was the technical information it provides. There are several reprints of Guild bulletins and brochures that deal with piano care and service. Topics covered include action regulation, humidity control, and basic rules of piano care. There's even an article on dealing with smoke-damaged pianos. You can look at technical drawings of piano actions and a cut-away view of a grand piano.

Another nice feature on this site is the "Virtual Piano Museum," an illustrated overview of the instrument's development. There are also a few nice photos, an industry event calendar and of course, lots of links.

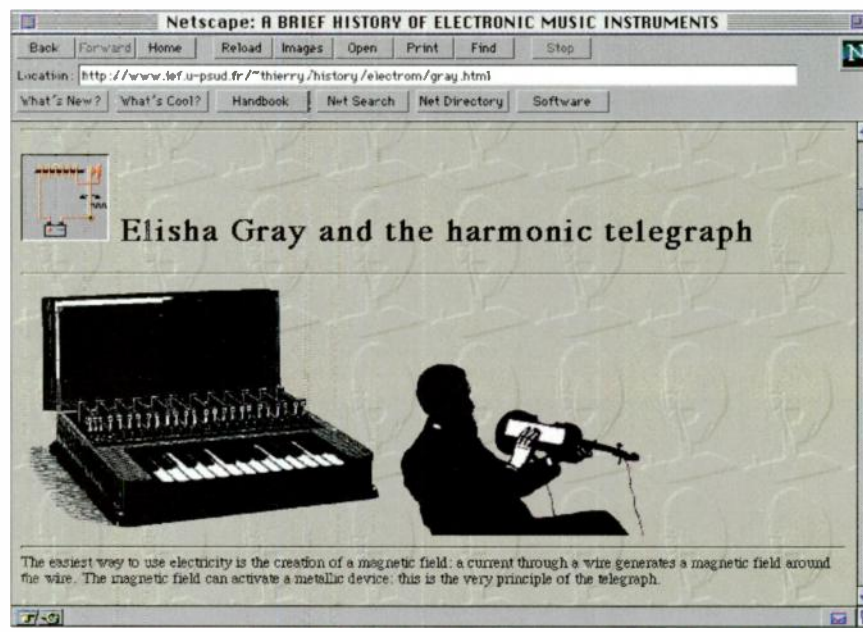
The Theremin Home Page. Jason Barile's theremin page is packed with well-organized and well-presented information. For those seeking their own theremin, there are projects and schematics along with pages on finding parts or buying kits. But this site isn't just for mad DIYers with soldering irons for fingertips. It includes an article on theremin virtuoso Lydia Kavina (grand niece of Lev Theremin) as well as a list of bands currently using theremins (check it out—you may be surprised!). An extensive bibliography lists theremin-related magazine and newspaper articles; books, service manuals, papers, and theses; patents; and films. There's also a list of known theremin recordings.

Photos of Lev Theremin and of contributors' theremins can be found here, along with a few audio files. Barile has also started a registry to catalog the current whereabouts of the original RCA Victor theremins. Whether you're simply curious or a certified theremin obsessive, you're bound to find something new and intriguing here.

MIDI FILES

The Web is a vast reservoir of MIDI files, and several sites have been created to help collect, organize, and make them available to you. We'll take a look at a couple of great sites with very different philosophies.

The Classical MIDI Archives. Maintained by Pierre R. Schwob, this archive has a beautiful layout and more than 2,900 MIDI arrangements of classical works. The files were compiled by Schwob or contributed by visitors. Titles are organized alphabetically by



Point and click through Thierry Rochebois' Brief History of Electronic Music Instruments.

The Library of Congress' Web site offers information on a variety of subjects, including copyright law and registration.

composer, and each appears with the name of the compiler (if known) and the size of the file (if larger than 30 KB). Schwob has noted files that are recent additions and ones that he thinks are particularly good. As he says, some are beautiful whereas others are pretty bad. I spent a lot of time at this site and found myself moved and amused by turns.

Acquire Many MIDI Files Quickly. On the other hand, if you can't take a lot of time online, you might want to check out this site. It doesn't have the handsome interface that the Classical MIDI Archive does; in fact, it makes a point of being "enhanced for speed, not 'Netscape-enhanced' nor 'best viewed with Microsoft *Explorer*.'" What it does have is pointers to MIDI files in zipped archives. The files run the gamut of musical genres and vary widely in quality. Unfortunately, the descriptions this page gives are pretty scanty, and some files have no description at all. Still, there are *a lot* of files.

A FEW WORDS OF ADVICE

Many people with specialized knowledge have been kind enough to make their experience available on the Web. I wouldn't recommend, say, performing surgery with an anatomy Web page as a guide, but if you're seeking answers to legal or medical questions, here are a few sites where you might start your search.

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Musicians and Injuries. Public consciousness about repetitive stress injuries has mushroomed recently as computer use has become commonplace. But musicians have been subject to these and other hazards since before the days when the best computers were colored beads on wires. Paul Marxhausen's Musicians and Injuries page contains a little advice, along with reviews of books and videos (with links where available). The site also has links to online articles about health problems such as overuse injuries, tinnitus, and dystonia. And there's a wealth of other health information. Get the facts, and get them *before* you start suffering.

The Bureau Law Scrolls. The Ark is a UK-based music site with one unusual feature, the Bureau Law Scrolls. These pages contain advice for creative artists in the areas of publishing, management, and record contracts. Although these articles were written by a London law firm, they should be useful to musicians in any country who aren't sure what to look for in a legal agreement. When the time comes to sign a contract, of course, you'll want to have your own lawyer advise you.

The publishing section of the Law Scrolls discusses questions such as "When should I conclude the Agreement?" and "Can I get my songs back if they are not exploited?" The management section goes over the items that need to be defined in management contracts, such as the function of the manager and the duration of the contract. The record-contract guide deals with royalties, recoupment, ownership, and related topics. If you're thinking about entering into one of these types of contracts, this is a good place to start looking into the issues that you'll need to be aware of.

U.S. Copyright Office. Online help is also available for copyright issues, and this time you can get it straight from the horse's mouth at the U.S. Copyright Office of the Library of Congress. There are articles on copyright basics, registration, the mandatory deposit law, and copyright news (yes, there is such a thing). You can even download copyright forms in Adobe Acrobat PDF format and, if you have a good printer, print up your own forms.

AROUND THE WEB IN 30 SECONDS

Acquire Many MIDI Files Quickly
www.tcp-ip.or.jp/~ebiten/midi/midifiles.html
A Brief History of Electronic Music Instruments
www.ief.u-psud.fr/~thierry/history/history.html
The Bureau Law Scrolls
www.arkangel.com/law
The Classical MIDI Archives
www.prs.net/midi.html
The EMUSIC-L Home Page
sunsite.unc.edu/mcmahon/emusic-l/index.html
The File Room Archive (Music)
fileroom.aaup.uic.edu/FileRoom//documents/Mmusic.html
Musicians and Injuries
www.engr.unl.edu/ee/eeshop/music.html
The Piano Technician Guild's Piano Page
www.prairienet.org/arts/ptg/homepage.html
Sonic State
www.sonicstate.com
The Theremin Home Page
www.nashville.net/~theremin/
U.S. Copyright Office
lcweb.loc.gov/copyright/

MIXED MEDIA

The Web may be the latest hangout for the Internet jet set, but older Net functions are still around, including some very good mailing-list conferences. And if you want to find out about them, what better place to look than—you guessed it—the Web?

The EMUSIC-L Home Page. EMUSIC-L is mainly an academic conference, but its sister list, SYNTH-L, caters to gearheads. The two lists are owned by Joe McMahon and Mike Metlay and share a home page on the Web. Look here for an introduction to and history of SYNTH-L, a "best of" compilation, and subscription information. Also housed at this site is a copy of an extensive FAQ on wind controllers.

PAST AND PRESENT

Whizzing around the Web looking at specs on high-tech gear sometimes makes me feel like I'm living in some futuristic electronic cocoon, divorced from the past or even from the rest of today's world. But the Internet was developed to keep us *in* touch, not out of it, and some Web sites do a great job of keeping us grounded.

A Brief History of Electronic Music Instruments. Thierry Rochebois' history starts in 1874 with Elisha Gray's harmonic telegraph and runs up to Robert Moog's and J.W. Beauchamp's transistor-based synthesizers of the 1960s. It will only take you a short time to read. The text is not technical, but it does briefly explain the workings of each instrument. Several illustrations are also provided. More details—especially technical ones—would make this site more interesting, but it's worth checking out as it is.

▼

The Synth Site makes very smart use of the Web.

The File Room Archive (Music). Whatever your position on issues such as the recent controversies over rap lyrics and religious music in schools, censorship is a topic of concern to all musicians. The File Room is an ongoing research project that records cases of censorship and cross-references them by date, location, grounds for censorship, and medium. It makes sobering reading. Visitors are invited to submit any cases they know of, and sources are given for each case. The site's owners make no claims for the accuracy of the facts presented; this is merely a place for exchanging information. If you don't think this issue affects you or that censorship is restricted to some other place or time, then you especially need to take a look at the Archive.

FOR THE FUTURE

Anyone who does a lot of Web surfing is likely to get peeved by the number of links that lead to half-functional or "under construction" pages. But that just means that lots of people are working hard to bring you new and better resources. Keep looking to **EM** for leads on interesting sites, and drop us a note at emeditorial@pan.com if you find something you think other electronic musicians should know about.

EM *Editorial Assistant* **Joe Humphreys** *is starting to see scroll bars everywhere he looks.*

WANTED
Self-contained digital recorder/mixer combo as easy to use and durable as my TASCAM Portastudio. No hard disk systems, please! Allan 646-3035.

FOR SALE
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★ ★ FOR SALE ★ ★
Yamaha digital recorder. No jog/shuttle wheel, no digital out, no solo or mute and slow drive mechanism, not enough AUXes. Will sell cheap. Make an offer. Call Dick after 5 pm – 555-9154.

Established working party rock band seeks digital multitrack recording system with 2 AUX sends and 2 stereo AUX returns, 4 XLR mic inputs, channel inserts and individual track outputs — cue outputs are a real plus. Call Gasm Sparks 454-3651.

FOR SALE
ADAT and Mackie 8-Bus. Must sell. Looking to buy an integrated system that takes up less space and easier to use. Bill 478-9322.

WANTED
Digital multitrack system with jog / shuttle wheel for easy editing. Mickey 444-3169.

BODY PIERCING FOR BANDS
If you've got the flesh, we've got the tools. Call INTooU 258-9631.

WANTED
ADAT transports. We can use all we can get. DMR Repair Services 767-0182.

Smashed my hard disk recorder. Too many menus made me go mad. Looking for artist who can use it in an abstract sculpture, or sea captain looking for anchor. Call Trent 457-9851.

FOR SALE
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Female country vocalist wanted by songwriter to develop hit records. Have full arsenal of TASCAM recording gear. Call Willie 236-6665.

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High Performance Digital Recording System that costs less than $1500 AND uses a non-destructive editing process — must be easy to use. Karl 778-1321.

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Desperately Seeking Digital Simplicity. Mario 251-4292

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If you want them, I've got them. Some broken, some used by the biggest stars. Electronic and acoustic.Good prices. 555-0973 - Call Razor.

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Resources for Women in Music

Learn how sisters are doing it for themselves.

By Mary Cosola

American women are caught in the uncomfortable paradox of being a majority that is relegated to minority status. The inequities are well documented and oft-discussed: women make less than men for the same jobs; very few women have cracked the glass ceiling to gain entree to the boardroom; and the list goes on. The music industry is one huge paradox itself. On one hand, times are good for female artists. Bands with female musicians have recently enjoyed a surge in the pop charts. Unfortunately, the media portrayal of these women leaves much to be desired. For instance, I would love to see a *clothed* female musician on the cover of *Rolling Stone*.

The crowd-pleasing, guitar-playing, tune-belting Del Rubio Triplets pose with their *ROCKRGRL* T-shirts and the magazine's publisher and editor in chief, Carla DeSantis.

"In any other field, the treatment women receive in the music business would be considered sexual harassment," says Carla DeSantis, publisher and editor in chief of *ROCKRGRL* magazine. "When I was playing in bands with other women, people would say things like, 'Is your drummer really a drag queen? A girl can't play like that.' I'd also hear the classic line, 'You're pretty good, for girls.' If you substituted any ethnic minority for the word 'girls' in that statement, nobody would tolerate it. But when the subject is women, it's a whole other ball game."

Unfortunately, things aren't any better for women behind the scenes, either. Just check the producer and engineer credits on the CDs in your collection. Chances are you won't run across many female names. It's extremely difficult for women to break into technical roles. Many male musicians shy away from working with female engineers, preferring to maintain the studio's "boys' club" atmosphere.

Given that things never change on their own (at least not for the better), many women in the music business have formed organizations focused on helping each other and educating the next generation of female music professionals. Even though these organizations

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are focused on helping women in music-related fields, they all welcome men into their memberships. Women often join these groups to gain skills that will help them professionally, but what they really gain is a source of strength and knowledge from interacting with women who have endured and succeeded in a "man's world."

Pictured above are the participants in the panel discussion "Marketing Yourself in Special Markets," sponsored by L.A. Women in Music. From left to right are Justin Wilde, Ruth Barrett, Ronny Schiff (the panel's moderator), Carole Koenig, Robin Frederick, and Shannon Williams.

AES WOMEN IN AUDIO

The women who started many of these organizations did so out of feelings of sheer isolation and frustration. They felt that if they could meet with other women experiencing the same career roadblocks, perhaps they could find ways to blow through those barriers.

Carol Bousquet is chair of the Audio Engineering Society (AES) Women in Audio Committee and is sales and marketing development manager of Ferrofluidics in Nashua, New Hampshire. (Ferrofluid is a thermal conductor used in loudspeakers.) Bousquet is also the only woman on the board of directors of the American Loudspeaker Manufacturers Association (ALMA).

The Women in Audio Committee holds forums once a year at the annual AES convention. The forums include speeches and panel discussions on selected topics related to women in the audio field. An open-mic luncheon after the forum gives attendees a chance to share their thoughts on the issues. At the 1996 AES convention in Los Angeles, the committee awarded its first "Granny Awards." This unofficial award (the AES has strict criteria for its series of awards) recognizes the achievements of women who have persevered and dedicated themselves to mentoring other women. The 1996 honorees were Suzanne Ciani and June Millington.

"When we started our yearly forums, they were just discussions to create a dialog of any sort," says Bousquet. "That type of process is necessary and cathartic. Now we're working to make the forums more constructive. To that end, we launched Women in Audio: Project 2000, a long-range program where we introduce and discuss information our members can work from."

The Project 2000 1995 keynote speaker was Dr. Catherine Steiner Adair of the Harvard Project on the Psychology of Women and Girls Development. Bousquet moderated a panel discussion on why young girls are socialized away from studying technically oriented subjects and addressed how to stop the cycle of "dumbing down" that happens to girls right around puberty. The 1996 forum addressed the problems faced by women working—or trying to get work—in audio engineering.

"Women make up less than ten percent of the AES membership, less than ten percent of any of the field's technical education programs, and less than ten percent of the audio profession overall," explains Bousquet. "Forums and panels aside, just supporting each other is very constructive. In order to gain a professional presence, women in audio-related jobs must join and get active in the AES. It is the preeminent association for our industry."

L.A. WOMEN IN MUSIC

On the West coast, L.A. Women in Music is working to support people in all aspects of the music industry. Each month, the 10-year-old organization sponsors an activity such as an educational seminar, a songwriter showcase, or a panel discussion. In the past they have given scholarships to UCLA's extension program for music. Most of the group's functions are open to members and nonmembers.

"We only have a few things that are for members only," explains Ronny Schiff, who sits on the board of directors for L.A. Women in Music. "We hold encounter-type sessions in which we'll present certain situations that our members might face, and then we'll work through how to deal with it. For a recent meeting, we presented our members with this scenario: 'You're a songwriter, and you've run into a producer who you've been dying to get a tape to. How do you handle that?' That kind of meeting is for members only because we want to keep the groups small, so we can work through things.

"The other members-only resource we offer is our job bank," she continues. "We give our members a certain number to call and a code, and they can then call and listen to the recording about job opportunities in the industry."

WMBA

Prior to starting the Women in Music Business Association (WMBA) in 1993, Catherine Masters wasn't even involved in the music business. She attended a Nashville party with a songwriter friend where she met several women who worked in the music industry.

"The women at the party were discussing problems they faced, many of them stemming from the fact that they were women in a male-dominated field," recounts Masters. "When I told them to take their problems to their industry association, they said they didn't have one. When I expressed disbelief, they told me to go start one. So I did."

"Most of our members are agents, managers, publishers, lawyers, and label execs," she continues. "We don't have many musicians as members, but we do encourage them to join. It's a great way for them to meet people in the industry."

WMBA started in Nashville and now has additional chapters in Atlanta, New

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Computer Audio Contest. Win a Digidesign Pro-Tools Project system (with your choice of computer platform: Mac or PC), with the 882 Interface. Bonus options include: $2,000.00 Software package, hard drives, CD recordable drive, Iomega Jaz drive, accessories, cash and more!

We're talkin' GEAR HEAVEN!

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In the future. There will be four more puzzles at $2.00 each and one tie-breaker at $1.00 which will be sent to you by mail. You will have 3 weeks to solve each puzzle. We don't know how many will play but typically 55% will have the highest score possible score to Phase I, 43% to Phase II, 36% to Phase III, and 32% to Phase IV. The tie-breaker determines the winner. If players are still tied they will split the value of the grand prize they are playing for.

Mystery Word Grid

	H				
		E			
P	I	N	C	H	W
	R				
S					

MYSTERY WORD

WORD LIST and LETTER CODE chart

PINCH .....W	PRESS.....K	BLAST .....A	WRECK .....D
BREAK .....Z	PUNCH .....S	SPRAY C	TURBO.....V
STOMP .....T	STAND.....R	PRESS.....E	DREAM ....O
CRUSH.....I	SCORE .....H	SLANT L	CHASE.....P

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York, Los Angeles, San Francisco, and New Orleans. Masters is currently working on expanding the organization internationally. The chapters hold seminars and workshops on working within the music industry. They also sponsor artist showcases occasionally.

"We're a networking organization," says Masters. "The main things we provide are information, contacts, and education. For example, we have a member directory. We tell our members, and it's even in our brochure, that if another WMBA member calls you, you're obligated to take or return that call. If you don't feel you can do that, then don't join. That's what we're here for."

IAWM

In 1995, the International Congress on Women in Music, the American Women Composers, and the International League of Women Composers—three long-standing organizations that focused on women composers, past and present—merged to form the International Alliance for Women in Music (IAWM). The goal in uniting these associations was to pool their efforts to create a stronger and more effective international organization. The IAWM membership is mostly made up of composers, conductors, musicologists, educators, librarians, and performers.

"We see ourselves as an information resource and networking tool, not only for women composers but for the performers and scholars who wish to perform and write about music by women composers," explains Sally Reid, vice president of IAWM and professor of music at Abilene Christian University in Abilene, Texas. "Initially, the three parent organizations were largely made up of composers seeking to network and promote their own music. Now we realize that we all benefit from the participation of performers and scholars. It's important to understand our musical heritage. When we know more about historical women composers—like Clara Schumann and Fanny Mendelssohn—we know our own genesis. People need to know that women have always composed. That's why our musicologist and librarian members are so important. They not only give contemporary women composers a voice, they help us reclaim and celebrate our history."

The organization publishes the *IAWM Journal* three times a year. It has

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WHERE THE GRRRLS ARE

AES Women in Audio and New England Women in Audio
tel. (508) 448-9596; fax (508) 448-6851
e-mail carolbous@aol.com
International Alliance for Women in Music (IAWM)
tel. (202) 994-6338; fax (915) 674-2232
e-mail sasha@gwis2.circ.gwu.edu
Web music.acu.edu/www/iawm/home.html
Institute for the Musical Arts (IMA)
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L.A. Women in Music
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ROCKRGRL
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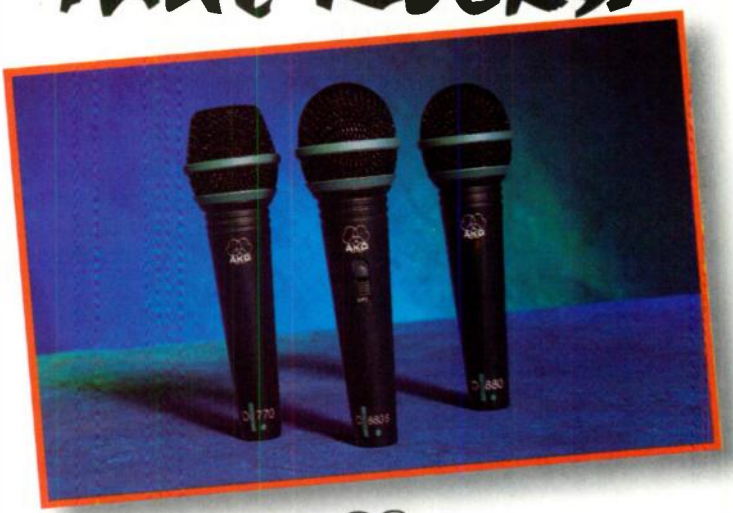

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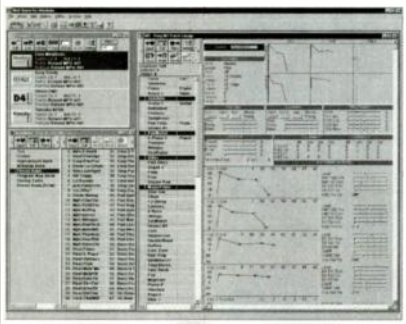

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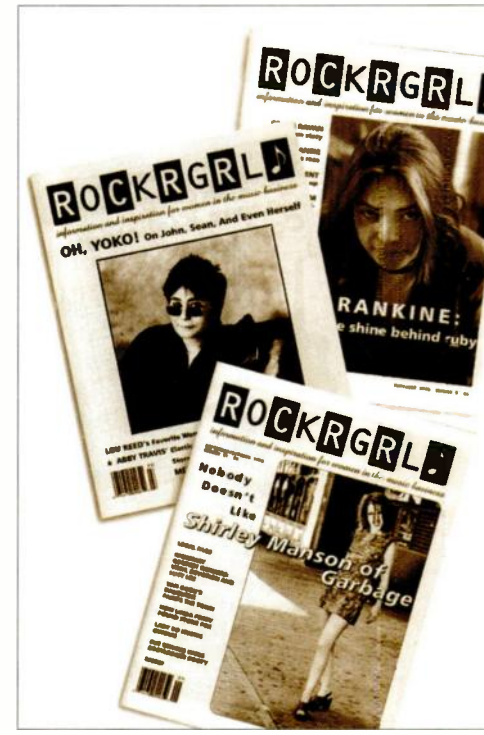
articles on composers, columns on such topics as music technology and education, updates on activities of IAWM members, reviews, and information on fellowships, competitions, and other opportunities. IAWM has recently introduced a new journal called *Women and Music: A Journal of Gender and Culture* to be published once a year. In addition to their publications, IAWM sponsors women's music festivals and international congresses on various topics related to women in music. They also have a Web site that provides extensive links to women-in-music organizations all over the world.



***ROCKRGRL* magazine devotes its pages to writing about women musicians and their craft.**

ROCKRGRL

Disgusted by the lack of intelligent media coverage of female musicians, Carla DeSantis decided to fill the void by publishing *ROCKRGRL* magazine, the first issue of which came out in January 1995. She devotes the pages of her magazine to covering a variety of women musicians, including Yoko Ono, Elastica's Justine Frischmann, and Garbage's Shirley Manson, and many of her writers are respected music journalists, including Deborah Frost and Jaan Uhelszki. The editorial content of *ROCKRGRL* is divided into two parts. One half, usually the first portion, is devoted to profiles of different artists, including the "Herstory" column, which focuses on an influential woman musician from the past who never got the recognition she was due. This column has covered a wide range of artists from the lesser known Lady Bears and AuPairs to the more well-known Patti Smith and Cyndi Lauper. The other half of the publication offers information and various resources, including Web sites, career books, legal tips, and equipment reviews.

"I really want to present an all-around resource," explains DeSantis. "I want to create an environment in a magazine where women can just talk about what it's like being a musician. I gear the magazine to appeal more to musicians than to fans because that's my personal crusade. But fans should read it because they get to read about these women and their music, not what they had for lunch and whether they prefer spandex to Lycra."

DeSantis is working on expanding the role of *ROCKRGRL* in music circles. The publication has started the ROCKRGRL Career Kickstart Contest, in which two winners get write-ups in the magazine and a track on a compilation CD. Judges for the 1996 contest included Uhelszki, Joey Ramone, and Bonnie Simmons.

"My biggest goal is to make a positive change to the way women are viewed in a very antagonistic industry," says DeSantis. "I want to dispel the notion that women rockers are merely a trend."

IMA

In 1987 June Millington—songwriter, performer, and member of the seminal all-women rock band Fanny—and Ann Hackler formed the Institute for the Musical Arts (IMA). The institute's Cultural Center and Studio Retreat is housed in an old creamery on five acres in Bodega, California. There is a 24-track recording studio and a performance space where artists perform and discuss their work.

"Part of the impetus in starting the IMA was to build a space for women to come and pick up creative and technical skills in a supportive environment, either from other women or from men

(continued on p. 159)

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Reviews

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Power Technology DSP•FX 1.0 (Win)

By Zack Price

Pro-quality effects processing in a computer-based package.

For the record, rack-mount effects processors won't be facing extinction any time soon. On the other hand, computer-based, real-time effects processing will be increasingly employed in pro and home studios because of its obvious advantages. For one thing, the digital signal-processing hardware can be configured to produce any type of effect you want. All you need to do is run the appropriate effects software to tell the DSP hardware what to do.

In addition, more parameters can be displayed at once on a computer monitor than on the small displays found on hardware effects processors. Better still, the relationships between the different parameters can be graphically displayed. This provides a clearer understanding of how particular parameter changes influence the overall effect.

Power Technology is the latest company to offer computer-based effects processing. DSP•FX is a stand-alone system: it's not part of an integrated production environment such as Digidesign's Pro Tools. The system consists of one or more hardware cards and flexible software for the Windows platform.

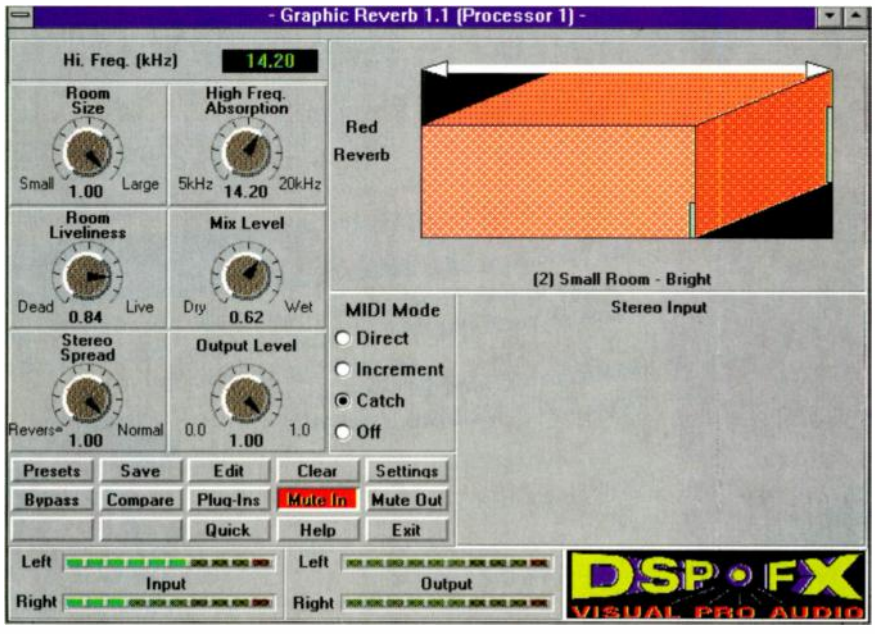

FIG. 1: The Graphic Reverb screen includes virtual knobs for adjusting parameters and an intuitive, graphic representation of all parameters.

FLOATING THE POINT

The DSP•FX card employs 32-bit, floating-point calculation, whereas most systems use 24-bit, fixed-point arithmetic at best. What makes 32-bit, floating-point processing so special? According to the people at Power Technology, fixed-point processors are unable to transparently handle signals with a wide dynamic range. At the top end of the dynamic range, fixed-point processors have a limited amount of headroom, so they clip the peaks of high-level transients such as percussive hits.

At the low end of the dynamic range, a fixed-point DSP uses fewer and fewer bits to represent the signal as the level decreases. Extremely low-level signals (e.g., reverb tails) might be encoded with an effective resolution of four bits. This low-resolution processing causes graininess in the tails of reverbs, because those tails are created by adding together many low-level signals.

A 32-bit, fixed-point processor theoretically sounds better, thanks to the additional bits, which increase the overall dynamic range. However, a 32-bit, floating-point format offers the additional advantage of always using all 32 bits to represent the signal, regardless of signal level. In theory, this causes 32-bit, floating-point algorithms to sound much cleaner and more natural than 24-bit, fixed-point designs. The end results are transient drum hits that don't clip and extremely low-level reverb tails that sound smoother because

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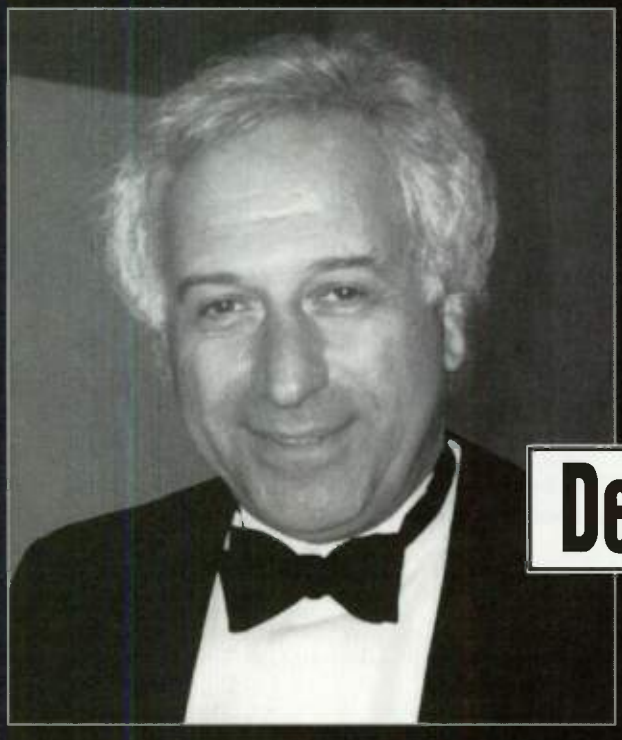

In addition to receiving an Emmy nomination for scoring all of the episodes of NBC's "Fame" series, William Goldstein has received numerous Emmy nominations and awards for his film and concert scores. So what composition software does he use? JAMMER of course. JAMMER instantly creates rock solid drums, powerful bass lines and beautiful rhythm tracks, all based on the chords you type in. It's like having a full band and orchestra ready to jam with you 24 hours a day.

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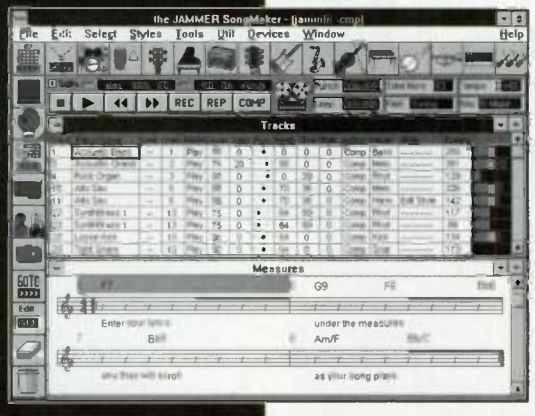

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they are constructed by summing many low-level signals that are represented with 32 bits.

This sounds good in theory, but how does the DSP•FX system sound in practice? It sounds pretty darned impressive to me. During my review, the sound quality remained excellent whether I was running a master mix directly through the system, routing the card's audio output through the aux send and returns of my mixer, or patching a guitar, synth, or percussion track directly through it. I'll discuss the types and quality of effects in more detail later. For now, let's talk about what you get for your money.

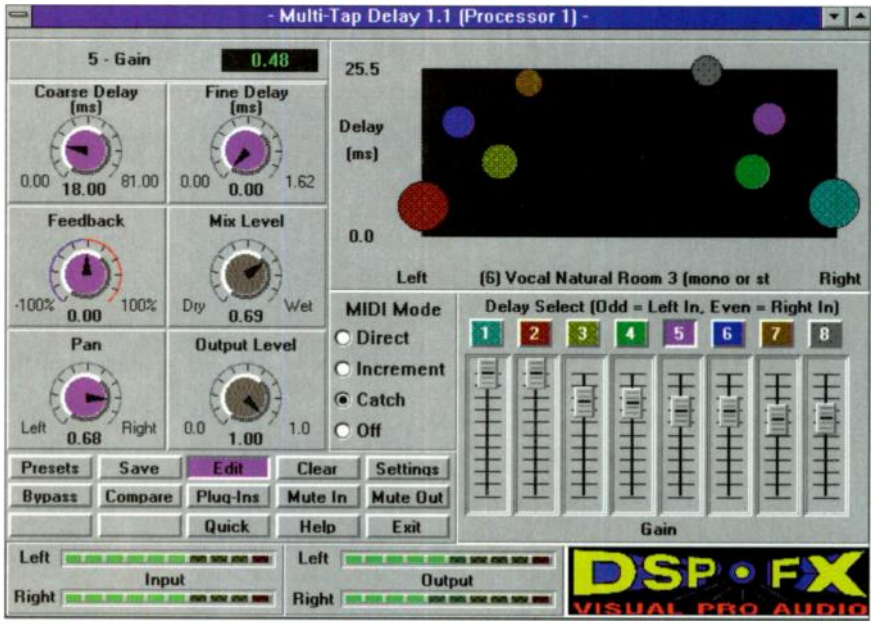

FIG. 2: This shot of the Multi-Tap Delay shows the virtual controls for the fifth delay tap and the graphic display of all eight taps and their relative settings.

GETTING IN AND OUT

The basic DSP•FX hardware consists of a half-length ISA card with a pair of unbalanced ¼-inch analog jacks for input and another pair for output. Depending on the effect used, you can configure the audio routing in one of three ways. First, you can use the left input as a mono input and use the two outputs for pseudostereo imaging. This is the routing typically used with the mono send and stereo returns found on many mixing boards.

Second, when both sets of inputs and outputs are used, the incoming stereo mix is processed and sent back out in discrete stereo. The card maintains the true stereo image in both the wet (processed) and dry (unprocessed) signal.

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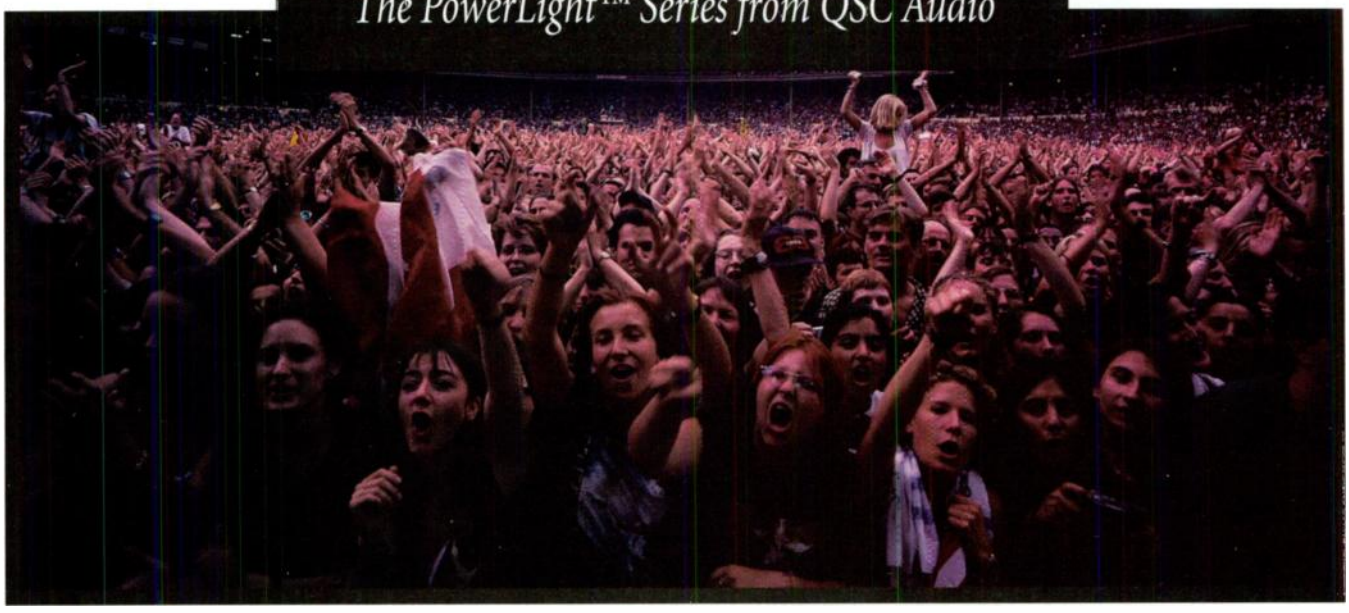

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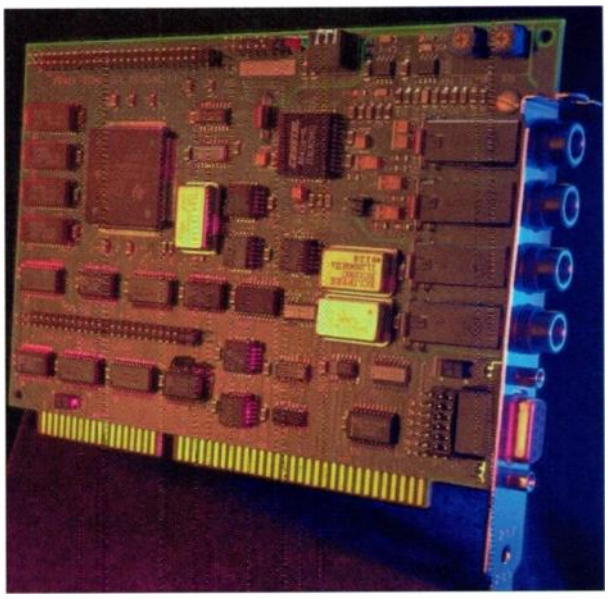
Finally, the unit can function in dual mono, with separate left and right input and output channels. Except for the Room Reverb algorithm, which is only configurable in stereo and pseudostereo, the parameters of all other effects can be set independently for the left and right channels, and each channel is processed separately.

The DSP•FX card also includes a 9-pin D connector that is used in conjunction with a variety of balanced analog and digital audio options. (I didn't test any of these options because they weren't available during the review. However, they should be available by the time you read this.) The first of these options is the AES/EBU Digital Interface ($299), a daughterboard that attaches to the DSP•FX card. The digital audio connectors are supplied in a breakout cable with AES/EBU XLR jacks and S/PDIF RCA connectors.



Power Technology's DSP•FX effects-processing system combines proprietary software with this ISA card. The card provides unbalanced jacks, a D-pin connector for balanced analog and digital I/O options, and expansion connectors for a daughterboard and additional memory.

Another I/O option is the AES Converter ($599), a single-rackspace unit that provides 20-bit A/D and D/A converters as well as balanced analog inputs and outputs. This unit can also operate as a stand-alone A/D converter. However, when the AES Converter is connected to the DSP•FX card via the D connector, it requires the Digital Interface daughterboard to be installed.

The DSP•FX card includes a 128 KB buffer of high-speed (15 ns) static RAM, which yields 670 milliseconds of delay time (single tap at 48 kHz). You can increase the RAM buffer to 512 KB, which provides about 2,680 milliseconds of delay (single tap at 48 kHz). Unfortunately, the memory expansion is proprietary; if you want to have the extra memory, you must buy a separate version of the Digital Interface daughterboard ($459) that includes the RAM.

As an alternative to mouse control, Power Technology offers the DSP•FX Controller ($799), which is really a JLCooper CS-102 with a gold-tone faceplate. In addition to making the system easier to use, the Controller sends MIDI Control Change messages that can be recorded and edited by a sequencer. (A MIDI interface and the DSP•FX MIDI Patcher driver must be installed.) If money is tight, you can control the DSP•FX system with your sequencer's software fader controls.

SET 'EM UP, JOE

Installing the DSP•FX card is a breeze: just find an open ISA slot, and pop it in. The card doesn't use IRQ numbers, DMA channels, or excluded upper memory-block areas. All it requires is a port-address assignment. Kudos to the folks at Power Technology for making sure the eight possible port-address settings weren't likely to be used by any other device in your computer.

However, I did notice that the card seems to be a little taller than most cards. This could be a problem if the space inside your computer is tight. In my case, the hard-drive and floppy-disk cables rested tautly (but without strain) on the DSP•FX card because I had to run the cables over the top of it. My cables weren't exactly short, either.

As you might surmise, eight available port-address settings mean that up to eight cards can be installed. Version 1.2, which is due to be released by the time you read this, provides support

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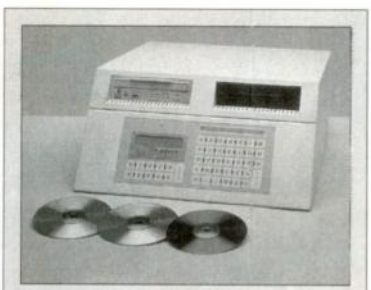

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for multiple cards. (I tested version 1.0, which does not support multiple cards.) Realistically, though, most computers have four to six available ISA slots at best, and most users need at least two slots for sound cards and MIDI interfaces. The bottom line: unless you dedicate a computer entirely to effects processing, you'll be lucky to install more than three DSP•FX cards in your system.

Still, if you simply must have a dedicated multicard system for effects processing, Power Technology offers the DSP•FX PowerPack ($3,999), an open-ended, turnkey system. The PowerPack is a rack-mountable Windows PC with a custom minikeyboard, mouse, and built-in SVGA video output. (You supply a standard PC monitor.) The base PowerPack system also includes one DSP•FX card (expandable to six), one AES Converter (also expandable to six), the Controller, and all five currently available software plug-ins.

SOFTWARE INSTALLATION

Installing the software plug-ins is not as simple as hardware installation due to the copy-protection scheme. The procedure starts easily enough: just install the plug-in and activate it with the password supplied by the company. This password is recorded into the memory of the DSP•FX processor card, so you never have to type in the password again. You can then make backup copies of the plug-in software as you do with any other program.

That seems simple enough if you have only one card. However, what if you have two or more cards? As it stands now, you must assign a plug-in to a specific card. In other words, you must decide ahead of time which plug-in will be permanently used with which card. This scheme is too inflexible. I'd much prefer to call up the plug-ins as I need them without having to remember which card they're assigned to; my brain is tiny and overtaxed as it is.

When I asked the Power Technology people why they had designed the copy-protection scheme this way, they replied that the low cost of the plug-ins ($199 each) justified making the copy protection card-specific. This also prevents users who have purchased a single copy of the software from installing a plug-in into multiple systems containing DSP•FX cards.

However, they do recognize the inherent inflexibility of the copy-protection scheme as it now stands. Company reps have assured me that they will examine ways to improve flexibility while ensuring that plug-in prices remain low. Perhaps using some form of system-specific site licensing would be effective. Plug-ins could be loaded as needed on a single system. However, you wouldn't be able to load identical effects into more than one card from a single copy of software. Stay tuned for further developments.

Once you've got the card(s) and plug-ins installed, you adjust each card's settings from the Settings dialog box. You can select sampling rates of 44.1 or 48 kHz for all plug-ins. When using the delay plug-in, you can also select sampling rates of 8, 24, or 32 kHz. These lower rates provide more delay time if you need it, but lowering the rate compromises the fidelity of the wet signal.

You can also select the MIDI channel and device to which a card will respond. The default channel is 16 (which corresponds to the Controller), and each card works with its own driver. In addition, you specify whether the effects patch will use a mono or stereo input.

I encountered only one problem with the Settings dialog box: it closes immediately after changing a single parameter. If you want to change several

Product Summary

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VALUE	● ● ● ● ◖

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parameters at once, you must reopen the dialog box for each parameter you want to change. I would prefer that the dialog box remain open until you close it explicitly.

PLUG-IN AWAY

Editing a preset is as easy as falling off the proverbial log. Just select the desired effect and select a preset patch as a starting point, or create a patch from scratch. Whenever you adjust a patch parameter, you not only see its numerical change, but you also see a cool graphic representation of how that parameter value fits in the overall context of the effect.

To see what I mean, look at the Graphic Reverb screen (see **Fig. 1**). The room being simulated by the effect is represented by a rectangular box in the upper right portion of the screen. When this screen shot was taken, I was adjusting the room's high-frequency absorption. The active parameter and its setting are displayed in the upper left corner of the screen. The current setting is also shown beneath its onscreen control knob. Finally, the high-frequency absorption parameter is graphically represented by the color of the top and right side of the room. In this case, the lighter the color, the higher the setting.

Once you're familiar with how the effects parameters are graphically displayed, you can easily imagine how the effect will sound just by sight. Returning to **Figure 1**, the size of the box indicates that the room is huge. The color depth of the top and right side suggests that only higher frequencies are absorbed, and the overall color of the box indicates that it's a fairly live room. The distance between the two arrowheads above the room indicates that the stereo separation is wide. In addition, the arrows point outward, which indicates that the normal stereo balance is maintained. (If they point inward, the stereo field is reversed compared to the dry signal.)

The height of the white bar above the room represents density or diffusion, which is moderate in this case, and the two vertical bars on the right corners of the box indicate early reflection and late reflection intensities, respectively. In this case, the display reveals that the intensity of early reflections is low and the late reflections are pretty dense. Given these parameters, I do not think we can accurately call this preset "Small Room Bright" as its name appears under the graphic display. It's time to save it under a new, much more accurate name.

You might notice that some of the reverb parameters mentioned in the previous paragraph (e.g., Density and Early and Late Reflection) do not appear with the onscreen controls on the left side of the screen. In fact, these parameters are hidden under the basic parameters. To view and change them, you would need to push the Edit button.

The DSP•FX Controller is a repackaged JLCooper CS-102, which provides an excellent alternative to mouse control. However, you can use any MIDI fader box or sequencer to accomplish the same ends.

This is easily illustrated in the Multi-Tap Delay screen (see **Fig. 2**). In this particular example, I was editing the fifth delay tap's parameters. You can tell that I was editing this particular tap because the number "5" appears in the upper left corner next to the word "Gain." In addition, button 5 in the slider section is depressed. Furthermore, the control knobs change to match the color of the selected tap button. Finally, the appropriate color-coordinated ball in the display area changes size, color density, and vertical and horizontal positions as its onscreen parameters are altered. Pushing a different Delay Select button brings up color-coded parameter controls for that particular tap, whereas disengaging the Edit button recalls the overall controls for that plug-in.

THE MOMENT OF TRUTH

Overall, the available effects are uniformly excellent. For example, Room Reverb is just what the name implies: high-quality room reverb with few bells and whistles. In other words, don't look for gated, reverse, reverse gated, or plate reverb simulations; you won't find them in this plug-in.

Power Technology "modestly claims" that its Multi-Tap Delay is the best sounding delay in the world. Now, I don't think you can make a claim like that and be modest about it, but I have to agree that it does indeed sound superb. I used it to fatten up a vocal track, which it did with such subtlety and finesse that no one would have known it was a processed track unless they had also heard the original.

In addition, the Multi-Element Chorus is excellent. I particularly like how thick (but not muddy) my guitar sounds through it. I love the Analog Tape Flanger for much the same reason. Unfortunately, I don't think I'll be able to tolerate running my guitar through my own effects processor after I have to return the DSP•FX system to the manufacturer.

Finally, although I'm not usually enthusiastic about pitch shifters in general, I do like the DSP•FX Full Stereo Pitch Shifter. It sounds good and clean when used with guitar leads, and it works well as a small-interval pitch corrector and lead-vocal fattener. Its capabilities are more than adequate for my usual application for pitch shifters, in which I use them as a drum-kit tuner and psycho percussion monster-maker. I don't normally associate "mean" and "clean" with seriously warped percussion, but the Stereo Pitch Shifter has forced me to alter my perceptions in this matter.

THE END IS NIGH

Obviously, I really like this product. I am impressed with how it sounds, even though I was limited to using the unbalanced jacks. All of the plug-ins are highly useful, and working with them is a piece of cake. My only major complaint about the system is its inflexible copy-protection scheme that seems to make life harder for users with multiple cards in a single computer.

On the other hand, the price is extremely reasonable. You can buy the card and all five plug-ins for $1,299, but if that's too much to shell out at once, you can purchase the card and your choice of a single plug-in for $799.

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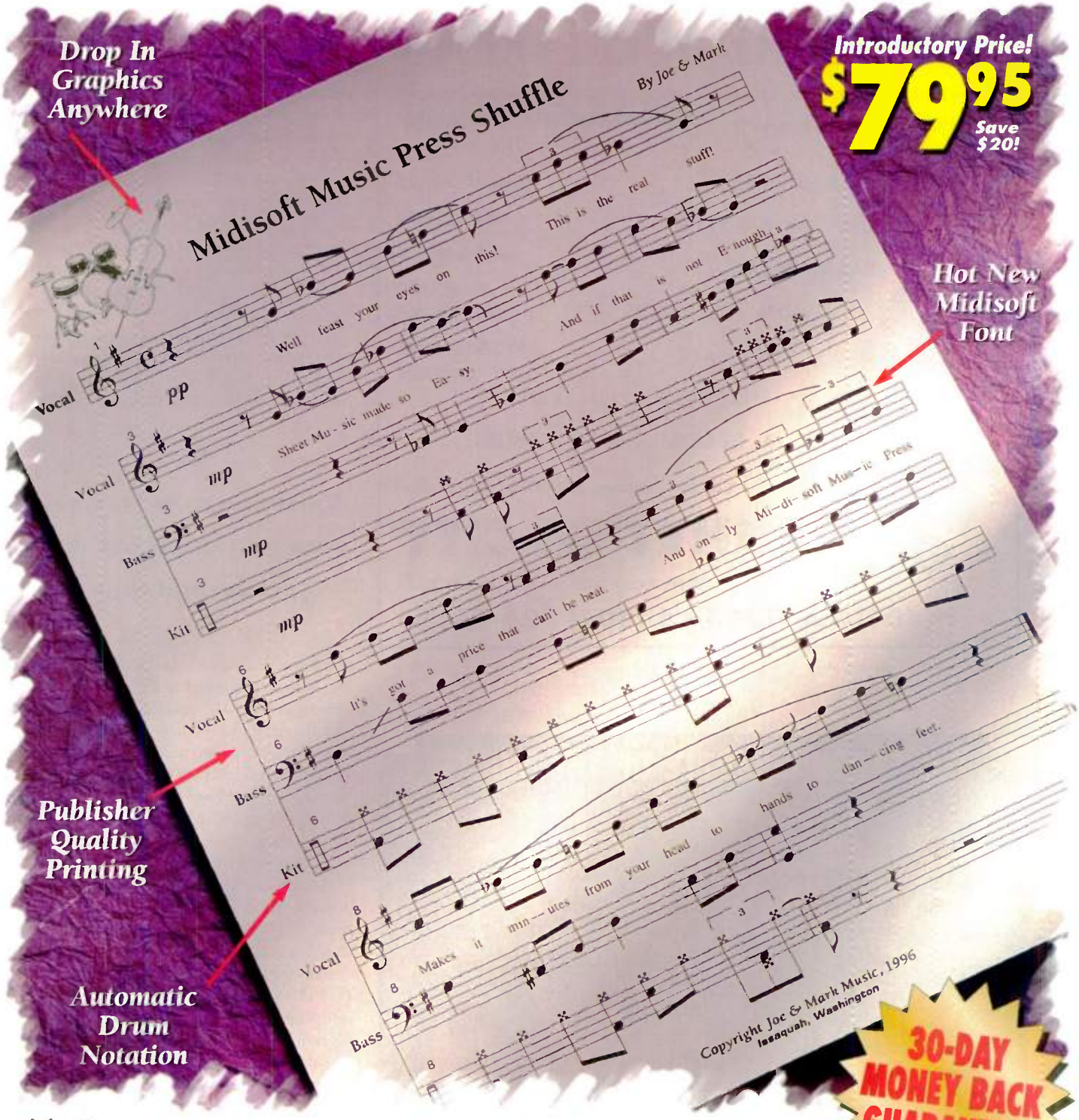

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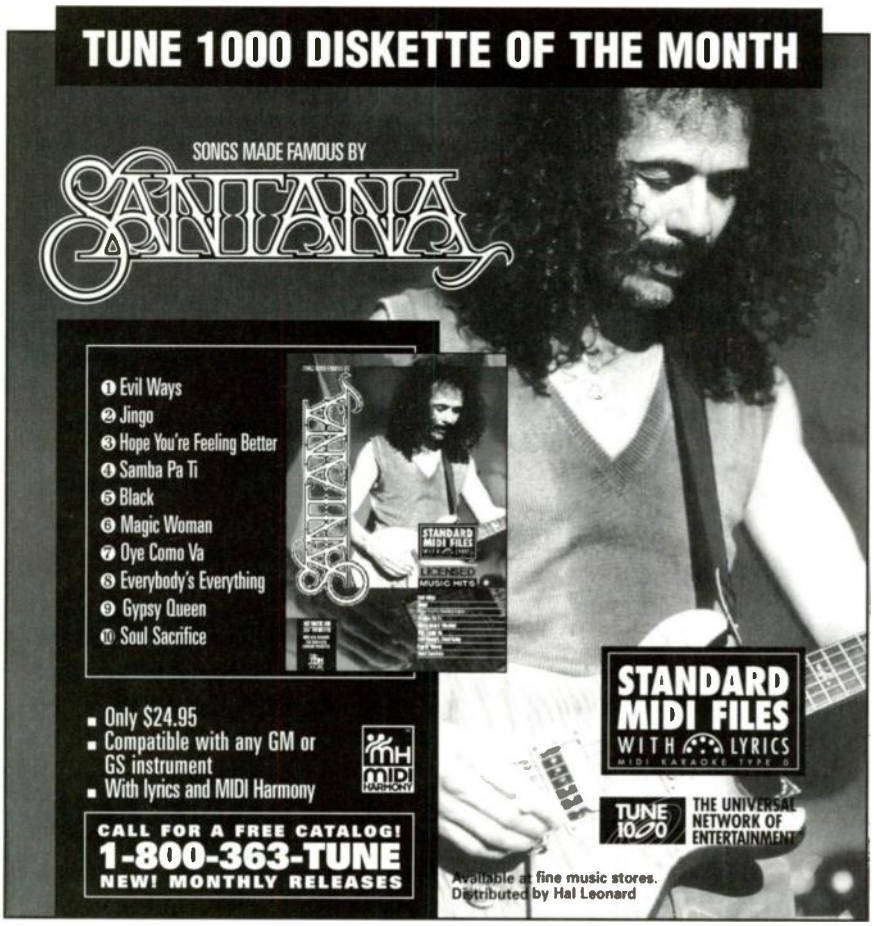

You can then upgrade to the complete set of the current plug-ins for an additional $500, which is the difference between the basic and complete package. Not a bad deal, considering that the price for each separate plug-in is $199. (Even that price is downright cheap compared to plug-in software prices for other systems.) The money starts to add up quickly, though, when you include some of the hardware options mentioned earlier.

One of the advantages of a computer-based effects system is the potential for expansion, and Power Technology is not ignoring this. For one thing, the company has announced the impending release of its new *ParaEQ* multiband parametric equalizer plug-in, which is due out in early 1997. (A fully functional demonstration version is available in the v.1.2 release.)

▼

Editing a preset is as easy as falling off the proverbial log.

In addition, Power Technology and Innovative Quality Software have announced an agreement to jointly develop a direct interface between *SAW Plus* and the DSP•FX system. This interface will allow *SAW Plus* users to apply the DSP•FX effects directly to selected tracks without requiring any external signal patching. This gives Power Technology a ready base for future development, and it gives IQS access to high-quality, real-time effects, which will dramatically improve *SAW Plus*' rather Spartan effects processing capabilities. (See the review of *SAW Plus* in the November 1996 **EM**.)

Even if no other plug-ins are ever developed for it, the entire DSP•FX system package is already a great deal as is. If you're looking to add some great effects processing to your home, project, or pro studio, the DSP•FX system should be on your short list of gear to check out.

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TC Electronic M2000 Wizard

By Peter Freeman

Clean, flexible effects that are a snap to access.

Until recently, most of TC Electronic's best-known products were aimed at high-end users. The company's all-singing, all-dancing M5000 has an open-ended, expandable software and hardware design that provides plenty of power and great sound quality, but it is very expensive.

Fortunately, the Danish manufacturer of signal-processing gear realized that, although its expandable unit is elegant and flexible from a "purist" standpoint, most people don't need its full power to accomplish routine processing tasks. Recognizing the need for a similar but lower priced effects processor, TC Electronic produced the M2000 Wizard, which provides some of the key features of the M5000 but stays in the mid-price range.

The 1U rack-mount M2000 employs two independent onboard digital signal processors (labeled Engines 1 and 2), each of which can handle one mono-in/stereo-out effect. The audio can be routed in a variety of ways. This scheme retains some important advantages of the M5000's discrete-processor design but eliminates the possibility of adding further coprocessing power later on, hence the M2000's more moderate price.

MAKING CONNECTIONS

The M2000's rear panel has been endowed with a pro-caliber I/O section, including both AES/EBU (XLR) and S/PDIF (coax) digital I/O. Although you can only use one type of digital input at a time, both sets of digital outputs and the analog outputs are simultaneously available. The stereo analog inputs and outputs are on balanced XLR connectors and use 20-bit digital converters. And of course, you get MIDI In, Out, and Thru ports.

The unit's rear panel comes complete with a footpedal input, a standard IEC 3-conductor power jack for the internal supply, and a power switch. The footpedal can be globally programmed as a tap-tempo source or as a bypass for any one section (Engine 1, Engine 2, or Combined 1 + 2).

A FRIENDLY FACE

The M2000's front-panel design is very straightforward. This is definitely one of the most easy-to-use, "no manual required" boxes I've ever tested. All parameters are at most one page away, and the functions are immediately obvious to anyone who has experience programming effects processors. A medium-sized, yellow, backlit LCD shows all the information you need to run the unit. A memory-protection function keeps you from accidentally overwriting your programs before you can back them up.

The controls are divided into five sections: Setup, Engine 1, Engine 2, Combined 1 + 2, and Control. The Setup section (I/O, Routing, Levels, and Util/MIDI) accesses system and hardware parameters. Here, you can choose between digital and analog I/O and set analog I/O levels, digital input level, sample rate, dithering, internal routing between the two DSP engines, and so on.

The detented Adjust wheel and the Control buttons—Cancel, OK, Tap, Shift, and Cursor Up and Down—constitute the main data-entry section. The Cursor and Cancel keys function as expected, and the OK key is the equivalent of an Enter button. The Tap key is used for tap-tempo input, and the Shift key accesses four special functions that I'll discuss later.

Three identical groups of four keys—Store, Recall, Edit and Bypass—access the main modes for DSP Engines 1 and 2 and combinations of the two processors (Combined 1 + 2).

The unit has 256 ROM presets, which are divided into 128 Normal (single processor) presets and 128 Combined presets. Combined presets comprise two Normal presets, one for each DSP engine. In addition, there are 256 user RAM locations, similarly divided into Normal and Combined banks. A front-panel PC-card slot accommodates 2 MB RAM cards that can hold 256 user programs. You also can back up the unit's memory via SysEx Bulk Dump.

Signals can be internally routed in any one of six ways. Dual Mono is a mono-in/mono-out mode with Engine 1 on the left and Engine 2 on the right. Dual Input mode sends separate mono input signals to the two engines but, unlike Dual Mono, sums the outputs in stereo. In Stereo mode, both engines run the same algorithm on opposite channels, linked in discrete stereo. As you might expect, Serial mode routes a stereo signal through both engines in sequence, with a stereo output. Parallel mode lets you use the two engines separately on the same source and combines their stereo outputs. Finally, Preset Glide mode lets you crossfade (at a selectable rate) between two effects, using a single engine.

Editing effect parameters on either of the M2000's engines is simply a matter of pressing that engine's Edit key and scrolling through the parameters with the cursor keys. Values are changed via the Adjust knob.

Pressing the Edit button for any program takes you to User mode, where you see a display of the parameters TC Electronic feels are most often used. To get to the more in-depth parameters, you scroll down via the cursor keys to select the word "Expert," which leads to other options. In the case of a reverb program, for example, the Expert area contains such parameters as diffusion, room shape, level of the reverb

Clean, useful, practical, easy-to-use effects are the TC Electronic M2000's forte. It's designed for the mainstream user, not for the inveterate sound mangler.

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tail, and so on. Once you have altered an Expert parameter, the Expert parameters will always appear in Edit mode for that program. There's no going back to User mode.

Presumably, TC Electronic chose this approach because unsophisticated users might be intimidated by seeing too many unfamiliar parameters at once. However, it seems an odd design for a device whose price tag places it firmly in the pro arena. I would rather see all of the parameters together in logical order.

EFFECTS PROGRAMS

The M2000 is a utilitarian "Swiss Army knife" device that does a good job of handling the effects commonly required in most mixing situations. You get plate, room, hall, and gated reverbs, as well as chorusing, pitch shifting, delay, flanging, panning, tremolo, phase shifting, de-essing, dynamics processing (compression, expansion, limiting, and gating), and 3-band parametric EQ with high and low shelving bands.

In general, the reverb algorithms sound good, although to my ears the room and hall reverbs don't convincingly simulate real rooms or halls in the way that, say, a Lexicon PCM 80 does. In general, the reverbs sound transparent, even bland. I prefer being able to choose between dark and transparent sounds for use in different contexts, and I was never quite able to achieve a satisfyingly dark sound with the M2000.

That said, however, enough control is provided over the reverbs in Expert mode that you can tailor their characteristics to suit many musical situations. The M2000's reverb fared particularly well on guitars and synths; it was not to my taste for use on drums and vocals, where I prefer a reverb that imparts a more distinctive sound.

It's no surprise that the M2000 chorus effects are excellent. Chorusing has always been one of TC's fortes; I would expect nothing less than excellence from this unit. In addition to the usual Rate and Depth controls, you get a Phase control and adjustable Hi Cut and Delay parameters. The full range of conventional chorusing effects can be achieved, from the subtle to the very pronounced.

The flanger and phaser effects sound good, but as with the reverbs, they lack a distinctive character. The phaser algorithms won't retire my Mutron Bi-Phase any time soon—now *there's* a phaser with a distinctive character!—but they are quite acceptable for many situations. I wish a greater range of low-frequency LFO rates were available for achieving extremely slow sweeps, though.

The M2000's dynamics-processing algorithms are unobtrusively effective and quite useful in the proper application. If you need a precisely controllable, extremely sensitive gate, you probably should turn to a dedicated unit rather than the M2000. However, if you are looking for an extra compressor or expander to even out a particular instrument's level, TC's box is a good choice. The compressor is probably the most successful of the dynamics algorithms, sounding smooth and providing a wide range of control. Like most M2000 algorithms, its sound isn't really "warm," but it does its job well. I found it best suited for guitars and basses.

The M2000's EQ reminds me of its cousin, the TC Electronic 1128 equalizer: precise, somewhat cold, and quite effective. I particularly like it for adding overall sparkle or gentle emphasis to a signal. Like the 1128, the M2000 has the ability to add considerable amounts of boost while remaining crystal clear, a quality I greatly appreciate.

The EQ section includes low and high shelving filters and three parametric bandpass filters, which are closer to quasi parametrics than they are to the parametric EQs found in most effects processors. The low shelving band ranges from 20 Hz to 5 kHz and has selectable cutoff frequency and a choice of two slopes. The high shelving band ranges all the way from 500 Hz to 20 kHz, again with selectable cutoff frequency and two slopes. The three parametric bands cover the entire 20 Hz to 20 kHz range and offer a choice of three fixed bandwidths, which are only identified by narrow, medium, and broad icons. The bandwidths are indicated by handy little shape icons on the LCD, so it's always easy to see which bandwidth setting you've selected. Each filter offers ±12 dB boost/cut.

The Pitch Change area of the M2000 is not particularly impressive and seems

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geared solely toward chorusing effects. Six individual "voices" are available, and a pitch-transposition range of up to one octave up and down is provided. The pitch shifter sounds best when set to very close intervals (within 30 cents or so); it doesn't track well when set to produce simultaneous, wide-interval harmonies. This area of the M2000 could really have been better.

The M2000 allows you to set tempos for delay time, reverb decay time, or chorus, flanger, tremolo, or pan speed. Tempos are measured in beats per minute and can be subdivided down to 32nd notes and 32nd-note triplets. They can be set in a regular menu or can be tapped in with the Tap button or the footpedal.

SPECIAL FEATURES

TC Electronic has thoughtfully included a number of convenience features that are especially noteworthy. The M2000's Snapshots are exactly what they sound like: quick "photographs" of the entire current state of the unit. The four Snapshot locations can be used like separate compare/recall areas or as discrete settings. All effects processors would benefit from this handy function.

I really like the Dynamic Morphing feature, which allows the level of the input signal to determine which effect is currently being heard. It works sort of the way a crossfade controlled by an envelope follower would.

For example, you could set up a small room reverb on Engine 1 that is dynamically morphed with a large, dramatic

Product Summary

PRODUCT:
M2000 Wizard effects processor
PRICE:
$1,995
MANUFACTURER:
TC Electronic
tel. (805) 373-1828
fax (805) 379-2648
e-mail tcus@tcelectronic.com
Web www.tcelectronic.com
CIRCLE #438 ON READER SERVICE CARD

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

circle #513 on reader service card

Hall program on Engine 2. This would yield a reverb effect whose depth changes as a function of input level, so that a vocal could inhabit different "spaces" during more or less intense parts of a song. I found this feature extremely musical and useful. It adds dimension to all of the M2000's algorithms.

As mentioned earlier, four special functions are accessed via the Shift key. The Help feature explains the functions in the current screen. The MIDI monitor shows Program Changes, Note On/Off, Control Changes, System Exclusive, and the channels on which the M2000 and its three sections receive MIDI messages.

You also get a tuner that can be set for bass, guitar, or chromatic. The fourth Shift-key function is Auto-Level, another utilitarian M2000 feature that would be a great addition to any effects processor. It automatically measures the analog input signal's amplitude for about five seconds and sets the correct input level.

The wet/dry mix of most M2000 presets is set surprisingly dry, which is fine if you want to use it in-line (for example, with an instrument rig in a live performance). However, in most studio applications you will want to leave it 100 percent wet so you can set the wet/dry mix with your mixer's aux controls. Therefore, TC Electronic thoughtfully provided a Mix parameter that globally sets all presets to the same wet/dry mix; all you have to do is set this at 100 percent, and you're happening.

Finally, if you aren't sure which algorithm is best for a certain type of material, the M2000's Wizard feature can suggest an appropriate ROM program. You indicate (via menu and cursor keys) the instrument you're processing, the category of effect you want, and the degree to which you want it: Gentle, Normal, or Extra. The M2000 responds by displaying a list of presets that TC's engineers consider suitable for that application.

I recognize that the Wizard feature could be useful for some folks, but somehow the idea irritates me. For one thing, the M2000 doesn't have nearly enough different algorithms and presets to justify the need for something like this. It's a bit like being provided with three pages of explicit directions to the corner store. In addition, the M2000 is clearly priced and designed to be a professional unit, so why offer such a rudimentary "help" feature?

M2000 Specifications

Analog Inputs/Outputs	2 (XLR)/2 (XLR)
Digital I/O	AES/EBU (XLR) and S/PDIF (coax)
No. of Presets (ROM/RAM)	256/256
A/D Converters	20-bit, 64x oversampling
D/A Converters	20-bit, 64x oversampling
Frequency Response (output)	10 Hz–20 kHz
THD (output)	<0.008% (1 kHz, +10 dB)
Dynamic Range (output)	>96 dB
PC Card Slot	2 MB Type 1 RAM card, holds 256 presets
Sample Rates (digital I/O)	32, 44.1, 48 kHz
Dimensions	1U x 8.2-inch depth

MIDI

The M2000's manual makes little mention of the product's MIDI features other than providing a MIDI implementation chart at the back. But in fact, the MIDI features are good. Each processor section (Engine 1, Engine 2, and Combined 1 + 2) can be set to any MIDI channel or to Omni mode. Each section responds to Program Change commands, and you can program your own Program Change map for each section, including an offset to accommodate either 1 to 128 or 0 to 127 numbering systems. The unit also sends and responds to MIDI Clock for handling tempo-related events.

Real-time continuous control over parameter changes is smooth, but the mapping method is unusual. Aftertouch, Velocity, Pitch Bend, and Control Changes 0 to 9 are not supported. CC 10 always controls the wet/dry mix when this parameter is available, and CC 11 handles output level.

After that, Control Change messages are premapped for each processor section according to each parameter's position in the Edit page, that is, Controller 12 is premapped to the first parameter in the Edit page, Controller 13 is premapped to the second parameter, and so on. Because the different programs have different numbers of parameters, the parameter being controlled by a specific MIDI message depends on the currently selected program. It's a very odd arrangement with no advantages that I can see. You can program each section to ignore or respond to Control Changes.

UTILITY REIGNS

TC Electronic has clearly prioritized convenience, ease of use, and simplicity above all else with this unit. The basic audio quality of the M2000 is also excellent. The result is a clean, professional, high-quality, and easy-to-use device.

In fact, the M2000 would be a killer effects box if it did just a few more things and if more time had been spent on developing interesting, unusual, and powerful algorithms (such as advanced filtering and resonant effects, vocoding, and unusual reverb/delay effects). I wish TC Electronic's designers would strike a better balance between catering to what they think "most people" want and serving professionals who want to experiment with algorithms that impart a more distinctive sonic signature.

My wish list notwithstanding, this is a fine product for the right user. The M2000's elegant, 2-engine architecture and simplicity of design make it a great basic platform. If you're looking for a clean, high-quality device to handle conventional effects-processing chores, this is the one for you. With its friendly interface, pro-quality sound, extensive parameters, and outstanding I/O options, you won't go wrong. But if you're looking to explore uncharted sonic territories and to boldly go where no one has gone before, you may have to go elsewhere.

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

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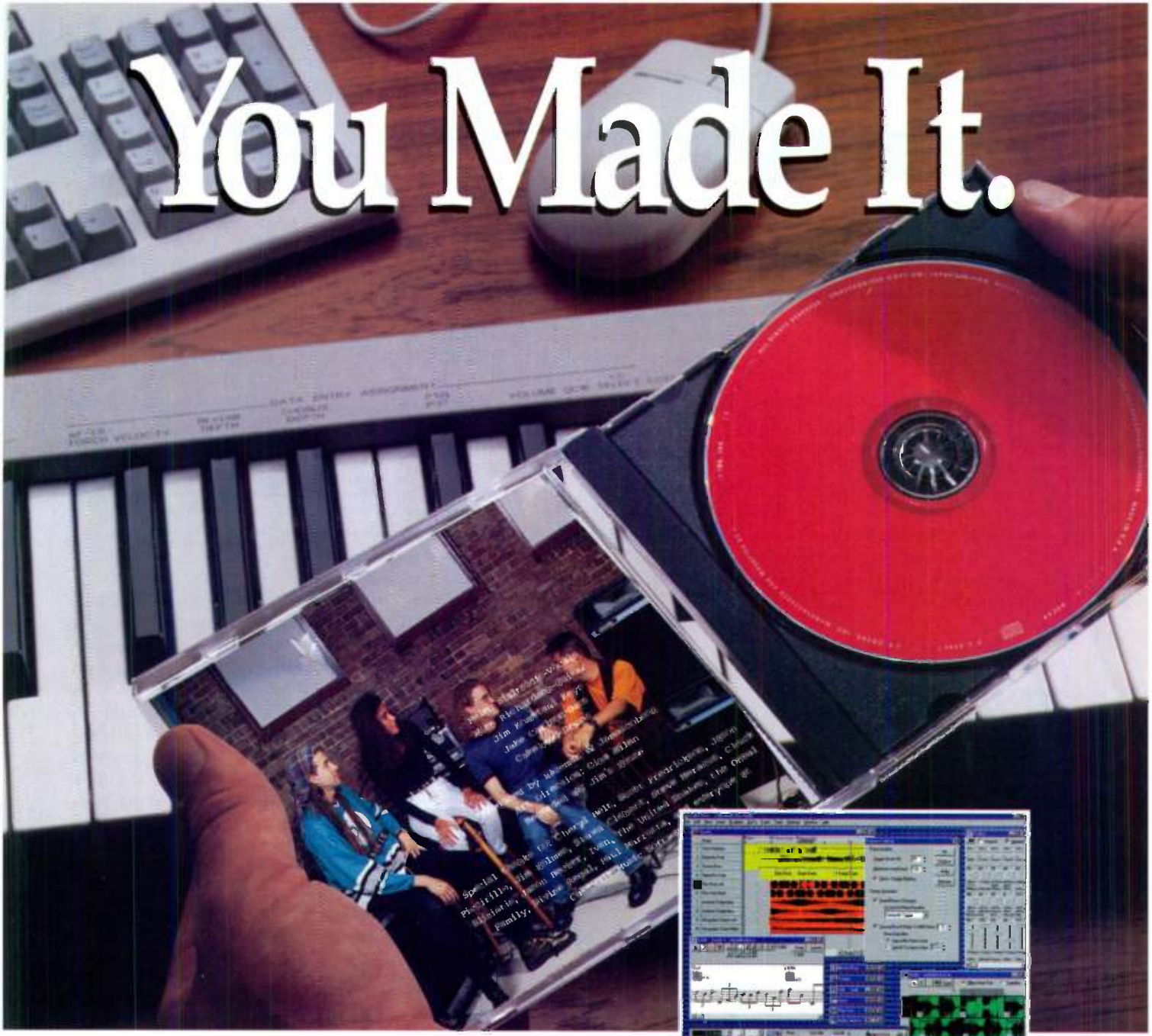

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* Maximum number of tracks determined by your hardware configuration

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Digital Kitchen Akil Wemusa

By Christopher Patton

The lowdown on sampling the low end.

Some serious cookin' is going on in the Digital Kitchen! The company's latest audio sampling CD, *Akil Wemusa, The Low End: Bass Loops*, vol. 1, is filled with over 70 minutes of some of the funkiest bass loops I've ever heard. Each track features 1- or 2-bar slapping, fingering, or filter effects, and you get between seven and fifteen bass-loop variations per track.

What makes this sampling CD unique is the talent of Akil Wemusa. Wemusa used a variety of techniques and bass sounds to successfully emulate such bass stalwarts as Larry Graham, Louis Johnson, Stanley Clarke, and Jaco Pastorius. On some of the tracks, Wemusa uses a Mutron III+ envelope filter, which makes him come frighteningly close to sounding like unorthodox and much-honored funkmeister Bootsy Collins.

GROOVACIOUS BASSES

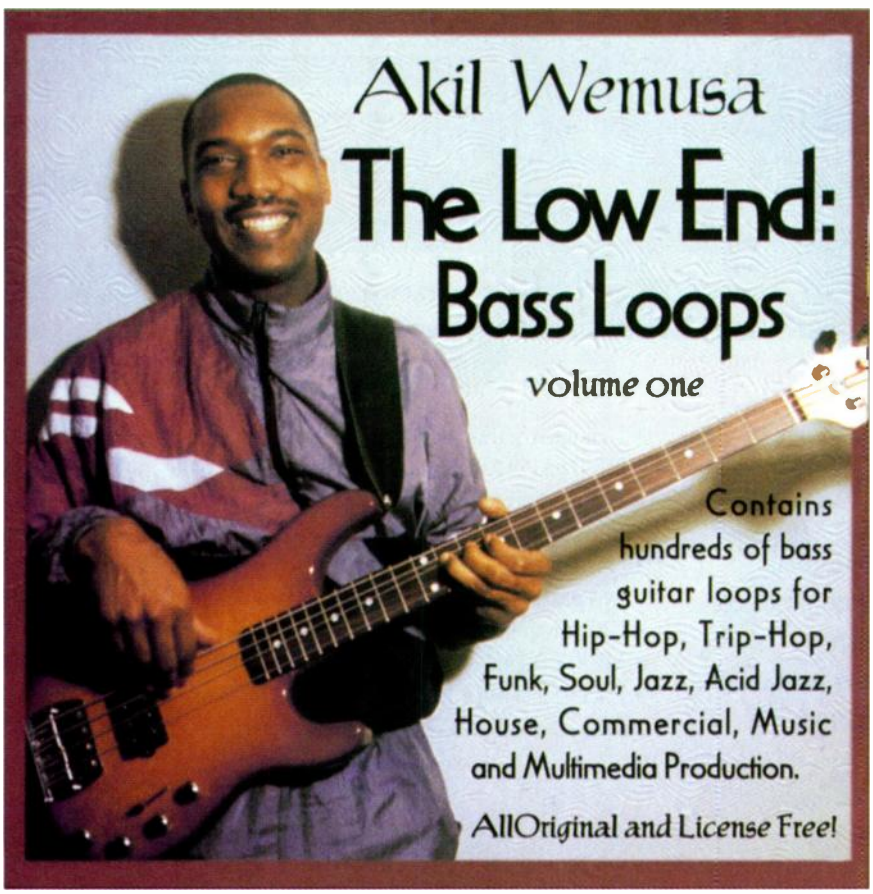
Sampling the sounds from this disc is not a task for the faint of heart. If you're not well versed at editing samples, using most of these samples can be frustrating. Because the loops are so loose, you might encounter difficulty in finding the downbeat after sampling a groove.

This wasn't a big problem when I was using a sampler such as the Ensoniq ASR-10, which records in Loop mode. But it can definitely be a problem when using the loops in software-based sequencers such as *Cakewalk Pro Audio*. I had to truncate the samples very carefully, and I spent more time than I liked sliding them around to get them in sync.

Don't get me wrong: using the samples in *Cakewalk Pro Audio* may have been a bit inconvenient, but it was well worth the effort. The samples are very tasty, and they really added some spice to my grooves. However, I'd love to see Digital Kitchen release CD-ROM versions in the most popular sampler formats. If they really want to go all the way, they could release a mixed-mode CD-ROM with WAV and AIFF files, which would make it easier to use these samples with Mac and PC audio-editing software.

The CD takes full advantage of the Red Book standard for CD audio, including track indexing. In case your CD player doesn't support track indexing, the time locations of each sample are listed in the booklet. The booklet also includes tonal-center information and lists the tempos (in beats per minute).

Digital Kitchen claims that the disc can be used for a variety of music from soul to acid jazz. In my opinion, some of the loops, given some editing, can work adequately for the styles they list. But to fully utilize this disc, you have to be a genuine funk aficionado, because only a true funk-blaster can appreciate Akil's technique. I feel that appreciation is necessary to utilize these loops effectively. To swim in the funk, you must start at the low end.



Funk producers can enhance their bottom line with the excellent bass loops in Digital Kitchen's *Akil Wemusa, The Low End: Bass Loops*, vol. 1.

Product Summary

PRODUCT:
The Digital Kitchen *Akil Wemusa, The Low End: Bass Loops*, vol. 1, sample CD

PRICE:
$49.95

DISTRIBUTOR:
Eye & I Productions
tel. (800) 726-7664
or (510) 625-7888
fax (510) 625-7999
e-mail info@dkitchen.com
Web www.dkitchen.com

CIRCLE #439 ON READER SERVICE CARD

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

Christopher Patton *is president of Ars Nova Productions, a production company that offers artist management, publicity, and recording services in the San Francisco Bay Area. (Special thanks to Peter Stanley at Apogee Studio in San Jose, California.)*

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BIAS Peak 1.10 (Mac)

By Geary Yelton

Powerful, innovative audio-editing software.

In the cutting-edge world of music production, there are three essential computer-software tools: MIDI sequencers, multitrack audio recorders, and in-depth sound editors. *Peak*, the first product from Berkley Integrated Audio Software (BIAS), is a stereo sound editor that combines most of the features found in such 2-track audio editors as Macromedia's *SoundEdit 16* and Digidesign's *Sound Designer II* with some—but by no means all—of the sampler support found in Passport's *Alchemy*.

Sampler users are in dire need of a Mac-based sample editor to replace legacy applications that are either discontinued or barely supported. Although *Peak* doesn't entirely fill this bill because it only offers direct SCSI support for a few samplers, it comes close. And for users of the supported samplers, it offers a much-needed new tool.

WHAT IT IS

Peak is a disk-based, nondestructive audio editor, meaning that, as with a word processor, when you edit a file, the original is untouched until you save the changes to disk. *Peak* also features unlimited undo capability. As long as there's enough disk space, you can make edits all day long, and you can undo them all until you save them.

In addition to *Peak*'s built-in signal-processing functions, it can use Adobe *Premiere*-compatible audio DSP plug-ins. If you require an effect that isn't already available, such as reverb or multiband EQ, you may be able to add that effect using a plug-in from a third-party software company such as Waves or InVision Interactive.

Peak reads and writes several 8- and 16-bit, mono and stereo file formats at any sample rate. Audio Interchange File Format (AIFF) is the default format. Other supported formats include QuickTime, for editing and creating Movie soundtracks; Sound Designer II, which is useful in conjunction with hard-disk recorders such as Pro Tools or digital audio sequencers such as *Digital Performer;* WAV, for working with sound files that will end up on the Windows platform; and Red Book, the standard format for audio CDs.

It can also open System 7 sounds, .SND files, and .AU files via the translation capabilities of QuickTime. Apple Sound Manager 3.2 makes it possible to open and save AIFF and QuickTime files with MACE 3:1, MACE 6:1, IMA 4:1, or µlaw compression. Multitrack audio files are not supported—*Peak* is limited to two tracks. In addition, *Peak* can send and receive sounds via SCSI to and from the Ensoniq ASR/EPS series and any sampler that supports SMDI, including the Kurzweil K2000 and K2500 series, the Peavey SP, and the E-mu e-64, ESI-32, and E-IV.

If you have a compatible CD-ROM drive, *Peak* can read audio CD tracks and convert them to sound files. You can specify the track number and the start and end points to sample. This capability is the fastest, easiest method for sampling from audio CDs. Instead of using your sampler's electronics to capture a sound, *Peak* can extract it from the CD and then send it to the sampler, all in the digital domain.

CONFIGURING PEAK

Peak requires Sound Manager 3.0 or later, and virtual memory must be turned off. The program will open without Sound Manager, but you can't play or record anything. BIAS also recommends that you turn off the Modern Memory Manager; leaving it on might cause clicks during sample-rate conversion or phase vocoding. In addition, crashes are more frequent with the Modern Memory Manager turned on. If you are using a Digidesign sound card, the appropriate Digidesign driver and extension must be installed to route sound through it.

Peak's *User's Guide* includes detailed, illustrated explanations of how to connect your Mac to a sound system and configure the Sound control panel, with or without a sound card. It even points out that the Mac's input expects a level of -10 dBu, which is useful information you won't find in your Mac user manual.

Like many music programs, *Peak* is copy protected. The original application disk includes two authorizations, which lets you run *Peak* directly from your hard disk. When you run the installation procedure, authorization is installed automatically. If your hard disk isn't authorized, you must insert the original key disk every time you use the program.

Unfortunately, *Peak* is a memory hog. The documentation suggests (but does not require) that you turn off most of your system extensions, turn off AppleTalk, turn off file sharing, disconnect from any networks, boost your disk cache, set your monitor for 8-bit color, and then dedicate every possible ounce of memory you can to the *Peak* application. In real life, devoting 16 MB of RAM seems sufficient on a Power Mac for most operations. I used *Peak* both with and without a Digidesign Audiomedia III card. I also left my monitor set for "thousands of colors," disabled a few real-time extensions like the Menu Clock and a screen saver, and turned off AppleTalk.

I did have one very annoying problem with *Peak* 1.10. Every time I quit the program, my system crashed with an "illegal instruction" error the next time I started the computer. When this happened, I had to restart with extensions off and then restart again with extensions on, after which everything was fine. I eventually discovered that the problem disappeared when I disabled the WorldScript Power Adapter extension. Hopefully, I wasted one of the most beautiful days of the year with

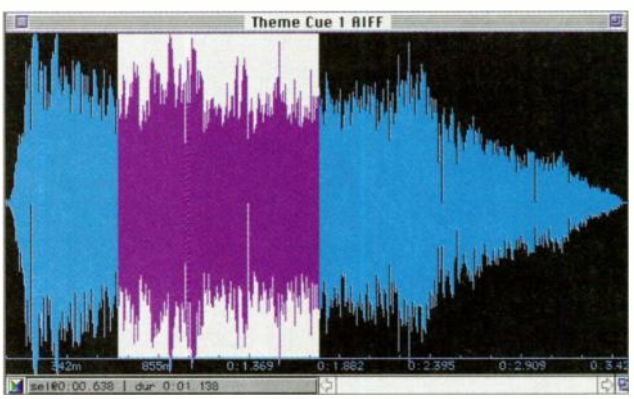

FIG. 1: BIAS *Peak*'s Audio Document window displays the waveform with markers, loop markers, and region names.

MEMO
FROM Mega Records
TO. Chief Engineer
RE: Demo

Problem
Vocals are lacking something - how about adding some harmonies and thickening?

Solution
the DigiTech Vocalist Workstation

WITH REVERB ON-BOARD

2-5 PART HARMONIES
triggered by one voice.
Uses: Live and studio

SEQUENCE YOUR HARMONIES
If you are using virtual tracks, you can build your harmonies and edit them like any other sequence data

LUSH VOCAL THICKENING
Add 4-voice detuning to give your lead vocal that big double-tracking sound for live or recorded use

PITCH CORRECTION
Save an otherwise great recorded vocal take by fixing a bad note

BIG, BRIGHT DISPLAY
Easy to read, easy to edit. Soft keys let you zoom in on editing parameters quickly and simply

100 HARMONY PRESETS
Great for any style of music

GENDER BENDER™
Apply male or female tonalities to your harmonies. Make your voice sound skinny or fat, more human!

BUILT IN KEYBOARD
for quick and easy commands.
Also includes a tone generator for cueing singers

FOOTSWITCH
For live use - programs up/down/bypass

NO PROBLEMS, ONLY SOLUTIONS

From the studio to the gig. On the road or at home. The Vocalist Workstation is the hottest new vocal processor to come along since the invention of the microphone! The Vocalist Workstation is an easy to use vocal workstation at your fingertips. *And best of all, it's affordable!*

Imagine, 2 to 5 part vocal harmonies triggered by one input voice with built-in reverb dedicated specifically to your vocal. The sleek new notebook design makes live or studio operation a snap.

You'll find loads of presets for any type of music. The Vocalist Workstation has 50 Factory Presets or you can customize your own styles and save them into 50 User Presets and each preset can have up to 8 variations. You can produce great harmonies for any style of music.

Control your mix in real time with easy to use control panel faders. Utilize the Vocalist Workstation in live performance with the Digitech FS-300 footswitch. Apply Gender Bender™ to the harmony voices to make them sound like different people. Try the pitch correct feature to fix that one bad note in an otherwise great recorded take.

New, The Vocalist Workstation, another Vocal Solution from Digitech.

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this problem so you won't have to.

USER INTERFACE

Peak's user interface is similar to those found in other audio editors; if you've used another audio editor, you'll easily figure out how to use this one. Almost all commands are issued from the menu bar, which avoids the clutter of cryptic icons. There are keyboard shortcuts for several menu commands, which lets you move quickly once you learn your way around *Peak*.

The Audio Document window displays a mono or stereo waveform along with markers, loop markers, and region names (see **Fig. 1**). You can open and automatically stack or tile lots of Audio Document windows at the same time. The Transport window contains the usual Play, Stop, Record, and Rewind buttons, along with a Loop Playback button, a counter display, and a stereo level meter.

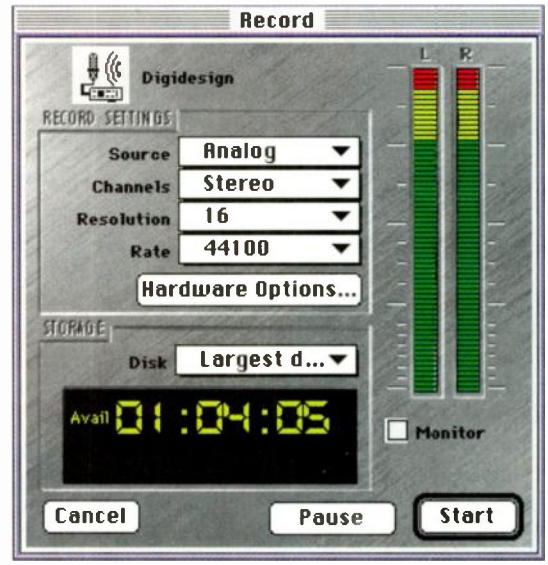


FIG. 2: The Record dialog lets you specify various parameters before recording.

Oddly, the meter usually crosses into the red even when the signal is at an acceptable level. In other words, there is no clipping indicator. As a result, recorded levels are a little low if you keep the signal out of the red. Normalizing the file pushes it up into the red on playback. The Transport counter displays the cursor position in samples or minutes:seconds:milliseconds.

You can zoom in on any point in the waveform, filling the screen with a fraction of a single cycle if necessary. You can also zoom out so the entire audio file fits in the Audio Document window. Not every audio editor has this command, but they should.

It's possible to customize the user interface somewhat by changing the Preferences. For example, units of time can be displayed in samples or seconds. In addition, you can select from several preset combinations of colors, called Themes, or you can specify individual colors of the background, waveform, markers, and loops.

You can also change the drawing speed, which determines how much processor time is devoted to background drawing. For example, if you have a slow processor, setting the drawing speed too fast may cause a delay before you can choose menu commands after changing the zoom level. In addition, you can specify whether the display scrolls during playback. A Show Edits command visually indicates the portions of a waveform that have been edited since the last Save command; edited sections are enclosed within thick, dotted lines, helping you keep track of your work.

Because editing is disk based, one or more disks must be specified as a "scratch" disk. This is the disk to which audio data is written as you record and edit. When that disk is full, the data will overflow to another scratch disk if one is available. If you're connected to a network, you can choose to "allow servers" as scratch disks. On the other hand, it's recommended that you disconnect from any networks to maximize performance. Unfortunately, setting the scratch disk didn't work as it should have. No matter how I set the preference, it always defaulted back to "use all available disks."

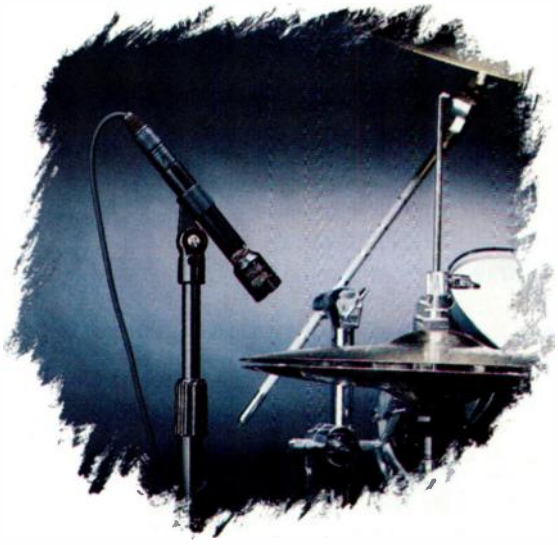
There are numerous ways of making selections by clicking and dragging, double-clicking, and Shift-clicking in combination with the Command and Option keys. Regions can be selected by using the Tab key alone to move from one region to the next. Unfortunately, there's no way to select only half of a stereo waveform.

MAKING YOUR MARK

Like most audio-editing programs, *Peak* lets you place markers at user-defined

If it can *Accurately* capture this,

Think what it could do for *These*.



Equally *Precise* in capturing warm,
orchestral nuances as it is in responding to crisp, fast transients,
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Their Wish was OUR COMMAND

The Eventide DSP4000 Ultra-Harmonizer® brand effects processor won this past year's TEC Award for signal processing. But when we asked the top professionals who inspired the DSP4000 what they wanted in version 2 software, they demanded even more:

Jude Cole
I DON'T KNOW WHY I ACT LIKE THIS
Produced by Kevin Killen

KEVIN KILLEN "Give me the power to do everything at once."

"Now I can strap together EQ, digital reverb, pitch correction, and a modulatable delay line with individual mix levels and pan positions in ONE preset! All with totally transparent audio quality so as not to degrade the tone I've worked so hard to achieve. Now THAT's power."

John Elefante
WINDOWS OF HEAVEN
Produced by John & Dino Elefante

JOHN & DINO ELEFANTE "We need really good digital compression modules"

"Best digital compressor we've heard yet - we left our own preset up in the machine after one of our sessions, then the people from TNN's "Live at the Ryman" TV series (featuring Pam Tillis, Rickie Scaggs and Reba McEntire) came in and said "Hey, this sounds great." They wouldn't let us take the DSP4000 out of the room!"

Nine Inch Nails
THE DOWNWARD SPIRAL
Produced by Flood and Trent Reznor

FLOOD "Can you make the patch editor more usable?"

"You did it! The NEW patch editor is finally really usable in a creative way — whatever I imagine in my head I can now create in the mix — the new distortion modules are fantastic."

Steve Vai
ALIEN LOVE SECRETS
Produced by Steve Vai

STEVE VAI "I want to go beyond 'effects.' I want it to sound 'real'."

"I've always wanted a pitch shift device that would simulate the differences in timing and tone of having two or three other guitarists in the room playing along. With the DSP4000's new software, I can have one voice slightly behind me, one right on top of me, a third drifting between the two, all with their own unique tone, and even distortion — very realistic simulation of multiple players."

Billy Joel
THE RIVER OF DREAMS
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positions within a displayed waveform. Defining markers makes it easier to locate significant points for editing or playback. For example, a marker might indicate the start of a verse in a song or the end of the vocal part within that verse. Markers can be inserted on the fly during playback or when playback is stopped.

Double-clicking a small triangle at the base of a marker summons an Edit Marker dialog. This lets you give the marker a name, change its position by typing in a numerical value, and specify whether it's a normal marker, a loop point, a reference point, or an anchored marker.

If it's a reference marker, selecting or dragging other markers displays their distance from the nearest reference marker. This is useful when you want an audio event to occur at a certain time after another event. An anchored marker is tied to its location in a waveform. Even if the waveform length changes by inserting or deleting material, the marker remains with the same audio material with which it was originally placed.

If a marker isn't anchored, it maintains its position relative to the beginning of the waveform. Markers are anchored by default, and a Region is any portion of a waveform that begins with a marker. Unfortunately, Sound Designer II-type regions are not supported.

RECORDING AND PLAYBACK

When you click the Record button in the Transport window, recording doesn't begin right away. Instead, a Record dialog box appears in which you set your recording source, destination hard disk, bit resolution, and other recording parameters before pressing the Start button (see Fig. 2). For some reason, the default resolution is 8-bit. The maximum record time, which depends on the amount of free disk space, is also displayed.

Recording begins when you press Start. You stop recording by clicking on the Done button, after which a dialog lets you save the file. The Audio Document window doesn't appear until you save. Then the Recording window reappears to record another take. I usually want to listen to what I have just recorded; I wish you could change the default operation so the Record window didn't automatically

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assume you want to immediately make another recording.

In addition, the Record dialog box is a little buggy. If you start recording and click the Pause button followed by the Done button, nothing happens until you click either Continue or Cancel. This may cause a problem if you start recording, click Pause, and then decide you like what you have and don't want to record anymore. Unless you click Continue and then Done, you may lose the recording. One other word of warning: if you click anywhere but in the Record window while it's displayed—even in the Transport window—*Peak* 1.10 unexpectedly quits with a type 1 error.

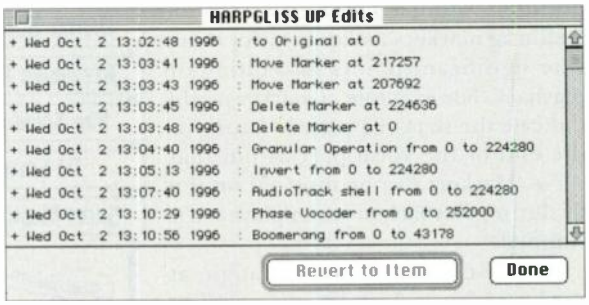

FIG. 3: The Edit List window compiles a list of edits you have performed since you last saved the file.

Peak's playback options are extensive. For example, the playback buffer can be set from 32 KB to 256 KB. Playback can be set to start from the beginning of the file or the insertion point when you press the Spacebar or click the Play button. You can also play from the insertion point by pressing Command-Spacebar or by simply double-clicking anywhere in the Audio Document window. Press Option-Spacebar to play only the selected segment. If several files are open at the same time, you can play them in any order by typing numbers that correspond to the order in which they were opened. For example, type 1, then 4, then 2 to play the first, fourth, and second files you opened, in that order.

Auditioning lets you specify the amount of preroll and postroll during playback. According to a mistake in the manual, you can click and drag to make a selection and then press Control-Spacebar to play it with pre- and postroll. When I did that, the program played from the previously defined default point (beginning or insertion point). I heard preroll beginning at the insertion point when I pressed Command-Spacebar, not Control Spacebar, but there still was not any postroll.

There are three ways to scrub audio with the mouse button. Dynamic scrubbing lets you specify a length of time from 10 to 600 milliseconds. When you hold the Control key and click on the waveform display, a loop of the specified length repeats continuously until you let go, allowing you to zero in on a specific event.

If you set the Dynamic Scrub Time to Tape-Style, you can play the file backward or forward from the insertion point at a rate controlled by how far you drag the cursor to the right or left. This is not really like scrubbing tape, but it's useful nonetheless. There's also jog scrubbing, which is sort of a combination of dynamic and tape-style scrubbing.

EDITING FEATURES

Peak offers several editing innovations, which can be extended with *Premiere*-compatible plug-ins. Editing sessions are sure to make frequent use of the program's unlimited undo capability. The most recent edit is shown in the Edit menu along with the Undo command. Likewise, the Redo command changes to the last item that was undone.

If you perform a number of edits, you can undo them back to any point in time, as long as they occurred after the last time you saved. Using Redo, you can reclaim edits that were undone, allowing you to compare your file before and after a series of edits. Multiple levels of undo and redo have long been a feature of several high-end graphics programs. I'm very glad to see this useful capability implemented in audio software.

But wait, there's more! As you make edits, they're saved in a list (see **Fig. 3**). The Edits list includes each edit operation in succession, the time it occurred, and the portion of the file it affected. You can click on any item in the list and select Revert to Item to return to the state before subsequent edits were made.

If you change your mind, you can either use the Redo command to reclaim

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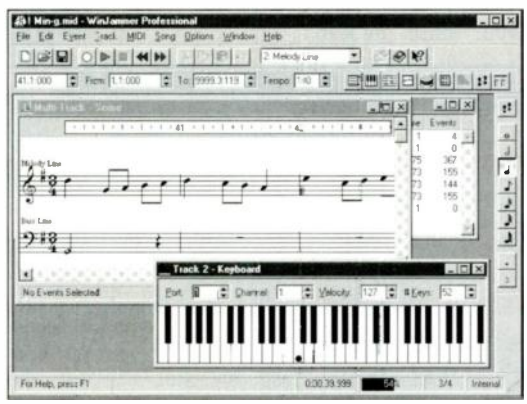

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the edits you eliminated one at a time, or you can open the Edits window again to revert to any edit in the list. However, if you make any new edits in the meantime, you lose the ability to redo anything that came between the edit to which you reverted and the most recent edit. The Edits list is an intuitive means of implementing multiple undos, and I hope other programs adopt this method. When you save your work, the Edits list is wiped clean.

Even simple edits like cut and paste exhibit a new twist when Blending is enabled. Blending creates a crossfade at splice points that lasts for a user-defined length of time. The intention here is to prevent abrupt changes when material is deleted or moved from one location to another. Blending is turned on and off with a small icon (the only cryptic icon in *Peak*) in the lower left corner of the Audio Document window. In addition, the Blending Envelope can be edited to determine the shape of the crossfade.

Exporting Regions is a very useful feature. I used it on a voiceover project in which I had to extract individual phrases from a single sound file into separate files to import into Macromedia *Director*. The first step was to place and name markers at the beginning

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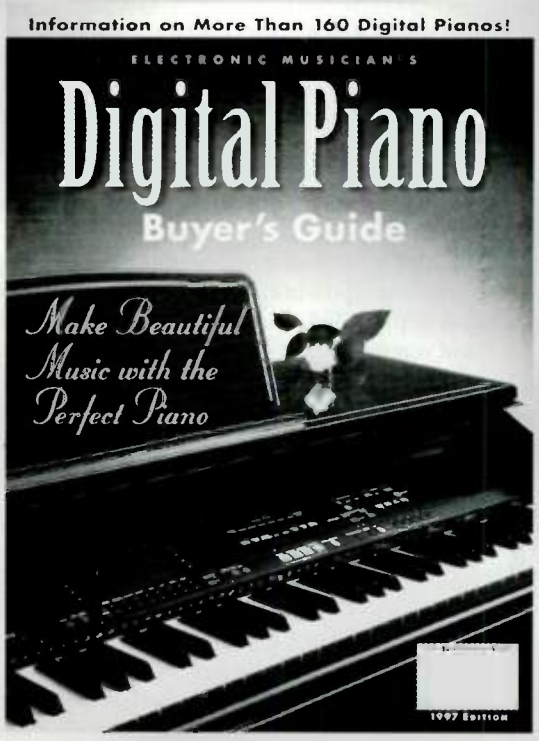

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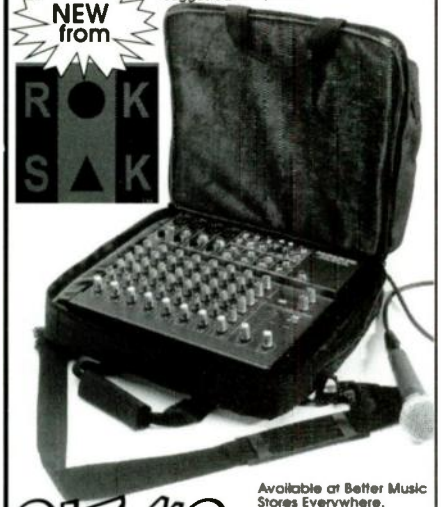

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and end of each phrase. The Export Regions dialog box lets you select only Regions with names that do or don't contain user-specified text, so I could include only Regions with the word "Start" in their names and exclude Regions with the word "End." You can also specify the file path, bit resolution, and sample rate of the extracted files. When you save the resulting file, you can specify its file format.

Version 1.10 of *Peak* features seventeen different editing commands in the DSP submenu, ranging from simple to complex. The simple ones need no explanation, including Fade In, Fade Out, Normalize, Reverse, and Sample Rate Conversion. Others, such as Phase Vocoder, are a little more obscure. Phase Vocoder sounds exotic, but it's just the name of the resynthesis algorithm used for pitch shifting and time compression/expansion (see **Fig. 4**). This lets you change a selection's pitch and length independently. Change Duration can also change length without changing pitch and includes some advanced tempo options.

A Repair Clicks function lets you find and remove clicks from noisy audio material, such as a scratchy LP. This function works a lot like Find and Replace in a word processor. Unfortunately, my computer froze up while using Repair Clicks.

An amplitude envelope can be applied to any of the selections with either Amplitude Fit or Gain Envelope. Amplitude Fit normalizes all parts of a waveform within an envelope's contour, and Gain Envelope lets you apply an envelope with both amplification and attenuation. To find the portion of a waveform with the greatest amplitude, you just issue the Find Peak command. The Threshold command automatically inserts markers based on changes in amplitude level.

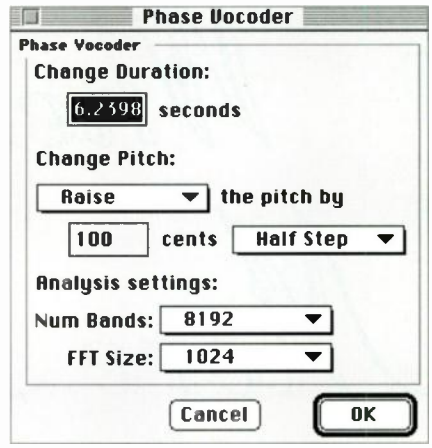

FIG. 4: The Phase Vocoder is one way to change the pitch or duration of a waveform.

EFFECTS

For years, I've been saying that digital effects processing is reaching the point where the biggest constraint on developing new effects is conceptualizing them. BIAS has come up with a few new ideas. Probably the best of these is called Convolution. To use Convolution, copy a sound to the Clipboard, select another sound, and choose Convolve from the Clipboard submenu. This combines the spectral characteristics of the sounds. Sometimes the results are predictable, and sometimes they are a complete surprise.

Convolution is related to but different from ring modulation, which can be applied with the Modulate command to create harmonically complex, metallic textures. Rappify is a type of resonant, dynamic filtering that reduces a waveform to its basic rhythmic elements. Reverse Boomerang turns a waveform backward and mixes it with the original. The result has interesting rhythmic possibilities and sometimes sounds like turning a sound inside out.

There are no delay or reverb effects, so you will have to rely on plug-ins to provide these processing functions. Fortunately, a good selection of *Premiere*-compatible audio effects plug-ins can be found. To get you started, a number of InVision and Waves demo plug-ins are included with *Peak*. These provide reverb, compression, flanging, equalization, tremolo, delay effects, and more.

When you apply an effect from the Premiere Plug-Ins submenu, you can hear a preview of any length (depending on RAM) before you finalize the change. A Premiere Envelope dialog lets you control the onset of the plug-in effect.

IN THE LOOP

Like other audio editors, *Peak* allows you to loop any portion of an audio file. There can be only one loop per file, and it can't be less than 256 samples long. The easiest way to create a loop is to select a portion of the waveform and choose Loop This Selection from the Actions menu. To hear the loop, press the Loop button in the

Transport window, select Use Loop in Playback from the Preferences menu, or just type Command-L.

You can adjust the loop points while the file is playing, which lets you fine-tune them by ear; every audio editor should do this. If you hold down the Option key while dragging one loop marker, both loop markers move together. The start and end points of the loop are crossfaded if Blending is enabled, and you can also crossfade the loop points by selecting Crossfade Loop from the Actions menu.

Another means of creating a loop is called Loop Surfing. When you turn

▼

If you've used another editor, you'll easily figure this one out.

on Loop Surfing, a dialog box appears that lets you type in the tempo and the number of beats you want in the loop. *Peak* automatically creates a loop of the specified length, beginning at the insertion point or the beginning of a selection. There's nothing to ensure that the loop points match up to make a seamless loop, so you'll probably have to tweak it manually.

In fact, there's no Loop window at all. Most sound editors provide a window that zooms in on the loop start and end points, displaying them side by side so you can match their instantaneous amplitudes. If the start point is above zero and the end point is below it, you hear a click unless there's some serious crossfading. A Loop window would let you align these points. *SoundEdit 16* comes with a Loop Tuner plug-in, so I hope someone creates or has created a similar plug-in that works with *Peak*.

SAMPLER SUPPORT

Peak communicates with Ensoniq samplers via either MIDI or a dedicated SCSI driver, and the program's Ensoniq sampler support is the best I've seen. BIAS's Steve Berkley used to work for Ensoniq, so he has an intimate knowledge of Ensoniq operating systems. When *Peak* requests information

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January 1997

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FIG. 5: Instruments within an Ensoniq sampler are listed in a hierarchical order. The keyboard at the bottom of the window indicates the root note and key range of the selected sample.

from the sampler, the Ensoniq Sampler dialog box shows instruments in a hierarchical menu with layers and wavesamples (see **Fig. 5**). When you click on a wavesample in the list, *Peak* displays its name, size, and panning information. In addition, the root key and key range are shown on a little graphic keyboard.

Wavesamples can be transferred from the sampler to the computer by selecting them and choosing Receive Sample from the List menu in the Ensoniq Sampler dialog box. Transfer doesn't start until you click the Begin button, so it's possible to select multiple sounds by Shift-clicking to batch-transfer them one after another. Changing the key range or panning of a wavesample is just a matter of pointing and clicking. You can also rename instruments and create new layers.

Peak can exchange samples via SCSI with samplers that support the SCSI Musical Data Interchange protocol (SMDI), including the Peavey SP, Kurzweil K2000/K2500, and E-mu e-64, ESI-32, and EIV. However, although SMDI allows you to transfer the basic samples and keymaps between a computer and a sampler, it cannot transfer sampler-specific parameters. To do that, you would need specific SCSI drivers for each sampler. Although *Peak* has such drivers for Ensoniq samplers, it does not provide similar support for other samplers. Roland and Akai sampler owners are out in the cold because their machines don't support the SMDI protocol, either.

Samples can be transferred to and from your sampler via SMDI by typing in the sample number and clicking on the Send or Receive buttons. In addition, Plus and Minus buttons scroll through samples in the sampler. A Get Info button requests the sample's name, rate, size, bit resolution, loop points, and whether it's stereo or mono.

This is one advantage that Passport's *Alchemy* retains over *Peak; Alchemy* directly supports virtually all of the more popular samplers via SCSI. I also wish *Peak* supported the MIDI Sample Dump Standard, but this is a good start.

To transfer sounds between *Peak* and a sampler, Opcode's OMS system extension must be running on your computer. Because I use Mark of the Unicorn's *Performer* sequencer, I use FreeMIDI instead of OMS. FreeMIDI includes an OMS emulator for software that requires OMS, but it didn't work with *Peak*. The samplers showed up in the pop-up menu, but I received errors whenever I tried a transfer. Once I turned off FreeMIDI and installed and configured OMS, I could select a sampler and successfully exchange sounds.

DOCUMENTATION AND GOODIES

The User's Guide is well written and comprehensive, and it does a good job of explaining most concepts. In addition to the manual, there's a supplementary guide to the Accessory Paks (which are extensions beyond the basic functions), a Read Me file that details every upgraded feature in every version of *Peak*, and an application called *Peak 1.10 Guide* that describes the latest features not covered in the printed documentation.

There are Help files on twenty subjects, ranging from configuring sound to using plug-ins. Pop-up Balloon Help presently works with only about half the menu items. If that's not enough, BIAS' Web site is an excellent source of information, upgrades, companion software, and links to related sites.

In addition to the demo plug-ins, a few other goodies can be found on the installation disks. One of these is *Audio Stamper*, a drag-and-drop application that enters text into an audio file's Get Info box in the Finder, including its file type, sample rate, duration, and so on. *Peak* also supports Apple Events, making it possible to automate various tasks and play sounds from within other applications; two *FileMaker Pro* templates are included to illustrate this capability. Finally, a handful of sound files are thrown in for good measure. If you log on to BIAS' Web site, you'll find a *HyperCard*-based audio database and the tools to develop audio plug-ins.

CONCLUSIONS

Peak fills an important niche in the electronic musician's suite of software tools, especially if you use one of the supported samplers. As more samplers are added (e.g., Akai, Roland, etc.), I'm sure its user base will grow.

This program has a lot going for it: unlimited undo/redo, audio CD sampling, plug-in extendibility, audible loop editing, unlimited markers, audio scrubbing—it's an impressive feature list. If I could change anything about the user interface, there would be more menus on the menu bar and fewer submenus. DSP and Premiere Plug-Ins, for example, should be menus unto themselves rather than branching from the Actions menu. A clipping indicator would be even more important.

I'd love to say that *Peak* is bug-free, but it isn't. Its problems aren't serious, though. I've used four different revisions, and they all have annoying little quirks that make them difficult to work with at times. Of course, it's possible that the specific bugs mentioned here will be gone by the time you read this.

Peak is well conceived, and I'm sure it will someday be the audio editor for the rest of us. But in the meantime, users must put up with the occasional unexpected system error. Still, it's a useful program, and there's nothing else quite like it. With only slight reservations, I recommend it highly, especially if you own one of the supported samplers.

Geary Yelton *is trying to spend fewer than 72 hours a week in front of a computer, leaving more time for hiking in the mountains and kayaking with his daughter Marisa.*

Opcode Vision 2.5 (Win)

By Dennis Miller

The leading Mac sequencer goes cross-platform.

Of the long-standing Macintosh programs that are now finding their way to the PC, none has been more eagerly anticipated than Opcode's best-selling sequencer, *Vision*. In its initial Windows release (version 1.4), *Vision* had little impact. But the new, mostly Windows-compliant version 2.5 has become a serious player with much to offer.

Opcode's 99-track, professional sequencer boasts powerful real-time capabilities and a multilevel architecture in which entire multitrack sequences can be nested within other sequences. The program can be extensively customized, and its editing features are fairly comprehensive. *Vision* requires Opcode's OMS (Open Music System; included) system extension, which keeps compatible software informed about the equipment in your studio.

The program lists for $299, putting it in the upper-mid category for sequencers of its type. Yet the program has several shortcomings that could be significant, depending on the type of work you do. For example, it only has simple, entry-level notation functions, and it fails to support a number of standard Windows interface features. In addition, there's no support for audio. This is particularly ironic because Opcode is the recognized leader in audio and MIDI integration on the Macintosh. Its best-selling *Studio Vision Pro* set the standard, and *Vision* 3.0 for Mac supports digital audio using Sound Manager on the Power Macintosh.

As a MIDI-only sequencer, *Vision* doesn't place huge demands on your system. It operates under Windows 3.1 or Windows 95. An 80486/66 PC should provide acceptable performance, but the manufacturer recommends at least a Pentium 75 with 12 MB of RAM.

OMS

Having proven itself on the Macintosh, OMS has now moved to the PC. This system extension acts like an information clearing house for all the equipment in your studio, telling compatible MIDI software what gear you have installed, which interface port and MIDI channel everything is on, and what patches are available in each piece of equipment.

This approach lets you work intuitively; you never have to worry about channels and ports, and you can call up device programs by name, only dealing with Program Change numbers when you wish to. When you add or delete MIDI gear, you simply update your OMS Setup, and all OMS-compatible MIDI software will automatically address the revised system.

However, *Vision* is currently the only Windows program that works with OMS. Opcode has not ported its OMS-compatible *Galaxy* universal patch librarian or *MAX* MIDI programming environment to Windows (at least, not yet), and there are no indications that other PC-software developers intend to support OMS. Therefore, OMS is obviously far less useful on the PC than on the Mac, where part of its purpose is to provide central timing services for MIDI software and route MIDI data between compatible programs from several vendors.

A while back, Opcode and Microsoft announced that they intended to integrate Open Music System into future versions of Windows. However, Microsoft has not made a definite, public commitment to this plan, and there is no word on when, or even whether, it will really happen.

TRACK OVERVIEW

Vision's main screen resembles many Windows sequencers, offering a Track Selection area for viewing and editing track parameters and a Track Overview for working with MIDI data (see **Fig. 1**). Across the top of the screen are a series of menu options, most of which can be accessed by keyboard shortcuts.

Rather than limit you to a single view of your data, Opcode's *Vision* lets you represent your music three different ways in the Track Overview. One alternative is to view chunks of data as Phrases, which are continuous horizontal bars. You tell *Vision* how to break the data into Phrases by specifying the amount of silence that must exist before a new Phrase is created, which helps make editing data a more intuitive process. This Silence Threshold can range from an eighth note to sixteen measures long.

If you prefer, you can view the data as Blocks of a user-selectable, fixed length, such as four beats or eight measures. The final option shows the entire track as one continuous segment.

With any of these choices, *Vision* displays a representation of the actual data in the track, letting you see exactly

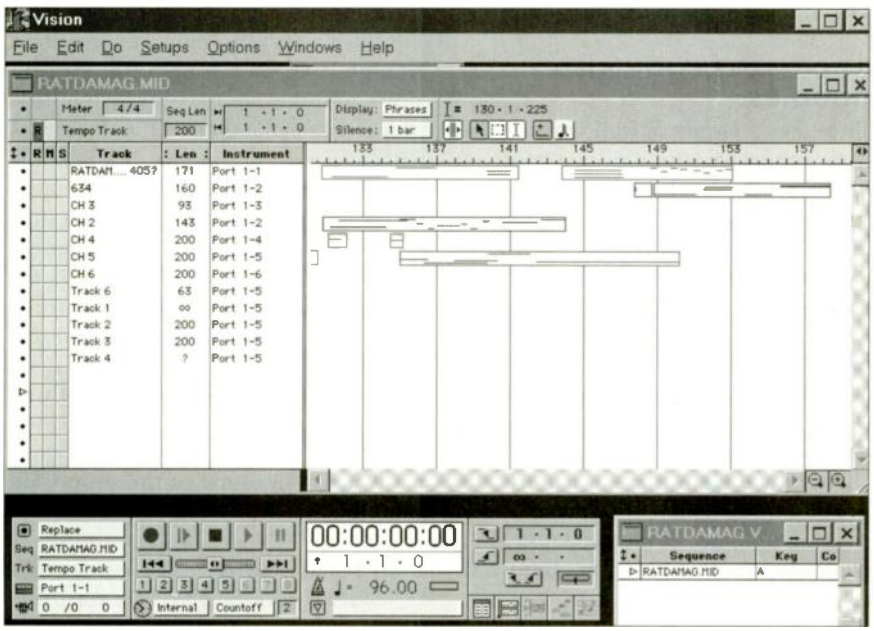

FIG. 1: *Vision*'s main Track Overview displays track parameters on the left and MIDI data on the right.

where a controller curve peaks or where the last note in a Phrase is. The program also offers the most zoom options I've ever seen, ranging from just over a single beat to 999 measures—the program's maximum track length—on a single screen.

You'll also see the Control Bar at startup. This movable window contains tape-transport controls, icons for moving directly to the main work areas, eight locator buttons, and icons for selecting the current track and patch.

Unfortunately, although this all-important window cannot be closed, it disappears into the background when you open any of the work screens. An "always on top" option would be especially handy to keep the Control Bar around at all times. And while you can Control-Alt-click on any screen and get a list of all open windows, it would be useful if *Vision* offered the standard Windows Tile and Cascade All Open Windows options.

MIDIKeys

MIDI Event	Device	Chan	Function
General	Port 1	1	MIDI Shift
Mod Wheel	Port 1	1	Erase
D3	Port 1	2	Repeat
E4	Port 1	2	Extend
C4	Port 1	1	ctrl- c
E4	Port 1	1	ctrl- r
G4	Port 1	1	ctrlshift- q
	Port 1	2	ctrlshift- a
Ext FX Depth	Port 1	3	tab
Chorus Depth	Port 1	3	q
Foot Ctl	Port 1	3	pgup
(Control 72)	Port 1	3	[+]
C4	Port 1	4	ctrl alt - a
E4	Port 1	4	ctrlshift- s
F4	Port 1	4	ctrlshift- a
G4	Port 1	4	ctrlshift- c
A4	Port 1	4	ctrl- z
C4	Port 1	8	esc

FIG. 2: The MIDIKeys window lets you control *Vision* from a remote MIDI keyboard by assigning MIDI messages to trigger various functions.

OTHER WORK AREAS

Vision's other main work areas are the Graphic window, where you'll find the familiar piano-roll view; a List window for viewing your data as text in an event list; and a Notation window that can display an unlimited number of tracks. You can have more than one sequence open at a time; all open sequences are

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listed in the Sequence window.

Vision includes several virtual mixers that provide up to 224 programmable faders. These faders can send any MIDI continuous controller message except Pitch Bend and Aftertouch to any attached device on any channel. You can control the faders with the mouse or an external MIDI controller, and fader moves are recorded into the current sequence. You can even group faders so that several faders are controlled from the same external MIDI device. (This lets you simultaneously send multiple MIDI messages using one external control device.)

There are 32 faders in the Faders window, but you can also use up to four Console windows to increase the number of available faders. Each Console window contains 24 tracks, and each track has two programmable faders (which default to Pan and Volume). If you use all four Console windows, you have 192 faders in addition to 32 in the main Faders window.

The Instruments window lets you name tracks (which you can also do in the main screen). Another interesting feature is the Input Map. Instrument input mapping provides a lot of flexibility by allowing you to use multiple MIDI controllers, record from another sequencer, and split the output of your MIDI controller. For example, this lets

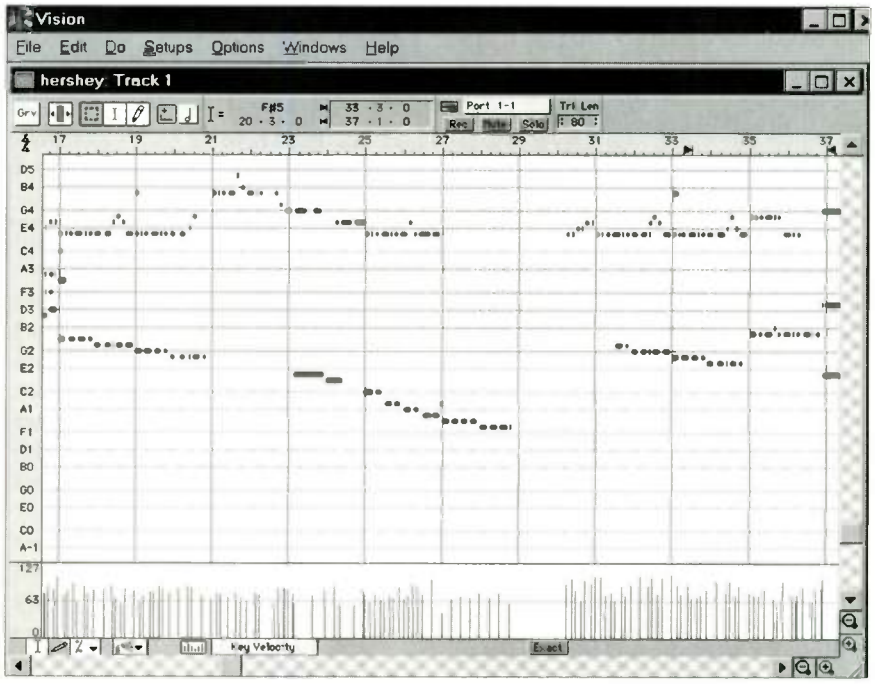

FIG. 3: Many types of MIDI data can be entered or edited in the Strip Chart.

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In general, I like *Vision*'s interface but with some reservations. For instance, similar functions are sometimes spread among too many different areas. There are several places where you can alter track data while it plays back without making a permanent change. You preview track quantizing from the main Track screen, but previewing a Velocity change or key change is done in the MIDI Instruments window. I prefer the approach of *Cubase* or *Cakewalk*, where all of the preview functions are available from a single window.

RECORDING

Like most sequencers, *Vision* supports real-time and step-time recording. The recording options include punch in and out as well as overdub and replace, but there's no way to insert data as you can in Steinberg's *Cubase*. Most recording options are easily accessible via keyboard shortcuts or a pop-up menu on the Control bar, and you can also initiate recording from a remote MIDI keyboard.

Although you can record multiple MIDI channels into a single track, you cannot record directly into multiple tracks at once or change tracks while recording, except in Loop mode. Fortunately, you can easily break a multichannel track into multiple tracks with a single command.

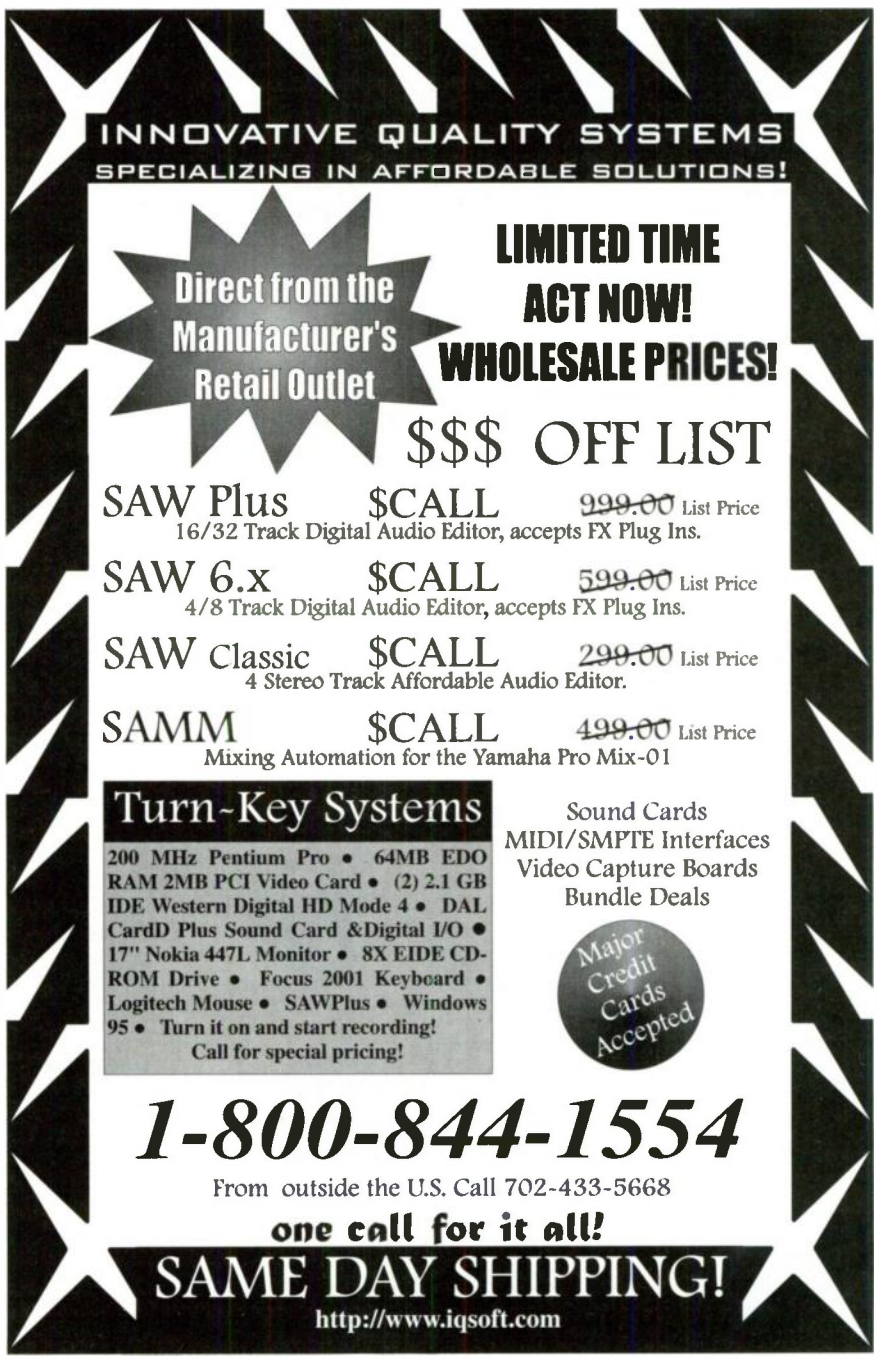
Vision offers several loop-recording options that make building drum patterns or other layered textures especially easy. You simply set the in and out point on the Control bar, toggle the Loop switch, and then select Overdub mode (the logical choice for this type of operation). The program records to the end of the loop range, returns to the beginning of the range, and continues to record as you add layers.

The handy MIDIKeys feature can be used with loop recording to create elaborate patterns of repeated notes directly from your keyboard controller. If you enable loop recording and then open the MIDIKeys window, you'll find a screen that allows you to control *Vision*'s functions using MIDI notes or controllers (see **Fig. 2**). There are four preexisting MIDIKeys with preset functions, and you can create an unlimited number of your own.

One preset MIDIKey, called Repeat, lets you fill an area with a repeating note whose duration you have set in the Quantize Input window. If you assign a MIDI Note On message to trigger the Repeat function, the program generates a continuous stream of whatever note you play for as long as you hold the key down. The repeat rate is programmable, and you can change the quantization setting while recording. Make sure to use the Enter key on the numeric keypad to enter values, rather than the Return key, which is mapped to the Stop command.

The step-recording options offer the usual fare and let you set the size, duration, and Velocity of every note. You can also enter chords by holding down the sustain pedal on your keyboard. Note Velocity can remain fixed or reflect the actual Velocity of each note you play.

A similar option lets you determine whether a note's duration is fixed, a percentage of the step size you've indicated, or the length of the note you play. You can also leave a fixed-length gap between attack points, which means



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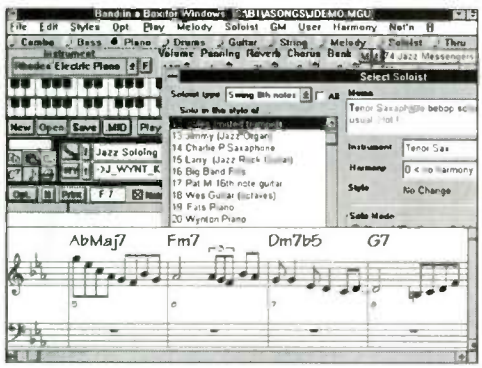

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that each note's duration is the step size minus the amount of gap you specify. Using the numeric keypad, you can change step sizes while you're recording. While working in Step mode, you can insert a Program Change from a Control Bar pop-up window or directly from your keyboard.

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↕	Sequence	Key	Comments
•	BASS RIFF	A	USE WITH K2000 PATCH 6
•	1ST LEAD LINE	B	A/D RAM3, 7
•	2ND LEAD ATTEMPT	C	K2K, 304
•	POLYMETRIC DRUMS	D	K2K 406
•	7/8 STUFF	E	K2K 719
•	ASYMMETRIC PHRASE	F	A/D RAM 2, 6
•	BETTER FAKE BASS	G	K2K, 441
•	NEW DRUMS	H	TRY K2K 044
•	NICE CHANT	I	1/D ROM 2/6 OR K2K 781
•	BETTER LEAD	J	HALL HORNS?
•	HARMONY	K	CLAV
•	LESS TONAL STUFF	L	K2K, 336
•	MODAL THING	M	K2K, 498
•	MORE PERCUSSION	N	A/D RAM 2, 6
▷	TOP LAYER	O	K2K, 565

FIG. 4: The Sequences window displays all open sequences and assigns a letter that is used to trigger each sequence.

STRIP TEASE

One of *Vision*'s most powerful editing features is its Strip Chart. This area at the bottom of the Graphic and Notation windows is used to enter and edit many types of control data (see **Fig. 3**). Move the mouse to the bottom of the screen, click on the Name box, and a drop-down list of various types of MIDI events appears. If you select Controllers, for example, another window lets you choose which controller you want. Then, using any of the entry tools, you draw controller data in broad sweeps or with fine detail.

These entry tools include a straight-line tool, a parabola tool that offers both inward and outward arcs, and a random tool, which is useful for "humanizing" data by large or small amounts. You can also draw freehand curves, and you can limit the range of existing data or scale it up or down.

The Strip Chart is also used for entering Velocity, Tempo, and Program Changes. However, I was annoyed to discover that once you enter a Program Change, you can't simply drag it to a new location. Instead, you must delete it and reenter it at the new spot.

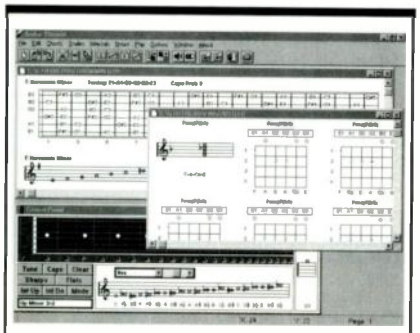
NATURAL SELECTION

It's easy to perform edits on multiple tracks or any number of random phrases at once. Simply highlight all the segments you wish to edit, and then activate the function you need. *Vision* offers a huge range of selection options, including the ability to select events based on very precise criteria. You can use various conditional statements to, say, define a range of notes between C-2 and C-4 with Velocity values not between 60 and 70 and durations between two and four beats. Or you can specify a range by metrical placement, such as all of the notes that fall between ten ticks before a beat and eleven ticks after it.

Even more unusual is the ability to select notes based on their position in a chord, such as the highest two notes of all chords within a range or all notes within one octave above the highest note in all chords. These functions greatly enhance the program's flexibility and are more intuitive than the event filters some programs use to set conditions for selection.

Once you've defined a selection, you can activate *Vision*'s many editing functions. In addition to the familiar Quantize (grid or groove), Scale Time, and Reverse options, there's a handy Transpose feature that allows you to map any note to any other, map one scale to another, or "expand" a group of notes. For example, you can transpose a C major scale spanning one octave into an 8-note pattern spanning two octaves. To perform the expansion, *Vision* simply increases the distance between each pair of notes. The opposite effect—"collapsing" all of the notes to fit into a smaller range or even a single pitch—is also possible. In addition, you can name and store your favorite mappings.

Another powerful editing feature is the Reclocking function. This command lets you align a freely recorded passage to a more regular meter while inserting tempo changes to retain the feel of the original. For example, I often record improvisations without paying strict attention to the metronome. The improv might begin a little after the downbeat or might wander off the beat early on. Using Reclock, you can force the music to line up with a steady click track or tapped tempo, which makes viewing and editing the data much easier.



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PLAYBACK

Vision offers many playback options, including a number of real-time tricks you won't find elsewhere. Controls in the Control Bar let you play from the beginning of the sequence or the current cursor location, and a Shuttle Bar scrubs forward or backward through a sequence at a variable rate. You can also scrub an individual track from its Graphic window, and you can scrub all unmuted tracks in the Track Overview window.

You can loop tracks individually—the start point must be at the beginning of the sequence, but the end point can be anywhere—and you can loop any portion of an entire sequence by setting in and out points in the Control Bar. Like many other functions, Loop Play can be toggled on and off from a remote MIDI keyboard.

Among my favorite features are the ability to set tempo with a MIDI controller or from an external keyboard and the Play Selection option, which lets you highlight any range of notes in one or more tracks and listen to just that range. Also unique are *Vision*'s four real-time modes, which include the ability to transpose an entire sequence simply by playing a note on your MIDI controller. The interval of transposition is defined by the relationship of the note you play to middle C. Using Trigger mode, you can hear both the

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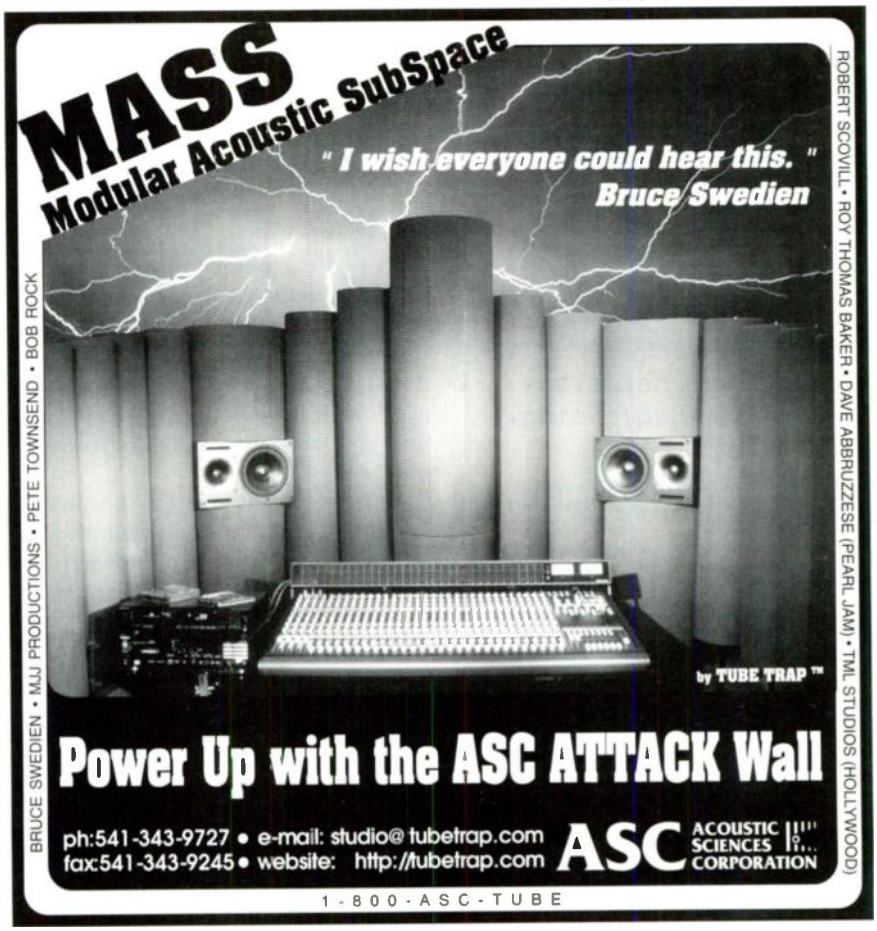

	Playing	Queue
1	MORE DRUMS	BEST LEAD, OTHER LEAD, NEW RHYTHMS, GREAT DRUMS, MORE DRUMS
2	GREAT DRUMS	MORE DRUMS, BEST LEAD, OTHER LEAD, TONAL STUFF
3	NEW RHYTHMS	GREAT DRUMS, MORE POLYMODAL, GOOD CHANT, TONAL STUFF
4	GREAT DRUMS	MORE DRUMS, GOOD CHANT, GOOD ADDS, MORE POLYMODAL, BEST LEAD
5	NEW RHYTHMS	MORE DRUMS, GREAT DRUMS, NEW RHYTHMS, TONAL STUFF
6	MORE POLYMODAL	BEST LEAD, OTHER LEAD, MORE DRUMS, GREAT DRUMS, NEW RHYTHMS
7	MORE POLYMODAL	OTHER LEAD, GOOD ADDS, BEST LEAD, GOOD CHANT, MORE POLYMODAL, NEW RHYTHMS
8	GREAT DRUMS	NEW RHYTHMS, MORE DRUMS, BEST LEAD, OTHER LEAD, MORE POLYMODAL, TONAL STUF
9	NEW RHYTHMS	TONAL STUFF, GOOD CHANT, MORE POLYMODAL, TONAL STUFF, NEW RHYTHMS, MORE P

FIG. 5: A Player can play one sequence at a time. Up to nine Players can be used at once, allowing you to simultaneously play multiple sequences.

original and transposed version of your sequence, giving you, in effect, a poor man's harmony processor.

Vision offers an enormously powerful feature called Subsequences, which, although it bears some resemblance to *Cubase*'s Grouped Parts, is unlike anything I've ever seen. This feature is important because it lets you embed entire multitrack sequences with varying tempos and meters into "parent" sequences. In addition, you retain extensive, independent control over the data even after it has been embedded.

Subsequences can be created in several ways. For example, say you have a section of an existing sequence, such as a range of sixteen measures across four tracks, that you want to convert into a Subsequence. Simply highlight the section and choose Make Subsequence from the Edit menu, and the entire section is placed as a distinct event within the first track of the parent sequence. You can then edit the Subsequence if you want to.

Another approach provides even more control over your material. Highlight and cut the entire range of measures and tracks you want, and then create a new sequence using the New Sequence command in the Sequences window. A new Track window appears, and you can paste the data into the new sequence.

Along with the new Track window, you'll also find a new entry in the Sequences window list that reveals all open sequences (see **Fig. 4**). Each one of the open sequences listed in the window is assigned to a letter key on the QWERTY keyboard. To play any open sequence, you simply press the appropriate letter key. (You can also trigger playback using different MIDI notes.) This lets you quickly try out different arrangements of your material.

Once you've determined how you want your music arranged, you build the finished composition by making the various sequences into Subsequences and incorporating them into your final, top-level arrangement.

You can also start an entirely new composition by creating a sequence for each major portion of the piece. For example, one sequence might contain a looping bass groove, another some keyboards riffs, and so on. You can then create the final arrangement by "playing" the keystrokes assigned to each sequence. Triggering sequences in this way is also useful in live performance.

Normally, if you have more than one instance of a Subsequence in a file, changes made to one also appear in the others. But by using the Clone Subsequence command, you can make independent copies of a Subsequence that won't reflect changes made in the original.

In addition to simply stringing all your Subsequences together, you can put them on separate tracks and layer them. If the Subsequences have different tempos, you can keep those tempos intact or make them conform to the top level's tempo. I created intricate percussive textures by building a multilayered sequence whose Subsequences moved at slightly different speeds. I also used the tempo track of each Subsequence to make it slow down and speed up independently. The effect was fantastic.

PLAYERS

The Players function offers yet another way to play multiple Subsequences simultaneously. Each Player acts like a separate sequencer that can play one Subsequence at a time, and you can define up to nine Players. Each Player can have up to sixteen different Subsequences queued and ready to play in a user-defined order (see **Fig. 5**).

To assign Subsequences to a Player, you click on the line for that Player and type in the keystrokes that trigger

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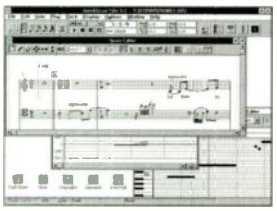

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the Subsequences you want. You can arrange the Subsequences in any order you like, and you can trigger the same one more than once. As you record data, all the Players play simultaneously and proceed through their queues, and you can continue to add events during playback.

Typically, a Player starts to play each Subsequence as soon as you enter its keystroke, but you can also set a Subsequence to wait until the next beat comes around before beginning playback. Unfortunately, there is no way to build an entire playlist of Subsequences for multiple Players before playback starts. It would be great if you could stop or pause the Players function, add entries to each Player, and then start them all when ready. In addition, there's no way to save a Players setup to disk, although you can capture the Players' output data to a new sequence in real time.

MANUAL AND HELP

Opcode's manual has the annoying habit of making you shuffle all over the place to get the whole story on certain features. For example, on p. 24 in the chapter on recording, the manual tells you to "set your metronome to the desired tempo," but it doesn't tell you how to do so. Instead, it says "see p. 297" for more information on the metronome. It also suggests that you might want to "set the countoff" before recording, but to learn how, you must flip over to p. 145.

This bad habit appears repeatedly throughout the manual, which means that you must often flip dozens of pages to get the complete picture on basic functions. This wouldn't be such a problem if the online help was indexed. Although *Vision* offers thorough, context-sensitive help, there's no searchable index of features. It would be great if you could search online for a topic such as "tracks" or "loops" and get a complete description of the operation.

LOOK AND FEEL

Opcode has done a good but not great job of supporting the Windows look and feel. *Vision* is missing some important interface options, such as the ability to auto-arrange all windows and support for long file names. Some of the basic display options are also a bit unusual. For example, pressing the

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• VISION 2.5

Maximize icon at the upper right side of a window enlarges the window but not to the extent that the window fills the entire screen, as it should. In addition, the dialog boxes do not look like traditional Windows dialogs; their text and overall appearance seem to have come from another era, or more likely, another computer platform!

Also, at least one of the Help screens tells the user to "type a key combination on the Macintosh keyboard" to enable a certain feature, and several references to Macintosh keystrokes appear in the manual. Somebody apparently fell asleep when editing the Help files.

None of these goofs affect performance, of course, but they are disconcerting to a Windows user. Macintosh users are justifiably outraged when Windows programs (such as Microsoft's *Word* 6.0) are ported to the Mac without being altered to completely meet the Mac interface specifications. Similarly, if you are going to port Mac software to Windows, it's a mistake to omit the finishing touches that make PC users feel at home.

SUMMARY

Vision has most of the high-end sequencing features professionals need, and it's intuitive enough for the beginner. Its many selection and editing functions are great, and you'll simply have to try the Players option to believe how useful (and fun!) it is.

However, the lack of support for sound-card audio is a serious shortcoming in today's pro market. In addition, the notation functions are pretty basic; if you want full-featured scoring abilities, you'll need to move to a more expensive program, such as Steinberg's *Cubase Score* or Emagic's *Logic Audio*. In addition, long-time Windows users, especially those who are fully migrated to Win 95, may not be completely comfortable with some of the nonstandard interface elements.

If integrated audio and notation are important to you, then you'll have to look elsewhere or wait for a major upgrade of the program. On the other hand, if you only need MIDI, take a close look at *Vision*. You may find that its unique strengths are perfect for your needs.

Dennis Miller *is a composer living in the suburbs of Boston.*

INA-GRM GRM Tools 1.51 (Mac)

By Peter Freeman

If you can't create unique effects with this program, it's your fault.

From a musician's perspective, one of the most exciting results of the ever-accelerating development of computer technology is its impact on real-time signal processing.

One of the latest and greatest signal-processing programs is INA-GRM's *GRM Tools*, which offers a variety of musically useful and often unusual effects algorithms for Macintosh users with Digidesign audio hardware. The software is available in two flavors: the *GRM Tools* 1.5 stand-alone application reviewed here and an even better TDM plug-in version that incorporates the same features as *GRM Tools* 1.5 and adds a few twists (see sidebar, "GRM Tools TDM").

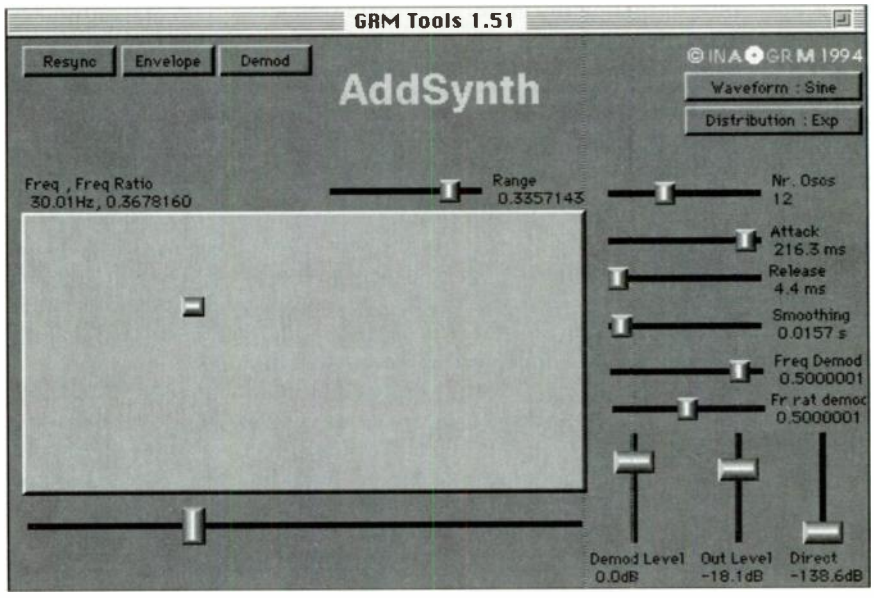

FIG. 1: Addsynth, the first of *GRM Tools*' fourteen algorithms, is an additive synthesizer intended for sound design rather than performance. The only way to modulate its frequency is via the on-screen slider at the bottom of the window

GRM Tools 1.5 requires at least a Mac II or better computer and any Digidesign audio card from the old Sound Accelerator up to Pro Tools II. (Pro Tools III and Pro Tools Project are not supported.) It runs on a Power Mac

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but is not native to that platform; fortunately, a native-code version is in the works. I tested the program on a Quadra 650 running System 7.5 with 40 MB of RAM, a 4.2 GB hard drive, and Audiomedia II and Pro Tools II hardware.

THE RIGHT TOOLS

GRM Tools is designed primarily for processing either real-time digital audio or preexisting Sound Designer II files. The program includes fourteen different processing algorithms, though only one algorithm can be applied at a time. In the end, you get a new Sound Designer II file containing the processed sound. Readers who are familiar with Arboretum's award-winning *Hyperprism* may recognize this way of working, and in fact, there are a number of conceptual similarities between *Hyperprism* and *GRM Tools*.

Although the program's algorithms have different sets of controls, the main playback and recording functions are handled by a common tool palette that is always available. This palette includes the Play, Pause, Stop, Loop, and External Input icons. Two Macintosh key equivalents are available (Spacebar = Play/Pause and Return key = return to the beginning of the sound).

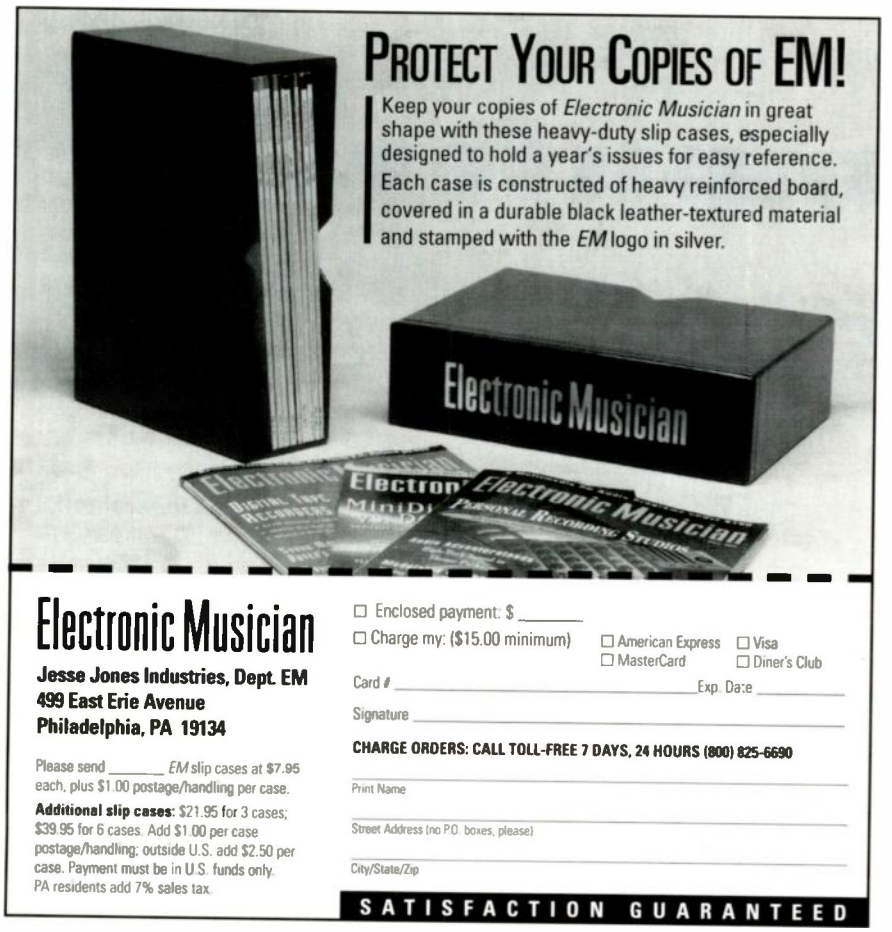
Certain features of the program are common to nearly all algorithms. For example, exact numeric parameter values can be entered for virtually all parameters by clicking on the numeric display next to the parameter's slider. This brings up a dialog box into which you enter the desired value. In addition, almost all algorithms provide a Bypass button, which is extremely helpful. Once you have processed your source sound, a new sound file is written directly to the disk. You can keep or discard it when you are finished.

COOL AND UNUSUAL

As noted earlier, *GRM Tools* offers fourteen processing algorithms. But the first item in the Algorithms menu, Addsynth, isn't purely a processing algorithm; it is capable of generating sound, as well. The manual refers to Addsynth as a "tabulated-waveform, additive-synthesis algorithm." In practice, it provides up to 32 simultaneous oscillators, with a choice of sine, square, pulse, triangle, or sawtooth waves. Its simple, 2-stage (attack/release) envelope generator can be disabled to produce continuous sound.

Keep in mind that this is a sound-design tool, not a conventional synthesizer. All oscillator frequencies are established by only two parameters: Freq and Freq Ratio. These parameters are controlled by dragging the mouse in an *x-y* window (see **Fig. 1**). The Freq control (*x* axis) lets you change the frequency of Oscillator 1, and Freq Ratio (*y* axis) determines the relationship between the frequencies of subsequent oscillators.

For example, suppose the frequency of Oscillator 1 is set to 100 Hz and the Freq Ratio is set to 0.5. In this case, the frequency of Oscillator 2 would be 100 Hz + (0.5 × 100 Hz) = 150 Hz. The frequency of Oscillator 3 would be 150 Hz + (0.5 × 150 Hz) = 225 Hz. The only way to modulate the frequency of Oscillator 1 (which affects the frequencies of all oscillators) is by using an onscreen slider; it's impossible to play the synth via MIDI.



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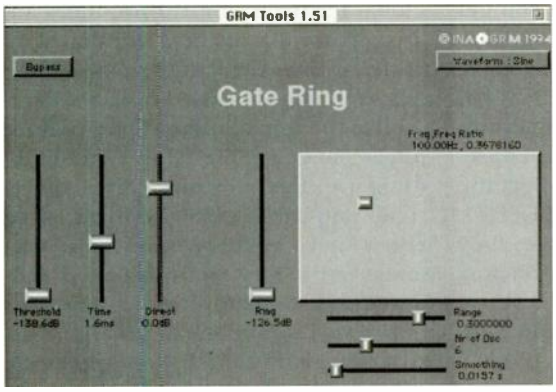

FIG. 2: Gate Ring is a sophisticated, multi-oscillator ring modulator with a noise gate on the output. Its *x*-*y* window simultaneously controls the frequency of Oscillator 1's waveform (*x* axis) and the ratio between the frequencies of subsequent oscillators (*y* axis).

Gate Ring is one of my favorite algorithms in *GRM Tools*. Basically a sophisticated ring modulator with a gate on the output, Gate Ring is capable of highly complex ring modulation that employs multiple software oscillators as modulators, the number of which is user selectable within the limits imposed by the Digidesign card's capabilities.

For those unfamiliar with this effect, ring modulation multiplies the frequency of one waveform (*a*), generally called the *carrier*, by the frequency of another waveform (*b*), called the *modulator*. (*GRM Tools* does not use the terms "carrier" and "modulator," but I'll use them here for convenience and clarity.) The resulting waveform contains the sum (*a* + *b*) and difference (*a* - *b*) frequencies of the two original waveforms (including the sums and differences of their harmonics). In true ring modulation, the original carrier frequency is lost. The resulting inharmonic sound is often described as "clangorous" and is useful for metallic, bell-like effects. I achieved the most successful results with Gate Ring on rhythmic material. The algorithm imparted a metallic, gritty sheen to sampled rhythm loops that was unique and totally cool.

The Gate Ring algorithm allows multiple modulator oscillators to be applied to the input signal, which acts as the carrier. This effect is adjustable in real time and includes Freq and Freq Ratio parameters that operate the same way as they do with Addsynth. The Freq control (*x* axis) allows you to change the frequency of the first modulator, and the Freq Ratio (*y* axis) determines the relationship between subsequent modulators (see **Fig. 2**).

A Range parameter limits the maximum frequency ratio of the modulators, and the Smoothing slider sets the response time of variations in the Freq/Freq Ratio control. This prevents abrupt jumps in the frequencies of the modulators when adjustments to the Freq/Freq Ratio control are recorded and played back. A Waveform button allows you to select a sine, square, triangle, sawtooth, or pulse wave form for each modulator. The gate has Threshold and Time sliders in an abbreviated version of a conventional noise gate's controls.

The Levels algorithm isn't really a sound-transformation device so much as a piece of test equipment. It consists of two L/R pairs of input meters that provide both peak and VU displays of incoming signal levels. There are also two horizontal meters that display the phase correlation between channels 1/2 and 3/4 for users of Pro Tools hardware. If you are running a stereo-only hardware setup, rather than a 4-channel system, you can use this display to show the phase correlation between the left and right channels of your stereo signal. You also get a test oscillator with continuously variable frequency (0 to 20 kHz, with a default of 1 kHz), a Level (output peak amplitude) control, and a Mute button.

FILTER TIPS

The Bandpass algorithm provides a pair of lowpass and highpass filters that combine to form a real-time bandpass or band-reject filter. You change parameter values using mouse movements inside a rectangular window in which the *x* axis controls center frequency and the *y* axis controls bandwidth. You can change between Bandpass and Band-reject mode in real time (i.e., while audio is playing) using onscreen buttons.

The Comb Filters are similar to the Resonators in Lexicon's PCM 70 and PCM 80 effects processors. These very high-Q, tunable, resonant filters sound much like a flanger does, but they're

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stationary rather than swept. You get seven independent, individually tunable filters with adjustable resonance for each processing channel. Global resonance and tuning controls let you make changes to all resonators at once. These master controls don't affect the relationship between the individual resonators' tunings and resonance; they are like offsets that affect all resonators at once.

The Equal23/Equal14/Equal8 algorithm provides a bank of 8, 14, or 23 fixed-frequency filters, depending on the Digidesign card used, which are equally spaced at ⅓, ½, or one full octave apart. Up to 100 dB of cut and 12 dB of boost are possible in each frequency band. A Global button lets you continuously vary all the filter settings by adjusting any filter slider with the mouse, and the Separate button lets you similarly control the individual bands.

This algorithm sounds fantastic. I especially like the extreme effects you can get by totally eliminating or radically boosting various frequency bands. You can totally or partially deconstruct a sound down to specific harmonic components with this algorithm and then spectrally reconstruct it in any number of ways.

You might argue that similar results are possible with a conventional graphic EQ, but this is not the case. In particular, the 100 dB cut, combined with the algorithm's extremely clean sound and precise control, let you make more radical changes than are possible with most hardware equalizers. In addition, you can record the parameter changes over time, which is rare in a pro-quality hardware EQ.

MAKING A PITCH

The Pitch Accum algorithm is a harmony processor that offers up to two channels of processing on a Sound Accelerator card and three channels on Pro Tools hardware. As with most *GRM Tools* algorithms, there are input and direct-signal level controls. You also get individual delay, level, and frequency-ratio controls for each voice. (A ratio of 2:1 transposes up one octave; 0.5:1 shifts the pitch one octave down.) A post-shift, global feedback control produces an arpeggiator-like effect. A Window slider determines the length of the signal "slices" being processed in real time.

I like the sound of the Pitch Accum's pitch-change engine. After a bit of fiddling with the individual voices' delay times and the Window control, I was able to get smooth-sounding and dramatic results with both sustained and percussive sources.

Also in the pitch-manipulation department is the Pitch Random algorithm, which combines a delay with a pitch shifter that can be modulated by an LFO. You can apply the process to between one and four audio tracks (again, depending on your audio card). The LFO can alter the input signal's pitch randomly or periodically and includes Amplitude (depth) and L/R LFO Phase controls. The LFO can produce the same five LFO waveforms as the Gate Ring oscillators.

The algorithm's Window slider (see **Fig. 3**) randomly divides the input signal into slices, or fragments, as the sound plays. The length of these slices can be randomly varied, and the amount of randomness is determined by the Period Random control.

As with other aspects of this program, there is a mathematical relationship, expressed as a ratio, between the transposition of the first fragment and that of subsequent fragments. The amount by which each fragment is transposed relative to the first fragment is initially determined by the Ratio parameter. But as with fragment length, this transposition ratio can be randomly altered.

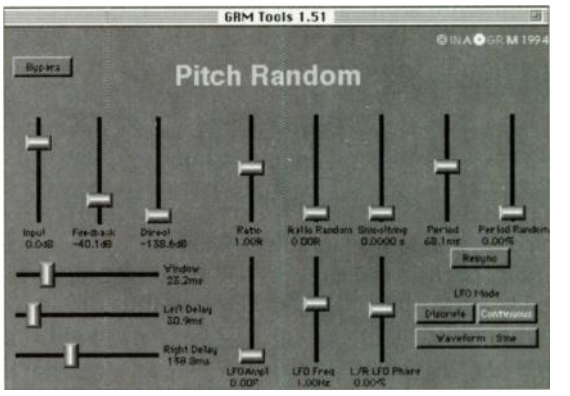

FIG. 3: Pitch Random combines a delay with a pitch shifter that can be modulated by an LFO. The algorithm's Window slider lets you divide the input signal into fragments in real time. The length of these slices can be randomly varied using the Period Random control.

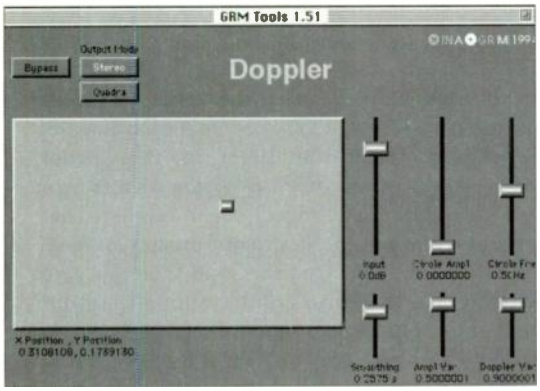

FIG. 4: The Doppler algorithm uses phase, pitch, and stereo position of the source to simulate the effect of a sound source moving within a 2-dimensional space. If you set the Doppler Var slider at None, pitch modulation is removed entirely, and the algorithm becomes a great 3-D autopanner.

The range within which the transposition ratio can be altered is determined by the Ratio Random parameter. For instance, if you set the Ratio to 0.5 (so that each fragment is transposed by half as much as the previous fragment) and Ratio Random to 0.25, each fragment has a transposition ratio that randomly varies between 0.25 and 0.75 (0.5 ± 0.25).

I found Pitch Random to be very musical sounding. It proved most useful as a subtle chorusing device, which works extremely well thanks to its random pitch shifting. The addition of delays for the left and right channels helps create even more complex thickening of the sound sources.

I really like the Doppler algorithm (see **Fig. 4**), which simulates the effect of a sound source moving around within a 2-dimensional space. The algorithm does its magic by playing with the phase, pitch, and stereo positioning of the source in real time using an adjustable low-frequency oscillator. It proved more useful than I had originally suspected, mostly thanks to the Doppler Var control. This slider determines the amount of pitch modulation applied to the source sound by the LFO. If the pitch modulation is removed entirely, the Doppler algorithm becomes, in effect, a super 3-D autopanner.

When I experimented with this effect, I ended up with a type of stereo panning/phase manipulation reminiscent of the old Dyno-Tronics Cyclosonic Panner. It sounds like the source is moving in and out of the speakers rather than just from left to right. I love to use it for adding new life and movement to stationary samples.

IT'S ABOUT TIME

GRM Tools' Shuffling algorithm is similar to the Time Scrambling algorithm pioneered by Eventide's SP-2016 ten years ago. The input signal is divided into small fragments, which are then randomly spliced back together, delayed, and played back at different speeds to create a chaotic, unpredictable effect. Control is provided over length of the fragments, their playback-speed variation (the range over which their playback speed is altered), the crossfade time between the fragments, and the amount of silence that is randomly inserted between them (see **Fig. 5**). The sonic result is akin to early tape-manipulation pieces by composers such as Morton Subotnick. You might not use it often, but it creates interesting sounds with just about any source.

Time Freezing loops a short segment of the input signal (740, 370, or 92 ms, depending on the audio card in use) in a buffer, using from one to eight loop points positioned at different places in the buffered signal. There is

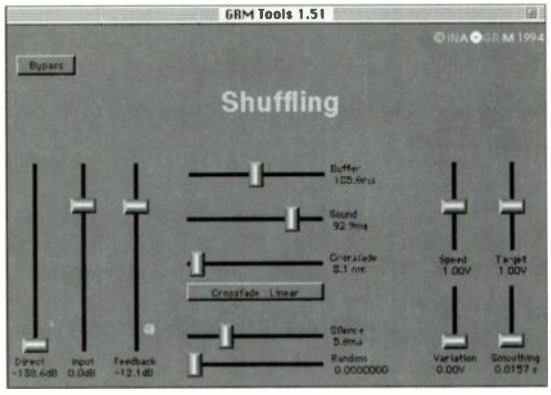

FIG. 5: The Shuffling algorithm slices the input signal into small fragments that are randomly spliced back together, delayed, and played back at different speeds. The Crossfade slider controls the fade time between fragments, and Silence determines the amount of silence that is randomly inserted between them.

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Although they bear a similarity to the stand-alone *GRM Tools* 1.5, INA-GRM's 2-volume *GRM Tools TDM* plug-ins ($499/volume) definitely take the product to another level. Each volume includes four plug-ins, which are based on the algorithms found in the stand-alone version. Volume 1 includes Shuffling, Equal23 (mono/stereo), Comb Filters, and Doppler. Volume 2 includes Bandpass, Delay 24, Time Freezing, and Pitch Accum.

All of these algorithms are available within *GRM Tools* 1.5, but they are much more flexible and fun to use within the TDM environment. This is primarily due to Pro Tools III's integrated preset management and the real-time, multitrack power of Pro Tools III with TDM. For one thing, you can work with more than just one mono or stereo file at a time, which you can't do with *GRM Tools* 1.5. In addition, you do not have to actually process or destructively alter a sound file in order to use it with other tracks, which is a nice bonus.

Each *GRM Tools TDM* plug-in includes sixteen user-definable presets, and you can crossfade between any of these in a fade period of between one and 30 seconds. This feature is one of the best additions to the world of plug-ins that I have ever come across.

Each plug-in also offers a variety of useful, factory-programmed presets. A very cool feature called the Interpolation Slider (the large slider at the bottom of **Figure A**) lets you gradually morph, or interpolate, between the first eight presets of each plug-in. This can lead to some very interesting combinations that you would never find otherwise. The only drawback I found is that you must move sequentially from preset 1 to 8; you can't morph directly between, say, presets 3 and 5. That aside, INA-GRM gets big points for offering this unique ability to mix and mutate your ideas.

The TDM plug-ins require at least a 68040 Mac or Power Mac (running System 7.1 or higher), with at least 16 MB of RAM, and a Digidesign Pro Tools III system (NuBus or PCI) or Pro Tools II with TDM. I strongly recommend adding a second DSP Farm card and more, if possible. You can only open a maximum of two or three of the plug-ins with just one DSP Farm card, and believe me, once you start working with these plug-ins, you won't want to stop! My tests were done on a Quadra 840AV running System 7.5.5 with 36 MB of RAM, two DSP Farms, and several 2.2 GB hard drives.

If you own a Pro Tools III system, you really owe it to yourself to check out *GRM Tools TDM* 1.0. You can even download a free demo from RiCharde & Co.'s Web site (see Product Summary).

—Mikail Graham

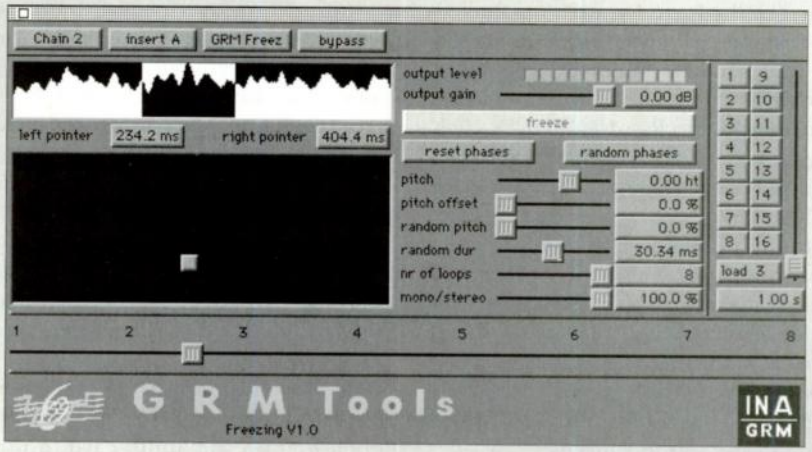

FIG. A: Each *GRM Tools TDM* plug-in has a large Interpolation slider (bottom) that lets you gradually morph between the first eight presets.

a mathematical relationship between the positions, durations, and speeds of the loops. Duration Ratio determines the relative lengths of successive loops, and Position Ratio determines the loops' relative time position. The overall loop playback speed is controlled by the Speed control. A secondary speed control, called Speed Ratio, determines the difference between the playback speed of the first loop and that of successive loops.

Time Freezing is an unusual process, and I can imagine it proving useful in various contexts, particularly experimental music and sound design. But the truth is that I got bored with this effect after trying it with several sources (including speech, singing, and guitar) despite the fact that I got some cool sounds.

The Time Stretching algorithm uses a novel interface to provide conventional timebase changes without pitch alteration and vice versa. Using the now-familiar *x*-*y* control surface, the mouse is used to alter the pitch and speed of a prerecorded sample. (The *x* axis controls playback speed, and the *y* axis controls pitch.) You can make adjustments very quickly, which lets you effortlessly experiment with wildly different speed/pitch settings in real time. This is another slice-and-dice processor: the Window control determines the length of the sampled fragments, and Crossfade controls the crossfade time between them.

If you are looking for sonically pure, straight-ahead time compression/expansion, this is not your best choice. The rhythmic and sonic structure of sampled sounds is noticeably altered by this algorithm. However, due to the immediate and friendly nature of its user interface, a much wider range of interesting and useful transformations can be obtained with Time Stretching than with a conventional program. Because transformation is what *GRM Tools* is all about, this algorithm succeeds quite well.

The Delay Accum algorithm is basically a multitap stereo delay with control over the relationship between the times and levels of the delay taps. As with other ratio-based algorithms in *GRM Tools*, you set an initial delay value for the first tap. The amount of time between each successive tap is determined by the Delay Ratio, and the relative level of each tap is set according to the Level Ratio parameter. As with the Gate Ring algorithm, Smoothing adjusts the response time of variations in the Delay and Delay Ratio parameters so the delay time doesn't suddenly jump around when you record and play changes in these parameters. A Feedback control governs the regeneration of the delayed signal. On my Pro Tools II system with one audio card, I got up to sixteen delay taps at a time.

I found only limited uses for Delay Accum because no controls are provided for the delay time, feedback, and level of each individual tap. (You can control the ratio that determines the relationship of these parameters between taps, but you can't control each tap directly.) Furthermore, no control over the panning of the individual delays is provided. This is not to say that interesting results can't be achieved; I was able to get some very cool effects from this algorithm, particularly with material that has rhythmic content to begin with. But if you're used to a conventional multitap delay with extensive parameter controls, you may find this algorithm a bit restrictive.

Finally, we come to Frequency Conversion, which converts the sample rate of a sound file to the currently selected output sampling frequency of your

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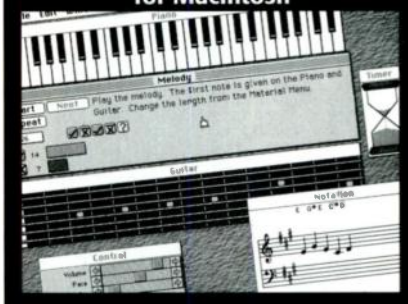

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Digidesign hardware (normally 44.1 or 48 kHz). The input file's sample rate must be less than twice the card's sampling frequency, which means you're fine with anything under 96 kHz.

I suspect the most common use for this feature would be to convert a 48 kHz file to 44.1 kHz. (For example, you might do this if you want to convert a 48 kHz DAT recording for mastering to CD.) A single slider allows precise pitch adjustment to compensate for the transposition that occurs as a result of the sample-rate conversion. The quality of the pitch change is quite good; this feature is certainly better than using a regular pitch shifter to achieve the same result.

MANUAL LABOR

The *GRM Tools* package comes with a manual that is a classic example of what happens when programmers write documentation for music software. Although it's technically precise for the most part, it describes the program's algorithms in coldly technical terminology without providing any applications suggestions or even simple directions. Critical concepts such as the ratio relationships used throughout the program are hardly discussed or are explained so poorly as to increase the user's confusion.

As for the tone of this tome, here is a short excerpt: "Addsynth is a tabulated waveform additive synthesis algorithm....An amplitude demodulation module can be used to control amplitude of the input signal. A dual envelope generator is also available. The number of oscillators per output channel can be greater than the standard value, but then, as calculation is undersampled, the frequencies are divided by 2."

Inspiring, eh? After reading that—and believe me, some passages are far worse—I have a crystal-clear idea of how Addsynth works, and I want to sit right down and create, create, create. I'm sure that after reading this excerpt, you are now inspired, too.

GRIPES

As far as omissions and/or complaints go, I only have a few minor points. First, it would be nice to have external (MIDI) control over the parameters of all the algorithms, especially algorithms such as Equal23 and Gate Ring. Adding this feature would make the program more musically accessible.

Initially, I had some problems with the copy-protection scheme, which prevented me from using the program until I called INA-GRM for help. A company rep told me to install another copy onto my hard disk without removing the previous one. This worked, but it was annoying. INA-GRM's Emmanuel Favreau called the copy-protection scheme used by the stand-alone program "too strong" and added that a more reliable type is used on the TDM plug-in version. I hope the developer switches to this more reliable type for the stand-alone version, as well. Otherwise, I had no difficulty with running the program.

Finally, some of the features in the program (such as the ratio relationships) are a bit difficult to grasp at first, though experimenting with them is usually easy enough. Therefore, INA-GRM should completely redo the manual to make it clear, helpful, in-depth (particularly on the applications front), and readable by musicians. You remember musicians, don't you? They're the people who are supposed to benefit by using this program.

CONCLUSIONS

A lot of work and thought obviously went into the design and execution of this program, which has resulted in a unique and powerful tool. As mentioned earlier, the only piece of Mac software remotely similar to this is *Hyperprism,* and even in that case, the simi-larities are limited. I had a lot of fun working with *GRM Tools,* which allowed me to generate entirely new sounds using both my sample library and live audio input as source material.

If you enjoy manipulating and processing sound, you must try this program. When you use it with some interesting source material and a little creativity, you'll discover a wealth of entirely new sounds. This alone makes *GRM Tools* worth the price. Enough control and algorithmic power can be found here to keep even the most sound-twisting musician occupied for a long time.

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

who really want women to be empowered with those skills," explains Hackler, executive director of IMA. "One of the things we focus on when working with women musicians, espe- cially on first and second album projects, is teaching them about working in the studio so they understand the process. We don't want women to go into studios and lose control of their music because they don't understand what's going on. In addition to educating women during production, we offer workshops on demystifying the recording process and on album production."

The organization also offers what they call "intensives," which are 5-day workshops on topics such as composition, performance, and recording. They also do seminars on some music-business topics, including entertainment law, booking gigs, and promotion.

MENTORING AND OUTREACH

In addition to helping each other carve out places in the world of music, many of these organizations are taking a role in reaching out to school-age girls, encouraging them to pursue fields that were traditionally considered appropriate for men only. The hope is that future generations of women in music won't have to face the same problems these professional women currently do.

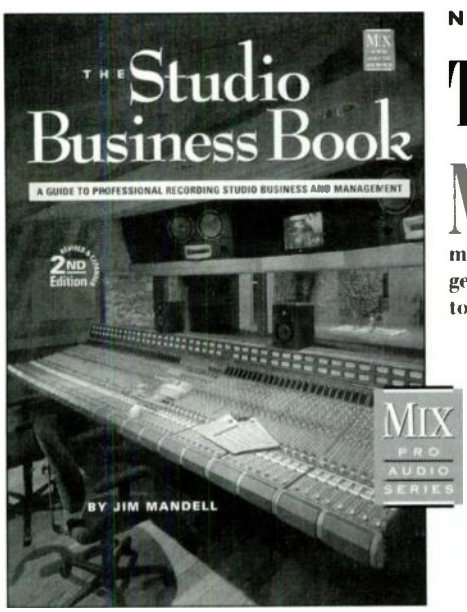
In addition to her work with AES Women in Audio, Bousquet also belongs to New England Women in Audio and is on the board of directors for the Girls, Incorporated (formerly Girls Club of America), in her area. "We are working together on a fundraiser for Girls, Incorporated, called Women's Music for Girls," she says. "In addition to being a fundraiser, everyone working on that project—performers and technicians—will mentor a little girl. I think the importance of these women's organizations lies in exposing young girls to nontraditional roles. One of the simplest things that anyone can do is the mentoring. At the most recent AES Women in Audio forum, I challenged everyone attending the forum to go out to an organization or to a school, take their MIDI setups and their instruments, and get started. Even if it's only once a year for a couple of hours, do something."

Schiff of L.A. Women in Music says her organization is starting to write grants to sponsor mentoring programs. "We're trying to raise enough funds to be able to go out to the schools and either do career advisement or do fundraising for music programs and get instruments and instructors to schools that can't afford them," she explains.

STRENGTH IN NUMBERS

Obviously, there are many more organizations in existence than are mentioned here. But if there's one thing I've learned, it's that the women and men who belong to these groups are eager to share information and resources with those who possess similar interests. If you're interested in finding an organization in your area, any one of the organizations covered here will probably be able to point you in the right direction. In the competitive world of the music business, it's nice to know that there's an entire group of professionals who are eager to see each other succeed.

Mary Cosola *is managing editor of* **EM.**



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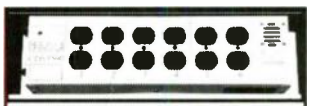

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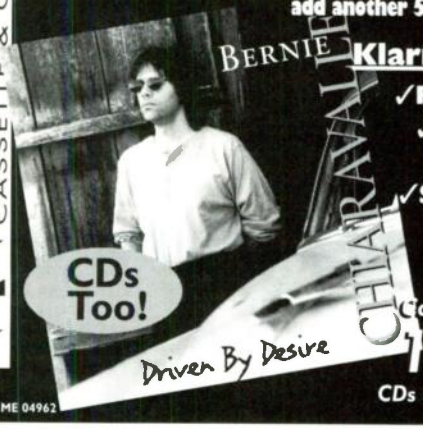

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TECH PAGE

Liquid Audio

Changing the way music is sold online.

By Scott Wilkinson

For musicians, one of the most exciting possibilities offered by the Internet is online music distribution, which could bring a new era of democratization to the entire music industry. However, there are several hurdles to overcome before this becomes commonplace. For example, it can take forever to download preview clips (not to mention entire albums), and the quality of real-time streaming audio is often less than compelling. In addition, protecting copyrights in cyberspace is a huge can of worms.

One of the companies working on solutions to these problems is Liquid Audio (tel. 415/562-0880; fax 415/562-0899; e-mail info@liquidaudio.com; Web www.liquidaudio.com). The system consists of three major software components: mastering, server-to-client delivery, and end-user playback.

The mastering software, called *Liquifier,* will be available for the Windows platform initially. This software encodes any audio file with a specially modified version of Dolby Digital (formerly known as AC-3), a multichannel surround-sound format that also includes a stereo algorithm. The engineers at Liquid Audio have tweaked the Dolby Digital process, improving the audio quality by about 30 percent at any given data rate.

The mastering software optimizes compressed audio files for real-time streaming at different data rates, including 14.4, 28.8, 48, and 96 kbps. Another option creates audio files that play back at 192 kbps. (By comparison, Red Book CD audio plays at 1.4 Mbps.) Liquid Audio is also investigating two lossless compression algorithms that offer an average compression ratio of 2.5:1. Files that play at 192 kbps or use one of the lossless algorithms are intended to be downloaded, not streamed in real time. According to Liquid Audio, most double-blind listening tests indicate that the 192 kbps files are indistinguishable from CD audio.

Liquifier offers many of the standard mastering functions, such as waveform editing, EQ and other effects, format conversion, and sample-rate conversion. It also lets developers incorporate graphics and text (e.g., lyrics, liner notes, cover art) into the file, which makes the previewing experience more engaging. Different versions of the audio for each playback rate are combined into a single file, and the appropriate stream is automatically sent from the server as needed. Coming soon is *Liquifier PT,* a plug-in version for Digidesign's upcoming *Pro Tools 4* AudioSuite plug-in architecture.

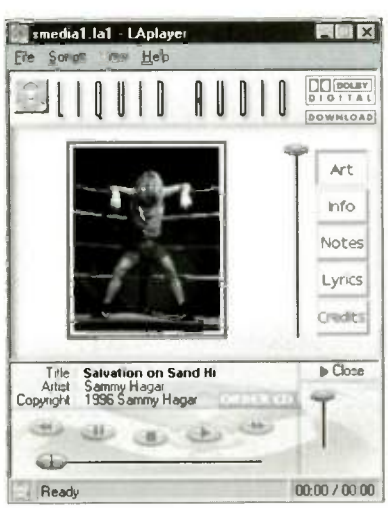

FIG. 1: *Liquid MusicPlayer* lets you play streaming audio clips and download high-quality audio files. (Courtesy Liquid Audio)

The *Liquid MusicServer* software delivers the audio and other media from UNIX and Intel servers to end users via the Internet. This software uses the new Real-time Transport Protocol (RTP), which will also be found in Netscape *Navigator* 4.0. Among other functions, RTP prioritizes the audio: if the datastream is bogged down for any reason, the server can reduce the bit rate and delay any pending graphics or text in favor of the audio. In addition, the software encodes copyright information into the audio data and keeps track of all purchases and royalty obligations.

You can download the client software, *Liquid MusicPlayer,* for free from the company's Web site (see **Fig. 1**). This software, which is currently available for Windows 95, lets you preview and download free audio clips and high-quality "commercials" for albums. This software will also let you buy music online and download it or receive it on CD via snail mail when the rest of the purchasing system is in place sometime during the first quarter of 1997.

As you might imagine, the major record labels are very interested in this technology. However, it also enables smaller, independent labels and unsigned artists to reach potential customers directly. The company estimates that any musician will be able to publish their music on the Internet, collect money for purchases, and deliver product with a suite of software costing under $1,000. That's music to my ears.

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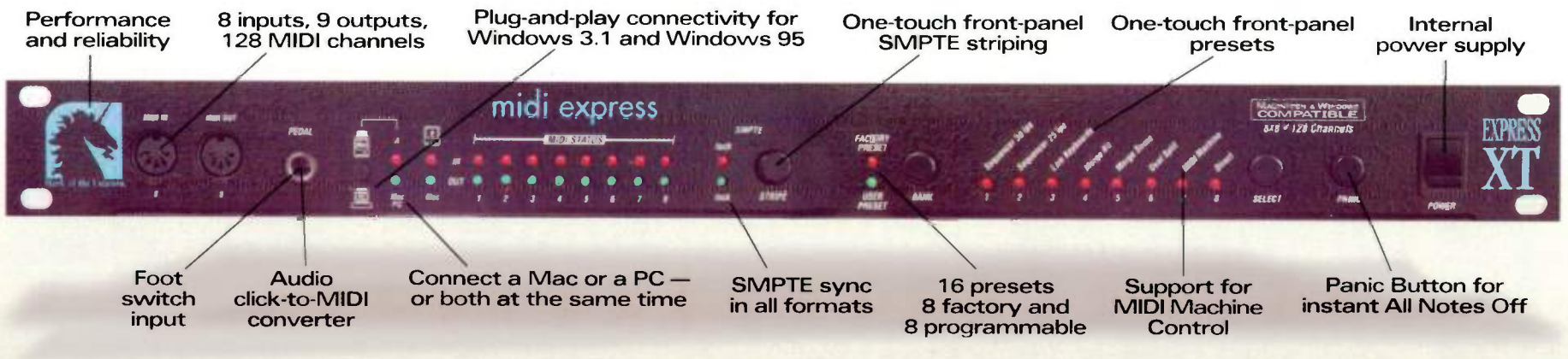

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