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JAM
the EM Guide to Gigging

Electronic Musician®

December 1998

CONQUERING PEAKS

15 dynamics-taming tips

STREET CRED!

Produce urban music in your personal studio

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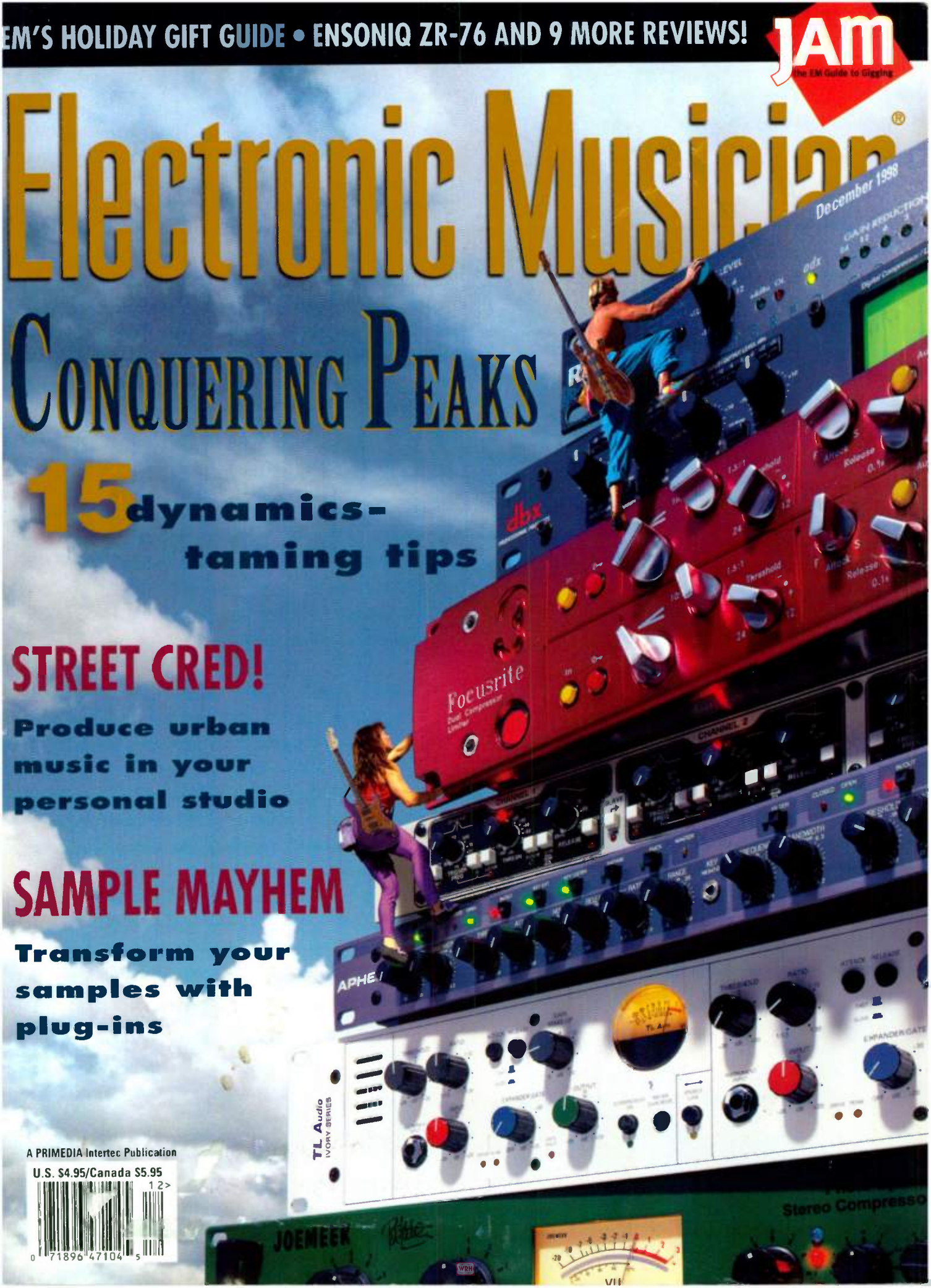

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VETERAN ENGIN

THE GROUNDSWELL OF HR82

HR824

Everybody makes glowing claims about their monitor speakers. But only Mackie Designs' HR824 Active Near Field Monitors have gotten this amount of acclaim from credible outside sources so quickly.

Here are some verbatim comments gathered by our roving Mackie video crew on a recent visit to Nashville and Los Angeles (call us toll-free for a copy of the finished epic production), interspersed with recent review excerpts.

We know you're as serious about your creative product as these folks are. So why compromise with less than the best near field monitors? Visit your nearest Mackie dealer for a demo or call us toll-free for more info.

"Mackie asserts that the HR824s are 'smooth from 39 to 20kHz (±1.5dB)' and our tests corroborated the claim. This is no mean feat for monitors this size. The HR824s performed admirably, allowing us to distinguish very fine shades of tonal color and to establish subtle timbral and harmonic relationships between sounds. If you are in the market for a pair of compact active monitors and you are not afraid of the truth, do yourself a favor and give the Mackie Designs HR824s a critical listen."

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"Very musical. Very accurate. We actually move them between our five rooms." **Glenn Meadows, TEC-nominated mastering engineer, Masterfonics**

"The most balanced pair of speakers I've ever had. I haven't heard anything better. The Mackies bring the full spectrum of sound into my room. They bring the full scope of the sound in an area that encompasses me AND my clients. You get subsonics — a terrific fullness of acoustic guitar, the lowest end of bass drum. When you have an upright bass you get low end that I normally don't get in a room like this." **Stephan Oberhoff, independent L.A. producer/engineer/keyboardist**

"Performance, features and a cost-not-barred design at a retail price of $1500 a pair* make this product a very good value. In the words of one person involved in these listening tests, 'I have a feeling that [the HR824s] will become the NS-10 of the late '90s and beyond' ...ubiquitous."

"I love the [HR824's] bottom end — it sounds real. You don't have to compensate or guess. It's nice to FEEL a speaker. Producers also say they feel really good." **Stanley Smith, feature films soundtrack composer, co-producer of Jordan Hill**

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* suggested U.S. retail.

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"[HR824s] sound incredible — I was extremely surprised by the low end response. Clarity, detail and reproduction in reverb tails is real good." Pat McMacon, Facility Director, Sony/Tree Studios

"Very tight bass... clean mids... crystal pristine highs. There's a truth to them once you hear you can't go back." Frank Serafine, Hollywood motion picture and television sound designer

"Very clean. Spectacular. Very impressive. You can listen to them for a long period of time. They work in a lot of rooms. What we get on these speakers comes out when we take the tapes other places." Milan Bogdan, General Manager, Emerald Studios (Billboard Magazine-rated "#1 Country Recording Studio")

"On material I've mixed using another monitor brand, I'm now hearing things I missed. Imaging is wide and very even. The whole spectrum is equally represented. Great frequency response... midrange is smooth... no low end hypiness." Bill Smith, Grammy-nominated recording engineer

"Their treble output is detailed and extended yet very smooth. Words like 'open' and 'silky' come to mind... and these adjectives apply to a very wide sweet spot. The Mackies put out the kind of deep, warm bass normally considered the sole domain of huge drivers and subwoofers. I would consider these speakers a bargain at twice the price, but at list they are a steal."

"You can sit and listen to them all day long. You get exactly what you hear. They're totally natural — I can't say the word enough — NATURAL." Lee Roy Parnell, Grammy-nominated singer/songwriter/producer

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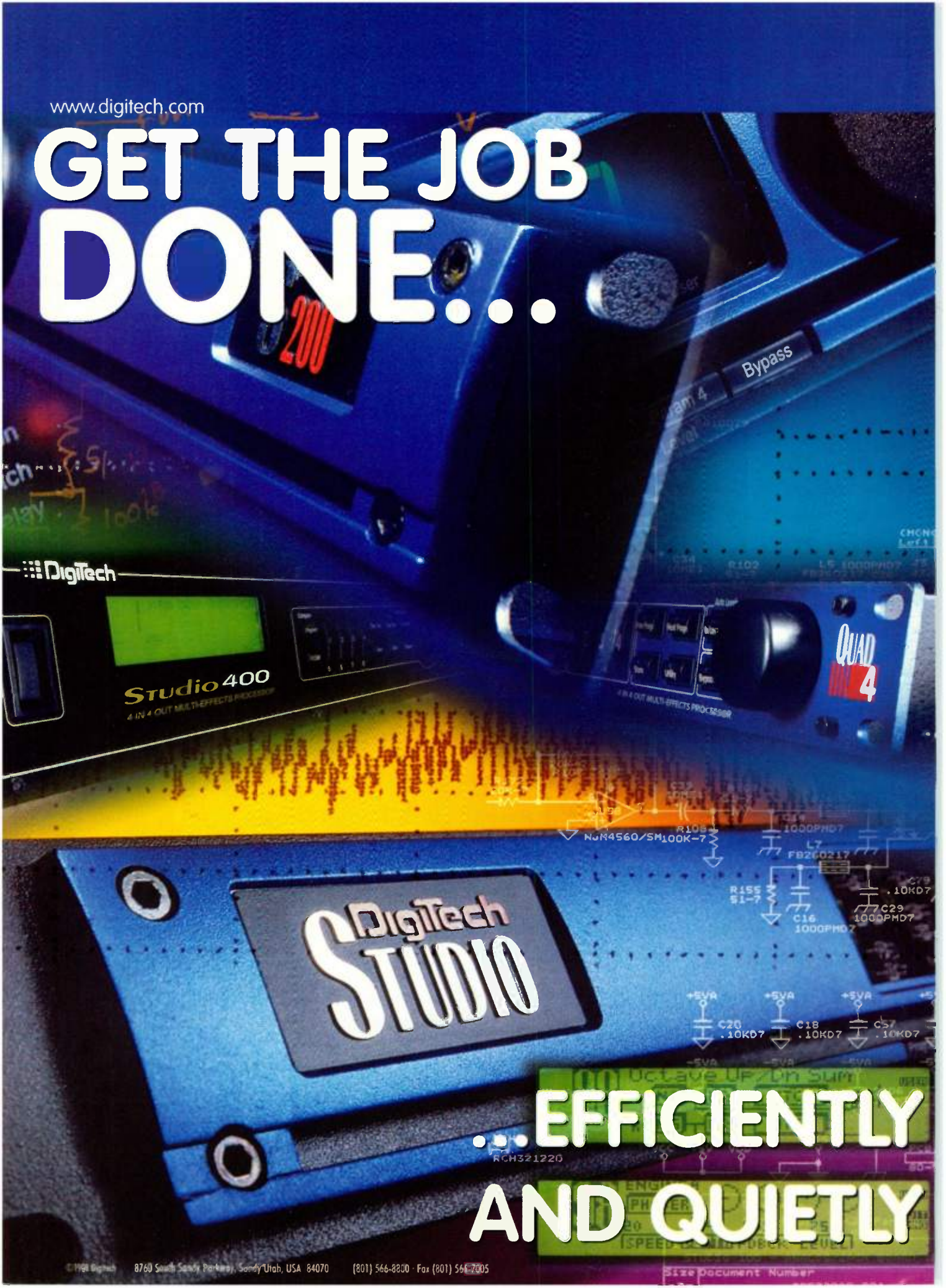
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I N S I

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Stop treating your samples with kid gloves! Learn how to bend, spindle, and mutilate them using software plug-ins.

By Jim Miller

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This month's headliner is drummer and music-technology pioneer Dave Weckl, who details the ins and outs of onstage digital mixing. We also help guitarists avert simple but disastrous gear problems, show you how those little consonants can blow a vocal performance, and take you to a good, old-fashioned multimedia performance. And don't forget to check out "Tools" for the latest in live-performance gear.

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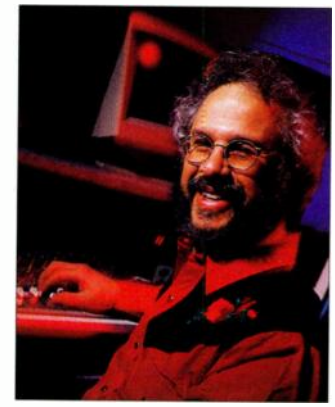
The X Files

Scully and Mulder go undercover at the AES Convention.



ANTHONY PIDGEON

One of the most newsworthy events at the 105th Audio Engineering Society Convention in San Francisco took place behind closed doors. Amidst the technical papers, product demos, and general bustle, Agents Scully and Mulder (bet you didn't know they were on the **EM** staff!) discovered that Cakewalk Music Software held a private developer's meeting at which the respected software company unveiled a new technology proposal called "AudioX." Plainly, the tiresome twosome reasoned, this plan was part of a dark conspiracy for sonic communication between humans and aliens.

Despite Cakewalk's desire to keep this proposal hidden from the public ear until it was further developed, it quickly became the talk of the show's computer-products community. The secret is out! Having debriefed our two secret agents, we figured out that AudioX is, in fact, a proposal for communication between computer audio hardware and software. (Maybe that isn't so far from Mulder's "alien conspiracy" theory after all.) AudioX is intended to establish a standard solution for enabling audio software to support the new, more advanced capabilities of the latest audio hardware. It is a supplement to, not a replacement for, audio-streaming drivers that allow software to address computer audio interfaces (e.g., Windows 95 and NT drivers, DirectSound HAL, and ASIO).

Many audio interfaces provide advanced capabilities that current audio drivers can't support. For instance, audio-streaming drivers don't support internal mixer functions such as patching mixer channels to and from I/O ports; providing precise, low-latency control over volume, pan, solo, and mute; and supporting busing for pre- and postfader sends and returns. Streaming drivers also don't provide direct support for SMPTE sync, varispeed pitch control, peak metering, and onboard sound-card DSP for effects. AudioX addresses all of these issues.

Furthermore, according to our agents, Cakewalk is offering AudioX as a cross-platform, open standard; nobody has to license the technology, and the code is available to all developers. It would be compatible with existing audio-streaming drivers and would coexist with such new technology as the Windows Driver Model.

I can't comment on the under-the-hood aspects of AudioX, partly because I possess only a few details—Mulder insists that aliens wiped most of the technical info from his memory—and more importantly because I am not a design engineer. But the Cakewalk engineers (who are not aliens, despite what their friends may think at times) have a fine track record, and the developers Scully and Mulder debriefed were enthusiastic about the possibilities of establishing AudioX as a new standard.

I am a big fan of establishing standard interfaces that make integrating a system as easy and trouble-free as possible. A well-integrated studio is easier and more fun to use; maximizes time spent actually making music instead of trouble-shooting; and encourages experimentation with various combinations of products. AudioX appears to be a fine effort in this direction. I urge the developers to examine this proposal closely and, if it makes as much sense technically as it does in principle, to find enough resources to make it fly. No saucers required, of course.

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Editor Steve Oppenheimer
Managing Editor Mary Cosola
Associate Editors Jeff Casey, Brian Knave, Dennis Miller, Gino Robair, David M. Rubin
Copy Chief Patricia Hammond
Editorial Assistants Carolyn Engelmann, Matt Gallagher, Rick Weldon
Contributing Editors Larry the O, George Petersen, Scott Wilkinson
Art Director Dmitry Panich
Associate Art Directors Tami Herrick-Needham, Laura Williams
Graphic Artist Steve Ramirez
Informational Graphics Chuck Dahmer

Publisher John Pledger

Marketing Manager Christen Pocock
Eastern Advertising
Angelo Biasi
angelo_biasi@intertec.com
200 Connecticut St., Norwalk, CT 06854
tel. (203) 838-9100; fax (203) 838-2550
Northwest Advertising
Joanne Zola
joanne_zola@intertec.com
6400 Hollis Street #12, Emeryville, CA 94608
tel. (510) 653-3307; fax (510) 653-5142
Southwest Advertising
Erika Lopez
erika_lopez@intertec.com
12424 Wilshire Blvd., Suite 1125,
Los Angeles, CA 90025
tel. (310) 207-8222; fax (310) 207-4082
Sales Assistants Alex Boyd, Mari Stancati
Classifieds Advertising Manager Robin Boyce-Trubitt
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Marketing Assistant Daniela Barone
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Circulation Associate Heidi Eschweiler
Circulation Assistant Austin Malcomb
Business Manager Cindy Elwell
Human Resources/Facilities Assistant Lauren Gerber
Receptionist Carrie Gebstadt
National Editorial, Advertising, and Business Offices
6400 Hollis Street #12, Emeryville, CA 94608
tel. (510) 653-3307; fax (510) 653-5142;
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Subscriptions, Customer Service, Back Issues
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tel. (800) 843-4086 or (615) 377-3322; fax (615) 377-0525
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RATE HIKES

Scott Wilkinson's article "Tech Page: I Want to Take You Higher" in the October 1998 issue reveals a lack of knowledge about modern ADC and DAC design. Modern designs use oversampled 1-bit—sometimes a few bits—converters running at a sampling rate of around 1 MHz. Just about every system designed in the past five to ten years works this way. These systems don't need fancy, high-order, analog anti-aliasing filters. They use digital filters that are easy to design, have linear phase response, and don't introduce the kind of ringing Scott talks about. High sampling rates (e.g., 96 or 192 kHz) have some utility in professional mixing consoles because they can cut down on into-out delay through the console. Other than that, most of the high-sampling-rate brouhaha is based on myths of the kind presented in Scott's article.

As record companies gear up for a move from CD to DVD, they need to find ways to waste space on DVD disks because they can't sell one DVD, with seventeen hours of music, for seventeen times the price of a one-hour CD. I believe that this is part of the driving force behind higher sampling rates and other proposals such as the 1-bit, "waste that space" technology from Sony.

Eric Lindemann
eric@audiologic.com
Director Technology Development, AudioLogic, Inc.

Eric—According to Richard Elen of Apogee Electronics, sigma-delta converters do indeed feature digital filters within the chip itself, rather than traditional analog filters. In addition, this type of converter is more common today than the older, "resistor-ladder" or "R2R" type of converter, to which I was referring in my article. However, some products, such as Apogee's DA-2000, use R2R converters, and some people think they sound better than sigma-delta converters.

Nevertheless, there are still good reasons for using higher sampling rates. For example, some musical instruments, such as violins, generate ultrasonic frequencies that cannot be perceived directly. However, within a violin section, these frequencies interact to produce difference tones *in the audible range that contribute to the timbre of the section. If the section is recorded with distant mics, the difference tones can be captured with lower sample rates, because they arise from the acoustical interaction taking place in the space between the instruments and the mics. But when each stand of violins is close-miked and recorded on its own digital track, without capturing the ultrasonic frequencies, subsequent mixing cannot produce the difference tones.*

Why go to 88.2 or 96 kHz rather than some other sampling rate? Well, 44.1 and 48 kHz will be with us for quite some time, and it's important to be able to convert from a higher rate to one of these "legacy" rates for backward compatibility. This process is greatly facilitated by using higher rates that are integral multiples of the legacy rates.

As a result, the higher rates of choice are 88.2 and 96 kHz; simply 44.1 and 48 kHz, doubled. But watch out if you record at 96 kHz and then want to convert down to 44.1; nonintegral sample-rate conversion can sound quite nasty.

CLUSTER BOMBS?

In your article "Attack of the Cardioids" (September 1998), you include excessive negative comments on the sonics of all the mics tested. Even the most expensive Neumann TLM 103 was described in part as "characteristically bright," with "slightly boomy lows" and "some exaggerated mids" on vocals. The second most costly microphone, the Beyerdynamic MC 834, was described as having an "aggressive, 'midrangey' sound, sometimes exhibiting a slightly 'honky' quality."

This alarming number of unusual descriptions for such fine microphones caused us to ask: Why? Reading this article further and observing your mic clusters revealed what could explain these disturbing results. Obstructing the area around a cardioid mic cartridge, as in these clusters, while using the great miking distance that you did in your evaluations, could be the reason behind so many descriptions of odd resonance.

It is our strong opinion that the test procedures for your evaluations were not typical, and we agree with the last paragraph of this article, which states, "We encourage you not to simply take our word for it, but rather to conduct your own listening tests before deciding on a new mic."

William Hannapel
President, Stedman Corp.

AUDREY COLMAN

EM EDITORS WIN PRESTIGIOUS AWARD

At the 1998 Audio Engineering Society Convention in San Francisco, Berklee College of Music presented Distinguished Alumnus Awards to **EM** Editor Steve Oppenheimer (above left, with Berklee Dean of Music Production and Engineering Don Puluse) and Contributing Editor Larry the O, "in recognition of outstanding achievements in contemporary music and music technology." Past winners of this prestigious award include Alf Clausen, Bruce Cockburn, Scott Gershin, Diana Krall, Branford Marsalis, and John Scofield, to name a few.

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the new legend

William—We stated several times in the article that all of the mics we tested were quality products and that most of the distinctions we made were very subtle. When our testers disagreed, we gave both sides; for instance, the comments you quote about the Neumann mic were Myles Boisen's views, which differed from Mike Lawson's opinions. We gave both opinions in the same paragraph, hopefully with enough detail for the reader to understand the reasons for the differences.

The mics were positioned two to three feet from the source, not an unreasonably "great" distance. We also did some tests on each mic individually, and the results were consistent with the results of our cluster tests.

Before beginning our tests, we discussed our planned procedures in depth (including the use of mic clusters) with well-known microphone designers and other technical staff at several of the companies whose products we covered. We had more superficial preliminary discussions with all of the mic companies involved, including Stedman.

The people with whom we had in-depth discussions agreed that clustering the mics was the only way to have each mic accurately capture the same source, i.e., "hear" identical vibrations. Although everyone acknowledged that clustering the mics could conceivably create some minute reflections between them, no one we spoke with felt that those reflections would skew the results.

One respected mic engineer insisted that, as long as the capsules are aligned on a horizontal plane (as they were), clustered together as tightly as possible (as they were), and the sound source is back far enough to allow space and time for the sound to open up (it was in every instance), each mic should hear almost exactly the same thing. Any reflections occurring between the mics—which were not more than a quarter-inch apart from one another—would be minimal to the point of being inconsequential. Finally, he pointed out that, to the best of his knowledge, clustering was the only way to do the tests fairly, and that he would have done them the same way. Three other mic manufacturers had comments similar to his.

Based on these comments and our own experience with mic comparisons, we feel our test procedures, while perhaps not perfect, are valid. We stand by our findings in the article.—Steve O.

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QUICKTIME BUGABOO

I read with interest the informative article in the October 1998 issue about QuickTime 3 and the improvements in its music architecture. In trying out QuickTime 3, however, I have come across what seems to be a serious bug in its MIDI implementation. Or perhaps I'm doing something wrong.

In converting Type 1 Standard MIDI Files to QuickTime movies, the pan values seem to have all gotten lost. These were files that had very clearly panned instruments, with some all the way to one side or the other. But as a QuickTime movie, everything comes out center, with no panning at all and the stereo effect completely lost!

This problem did not occur with version 2.5. So although, as Mr. Leonard wrote, there are many improvements in the music architecture in QuickTime 3 (the greatest being the enlargement and GM-compatibility of the sound set), this panning problem seriously detracts from the improvements.

Is anyone aware of a work-around for this?

Michael Spector
Carmel, CA

Michael—I contacted Charles Wiltgen at Apple to get to the bottom of the QuickTime panning problem. As it turns out, this is neither a bug nor an error on your part.

QuickTime 3 is scaled to respond to the operating power of the CPU it's working on, and it will allocate that power to various tasks accordingly. Customer response led Apple to set a default for polyphony over stereo processing, as people generally seemed more interested in using numerous voices. Users can override these defaults, however, and therefore you can set your own preference to accommodate your pan settings. In other words, your data is not lost, it has just been pushed to the sidelines.

ALEX BUTKUS

Season's greetings from the EM editorial staff. Left to right: Copy Chief Patty Hammond, Associate Editor Gino Robair, Associate Editor Dennis Miller, Associate Editor David Rubin, Associate Editor Brian Knave, Editor Steve Oppenheimer, Editorial Assistant Matt Gallagher, Editorial Assistant Carolyn Engelmann, Associate Editor Jeff Casey, Managing Editor Mary Cosola, Editorial Assistant Rick Weldon.

Your options, then, are to get a more powerful CPU; to use a sequencer or a MIDI player, such as Arnold's MIDI Player *(freeware available from the CNet Web site, www.download.com), that gives you lots of playback control; to use a digital audio sequencer that imports QuickTime movies, which also allows you to work to picture; or to use an external sound module to process your voices, which would take some of the load off your CPU and give QuickTime the leeway to process your stereo effects.—Carolyn E.*

ERROR LOG

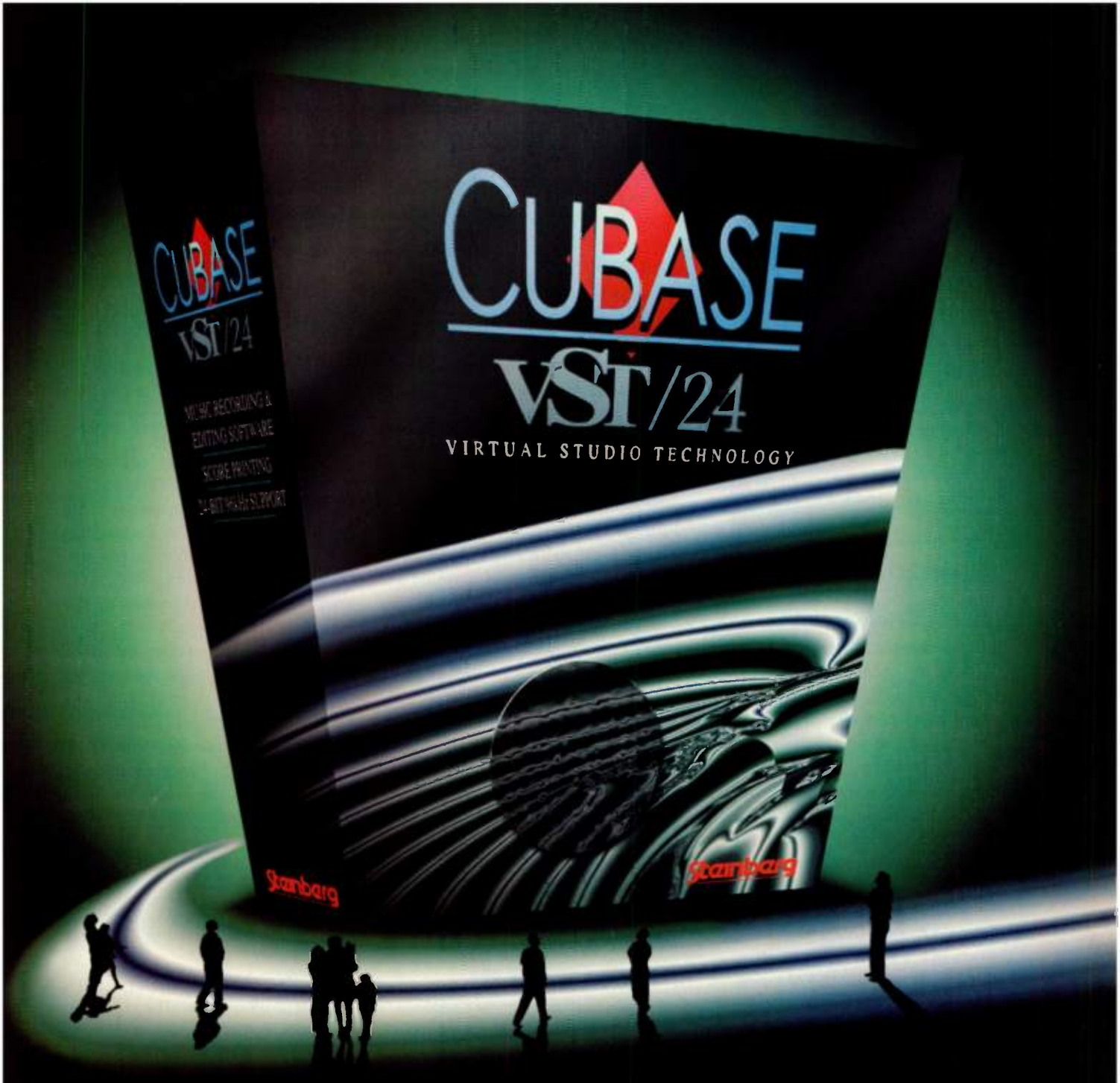
October 1998, "Contact Sheet," p. 195: We neglected to include the following contact information for products mentioned in "Mastering on a Budget": Weiss Engineering, Ltd.; tel. 41-1-940-20-06; fax 41-1-940-22-14; e-mail weiss@weiss.ch; Web www.weiss.ch.

October 1998, "Contact Sheet," p. 195: The correct e-mail address for Xavier Serra is xserra@iua.upf.es.

1999 Personal Studio Buyer's Guide, Recording/Editing Software table, p. 139: The correct price for SEK'D's *Samplitude 24/96* is $1,499.

WE WELCOME YOUR FEEDBACK.

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



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circle #506 on reader service card

WHAT'S NEW

By Carolyn Engelmann and Rick Weldon

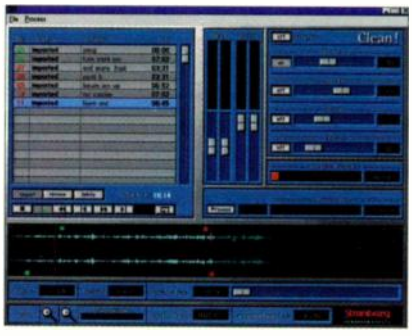
STEINBERG CLEAN!

Steinberg's *Clean!* (Win; $99) allows you to assemble WAV files for sequential playback, clean them up, apply fades for each file, and burn a CD-R submaster with any standard CD-R burner. The program also can record audio and save it as a WAV file. *WaveLab Lite* is bundled for more intricate editing.

As you assemble tracks, *Clean!* creates a track list with up to 99 titles. The track list can be exported as a text file that you can use when printing your CD cover or booklet. Four restoration modules provide declicking, denoising, descratching, and enhancing.

Clean! can run on Windows 95, 98, or NT, requiring at least 32 MB RAM. It requires a Pentium MMX/200 MHz or faster and a 16-bit, MME-compatible sound card; if you use a Pentium II, you can run all four sound restoration modules in real time. Steinberg North America; tel. (818) 993-4161; fax (818) 701-7452; e-mail info@steinberg-na.com; Web www.us.steinberg.net.

Circle #401 on Reader Service Card



GENELEC 2029A

With digital mixers and digital audio workstations becoming commonplace, Genelec has decided to extend the digital audio chain by providing powered speakers with digital inputs. The 2029A near-field monitor system ($1,325/pair) is based on the company's popular 1029A powered monitors and has the usual XLR and ¼-inch inputs for analog signals, but it also accepts 16- to 24-bit digital signals via S/PDIF (on a coax connector) and includes a 20-bit, delta-sigma digital-to-analog converter. The DAC yields a dynamic range of more than 101 dB.

The right enclosure is the master unit; it contains the power amp and stereo level knob for the pair, as well as frequency-response controls to customize the system to your studio environment. A Directivity Control Waveguide provides greater control of stereo imaging and frequency balance.

Each vented enclosure contains a ¾-inch metal dome tweeter and a 5-inch coated-paper low-frequency driver, both magnetically shielded. The enclosure is constructed of pressure-injected aluminum and contains integrated back-panel heat sinks. Crossover is at 3.3 kHz with crossover slopes at 24 to 32 dB/octave. The system can output peak SPLs of up to 110 dB at 1 meter. Overall frequency response is rated at 68 Hz to 18 kHz (-2.5 dB). Genelec; tel. (508) 652-0900; fax (508) 652-0909; e-mail genelec@genelec.com; Web www.genelec.com.

Circle #402 on Reader Service Card

SYMETRIX 302 AND 304

Symetrix has replaced its SX200-series signal processors, which have been available since 1987, with half-rackspace, 300-series models that offer more features at lower prices. The initial offerings in the new series are the 302 microphone preamp ($299) and 304 headphone amp ($299).

The 302 is a 2-channel, dual-mono preamp with globally switched, +48V phantom power. It has 20 to 60 dB variable gain, allowing it to operate at mic levels up to +14 dBV. The front panel provides a gain control with clip indicator, a polarity reversal switch, and a 15 dB pad for each channel. Input is through XLR jacks, and balanced outputs are provided on both European-style terminal strips and ¼-inch TRS jacks. The 302's frequency response is rated at 20 Hz to 20 kHz (+0/-1 dB), and THD+N is 0.007% (at 1 kHz, 0 dBu, 600Ω). The signal-to-noise ratio is 95 dB (-50 dBV, 150Ω).

The 304 2-channel headphone amplifier provides volume control for four headphones. The front panel has four ¼-inch outputs and an individual level knob for each, as well as a master level control and a stereo/mono selector switch. Two ¼-inch inputs are located in the rear, along with two ¼-inch thru jacks, which allow daisy-chaining of multiple 304s. The 304 allows for gain up to 20 dB, with a 95 dB signal-to-noise ratio and total harmonic distortion of 0.01% (1 kHz, 0 dBm, 600Ω). The frequency response is 20 Hz to 20 kHz (+0/-1 dB). Symetrix; tel. (425) 787-3222; fax (425) 787-3211; e-mail symetrix@symetrixaudio.com; Web www.symetrixaudio.com.

Circle #403 on Reader Service Card

PRESONUS M80

PreSonus's M80 8-channel mic/line preamp ($1,899.95) is housed in a 2U rack-mount all-steel chassis with an anodized aluminum faceplate.

Channel inputs are on ¼-inch/XLR Neutrik combo connectors, and outputs are on balanced XLR connectors. Each channel features a Jensen input transformer; a pan knob; a switch for L/R mix bus assignment; and a servo-balanced, send/return loop on balanced ¼-inch TRS jacks. Thus, the unit can act as an 8-in, 2-out mixer. For those who require more than eight mic preamps, an auxiliary input section lets you daisy-chain two or more M80s together.

Rather than incorporating capacitors, each channel uses an FET, discrete Class A input buffer followed by a twin-servo gain stage. Up to 60 dB of gain is available, using the M80's microphone input. Also on each channel are buttons for phase reversal, 48V phantom power, a 20 dB pad, and an 80 Hz, 6 dB/octave rumble filter.

Every channel features an IDSS knob that adjusts the drain current, and thus, the harmonic distortion of the incoming signal from 0.001 to 0.5%. This alters the even-harmonic levels of the signal to emulate the effects of analog tape saturation and tube warmth.

PreSonus rates the M80's dynamic range at >120 dB, its frequency response at 10 Hz to 60 kHz (±0.5 dB), and its THD+N at <0.02%. PreSonus; tel. (800) 750-0323 or (504) 344-7887; fax (504) 344-8881; e-mail presonus@presonus.com; Web www.presonus.com.

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ALESIS Q20

Alesis has released the 1U, rack-mount Q20 master effects processor ($999), which replaces the company's Q2. The Q20 operates with 24-bit internal resolution, and you can program and run up to eight effects simultaneously in series or parallel. You can route effects in any order or combination, and effects blocks can feed back into themselves.

The Q20 comes with 100 preset and 200 user-programmable effects. Many of the presets were designed by award-winning engineers and musicians such as Francis Buckley, Robert Scovill, and Todd Rundgren. Effects include hall, room, and plate reverbs; graphic and parametric EQ; flanging; chorus; pitch shifting; delay; rotary-speaker simulation; Doppler; ring modulator; and up to five seconds of delay or sampling. In addition to showing the names of effects programs, the backlit LCD displays Alesis's Virtual Patch Cables, which visually represent the effects being used and how they are routed.

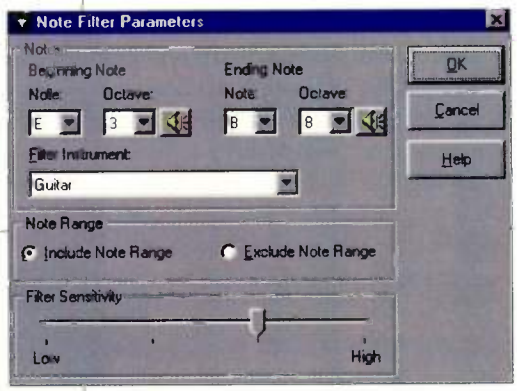
Analog input is on two balanced ¼-inch TRS/XLR combination jacks, and output is on two balanced XLR and two balanced ¼-inch connectors. A/D and D/A conversion is 20-bit. ADAT Optical and S/PDIF coax digital I/O are also provided. A BNC connector allows the processor to accept word-clock input, and MIDI In and Out/Thru ports are included.

Q20 can work at both -10 dBV and +4 dBu operating levels. Alesis rates its frequency response at 20 Hz to 20 kHz (±0.2 dB), dynamic range at >92 dB (A weighted, 20 Hz to 22 kHz), and THD+N at <0.005% (@ 1 kHz). Alesis Corporation; tel. (800) 5-ALESIS or (310) 255-3400; fax (310) 255-3401; e-mail alecorp@alesis1.usa.com; Web www.alesis.com.

Circle #405 on Reader Service Card

REPLAY DECOMPOSER

While listening to others' music, do you secretly yearn to make it better by adding your own parts? Would you like to play the solos yourself, using the other original band members as your own personal backing band? Replay Technologies' *DeComposer* (Win 95/NT; $99.99) is designed to let you take prerecorded music that is saved as a WAV file and apply filters in order to remove a single instrument—or even an entire instrument section—from the mix. It allows you to adjust the filter amount so that the given instrument is only partially removed, which is useful if you wish to learn a part and want a trace of that part for cues. In addition, you can program the filter so that only a given instrument remains.



You can filter to include or exclude any range of notes. In addition, you can make your own custom highpass, lowpass, band-reject, and notch filters. *DeComposer* also allows you to set up two filters and use them simultaneously. There are a number of preset instrument ranges to get you started, including guitar, bass, piano, trumpet, and violin. The program can also be used for general noise removal and can filter out 50 and 60 Hz hum, hiss, pops, and clicks. A Filter Sensitivity parameter lets you adjust how much filtering is applied.

DeComposer requires a PC running Windows 95, 98, or NT with at least an 80386 processor, 8 MB RAM, 5 MB free hard-drive space, a sound card, and a CD-ROM drive. Replay Technologies; tel. (888) 3-REPLAY or (516) 385-1398; fax (516) 385-1398; e-mail info@replayinc.com; Web www.replayinc.com.

Circle #406 on Reader Service Card

STOP THE PRESSES! ▲ ▲ ▲ ▲

Digidesign has released its most powerful Pro Tools system yet. Perhaps even more exciting, the company has made its digital audio workstations fully cross-platform, running on both the Mac operating system and Windows NT. All Pro Tools systems will ship with both Mac and Windows NT software. (Note that *Pro Tools PowerMix* is still available only for the Mac.)

On the software side, *Pro Tools* 4.2.1 has been released for Windows NT, and *Pro Tools* 4.3 has been released for the Mac OS. The two versions of the software have virtually identical user interfaces, and all session files can be directly read by either version. Most of Digidesign's TDM and AudioSuite plug-ins are now cross-platform, and the company states that many third-party plug-ins will soon be updated for the new system. (Check with individual companies for information on cross-platform availability.)

Along with the Windows software, Digidesign released Pro Tools/24 MIX ($7,995), a 16-channel, 64-track, core system card that has two to three times more processing power than a Pro Tools/24 system with both a core card and the company's DSP Farm card. The Pro Tools/24 MIXplus system ($9,995) includes *Pro Tools* software, a Pro Tools/24 MIX card, and a MIX Farm PCI card (which is also available separately for $3,995) that adds sixteen more channels of input and output and six more DSP chips.

The new cards have a DSP Manager function that optimizes DSP usage, and a new MultiShell feature that provides greater efficiency by allowing multiple plug-ins to run simultaneously off the same DSP chip. Using the MIX Farm card with an original Pro Tools/24 system adds Pro Tools/24 MIX DSP-managing capability to your existing system while increasing your track count to 64 tracks.

If additional inputs and outputs are all you need, you can get sixteen more channels of I/O with the MIX I/O card ($795). All of the Pro Tools MIX cards will be available for both Mac and Windows platforms in December; Pro Tools/24, which has been reduced in price to $5,995, also now runs on the Windows platform.

Macintosh users with *Pro Tools* software can upgrade to version 4.3 (Digidesign is offering a free upgrade from *Pro Tools* 4.2; $149 from older versions). The new version includes several new DigiRack plug-ins and a new SmartTool for creating, grabbing, and editing fades and crossfades; The SmartTool automatically changes its function depending on the current cursor position. The program supports the MultiShell plug-in feature on the new MIX cards.

A new track-arming feature called MachineControl allows the user to remotely activate tracks on 9-pin and V-LAN decks. You can use Machine Control or Digidesign's Universal Slave Driver with the serial port on the MIX Core, MIX Farm, or d24 card, instead of using your computer's serial port.

Another newcomer to the Pro Tools family is *Maxim* ($445), a peak-limiter plug-in for TDM and AudioSuite. *Maxim* provides parameter control for threshold, output ceiling, release time, gain reduction, and mix. It performs limiting by reducing peak gain, rather than clipping peaks, in order to maintain the maximum dynamic range of the signal while reducing its distortion.

The plug-in's graphic interface includes input and output meters and a color histogram that displays input peaks (in dBs) during playback. *Maxim* also offers dithering and noise shaping. It requires *Pro Tools* version 4.1.1 or later.

Digidesign; tel. (800) 333-2137 or (650) 842-7900; fax (650) 842-7999; e-mail prodinfo@digidesign.com; Web www.digidesign.com.

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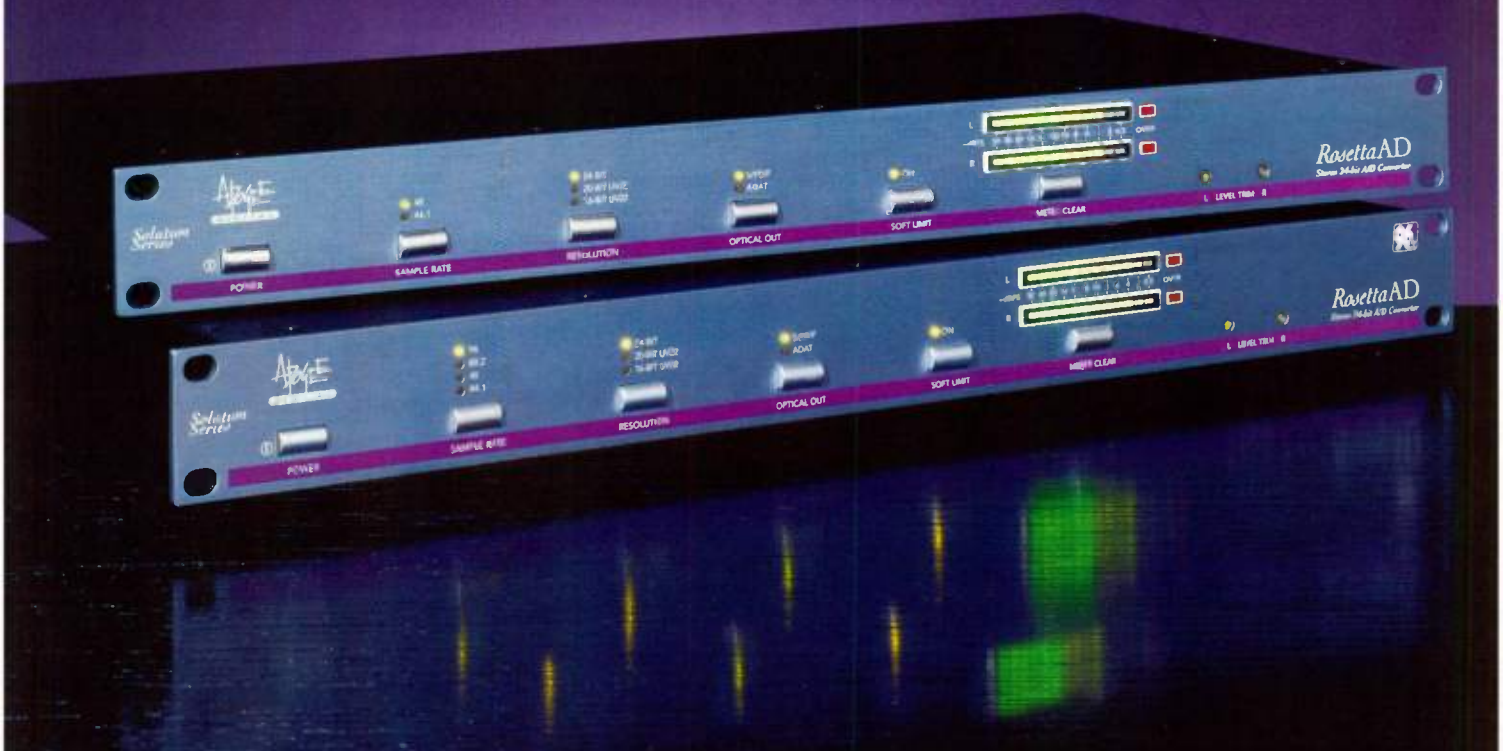

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PLUG-IN BONANZA ▲ ▲ ▲ ▲

▼ CAKEWALK

Cakewalk Music Software has introduced a two-in-one DirectX plug-in package designed to breathe analog life into digital recordings. *Audio FX 2* (Win; $159) offers both amplifier and analog-tape simulation, each with many assignable parameters, in one package.

The amplifier/speaker simulator provides the warm sounds of eight different amp types, including solid state, fuzz, and tube. Users can specify frequency response, with typical guitar-amp settings for presence, bass, mid, treble, brightness, tremolo, and drive, as well as cabinet size, off-axis mic position, and open or closed cabinet back.

The analog-tape simulator offers magnetic-tape qualities with adjustable settings for input gain, output gain, record level, "warmth" (output/input

level ratio), tape speed, standard tape EQ curves (highpass shelving filters), and added hiss. You can hit your virtual tape as hard as you want with full control of the outcome.

Audio FX 2 allows unlimited user-definable presets. The plug-in will run on a Pentium 120 or faster with Windows 95/98 and 16 MB RAM, or with Windows NT and 32 MB RAM. It runs with any DirectX-compatible host program. Cakewalk Music Software; tel. (888) CAKEWALK or (617) 441-7870; fax (617) 441-7887; e-mail sales@cakewalk.com; Web www.cakewalk.com.

Circle #408 on Reader Service Card

▲ INTELLIGENT DEVICES

It sounds like a hard candy that makes your eyes water, but it's actually an EQ plug-in that gives you tools for precision equalization. It's *Fire•Ball* (boxed/downloaded: Premiere $175/$149; VST $275/$249), a new plug-in for Macintosh and Windows from Intelligent Devices.

Fire•Ball (Finite Impulse Response Equalizer using control Balls) can be used for mono or stereo signals; in stereo, you can control each channel separately or both in tandem. The interface shows your EQ curve with 40 adjustable points, which may be manipulated by dragging them with your mouse, nudging them with keyboard arrows, or typing in values.

You can either make adjustments to the existing EQ or simply draw the curve you want on the screen, and you hear your changes in real time. The program offers four animated spectral displays: left and right in, and left and right modified. There are 99 levels of undo and 99 levels of Smooth/Unsmooth commands.

The plug-in comes with a library of presets and allows you to save your own. Intelligent Devices plans to provide a forum at its Web site where users can exchange custom presets.

For Mac, *Fire•Ball* requires a 604e CPU or faster, Mac OS 7.6 or later, and 1.5 MB free RAM. Minimum requirements for PC are an 80486 or Pentium running Windows 95 with 1.5 MB free RAM. The boxed version comes with a printed manual. Intelligent Devices; tel. (410) 744-3044; fax (410) 788-6370; e-mail sales@intdevices.com; Web www.intdevices.com.

Circle #409 on Reader Service Card

▼ STEINBERG

Two new plug-ins from Steinberg offer sophisticated de-essing and 7-band parametric equalization. *SPL Auto Dynamic De-Esser* (Mac/Win; $399) and *Q-Metric* (Mac/Win; $499) can both be used with host software compatible with VST, WaveLab, or DirectX plug-in formats.

SPL Auto Dynamic De-Esser provides a simple interface for quick reduction of vocal sibilance. It automatically identifies the narrow frequency band where sibilance occurs and then feeds a phase-inverted signal in the same range, dampening those frequencies while leaving all others unaffected. The only controls necessary to perform this function are S-Reduction level and male/female voice selection.

Q-Metric offers 24-bit processing of seven independent bands of EQ: three fully parametric midrange bands with adjustable Q, variable high and low shelving with switchable slope, and high- and lowpass filters. The interface consists of a control screen and a graphical display showing the filter output.

Minimum PC requirements for both plug-ins are a Pentium 133, Windows 95 or NT 4.0, and 32 MB RAM. For Mac, you need a Power Mac with Mac OS 7.5 or higher and 24 MB RAM. Steinberg North America; tel. (818) 993-4161; fax (818) 701-7452; e-mail info@steinberg-na.com; Web www.us.steinberg.net.

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KEY CHANGES

G-Vox Interactive Entertainment has acquired Passport Designs. G-Vox will continue to market Passport products like *Encore* and *Master Tracks Pro,* and in addition, the music-education software manufacturer plans to implement Passport's proprietary software in its own product line...**Sonic Foundry** announced the release of the Professional Remix Factory ($895), an all-in-one, software/hardware package for recording, mixing, and burning music onto CDs from your PC. The package includes Sonic Foundry's *Acid* and *CD Architect* software, a Microboards PlayWrite 4080 CD burner, a PCI SCSI card, and a SCSI cable...**TL Audio** has a new digital division, TL Audio Digital, Ltd., which specializes in the development and marketing of high-end digital audio products. The company also recently acquired the right to design, market, and sell the Audio Multiprocessor line of multichannel digital processors from Penny & Giles...**Re'an** has been acquired by Neutrik. Re'an will continue to manufacture its line of control knobs, connectors, and patch bays...**Tascam** has dropped the prices of a few of its digital tape recorders. The DA-38 is now $2,599 (down from $3,499); the DA-20 MKII, $899 (down from $1,099); and the DA-30 MKII, $1,299 (down from 1,599)...**OmniMount Systems** has acquired distributor Melody Audio. OmniMount will now distribute, as well as manufacture, its line of metal equipment racks, stands, and storage systems...**Emagic**'s *Logic Audio Platinum* and *Logic Audio Gold* v. 3.5 have newly added support for multichannel MME cards from RME, Alesis, Sonorus, Creamware, Korg, Event, and ProMidia. Emagic has also released multichannel MME drivers for use with the company's 8-channel Audiowerk 8 PCI digital audio card.

—Rick Weldon

▲ LUCID AD9624 AND DA9624

Recognizing the movement toward 24-bit, 96 kHz digital audio recording, Lucid has released the AD9624 ($899) analog-to-digital converter and the DA9624 ($749) digital-to-analog converter. The two stereo, half-rackspace units can be combined to provide a complete, 24/96 conversion solution in one rackspace.

The AD9624 accepts two line-level, analog inputs on XLR connectors. The converter can simultaneously output AES-3 on XLR connectors and S/PDIF on coax and Toslink optical ports. Although conversion is to 24-bit resolution, the AD9624 can downconvert to 16-bit digital output with noise shaping. The unit also offers external word-clock synchronization.

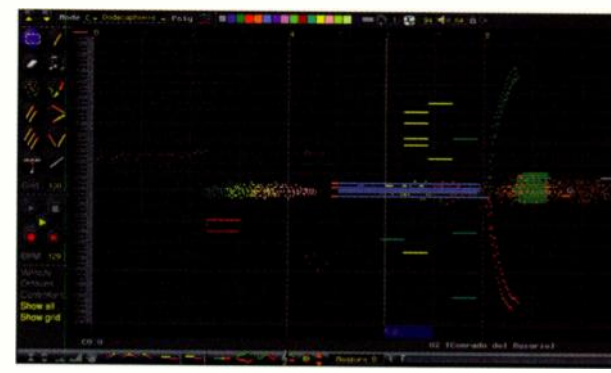
The DA9624 can accept AES-3 on XLR connectors and S/PDIF on coax and Toslink optical ports and output analog audio on either a balanced XLR or unbalanced ¼-inch jack. This unit also has a headphone jack with level knob.

Both units have 2-channel, 20-segment LED ladders for monitoring input level. They support 32, 44.1, 48, 88.2, and 96 kHz sample rates. Dynamic range is rated at >114 dB for the AD9624 and >110 dB for the DA9624 (A weighted). Lucid Technology; tel. (425) 742-1518; fax (425) 742-0564; e-mail lucid@lucidtechnology.com; Web www.lucidtechnology.com.

Circle #411 on Reader Service Card

▶ U&I XX

U&I Software is shipping *Xx* (Mac; $179), a new MIDI sequencer developed over the past five years by *MetaSynth* creator Eric Wenger. An all-purpose sequencer with special functions for use with *MetaSynth, Xx*'s highly stylized graphic interface gives you access to all the program's features on a single screen; there are no windows used to present toolbars or other extra information. In addition to tape deck–style transport controls, there are draw and spray paint tools with which you can draw in MIDI information. You can enter notes using a MIDI controller, a computer keyboard, or a mouse, and you can select and paste in MIDI note patterns from a set of pattern icons at the bottom of the screen. Track and MIDI channel numbers are differentiated by color.



Xx can detect a composition's key and the scale being used, and you can also program the sequencer to allow only the correct notes within a given scale to be entered. You can save any MIDI file as a PICT file and export into *MetaSynth* for further manipulation. Conversely, *MetaSynth* PICT files, or any other digital images, can be imported into *Xx* as a MIDI sequence.

Included with *Xx* is Headspace's *Beatnik Editor,* and *Xx* supports Apple QuickTime musical instruments. These features let you use the program without any additional hardware or software. *Xx* requires a Power Mac with system 7.6 or higher and at least 10 MB RAM. U&I Software/Arboretum Systems (distributor); tel. (800) 700-7390 or (650) 738-4750; fax (650) 738-5699; e-mail info@arboretum.com; Web www.arboretum.com.

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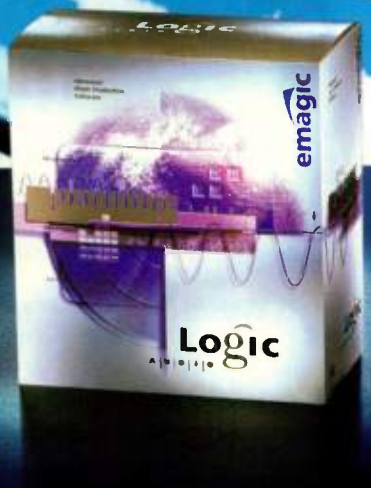

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REV UP ▲ ▲ ▲ ▲

▼ WAVE MECHANICS

Users of Pro Tools TDM systems can now purchase an updated version of Wave Mechanics' PurePitch TDM bundle ($895). New to the bundle are two real-time plug-ins, *PitchBlender* and *TimeBlender* (also available as a separate package for $495). Each is designed to re-create the sounds of vintage pitch-shifting hardware.

PitchBlender takes a mono source, splits the signal into two, and varies the pitch of each before sending the signals out through two channels. In addition to a multi-octave pitch-shift range, the plug-in features independent delays and filters for each channel and an LFO for each channel. The LFOs can generate several different waveforms, including sine, square, sawtooth, and random. Each of the three mod sources can function as a gate or an envelope detector. The waveform triggering, gate, and envelope detection can be keyed from the audio input or from a sidechain input. *PitchBlender* also comes with more than 100 presets that provide chorusing, amplitude modulation, auto-panning, and more.

TimeBlender is designed to emulate the function of reverse pitch-shifting hardware devices, which themselves were originally created to mimic the backward effects popularized by such artists as Jimi Hendrix. The plug-in features similar modulation options to those of *PitchBlender*. Wave Mechanics; tel. (973) 746-9417; fax (973) 746-0762; e-mail info@wavemechanics.com; Web www.wavemechanics.com.

Circle #413 on Reader Service Card

▲ CAKEWALK

Cakewalk's *Pro Audio* upgrades have been coming on fast and furious over the last couple years. The latest, *Pro Audio 8* (Win 95/98/NT; $299), sports a number of new features in addition to its ability to record and edit up to 128 tracks of 24-bit, 96 kHz digital audio. (The program also supports 16-, 18-, 20-, and 22-bit audio and features 32-bit internal processing.)

Perhaps most interesting is the inclusion of real-time MIDI effects, which work similarly to their audio counterparts. Editable effects such as Quantize, Delay, Echo, MIDI Event Filter, Transpose, and Velocity Shift, as well as a chord analyzer and an arpeggiator, are included, and users can patch these into any of their MIDI tracks during playback of a sequence.

Pro Audio 8 also supports several video formats, including AVI, QuickTime, and MPEG. You can create or modify existing soundtracks within these files with sample-accurate synchronization, scrub audio and video together, and loop video as you would audio. Video and audio tracks can be exported to a new AVI file.

With the new version, you can draw volume and pan changes directly on top of audio tracks. Other new features include a Patch Browser, which lets you search for MIDI-device programs by using keywords, lasso-style zooming, and an event-list display filter. Finally, SysEx messages can be echoed in real time, so that your MIDI equipment responds immediately as you make changes to MIDI data.

The upgrade is available to registered users of *Pro Audio* 7 for $19; however, it is free if you purchased version 7 on or after September 1, 1998. Cakewalk Music Software; tel. (888) CAKEWALK or (617) 441-7870; fax (617) 441-7887; e-mail sales@cakewalk.com; Web www.cakewalk.com.

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▼ ARBORETUM

Arboretum is shipping an AudioSuite version of its *Ionizer* noise-reduction plug-in. This version will allow for use within Avid Media Composer 7.0 and Xpress 2.0 systems, as well as Pro Tools.

Ionizer 1.2.6 ($399), which is also available in a stand-alone version and as a Premiere-format plug-in, offers spectral analysis and up to 512 bands of

EQ per channel. Each band has a gate and two adjustable thresholds. The equalizer can be customized for use as a high- or lowpass filter, brickwall limiter, notch filter, and so on. When used with *Ionizer*'s threshold controls, these functions can be dynamics dependent. In addition to broad-band noise reduction and equalization, the application is designed to act as a compressor/expander. Thirty-two-bit, floating-point processing is used within the program. Arboretum Systems; tel. (800) 700-7390 or (650) 738-4750; fax (650) 738-5699; e-mail info@arboretum.com; Web www.arboretum.com.

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Available on Mac OS and Windows NT*

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Pro Tools | 24 MIX:

Incredible Mixing and Processing Power

- 3 times the DSP power of Pro Tools | 24
- 64 tracks — all with a single card
- Amazing 24-bit fidelity, from input to output; recording, editing, automated mixing, and mastering; world-class Plug-Ins from the best names in audio; and great-sounding new DigiRack™ Plug-Ins included for *FREE*
- Seamless session and audio interchange between Mac OS and Windows NT

* *Windows NT availability expected late 1998*

Pro Tools | 24 MIXplus:

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Check out this sample Pro Tools | 24 MIXplus setup:

- 32 tracks (up to 64 possible)
- 4-band EQ and dynamics on every disk track
- 2 TC reverbs
- 10 delay-based effects
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- 48x32x2 mixer

All running simultaneously and in real-time!

For more information, or to schedule a free demo, call 1.800.333.2137, code 415.
To learn more about Pro Tools software capabilities, ask for a free video. Already own Pro Tools? Call about our special Pro Tools | 24 MIX exchange offers!

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The EM gift guide

By Mary Cosola

Yep. It's that time of year again. Time to start stimulating the economy and spend, spend, spend. *Sigh.* Wouldn't it be nice if you could find affordable and useful gifts for the musicians on your list? (And maybe, *just maybe,* find room in your budget for a few goodies for yourself?) Well, help is here.

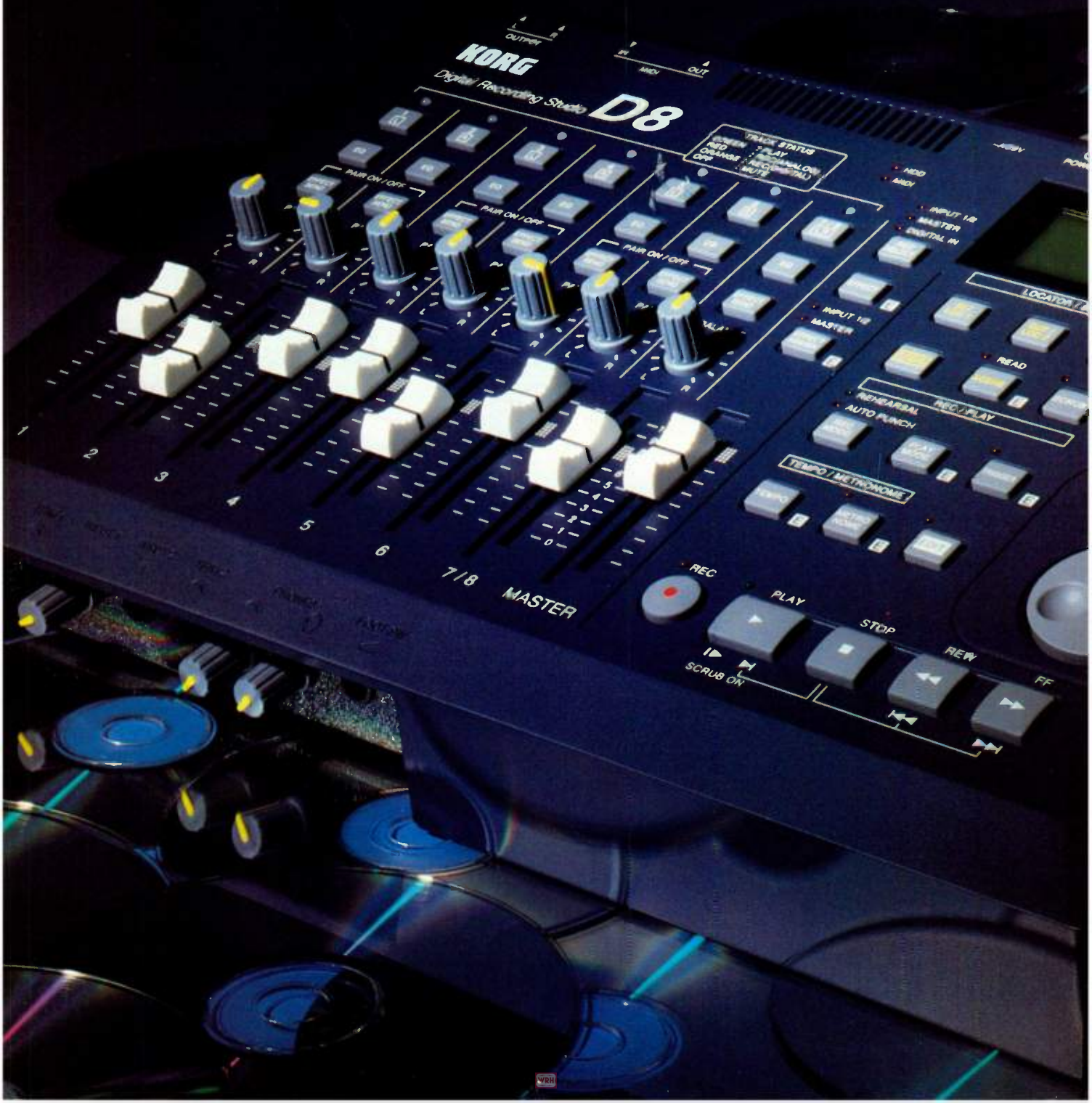
When casting about for ideas for this article, I asked the staff members of **EM**, *Mix*, and associated publications (*Recording Industry Sourcebook,* MixBooks, etc.) for their ideas on inexpensive, useful, and perhaps overlooked gift ideas. What an inspired group I work with! Ideas poured in from every department, and all of them were good. Because of space considerations, I had to pare down the list to just seven selections. Read on for an array of gift ideas for friends, family, or even yourself. (Nonchalantly leave this magazine around the house with sticky-notes next to the items you covet. Trust me. It works.)

PHOTOGRAPHY BY RON MILLER

A COLLECTION OF AFFORDABLE AND FUN GIFT IDEAS.

Give yourself or another musician in your life the gift of a professional-quality mastering medium. **Apogee Electronics,** well known in the industry for its pro-quality digital media, has recently introduced its Producer's Pack, which is standard packaging when you buy ten Apogee DAT tapes. (The pack is only available with the purchase of ten tapes; it is not sold separately.) The case has the Apogee logo and two windows for labels or your business cards. It's a perfect way to store or ship your precious masters. Shown above is a Producer's Pack of Apogee AD34-PP tapes (running time 34 minutes, $7.70 each, $77 for the ten-pack). Other tape lengths are available.

From recording
D8 does it all, i



to mixdown, the ncluding effects.

All digital 8-track recording studio
The D8 is all digital, including the recorder, mixer and effects. Your material remains in the digital domain throughout the entire recording and mixing process, yielding superior results no matter how many times you bounce tracks.

No data compression
The D8 records CD-quality (44.1kHz) digital audio with no signal robbing data compression. Other recorders with smaller drives use data compression to increase recording time. This results in signal degradation and reduced sound quality, which is especially noticeable when tracks are bounced.

Built-in 1.4 GB hard disk
4 1/2 reliable hours of music on a track, or 34 minutes on all 8, the D8 has room to spare—avoid the pitfalls of having to use an external drive as your primary recording medium.

Easy to operate interface
If you can use a tape recorder, you can use the D8. Go digital without the annoying learning curve. Valuable features like cut, paste, copy, scrub and set start/end make recording and arranging simple.

12-channel, 4-bus mixer section
All settings such as fader, EQ and pan can be memorized as a scene, and up to 20 scenes can be memorized per song. No other comparable unit offers this feature! The D8's mixing capabilities let you create a CD-quality "finished" recording quickly and easily!

Built-in SCSI port
Unlike most portable units, SCSI comes standard. SCSI provides flexibility, easy data archiving and gives you access to an amazing amount of recording time.

50 quality digital effects built in
Not just any effects—*Korg* effects! You'll find the best selection (including awesome multi-effects) of any portable device. 65 presets and 65 user programs!

Guitarist friendly
No amp, pre-amp, or direct box needed... Just select the correct level and impedance for direct connection and get great guitar sound quick, and with no hassle. The D8 even has an amp simulator and a cabinet resonator... you'll never mic' another amp!

131 internal rhythm patterns
No other recorder offers this! Perfect for trying new ideas, or just playing along to. And they don't even take up track space! Lay down scratch tracks in a hurry—with no drum machine required.

D8 Digital Recording Studio
List Price: $1250

KORG ***D8 Digital Recording Studio***

© 1998 Korg USA, 316 South Service Road, Melville, NY 11747. Prices and specifications subject to change without notice. For the Korg dealer nearest you: (800) 335-0800
www.korg.com • Tech support: (516) 333-8737 • For more information about the D8 Digital Recording Studio via faxback call: (516) 393-8530 doc # 4101

circle #510 on reader service card

Make it your New Year's resolution to send out only the most professional-looking CD demos. To help you achieve this goal, **Stomp, Inc.** just reduced the price of its CD Stomper CD Labeling System by $20 to $49.99, which makes the kit one of the best CD-labeling deals around. The Stomper system comes with ten blank jewel-case inserts, 50 blank CD labels, a label-alignment tool, and a CD-ROM (Mac/Win) with design software, clip art, and templates for other graphic-design programs (such as Adobe *Illustrator*).

The djembe (a, $69) and floor tom (b, $38) from the **Remo** Kid's Percussion line are anything but child's play. George Petersen, editor of *Mix*, urged me to include these products in this guide. Here's what he had to say about his djembe: "The Kid's Djembe is an expressive instrument with excellent tone and tight definition, especially with finger rimshots. If you think of this drum as an 'alto' djembe, you get a better feeling for what it does. I've had one for several years now, using it on over 100 live performances and numerous recordings. The Rainforest finish is cool and the pretuned Fiberskyn head doesn't change tunings with heat or humidity changes."

If you can't afford to spring for a real theremin as a present, how about some affordable theremin-related gifts from **Big Briar, Inc.**? The ThereminHead mug sports a picture of Bob Moog with theremin antennas coming out of his head and the question "Has the theremin gone to your head?" Then there's the Minimug, with its silk-screened reproduction of a Minimoog (mugs are $8 each). Other items from Big Briar include bumper stickers, a Clara Rockmore CD, a video entitled *Theremin: An Electronic Odyssey*, Leon Theremin T-shirts, and more.

PHOTOGRAPHY BY RON MILLER

For manufacturer information, please see Contact Sheet, p. 163.

In 1990, Sweetwater Sound Inc. created an exciting new way to serve musicians and studios. We combined the convenience of direct-to-your-door service with a solid focus on music technology.

Like L. L. Bean, Dell and other specialty direct marketing leaders, Sweetwater is fortunate to have grown by leaps and bounds, while earning your trust and providing greater and greater value. Our exclusive "Music Technology Direct" approach has helped over 150,000 satisfied customers make their musical dreams come true.

Music Technology Direct!

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What does Music Technology Direct mean to you and your music?

1. Convenience. You get the right gear, when you need it!

It's like having a huge warehouse of music gear right outside your front door! One call gets you all the top brands—no chasing around all over town! Why put up with any hassles?

2. Savings. You get a fair "ProNet" price.

We stock in tremendous quantity to get the lowest possible cost from our vendors. We pass the savings directly to you with our "ProNet Pricing." Why spend more?

3. Service. You get great Tech Support and Service, when you need it.

Help with an installation? Confusing problems? We know our stuff cold! We don't pass the buck, we get you back to your music as fast as possible. Why wait?

4. Respect. You get treated with respect.

Shouldn't shopping for gear be easy and fun? We'll do everything we can to make sure you have a great time selecting and building your rig, without pulling out your hair! Why not enjoy yourself?

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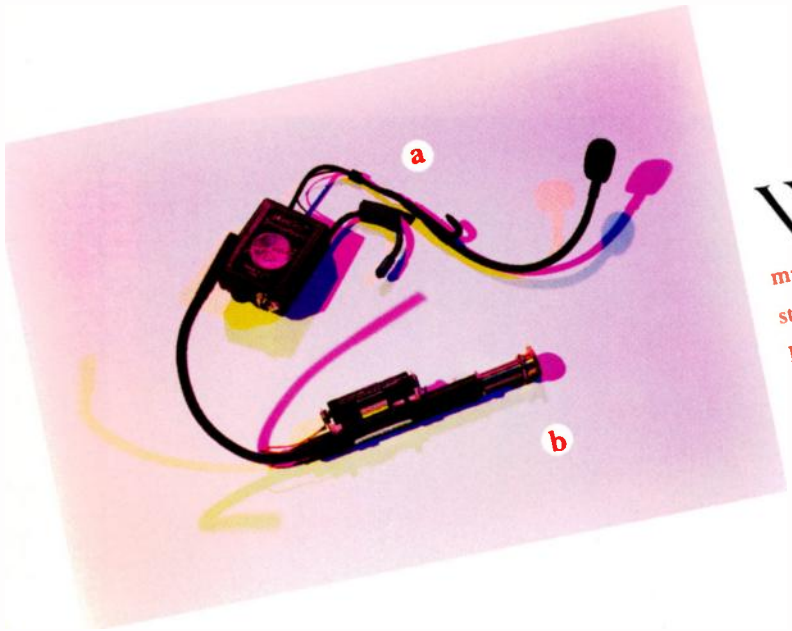
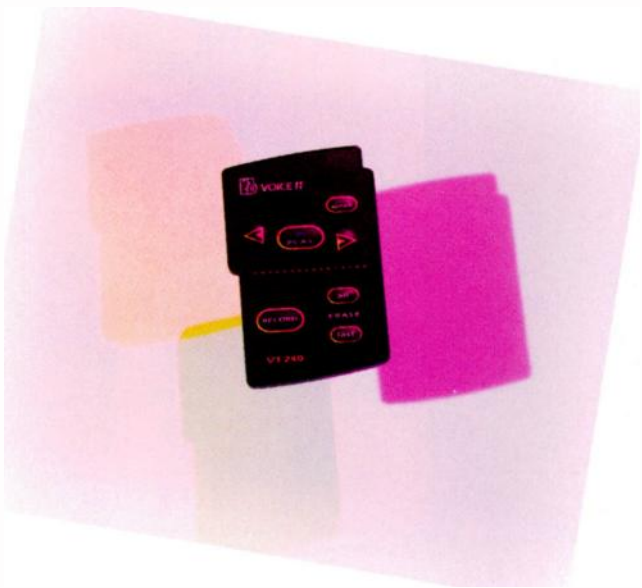
What turned the music technology industry on its ear?



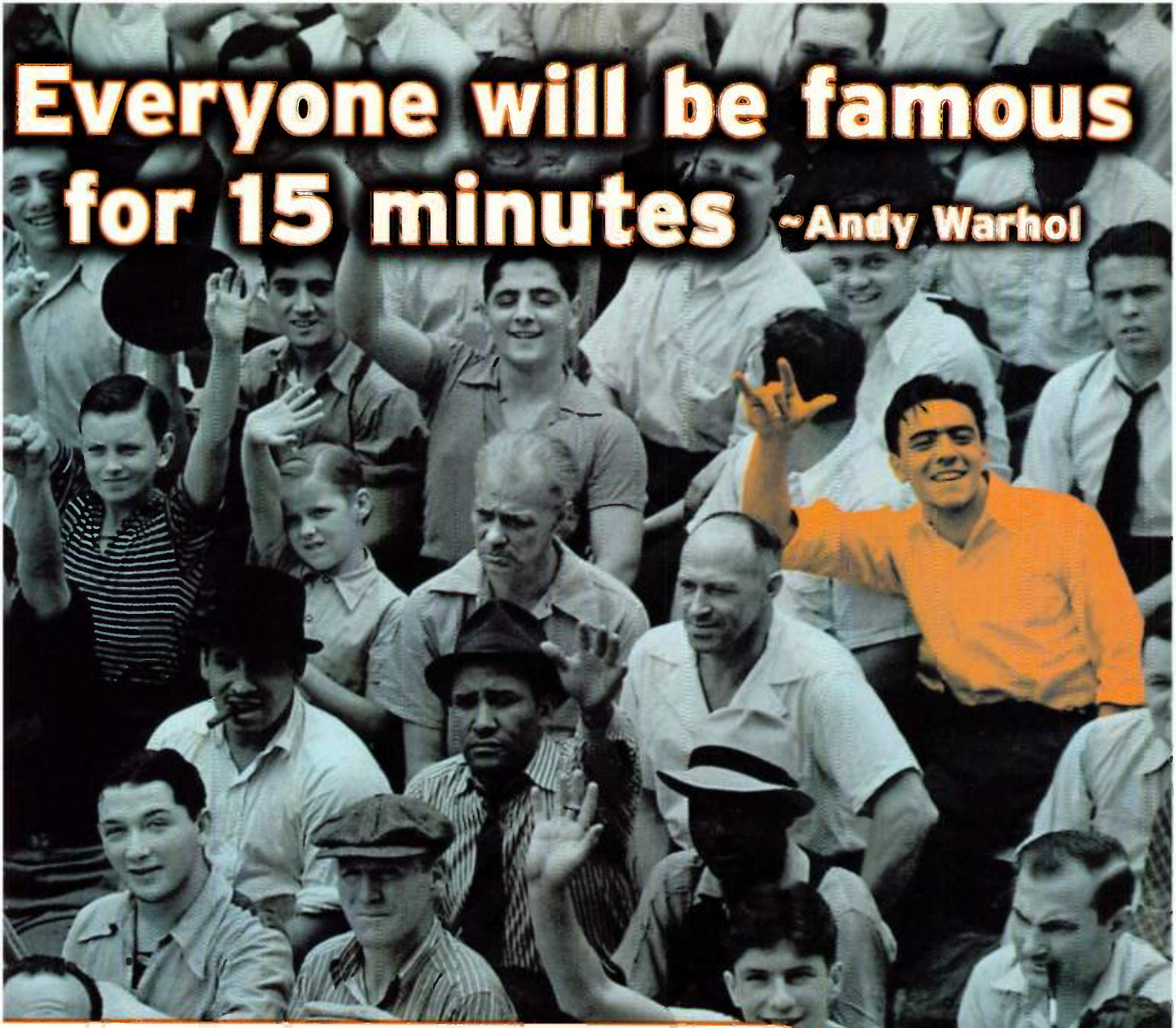
We could all use more flexibility in our lives, so why not start with mics? **MiniFlex Innovations** makes an array of flexible mics that attach directly to stringed acoustic instruments. Shown here are the model 128 Soundhole omnidirectional mic (**a**, $99.50) and the model 122 MiniFlex omni guitar mic (**b**, $124.50). Other models with different polar patterns and volume control are available, as are various mounting styles.

When coworker Alex Artaud, editor of *Mix en Español*, heard that I wanted ideas for a gift article, he suggested his beloved **Voice-It** VT-240 voice recorder. He uses it for capturing spur-of-the-moment lo-res vocal and field samples. The unit's slim profile lets him carry it everywhere for that very purpose. Artaud's VT-240 (shown here) has been discontinued, but Voice-It makes the VT-90 ($49.99) and VT-300 models, both of which are similar in function to the VT-240.



And finally, a subscription to **EM** ($36) is a substantial savings off the newsstand price, and it ensures that you'll never miss a month of information on the latest in recording applications; music technology; and new, hot gear. Also shown here is a sampling of titles from **MixBooks** and **EMBooks**: *The Home Studio Guide to Microphones*; *Music Publishing: The Real Road to Music Business Success*; and *The Songwriter's Guide to Collaboration*. New titles just out include *The Independent Working Musician* and *The Dictionary of Music Business Terms*.

PHOTOGRAPHY BY RON MILLER



Every 15 minutes someone buys an Opcode MIDI interface

By our calculations, somewhere in the world, an Opcode MIDI interface for Windows or Macintosh is sold about every 15 minutes. And they've been selling well for about 15 years. Musicians choose Opcode because of reliability, ease of setup and variety. And we've just spent the last six months making our PC interfaces compatible with an even wider ranger of PC models. The setup and installation has been simplified and we now have ten models including the the MIDI Translator series and our professional rackmount Studio series: the 128X, 64X, XTC and the 5LX. Take your pick.

MICROSOFT WINDOWS COMPATIBLE

Pros* use our MIDI interfaces on-stage and in the studio everyday, if *your* 15 minutes is about due, see your music retailer today for your next MIDI interface – just ask for Opcode.

Check our web site for the latest news or more information at www.opcode.com

*Tim Myer, MIDI tech-extraordinaire, is currently on the road with Janet Jackson and the Studio 5LX. The Dust Brothers are using the Studio 64XTC for digital recording. Nick Hexum of 311 fame used the Studio 5LX on the platinum "Transistor" release. You're next.

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OPCODE

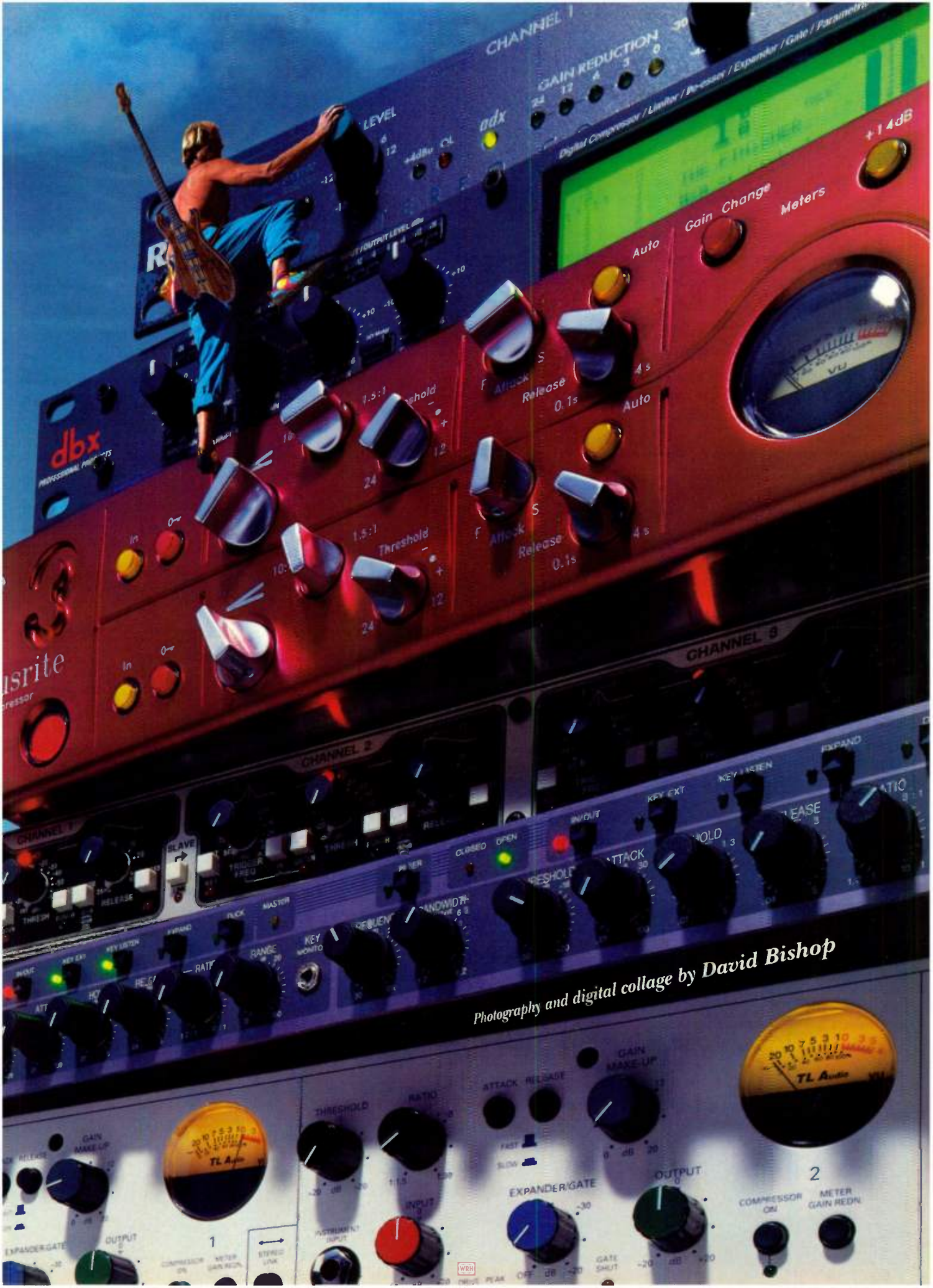
Conquering PEAKS

By Jeff Casey

FIFTEEN ESSENTIAL DYNAMICS PROCESSING APPLICATIONS.

Imagine what would happen to the Colorado River basin if the Hoover Dam didn't exist. During heavy rains the river would swell, flooding low-lying areas and washing away crops, livestock, and homes. In times of drought the river bed would dry up, leaving the land completely infertile. The dam keeps the flow of water regulated at a constant value—shutting floodgates when necessary and opening them a certain amount as needed—maintaining the stability of the valley's ecosystem. Without it, this geographic region would be totally at the mercy of the rainfall.

Dynamics processors are a lot like the Hoover Dam, and without them a mix would be slave to the dynamic range and noise of its individual components. Dynamics processors allow us to regulate audio levels by determining what signals will pass through, as well as how much and when, based on the content of the input signal. No matter what you're doing—be it music production, film scoring, or spoken word—chances are you'll need to use some sort of dynamics processing during your session. This month, **EM** offers up fifteen typical applications for this essential processing.



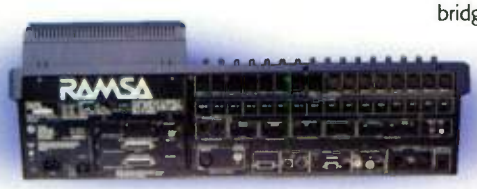
Photography and digital collage by David Bishop

Advanced Digital Mixer

Panasonic is taking digital further today with the DA7 digital mixer, an entirely new standard in quality, flexibility, affordability, ease-of use and value. 24-bit converters, 32 inputs, 8 buses, 32-bit processing, moving faders, instantaneous recall of all settings, surround sound mixing...nothing this fully featured has been this easy to use or affordable... and it's available NOW! Incredible sound quality, Internal 32-bit processing and 24-bit A/D and D/A converters give this mixer sound worthy of consoles costing several times its price.

Easy-to-use. The DA7 is one powerful mixer. If you know how to run a traditional mixer, you already know how to run a DA7, since it has a smart, user-friendly design. To access any of the 32 channels, just press its select button and all parameters for the channel-EQ settings, bus and aux assignments, and dynamics and delay settings come up on the large backlit LCD screen. To access individual parameters, just touch the appropriate knob in the console's master section. This automatically calls up the sub-menu on the LCD screen and zooms in on the appropriate function. No more digging through menus or getting lost in functions; just adjust EQ, Pan/Assign, Dynamics/Delay, or Aux... and you're there.

The power to control. The EQ section offers 4 true overlapping parametric bands active on every channel (with the top and bottom bands switchable to low or high peak/shelving, or low pass, or high pass filters). Each Aux return also provides two bands of fully parametric EQ. The dynamics section offers variable attack/release times and levels for threshold and ratio on each channel, and delay is adjustable up to a maximum of 300ms. 50 Memories each are provided for EQ, Dynamics and individual channel settings. In addition to full dynamic moving fader automation of 32,000 events, there are 50 "snapshot" or "scene" memories. Plus, a Macintosh and windows software package (that greatly expands the capabilities of the DA7), will soon be available.



Surround sound at your command. You'll be mixing surround soon. The DA7 is equipped to mix 5.1 channel today. The DA7 has 3 built-in panning modes, and all modes provide full dynamic control of panning, and can be copied, stored, and transferred to any other channel. An optional MIDI joystick gives you yet a fourth method of surround control.

MIDI and more. The DA7 features 4 up/down/left/right cursor keys that can be switched to output MIDI Machine Control commands to MDMs, sequencers, or workstations. Data entry is done through the large parameter dial or an alphanumeric keypad. There's also an undo/redo button, a solo-mode set, and a built-in Talkback mic.

Take on the world. The rear panel sports 16 analog mic/line inputs (8 XLR with individual software-switched phantom power, and 8 with TRS); 16 channel inserts (pre-A/D); and 6 auxiliary send/return jacks (1,2 use S/PDIF; the rest use +4dB 1/4inch connectors). Along with the 2 digital and 4 analog Aux returns, the DA7 has 38 total inputs. Digital I/O, provided via XLR connectors switchable between AES/EBU and S/PDIF, offer the master out signals and they can be assigned to inputs 15 and 16.

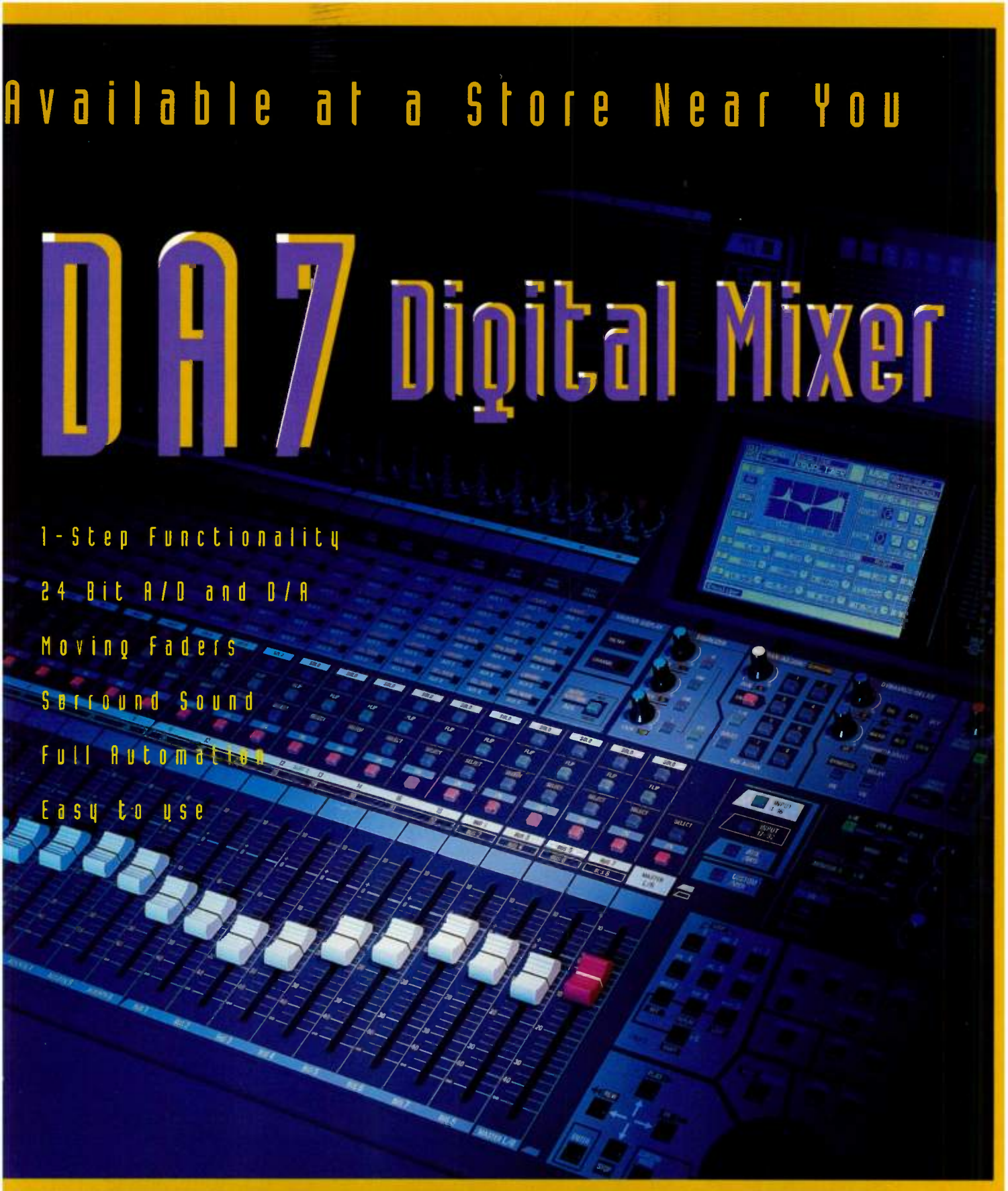
The DA7 rear panel also offers MIDI In and Out, word clock I/Os, both a 9-pin RS-422/485 serial port and PC port for Mac or Windows with software support for both, a 1/4 inch footswitch jack for controlling Talkback on/off or automatic punch in/out, and a D-15 subconnector for the optional meter bridge. So, take your digital mixing further today by going to the nearest Panasonic dealer and auditioning the DA7 for yourself!

PANASONIC PRO AUDIO
TAKING DIGITAL FURTHER

For more information call:
1-800-777-1146 or visit our website at
www.panasonic.com/proaudio

Available at a Store Near You

DA7 Digital Mixer



- 1-Step Functionality
- 24 Bit A/D and D/A
- Moving Faders
- Surround Sound
- Full Automation
- Easy to use

Taking Digital Further

Panasonic
Broadcast & Digital Systems Company

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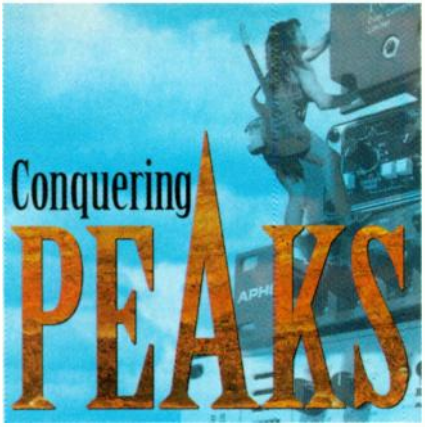


TAKE A LISTEN

There are myriad reasons for regulating the dynamics of a track or mix, and dynamics processors are effective tools for helping to make your recording as tight as possible. For example, carefully adjusted compression can bring out a track in a mix without overloading the console. Likewise, erratic transient signals such as cymbal crashes and staccato horn notes can be kept under control through limiting, and signals containing excess noise during nonplaying sections can be silenced with gates.

To get some outside input for this article, I spoke with Sean Miller, owner of Loud-Mix Studios in New Jersey, and Paul D'Angelo, a post-production engineer at Central City Recording in Los Angeles, who specializes in music for television. Both engineers agree that, before you go crazy with dynamics processing (especially compression), it's important to do some critical listening. Remember, dynamics processors are the clean-up crew and should be used accordingly. At mixdown, it's almost second nature to patch gates on the drums, a compressor across the vocal track, and a limiter on the bass guitar. However, you need to stop and listen to the performance. Miller explains, "Dynamic motion is a big part of a good mix, and if you think a track can be blended well without altering its dynamics, that's even better."

D'Angelo says that he recently did a session with a really well-trained singer "whose dynamic range was completely under control. The bassist's dynamics, however, left quite a bit to be desired. In the mix, the vocal was okay without processing, but the bass guitar needed to be heavily compressed."

The style of music you are producing should also influence how much processing you use. For pop, rock, urban, and alternative music, tracks need to stand out, so compressing or limiting various instruments' dynamic ranges is almost inevitable. Jazz and classical, on the other hand, rely heavily on the accuracy of the dynamics within a performance.

No matter how much you use dynamics processing in a session, it should go unnoticed by the listener, unless you are using it to create an "out there" effect. D'Angelo explains, "If something is adjusted improperly, you'll hear it. If the bass guitar sounds noticeably squashed and boring, you're most likely overcompressing the signal. If you can hear a gate opening and closing, you need to adjust the attack and release times, or if your compressor is making a pumping sound, you need to extend the release time."

WHEN TO PROCESS?

The debate will always arise as to whether you should process signals before recording or during the mixdown. While it's generally a good idea to remember the axiom "You can always add" with regard to multi-effects processing and EQ, the rule for dynamics processing is not quite as clear.

Compression and limiting present the largest gray area. Many engineers like to print a "hot" signal to tape, and the only way to do that is to add compression before recording. Likewise, people using digital recorders often apply limiters to certain signals (e.g., vocals and drums) to prevent transient peak distortion at the multitrack.

The argument against this is the belief that signals should be routed to the multitrack through the shortest path possible, which means interjecting little or no processing en route. Other skeptics simply don't feel comfortable experimenting with live performances and would rather have a "dry" signal to work with later.

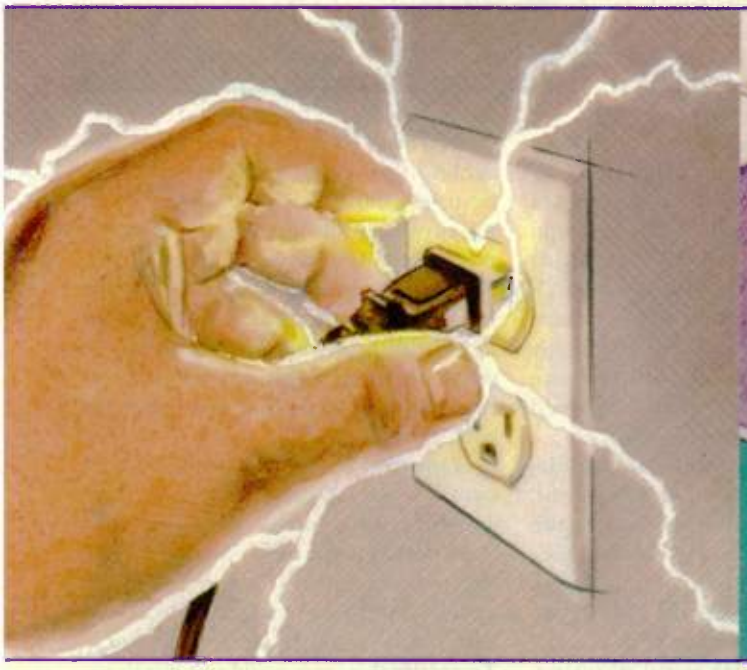
Miller again suggests the best advice is to decide on an application-by-application basis. "No two performances should ever receive the exact same treatment," he says. "If the signal has a really broad dynamic range that you think will be a problem during the mix, then compress it going to tape." However, slamming a signal with compression all at once is not necessarily the best idea. Often, applying a moderate amount before recording—just enough so that the signal gets printed hot—gives you much more mixdown flexibility than with an already heavily compressed track. "You always want to be cautious of dialing in extreme settings that you may regret later on," says Miller.

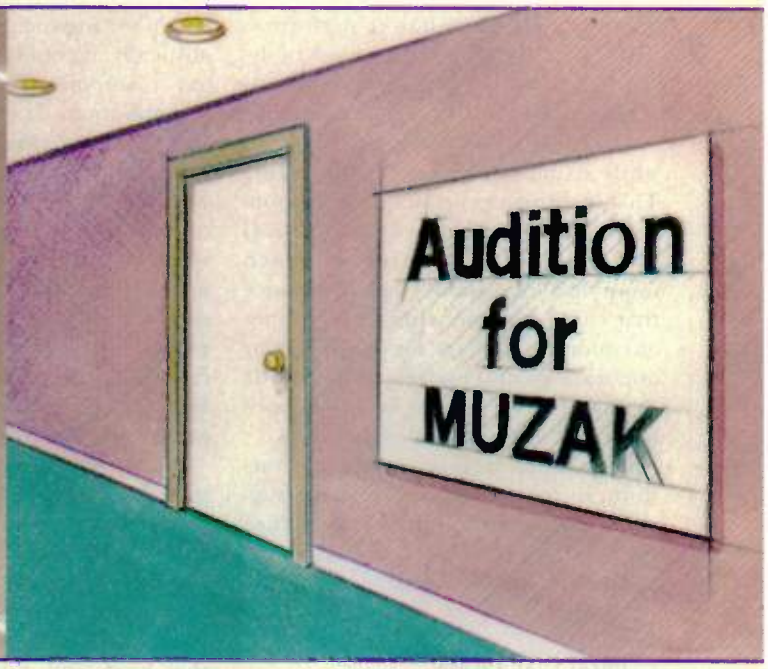
You also need to take into account how many dynamics processors will be available at mixdown. If you only own a stereo compressor/limiter or a single-channel expander, you might want to apply light processing to signals that need it before you record them, and then use your units for the most problematic tracks during the mix. Gates, on the other hand, are a different story, which we'll discuss in detail later.

Regardless of when you apply dynamics processing to a signal, it's a good idea to periodically monitor your tracking session with *all* processing engaged. This means that, if you're processing a signal before recording and are planning to add more during the mix, you should have a second processor connected that you can turn on and off for referencing.

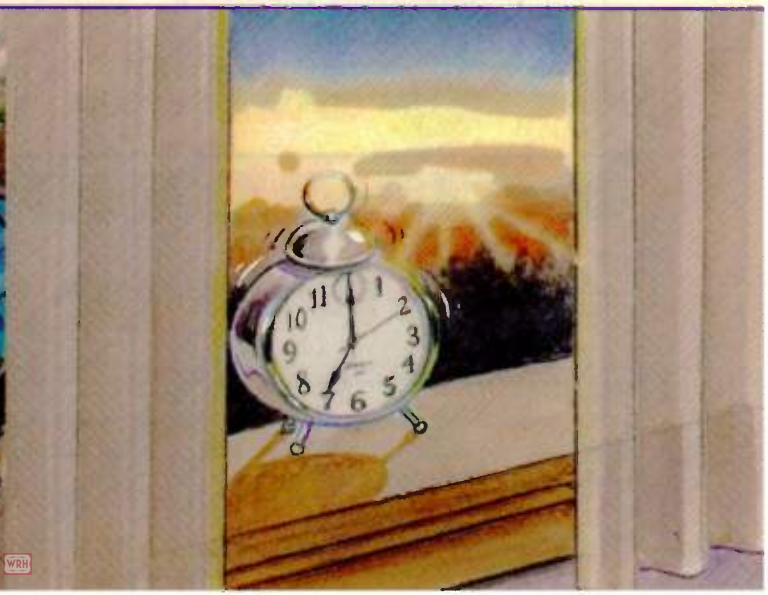
The dbx 166a is one of the world's most popular dynamics processors. Offering two channels of compression, limiting, and gating, this unit is a great choice for personal studio owners—and at $429, it won't kill your budget.

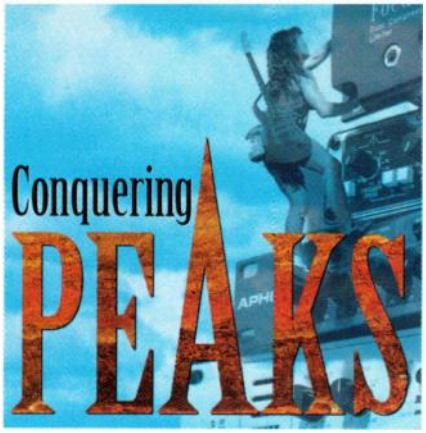
There are many things





a musician can live without.





THE TOP 15

This is not a comprehensive article; not *all* possible applications for dynamics processors are covered here, just those that are most common. Although only some of them are likely to apply to your day-to-day work, this represents a pretty good list of applications that any engineef should know how to perform.

You'll notice that certain types of dynamics processing receive more attention than others. For example, compression is part of nine applications, while expansion is covered in three. This is a direct reflection of the popularity of these processors in practical use: people use compression much more than expansion. You'll also notice that certain instruments receive more attention than others; for example, four applications deal entirely with acoustic drums. I have simply devoted more space to the more challenging tasks.

Remember, nothing exists in a vacuum, so you should interpret the suggestions that you read here as reference points that are subject to change depending on the particular signal you're dealing with.

1. COMPRESSING VOCALS

Most engineers agree that, if they had only one compressor in their studio, it would probably wind up on the lead vocal track. Vocals are one of the few recorded instruments in which the distance between the sound source and the microphone constantly varies; even trained singers don't stand completely still. (Just picture Robert Plant thrashing about in a vocal booth, and you get the idea.) In the worst-case scenario, this variable will be factored in on top of an already dynamic performance, resulting in a track that screams to be regulated.

Theoretically, you could ride the fader during mixdown to compensate for changes in level. There's a major problem with this, though: by the time you react to a peak in the signal, it's too late to do anything about it. Even with an automation system, this is an inefficient way of solving the problem; realistically, it could take you all day to automate a single track to perfection. The answer, of course, is compression.

When working with a well-trained vocalist who has good microphone technique, a relatively subtle compression setting (2:1 ratio, -10 dB threshold) usually works fine. However, not all singers have such a controlled dynamic range (see **Fig. 1**), and a more dramatic ratio is usually necessary—somewhere between 3:1 and 5:1. (You may need to readjust the threshold, too.)

Attack and release times should depend on the tempo of the material. Don't reference these settings to the tempo of the overall song, though; they should be relative to the tempo of the vocal track. Miller explains, "There are plenty of hip-hop songs with steady, slow beats and quick vocal phrasing. In these cases, I usually set the release time tight, even though it contradicts the rhythm of the song."

For a more intimate vocal, almost like a whisper, try overcompressing the signal. This usually works best with vocalists who tend to sing with an "air" to their voice (e.g., Barry White). To achieve this effect, a hard ratio should be used (between 6:1 and 10:1), and the threshold should be well below the peak signal (between -10 and -20 dB). The attack time needs to be fast for this application, and the release should again depend on the tempo of the vocal phrasing. Multi-effects processing is usually kept to a minimum on such intimate tracks.

Compression can be a double-edged sword, especially at extreme settings. Any time you apply it to a signal, low-level noise (particularly hiss from analog tape machines) becomes more apparent during breaks in the material, which are common on a vocal track. To rectify this, you could use mixdown mute automation, or you could employ a gate or expander after the compressor (more on this later).

If you notice a problem in the frequency content of a vocal (e.g., excessive treble or low-end rumble), you should apply a filter before the dynamics processor; otherwise, these frequencies will falsely trigger the compressor. This causes a situation in which dialing in effective compression is almost impossible because you are basing your parameter settings on a section of that signal's frequency content, rather than on the entire signal.

On the other hand, you may notice a change in the frequency content of a signal *after* a compressor has been applied. This is quite noticeable on heavily compressed vocals, in which

THE FOUR REGULATORS

Dynamics processors can be divided into two categories: compressor/limiters and expander/gates. (De-essers and duckers are actually considered variations of compression.) Although both types of processors regulate the level of audio signals, they are in fact opposite beasts.

Compressors and limiters both act on a signal once it reaches a certain threshold, decreasing or confining its dynamic range. Expanders and gates go to work on a signal that has fallen below a specific level, bringing out more dynamics or, in the case of gates, cutting off the signal altogether. Limiting can be considered an extreme form of compression, and gating, an extreme version of expansion.

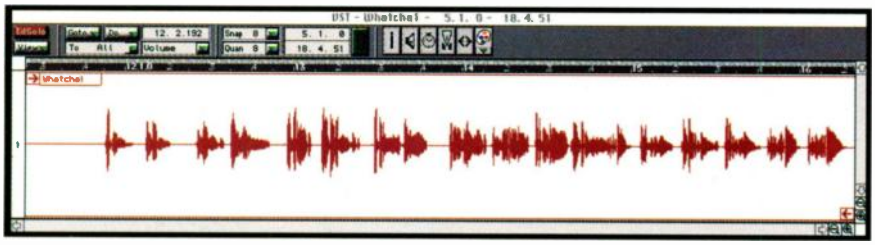


FIG. 1: This screen shot illustrates a very dynamic vocal performance. Notice the difference in amplitude between the beginning of each phrase and the rest of it. This track needs to be addressed by a compressor, probably with a ratio of 4:1.

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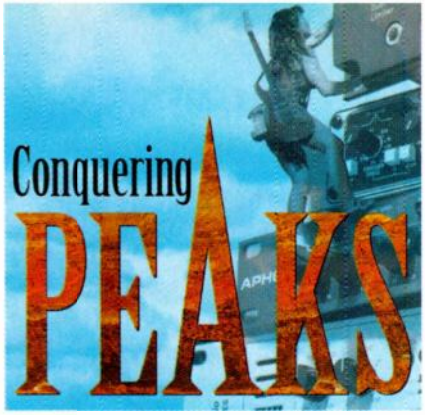

an increase in sibilance is typical. For this, a de-esser will fix the problem, inserted after the compressor (see application 15, Frequency-Dependent Compression).

Even when pop filters are used, many vocalists tend to "pop" on hard consonants (*b, d, p,* etc.). You can solve this problem by inserting a limiter before the compressor to prevent transient peaks from reaching the threshold before the rest of the program material. To eliminate the pops altogether, a frequency-dependent compressor can also be used, adjusted to filter the offending frequencies.

2. COMPRESSING/LIMITING BASS GUITAR

Proper compression (along with EQ) can often save a poor bass performance. In a mix, the bass track usually provides most of the low-end content—frequencies that are *felt*, as well as heard. As long as that undercurrent is powerful, you can usually get by with a bass sound that's not well defined. By fattening the low end with compression and making the attack of the notes less obvious, a sloppy performance can be passed off on a commercial record. Believe me, it's been done. This is because compression, when used on melodic instruments, increases the apparent sustain, making it as loud as—or louder than—the attack of the notes.

Obviously, you first need to evaluate the quality of the performance at hand to determine how much (if any) compression is necessary. "If I had had the pleasure of recording Jaco Pastorius," says Miller, "you can bet that heavy compression wouldn't have been a part of the signal path. The natural dynamics that players like Jaco use are part of their sound, and by squashing those dynamics, you're effectively killing the entire vibe."

However, the reason that Jaco is revered as one of the finest bassists ever is that few people can play with the same dynamic grace. You'll need to do *something* to most players' signals, be it a soft touch-up or heavy squeezing. In general, for players who are in control of their performance, a light compression ratio of 2:1 and a threshold of -5 dB usually works best. For other, less controlled players (I'll refrain from citing any examples here), a heavier ratio (upwards of 7:1) and a lower threshold (around -12 dB) should help. Short attack times and medium release times are generally used on bass signals. If you need to increase the sustain of notes, extend the release time accordingly.

You might also consider using a limiter on performances that have good dynamics, with a threshold set to -3 dB. This won't blatantly alter the dynamics of the signal, but it will prevent transients from overloading the equipment.

A really cool way of controlling the dynamics of an electric bass is to use two separate signals, one from a DI box and the other from a miked cabinet (see **Fig. 2**). Many engineers use this method for various reasons, but I think that it's worth doing simply for the control it affords you over the dynamics. A compressor is applied to the miked-cabinet signal, while a limiter gets patched across the DI box; the limiter controls loud passages and the compressor smoothes over and raises the level of soft passages.

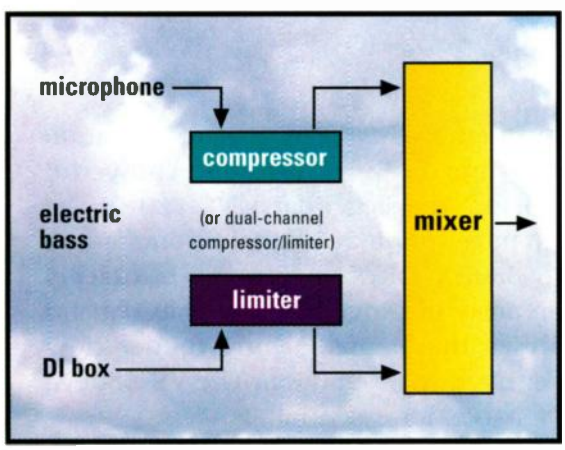

FIG. 2: Two signals are often better than one, especially with bass guitar. The miked cabinet is fed to a compressor, which smoothes over and raises the level of soft passages, and the DI box is routed to a limiter, for regulating loud sections.

The limiter should be set to its maximum ratio, with the threshold somewhere between 3 and 10 dB below peak. The attack time should be fairly fast and the release (depending, of course, on the tempo) moderate. For the compressor, you'll want a ratio around 5:1, a fast attack time, a slow release time, and a threshold 3 to 10 dB below peak. As an alternative, if you have only one signal to work with, consider running it through a limiter before the compressor, much as was discussed for vocal applications (see application 1, Compressing Vocals).

As mentioned earlier, compression boosts certain frequencies residing in the upper and lower regions of the spectrum. With bass guitar, you need to watch out for a boost in low frequencies. A parametric or semiparametric EQ inserted after the compressor will allow you to gradually roll off the low end with a shelving filter. Heavy compression can also result in an increase in fret noise, so you'll need to keep an ear open for that. (For more information on recording electric bass guitar, see "Recording Musician: Rolling Thunder" in the June 1998 issue of **EM**.)

3. EXPANDING TO REDUCE SUSTAIN

Just as excess sustain can save a poor performance, it can also ruin the sound of a good one. In these instances, you can use expansion to increase a signal's dynamic range and subsequently decrease the sustain. At more extreme settings, expanders can also be used to resurrect dynamic motion from tracks that were recorded with too much compression. Although this solution is less effective than rerecording the track, it works when no other fix is available. In general, expanders are used at mixdown, not during tracking.

Acoustic and electric guitars usually benefit most from expansion. If either one has been recorded in an ambient space (as many are), the reverberations of that room can increase the apparent sustain of the instrument, and simply equalizing the signal is often not enough. In addition, many electric guitar players use compression at the preamp to fatten up their sound, and the parameters may or may not have been properly set.

Typically, expansion ratios for electric guitars range from 2:1 to 6:1, with moderate attack and release times. (A word of caution: some expanders offer

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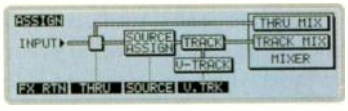

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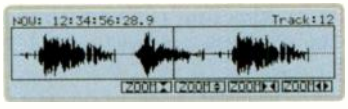

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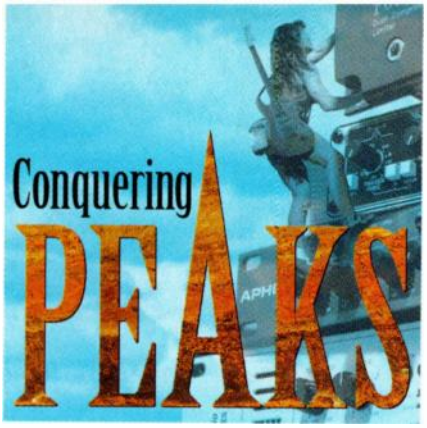

only release control and no attack control.) The threshold will depend on how much sustain you want to eliminate, and it should be set at the exact point at which you want the decay to begin. To do this, listen to the guitar track (sections with single chords work best), and watch the input meter on your expander. When you reach the point at which you want the decay to start, note the level. Then, adjust your threshold accordingly. For a faster decay, increase the expansion ratio.

Drum toms are also notorious for ringing too long and muddying a mix. However, they do require *some* resonance, and simply cutting off the sustain with a gate is not always appropriate. By expanding their dynamic range, the sustain will naturally decrease. Although each tom-tom may require its own expansion settings due to the different characteristics of each drum, start with a ratio of 3:1, with moderate attack and release times, and adjust the threshold in the same manner as outlined above for guitar. If you wish, you can then route the expanded tom signals through gates to filter out unwanted noise from other drum mics.

4. GATING DRUMS

Gates are most commonly used on close-miked drum tracks to eliminate bleeding from other drums. Kick and snare drums are almost always gated, while tom-toms can be either gated, expanded, or expanded and then gated, depending on the desired effect. Gates can also be used to alter the sound of a particular drum, as determined by the settings of the attack and release parameters.

With a short release time that closes the gate before a drum has finished ringing, you will hear a more pronounced attack, with little or no sustain. On the other hand, a longer release time will generate a tone closer to the natural sound of that drum. On snare drums, either approach is acceptable; it depends what you and the artist are after. Shorter release times (under 100 ms) will produce a snappy snare—even if the drum has a naturally full-bodied thump to it. In this case, you'll probably have to process it with a room or plate reverb to give it some dimension.

Unless the artist objects, Miller strives for a chunkier snare sound by using longer release times. "The snare has a very distinct place in the frequency content of a mix," he explains. "You should feel it in your gut, and for that to happen, you need to let the sustain come out a little."

Short attack and release times on a kick drum produce a "punchy" sound, with emphasis on low-mid frequencies. (Dig into your cassette collection and listen to some '80s "big hair" bands as an example.) Don't forget, the human chest has a resonant frequency of 80 Hz, which is why you can often feel the kick drum on large monitoring systems. At release times of less than a second, the full 80 cycles don't have a chance to oscillate, and the boomy low end of the kick is lost.

If you have already expanded your toms to reduce sustain, you'll want the gates to close after the drums have stopped ringing completely. Alternately, if you haven't expanded the toms and you want to cut some sustain, the gates need to close before the decay ends. This will cause the toms to have a tighter punch, albeit a more artificial sound. (This tom sound is common in pop music, while jazz engineers often strive for a fuller tone.) When using short release times, reverb is typically applied to the signals.

The character of your overhead mic tracks will also play an important role in how you approach your tom-tom gates. For example, if the overheads are picking up a good deal of sustain from the toms, you might want to consider a short release time, just accenting the attack of the drum, and blend the dedicated tom tracks lower in the mix.

A major problem with gates is false triggering, and with a drum kit, transients from cymbal crashes can often trigger the gates to open unexpectedly. A good idea is to patch the gate *after* the EQ section. This allows you to filter out unnecessary frequencies—ones that the drum in question does not produce—that would most likely trigger the gate. Or, if your gate offers a sidechain input, you can patch an EQ into it and filter out the unwanted frequencies; for example, on a kick drum gate, you could probably roll everything off above 2 kHz.

Some engineers like to gate drums before they are recorded so that they have one less thing to worry about at mixdown. D'Angelo disagrees: "Unless you have a limited number of gates that need to be used on other tracks during the mix, or you're performing a submix of the drums, I see no reason whatsoever to print a track with a gate employed. By doing so, you are only committing yourself to attack and release times that may sound great when the track is soloed but not so great in context with the supporting and lead instruments."

Heavy compression before a gate generally doesn't work.

5. COMPRESSING A SNARE DRUM

The snare drum plays a prominent role in any rhythmic song, and many times a fat sound, rather than a crisp snap, is called for. Unfortunately, many drummers (including myself) don't spend enough time tuning their snare drum and often adopt the "fix it in the mix" attitude. Which leaves you, the engineer, responsible for electronically fattening it up. Although proper EQ is an essential part of doing this, many engineers like to compress the track as well, evoking the drum's sustain.

Compression ratios for a snare drum vary, depending on the natural tone

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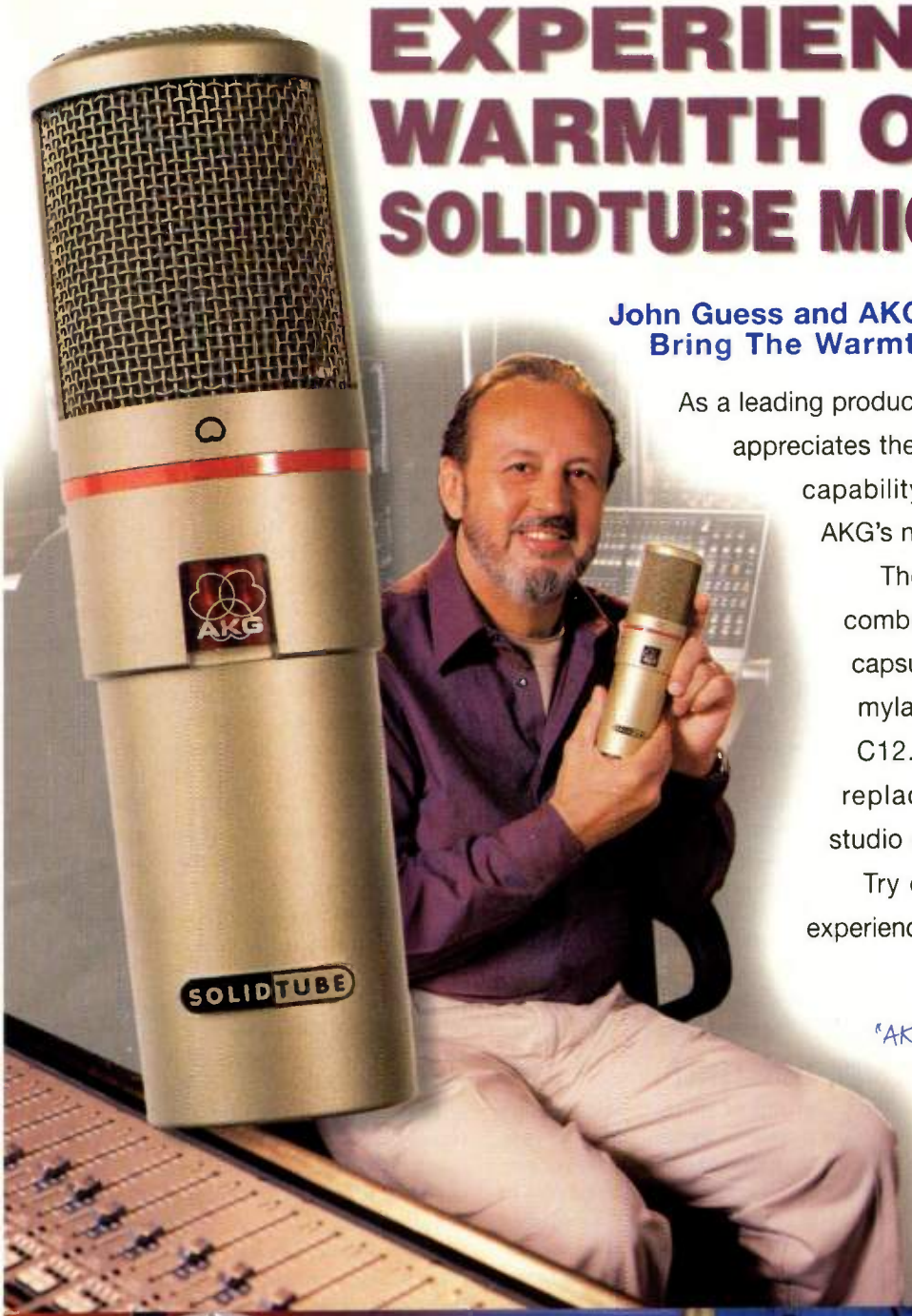

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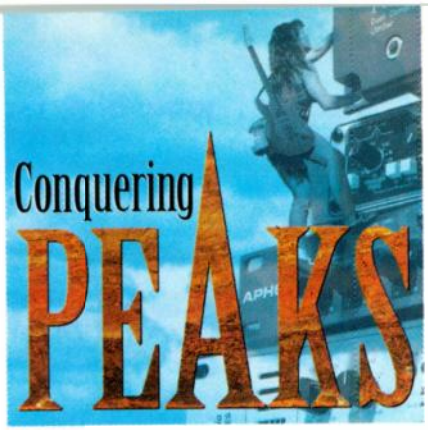

of the drum. For a fairly low-tuned snare with good body, a ratio of 3:1 is generally in order. Drums that are tuned poorly or to a higher pitch require a more dramatic ratio of around 5:1 or 6:1. Start with a threshold of about -10 dB. Attack and release times will vary, depending on the song's tempo, but a good starting point is a fast attack and a fast to moderate release, based on how much sustain you want to bring out.

A major factor in successful compression of a snare is the compressor's relationship to the gate. Applying heavy compression before the gate generally doesn't work. Remember, each processor is working toward an opposite goal. If you're compressing the dynamic range of the snare mic, you'll also be bringing up the level of background sounds (i.e., hits from other drums). These noises might trigger the gate to open, making its threshold difficult to set. Conversely, if you apply the compressor after the gate (making sure that the gate remains open for the entire decay of the drum hit), you should have no problems. If you really want to gate the compressed signal, I suggest using two gates, one before the compressor and one after.

6. COMPRESSING/LIMITING OVERHEADS

There are two reasons for altering the dynamics of overhead drum mics: to limit transient cymbal peaks from overloading the equipment and to compress the sound of the entire kit so that it is better blended. In the first case, a limiter is used, set to capture all transient peaks (remember to do this while you're listening to the loudest passage), with fast attack and release times. When recording with a digital multitrack, this limiting is usually done going to tape.

Compressing the overheads can be especially useful in situations when the tom-toms are not close-miked. Before you employ a compressor for this application, though, you should try using selective EQ. If the cymbals are much louder than the toms (as they probably will be), roll off some upper frequencies (above 7.5 kHz) or boost some of the fundamental tom frequencies. If that still doesn't improve the blend, applying some light compression will do the trick (2:1 ratio, -3 to -6 dB threshold, a fast attack, and a medium to slow release). Likewise, using compression at mixdown can also save you from poor overhead mic placement.

Although D'Angelo often uses compression on overhead drum mics, he rarely prints the tracks to tape with it engaged. "Generally, these tracks don't require that much processing," he notes. "We're not talking about an out-of-control bass guitar here. Smooth compression at mixdown should be all you need."

Light compression can also help out acoustic percussion, such as conga drums, which are often difficult to blend into a mix due to the dynamic manner in which they are played. To obtain the best results, dial in a compression ratio of 2:1 or 3:1, a threshold about 6 dB below peak, a fast attack, and a moderate release.

7. COMPRESSING A GROUP

With a group of singers, one of them will inevitably be louder than the rest, and if the performance is being recorded to a mono track or to a stereo pair of tracks (as many background vocals are), keeping individual voices from standing out can be a problem. Once again, compression can save the day.

First try to determine which performer is singing at the lowest level—perhaps he or she is singing solo at some point. Adjust your threshold just below this level, so that the softest voice gets processed along with the rest of the singers. (If you can't discover that level, assume it's around 15 to 20 dB below peak.) Set the compression ratio to 3:1 or 4:1 and the attack and release times according to the tempo. If you want a thicker background vocal sound, increase the ratio to 8:1 or higher. (For an innovative approach to tightening up multitracked harmony vocals using gates, see "Recording Musician: Using Expanders and Gates" in the February 1998 issue of **EM**.)

This setup will also work to blend an acoustic group (one or two acoustic instruments playing with one or more vocals) recorded with a stereo pair. In this situation, it's important that you process both microphones as separate sources. Yes, you should also reference them as a stereo pair, but each mic will be picking up different signals—often from different performers—and may require its own tweaks.

"I recently recorded a live performance of an acoustic duo for a television station," says D'Angelo. "Both performers played acoustic guitars and sang. I miked them with a stereo pair of condensers, positioned just left and right of where they were sitting. When I got back to the studio to polish the recording, I applied a linked stereo compressor to the left and right channels. But there was a problem: although the guy on the right was the lead singer, the guy on the left had a much more powerful voice, which was triggering the compressor on both channels.

A favorite of professional engineers, the Drawmer 1960 is a 2-channel tube compressor/limiter. Although it's a little pricey ($2,349), this box is great for processing vocals and bass guitar, especially when you're working with a digital multitrack.

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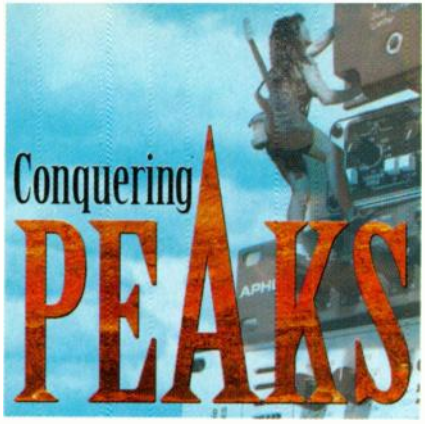


Conquering PEAKS

When he would come in, the compressor would squash the lead singer's voice. So I had to disengage the Stereo Link button and process each channel individually."

8. COMPRESSING ELECTRONIC INSTRUMENTS

Of all the instruments you can imagine, wouldn't it stand to reason that electronic keyboards would require the least amount of dynamics processing? Not necessarily. Remember, the sounds they generate are designed to have dynamic motion—sometimes more so than acoustic instruments. Couple this with velocity-sensitive keys, and you may have dynamics that really need to be smoothed out.

To blend keyboard sounds into a mix, you'll generally want a light ratio of 2:1, with a threshold around -10 dB. For a more pronounced effect, as is popular in some forms of techno music, increase the ratio upwards of 10:1, and drop the threshold to -15 dB.

With urban music as popular as ever (see "Urban Players" on p. 54), sampling is becoming a hot trend in all styles of music. However, sampling presents engineers with an interesting dilemma: the samples used in urban music are usually derived from various musical styles and eras, and the quality can vary greatly from one sample to another.

Miller has dealt with this problem before. "I worked on a hip-hop tune last month," he explains, "that relied heavily on samples from the '70s. No two samples sounded even remotely similar, and the dynamic range of all of the samples—from the softest one to the loudest—was probably 30 dB. At mixdown there were 24 tracks in use, 11 of which contained samples, and most of them had five or six samples each. We applied a gentle compression across each track, something like 3:1 at -10 dB, and then did a submix of the eleven sample tracks to a stereo pair, which we slammed with the compressor at 8:1. It did the job and it sounded great."

9. COMPRESSING GUITARS

Have you ever heard a guitarist complain that he or she is too loud in a mix? I didn't think so. In all fairness though, electric guitars are what give contemporary music an edge, and as long as they work in context with a piece, they should be screaming. In fact, I always compress guitars; as long as their sustain isn't causing any problems, the rule about assessing each instrument individually is suspended here.

Start with a ratio between 4:1 and 8:1 at a threshold between -10 and -15 dB, with a moderately fast attack time and a medium release time (depending on the amount of sustain you want to evoke). Consider printing the signal to tape compressed; just make sure that the sustain of the guitar is not interfering

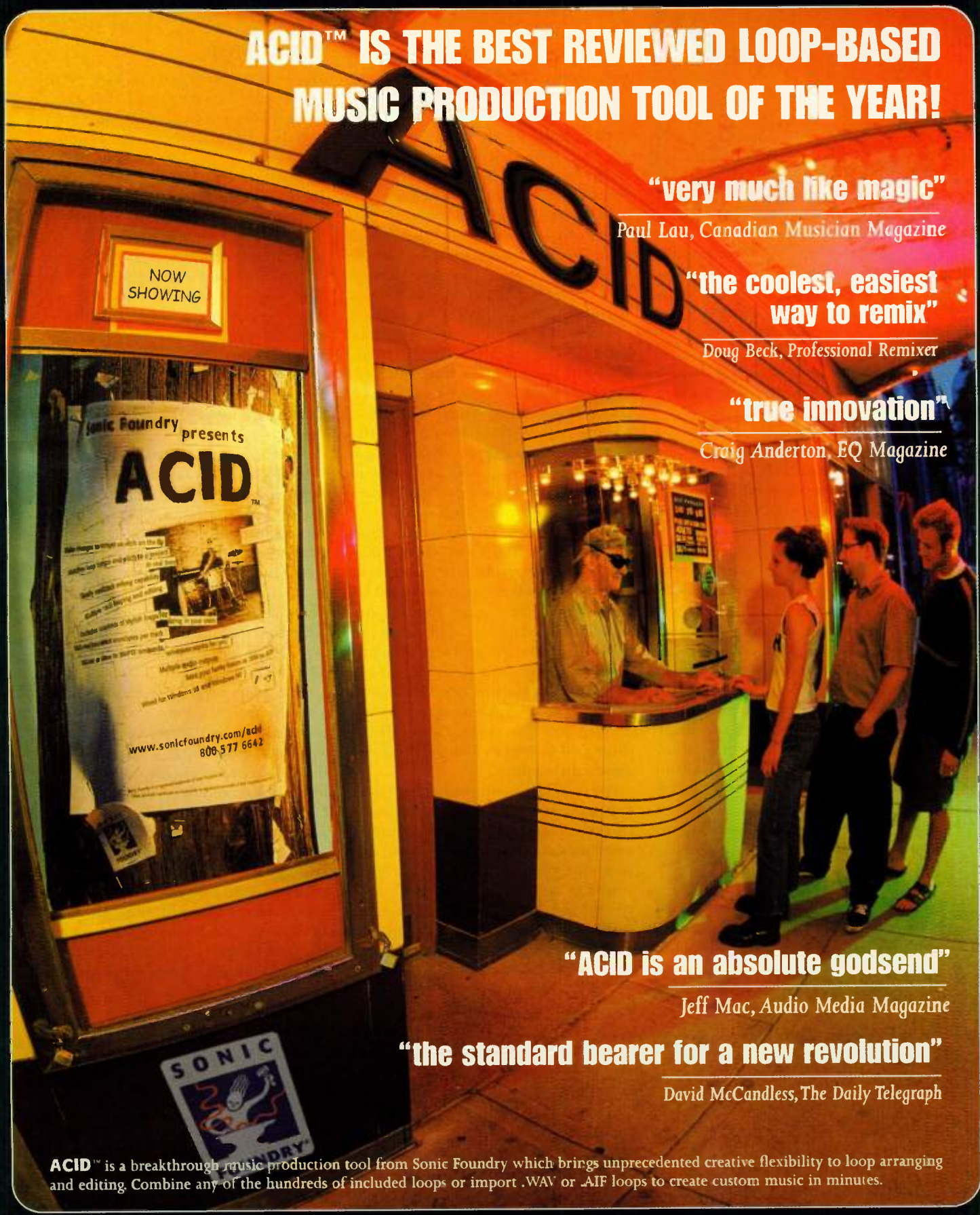
DYNAMIC BOXES

Dynamics processors come in all shapes and sizes, some offering multiple processors in one unit, others providing only a single type of processing. (More expensive, tube-based units generally perform just one function.) Many units are multichannel, while others provide one channel of processing.

Compressors and limiters are often combined into a single device, because the difference between the two is largely a matter of ratio settings. The same is true with expander/gates, although you will find gate circuits on certain lower-end compressor/limiters, and gates and expanders are both available as discrete processors (gates often in 4-channel units). Finding affordable stand-alone expanders, however, can be a bit of a challenge; most are pricey high-end boxes.

If you're working on a computer, chances are you'll be able to find what you're looking for: most audio recording software ships with a comprehensive selection of dynamics processors. In addition, you can get single-function plug-ins from third-party developers.

For manufacturer information, please see Contact Sheet, p. 163.



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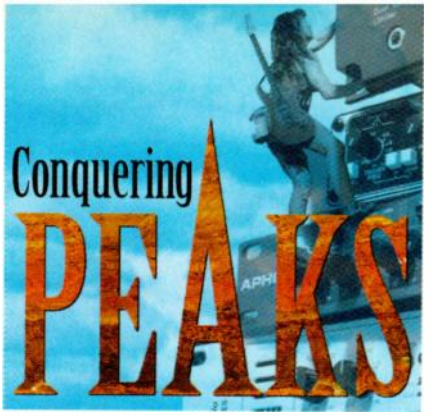

with any other instruments. If you're recording an acoustic guitar, it too can benefit from a bit of compression (granted, not as drastic), usually with a lighter ratio of 2:1 or 3:1.

If I'm working in a decent ambient space, I usually use two mics on an electric guitar cabinet: one about an inch from the speaker, the other about five or six feet back from the amp. In the mix, I pan them left and right to achieve a nice natural delay. When you do this, however, each microphone is going to pick up a radically different signal, especially if you're using dynamic mics, which are subject to the bass proximity effect. So you need to address each signal with different dynamics processing.

The close-miked signal will require some heavy compression, probably around 10:1 (you'll have to crank the amp for the far mic to receive a hot signal). Set the threshold between 10 and 20 dB below peak, and the attack and release times fast. For the other signal, a lighter compression will do just fine (about 6:1), with a similar threshold, a medium attack time, and a slow release. Pan your signals, and you're in business!

10. EXPANDING VOCALS

Despite the ever-increasing use of digital mixers and computer-based recording software, many people are still working on analog consoles with no automation. Performing complex mixdown muting can often be a drag for these folks, if not downright impossible.

Under these circumstances, expander/gates can be employed in lieu of an automation system. They can be useful on (although not limited to) vocal tracks, especially if the lead vocal resides on more than one track (e.g., overlapping "call and answer" passages). A gate is probably too harsh to use on a vocal, as it can make audible clicks when it opens and closes (things that can be passed off on a kick drum track, but not on a vocal), so a good choice would be to use an expander. Unlike an electric guitar amp, in which hum and buzz are often considerations, the extraneous noise on a vocal track should consist of nothing more than the sporadic body movement of the singer, and an expander should be adequate. (If more pronounced environmental noise is present, you should consider rerecording the track.)

Start by setting an expansion ratio between 2:1 and 3:1 (which you may need to adjust accordingly), and moderate attack and release times based on the tempo of the vocal. Finding the right threshold for this application can be a little tricky; the goal is to set it just below the softest sounds so that no important information gets clipped. A good way to do this is to set up a loop during a soft passage. Generally, a threshold between -6 and -10 dB is a good starting point.

For vocals, it's common to patch an expander in-line after the compressor to reduce some of the extraneous noise that compression can bring out (e.g., the vocalist's breathing). Now, you may be thinking, "Doesn't that counteract the compressor?" Theoretically, yes, but only if used at extreme settings. So make sure that your expansion parameters are subtle, otherwise you'll defeat the compression.

11. GATING EFFECTS

Multi-effects processors make a lot of noise, even when they're not doing anything. Gates are commonly employed to help eliminate some of this sonic garbage.

Parameters must be set carefully, especially when a reverb preset is involved. Make sure that the threshold is below the quietest part of the reverb tail, otherwise the gate will waiver, opening and closing before the decay is complete. Effects with no decay (e.g., phaser, single-tap delay, etc.) can be gated as soon as the signal passes through. You'll also need to be certain that the release time is longer than the reverb's decay, unless you are looking to gate the effect itself.

What do you get with gated reverb? You guessed it: the famous Phil Collins drum sound—sure, it may be dated, but so is swing music. Although most digital multi-effects processors offer gated reverb presets, I've always preferred the real deal. Here's how to do it: patch your reverb's outputs into a stereo limiter, the outputs of that into two gates (preferably linkable), and the outputs of the gates into your console's effects return.

Next, pick a reverb preset, preferably something with a long decay (e.g., a hall or plate). Set the ratio of the limiter to its maximum value, with a very fast attack time, a moderate release time, and a low threshold of -15 to -40 dB. The gate's attack time will depend on the timing of the music, and the release should be somewhat fast. Play with the gate's threshold until you achieve the desired effect. As an alternative, experiment with the gate's key input, feeding it the dry signal from an aux send on the console. This way, the gate's opening and closing is not influenced by the reverb.

Truly a professional processor, the Symetrix 562E Windowing Expander/Gate features intelligent gating that looks at the incoming signal and opens the gate slightly ahead of time, avoiding unpleasant clipping.

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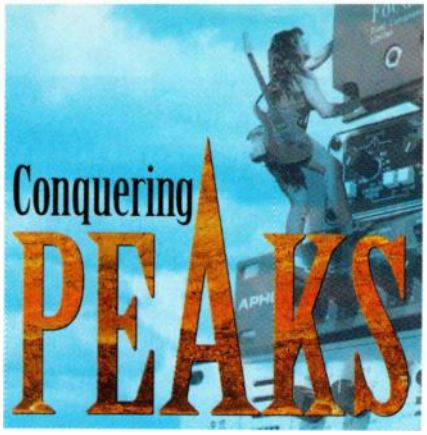

12. COMPRESSING A STEREO MIX

You can almost bet that, at this very moment, an argument is occurring somewhere between the old guard and the new kids about the use of compression on a final mix. For better or worse, radio-ready mixes need to stand out, and compression of the stereo mix is often an important part of making that happen.

Although the mastering engineer is generally responsible for adding compression to the final mixes, many mix engineers like to hear a tight product before it even leaves their studio. Miller is one of them. "The only thing I want the mastering house to do is make everything sound uniform," he explains. "Clients are usually sitting with me during the mix, and they want to hear something that's ready to be put on the radio. That's what I give them—compression and all."

If you opt to go this route, remember that compression across the stereo bus should be gentle, with a ratio no greater than 3:1. The threshold should be set around -3 dB, with a moderate attack time and a slow release time. If the song fades out, you will also need to gradually reduce the compression ratio to 1:1, otherwise the compressor will work against your fade.

13. GATING/EXPANDING GUITARS

Guitar amps sure do make a lot of noise, don't they? Even if you are using an automation system, it's a good idea to get rid of this noise altogether.

You can approach this problem in one of two ways. If the noise from the amp is only noticeable during nonplaying sections, a gate is your best bet. If, however, the hum and buzz is coming through along with the performance, an expander followed by a gate is a better route. With this arrangement, the expander pushes the low-level noise further into the background while the guitarist is playing, and the gate silences the noise during breaks. Make sure your release time on the expander is fast, so that the gate can take over as soon as playing stops. Likewise, make sure that the threshold of the gate is high enough so as not to clip the sustain of the notes.

Gates can also be used on guitar amps as an effect. For example, many alternative rock songs start with heavily compressed, gated guitar riffs. (This only works with riffs in which there is a distinct stop between chords.) For best results, you'll want to receive a dry signal from the guitar amp; make sure the player doesn't use any reverb or other processing, just distortion. If you want to put a reverb on the sound, it can always be done with an outboard box *after* the gate. The gate's parameters should be set according to the tempo of the riff.

If you want to get creative, try keying the gate from another rhythmic source, such as a kick or snare drum. This will ensure that the gate opens and closes at a steady pace, without influence from transient amp noise. Your key source doesn't need to be up in the mix; you can route it from a prefader aux send. But you will need to think ahead during recording. For example, if you want to use this effect at the beginning of the song, the drummer will need to hit the kick drum in tempo with the guitarist (or you could record a kick drum in time with the guitar track at a later date).

14. DUCKING SPOKEN WORD

Ducking is commonly used in radio and television broadcasts, so that when an announcer speaks, the music bed automatically gets compressed and quieter. To achieve this, the music is routed through a compressor, and the announcer's mic is fed both to the console and to the compressor's sidechain input, so that it triggers the compression. Typical parameter settings include a ratio of about 6:1, a threshold 8 to 16 dB below peak signal, a fast attack time, and a medium release time. The further you lower the threshold, the quieter the ducked signal (in this case, the music) gets.

Although ducking is rarely used in mainstream music production, strange things sometimes happen in the studio, and you never know when you may need to use it. Miller relates: "In my wildest dreams I never thought that I would have to use a ducker during a session. But last year I was working with an alternative band that wanted to include a spoken word part during the break in one song. The singer and the guitarist were going to do this back-and-forth conversation thing, where one guy would start talking over the other, but we only had one track available. I couldn't put them both on the same mic and the piece was too complex for me to ride the faders, so I used a ducker—one on each mic—so that when one person spoke, the other mic was compressed. It worked great."

15. FREQUENCY-DEPENDENT COMPRESSION

It's all too common for midpriced vocal mics to yield harsh sibilance (i.e., "ess" or "sh" sounds), which can falsely trigger a compressor. Although you could equalize the offending frequencies out of the signal, you would be reducing those frequencies by a fixed amount. A better solution is to use a de-esser, a form of frequency-dependent compression.

A de-esser is basically a compressor with an EQ (parametric or graphic) inserted into its sidechain. You'll need to set your compressor as follows: a ratio between 2:1 and 6:1, a threshold of -2 to -10 dB, a very fast attack time, and a moderate release time. The EQ's center frequency will obviously depend on where the offending frequency resides; for vocal sibilance, it should be somewhere between 3 and 8 kHz. Once you find it, boost that frequency by 3 to 12 dB, depending on how loud the sibilance is.

Frequency-dependent compression works with more things than just sibilance. You can dial in whatever frequency needs to be attenuated, such as low-mids to filter vocal popping or high-mids to address "clangy" guitars.

DAM IT!

Whether you produce music for love or for money, it still has to sound great, and dynamics processing is a big part of making that happen. As long as you don't go overboard, subtle compression, appropriate gating, proper limiting, and selective expansion can tighten up a mix in ways that would not otherwise be possible.

EM *Associate Editor* **Jeff Casey** *is amazed at how they pack the harnessing power of the Hoover Dam into a 1U rack-mount box.*

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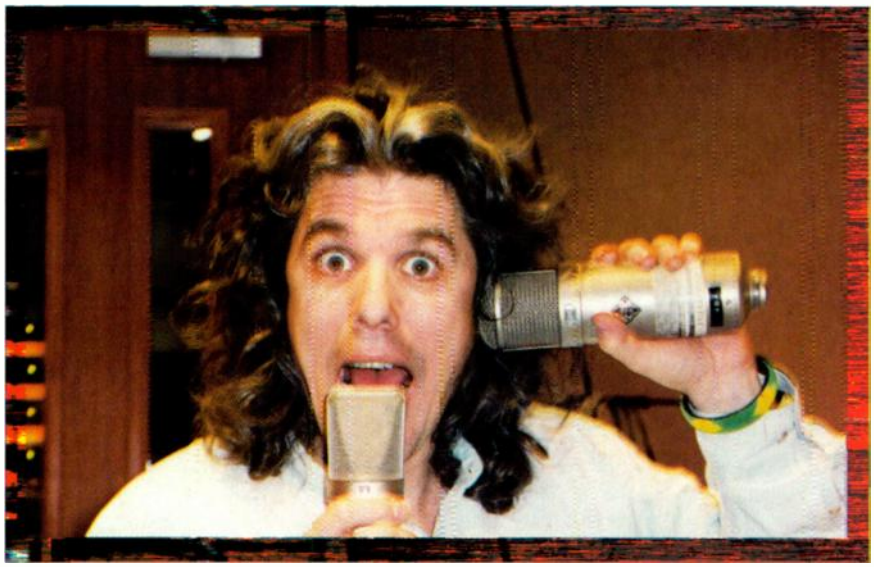
By Scott Rubin

There's no question that urban music has forged a solid place in twentieth-century American recorded music. According to SoundScan, the official body that tracks record sales, urban music accounts for 35 percent of the total purchases in today's marketplace. Although it has taken some time, this genre has been embraced by a wide consumer audience—everyone from Wall Street stockbrokers to teens in middle America.

Illustration by
Thomas Hart
P-808
OMMY

Lately, smatterings of urban stylings have been finding their way into other of musical genres—alternative, dance, and rock 'n' roll, to name a few—and the defining lines between genres are starting to blur. You may not be producing this kind of music now, but there's a good chance that you'll incorporate urban sounds into your productions in the not-so-distant future. With that in mind, here's a look into the world of sampling, breakbeats, and lo-fi recording.



Bob Power has recently produced projects for Erykah Badu, D'Angelo, and Bran Van 3000. Clearly, he's working a little *too* much.

Technology Shaping Music

Urban is the '90s term for the genre that has evolved from R&B, through rap, and now into hip-hop and other related styles. Although we can easily see differences in modern production techniques between urban and rock music, both descend from the same genre.

During the '50s and '60s, R&B was recorded in much the same way as rock, with musicians playing mostly acoustic instruments live. However, once synthesizers, drum machines, and samplers stepped onto the scene, things changed. Urban artists and producers saw these tools not merely as passive devices for re-creating traditional sounds, but rather as creative instruments for inventing completely new, distinctive sounds. Technology has always been the driving force behind urban music: it influences the way artists write, it defines how engineers record, and it continually shapes the future of this genre.

"There were times, when we were making some of the first hip-hop records, that we fell upon something by accident and the next thing you knew, it was considered cool among the artists," explains renowned producer Bob Power, who has worked with Erykah Badu, D'Angelo, and Bran Van 3000. "Like filtering—all of a sudden we were working with filtered sounds on snare and bass parts. Take Public Enemy, for example: they pushed the envelope to a point where most engineers where wondering, 'What's going on here?' The concept of what's acceptable will always be challenged as rap and hip-hop create new, wonderful music."

Producer/engineer Paul Logus recently completed work on "Come With Me," the atypical collaboration of Puff Daddy and Jimmy Page, further evidence that the lines between urban and rock music have greatly diminished.

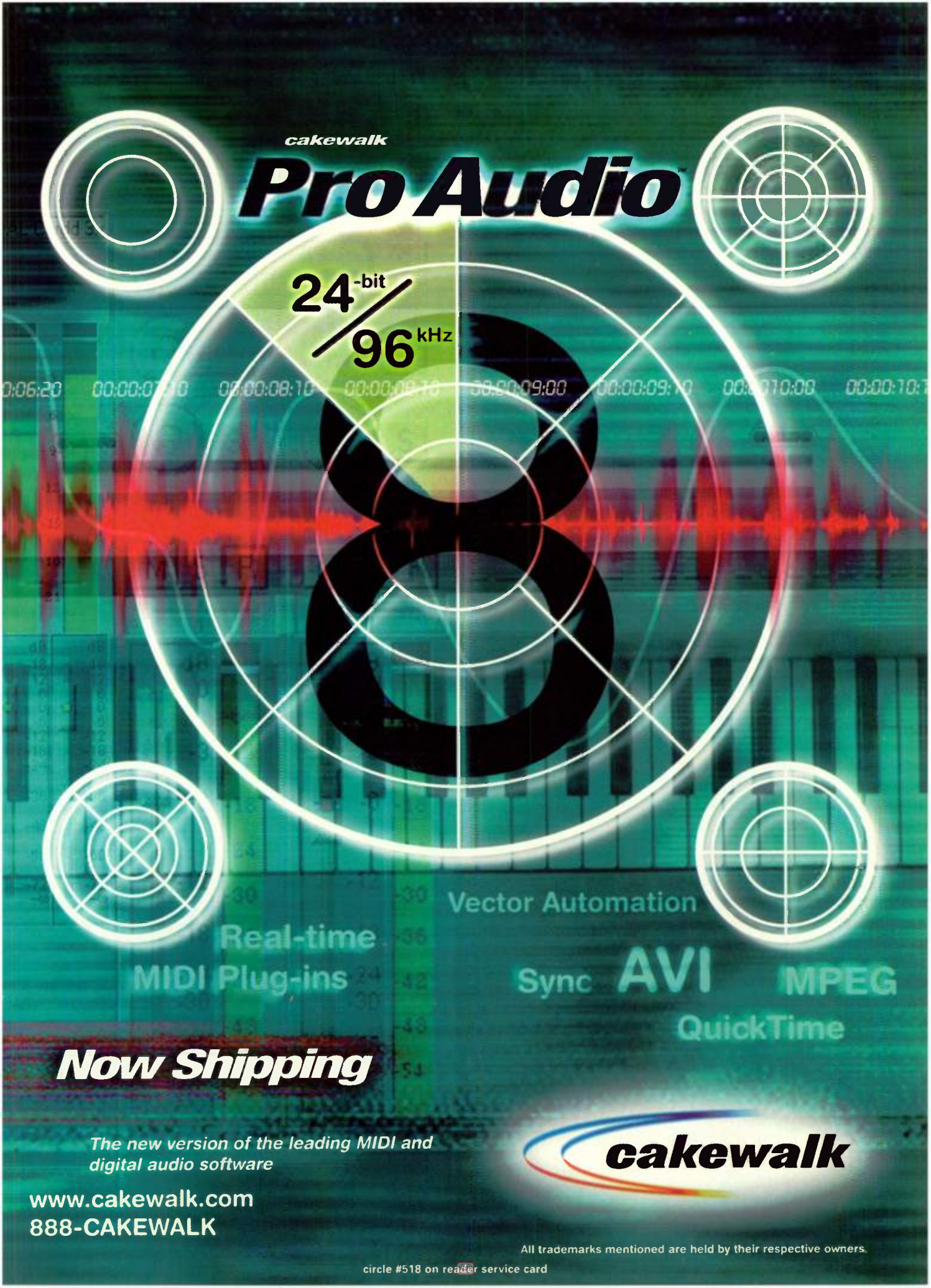
Bringing It Home

One major difference between urban and rock music production is that a large part of a professional urban record—often 50 to 75 percent of it—can be produced in a personal studio. Although some rock artists produce music in personal studios, the practice is much more common in the urban community. In rock music, a major-label artist who records a demo at home with live instruments would most likely have to rerecord the piece again in a professional studio, never assured that it would come out with same fervor that it did the first time.

In urban production, however, much of the final instrumentation relies on sequenced parts such as drum machines, samplers, and keyboards; so once a part is nailed, it never needs to be recorded again. Also, real-time electronic instruments can be tracked to a digital multitrack and then imported to the mixdown studio's machine. In fact, it's become standard in the industry for urban artists who land a record deal to put part of their recording budget toward their personal studio.

Engineers acknowledge that completing an urban record in a personal studio—including the recording of acoustic tracks—has benefits and drawbacks. Producer/engineer Paul Logus has worked with Jimmy Page and Puff Daddy, Public Enemy, and Joan Jett. Logus says, "You have an advantage with recording in a personal studio because your cable run is usually no longer than 20 feet or so. In a professional room, however, the cable run can be up to 200 feet to get to all the places it needs to be." (Signals typically exhibit a degradation in quality with cable runs longer than 100 feet.)

Unlike rock music, hip-hop vocal tracks seldom employ much expensive processing or tube EQ. "A lot of people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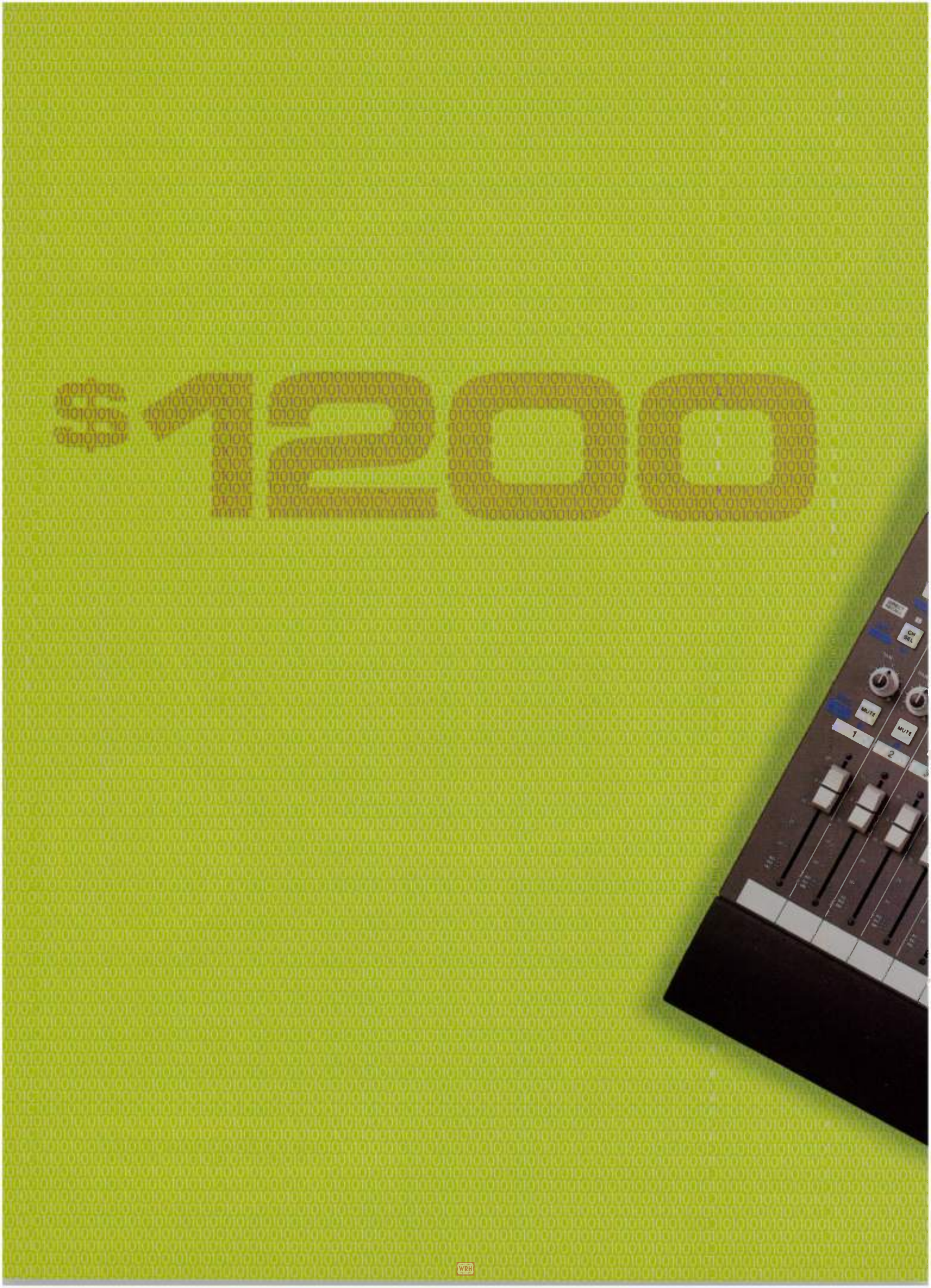
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think you have to add EQ to make something sound good," says Logus. "In reality, a Shure SM57 sounds amazing just flat with a bit of compression."

On the other hand, the majority of urban music is produced in urban centers, and artists working at home in these locations have to consider the unpredictable nature of their surroundings. "You have to be aware of your environment," notes Power. "Unless you are totally isolated, a siren screaming by while you're rapping can not only kill your vibe, but it'll also screw up your take."

Furthermore, because urban music tends to have an extremely heavy low-frequency content, most engineers agree that at some point an urban record should pass through an analog tape machine to generate some natural compression, and most personal studios don't have analog machines. "I've mixed quite a few records," says Power, "where the beats, keys, and samples were all laid to digital multitrack at home and then dumped to 2-inch tape in the studio for vocals and mixing."

It goes without saying that, because most urban artists take advantage of personal studios during production, they have more opportunity to perfect their arrangements. Power is a big fan of utilizing this pre-production time. "I don't let my artists step into a pro studio unless they've worked out their arrangements beforehand," he says. Because MIDI is an integral part of urban production, artists also have the advantage of being able to collaborate with other personal studio owners. Just bring your disks, your sampler, and some records or CDs to sample from, and you can collaborate with countless other artists and producers.

Hi-Fi vs. Lo-Fi

Urban music production is influenced by two different motives: the desire for a slick, sophisticated sound, which is usually associated with R&B, and the need for a lo-fi, grungy sound, which is more prevalent in hip-hop and rap. The hip-hop community has always embraced dirty-sounding samplers, drum machines, and keyboards; and hip-hop producers and artists often build their songs around gritty drum samples and beats.

"Traditionally, the number of string, keyboard, bass, and guitar lines used in a track has distinguished hip-hop from R&B," explains Power. "For an underground record, there's nothing like the sound of a grungy, grit-laden kick drum. Conversely, R&B has always screamed for slick, compressed bass tracks and polished vocals."

Lately, however, the lines have become blurred. Slick-sounding tone generators and sound modules have given hip-hop a polished texture, and R&B has taken on a somewhat gritty sound. "More and more, hip-hop rhythm tracks are used with R&B artists, and traditional R&B sound and structure has found its way into a large number of commercial hip-hop songs," says Power.

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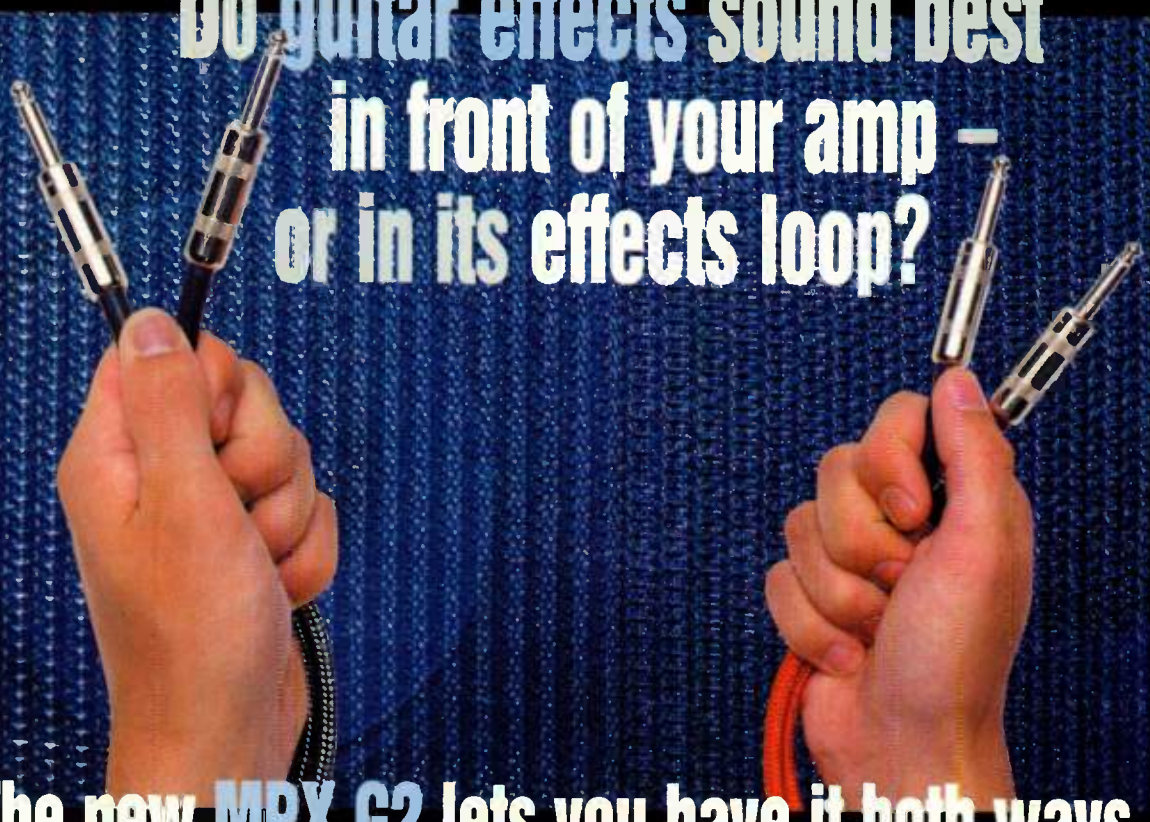

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WRH

The LOst InstRument

Samplers are far and away the most valuable tool in the urban music production arsenal. Many modern units not only provide sampling capabilities but also offer a bevy of tools, including sequencers, drum machines, and often, sound modules. But the sampler itself remains the quintessential instrument for urban production.

"Digging in crates and finding rare records to sample is part of the technique of producing hip-hop," says mix engineer/producer Tony Maserati, whose credits include Puff Daddy, Notorious B.I.G., and Mariah Carey. "Despite what some people think, taking a sample and manipulating it to become a totally different entity from its original *is* an art form."

There's no question that sampling has stretched the boundaries of creativity. "There are guys out there who are not only using samples, but they are playing bass parts, keyboard parts, and guitar lines and sampling them to get a live feel with a consistent pattern throughout their song," Maserati adds.

Many agree that, for a lo-fi sound, the E-mu SP-1200 is the way to go. The combination sampler/drum machine hasn't changed since being introduced to the hip-hop world in the late '80s. One of the most important features of the SP-1200 is 12-bit sample resolution. The SP-1200 has a 3.5-inch disk drive, allowing you to save your sequences, and it comes with an excellent pitch-change system and some serious filters. The other great feature of this urban production staple is its eight individual outputs. (A sampler without individual outputs puts a greater strain on the unit to mix the sounds internally.) The drawbacks of the SP-1200 are a short sampling time (10.5 seconds) and a fixed memory size.

Offering a sampler, sequencer, and drum machine, the Akai MPC2000 is the perfect choice for anyone looking to get into remixing or urban music production.

A cleaner, more sophisticated unit is the Akai MPC2000 MIDI Production Center (reviewed in the June 1998 **EM**). The MPC2000 is relatively new to the sampling world and is the replacement for the older MPC3000 and MPC60 samplers. The MPC2000 is a perfect unit for getting into remixing or urban production; like the SP-1200, it offers a sampler, sequencer, and drum machine. It offers 16-bit resolution and comes in a variety of configurations. The MPC2000's memory is expandable to 32 MB, which gives you more than enough room to remix a vocal track.

Competing with the MPC2000 and SP-1200, Ensoniq's ASR-X has all the features of the company's popular ASR-10, in addition to expandable memory (up to 34 MB), thirteen Velocity-sensitive trigger pads, and a sound module. It's easy to sample, resample, and loop with this full-featured unit. With 34 MB of memory, the ASR-X can give you six minutes of mono sampling time at 44.1 kHz. Built-in effects like reverb, delay, filtering, and modulation make it a well-rounded personal studio workhorse.

A staple of urban music production, the E-mu SP-1200 has been providing artists and producers with the quintessential lo-fi sampling sound for the past decade.

Break It Down

Drum machines, which once dominated hip-hop beats, have mostly been replaced by samples. In fact, where you once heard a complete drum loop, you now have artists breaking up samples and making new beats and phrases from just the kick and snare. "You don't want to use the same beat as everyone else, looped in the same way," Maserati explains. "There's nothing creative about that." With sampling, you can manipulate and edit and use the DSP in your sampler to change the texture of the sound; whereas with a drum machine, the parameters are much more limited.

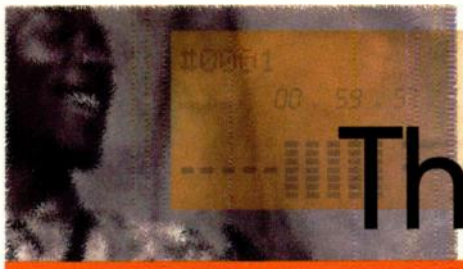
Power advocates changing old drum samples into new sounds. "How you use the samples is the key," he says. The same holds true for breakbeats, or loops, as they are often called. "I'll take a loop that I want to work with and manipulate it into a new phrase using sequencing." Some manufacturers of loop CDs even break down the actual samples within the loops; so if you love the sound of the snare but hate the drum pattern, simply copy the snare sample and use it in a new beat.

Power regularly restructures loops using Steinberg's *ReCycle!* sample editor. "If you want to add other samples to the new beat," he says, "the program keeps them in perfect time. Factor in the concept of time stretching, and this is an endlessly creative tool."

Sample Savvy

A common trick within the urban music community is resampling. Taking your separate samples, such as kick, snare, and hi-hats, and resampling them as one new sample can save outputs and memory. A sampler that features resampling ability, such as the Ensoniq ASR-X, gives you the opportunity to explore directions and options otherwise unavailable.

To give separate samples a more cohesive sound, some engineers throw them through a compressor after they've been mixed together. "When working with different samples for hi-hats, kick, snare, and a loop," notes



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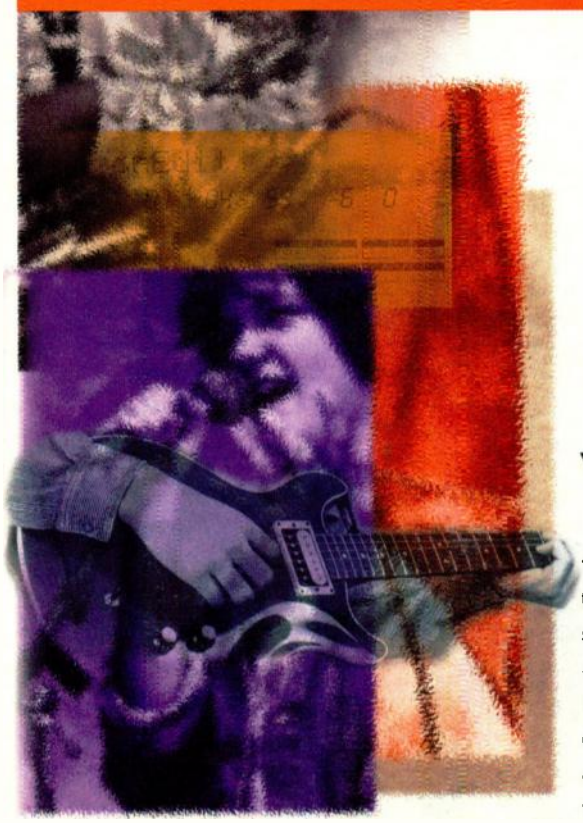

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Maserati, "you might have as many as four or five samples that were all recorded differently—and often recorded from different eras. Sometimes, using a compressor makes everything come together."

"When mixing," Logus adds, "I give separate samples a more balanced sound with EQ. I tend to shape the samples and give them their own character. In terms of making the parts sound like one kit, the balance of levels is extremely important."

Crossing the Lines

Interestingly, as hip-hop becomes more popular in the overall music market, other genres are starting to incorporate its techniques and sound patterns. "Look at all the rock records today that are built upon loops," says producer/engineer Chris Shaw, who has worked with Weezer, Public Enemy, and Jack Drag. "Alanis Morissette, Hanson, the Butthole Surfers, and tons of others are incorporating breakbeats and drum sounds that hip-hop guys have been using for years."

"It's been this way for decades," Power adds. "Pop culture has always been influenced strongly by the black youth culture. That carries over into the world of recording, where breakbeats, drum loops, and samples are more prevalent than ever in rock 'n' roll."

With the current trend of collaborations between rock and hip-hop artists—for example, the Puff Daddy/Dave Grohl remix of "All About the Benjamins"—not only are elements being borrowed, but techniques are being adopted by both genres. John Eaton, coproducer of "All About the Benjamins" and technical director at Daddy's House Recording, says, "It's been an awesome experience. We were using live drums and guitars from Dave Grohl; samples from the original track; guitars and bass parts played live by the band; and all different rappers, including Puffy, Notorious B.I.G., and Lil' Kim."

Resampling ability and expandable memory make the versatile Ensoniq ASR-X a powerful and useful tool in urban music production.

"It all makes for an interesting mix of bits and pieces," says Shaw. "I use a lot of urban recording techniques when I'm at work on a traditional rock project. My past experience in working with Public Enemy and A Tribe Called Quest—acts that use a lot of sampling—has been a great benefit for my work today."

Rap It Up

In talking about the evolution of urban music and its recording, Shaw reflects: "When we were first recording hip-hop, we were using two turntables, a drum machine, and a microphone. We had to mix a record with these basic elements and make them sound like a big record." Today, with modern technology, the task is certainly easier, but the challenge always remains to redefine the practices.

Consumers nowadays listen to a wide mix of artists, and therefore, record companies will continue to produce music that calls for both urban and rock 'n' roll elements. There's plenty of room on a 2-inch reel (or a hard disk, for that matter) for sampling, drum machines, electronica, and rock guitar. The techniques of recording were at one point universal and uniform; then, due to advances in music technology, they splintered into diverse styles. Perhaps, in the near future, recording will arrive back at its unified starting point.

Scott Rubin *is a freelance writer and vice president of production for Reach Music International. Write to him at srubin522@aol.com.*

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WARPED REALITY

Mutilate your samples with software plug-ins.

When I began working with samplers in the mid-1980s, there was no such thing as looping software. In fact, the widespread use of personal computers was still a few years off, so all sample processing was done right in the sampler. If you wanted to loop a sample in an Ensoniq Mirage back in 1984, first you had to figure out how to interpret the tiny 2-character display and learn a little hexadecimal math, and then you were on your way. It was so painful that it made a visit to the dentist seem like fun. ● In comparison, the tools available to the modern sound designer are nothing short of amazing. To me, the most exciting development of the past decade was the introduction and evolution of the software plug-in, which is a program that runs within a host application and performs functions that the host software does not provide. ● Audio plug-ins let us process sounds without adding noise, which cannot be said for analog processors. In many cases, the degree of control that plug-ins offer is enormous, and most products include presets that allow even a novice to get good results without having to understand exactly how the plug-in works or completely master its operation. Here are some ways to fiddle with your sampled sounds using plug-ins. **By Jim Miller**

ILLUSTRATION BY DAVE EMBER

For example, one violin sample out of a multisample set I was working on had a bit too much "nasal" quality. From past experience, I knew the problem was at about 1 kHz, so I selected this frequency as a starting point. With *Q10*, you can hear your adjustments in real time, which made it possible for me to quickly zero in on the offending frequency (actually around 800 Hz) and lower it using a fairly narrow Q.

Like most EQ plug-ins, *Q10* includes a comprehensive collection of presets and setups that facilitate important (and previously difficult) processing jobs, such as hum removal, noise filtering, and notch and bandpass filtering. I've used the hum-removal preset many times to remove the 60-cycle hum of overhead fluorescent lights. (For serious noise removal, you'll want to use *Ionizer*.) *Q10* can even instantly create pseudostereo effects and that often-needed "AM radio," or "telephone voice," effect (see **Fig. 2**).

Another interesting plug-in that changes the timbre of a sample or sample set is DUY *Shape*. This software uses DUY's exclusive Frequency Dependent Waveshaping (FDWS) algorithm to process sounds. It works well on entire tracks and mixes, but it can also be used to fix or enhance samples. Unlike equalization, which can sometimes add unwanted artifacts (such as hiss when you brighten a sample), *Shape* can usually enhance the perceived relative brightness in a sound without the side effects. (It can add lows and mids, as well.) In addition, it can act as a frequency enhancer by redistributing the harmonic content, much like the Aphex Aural Exciter (which has just been introduced as a plug-in, but only in Digidesign TDM format).

MAX AMPLITUDE

Many plug-ins are useful for making samples as loud and punchy as possible without any clipping. Of course, you can use the Normalize function in your sample-editing software or sampler, but this merely brings the hottest parts of the sample to 0 dB. Many samples have an amplitude spike that is much louder than the overall sample, but this spike is very short in duration. In this case, most of the sound will still be too low in level after normalization.

Waves' *L1 Ultramaximizer* plug-in solves this problem elegantly. *L1* provides a peak limiter that decreases the level of the spikes and increases the overall level of the sample, often by several decibels more than normalization can achieve. This might sound like compression, but there is a difference: compression reduces the overall dynamic range of a sound file, whereas *L1* leaves most of the dynamics exactly as they were originally recorded. *L1* lowers only the short, hot spikes. Once the spikes have been "reshaped," the sound file can then be made several decibels hotter using normalization.

In addition, *L1* can decrease the perceived amount of noise in a sample or sound file and increase the perceived resolution of the file by shifting the energy of the noise into frequency ranges where we hear it the least. This works so well that I almost always run this plug-in before dumping my samples down to my Kurzweil K2500 sampler.

One word of warning: apply *L1* only after you've completed all other processing to the sample. Using any maximizer plug-in, such as *L1* or DUY *Max*, should always be the final step before you send the sample to your sampler. Processing applied after using *L1* can potentially cause clipping or other nasty digital artifacts.

Of course, the maximizing process isn't perfect. As always, trust your ears. In a highly percussive sound (e.g., the initial mallet strike in a marimba sample), an amplitude spike of even a few milliseconds plays an important part in the complete sound. Reducing it might compromise your sample, making the attack sound somewhat muted.

You can usually undo and redo plug-in processing, so listen carefully to the "before" and "after" versions of your sample, and be sure that you are not sacrificing any part of the attack portion. If the unprocessed sample sounds best, it's better to raise the volume of each sample in your final key map until they all match.

Figure 3a shows a sample of a Steinway piano that has already been normalized. Notice the hot amplitude spike right at the start of the sample. I typically work with 16-bit files at high sampling rates

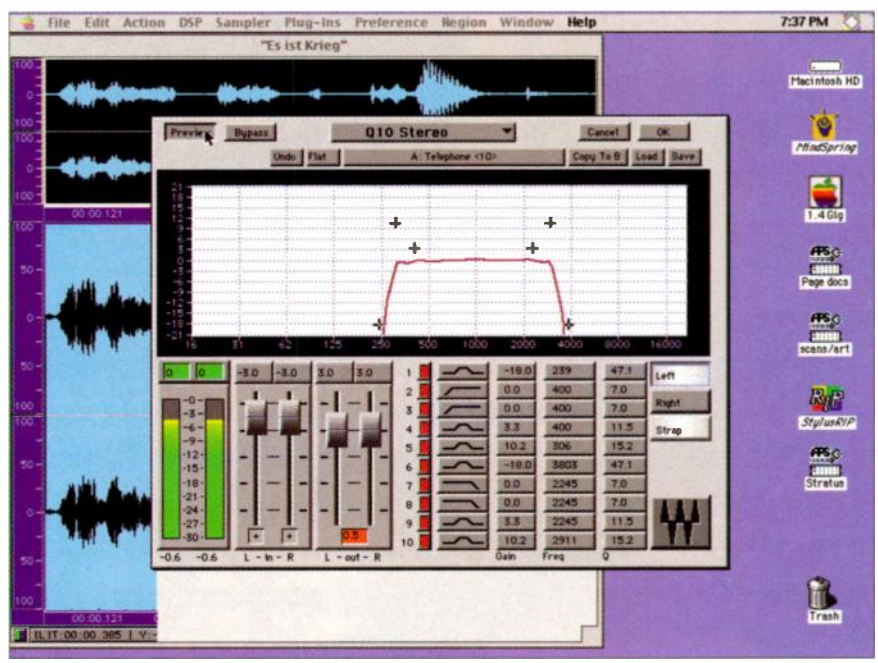

FIG. 2: This setting in Waves' *Q10 Paragraphic Equalizer* limits the frequencies to a band from 250 Hz to 4 kHz to simulate the sound of an AM radio or telephone.

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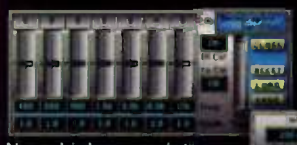

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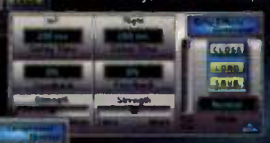

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(sometimes up to 48 kHz), so I often use the "16-bit Final Master, highest resolution" *L1* preset to fix such problems (see **Fig. 3b**). After processing, you can easily see how much louder the sample is (see **Fig. 3c**).

SPREAD 'EM

Stereo samples sound much more realistic than mono samples and have a lot more depth and overall personality. They can be enhanced by widening their stereo image using a plug-in such as Waves' *S1 Stereo Imager* and DUY *Wide*.

The *S1* plug-in can add a variety of interesting spatialization effects, such as changing the relative position of an instrument from side to side or from front to back. You can even use this software to widen the perceived stereo stage beyond the boundaries of the speakers, which is a similar function to that of a dedicated hardware processor, such as the Carver Sonic Hologram Generator or a Roland RSS unit.

It should go without saying that you need to process all the samples in a multisample set using the same spatial settings. Also, remember that radical processing can create serious phase cancellation problems, which you must anticipate if you plan to use the final samples in a mono mix.

Let's say you have a stereo sample of an explosion. To make the sound expand beyond the range of the speakers using *S1*, adjust the width of the sound beyond a value of 1 while previewing the sample. Once the sound is as wide as you'd like, you can use the Shuffling slider to increase the stereo width in the bass frequencies. This compensates for the fact that we hear less stereo effect in the bass than in the mids and highs. To me, the best value is usually between 1.6 and 2.5. This should give you an explosion that spans 180 degrees across the sound field and has much more drama and impact than your original, "real" explosion.

BIAS SFX MACHINE

The *SFX Machine* plug-in from BIAS will undoubtedly prompt many sound designers to buy a copy of *Peak*, with which it is bundled. For the most part, *SFX Machine* does what its name suggests, letting you create unusual sound effects from ordinary (or not-so-ordinary) samples. In this respect, it is more useful for "one-shot" sounds, rather than traditional multisamples (e.g., a complete solo oboe). However, it's more than capable of adding an unusual chorus effect: for example, to thicken a synth string sound.

Above all, *SFX Machine* is great fun to work with, particularly when you stumble onto some unexpected effect that turns an average sound into something quite outrageous. You can process the same sample repeatedly with different effects until it's completely unrecognizable when compared with the original.

In the March 1998 issue of **EM**, I wrote an article called "Wild Things" about sampling sound effects. One example I presented was turning a nonpitched sound (a pseudosnare) into a pitched waveform that could then be looped and played as a bass sound by using *SFX Machine*'s "Robodistortion" preset. Even more recently, I've used the "PTrk->RM->DDL" preset (which stands for Pitch Track into Ring Modulation into Digital Delay Line) to turn a stereo clavichord sample into an ultrastrange sci-fi effect for a major theme park. You have to hear this one to believe it.

ADDITIONAL PLUG-INS

For dynamics processing, I've been using Waves' *C1 Compressor/Gate* with exceptional results, particularly on a drum-sample library I completed last year. To add some analog warmth to even the coldest digital samples, try *DaD Valve* from DUY, which simulates a wide range of classic tube-saturation effects via physical modeling.

If you have samples that you want to port between a number of different samplers, and you don't want to spend inordinate amounts of time retuning individual samples in each key map on each instrument, give some serious consideration to AnTares's *AutoTune* plug-in. With this software, you can accurately tune any sample within a ±100 cent range; after processing, you never have to worry about tuning it again, no matter which sampler you send it to.

In some instances, it's useful to add

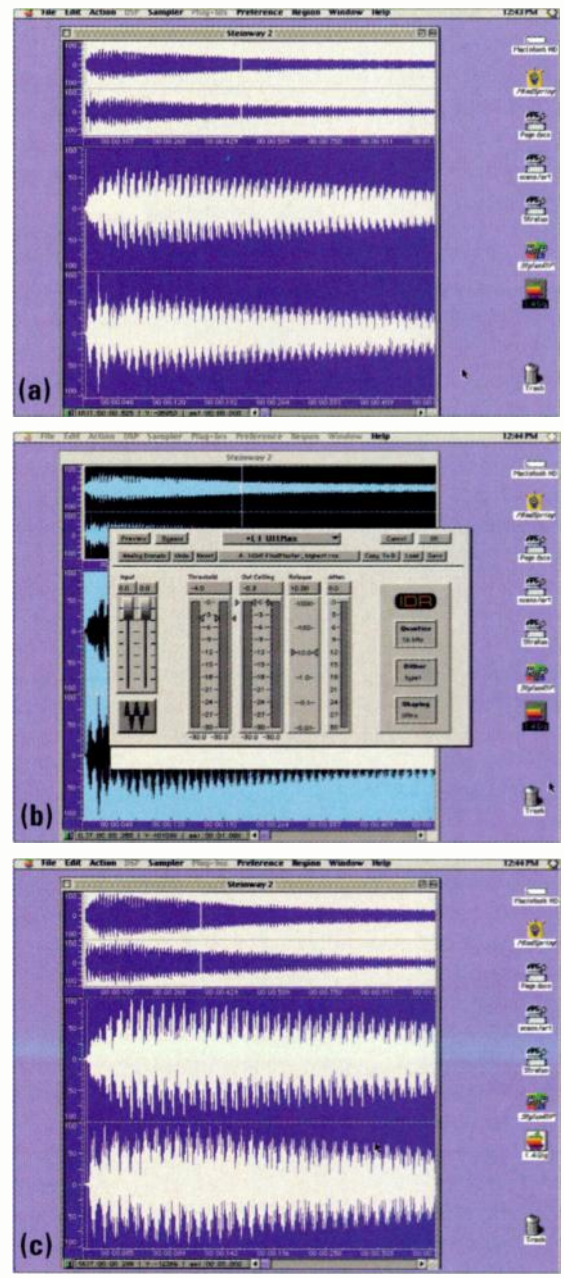

FIG. 3: This sample of a Steinway piano (a) has been normalized, but the transient spike in the lower channel prevents this process from maximizing the overall level. By applying Waves' *L1 Ultramaximizer* (b), the overall level can be increased without clipping the transient spike (c).

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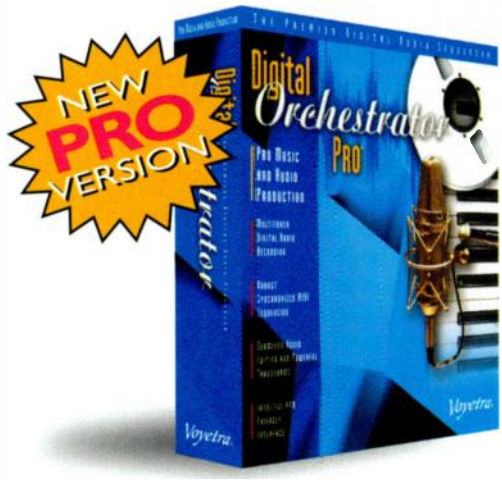

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some reverb or room sound to your samples (e.g., a drum set) to free up your main reverb to handle other tasks. I've used Waves' *TrueVerb* to do that on some close-miked drums, and they sounded great. It's easier to build the perfect "virtual room" in software than it is to hire a contractor to build you a real one just to get a nice drum sound. (You can find plenty of reverb plug-ins that can do this job well, especially if you have a Digidesign Pro Tools TDM system. For a comparison of TDM reverb plug-ins, see "Plug In, Turn On, Space Out" in the May 1998 **EM**.)

PLUG INTO THE FUTURE

Most plug-in developers have Web sites from which you can download demo versions of their products. In addition, we can expect even more companies to jump on the plug-in bandwagon as this technology kicks into high gear.

However, the competing formats and compatibility issues presently have things in a state of flux. Currently, the most popular plug-ins are Digidesign TDM, Microsoft DirectX, and Steinberg VST. Other common formats include Digidesign AudioSuite, Adobe Premiere, and MOTU Audio System. Which one is best? That depends on what you want the plug-ins to do and which format your existing software can accommodate. Which ones will matter a year from now? I doubt that anyone can predict the answer to that question.

Plug-in technology has the power to take samples to new places, and getting there is a whole lot of fun. When you realize that the processing power of a whole rack of expensive outboard gear can now be had for a reasonable price on a floppy disk or CD-ROM, you can't help but believe that there are even more exciting advances waiting just around the corner. I, for one, am glad to be along for the ride.

Jim Miller *is a freelance sound designer and frequent* **EM** *contributor, whose samples have appeared in sound libraries and instruments from Alesis, Korg, Roland, Kurzweil, and Sweetwater Sound.*

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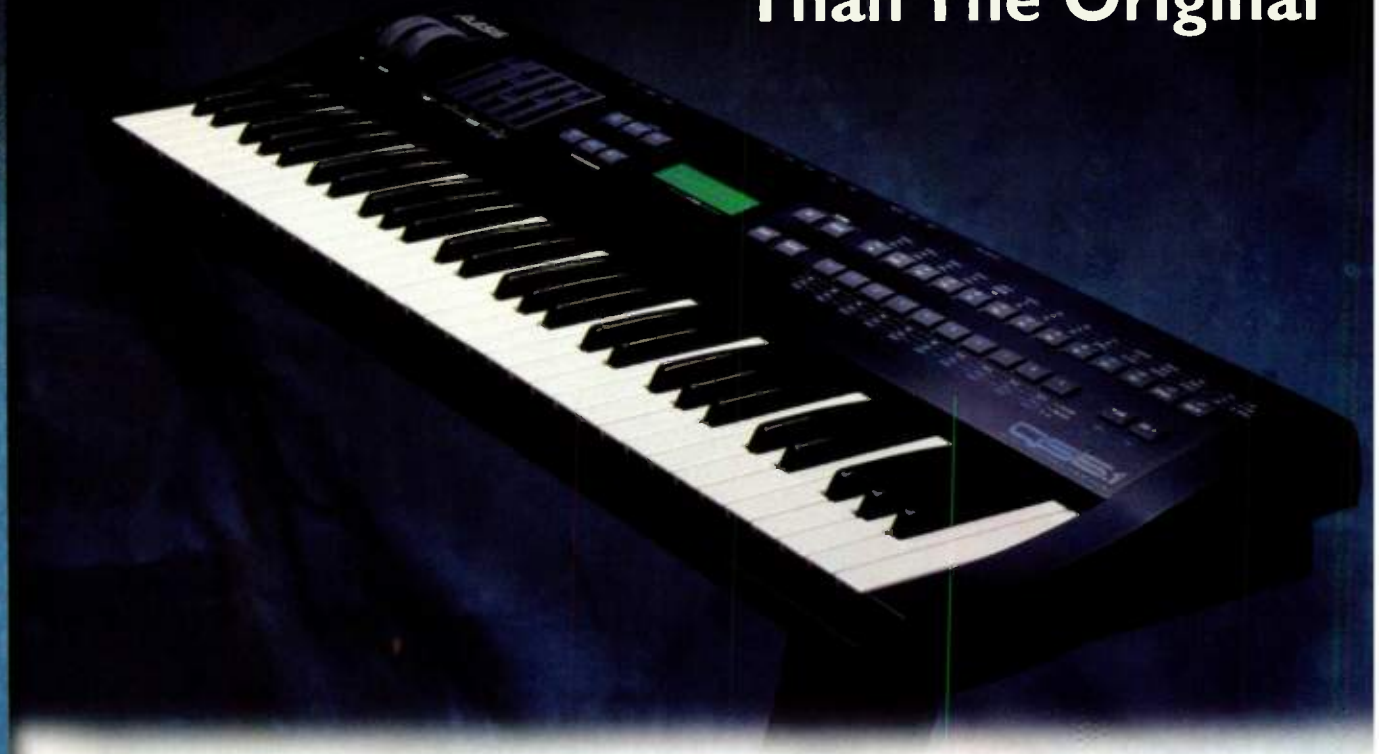

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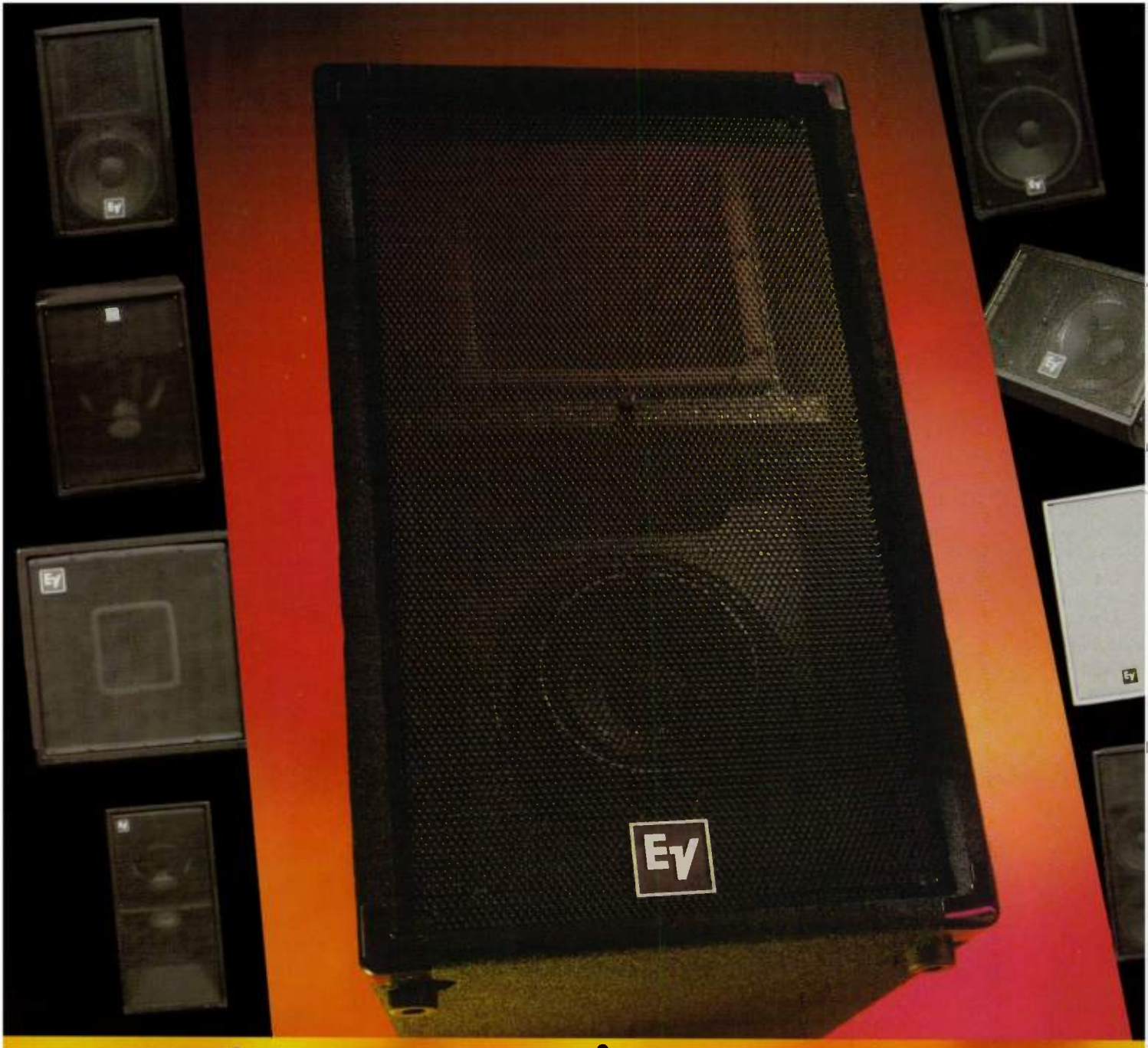

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JAM

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Digital Mixing Onstage with Dave Weckl

Singer's Little Helper

How to get away with murdering the language

17 Low-Cost Solutions to Guitar Rig Headaches

Visit an Old-Fashioned Multimedia Show!

setList

TOOLS New tools for live performance. PAGE 80.

HEADLINER

Mixing It Up on the Digital Scene

Drummer and music-technology pioneer Dave Weckl explains how using a digital mixer has improved his life onstage. PAGE 84.

VOX

Consonants and Dissonance

Are your consonants and your mic having trouble getting along? Learn how to make peace between them. PAGE 94.

RIFFS

Gig Wreckers

If something's going to go wrong with your guitar rig, it'll probably happen at a gig. Our expert consultants help you quickly identify common malfunctions and execute on-the-spot repairs. PAGE 98.

TECH

Omnimedia: A Vintage Multimedia Encounter

Electrochemical improvisation, autonomic orchestrations, and analog counterculture...oh my. PAGE 104.

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tools

By Carolyn Engelmann and Rick Weldon

Crest Audio Pro II Series

Crest Audio's Pro II Series of lightweight, dual-channel, power amplifiers includes three models: the 2U rack-mount 4802 ($1,880) and 7002 ($2,720), and the 3U rack-mount 8002 ($3,560). The 4802 delivers up to 600W per channel; the 7002, 830W per channel; and the 8002, 1,400W per channel (each into 4Ω). Each amp in the series can operate at 2, 4, or 8 ohms. The units' Active Clip Limiting provides gain reduction at the clipping threshold in order to prevent speaker damage.

Crest's PowerLok circuitry allows the Pro II amplifiers to consistently deliver the full-rated output over a wide range of input line voltages. In addition, all Pro II models are designed to draw lower peak/RMS current than traditional designs.

Input for each channel is on balanced male and female XLR connectors, and output is on Neutrik Speakon connectors and 5-way binding posts. Frequency response is rated at 20 Hz to 20 kHz (+0/-0.3 dB) and THD+N at <0.05%. Power amps in the Pro II Series have a damping factor of 400:1 (10–400 Hz @ 8Ω). A 5-year warranty is included for all models. Crest Audio; tel. (201) 909-8700; fax (201) 909-8744; Web www.crestaudio.com.

Circle #416 on Reader Service Card

Boom Theory X-Series

Boom Theory's new X-Series ($5,859; includes module, cables, mounting hardware, snare stand, and Boom Theory's Integrated Rack System) is the latest in the Spacemuffins line of electronic drums. The all-maple, 5-piece acoustic drum kit has built-in triggers for use with the company's 0.0 sound module. Unlike Boom Theory's other triggering acoustic drum sets, the X-Series drum heads are unmuted. The drum triggers are piezo transducers embedded within each shell in the kit, and solid aluminum billet lugs are used to mount the heads.

The 64-note polyphonic 0.0 sound module (which can be purchased separately for $1,699) offers 250 16-bit, 44.1 kHz, sampled sounds. It has ten preset drum kits and 54 user-programmable kits. There are ten trigger inputs and ten audio outputs, all on ¼-inch, unbalanced connectors. Each trigger can activate up to eight sounds simultaneously, and each sound can be assigned its own Velocity, pan position, MIDI channel, MIDI note number, and more. The triggers can also be assigned different modes, such as Normal, Roll, Hi-Hat, or Random; the latter mode calls up eight sounds in random order. Volume and Pitch Bend can be controlled with a CV pedal. There are gain, volume, treble, and bass knobs for each trigger's channel on the module's front panel.

The module also has stereo main outputs and a mono monitor output, all on ¼-inch unbalanced connectors, and a ¼-inch stereo headphone out. There is a dual-footswitch input as well as the input for the CV pedal. Boom Theory; tel. (206) 624-2240; fax (206) 624-2570; e-mail info@boomtheory.com; Web www.boomtheory.com.

Circle #417 on Reader Service Card

Earthworks SR71

Although Earthworks' SR71 cardioid condenser mic ($399) is designed especially for live sound, including vocals, drums, and all manner of acoustic instruments, it can also be used for recording. Earthworks boasts exceptional off-axis rejection, as well as low handling noise. The microphone is 9.25 inches long and less than an inch in diameter at its output end, tapering at the capsule end.

The SR71 can take more than 145 dB SPL, has a self-noise specification of 22 dB SPL (A weighted), and requires 48V phantom power. On-axis frequency response is rated at 50 Hz to 20 kHz (±2 dB). Earthworks; tel. (603) 654-6427; fax (603) 654-6107; e-mail earthwks@jlc.net; Web www.earthwks.com.

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ITS A POWERFUL, COMPLETE, COMPATIBLE AND AFFORDABLE SYSTEM

The APS hardware consists of the E-Card (a Windows 95® PCI card with analog and digital I/O), the E-Drive (a drive bay replacement with microphone/line inputs and additional digital I/O), MIDI bracket, connecting cables, plus all of the basic software you'll need to sample, record, and process MIDI and audio. And, of course, the APS is compatible with most professional Audio/MIDI and multimedia software. Enjoy the Audio Production Studio's professional features and remarkable sound quality at the astounding price of only $699.00 – see your dealer today!

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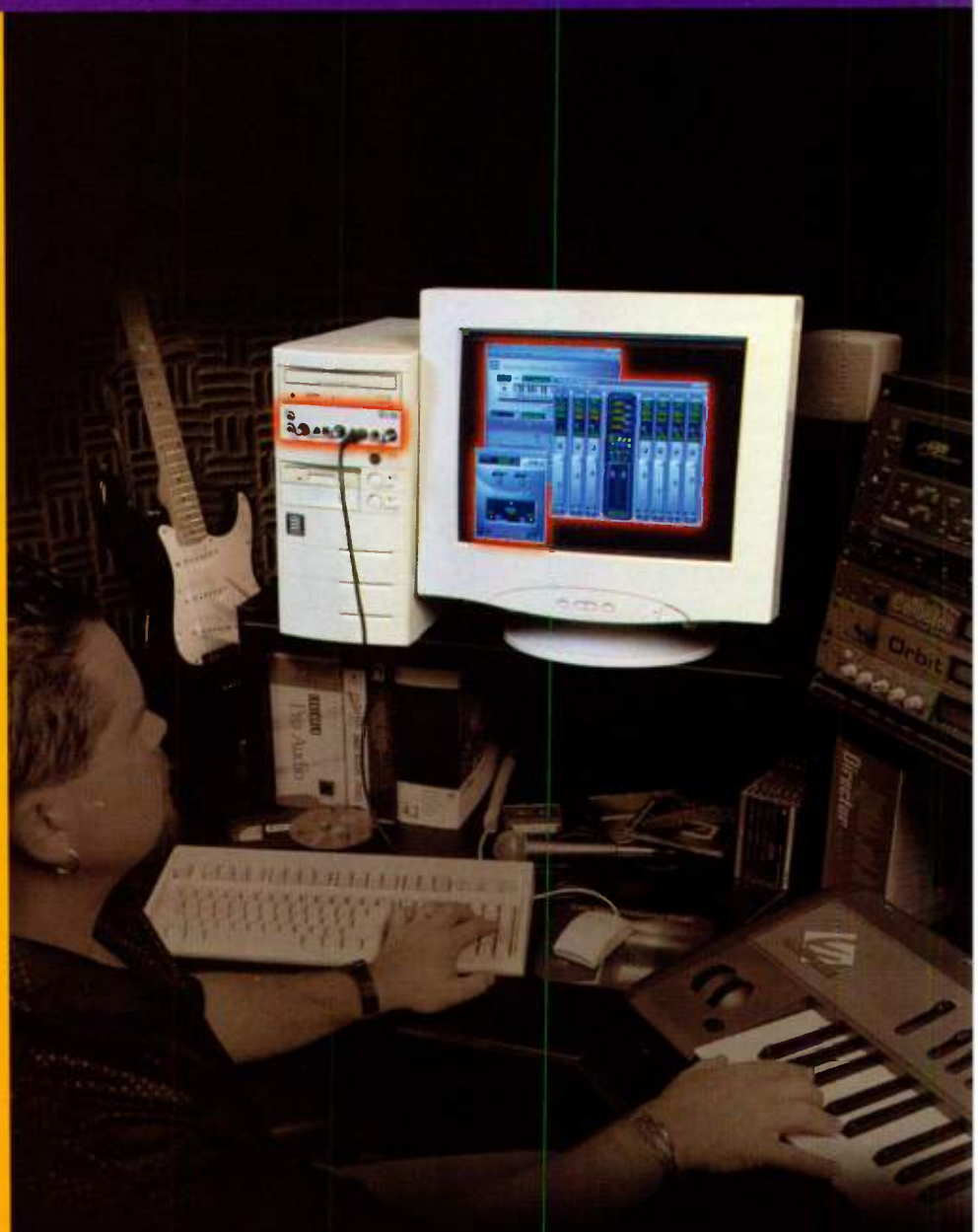

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BSS Audio FCS966

The FCS966 30-band, stereo graphic equalizer ($1,095) from BSS Audio features 45 mm long-throw faders, each of which provides 15 dB of boost/cut with a constant filter width of ⅓ octave. When any EQ fader is in its center position, the filter is automatically bypassed. Each channel features an overall gain adjustment, from 0 to 10 dB, and a highpass filter that has a sweepable cutoff frequency between 0 and 250 Hz, with a slope of 12 dB/octave.

Also on each channel are low- and high-frequency contour filters. The low-frequency filter allows for ±6 dB gain at 50 Hz, the high-frequency filter ±6 dB at 14 kHz. These shelving filters are designed to let you subtly control a channel's overall sound while maintaining the graphic EQ settings, which is ideal if you use the EQ to tune a room or to adjust the response of a loudspeaker to defeat feedback.

Input and output are on ¼-inch TRS jacks; XLR connectors; and Phoenix/Combicon screw terminals (all balanced). Frequency response is rated at 5 Hz to 45 kHz (±1 dB), noise at <-94 dBu (22 Hz to 22 kHz), dynamic range at >115 dB, crosstalk at >-80 dB (@ 1 kHz), and THD at <0.005% (20 Hz to 20 kHz). All specs are rated with the faders set to the center position. BSS Audio; tel. (615) 399-2199; fax (615) 367-9046; e-mail pfreuden@harman.com; Web www.bss.co.uk.

Circle #419 on Reader Service Card

Etek NoteMix

Inspired by the innovation of compact, laptop-style computers, NoteMix ($899) from Etek is a portable, 14-channel, notebook-style powered mixer designed for both sound reinforcement and desktop audio. Two models are available: the MA200 provides 100W per channel, and the MA400 delivers 200W per channel. All controls and faders are tucked into the inside of the top panel of each 11.6 x 3 x by-13.3 inch, 15.4-pound unit, and you can easily carry the compact mixer in the included shoulder bag.

The six mono channels have XLR inputs, ¼-inch inputs, and 48V phantom power; the four stereo channels just have ¼-inch line inputs. Faders control channel level and the 3-band channel EQ. The EQ bands are set at 80 Hz, 700 Hz, and 10 kHz, with 15 dB boost/cut for the highs and lows and 12 dB for the mids. Each channel has three aux sends; aux 1 addresses the internal effects processor, which allows you to switch between three digital effects: reverb, delay, and "surround." An expansion port connects to a 24-channel expansion module ($750), which has the same dimensions and configuration as the NoteMix.

The mixer's frequency response is rated at 20 Hz to 20 kHz (±1 dB) on the line inputs and 75 Hz to 20 kHz (+1/-3 dB) on the mic inputs. Signal-to-noise rario is rated at >92 dB. The amp has a 92 dB dynamic range and frequency response of 30 Hz to 20 kHz (±1 dB @ 1W). It provides a 40 dB gain range, and its total harmonic distortion is rated at 0.03%. Wave Distribution; tel. (973) 728-2425; fax (973) 728-2931; e-mail notemix@wavedistribution.com; Web www.wavedistribution.com.

Circle #420 on Reader Service Card

SoundTech AL2S

Designed for portability and easy setup in small venues, SoundTech's AL2S Power P.A. ($849) offers a compact public-address solution. This sound-reinforcement system is composed of two 12-inch, 2-way, broadband speaker enclosures with a 7-channel stereo mixer and 100W power amp (50W per side) that are built into the left enclosure.

The mixer has two mono channels with mic/line inputs (¼-inch phone and XLR), pan, rotary level control, one aux send, and bass and treble EQ. There are four stereo channels, which have ¼-inch line inputs only and come in three different configurations. Channels 3 and 4 are full featured, with the same controls as the two mono channels (except that balance replaces pan). Channel 5 has volume, aux, and balance controls but not EQ. Channel 6 has volume and balance controls only (no EQ or aux send). The seventh channel is intended to accept a feed from a tape recorder or CD player; it has RCA tape input and output jacks and a volume knob.

The only master controls are the L/R volume knobs; there is a mono aux return, but it has no level control. You also get a stereo master bus insert. In addition to the rear-panel powered output, the AL2S has unpowered L/R mix outputs and L/R amplifier inputs. A ¼-inch headphone output with volume knob is also provided.

The pole-mountable, 19.8-inch-tall speaker enclosures are carpet covered for durability in transport. Frequency response is rated at 50 Hz to 20 kHz and sensitivity at 95 dB. SoundTech; tel. (800) US-SOUND or (847) 913-5511; fax (847) 913-7772; Web www.washburn.com/soundtech. ◆

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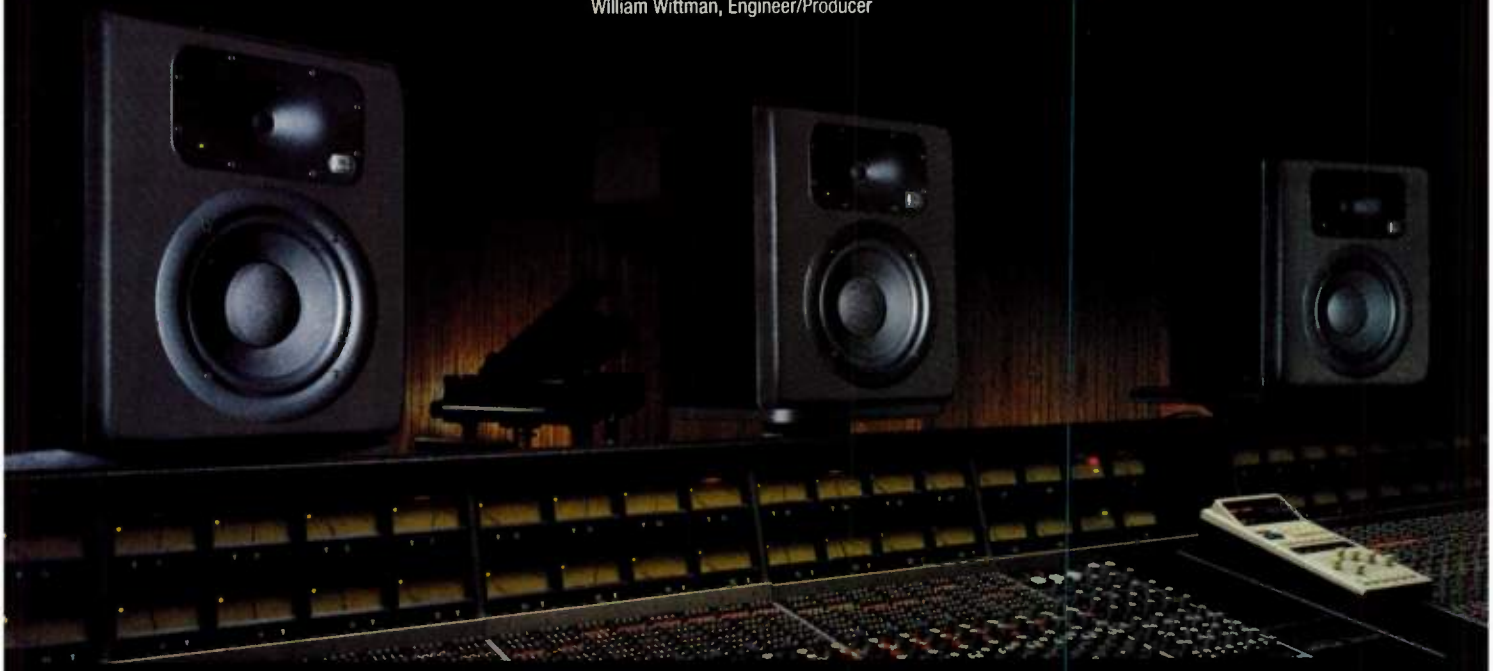
"When A $2,000 System Sounds As Good As A $50,000 System, I'd Say They Got It Right."

William Wittman, Engineer/Producer



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The All-New JBL LSR Monitors are, quite literally, just that. Highlighted by a long list of performance-tailored components and customer-inspired features, they're like no other systems on the market today. The entire line, including the LSR32 3-way, 28P 2-way and 12P Subwoofer, is a technical triumph; resulting in new standards and performance levels for a rapidly emerging multi-channel recording industry.

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Revolutionary transducer designs, optimized network topologies and innovative materials are some of the reasons why the LSR line is being hailed as 'the world's most advanced monitor'. JBL's all-new ***Differential Drive®*** woofer permanently dispels the notion that better linearity, higher power handling and greater dynamic accuracy are somehow an unobtainable, evil triangle. ***Dynamic braking*** produces truly accurate bass at higher SPL's with maximum reliability. Composite materials, including ***Carbon Fiber*** in the woofer as well as ***Titanium*** and ***Kevlar®*** in the high and mid frequency components, insures performance that is always optimally maintained.

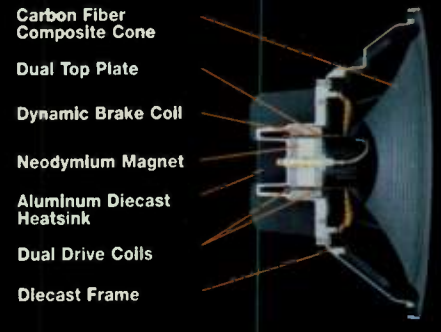
Not Just A Better Spec... A Better Monitoring System

While all companies boast about their specifications, JBL went one step further. To guarantee that every component of the LSR family worked together for optimal performance, LSR development employed JBL's unique 'system-engineered' design philosophy. Simply put: the entire line was researched and refined as one, with an overall performance goal in sight. What this means to you is a monitor and subwoofer that work together as a system; delivering stunningly uniform and accurate performance in both stereo and multi-channel applications.

LSR 32
12" 3-way mid-field monitor with rotatable Mid/High Elements.

LSR 28P
8" 2-way close field monitor with bi-amplification and active filtering.

LSR 12P
12" Active Subwoofer with Bass Management System.



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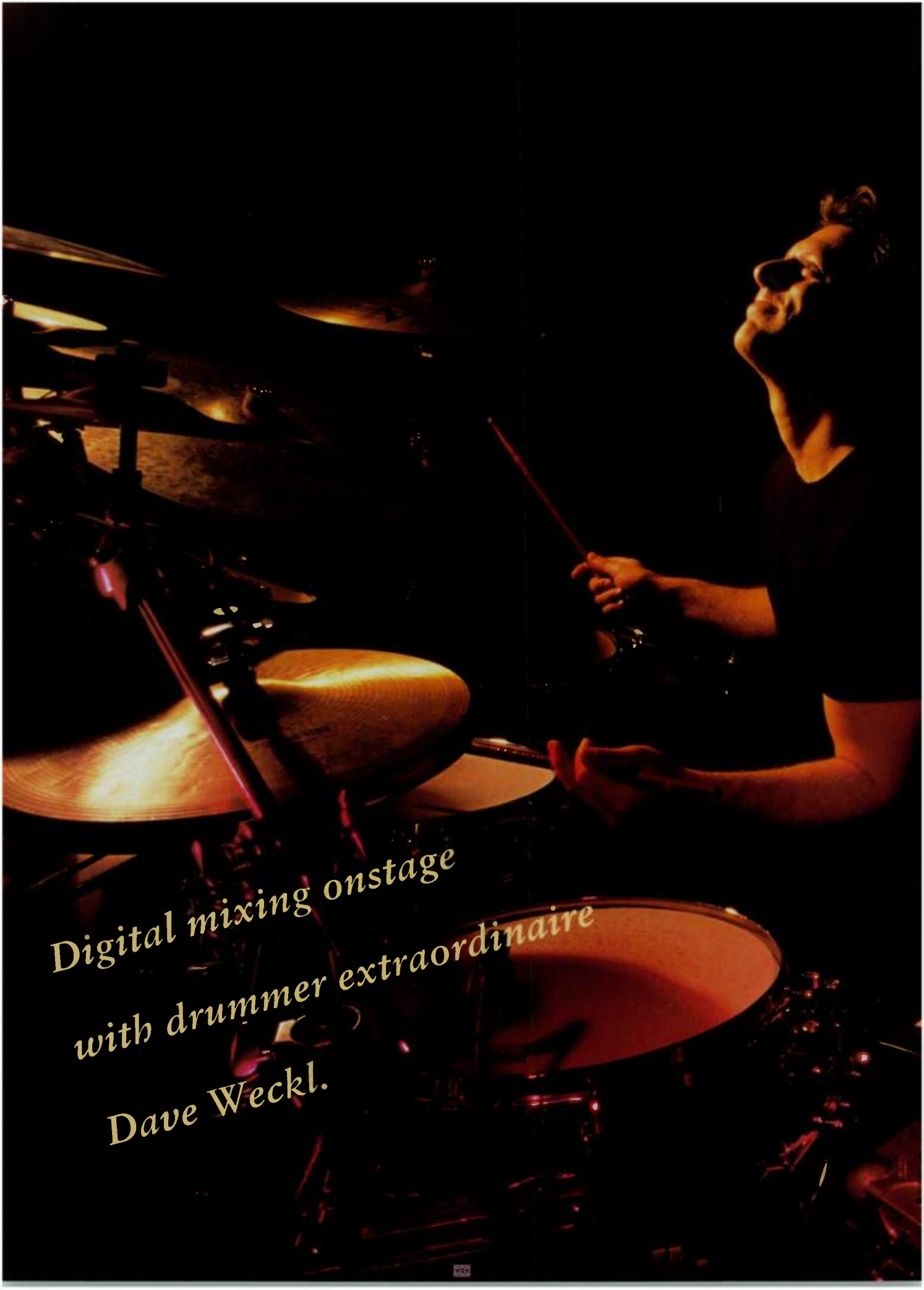

Digital mixing onstage
with drummer extraordinaire
Dave Weckl.

Mixing It Up on the Digital Scene

By Brian Knave

Dave Weckl has long been a pioneer both in drumming and music technology, eagerly embracing the latest electronic offerings and combining them in various setups throughout the years with his acoustic drums. On the 1983 Simon and Garfunkel reunion tour, for example, Weckl intermixed Simmons SDS5 electronic drums with his acoustic kit. With the Chick Corea Elektric Band, he triggered a Linn drum machine from a floor tom and a Simmons pad; later, he replaced the Linn with two Akai S900 samplers and added a Roland Octapad. Weckl's sound grew increasingly colored by electronics as he triggered sounds from all over his kit. He even played bass lines, for example, on the Elektric Band tune "Jammin' E Cricket" (*Beneath the Mask*, GRP, 1991).

Weckl's journey into MIDI land came to a dramatic climax with the song "Trigger Happy" from his solo CD *Heads Up* (GRP, 1992). On that tune, he triggered all the parts live (no overdubs) from his drum kit, including bass, chords, melodies, and percussion. By then, Weckl's stage rig had grown to include two 16-channel analog mixers and two refrigerator-sized racks full of processing gear.

Photo by Alex Solca

Mixing It Up on the Digital Scene

Recently, though, Weckl has revised his sound in the context of a new group, The Dave Weckl Band, which includes Jay Oliver on keyboards, Tom Kennedy on bass, Buzz Feiten on guitar, and Brandon Fields on saxophone. For this outing, Weckl has put aside his triggers and samples and returned to his R&B roots with a looser, more human-sounding technique—and not an electronic drum in sight. The group's debut CD, *Rhythm of the Soul* (Stretch Records, 1998), is perhaps the most listenable—and certainly the most grooving—disc Weckl has released.

I heard The Dave Weckl Band recently at Kimball's East in Emeryville, California, and—honestly—I spent much of the evening dancing in the aisles. Although the band is currently playing primarily jazz venues, make no mistake: this hard-grooving quintet lays down some of the most serious (and seriously enjoyable) rock, funk, and shuffles that you're likely to hear this side of blues heaven.

It wasn't until intermission, though, when I wandered down to the stage for a gawk at Weckl's drum kit, that I noticed a glowing, fluorescent-blue LCD display and realized we were no longer in Kansas. As it turns out, Weckl has traded up his mondo racks of gear and analog mixers for a smaller, sleeker solution to onstage mix control: the Yamaha O3D digital mixer.

> **"Given the unit's potential, it would be easy to act like a kid in a candy store."**
> **—*Dave Weckl***

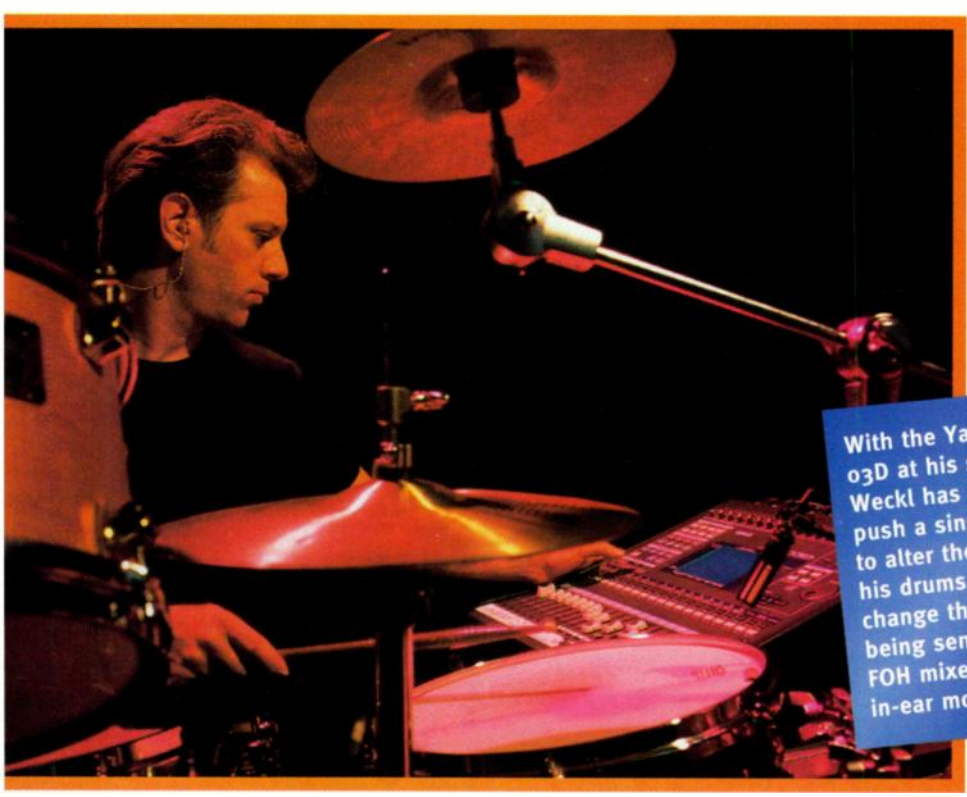
UNPHASED

Weckl is unequivocal about the enhancements the 03D has afforded his stage rig and sound. Despite its small footprint—an especial boon for the touring musician—the 03D is a full-featured mixer, complete with two independent, internal multi-effects processors available on every channel and comprehensive dynamics processing and 4-band parametric EQ available at practically every signal juncture in the board. (See the November 1997 **EM** for an in-depth review of the Yamaha 03D.)

Obviously, all these built-in features have simplified Weckl's gear list considerably, allowing him to dispense with the huge racks and separate mixers, not to mention all the cable required to connect everything. This, in turn, has substantially decreased setup time. Drum tech Doug Smolens is in charge of setting up the drum kit (see the sidebar "Weckl's Live Rig"), but Weckl handles everything else, including tuning, setting up the 03D, and testing the sound in each venue. "Things like EQ and phase on each drum need to be tested daily," explains Weckl, "because these settings will almost always change with different rooms and P.A. systems."

Weckl finds it very important to check for consistent phase. "You wouldn't believe how many systems we've run across that are out of phase to begin with," he says. "Of course, the O3D makes it easy with phase reversal possible on all channel inputs and outputs. This is really helpful when, for example, the phase settings on the kick and some of the toms need to be reversed, but this in turn puts the stage monitors out of phase. To correct the problem, I simply switch the phase on one or both sides of the output."

Weckl is also enthusiastic about the audio quality of the 03D. He finds the unit noticeably quieter than his former rig, and he describes the effects processors (which use the same DSP chip found in Yamaha's ProR3) as "top notch...with all the necessary parameters. They sound really great."



With the Yamaha o3D at his side, Weckl has only to push a single button to alter the sound of his drums or to change the mix being sent to the FOH mixer. Note the in-ear monitoring.

TOTAL RECALL

Of course, the quantum leap in Weckl's stage-mix upgrade was made possible by the 03D's ability to save multiple parameter settings and recall them at the touch of a single button. The 03D provides four dedicated user-definable buttons, which are easy-to-see white buttons located in the upper-right quadrant of the mix surface, just above the unit's parameter wheel. Once the performance starts, these are the

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only four buttons that Weckl is likely to use—and typically, he uses only two of the four per venue.

Weckl has configured buttons 1 and 2 as a toms-only mix, the first with a short reverb and the second with a long reverb. Buttons 3 and 4 call up a mix of the whole drum set, again with a short reverb on button 3 and a long reverb on button 4. Either mix is stereo, of course, and is preequalized, -gated, -balanced, and -panned to accommodate the particular room. (Preset 1 gets the same effects, EQ, and other settings as preset 3, and preset 2 gets the same as 4.) Which pair of presets Weckl uses per gig—those called up by buttons 1 and 2 or by buttons 3 and 4—depends on the venue.

"We have mostly been touring on a 'jazz venue' circuit," explains Weckl, "which can sometimes be very limited in P.A. equipment, especially when it comes to outboard gear and having enough inputs. When we are in a pinch for time, have limited P.A. gear, or if I am working with a sound man I do not know and who is unfamiliar with our music and my preferred drum sound, I use presets 3 and 4, either of which sends a mix of the entire kit to the front of house in stereo. In this situation, I have complete control of all drum-mic balances and effects. Of course, I have to be in contact with the front-of-house engineer during the sound check—that is, if there is one. If there is no sound check, then I have to wait until after the first tune or two to determine if everything is cool in terms of the balance. Usually, though, the sound is very close to being right, thanks to the 03D's total recall."

When there is ample time for a sound check—and especially if the band is playing a larger, better-equipped venue—Weckl will send the toms-only mix to the front-of-house P.A. The rest of the mics are split at the band's custom matrix box (more on this later) and sent both to the 03D (for monitoring) and to the front of house, where the engineer can tweak the mix to his or her satisfaction.

Whether he sends the toms only or the full drum mix, Weckl's arrangement of the four presets allows him to toggle between two different reverb settings, long and short. He chooses the reverb to complement the song. For example, on ballads (such as the lovely "Song for Claire," dedicated to the newest member of the Weckl household), Weckl calls up the long-reverb setting (button 2 or 4); for medium- and up-tempo songs, he uses the short reverb (button 1 or 3).

> **"Things like EQ and phase on each drum need to be tested daily."**
> **—Dave Weckl**

Weckl created both reverbs from scratch. "I tried to make them sound as much like a natural room as possible," he says. "Mostly, I just wanted to give the kit some air, rather than add an obvious effect. Of course, I realize that I am only scratching the surface of the 03D's capabilities. Given the unit's potential, it would be quite easy to act like a kid in a candy store, dialing up different reverb, EQ, and compression settings for each individual tune. But I'm more concerned with the drum sound being consistent and good. After all, effects may distract the listener and detract from the source sound rather than enhance it. In some situations—say, a pop gig with lots of electronics—more presets would definitely be useful. However, as with anything else, especially in a more raw setting such as my current band, sometimes less is more."

GATE MATE

The 03D's onboard dynamics processing (which offers compression, limiting, expansion, ducking, companding, and gating on every input, output, channel, aux bus, and effects return) has also proved critical in Weckl's all-acoustic setup. His only gripe is that just one dynamics processor is available at a time per channel; that is, it is not possible to apply, say, both a compressor and a gate to a tom (short of sending the compressed

What formerly required two 16-channel analog mixers and two refrigerator-sized racks full of processing gear is now elegantly handled by a single Yamaha 03D digital mixer, which Weckl positions within arm's reach.

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signal out of a bus or aux output and back into another channel with a gate on it). Fortunately, though, Weckl's stage applications call primarily for gating. "I usually don't like to use much compression anyway," he explains, "so that I can maintain maximum dynamic range."

Most of the gating is applied to the toms to cut down on the resonant ringing that occurs when the bass drum is hit. "Of course, I make sure to set the threshold as low as possible," says Weckl, "so as not to miss any of the lighter hits. Then I set the decay to be as long and natural-sounding as possible. I might also have to adjust the gates a bit to get rid of any 'flutter' that takes place during the decay, particularly on a long-ringing tom. But I'm always able to find a setting that works with no flutter."

Weckl also usually gates his secondary bass drum, an 18-inch "jazz" kick fitted with two full heads (see the sidebar "Weckl's Live Rig"). "That drum tends to ring quite a bit," he explains, "and occasionally will be set off by a resonant frequency from the bass or guitar. Generally, though, bleed from the other instruments is not a problem because the mic is mounted inside the drum." (Weckl endorses the May bass-drum mounting system, which comprises a shock-mounted mic holder that attaches to the inside shell of the drum.)

CUE UP

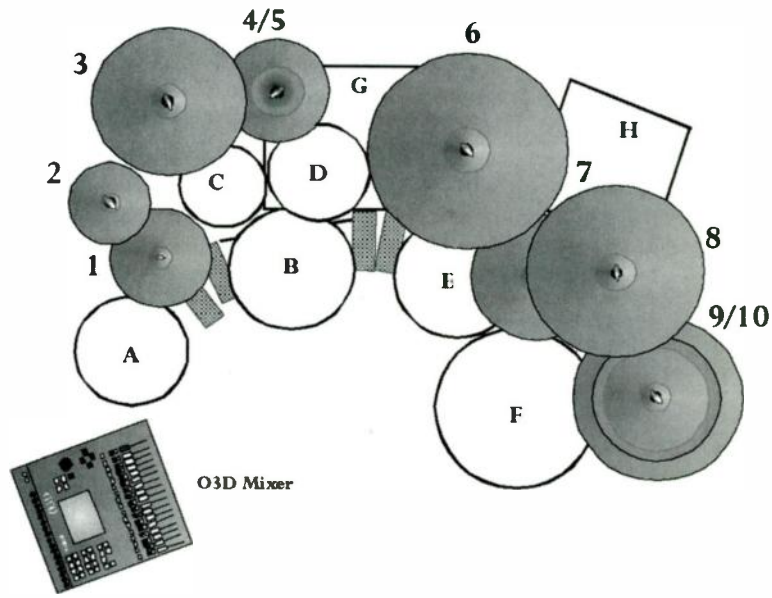
It's also interesting to note how Weckl monitors with the 03D, and how he has integrated it into a system that accommodates everyone in the band. The centerpiece of the group's monitoring system is a custom-built matrix box that allows for independent mix control for each musician. Weckl's is the only digital mixer onstage; each of the other musicians has his own Mackie 1202 mixer. The matrix box ties everyone together via separate snakes going to each mixer. After receiving each band member's signal, it sends all the signals back to each mixer. From there, each person can dial in his own monitor mix to taste.

Interestingly, each musician monitors differently. Oliver (keyboards) likes to use regular, over-the-ear-style headphones; Feiten (guitar) and Fields (sax) both prefer to use the house stage monitors; and Kennedy (bass) doesn't use anything, preferring to cue off the stage sound alone. Weckl, ever the fidelity hound, employs a double setup, using both the Shure P6HWE1 in-ear monitoring system and stage monitors.

The output flexibility of the 03D accommodates his needs beautifully. The mixer provides a variety of analog outputs, including Stereo, Monitor, and Rec (for connecting to a recorder) outs, four discrete aux sends, and four bus outputs on ¼-inch jacks. All of these outputs are assignable. Weckl uses the Stereo outputs to send either the toms-only or whole-kit mix (as described previously) to the FOH main board.

Weckl sets the four aux sends to pre-fader so they function essentially as direct outputs. (That way, too, an accidental move of a fader won't affect the output level.) Auxes 1 and 2 are assigned

WECKL'S LIVE RIG



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4. 2" Brilliant K Splash
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4. Overheads: (2) SM 81

COURTESY DAVE WECKL

Weckl's current live setup employs two snare drums, two kick drums, four toms, twelve cymbals, ten microphones, the Yamaha 03D mixer, Shure's in-ear monitoring system, and two 15-inch floor monitors for low-end enhancement.

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to send the stereo drum mix to the matrix box, where it becomes available to the other musicians. Auxes 3 and 4 feed Weckl's in-ear system, from which he monitors the band mix.

"Once I've sent my stereo mix of the drums to the matrix box," explains Weckl, "each player can bring it up in his own monitor as desired. I, in turn, get everyone's signal coming out of the matrix box into the O3D, which I can then mix to my liking. This setup eliminates the nightmare of trying to get the monitor engineer's attention to let him know what you need more or less of—an aggravating situation that any performing musician can relate to."

Weckl feeds his two 15-inch stage monitors from two of the 03D's four bus outputs, which he has assigned to carry the drum mix only. "My stage monitoring is more for fidelity enhancement rather than volume," he explains. "Basically, it helps me better match the SPL of the other electric instruments on stage. Also, as good as the Shure in-ear monitoring system is, the low end isn't sufficient for my needs. However, the 15-inch speakers take care of that problem. Some drummers like to use a system mounted on the drum throne that vibrates when low frequencies are put through it, so they can really feel the low end. But I prefer to look at it from a 'sound' perspective rather than from a 'feel' perspective. What I'm after is the same fidelity that the other instruments have on stage."

DIGITAL DELIGHTS

More than a trend, the recent spate of affordable digital mixers qualifies as a wave—and evidently one that has only begun to hit shore. At the 1998 Audio Engineering Society Convention in San Francisco, I counted twelve affordable digital mixers, nearly half of them new, and most costing less than $5,000 each.

What do these binary bundles have to offer that make them more desirable than their analog predecessors? A number of things, including better specs, practically no signal degradation, and, of course, the ability to automate functions and save parameter settings. Most even come with onboard digital effects and dynamics processing. And not only is the digital price/performance ratio considerably better than in the analog realm, but the digital-mixer footprint is smaller, too. Clearly, the features that give digital mixers an edge in the studio render them highly desirable for live applications, as well.

ONES AND ZEROS

Clearly, Weckl is delighted by the time-saving and fidelity-enhancing advantages that his Yamaha 03D has provided. In most every way, it has made his life on the road easier and improved his sound to boot. Of course, that's not to say the 03D offers everything Weckl needs or wants in a personal stage mixer. For example, the mixer provides only eight mic preamps, which means Weckl needs to pack two extra preamps to cover miking his kit. (He uses the dual-channel Aphex Tubessence model 107, which is dedicated to the overhead mics.)

Then again, as Weckl points out, the latest digital mixer from Yamaha, the 01V, provides twelve mic preamps. In addition, it is smaller and costs considerably less than the 03D. Moreover, a half-dozen other affordable digital mixers have hit the market this year alone. It seems a no-brainer that compact digital mixers have a bright future in onstage mixing applications, especially for drummers and other multi-instrumentalists who need to juggle a lot of signals, recall multiple parameters, and change sounds fast.

Brian Knave *is an associate editor at* **EM.** *For more information and updates on the Dave Weckl Band, point your browser to www.daveweckl.com.*

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Vox

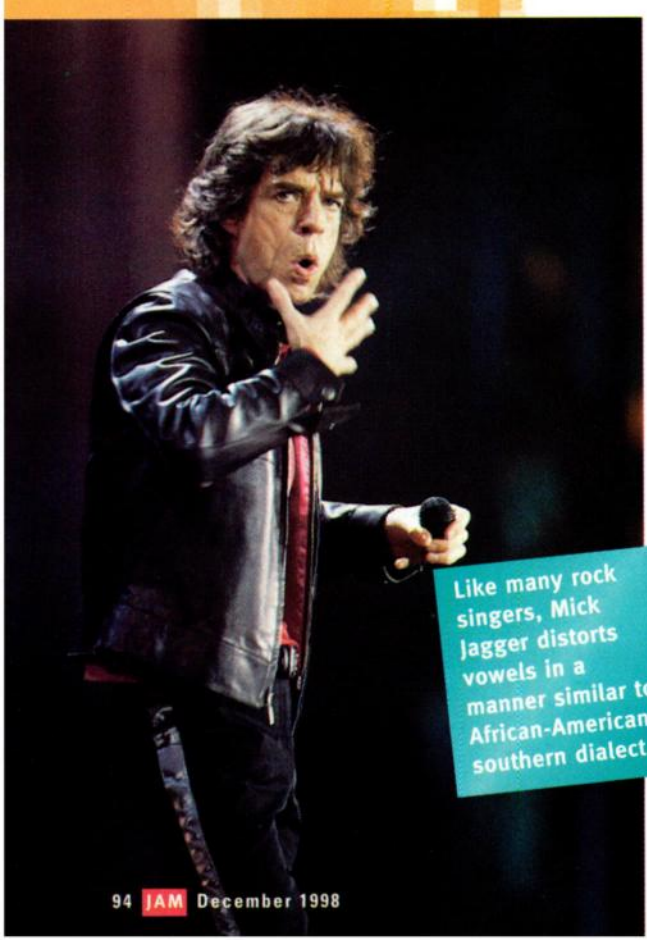
By Joanna Cazden

Consonants and Dissonance

Back in elementary school, we all learned that the 26 letters of the English alphabet are divided into two categories: consonants and vowels.

Vowels are relatively similar to one another acoustically. Consonants, however, encompass a much wider range of sounds, some of which cause unique problems for microphones and the rest of the audio chain. The more you, as a vocalist, understand about the articulation of consonants, the better you can control them and minimize the problems they present to a sound system.

Speech scientists group consonants according to how and where they are produced in the mouth. As you become more aware of the relationship between how consonants sound and how they are made, you can fine-tune your pronunciation of lyrics to work with, rather than against, your gear.



Like many rock singers, Mick Jagger distorts vowels in a manner similar to African-American southern dialect.

PHOTO BY STEVE JENNINGS

Vowel Play

First let's take a quick look at vowels, which are the sustaining sounds of speech and singing. They radiate from the mouth with minimal obstruction, somewhat like tones from the bell of a trumpet, and they ride on a relatively steady stream of air. Different vowel sounds are produced by changing the shape of the mouth and (more subtly) by altering the tension or stiffness of the walls of the mouth. These muscle manipulations become evident acoustically as spectrum or timbre changes.

For example, the vowel *ah* involves a relatively vertical mouth posture, with the jaw dropped and the tongue and lips relaxed. In contrast, the vowel *ee* requires a higher tongue placement and often incorporates a wider lip position and increased tension in the muscles of the mouth and throat, all of which contribute to that vowel's more treble and penetrating tone. (For more information about this subject, see "Recording Musician: Vocal Acoustics," in the February 1993 **EM**.)

Each singer's oral anatomy, personal style, regional dialect, and subculture influence his or her pronunciation of vowels, but these variations do not usually interfere with being understood. In fact, rock singers, such as Mick Jagger, seem to have created their own "dialect" (e.g., pronouncing the pronoun *I* as *ah*). The similarities between this singing style and the speech dialects of African-Americans from the deep South reveals the strong influence of blues and early R&B on classic rock.

Yada Yada Yada

Now, consider the rest of our language: consonants. Starting with those that are most similar to vowels, the consonants *w, y, l,* and *r* are favored by singers and lyricists, because they shape vocal resonance in appealing ways and are relatively easy to amplify or record. These consonants, classified as *glides (w* and *y)* and *liquids (l* and *r)*, are momentary timbral shifts made by rounding the lips or curling the tongue. They alter the resonance and spectrum of the vocal signal by constricting, but not interrupting, the flow of air or sound.

However, the majority of consonants are made by valving or obstructing the

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singer's outgoing airstream. These more aggressive consonants are generally described according to how they are produced. The two subgroups that most often cause problems for sound systems are the *fricatives* and *plosives.*

Plosives are produced by momentarily stopping the flow of air, then suddenly releasing it in an explosive manner. The plosive consonants are *p, t, k, b, d,* and *g.* By contrast, fricatives are produced by a tight constriction of the airstream, and their name arises from the friction of the air being forced through a narrow passage. This group includes *s, z, f, v, th, sh* and *zh.*

You might have heard the term *sibilants,* which refers to a special subcategory of fricatives, *s* and *sh.* Their high frequencies and moderately high amplitude are infamous to sound engineers and choir directors.

Another distinction of importance to vocalists is whether a consonant is pronounced with help from the vocal cords. Consonants that include a vocal sound are referred to as *voiced* (e.g., *b* and *z*); those without vocal-cord vibration are called *unvoiced* (e.g., *p* and *s*).

The unvoiced plosives and sibilants completely replace a vocal tone with air noise for a few milliseconds, and this noise is more intense than any other sounds in our language. These high-pressure consonants are the bane of sound technicians.

Clearly those foam balls or dirty socks placed over microphones are not there to filter the sound. Their job is to screen the mic from surges of air pressure, either prolonged (sibilants) or sudden (plosives), and to keep these fluctuations from interfering with a clean reproduction of the rest of your vocal expression.

Solutions

So what's a singer to do? Pop screens can tame plosives somewhat, but they do little for sibilants, and those external screens on gooseneck clamps look odd on stage. De-essers can help with sibilants but must be configured carefully to avoid dulling the overall tone of your voice.

Some performance techniques can help tame these voiceless demons. For example, you can turn your head as you utter the particularly egregious sounds so that the mic is aimed at the corner of your mouth, away from the nastiest blasts of air, and leave the rest of the cleanup job to your ever-patient engineer. But keep in mind that each consonant lasts only a few milliseconds. Few engineers can ride the board as fast as your lyrics fly.

Better yet, you can cheat on your pronunciation so that less air is expelled on these particular sounds. Here's how to practice this: first, hold one hand an inch or two in front of your mouth. Say "buh, buh, buh" at normal speaking loudness. You'll feel little bursts of warm air on your hand. Then say "puh, puh, puh," and notice how much more air is expelled on *p*. This causes the extra pop or boom that drives engineers nuts.

Now practice saying "p" without pushing out that extra air. (This is how *p* is produced in many other languages, including Spanish; it's called *unaspirated.*) Then, see if you can say "paper" with no more breath than "baby." Once you have the feel of it, try practicing more complex words and phrases, such as "purpose, people, pack it up, pick up the pieces," using the reduced-air-pressure adaptation. The final step involves trying some song lyrics that have been troublesome.

For a similar adaptation of the noisome *s,* practice it with your tongue slightly lower and closer to your teeth. This comes closer to the position for *th,* so you might feel as if you have a partial lisp. The idea is to soften the impact of the *s,* and perhaps lower its frequency a bit, without distorting it so far that your lyrics are no longer clear.

At first, you might need to go through all your lyrics, marking the trouble spots and practicing each phrase, before you get on stage or record that demo. After a while, though, these techniques will become automatic, and you won't need to practice each instance. Nor will you have to cheat this way on every high-pressure consonant when you're actually in performance. Just softening an explosive *p* or an ear-piercing *s* when they are most exposed, such as at the beginning of a phrase or in a loud climactic line, can clean things up a lot.

Remember that, as a singer, you convey tone, melody, and emotional expression during vowels, but consonants carry the meaning of your lyrics. Consonants also provide crisp punctuation in the flow of the voice, focusing the poetry and storytelling that are part of the magic of song. So treat 'em right, and remember the old typesetters' advice to mind your p's and cues.

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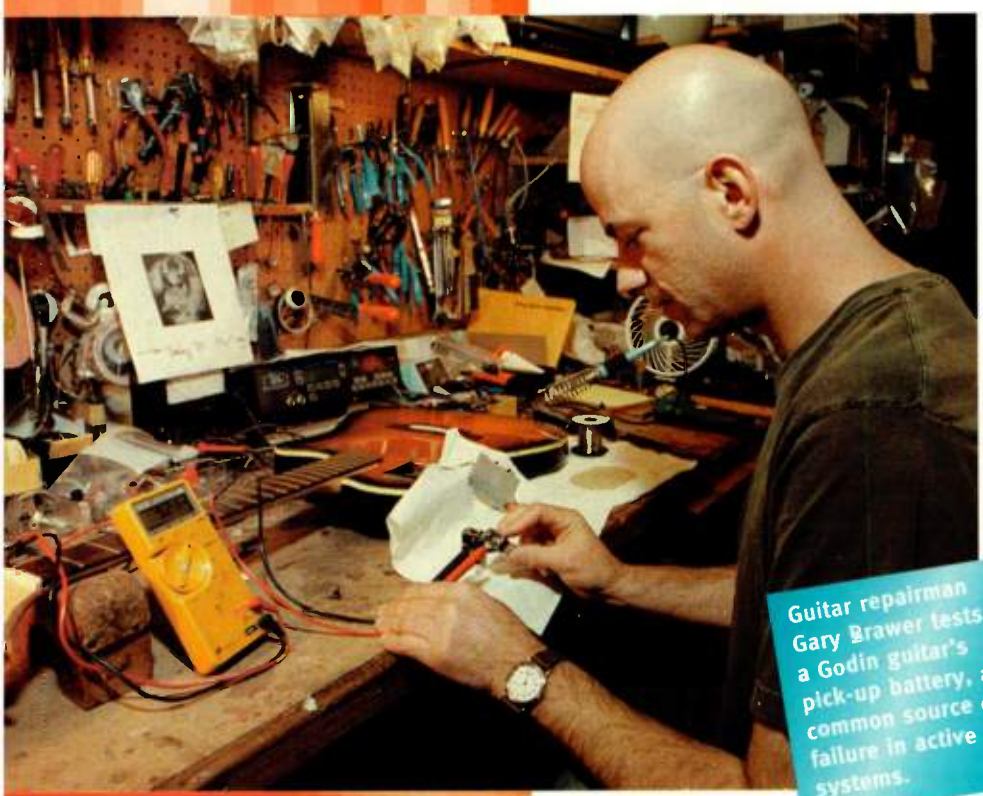
riffs

By Matt Blackett

Gig Wreckers

We've all had gigs ruined by equipment problems. It's hard to keep your cool when things aren't sounding right—or aren't sounding at all. But you can deal with these headaches better if you can swiftly identify the problem and, hopefully, find a quick fix.

Here is a lineup of possible solutions to some of the most common gear problems that guitarists and bassists face. For this advice, we turned to two guys who know gear inside and out: Paul Rivera of Rivera Research, one of the foremost amplifier experts on the planet, and Gary Brawer, a guitar repairman for the stars who is based in San Francisco.



Guitar repairman Gary Brawer tests a Godin guitar's pick-up battery, a common source of failure in active systems.

STEVE MALLER

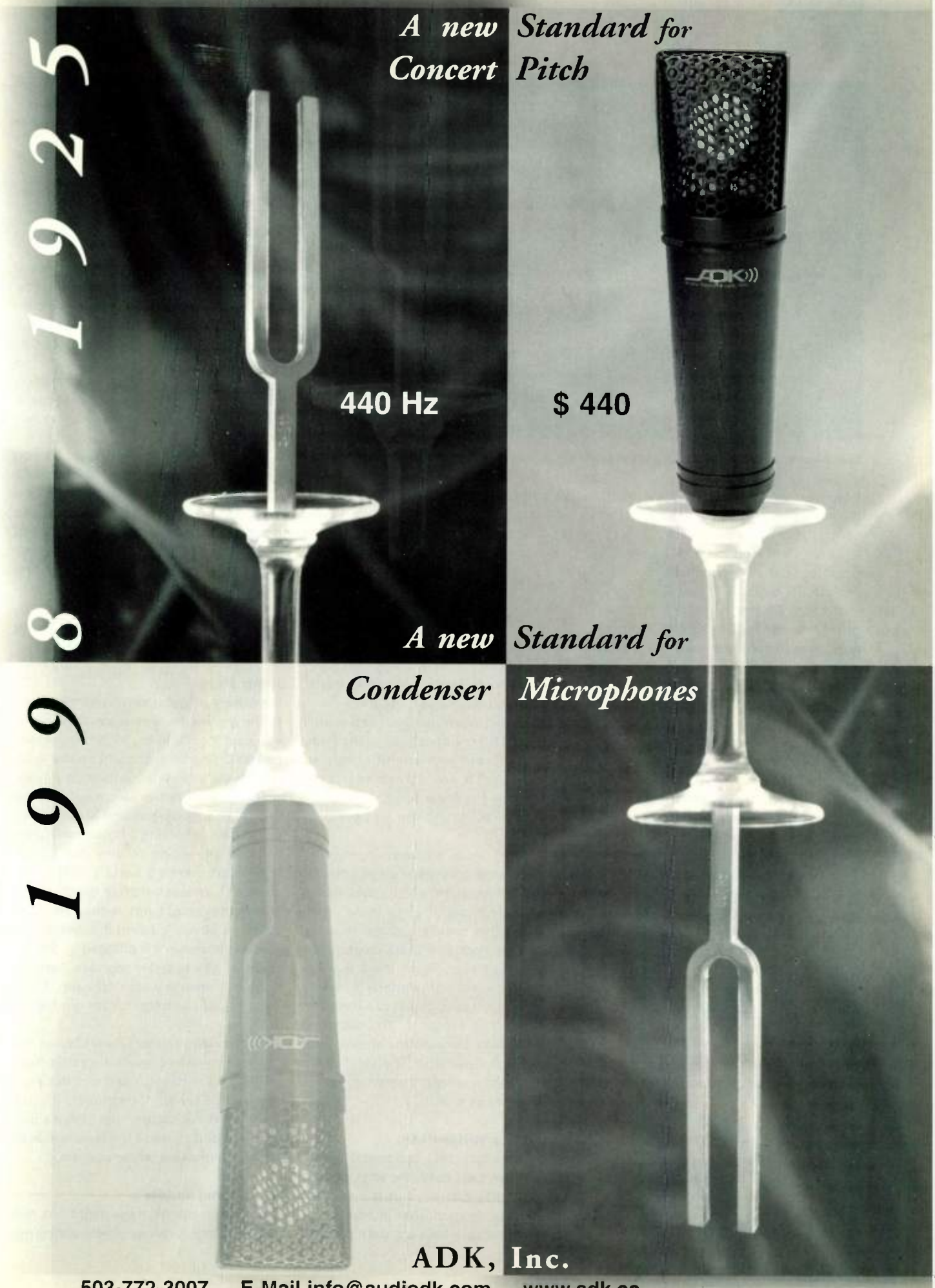
Is This Thing On?

Don't you hate it when you plug in and get no sound from your amp? This can be due to a variety of factors, so you need a really efficient method for troubleshooting. After all, the show must go on, right? Start by eliminating some variables: remove everything from your signal path except your instrument, cord, and amp. If you now have sound, the problem is in your effects chain, and smart money says it's a bad patch cord or a dead battery. Still no sound? Try swapping cables. You might have to do this twice—even though it's rare, I have seen two bad cables in a row. (*That* was a great night.)

You can help keep the gig-ravaging wolf from your door by spending a few extra bucks for really good cables. High-quality cables can still go bad, but not with the alarming regularity of the little plastic ones. If you're still out of luck after changing cables, either your instrument or your amp is causing the problem.

Tube Trouble

Here's the situation: you show up at your gig, you plug in, and your amp makes a high-pitched squealing sound, even with your instrument volume all the way down. Most likely, you have a microphonic preamp tube. Great, but how can you tell? Paul Rivera suggests, "Set the amp at the volume at which you would normally play, and then tap on the preamp tubes with the eraser end of a pencil. (The preamp tubes are the small ones.) See which tube makes the most racket—that's your bad one." This is a little trickier than it sounds because at first, they *all* might seem noisy. The bad tube,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STEVE MALLER

Matt Blackett taps on the preamp tubes of an old Fender amp to find the microphonic one.

however, will be the noisiest of the bunch by far and might even howl uncontrollably when provoked.

To be delivered from this squealing situation, get out your spare tubes and replace the bad one. If you don't have a spare tube (shame on you), there is another remedy: because some tube stages are hotter than others, preamp tubes get microphonic at different rates. Your bad tube can probably trade places with one of the others and survive one gig just fine. If your tubes are so old that they all squeal, well, you deserve what you get.

Some other, lesser-known causes for squealing include bad reverb tanks (turn the reverb all the way off and see if the problem goes away), microphonic pickups (try rolling your tone control down), and speaker cable used as a guitar cord (don't make this substitution).

Another tube-induced symptom is a weird, low-frequency growl that follows a note. This may be caused by a bad power tube. Tap on the power tubes (they're the big ones) to see if one is noticeably noisier than the others, and if you find it, replace the bad tube. Rivera advises, "Carry a spare set of tubes. One of the coolest things about a tube amp is that you can fix it. Solid-state amps are, for the most part, not user-serviceable."

Power Trip

So how about this: you're set up at your gig, and your amplifier seems low on power. It sounds muddy and has no clean headroom. This is possibly due to insufficient power on stage. "When you have a couple of amps, the P.A., and lighting all going through the same darn box, you can have as much as a 25-volt drop on your AC line," explains Rivera. "A volt meter is a handy thing to carry with you, so you can see whether there's any voltage drop to the outlet on stage. If the onstage outlet is only putting out 95 volts, your amp's going to sound muddy and have less power." To get around this problem, carry a long, beefy extension cord, and try to plug into another outlet that doesn't have a voltage drop.

One other possible cause of a murky sound with no headroom is that you have connected your amplifier to your speakers with an instrument cable rather than a speaker cable. Always use a speaker cable, and use a heavy-duty one, at that.

What if your speaker is making buzzing, rattling noises when you play? It might be blown (in which case, you're screwed), or it might just be loose. "Plug into any other speaker cabinet to make sure it's not your amp that's creating the noise," says Rivera. "Next, check that the speaker is mounted properly." What? "The speaker's cork gasket can compress over time," he explains. "You can get a rattle or buzz because the speaker has actually loosened up." The solution to this problem is simple: tighten down the speaker screws or nuts.

This Thing Still Isn't On

Let's go back to that "no sound" problem. If it isn't the cord, the amp, or your effects, sorry Charlie, but it has to be your guitar. Plug another instrument in (you did bring a backup, didn't you?), and see if you get sound that way. If you don't want to play your backup instrument for the entire gig, you can try a few things to fix up your problem guitar. Gary Brawer checks the jack first. "A dirty jack can cause the signal to cut in and out, or drop out completely," Brawer says. "Roll up some 600- to 800-grit sandpaper, and ream out the jack."

"If the sandpaper doesn't work," Brawer continues, "you have to get into the jack. Take off the backplate, and you will probably see a disconnected wire. Reconnect the wire any way you can." To accomplish this, you can solder it, twist it on, or tape it in place. If it's too short, you can use a piece of guitar string to extend it, and then you should wrap it with tape to keep it from shorting out against any other metal.

Follow the above procedure if you plug in and get only hum, which would indicate a broken ground wire. "The main reason this happens," according to Brawer, "is that the jack loosens up, and people try to tighten it from the outside." This spins the jack around, and the wire finally breaks. Dr. Brawer's preventive medicine: "Put a big flat-head screwdriver inside the jack, and tighten the nut with a Crescent wrench."

Jump Start

Suppose you get a distorted, flatulent sound coming from your amplifier when you plug in your killer, high-tech, active-pickup instrument. It could be the amp, but it's more likely a low battery in your guitar or bass. Active electronics, all the rage with bass players and acoustic guitarists, are becoming so common that—no kidding—many players don't even know that there's a battery in their instrument. Or even if they do know it's there, they might not realize that the battery's power is being drained whenever the instrument is plugged in. So first of all, it pays to know your axe. Second, unplug it when you aren't playing. Third, carry a spare battery in your gig bag at all times.

Battery clips can sometimes loosen up. "People come in complaining that their guitar was cutting in and out during a gig," says Brawer. "Sometimes, it's just because of the battery clip." Take a pair of pliers, and squeeze the female side of the clip to make a better contact.

Back in the Saddle

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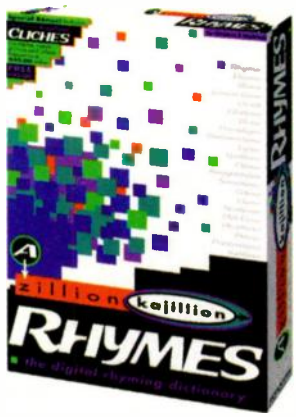

*(Some assembly required.)

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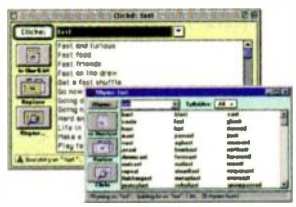

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riffs

Sometimes it can't be helped, especially if your strings are old. If you consistently break the same string, however, you may be able to do something about it. "Strings usually break at the saddle," says Brawer, "because the string notches the saddle, and then the saddle develops a burr." This burr may not be visible to the naked eye, but you can feel it with your fingernail. Using sandpaper, smooth out the saddle where the string makes contact.

This goes for acoustic players, as well. "I find that acoustic guitarists break strings a lot," says Brawer. "You can sand and polish an acoustic saddle pretty easily." Other ways to avoid string breakage include using a lighter-gauge pick and replacing metal saddles with graphite ones.

The List Goes On

Here's a quickie: the strap button pulls out of your instrument, sending it plummeting toward the floor. Hopefully, you're lucky enough to catch your axe before it crashes. In any case, you have to get that strap back on. "At a bar, you can usually get a toothpick," says Brawer. "Cram two toothpicks in the hole for the strap button, and screw it back in."

Maybe all your gear is working properly, but you can't keep your guitar in tune to save your life (or your gig). "Plenty of people don't know how to put their strings on correctly," explains Brawer, "and they don't stretch them. Don't blame your tuning machine," he warns. "The nut is the main culprit." A little pencil lead in the nut slots will help a lot. (For in-depth tips on stringing, check out "Riffs: Intonation Regulation" in the June 1998 *JAM*.)

Of course, these are only quick fixes designed to get you through your gig—not proper, permanent solutions. You wouldn't drive for weeks on a spare tire, would you? So after the show, get your equipment repaired by a pro.

When gear problems crop up at a gig, try to remain calm. Have spare strings, tubes, batteries, and cables on hand, and get your equipment up and running again as quickly as you can, even if it means doing without your favorite pedal, instrument, or smoking pickup. Your only alternative is a drum solo.

Guitarist and instructor **Matt Blackett** *is a regular* **EM** *and JAM contributor. He carries spare guitars, amps, tubes, cords, cases, fuses, footpedals, and strings, but not picks.*

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tech

By Bean

A Vintage Multimedia Encounter

Readers of this column can easily understand why an invitation to experience electrochemical improvisational acts and autonomic orchestrations would be too intriguing for me to pass up. So I ventured into San Francisco's Crucible Steel Gallery—also known as "the Cell"—for Omnimedia's fourth psychoacoustical investigation. This show integrates an overwhelming collection of electronic media, audio, video, and assorted visual stimuli into an impressive assemblage of all things electronic.

Peter Washburn, a.k.a. "Index," plays Thor's Hammer, a homemade gadget that uses a small Tesla coil (a high-voltage, high-frequency, electronic device) to control a Casio SK-1 sampling keyboard.

ERICH SCHIENKE

A slice of the San Francisco analog counterculture was assembled for the warm-up portion of the show. At first glance, the Cell looked like a garage sale of old-fashioned gizmos. Speakers were placed randomly around the room, having no apparent relationship to the performer's hearing requirements. I was more than a little bewildered and wondered how anyone trying to create sounds in a warehouse full of equipment junkies would have a clue as to which sounds they were generating themselves.

It wasn't long before the realization hit home that this was exactly the point of the evening's festivities: a complete loss of the egotistical self-awareness that often plagues "new music" events. This would be a massive improvisational jam, topped off by a fez-capped, poobah-conductor who would coordinate the sonic mutations that were flying, fast and furious, around the room.

The modern Univac. As I wandered among the tangle of audio and visual paraphernalia, my attention was drawn to the Vibratron, a 6-foot bedspring with a 1940s-vintage vibrator attached to the middle of the frame. This specific type of vibrator has springs that your hand slips into; the springs cover your palm so that the vibrator sits on "top" of your hand.

Tom Koch (a.k.a. Univac, named after the first general-purpose electronic digital computer designed for commercial use) was using a Superior Electric Company Powerstat rheostat to vary the power between 0 and 140 volts, controlling the vibrator's frequency. Univac miked the spring to capture its vibrations and used an MXR 10-band graphic equalizer to filter out the hellish buzz generated by the rheostat and the cheesy 1980 Sony tape recorder mic's magnets. After processing the signal through an Alesis MicroVerb II, Univac swore the results sounded like the lowest and best part of thunder, with a slightly metallic taste.

Mind-controlled devices. Behind the Vibratron, Univac attached sponge electrodes to his forehead and engaged an Autogenic Systems AutoGen 70, an encephalographic biofeedback unit that was manufactured circa 1975. Univac proudly revealed that, in keeping with Omnimedia's aesthetic of trickle-down technology, his roommate had discovered the AutoGen at a bargain-basement sale for one dollar. It even included a manual.

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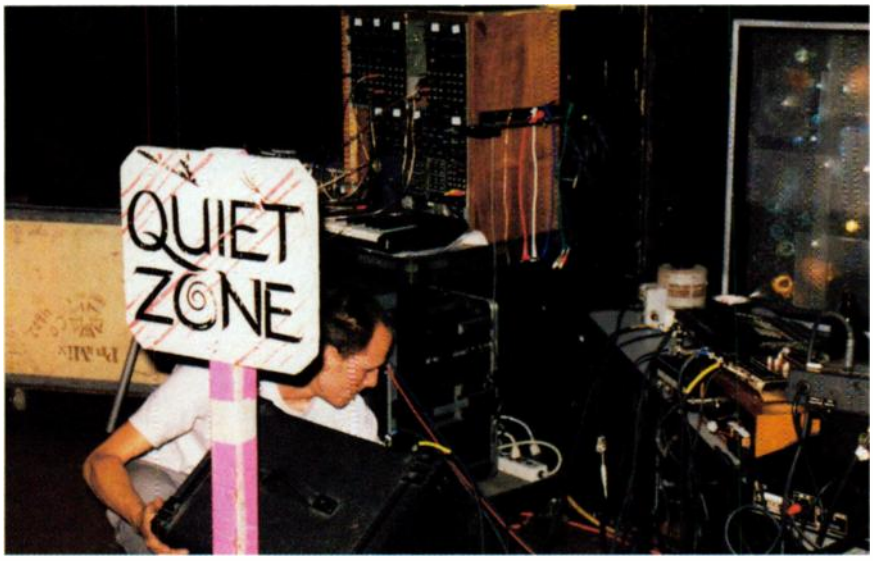


ERICH SCHIENKE

Univac Index sets up at Omnimedia v.04. Note the classic Ares Modular and Realistic Moog analog synths.

The AutoGen 70 triggered an extensive display of drum machines, all wired in parallel. Univac's beatbox collection included an Alesis HR-16, a Tama DS200 drum synthesizer, a Simmons SDS 800 electronic-drum controller, a Sequential Circuits Drumtraks, and a Casio RZ-1.

The frequency generated by the AutoGen 70 was a function of Univac's state of relaxation. The more relaxed he was, the lower the frequency and the more control he had over retriggering the drum loop coming from the drum machines. The drum machines in turn triggered each other to create a recombinant loop. Said Univac, "It sounds like music you think you could dance to, but it leaves you with severe internal injuries."

Thor's Hammer. Univac's partner, Peter Washburn (a.k.a. Index), uses an invention known as "Thor's Hammer," which combines a Casio SK-1 (a low-budget, sampling keyboard) with a small Tesla coil in a handheld unit called Mr. Violet Ray. Mr. Violet Ray is a high-voltage, high-frequency, electronic device that was reportedly used in the 1930s as a doctor's aid to frighten patients.

Index suspects that the SK-1's electronics are affected by Mr. Violet Ray's Field Effect Transistor (FET), which allows him to control the keyboard by altering the position of the high-voltage whip. Because Mr. Violet Ray tends to overheat after three minutes, the compositions are shortlived.

New cures for sore throats. Alone in the corner, sound designer Das Ubuibi, billed as "bxg cxty orchxstrx, providers of itchy, screamy noise" (on the Web at www.geocities.com/SoHo/Lofts/5503/), lamented the fact that his violin bow still hadn't arrived. Nothing in his setup appeared to require the use of a violin bow.

Ubuibi pointed to a beaten up chunk of styrofoam that had a Sucrets lozenge box attached to it with duct tape. A piezo transducer was glued to the inside of the empty lozenge box's lid. Ubuibi insisted that there was a band of warped angels waiting to be released from this sculpture. He handed me a mallet so I could beat on the Styrofoam to evoke its screechy sounds. I don't believe the mallet did justice to the angels captured inside.

Continuing on my journey, I found creative youths in fluorescent gray, flailing on a Casio CZ-101 and triggering samples from a Roland S-50. They used a Casio Rapman to process metal chimes through the Casio's vocoder and took turns crawling under the table to smack a computer monitor that displayed blips and bleeps of antiquated video games as accompaniment. As they miked Involution's live didgeridoo player with white noise and the 8-bit audio output of the video games, I caught a glimpse of the future of electronica.

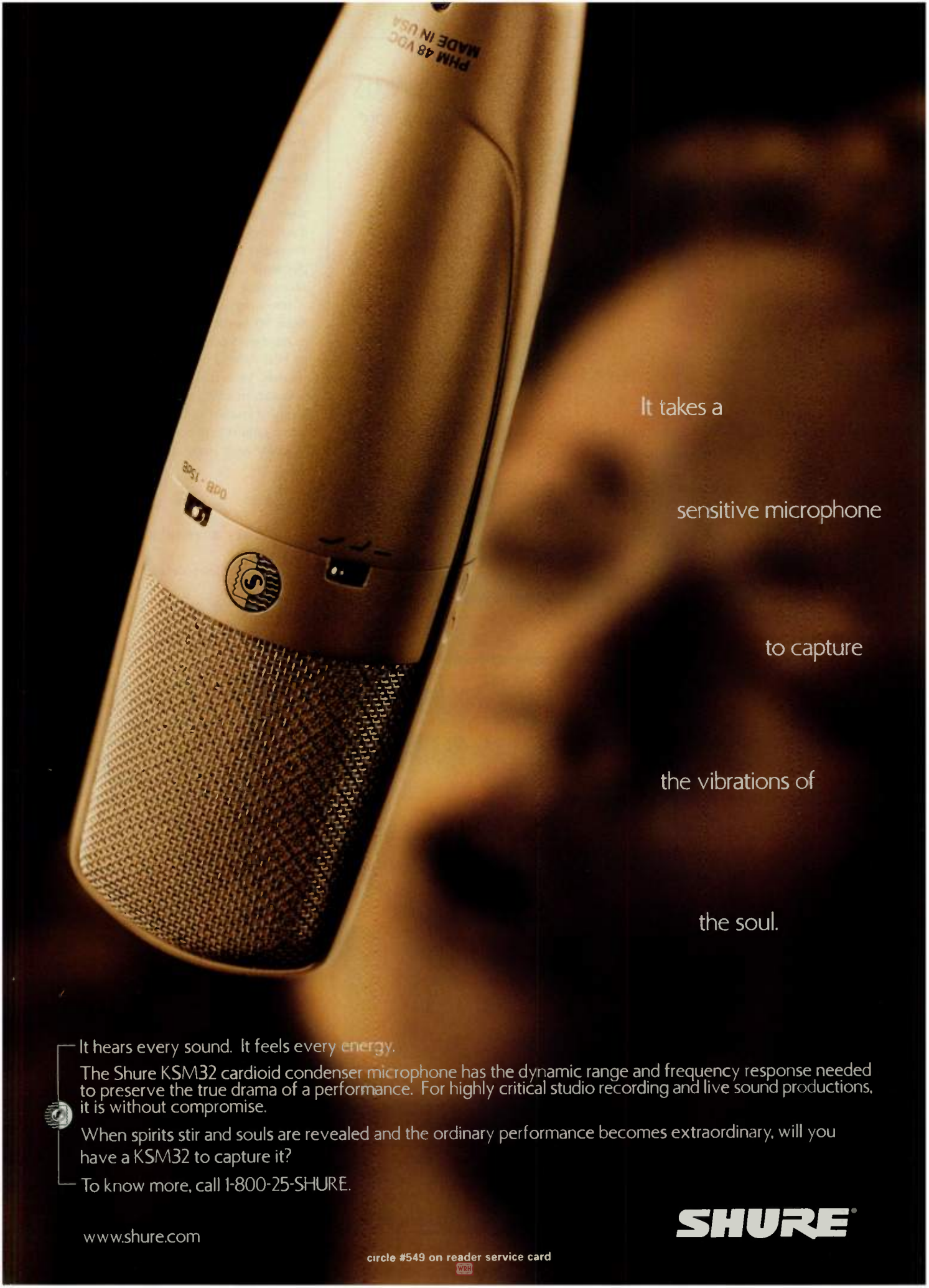
Distant memories. Brain Science (www.ovenguard.com/music/index.html), a duo consisting of Erick Gallun and Chris Stecker, claim that their oscilloresoneutromatic test tones will phase-lock neurons and recycle gray matter. For his part in their collaborative process, Gallun records urban environmental sounds on the streets of Berkeley, California, and then manipulates this source material using Macromedia's *SoundEdit* for Mac. Stecker then blends radio signals and spoken word with Gallun's street-smart recordings and samples, resamples, and loops the output in real time. He uses customized Opcode *MAX* patches running on an Apple PowerBook 520 to control an Oberheim Echoplex Digital Pro effects processor.

Gallen and Stecker share an interest in psychoacoustics, which fuels their experimentation with the Echoplex. Repeating a short sound at a very fast rate to create a pitch is known as *repetition pitch.* Using *MAX* to control the Echoplex allows Stecker to sample at rates up to 200 times per second. The result is a series of one-second-long "notes" consisting of repeating waveforms that disguise the original source input but tend to reveal slow changes in pitch and timbre. Gallun points out that this method exploits the time slop in MIDI in order to generate multiple pitches with the effect of a strange, pseudorandom sequencer. Stecker gradually changed the length of the audio so that the notes began to sound more like their original source. If you have a discerning ear, you may even recognize what you have been listening to.

In performance, Stecker also employs a Sony HR-MP5 effects processor, Mackie CR-1604VLZ mixer, PAiA Theremax theremin, and three analog synths: a Moog Prodigy, Yamaha CS-15, and Univox Mini-Korg. A custom-built, 8-by-2 analog sequencer outputs a single stream of control voltages used to drive the Prodigy and CS-15.

Gallun "plays" a Radio Shack handheld, monaural tape recorder with all the "latest" features: pause, rewind, fast-forward, pitch, and speed control. Keeping the playback head engaged, Gallun generates a variety of rewind sounds, which he runs through a Roland SP-202 Dr. Sample and a Sony GS-5 guitar-effects processor, which is used for delays, distortion, reverb, auto-panning, spectral filtering, and flanging. The GS-5 allows Gallun to chain up to six processes together in a variety of architectures. He usually makes custom chains for different sources (e.g., a recording of air-traffic communication made on a recent flight), and he optimizes one delay for Stecker's synth array.

In the future, Brain Science plans to incorporate Cycling '74's *MSP* extensions for *MAX* (reviewed in the October 1998 **EM**) into their performances.



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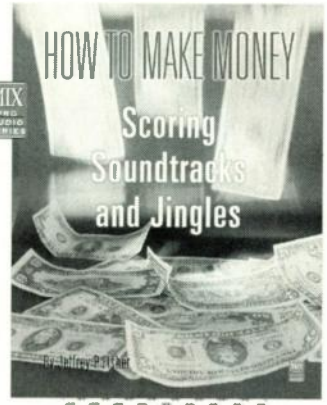

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Visual hybrids. Throughout the evening, the Cell's walls are pulsing with the latest evolution of Imaja's *Bliss Paint* live-performance animation software (www.imaja.com), blended with video and David Tristram's 3-D imagery (Tristram Visuals; www.tristram.com), which was rendered with proprietary software on two Windows 98 PCs. This group venture is a dynamic approach to real-time image processing.

Imaja founder Greg Jalbert played a Korg M1 keyboard with customized MIDI mapping to provide continuous control of *Bliss Paint* 2.0's algorithmic color synthesizer. With this combination and a new generation of *Bliss Paint* animation and plug-ins known as *Space Garden Meditations,* Jalbert captured subtle expressions of color and wove organic shapes, abstract textures, and special effects.

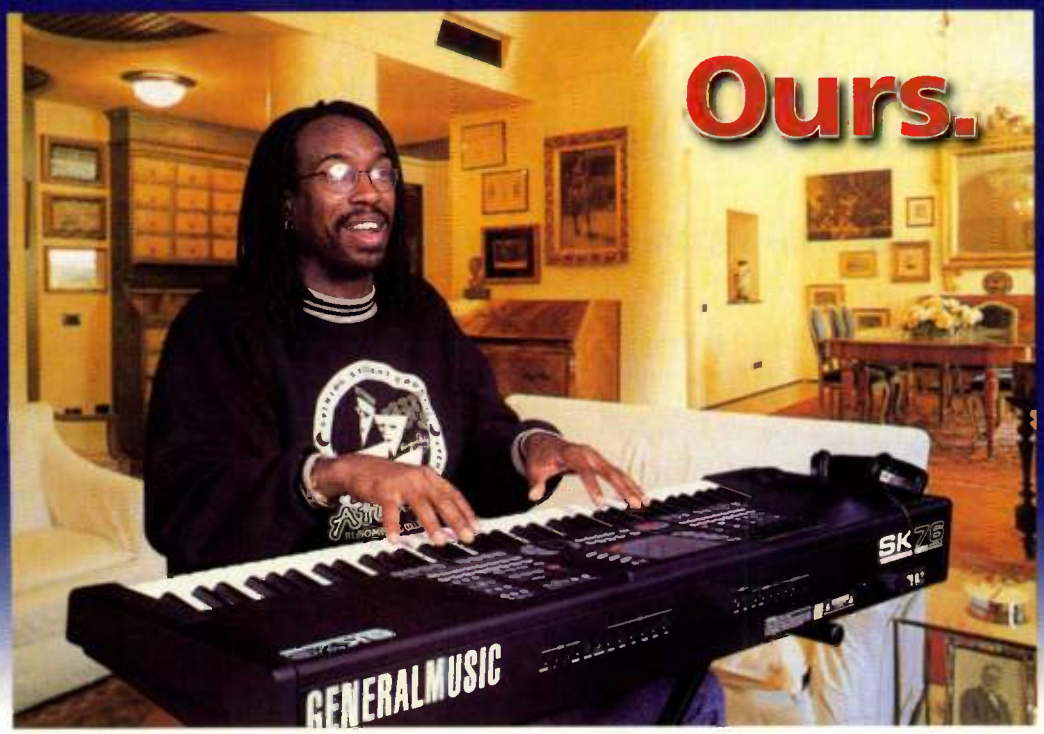
An evening of Omnimedia pays tribute to a bygone era of electronica.

Across the room, Peter King's kaleidoscope of experiential video feedback responded to images from a live rotating camera and reflections from glass and mirrors. A large video monitor sat between the camera and the glass. Fractal patterns were created in response to objects and people moving into this mechanical system, and a video feed of these patterns was layered onto the overall mix of computer graphics projection.

A night to remember. An evening of Omnimedia pays tribute to a bygone era of electronica. Gearheads reveling in time-honored analog traditions can inspire further reflection on how far we've come in such a short time. As you run out to buy the latest digital gadgets, remember Omnimedia's maxim: That bit of electronics you covet today, you will find in a garage sale or swap meet tomorrow.

Bean's *techno-rhythmic journeys have taken her from Senegal to Silicon Valley in pursuit of percussion. Her latest music-making methods include sneaking into schools around the Bay Area with her group, RhythMix.*

Their idea of a project studio...



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DESKTOP MUSICIAN

Down and Out in Cyberspace

Downloadable sounds: the WAVE of the future.

By Neil Leonard III

Imagine if there were a standard wavetable instrument file format that was supported by all software synthesizers, sound cards, and even some hardware synthesizers. In other words, imagine a format as widely supported as the Standard MIDI File format. Furthermore, suppose that when you ported sounds from one synthesizer to another using this format, the instruments sounded virtually the same. People using different platforms could have a common listening experience, even when listening to unique patches. Composers could transfer their libraries of sounds between desktop synthesizers, samplers, and dedicated game hardware with very little effort. The potential for effectively creating and distributing music would be exciting indeed.

Well, such a specification for synthesis and instrument sound storage now exists. It's called the Downloadable Sounds Level 1 Specification. It was published in late 1997 by the MIDI Manufacturers Association (MMA) and was developed by members of its Interactive Audio Special Interest Group (IA-SIG), which includes engineers from IBM, Microsoft, S3, Nvidia, ESS, Crystal Semiconductor, Yamaha, Sequoia Development, Sonic Foundry, and Creative Labs.

The Downloadable Sounds (DLS) standard is so new that we are only now beginning to see its first usage in entertainment products. The idea makes a great deal of sense, and it has already been adapted by Microsoft and Apple as a cornerstone for their software synthesizers. People we spoke to at the aforementioned companies said that they expect DLS to be adopted as an industrywide standard, and that MIDI will then blossom as a premiere approach to providing high-quality interactive music on desktop systems.

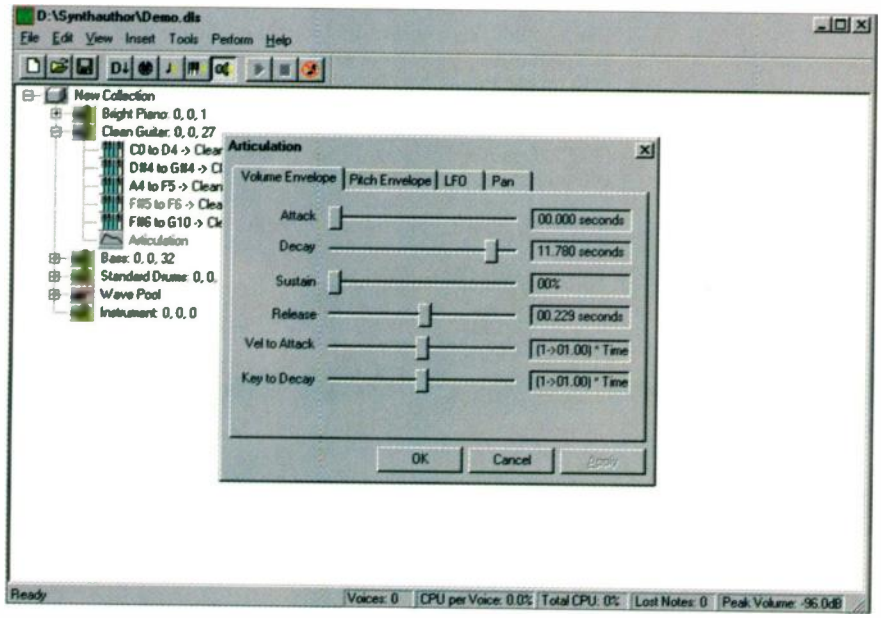

FIG. 1: The *DLS Synth/Author* interface displays available instruments along with waveform and articulation data. The foremost window is for editing articulation data.

HOW IT WORKS

To ensure the acceptance of DLS, the MMA first defined a bare-bones synth

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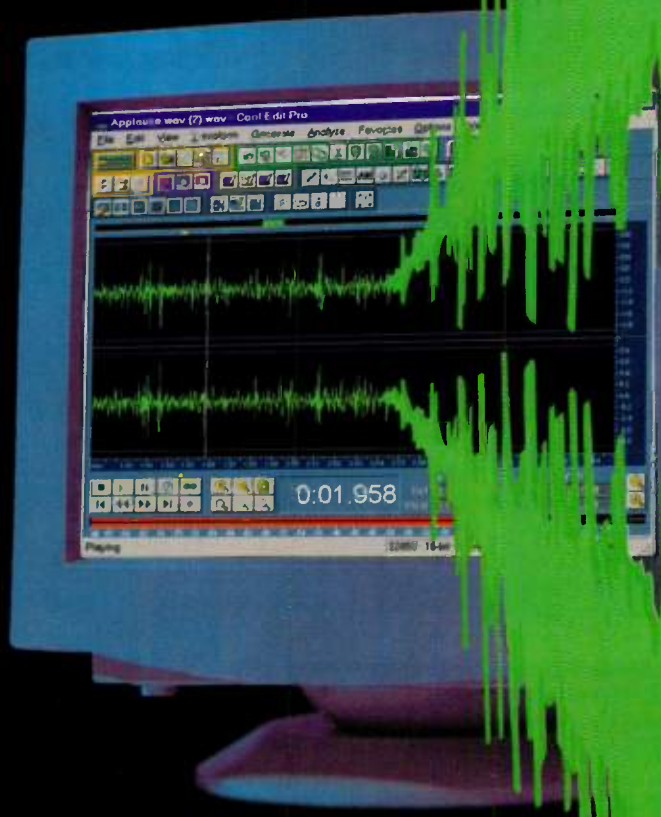

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for immediate implementation on the widest range of systems. The synthesis architecture is composed of three distinct subsystems: control logic, a digital audio engine, and articulation modules and routings.

The control logic receives incoming messages and determines which MIDI channel, sample, and articulation module to use. Level 1 instruments are limited to multisampled keymaps with no Velocity switching or layering.

The digital audio engine comprises a digital oscillator and a digitally controlled amplifier. The DLS Level 1 Specification provides for both 8- and 16-bit samples, making it easy to move sounds from most digital audio file formats. A wide range of sample rates is supported for wavetables; however, DLS synthesizers must support a minimum sample rate of 22.05 kHz and at least 24-note polyphony. A single loop is also supported.

The oscillator can modulate a pitch based on input from an LFO, envelope generator, or MIDI Pitch Bend controller. The amplifier responds to input from an LFO, envelope generator, or MIDI Volume controller. The MMA made a clear attempt to support dynamically responsive real-time expression, which gives MIDI an edge over basic digital audio playback.

The Level 1 audio path simply routes the signal from the oscillator to the amplifier to the digital-to-analog converter (DAC). Future additions to DLS will allow for additional processing modules between the oscillator and the DAC.

The articulation module is a set of devices that increases expressive control of a sample as it plays. The Level 1 Specification uses LFOs, envelope generators, and external MIDI events in a preset routing arrangement. Later specifications will support this routing as one configuration in a flexible system with many other possible combinations.

The MMA specification emphasizes that the modulation routing is "purely a symbolic system that can be mapped on many different hardware designs." It is not intended to propagate a homogenous real-time architecture, but rather a "common language between different hardware implementations."

INSTRUMENTS

There are two types of DLS instruments: melodic instruments and drum kits, both of which consist of a collection of wavetables and associated synthesis parameters. Melodic instruments can be accessed through any MIDI channel except 10, which is reserved for drum kits.

DLS instruments include a default bank and instrument number, although DLS synthesizers can download instruments to any bank and program location. To avoid conflict with GM, GS, and XG synthesizers—which allocate sounds to specific locations—DLS synthesizers must first be sent a System Exclusive message to activate a special "DLS" mode. The device can then place a downloaded sound into any location. Each DLS-compliant synthesizer has a unique device ID.

The DLS specification also defines a set of parameters, termed a *region*, which includes MIDI Note and Velocity ranges, articulation information, and the location of the wavetable data. A melodic instrument can have up to sixteen regions, and the DLS drum kits can have as many as 128 regions (one for each drum note).

One early proposal for the file format was Creative Labs' SoundFonts format. However, the consensus at the MMA was for a nonproprietary format, like the Standard MIDI File format. The actual DLS file format is unique but borrows its overall structure from Microsoft's Resource Interchange File Format (RIFF). RIFF files are a little like AIFF files in that the data is organized into discrete groupings, called "chunks," which in turn can contain subchunks. Wavetable data is stored in the WAV file format and embedded in the RIFF file.

DLS TOOLS

I went in search of a way to create original DLS instruments and use them in a sequence. I found four audio editors for creating sounds; all are available only for Windows. Reportedly, E-mu will soon have a version of its *Vienna* editor for Mac that can save a DLS file.

DLS Synth/Author, which is distributed by the MMA, was used by Roland to create the DLS Sound Canvas library that ships with Microsoft DirectMusic (see **Fig. 1**). This same library was later loaded into Apple's *Atomic Editor*, which imports DLS instruments, and converted to QuickTime Musical Instruments (QTMI) to provide QuickTime's first full GM library.

FMJ-Software's *Awave* enables you to edit wavetable instruments and can make conversions between more than 100 audio-related file formats, including SoundFonts and Mod files (see **Fig. 2**). It can batch-process files; has a graphic editor for setting loop points; supports resampling, fades, normalization, and effects; and even has a real-time oscilloscope and spectrum analyzer graph. The instrument editor provides full support for all the features of DLS.

RAD Game Tools bundles a DLS editor and a DLS synthesizer with its Miles Sound System (MSS), a comprehensive collection of MIDI and audio drivers for Windows and DOS machines. The software can be programmed in the C programming language. RAD also offers an Xtra for Macromedia *Director* that allows you to play MIDI sequences using the Lingo scripting language.

According to Tom White, president of MMA, using DLS files in a sequence may be harder than working with simple MIDI files, because most sequencers don't handle the downloading for you. This situation is temporary, however, and is already surmountable with some third-party products. Most sequencers will look to the operating system for a mechanism they can call, much like calling MIDI or audio port drivers. Miles Sound System provides this function,

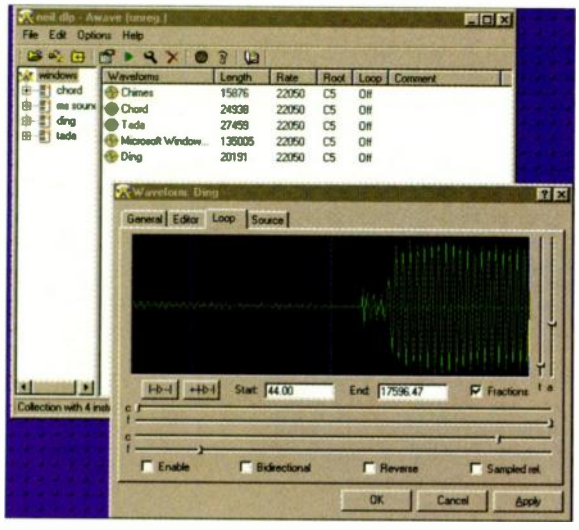

FIG. 2: Aside from reading and converting between more than 100 file formats, FMJ-Software's *Awave* can serve as a wavetable editor for DLS sound cards.

IMAGINE THE POSSIBILITIES

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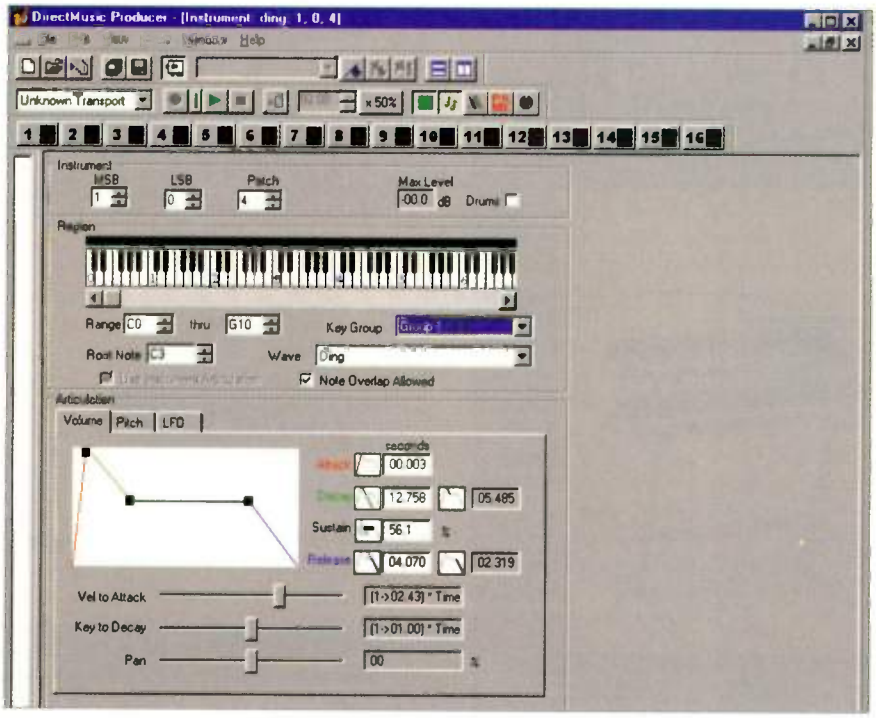

FIG. 3: Microsoft's DirectX kit includes *DirectMusic Producer*, shown here with its DLS instrument editor open to the Volume Edit screen.

as will Microsoft's DirectMusic, and Apple will do so in QuickTime 3 (which currently requires conversion of DLS to QTMI). Until this happens, some titles may use S3's API, or the download may be done by the user on a card that provides the necessary utility.

DIRECTMUSIC

At present, the best way to try out DLS is in Microsoft's DirectX Software Developers Kit. It's shipped on CD-ROM for $12.50 and is available free via the Internet for a limited time. (The entire package is more than 60 MB, so the CD route makes more sense for most people.) The DirectX kit includes *DirectMusic Producer*, which has a DLS editor, DLS-based sequencer, and extensive interactive composition tools (see **Fig. 3** and **Fig. 4**). Although still in its beta stage, *DirectMusic Producer* performed reliably, and its DLS editor was more intuitive than the MMA's *DLS Synth/Author*.

DirectMusic Producer allows composers to embed compositional techniques in a nonlinear music presentation. Composers can import Standard MIDI Files that contain musical fragments and

GENERAL MIDI

Sound compatibility has been a long-standing problem for interactive presentations. On the Windows platform alone there are a number of sound cards, each with a different synthesis engine and instrument library.

The acceptance of General MIDI has helped reduce the problem by providing a standard for instrument mappings. However, GM synthesizers can still use different sampled wavetables, synthesis architecture, and audio circuitry. As a result, GM patches can vary greatly when played by different synthesizers. Game composers are often forced to make several versions of their music, each optimized for a different synthesis engine. Others opt for digital audio playback to ensure sonic uniformity.

The DLS Specification provides a solution to this problem by offering a means for delivering unique instruments across a wide variety of synthesizers, without compromising the common listening experience.

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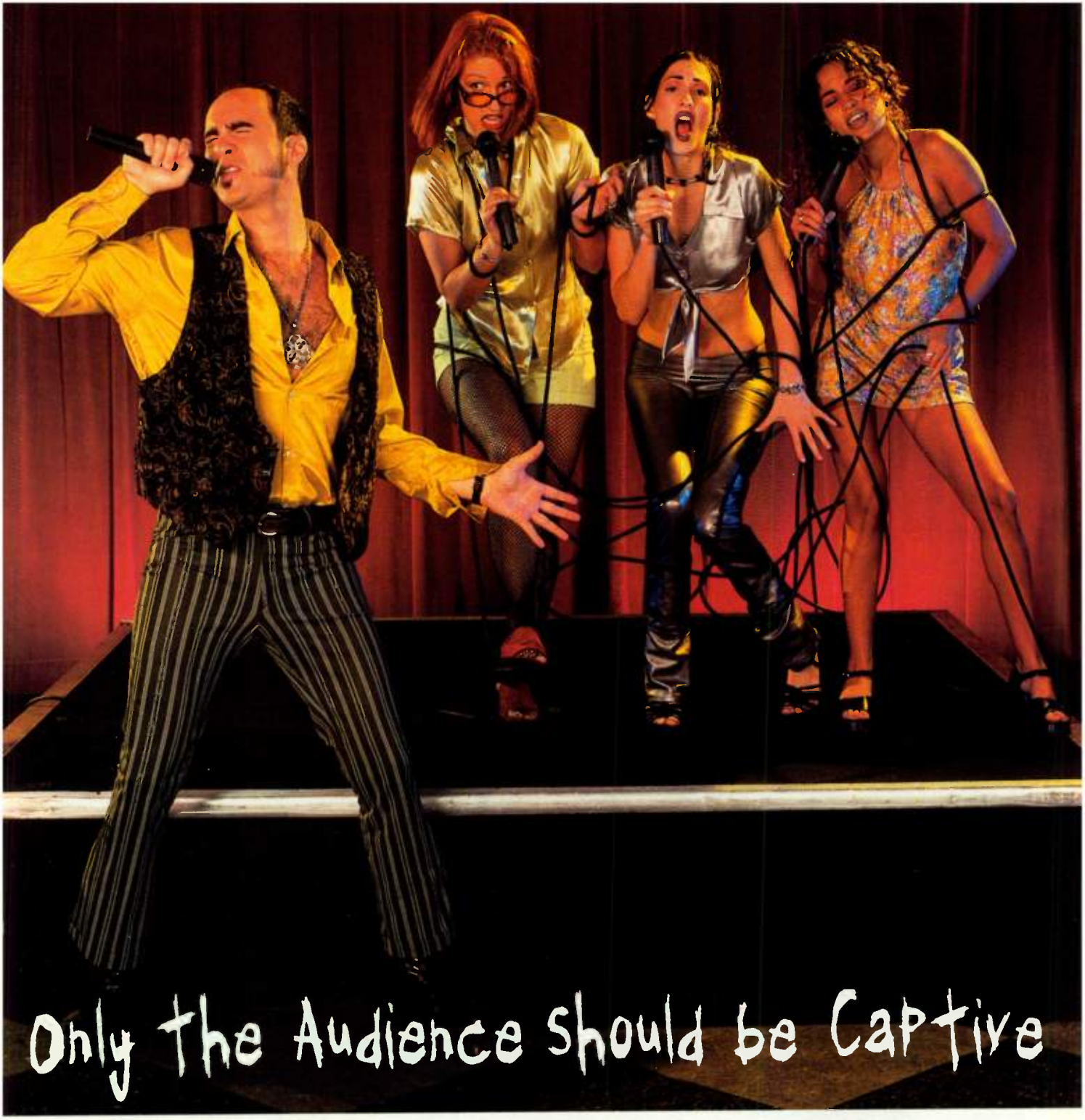

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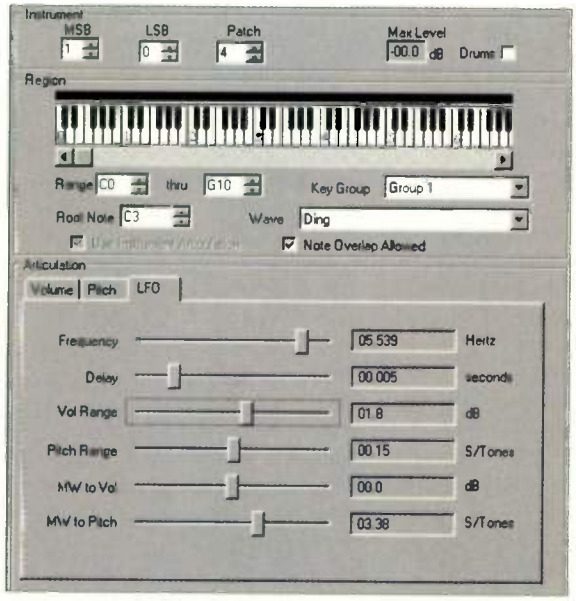

FIG. 4: *DirectMusic Producer* is shown here with the DLS instrument editor open to the LFO Edit screen.

specify guidelines for variations. *DirectMusic* will then generate unique variations on the material every time it is called for. Styles can be changed on the fly, and *DirectMusic* can notify the calling application when it has finished a musical transition, which makes it an ideal tool for interactive presentations.

DirectMusic Producer is the next wave in multimedia music on the Windows platform, and DLS is the core synthesis technology. All sounds are synthesized in software using DLS instruments and then output using the sound card's DAC. General MIDI sounds can be played using DLS's Sound Canvas library or by using external GM sounds on a card or an external synthesizer.

One of the key people in the development of the DLS specification was Todor Fay, development lead for *DirectMusic* and cochair of the MMA's IA-SIG for DLS. Fay worked on *DLS Synth/Author* and later *DirectMusic Producer*. He believes that sound cards as we know them are likely to disappear and be replaced with DLS accelerators. The accelerators will have no onboard sounds but will provide higher sound quality than the software synth, because the additional hardware isn't constrained by CPU cycles. For example, it can run at higher rates, use multipoint interpolation, and support multiple levels of DLS.

The Level 1 Specification has been on the table for more than two years, and the Microsoft DLS engine is also about that old. It is the first DLS software synthesizer and has already been highly optimized. According to Fay, on a Pentium 120 it uses 1 percent of the CPU's clock cycles per voice; on a Pentium 166 with MMX, it uses 0.3 percent; and on a Pentium II 266, it uses 0.12 percent. (RAD Game Tools claims that its MSS synth is almost twice as fast as the Microsoft DLS engine.)

The Microsoft DLS synthesizer has been used in the company's Interactive Music Architecture (IMA) and is often heard in Microsoft Network presentations. IMA is being used in forthcoming games by Monolith. You can get an DirectX Web control from

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www.microsoft.com/music. The Web site lets you download the Interactive Music development kit and also has pointers to public domain Web sites that use it. You can put high-quality interactive music on your Web pages with the Interactive Music control.

DOWN THE ROAD

A forthcoming Level 2 Specification, which is already in the works, will address more advanced features in an effort to match the next generation of wavetable synthesizers. The MMA hopes that the timely release of the Level 2 Specification will help define present synthesizer chip design. The standard does not preclude the later addition of streaming audio and real-time download capability.

According to Tom Savell of the Joint E-mu/Creative Technology Center, the DLS Level 2 Specification has not yet been ratified by the MMA, as it is still a work in progress. DLS-2 has the potential to be a far-reaching standard because it is also expected to become part of the MPEG-4 specification.

The Moving Picture Experts Group (MPEG) was considering SoundFonts 2.0 as the standard method of describing wavetable patches, but the MMA suggested that DLS would have wider industry acceptance, since SoundFonts 2.0 is a proprietary standard belonging to E-mu. However, MPEG was quite far along in its selection process and had already accepted SoundFonts 2.0. In addition, DLS Level 1 lacks many important features that SoundFonts 2.0 has, such as second-order resonant lowpass filters, overlapping key and Velocity ranges, and six-stage envelopes. So, MPEG agreed conditionally to adopt DLS, but only if it included all the features of SoundFonts 2.0 and was completed in time.

And that's where things stand. DLS has become a hot topic in recent months, and indications are that it's going to become even hotter in the near future. Stay tuned for late-breaking developments in this exciting new technology.

Neil Leonard III *received this year's award for the most valuable contribution to the Music Technology Division curriculum at Berklee College of Music. He has performed his original works for saxophone and interactive systems throughout North America, Latin America, and Europe.*

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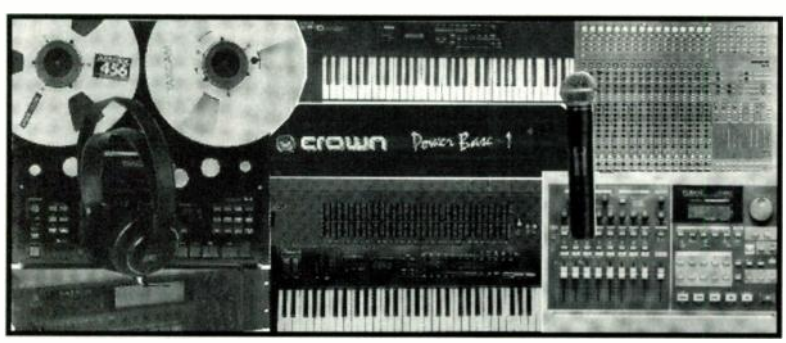

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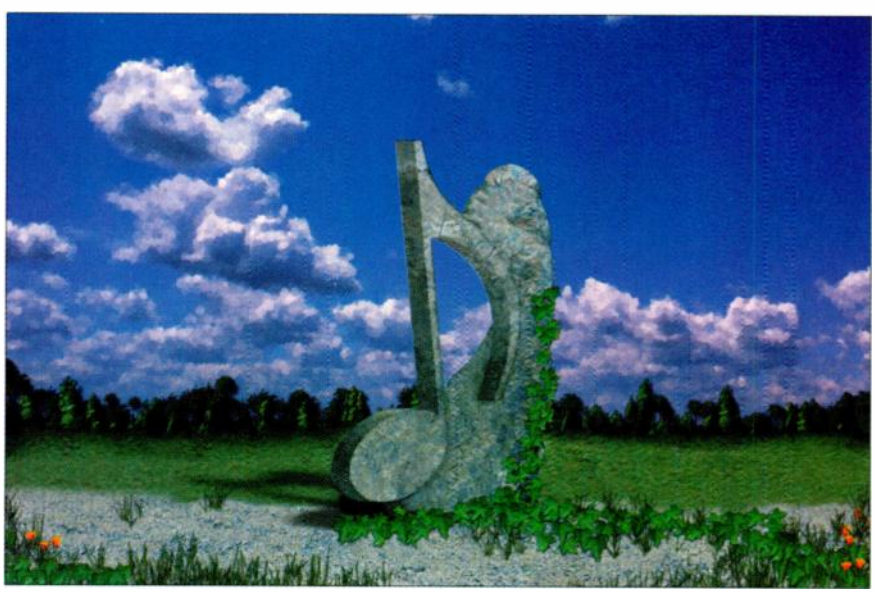
Spectrum Sculpting

With a filter as your chisel, explore the venerable art of sound design.

By John Duesenberry

Back in the era of analog synthesis, synthesizers typically had oscillators that generated "dull-sounding" waveforms, such as sine and triangle, and "bright-sounding" waveforms, such as sawtooth and pulse. For timbral variety, you could start with a dull signal and enliven it with distortion and modulation techniques. Or you could begin with a bright signal and shape it to meet your needs. This second approach, known as *subtractive synthesis*, used one or more filters to accomplish its goals.

In subtractive synthesis, a common signal-processing technique even today, filters are used to modify the spectrum of a complex signal. A filter, for our purposes, is a hardware or software device that has a user-controllable frequency response. A filter selectively modifies a signal's spectrum by attenuating or boosting one or more frequency bands within that spectrum. Many (though not all) filters we encounter in synthesis weaken or remove components of a signal. The use of filters has therefore come to be called *subtractive*.



STEPHEN RAMIREZ

Filters have been a staple in synthesis from the tape-studio era to the present. Popular analog units such as the Minimoog, the ARP 2600, and the Oberheim SEM included voltage-controlled filters in the middle of their preset signal paths, encouraging subtractive synthesis by default. Current synthesizer voice architectures show the influence of their forerunners. Whether you're looking at a digital synthesizer, a software-synthesis program, or an analog system, you're most likely to find one or more filters. Synthesis filters can differ significantly from those designed for other applications. In this article, I am going to concentrate on the filters that are most often used in subtractive synthesis, and I will explain some common applications in which they're found. I will also give a brief historical overview of their use in synthesis applications in the sidebar "Famous Filters in History."

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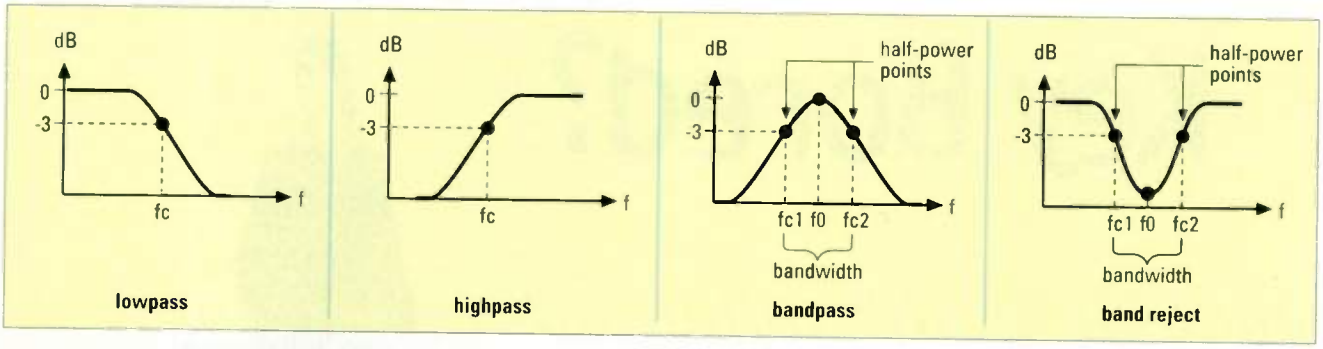

FIG. 1: The frequency response curves of the four basic filter types.

BASIC FILTER TYPES

The four filter types most commonly encountered in synthesis applications are lowpass, highpass, bandpass, and band reject. Each filter type attenuates frequencies in a range that is called the *stopband*, while allowing all other frequencies to pass without significant attenuation. The range of unattenuated frequencies is called the *passband*. The stopband begins at the *half-power point*—that point in the total frequency range where the power of the filter's output signal drops to one-half the power of the input signal. The amount of attenuation at this frequency is approximately -3 dB, so the half-power point is sometimes called the -3 dB point.

The half-power point is more commonly known as the *cutoff frequency* (fc). We can think of the cutoff frequency as the frequency at which the filter begins to act upon the input signal. In a synthesizer filter, the cutoff frequency is usually variable across the whole audio range. In fact, many filters allow you to drive the cutoff frequency below and above the audible range. Frequencies in the stopband—above or below the cutoff frequency—are not literally cut off, but are gradually attenuated. The degree of attenuation is defined by the filter's *slope*. I'll discuss slope in more detail later.

Each filter type has a characteristic frequency response (see **Fig. 1**). A lowpass filter's passband consists of all frequencies below the cutoff frequency, down to 0 Hz. Frequencies above the cutoff frequency are gradually attenuated. The lowpass filter is the most common type; if your synthesizer has only one filter, it's undoubtedly a lowpass. The inverse of lowpass is highpass, and it passes frequencies from the top of the audio range down to the cutoff frequency. All frequencies below the cutoff frequency are gradually attenuated.

Next, a bandpass filter attenuates frequencies on either side of a center frequency (fo). Bandpass filters have two half-power points (marked "fc1" and "fc2" in **Figure 1**), one below

FAMOUS FILTERS IN HISTORY

Early electronic composers developed the art of subtractive synthesis partly in reaction to *additive synthesis*, a process in which complex spectra are created by mixing many sine waves tuned to different frequencies. Most composers soon abandoned this laborious approach, or combined it with subtractive and other techniques. Many early tape-music studios were equipped with cumbersome, manually-controlled filters, which were often lab instruments adapted for musical purposes.

In the late '60s and early '70s, two developments got pop musicians interested in filters. One was the introduction of the wah-wah pedal, which is, in effect, a simple resonant filter. The other was the popularization of the voltage-controlled filter (VCF) by synthesizer manufacturers such as Moog, ARP, and Buchla. The VCF could be driven by control signals from envelope generators, keyboards, LFOs, and other devices. VCFs offered musicians new ways to animate sounds, and they quickly noticed that they could use a VCF to make the same types of sounds as they had with a wah-wah pedal. Soon thereafter, no self-respecting synthesist would be caught without one or more VCFs in his or her rig.

This trend was encouraged by the default signal paths of the most popular analog synthesizers. The Minimoog, for example, routed a mix of oscillator or noise signals through a VCF and a voltage-controlled amplifier (VCA), both of which were controlled by envelope generators. The ARP 2600's preset patching was similar. The legendary "fat" Minimoog sound is often attributed to its VCF, although the tube-like distortion characteristics of the VCA were probably equally important.

At the height of the analog synthesis era, digital filters were being implemented in computer music centers around the world. Time-variant digital filters were available in Barry Vercoe's Music11 software synthesis language by the mid-'70s. A decade or so later, real-time digital filters became commonplace in commercial synthesizers.

The voice architectures of even the most sophisticated modern synthesizers and samplers continue to be influenced by their analog ancestors. The Default Program of the Kurzweil K2500, for example, routes samples through a dynamically controlled lowpass filter, and then to an amplitude-envelope section. In fact, synthesizers that do *not* include some sort of filter function in the signal path are relatively rare items in the history of synthesis. So, whatever other algorithms your instrument may boast, it's likely that there's some subtractive synthesis going on under the hood.

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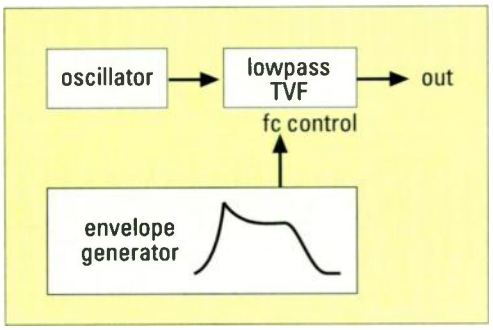

FIG. 2: This sound-design patch shows the signal flow of a lowpass filter that is under the control of an envelope generator.

and one above the center frequency. The passband is the range of frequencies between these two points. The bandwidth of a bandpass filter is the difference in frequency between the upper and lower half-power points. Bandwidth may be expressed in absolute frequency (Hz) or as a musical interval (octaves or fractions of an octave).

Finally, band-reject filters, the inverse of bandpass, attenuate a band of frequencies around the center frequency. The center frequency is maximally attenuated, or "notched out." Thus, a band-reject filter is often called a *notch filter*.

ON THE SLOPES

A filter's slope, or rolloff, describes the amount of attenuation (or boost) above or below the half-power point(s) as a function of frequency. Slope is specified in decibels per octave. Most synthesizer filters have a slope of -6, -12, or -24 dB/octave. Unlike the cutoff frequency, the slope is usually fixed.

The audible effect of a filter is crucially influenced by its slope. Consider, for example, a 100 Hz sawtooth wave passed through a lowpass filter with fc = 300 Hz. The third harmonic (exactly at the cutoff frequency) will be 3 dB down from its original level. If the slope is -6 dB/octave, the sixth harmonic will be attenuated by an additional 6 dB, the twelfth harmonic by another 6 dB, and so on. This is a fairly gentle effect—much of the upper harmonic content will pass through. A sharper slope, such as -24 dB/octave, will have a more pronounced effect. The upper harmonics will practically disappear.

Sometimes you'll see filters described as having a certain number of poles: for example, "2-pole lowpass." The greater the number of poles, the sharper the filter's slope. A 1-pole filter has a slope of 6 dB/octave, a 2-pole filter has a slope of 12 dB/octave, and a 4-pole filter has a slope of 24 dB/octave. (Refer to any current book on digital signal processing for more information.)

Q, RINGING, AND RESONANCE

Many filters offer a control labeled *Q*, which is also known as *resonance* or *regeneration*. Q is usually associated with bandpass filters, but Q controls are often available for lowpass and highpass filters. The Q of a filter is defined as the ratio of center frequency to bandwidth and can be represented as:

$Q = fo/BW$.

Given a constant center frequency, changing Q changes the bandwidth. By increasing Q, you can narrow the bandwidth of a filter and focus in on a restricted range of a signal's spectrum, even an individual harmonic. Note, however, that depending on how the Q control is implemented, adjusting Q may affect the slope of the filter. A Q control is not the same as a bandwidth control, though it is often advertised as such.

A "constant Q" filter can adjust its bandwidth as its center frequency

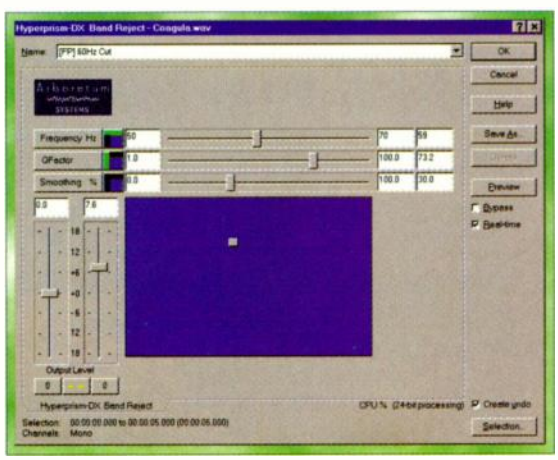

FIG. 3: Arboretum's *Hyperprism* provides controls for changing filter parameters in real time. Settings can be recorded and reused.

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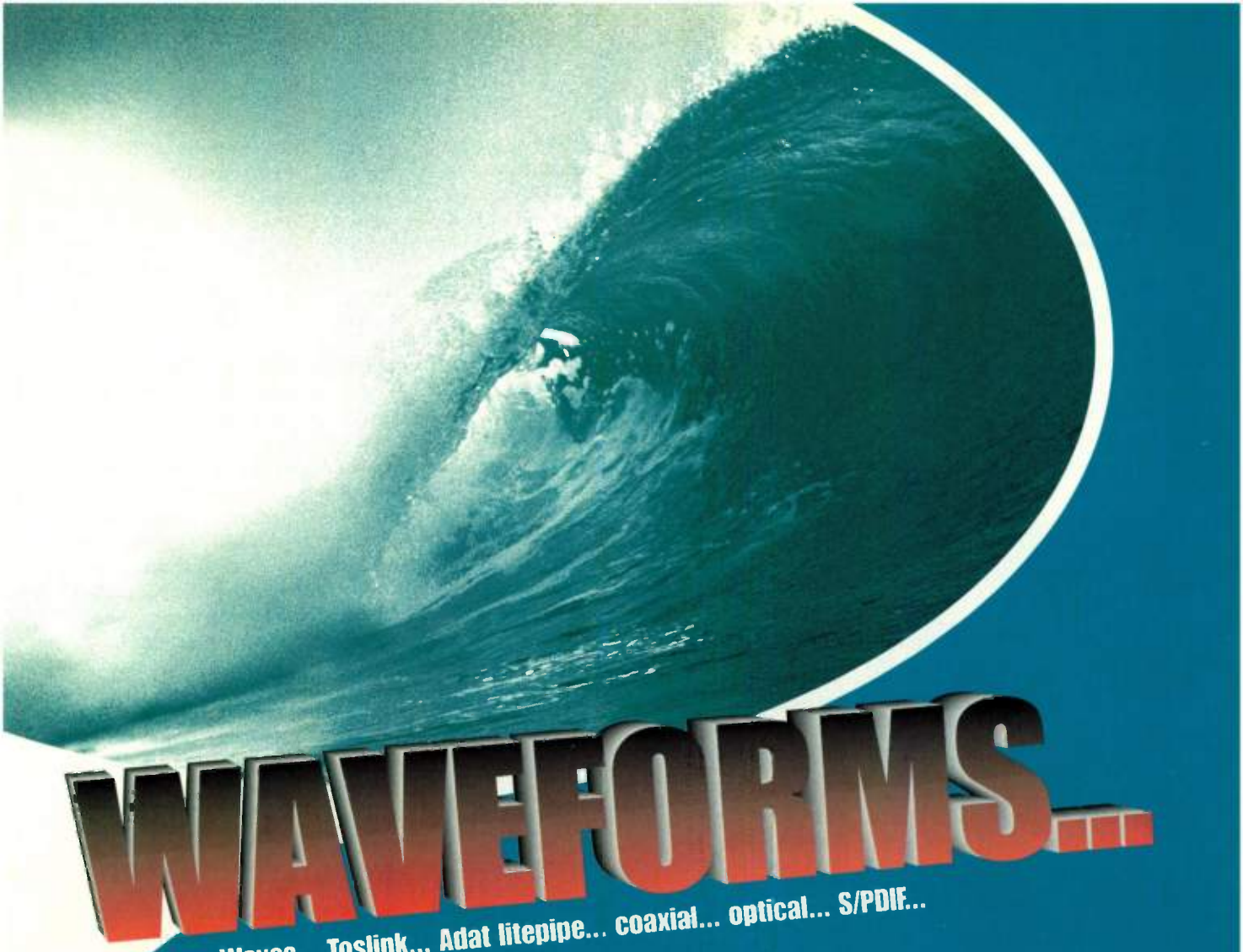

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changes. This is musically useful in situations that require you to "tune in" on a particular band of harmonics and have the filter track this band across the keyboard range. It may come as a surprise, but Q can be used to turn a filter into an oscillator. A very high-Q filter will respond to a signal near its center frequency by oscillating, or "ringing," for some time. The output signal is an exponentially decaying sine wave whose frequency is equal to the filter's center frequency.

This behavior resembles the resonance characteristics of acoustic systems such as marimbas and temple blocks, which oscillate at one or more resonant frequencies in response to an excitation. For this reason, the Q control on some older analog filters was labeled "resonance." Due to the current craze for retro technology, fashionable synthesizers often boast "resonant filters" with similar Q controls.

If Q is increased to infinity, the filter will output a constant sine wave at the frequency of the center frequency, behaving just like an oscillator. It is quite possible to "play" an oscillating or ringing filter with a keyboard controller. The notoriously cheesy lead line of the early-'70s instrumental hit "Popcorn," by Hot Butter, was played on an ARP lowpass filter with Q set to just below the point of oscillation.

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FILTER APPLICATIONS

Parametric and graphic equalizers. Equalizers allow you to construct a complex frequency response by manipulating a group of filters. There are two common categories of equalizers. A parametric equalizer is a small group of filters, or "sections." In a true parametric EQ, each section resembles a bandpass filter, with independent control over center frequency, Q, and the amount of attenuation or boost.

A graphic equalizer is a group of parallel bandpass filters, each receiving the same input signal. Usually, each filter has a fixed center frequency and bandwidth and offers both cut and boost for each band. A graphic equalizer offers less detailed control of each band than a parametric EQ, but generally has a larger number of individual bands.

Vocoders. Channel vocoders use two banks of fixed bandpass filters. The first bank is used to analyze the energy present in several frequency bands, or "channels," of an input signal. The result of this analysis is used to control the gain of a second group of filters that are receiving a carrier signal. As a result, the spectral characteristics of the first signal are imposed upon the second. The classic application is to produce "talking instrument" effects, in which the input signal is speech and the carrier signal is a synthesizer or guitar output.

Allpass filters and the comb filter effect. Allpass filters have a flat frequency response. Why is this of any use? Because allpass filters can be used to modify a signal's phase spectrum. Some components of the signal will be phase shifted, with the amount of shift varying with frequency.

Allpass filters are usually found as components of an effects device or patch. A typical application is the effect known as *phasing*. A signal is passed through several allpass filters, and this throws some partials of the output signal out of phase with respect to the original signal. If the outputs

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SERVICE CLINIC

Getting Connected

The overlooked art and science of soldering.

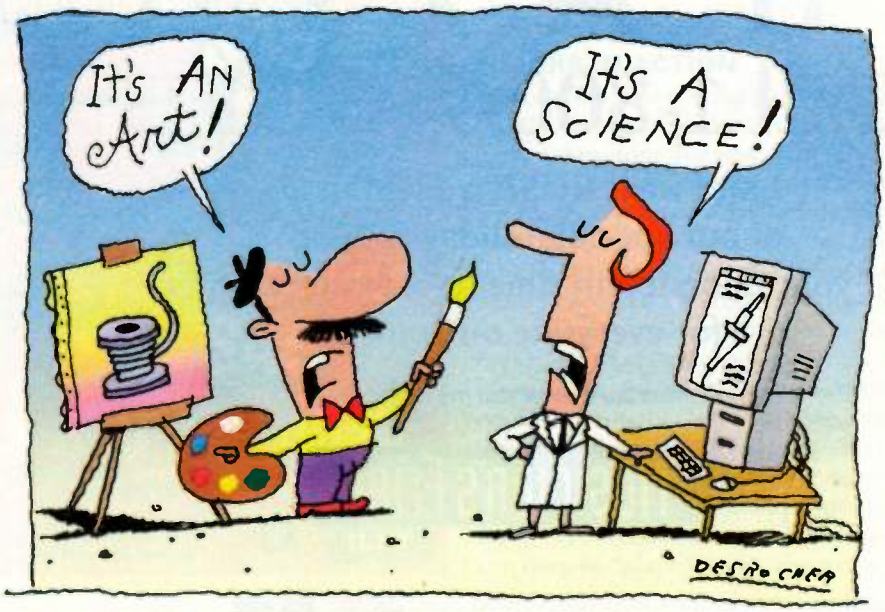
By Peter Miller with Paul Howard

When a customer brings an electronic instrument into my shop, one of the first things that gets checked is the connections. Broken solder joints are by far the most common cause for the malfunction of electronic musical instruments.

Why are poor connections so pervasive? Partly because there are so many connections: a synthesizer or a mixer may have thousands of solder connections. Some integrated circuits commonly found in electronic instruments have dozens of pins, each with a solder connection to a printed-circuit board. Even the simplest electronic components have at least two connections.

One way to look at solder connections is as electronic components. A poor connection can have the characteristics of a resistor, a switch, or a semiconductor. Even connections of the highest quality have some resistance, which might be appreciable, depending on the application. A fractured connection often acts like a pressure-sensitive switch. If a connection has more resistance in one direction of current flow than in the other, the result is a crude semiconductor.

Bad solder connections have the effect of adding more components to the circuitry of an electronic instrument than its designers intended. Not surprisingly, this causes the instrument to go "tilt."



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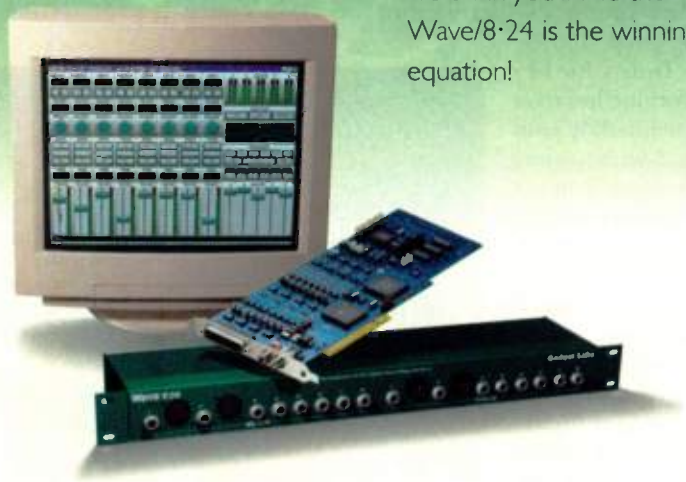

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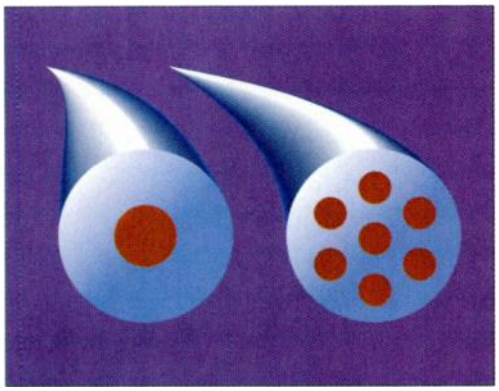

FIG. 1: Some techs feel that multicore solder (right) provides more reliable flux activation because the multiple smaller cores respond quickly to heat. However, single-core solder (left) is more commonly used. Good-quality solder of either type should yield excellent results.

electronics is called *rosin-core* solder and is composed primarily of a combination of tin and lead; the former is for conductivity, and the latter is for low melting point. **Important:** never use *acid-core* solder for electronics work; it is designed for building things such as gas tanks and will destroy electrical connections.

The most commonly used proportion of tin to lead is 60 to 40. This 60/40 mixture goes through three phases: its original solid state; a plastic, puttylike stage when the solder is solidifying; and a molten-liquid stage. During its plastic phase, solder is highly susceptible to fracturing due to uneven cooling within the connection. For this reason, a 63/37 tin/lead combination, called *eutectic*, is preferable; it has no noticeable plastic phase and significantly reduces the incidence of internal, hidden fractures. It's especially important to use 63/37 solder for PC boards with plated-through holes.

You may have noticed the smell of pine trees while soldering. This is from the rosin contained in the hollow center of the solder. Rosin is the brittle, hard resin that remains after turpentine is distilled; when it is molten, rosin becomes a detergent. It flows rapidly and freely throughout a molten solder connection and attaches itself to contaminants.

Another name for the core is *flux*, which is suggestive of its rapid flow through the connection due to capillary action. When solder cools and solidifies, rosin is displaced to the surface of the connection, taking contaminants with it. The most common type of solder has a single core, but you also can get multicore solder, which responds more quickly to heat because each core is small (see Fig. 1).

The size of solder that you'll need to use will depend on the type of project that you're working on. For IC and small-component work, and even for some larger components, 0.037-inch diameter solder should be fine. However, 0.025-inch solder is considered acceptable, and it's easier to handle.

CLEANLINESS

You must clean solder connections before and after soldering. Cleaning beforehand is a good policy because of the many contaminants present on the surfaces of the metals being bonded. Rosin's detergent action is not perfect and will not remove all contaminants. The best way to preclean connections is with a cotton-tipped swab and alcohol or acetone. You can prepare component leads for soldering by burnishing them with steel wool or braided wire to remove oxidation.

Cleaning connections after soldering is also important. Remember that rosin is merely a carrier, transporting contaminants to the surface of the connection. Few people realize that rosin is corrosive and, in time, will eat into a connection. Acetone is useful for removing rosin, and the best time to do so is soon after a connection has cooled and solidified.

THE RIGHT TOOL

You need a proper soldering iron for making good connections. Don't bother with anything less than a well-made 30W iron with a 3-wire power cord; a cheap iron is a bad investment. The tip of the iron should look like a good solder connection, smooth and mirrorlike. A thin layer of solder should already be on the tip; the procedure for applying solder to the tip is called *tinning* the tip.

The tip size you need depends on the size of the work. For ICs and other small, solid-state components, use a small (say, ⅛-inch) tip to avoid creating solder bridges between components. For other types of components, such as resistors and capacitors, an intermediate-size tip is better. Soldering electromechanical components, such as audio jacks, calls for a larger tip, perhaps ¼-inch.

Tip temperature should be electronically controlled at 600 to 700 degrees Fahrenheit, depending on the application. Lower temperatures are preferable for semiconductors and other heat-sensitive components. Tip temperature is critical and should not be allowed to fluctuate.

Keep the soldering iron in a solder station when not in use. The solder station should have a heat-resistant sponge on which you should periodically wipe the soldering-iron tip clean. Wet the sponge with distilled water so as to avoid contaminating the soldering-iron tip with the minerals that are normally present in tap water.

To clean and tin the tip, apply solder liberally to it, then wipe it gently on the sponge. The same detergent action that cleans solder connections also keeps soldering-iron tips clean. Replace tips regularly, because they are constantly subject to the corrosive effects of rosin.

HEAT THE CONNECTION

When making solder connections, heat the connection first, not the solder; then apply solder to the connection, not the soldering iron. Heating the connection thoroughly ensures proper detergent action and allows rosin to do its work. If a connection is hard to

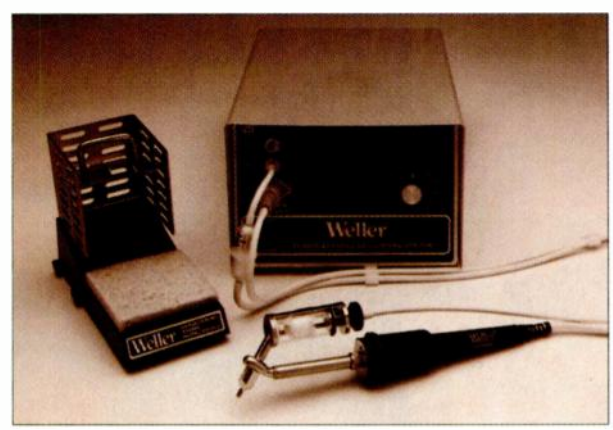

FIG. 2: This Weller DS 800 electronic desoldering station provides a closed-loop, temperature-controlled hollow tip through which solder is sucked into a reservoir by an internal pump.

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heat, apply a small amount of solder to the soldering iron tip to act as a catalyst to heat the connection, then apply solder to the connection.

Inspect all solder connections carefully. There are several telltale visual clues you can use to spot a bad, or "cold," connection. This type of connection was not heated properly to begin with, and detergent action never occurred. A cold connection is usually obvious: it has a pitted, dull appearance and is spherical in shape, indicating poor capillary action. A good connection is shiny and smooth, and has a graceful, gentle slope from the center of the connection to its perimeter. You can see your face in it.

From the perspective of the service technician, a bad connection often requires resoldering. Dirty or fractured soldering connections can be found in instruments built by the most reputable

▼

When you solder always remember that you are working with molten metal.

manufacturers. You may find several poor connections. Fracturing can occur because of manufacturing flaws or mechanical stresses caused by users, such as dropping.

Resoldering is sometimes known as *reflowing*. This means that the connection is heated until the old solder is molten, then new solder is applied to clean the connection.

Resoldering several strategic connections in an instrument may completely solve the problem. Resoldering is also a highly effective preventive measure. Learning how to decide which connections to rework out of hundreds in a given instrument comes only with experience; connections that look good may contain hidden flaws.

A good place to start looking for fractured connections is with components that are subject to mechanical force, such as connectors mounted on printed-circuit boards. Some of the worst culprits are ¼-inch phone connectors. Due to their length, they exert powerful

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forces on connections to printed-circuit boards. Phone connectors were designed for use with telephone switchboards—where ease of insertion and removal are paramount—rather than for the rigors of musical applications.

Another common source of fractured connections is heavy components that are not mechanically attached to the circuit board. Large electrolytic capacitors or power resistors fall into this category.

OUT WITH THE OLD

Some connections are so bad that the old solder must be removed and replaced with new. Removing old solder is sometimes accomplished with a braided copper wire coated liberally with rosin, known as *solder wick*. Solder wick is pressed gently against a molten connection, and the old solder is then drawn into the braid through capillary action. Although inexpensive, braid can present the danger of overheating the work and can leave solder in the hole, making safe removal of the lead component problematic. Still, with practice you can learn to avoid most of these problems.

Some people use a simple, vacuum bulb to remove solder, but the results are unpredictable, and I don't recommend this approach. Another unreliable method involves a plunger-type vacuum device with an internal spring. You place the suction tip over the solder joint, heat the joint with the soldering iron, and trigger the plunger to create suction. This method brings about some of the same problems as using a solder wick.

The most professional way to remove old solder is to use a desoldering station (see **Fig. 2**) that has a closed-loop, temperature-controlled tip with an axial bore, through which the solder can be sucked into a reservoir. An internal (or, in some models, external) pump provides the suction that draws molten solder from the connection. The suction is controlled by a trigger in the grip of the desoldering assembly.

When you use a desoldering station, be sure to select a tip that matches the diameter of the lead to be desoldered. Proper tip maintenance is crucial to obtaining good results. For example, unlike soldering tips, desoldering tips should be lightly filed to remove debris. Do not use a conventional file, however, or you will damage the tip; a light-duty file is usually provided with the unit. You must clean the bore of the desoldering device at regular intervals with a large-diameter rod, empty the solder receptacle, and replace the filters.

COMING SOON

Here's a question to ponder until our next "Service Clinic": Why do customers bring in an electronic musical instrument worth $500 and authorize a $350 repair bill? I know what you are thinking: sentimental value. But what exactly is it about an instrument that its owner gets attached to? The answer has everything to do with failure modes and troubleshooting. See you next time.

Peter Miller *has specialized in the repair of electronic musical instruments for more than 30 years. He has owned and operated CAE Sound (located in San Mateo, California) since 1980 and has designed custom audio electronics for groups such as Tuck and Patti, Counting Crows, and the Grateful Dead.* **Paul Howard** *is on staff as a service tech at CAE Sound.*

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ENSONIQ

ZR-76

A keyboard workstation designed for songwriters and pianists.

By Julian Colbeck

In 1996, Ensoniq launched the MR-76, the design of which reflected a unique and refreshing reappraisal of the workstation concept. The MR-76's most innovative features included the Idea Pad, a scratchpad sequencer that was permanently in Record mode; a powerful drum machine; a full-fledged, but friendly, 16-track sequencer; and a carefully databased library of sounds. With the ZR-76, the mavens of Malvern (Pennsylvania) have attempted to maintain the strengths of the previous model while adding some new attractions.

Some of the MR-76's irritations also remain, notably the awkwardly placed I/O jacks and the wide discrepancy of volumes and pitches among the sounds. But the good far outweighs the bad, and with the addition of arguably the finest set of acoustic piano samples on the planet (from William Coakley's *The Perfect Piano* library, reviewed in the May 1997 **EM**), a generous handful of additional new sounds, a few innovative touches, and some streamlining of both the front panel and its functionality, you get a workstation that just oozes songwriter features and flexibility. Really, if you can't write a good song with the ZR-76, you might as well give up music and take up golf.

Ensoniq has created a marvelous songwriting tool in the ZR-76, which offers a wealth of sounds, an easy-to-use sequencer, and a drum machine with patterns that were played in real time by professional drummers. Two of its best features are an outstanding set of piano samples and the Idea Pad, a scratchpad sequencer that records constantly in the background.

HEAVY HARDWARE

The ZR-76 feels heavy, although at 51 pounds, its weight is comparable to other 76-key synths. The instrument is

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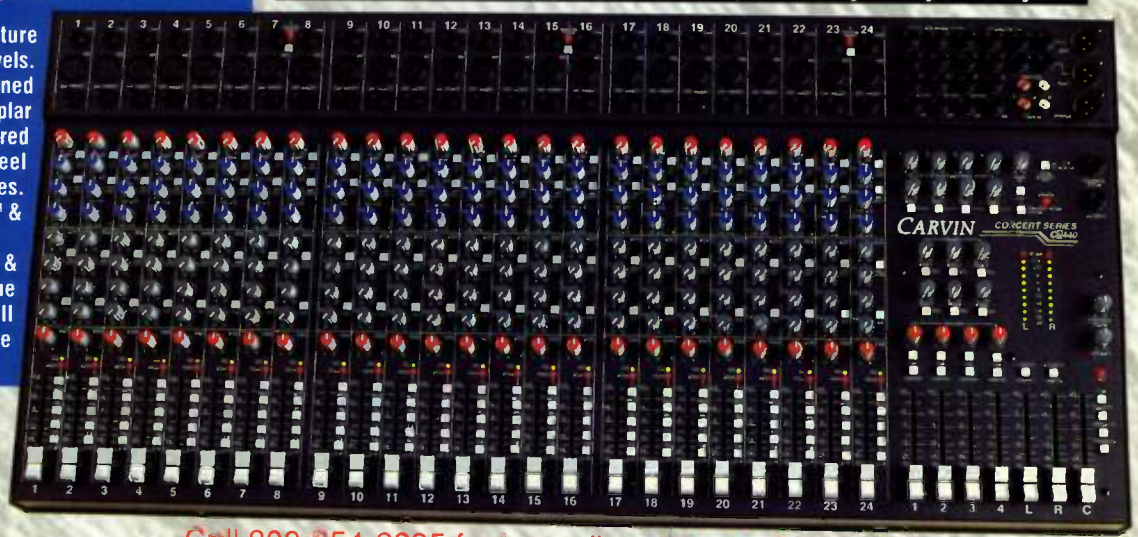

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GRP3

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FIG. 1: The ZR-76's rear panel would be unremarkable except that the jacks are inconveniently placed below the lip of the instrument, so you have to go around to the rear to access them.

well constructed, and I have only one major gripe about its physical aspects: the ludicrous positioning of the audio, MIDI, and power connections. All jacks (including the headphone jack) are tucked beneath a lip at the back of the instrument (see **Fig. 1**), making it difficult to plug in unless you are squatting behind it. Another problem is that the disk drive, which sits at the back of a recessed area to the left of the keyboard, is neatly obstructed by the pitch and mod wheels.

I was somewhat pacified when I saw that the ZR-76's front panel is similar to the friendly visage of the MR-76. Although there aren't that many knobs to tweak, the panel is very busy—and busy is cool these days.

Each of the instrument's many separate features—the drum machine, the sequencer, and so on—has its own dedicated area and set of controls. Although the LCD has only 40 characters, the script is nice and big, as it always is on Ensoniq instruments.

The 76-key, weighted keyboard is great. I complained about the MR-76's heavy-handed action, but this action feels much better to me. At first, I thought I had grown stronger in the past two years, but it turns out that Ensoniq is now using a different keyboard. The action plays smoothly and positively. Admittedly, it has a hair-trigger response: even if you depress a key at a snail's pace and with a feather touch, it'll still trigger. But playing the instrument's star piano tone is a real joy. (I'll return to this subject.)

In addition to Note On Velocity, the synth responds to Release Velocity. As expected, it is Channel Pressure–sensitive, with Soft, Medium, Firm, and Hard response options. You can choose among four graded Velocity curves, in addition to two linear response curves, one fixed at 64 and the other at 127. The manual suggests that the 127 response works well for drum programming, which assumes that you won't want dynamics in your drum parts—a little old-fashioned, I have to say. The fixed value surely would be better for playing organ sounds and emulating old synths that never offered Velocity control in the first place.

SOUND THEORY

The ZR-76 essentially sports a standard sample-playback, subtractive-synthesis engine. The samples, or raw material for each sound, are given the catch-all title of Wave. An Ensoniq Wave can be a sample of an analog waveform, an inharmonic sound bite, or one of Ensoniq's moving-picture-show Transwaves. (Transwaves are dynamic waveforms created with digital synthesis and resynthesis.) You can even load in WAV and AIFF samples, provided you have the MR-FLASH sample-memory board installed (see the sidebar "But Wait... There's More!").

Waves, whatever their origin, can be processed by digital amplifiers and digital filters, some of which emulate old, analog-style filters. These can be controlled with envelope generators and LFOs (see **Fig. 2**). You can use up to sixteen layers of edited and reshaped Waves per finished sound.

In SoundFinder Edit mode, you have control over all the parameters governing a sound's basic structure and appearance. Given the massively complex nature of ZR-76 sounds (up to sixteen layers), you are sensibly given a choice of editing using Override, which alters all current layers to the same absolute value you choose to set, or using Offset, which preserves the layers' relative balance. You have control over volume, pan, pitch, pitch bend, tuning, portamento, delay, LFO (which can be synched to MIDI), attack/decay/release EGs for both amplifier and filter, filter cutoff, zone, and Velocity response.

Although the ZR-76 is not in a class with synths that are focused primarily on sound design, it offers a powerful set of programming tools that are far beyond the requirements and scope of the average songwriter to whom the instrument is geared. Ensoniq's elegant solution is to provide a MOTU *Unisyn* module for the ZR-76 (provided on CD-ROM) that allows songwriters who are also programmers to climb deep inside the sound engine via their PC or Mac. *Unisyn* opens up a brand-new world of filter types, wave-playback modes, modulation paths, and multistage envelope generators—per layer.

THANKS FOR THE MEMORIES

You can save edited sounds to memory internally, or you can save them externally via the floppy-disk drive. The ROM memory houses preset sounds and drum-machine patterns, while the INT (internal) memory stores edited sounds, sequences, and customized system setups. The INT memory is divided between Flash memory and RAM, and you must understand the distinction between the two or you risk losing precious material. Editable sounds and

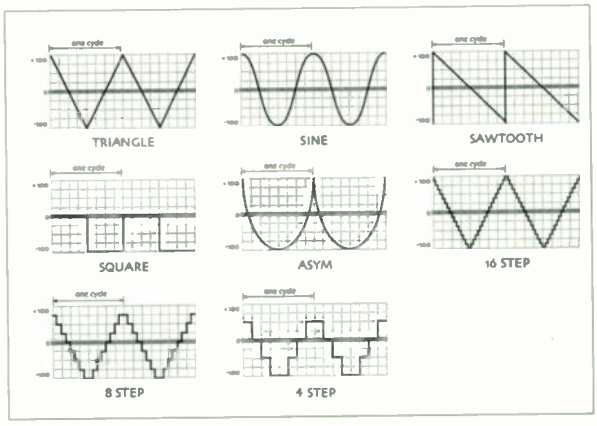

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FIG. 2: The LFOs can be applied in several ways, including to modify insert effects, and they can be synched to MIDI Clock. Eight LFO waveshapes are available.

Real words from a Reality™ user

"Most of my shows...

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

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

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

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

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

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

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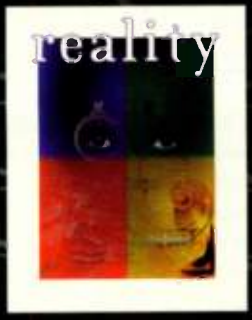

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FIG. 3: The sequencer, which Ensoniq dubs "16 Track Recorder," has dedicated track buttons with LEDs that light up to indicate that the associated tracks contain data. The section to the far right shows four of the eight lettered Sequence buttons; you can assemble up to eight sequences per song. Notice the labels below the buttons, which indicate Intro, Verse 1, and so on.

rhythms are stored in Flash memory, and they are retained in memory when you power down the synth. Your strokes of genius, captured by the Idea Pad or on the sequencer, are stored in RAM, which is not battery backed, so you lose this data on power-down unless you save it to disk.

Saving to Flash memory is a little time-consuming because major internal resaving takes place every time. Even recalling from Flash produces a tiny hiccup as you switch from sound to sound. It's nothing too offensive, but it can wrinkle the creative flow. The advantage Flash memory offers over battery-backed RAM is that Flash memory requires no batteries; one wonders, however, if that's a worthwhile trade-off for its inconveniences.

Although the amount of RAM is fixed, the amount available for the various sections of the ZR-76 is flexible. You can apportion more for sequencing, less for sound editing; more for ideas, less for rhythms. Complicating things further, memory is consumed by factors that you may not have considered, most notably the number of layers in a given sound and the amount of controller data in a sequence.

Therefore, you need to keep a careful eye on the fuel gauge and have a clear understanding of the trade-off between custom sounds and sequences. Although inevitable, it's a shame that an instrument which generally (and refreshingly) eschews obvious displays of technology forces you into technological decisionmaking in this regard.

SONIC RESOURCES

Because the ZR-76 is primed with over 1,200 sounds (including drum elements), the auditioning process could have been a nightmare. Instead, it's a dream. The SoundFinder is a database of sounds that allows you to type in the sound names you're looking for using letters printed above keys on the keyboard; the sound magically appears as soon as the SoundFinder recognizes the first few letters. You can browse through lists of sounds alphabetically or by category (bass, piano, brass, etc.). In addition, the front panel sports a dozen programmable SoundFinder Favorites buttons that allow you quick access to your most-used sounds.

The sound categories are comprehensive, covering basses (electric, synth, and others), bells, brass, strings, drums, guitars, keyboards, mallets, organs, vocals, winds, and much more. Each category contains many sounds, and all are of high quality for this type of sound engine. While you shouldn't expect realistic brass *a la* physical models, these sounds are very good, especially in the context of a sequence.

Standouts include the raucous "Capt. Crunch" power guitar, set up with mod-wheel-induced feedback; the sitarlike "Ethnotan" in the Plucked bank; and the exceptionally smooth "Legato Str" in the string-section bank. In general, I'd say the ZR-76 excels at keyboard and percussive sounds but is less strong with brass, woodwind, and string sounds.

As much as I like all the above sounds, the pianos are the ZR-76's top sonic attraction. Sorry to say, I wouldn't know William Coakley if I ran him over, but the man concocts a mean set of piano samples, and Ensoniq has scored a major coup in enlisting (and presumably licensing) his services here.

Coakley's 16 MB, modestly entitled *The Perfect Piano* sample library, is delivered in Ensoniq's EXP-4 expansion board, which comes standard on the ZR-76. Its main acoustic piano, "Perfect Piano," is based on a set of samples from a Steinway D grand piano and is

ZR-76 SPECIFICATIONS

AUDIO SPECIFICATIONS	
Sample-Playback Frequency	44.1 kHz
Signal-to-Noise Ratio	103 dB
Frequency Range	2 Hz–20 kHz
HARDWARE	
Keyboard Action	76-key, weighted w/Note Velocity, Release Velocity, and Channel Pressure
Left-Hand Controllers	pitch-bend wheel, mod wheel
Display	2-line x 20-character LCD
Audio Outputs	(2) Main L/R, balanced, ¼" TRS; (2) Aux L/R, balanced, ¼" TRS
Headphone Output	(1) stereo ¼"
Additional Ports	MIDI In, Out, Thru; (1) assignable continuous pedal; (1) footswitch
D/A Converters	18-bit linear
Removable Storage	1.4 MB, 3.5" floppy drive, MS-DOS format; file format is SMF-compatible
Standard Accessories	system disk (w/sounds, rhythms, demos); SW-6 footswitch; MOTU Unisyn editor/librarian module (Mac/Win)
Options	EXP wave-expansion boards; Flash sample-memory board; SW-10 dual footswitch; CVP-1 CV pedal; MS-1 removable music stand
Dimensions	50.5" (W) x 15 .7" (D) x 5" (H)
Weight	51 lbs.

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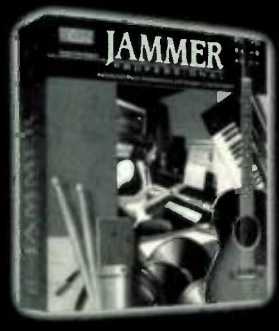

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► "It's remarkable that algorithmic composition software sounds as convincing and musical as this program does, right out of the box."
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► "What makes this program different is the fine degree of control available to the user. The JAMMER lets you take your computer where no computer has gone before."
Electronic Musician

► "... this is one of the most impressive music programs I have seen."
INFO WORLD

► "JAMMER Pro produces surprisingly lively and professional music."
PC Magazine

► "Remarkable user programmability of styles and arrangement options. Simple to learn and use."
Keyboard

► "Each time the user presses the key, the studio musicians create new and different professional melodic parts with human-like feel."
The Music and Sound Retailer

► "The JAMMER's composing flexibility is remarkable. You can have it compose and re-compose entire tunes, individual sections, discrete instruments, single measures, even individual drums or percussion instruments, saving successfully composed parts."
Keyboard

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superbly expressive, with no hint of looping or electronics. This sample has a wonderful ringing bass, a clear mid range, and a beautifully aerated top end. In short, it's just about perfect. If you're not a pianist, check out Mike Ford's solo-piano demo to savor MIDI at its most mellifluous. If you are a pianist, you'll be too busy playing to bother.

The pianos include electric-piano samples from Ensoniq's collection, as well as Coakley's true-stereo acoustic pianos. The sounds range from acoustic honky tonks to rubbery Rhodes and fat Wurlitzers. I also liked some of the layered piano tones: the evocative, watery "Padulatory," and an ever-useful vamping tone called "LA Layer." Even on the presets, there's evidence of thoughtful programming: some layers come with mod-wheel volume control over one of the sounds, others with mod-wheel effects control. This is good stuff.

ZR-76 Features

SYNTH/CONTROLLER	
Synthesis Engine	sample-playback, subtractive
Polyphony	64 notes
Multitimbral Parts	16
Keyboard Zones	3
Preset Sounds in ROM (not including drums)	384 internal (2 banks of 128 + 128 GM sounds) + 52 in EXP-4 Piano Expander (preinstalled)
User RAM Locations	256 (70 factory sounds)
Waveform ROM	14 MB internal + 16 MB piano expander
Drum Kits (ROM)/Drum Sounds	90 (79 Ensoniq, 11 GM/GS)/751
Filter Types	lowpass, highpass, variable-bandwidth bandpass (2, nonresonant)
Envelope Generators	(3) 5-stage
LFO	(1) 7 waveform choices, can sync to sequencer, drum machine, or external MIDI Clock (12 subdivisions)
Portamento	yes
Modulation Sources/Destinations	22/8
SEQUENCER	
Sequencer Tracks/Sequences per Song	16/24
Sequencer Resolution	384 ppqn, synched to internal or MIDI Clock source
Types of Quantization	whole note to 64th-note triplet, normal or Delta quantization, strength, swing, random, shift, key range, window, quantize Note Offs, move Note Offs, user-definable templates
Sequencer Storage Capacity	231 KB (sequencer + Idea Pad); approx. 60,000 events
Drum Machine	119 rhythms w/8 Variations and 8 Fills per rhythm, adjustable tempo (25–350),
Other Sequencer Features	5 real-time record modes: Replace, Add, Step-Entry, Track Mix, and Final Mix; automated punch/edit/autolocate regions remembered for each sequence
EFFECTS & SPECIAL FEATURES	
Effects Processors	(1) stereo global reverb, (1) stereo global chorus, (1) stereo insert
Insert Effects Types	40
Effects Buses	6
Special Features	Idea Pad free-running MIDI recorder; SoundFinder sound database

As if all these sounds weren't enough, the ZR-76 offers two slots for internal expansion boards, which can add sounds and allow you to load AIFF and WAV samples (see the sidebar "But Wait... There's More!"). Unfortunately, you can't load ASR/EPS samples (with program parameters) directly into the ZR-76, as you could with the Ensoniq TS-10/12.

SEQ AND YE SHALL FIND

Ensoniq's sequencers have long been a major selling point of its synth workstations, and the ZR-76's 16-track MIDI recorder is no exception. Resolution is an impressive 384 ppqn, and you can record in real time or step time. Flexibility in terms of time signature is almost limitless, which is a big plus.

Operating the sequencer is, for the most part, logical and friendly: you have dedicated track buttons with LEDs that light up when their associated tracks contain data (see **Fig. 3**). There's an audio "1, 2, 3, 4" count off before recording. You can punch in using a footswitch and quickly loop sections, as well as spot-erase notes with a neat Scoop feature. When you rewind your sequence in Play, you even hear your music playing backward, just as you would when scrubbing tape. Although unnecessary, it's cute.

The sequencer is geared toward recording music in chunks—or Sequences—that you assemble into completed songs using a line of eight buttons, labeled A through H. Ensoniq has conveniently double-labeled these buttons, so button A is also labeled Intro, button B is Verse 1, button C is Chorus 1, and so on to H, which is Ending (see **Fig. 3**).

You can repeat and string segments together in any way you like, providing an excellent opportunity to experiment with your song format. You can even mix and match sections from what were initially distinct ideas or songs. (What would George Martin have given for this sort of facility during the recording of *Abbey Road*?)

One word of warning, though: if different sequences use different effects configurations, or if they are data-heavy at their starts, you will experience noticeable hesitations as one section moves into another. You need to be careful with effects; trim excess data from the top of sequences (controller data, especially); or, as a last resort, use the sequencer as a generator of ideas and

formats, and download material into a computer sequencer for final assembly.

To this end, Ensoniq was smart to employ the Standard MIDI File format as its sequencer format. As a result, a ZR-76 sequence can be saved to a DOS-format floppy disk and imported directly into a computer sequencer, without having to convert anything.

Indeed, I transferred a sequence from the ZR-76 into Steinberg's *Cubase* for Macintosh, and it worked just great. If you want to edit the sequence on your computer and then load the resulting file back into the ZR-76—say, to use it as a backing on a gig—you save the sequence as a dedicated Standard MIDI File. Be aware, however, that the ZR-76 likes to arrange tracks and MIDI channels together: for example, track 1 should be on MIDI Channel 1 and so on. This might not tally with how you have worked on your software sequencer, so expect some degree of configuring.

I also loaded in a number of third-party MIDI products and was impressed to find that GM Program Changes, tempi, and time signatures all came across without a glitch. Again, the one extramural activity was realigning tracks to MIDI channels, and this occurs only if you edit the tracks, not if you just load and play a file.

Due to the restrictions imposed by small-screen viewing and finite amounts of memory, the sequencer makes an excellent transitional tool from idea to arrangement. However, I would still recommend a software sequencer for mastering, and, impressively, so does Ensoniq.

WHAT'S THE BIG IDEA?

The smallest feature often makes the biggest impact, and the Idea Pad is a killer feature of the ZR-76. Scratchpad sequencers have been around for years. No big deal? Ah, but the clever thing about the Idea Pad is that you never need to hit a Record button because it is permanently in Record mode. The Idea Pad records whatever's going on at the moment, from the notes you're playing to the sound you're using, the drum-machine pattern, and the effects. Every time you stop playing for a specified period of time (the length of which is programmable), the Idea Pad interprets that gap as the start of a new Idea and logs it accordingly. When you want to replay some magical, serendipitous slip of the fingers, you dial up, say, Idea 8 of 9, and hit Start.

This single, simple feature puts the ZR-76 at the head of the pack for songwriters, both professional and aspiring. How many great songs have gone unwritten because the kernel of your idea slipped through the net as you were noodling around on the keyboard?

You have to be disciplined with the Idea Pad because great Ideas, unlike their theoretical counterparts, do not last forever: the Idea Pad has a finite (though flexible) amount of RAM. Also, as noted earlier, all of your recorded Ideas will go down the drain the moment you hit the power switch.

That said, Ensoniq makes it easy to send an Idea direct to the sequencer, where you can cut, paste, and generally knock it into some sort of shape that's worthy of being saved to disk. How easy is it? Press the Send To Track button, and hit the Yes button a couple of times.

The Idea Pad is even active when you're playing back a previously recorded sequence. You know the problem:

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you're midway through a song, and you get stuck or bored or bogged down. Now you can jam along to your half-finished song, and, should the muse start to fly once more, the moment will be automatically captured. I found this extremely useful for experimenting with melody lines.

Although the manual expounds on the Idea Pad for some fourteen pages, the Pad's power lies in its simplicity.

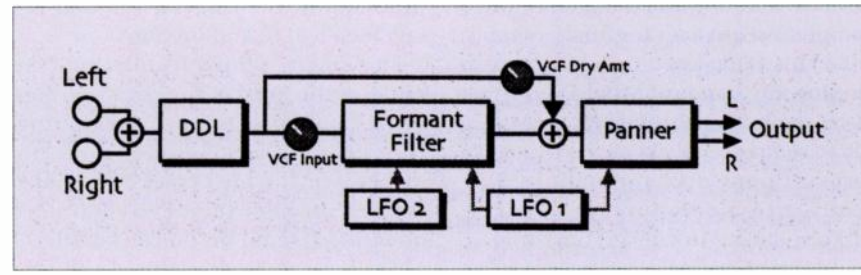

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FIG. 4: The "Chatter Box" effect uses a formant filter with a time-varying spectrum to add a vocoderlike, vocal quality to the sound. The two LFOs are combined, so that the filter morphs between four selectable vowel shapes, and the first LFO is also tied to an auto-panner to create stereo panning effects. The digital delay allows you to create "talking echo" effects.

DRUMMING UP BUSINESS

Everybody needs drum patterns. If you're a songwriter, you could either program them yourself (a skill not everyone has), hire a drummer (expensive), use sample CDs (not cheap, and you have the hassle of mixing audio and MIDI tracks), buy off-the-shelf MIDI drum patterns played by real drummers, or use a drum machine.

Ensoniq's solution is a combination of the latter two options. More than 100 drum patterns reside in the machine, each with eight variations and fills that can be called up using the eight Fill/Variation buttons. Additional patterns have even been stored on a floppy disk that comes with the instrument.

Ensoniq says that the patterns have all been played by top drummers using MIDI drum pads, and indeed, the standard is high. There are stock ballad, Latin, pop, and rock beats, as well as jungle, world, ambient, and hip-hop. In the odd-meter category, I found a delightful 5/4 pattern that is pure Vinnie Colaiuta on Sting's "Seven Days." I also loved the finger snaps in the 12/8 ballad patterns, even though some of the variations feel a little heavy-handed.

Tempo is variable, of course, via the Data Entry and Tap Tempo buttons. But more than that, the kit that each rhythm uses is variable, and so are the individual drum or percussion sounds within the kit. Effects currently applied can also be specified per keyboard zone, as can volume and pan.

As with the Idea Pad, the drum-machine patterns, tweaked or preset, can be spun over to the 16-track sequencer for further elaboration and saved to floppy disk.

KITS AND CABOODLES

Ensoniq is big on drums. Aside from its more than 70 drum kits, the ZR-76 allows you to use any sound as a drum sound when you construct a new kit. GM mapping is supported, but I found the Ensoniq drum map and the programs that house a single drum sound (mapped across all keys) to be extremely handy when I was constructing a more considered drum environment.

Why does Ensoniq persist in using its own drum mapping for a large proportion of the resident kits? The answer lies in how easy it is to play drum patterns from a keyboard. If you have new sounds on each key, playing rolls and flams is difficult, but Ensoniq mapping places some instruments—notably snares—over several keys. By simply drilling your fingers over three keys, you can produce a most convincing roll or skip. Some of the kits even apply different effects, or amounts of effects, on different keys. This way you can use a dry snare for a roll and then use the snare with reverb for a proper hit.

Strangely enough, I found this feature to be most useful when creating fast snare jungle and drum 'n' bass patterns. These were the patterns that I

BUT WAIT... THERE'S MORE!

No matter how many onboard sounds a synth has, sooner or later you're going to need some new ones that you're unable to replicate with your existing sound set. Over the years, Ensoniq has built up a large sample library, and its engineers had the good sense to allow MR-series and ZR-76 users access to some of it in the form of expansion boards.

As of this writing, there are two sound expansion boards ($499.95 ea.), both of which were originally designed for the MR-series instruments. EXP-1, entitled *The Real World,* gives you 24 MB of world and ethnic instruments, including 441 Waves and more than 500 programmed sounds and drum kits. The sounds were recorded on location in Asia, Africa, Europe, South America, and North America. EXP-3, or *Urban Dance Project,* also contains 24 MB of material, including 369 Waves and 400 sounds and drum kits.

The MR-FLASH Sample Memory Board ($299.95), a different sort of board from the previous two, gives you additional memory for up to 4 MB of Waves and comes loaded with 1 MB. You also get a floppy disk that has a demo, a backup of the MR-FLASH Waves, and some additional Waves. Perhaps more exciting, this board allows you to use AIFF and WAV files in your ZR-76. The MR-FLASH board goes into a separate slot, so you can use it along with the EXP boards.

If that still isn't enough, you can get the MRD Sound Disk Series ($24.95). Each set provides three banks of sounds, for a total of 180 sounds, and they're organized using the SoundFinder.

Ensoniq is also offering *ZR/MR Rhythm Builder* as a free download from the company's Web site. This program for Windows lets you create your own drum rhythms for ZR/MR-series keyboards and save them to disk. As with other Ensoniq support software, however, it's unavailable for Macintosh.

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found the least convincing of all Ensoniq's presets, so I made my own.

EFFECTS "R" US

I've admired Ensoniq effects ever since the release of the now-discontinued DP/4 effects processor. Sure enough, the ZR-76's toy box of 24-bit effects is as quality-laden and full as I expected. You get a nice global chorus and global reverb, and a section of insert effects, which are applied to a particular sound or section of the sequencer.

The effects architecture uses six stereo buses, enough to give you a lot of processing choices. The Chorus bus carries a wet/dry mix to both the global chorus and the global reverb. Three stereo buses go to the global reverb; each bus has a different overall wet/dry mix, ranging from light to very wet, and you still get independent sends for each sequencer track. This is a reasonable way to place all of your "instruments" in the same virtual "space," but not all with the same depth. The fourth effects bus carries a dry signal directly to the outputs.

But the most powerful bus handles the insert effects. There are more than 40 distinct insert effects, ranging from reverb, delay, pitch shifter, and chorus to unusual items, such as "Formant Morph" and "Chatter Box," that will create instant vocoderlike weirdness (see **Fig. 4**). You also have rotary speaker, compression, auto wah, and multi-effects algorithms such as EQ-chorus-digital delay.

Ensoniq provides complete internal control over each effect's parameters, most commonly ten or more, all of which are well documented in the user manual. You also have around fifteen Insert Effect Modulators (keyboard Velocity, mod wheel, external controllers, etc.), which you can apply independently for each sound, a feature that allows you to dramatically enhance a fairly standard sound in real time by introducing effects via a wheel or Pressure.

This versatile, flexible effects architecture turns the ZR-76 into a highly customizable and expressive live-performance instrument. Of course, you can also control all of these parameters from an external MIDI source, such as a fader box or a software sequencer.

IN CONTROL

The ZR-76's drum machine and sequencer provide an internal timing reference, which you can use to sync LFOs and noise generators. You can also sync the drum machine and sequencer to an external MIDI Clock, and the sequencer responds to Song Position Pointer (SPP) messages. Alternatively, you can use the ZR-76 sequencer as the master clock for external MIDI devices, transmitting Clock, SPP, Start, Stop, and Continue messages.

As a MIDI master keyboard, the ZR-76 is solid, although not exceptional. It has pitch bend and mod wheels, and you get one footswitch with the instrument, which can be programmed to send Sustain, Sostenuto, increment/decrement, or a value of 127 to a host of ZR sound and effects parameters. The rear panel has a pair of footswitch jacks, so you can substitute the optional Ensoniq SW-10 dual footswitch for the single footswitch. You also get a jack for an optional, programmable CV pedal that can send

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Volume (CC 7), Foot Controller (CC 4), or continuous values to any of the parameters addressed by the footswitch.

Additionally, the ZR-76 can generate, respond to, and transmit Data Entry (CC 6), and Pan (CC 10). What don't you get? Well, if you are looking for banks of faders, ribbon controllers, assignable knobs, and such, look elsewhere. You also won't get the kind of sophisticated MIDI modulation that you find in some advanced synths. But Ensoniq has never gone in for that level of MIDI madness, so there's no reason to expect it now.

The instrument responds to the three main "panic" messages: All Notes Off (CC 123), All Sounds Off (CC 120), and Reset All Controllers (CC 121). The ZR-76 sends an All Notes Off message on all channels when you double-click the Demo button. This serves as a basic panic feature, although I wish it also sent individual Note Off 0 to 127 messages, because some older synths don't respond to All Notes Off.

THIS IS Z END

The ZR-76 is an exceptional instrument. While it has a few faults and quirks, it has the right things in the right places (except the I/O ports). Does it have everything you could want? No, of course not. Some rival products offer powerful arpeggiators, sampling options with digital I/O, multiple synthesis architectures, more sequencer tracks, and more extensive MIDI control. In general, you pay plenty for all that, though.

But the ZR-76 provides you with both inspiration and the tools to turn that inspiration into musical results. The effects are studio quality, and the Idea Pad and drum machine are heaven-sent. The main piano tone is a benchmark that stands as a challenge to dedicated digital pianos, and it's mated with a lovely action. Obviously, some pianists (especially those who play a lot of classical or jazz) need an 88-key action, but 76 keys are plenty for most people.

Clearly, Ensoniq has made good use of the two years since it issued the MR series. Whether you are a songwriter, a pianist with a hankering for a digital instrument, or a synthesist, the ZR-76 is a fine choice.

Julian Colbeck *runs Keyfax Software, producers of Twiddly Bits off-the-shelf MIDI drum patterns played by real drummers (and more). He used to be a professional keyboard player, but he's better now.*

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CONS: Limited sound editing. Paucity of dedicated multitimbral memories. Awkward position of ins and outs.

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TC ELECTRONIC

FireworX

This multi-effects processor burns brightly!

By Erik Hawkins

TC Electronic has long had a solid reputation for producing high-quality signal processors. Its latest offering, FireworX, is similar to the company's G-Force guitar processor but far surpasses that model's capabilities. Aimed at professionals who need a comprehensive multi-effects unit for studio work and live shows, FireworX is loaded with goodies. However, with a price tag of $2,195, this unit isn't for the musician on a low budget.

The 1U rack-mount FireworX offers eleven effects types: reverb, chorus, delay, distortion, panning, pitch shifting, vocoder, dynamics, EQ, filters (e.g., resonant, bandpass, phaser), and formant filters. In all, there are 38 different effects algorithms that can be combined and routed in a variety of ways. You can control a host of real-time effects parameters via MIDI or directly from the unit's front panel. There are 200 ROM presets and an additional 200 user-definable locations in RAM, and the unit is able to store up to 2 MB of user programs on a PC (PCMCIA) card.

I/O AND POWER

FireworX's analog inputs and outputs use 24-bit D/A and A/D converters and are on XLR jacks; there are no ¼-inch I/O jacks in sight (see **Fig. 1**). The inputs, but not the outputs, are switchable between +4 and -10 dBu operation. This is a consideration if you want to run your whole studio at -10 dBu, which is common in personal studios. The unit can produce a handy 1 kHz tone for setting operating levels.

Digital I/O includes one pair each of AES/EBU on XLRs, switchable S/PDIF or ADAT Lightpipe on optical Toslink, and S/PDIF on RCA coax connectors. FireworX can lock to an incoming digital signal, its own internal clock, or external word clock via an RCA jack on its rear panel (great for locking to house sync). Word clock ports are usually on BNC connectors, so the choice of an RCA jack is a bit of a compromise. Fortunately, an RCA-to-BNC adapter is included.

The inputs (analog or digital) can be configured to run in stereo, mono L/mono R, or with left and right summed to create a monophonic source. All inputs are fed simultaneously to every digital output, making this unit a nifty format converter. At the outputs (again, analog and digital), word length can be dithered to 22, 20, 18, 16, or 8 bits. When using the ADAT Lightpipe connectors, any two ADAT channels can be chosen as the source and sent, after processing, to any two ADAT Optical outputs.

FireworX runs on 100 or 240 VAC at either 50 or 60 Hz (a way cool feature for world travelers). An IEC Type 2 removable power cable plugs into the unit's rear. The unit is equipped with two power switches: a rocker-type switch on the rear panel and a button on the front. To help avoid accidental shutdowns, TC has designed the unit so that you must hold the front-panel button down for about three seconds to power off. Because of the red LED that blinks while the unit is off, this switch could be mistaken for a standby button, but it actually does a complete power-down.

ON DISPLAY

The front panel is laid out beautifully, which is a necessity considering the complexity of this unit. In contrast with many effects processors, FireworX has plenty of dedicated buttons, a big LCD screen, and lots of LEDs for visual cues. Its face is divided into four sections: power and master volumes, metering and LCD display, Effect Control (effects and effect parameters), and Control (data entry/real-time controls).

In the power and master volumes section, you'll find the power button, the PCMCIA card slot, and the master input and output volume knobs. An I/O page can be brought up on the LCD showing a virtual image of these knobs along with their numerical values (-22 to +10 dB for the In knob and -10 to +22 dB for the Out knob). These knobs are dedicated to the analog I/O and provide no control over the digital I/O; however, on the same display page, the digital I/O can be attenuated from 0 dB to -99 dB or turned completely off.

The metering section sports 6-segment LED input meters for the left and right inputs. Each meter has three green, two yellow, and one red (peak) LED. A red LED located beneath the meters lights up when an overload occurs internally. While this LED functions adequately as a basic peak-output indicator, it does not replace a real output meter. Sometimes I lost my output, and although I saw a signal coming in, having no output meters made it difficult to track down the problem (e.g., determining whether something was set incorrectly within the unit or something was unplugged at the mixer). It would help if the input meters were switchable to output meters.

The main LCD is a robust 1⅛ by 2½ inches and displays a wealth of information, from text to illustrations. On many of its pages, parameters appear with associated images; for example, the EQ algorithm edit page also displays EQ curves. The LCD is nicely backlit, making it easy to see in low light. The contrast is fully adjustable and accommodates almost all viewing angles.

UNDER CONTROL

The Effect Control section provides access to the heart of FireworX. Each effect (reverb, vocoder, dynamic, etc.) has a dedicated button with a yellow LED that lights up when the effect is used in a patch. Pressing a lit Effect

TC Electronic's FireworX is a comprehensive multi-effects processor that offers outstanding sound quality and versatility.

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Key once mutes the effect, pressing it again engages it, and double-clicking it takes you to that effect's editing page. This is a wonderfully intuitive setup, much like a chain of effects pedals. The Bypass button globally mutes all effects, the Tempo button changes the bpm setting, and the Alpha Modulation keys modify the parameters of the Alpha Mod Wheel.

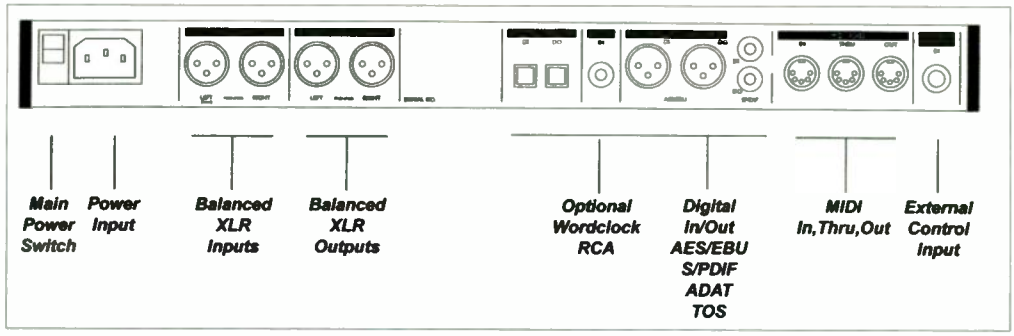

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FIG. 1: In addition to balanced XLR analog I/O, FireworX accommodates three major digital formats: AES/EBU, S/PDIF (on RCA and optical), and ADAT Lightpipe. A ¼-inch footswitch jack and a word-clock input (RCA) round out rear-panel connections.

The Control section has Left and Right Arrow keys for scrolling between pages, a Store key, an Exit key, and an Enter key. There are also utility buttons that control MIDI settings, program recall, and I/O setup. Anchoring the Control section are three large, rotary knobs. The first rotary knob acts like a cursor, allowing you to select an editable field; the second lets you enter a value for the selected field; and the third is the Alpha Mod Wheel. All are infinitely rotating, detented knobs.

The Alpha Mod Wheel is a breakthrough feature on a multi-effects unit. It provides real-time control over a plethora of onboard parameters from the front panel. Parameters range from simple mix values to pan positions and frequency sweeps. (The number of modifiable parameters varies from algorithm to algorithm.) Moreover, each modifiable parameter can have its own response curve; for example, you could have a distortion effect that increases, as you turn the wheel, faster than a simultaneously running EQ effect.

Once you've set up the Alpha Mod Wheel, you can name its function for that particular patch and have it displayed in the Recall window. The wheel also transmits MIDI-controller data, so you can record your machinations into a sequencer or even use it to control an external MIDI gizmo. My only complaint is that the Alpha Mod Wheel is detented, making it hard to spin quickly.

Each algorithm's parameters can also be controlled by up to eight internal and nine external modifiers. The internal modifiers include such synth-like items as a pitch detector, a pair of envelope detectors, two ADSR envelope generators, two LFOs, and a pair of function generators (which can add, subtract, or multiply the values of two control inputs and add a constant). You also get a Freeform modifier, which is a small sequencer that can sample the control values over a period of time and play up to 32 values, sort of like a modern-day, more sophisticated version of sample-and-hold.

There are nine external modifiers, which include eight MIDI messages and the Alpha Mod wheel. You can also substitute Value and Parameter knobs for two of the eight external controllers, giving you two extra real-time controllers on the unit's face. This also lets you test your modifier assignments without plugging in a MIDI device.

Assigning external controllers is easy: simply plug a MIDI controller in, select the parameter you want to control, and move the physical controller (e.g., a Pitch Bend wheel or a MIDI fader). The FireworX automatically detects the modifier and makes the connection.

AS I RECALL

Selecting programs is simple: the Recall key brings up the Recall page, and the Value knob selects the program. Although the new program will appear on the LCD, you won't hear it until you press the Enter key. The Enter key flashes to let you know when the displayed program is different from the one loaded in memory.

You can recall programs either sequentially, by numeric entry, or by Effect Block. You can also scroll through programs using a display filter, so that only those programs containing a particular type of effect are shown. This is a great feature: if you're looking for a patch that uses chorus, simply choose the Chorus Block as your search parameter, and only effects with chorus algorithms will be displayed.

FireworX responds to MIDI Program Changes, but there is an audio blackout for a few seconds when it loads a new program. However, you can get around this problem by using the nifty Mute function, which allows you to mute and unmute algorithms at different times, instead of changing programs in mid-song. There are several types of mute modes, but you'll probably want to use FX In mode, which mutes the input to the effect, letting its tail decay naturally. If you have everything set correctly, you'll be able to smoothly add and subtract effects throughout your composition. The mute functions will respond to a variety of MIDI controllers, which enables you to sequence your moves.

Theoretically, the unit can store up to 200 user programs, but the actual number may be less if the programs use a lot of DSP. A small, red LED lights up to let you know when a program has been edited. FireworX remembers the last thing that you were editing at shutdown, so you don't need to worry if you forget to save your program.

FUELING THE FIRE

FireworX's eleven effects types are grouped into Effect Blocks. From the Effects Edit page, you can choose an Effect Block and then scroll through the different algorithms available in that Block; for example, in the Delay Block you have a choice of six types of delay algorithms. Some Effects Blocks contain several algorithms, while others have just one or two.

You can chain algorithms together in almost any order, using an eight-by-eight matrix available on the Effects Routing page (see **Fig. 2**). From this page, you can arrange algorithms in parallel or series, as well as create a feedback loop at any point in the signal chain. You can also move, insert, and

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delete the columns and rows that make up the matrix.

Once an algorithm is placed in the matrix, its signal path can be defined for that particular program (see **Fig. 3**). An algorithm's input source can be either a direct path from the unit's master L/R inputs or a feed from another algorithm in the same matrix. An algorithm's inputs can be configured, like the master inputs, as mono L/mono R, stereo, or summed mono. An algorithm's I/O is set in the Effects Edit Routing page (under the Effects button), where you can also configure the algorithm's left and right outputs as dry, off, or mixed.

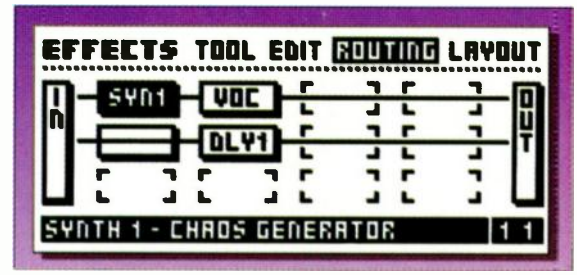

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FIG. 2: The Effects Routing page offers an eight-by-eight matrix that allows you to configure algorithms in almost any order imaginable.

Having all these options means that you can pass a signal through an Effect Block's algorithm in almost any way you want. If you want a Delay Block to feed a Reverb Block but only want the left side of the delay to be reverberated and then returned completely wet, no problem; just set the Reverb Block's source as "left only" and its output as "wet."

The ability to assign the inputs and outputs for each individual algorithm makes FireworX an incredibly powerful processor. Its flexibility and ease of use remind me of something you'd expect from a DSP plug-in. It's a joy to create patches with this unit.

DYNAMIC ALLOCATION

FireworX dynamically allocates its processing power: when no effects are being used, all of the processing power is available; processing power is devoured as effects are turned on to create a program. Each algorithm requires a different percentage of total processing power (e.g., delays use between 19 and 23 percent, and reverbs use between 39 and 44 percent). A bar meter on the Effects Setup Tool page displays the amount of DSP being used; the bar fills up to indicate diminishing DSP resources. Beneath the bar, a corresponding numerical percentage is provided. If you're creating a program and you run out of DSP, FireworX automatically mutes and prompts you to reduce the number of algorithms being used.

The cool thing about dynamic allocation is that it lets every algorithm sound its best, regardless of how many algorithms are employed simultaneously. Some multi-effects units compromise sound quality in order to pack more algorithms into a program, causing effects to become grainy and thin. The downside of dynamic allocation is that you may run out of DSP before you've finished chaining algorithms together. If this happens, you can assign an I/O pair to insert an external processor anywhere in FireworX's matrix, either before or after a particular algorithm. The insert can be digital or analog, but not a combination of the two and not a combination of different formats (e.g., analog send and S/PDIF return).

DYNAMICS AND EQ

FireworX has three algorithms in its Dynamics Block: an expander/gate, a soft compressor, and a hard compressor/limiter. All three sound great and offer the basic parameters you'd expect from a stand-alone dynamics processor: threshold, ratio, attack, and release. The soft compressor can be set for either soft- or hard-knee operation, and the hard compressor/limiter has a makeup gain feature that increases output to compensate for amplitude loss during compression. There is even a dedicated LED meter to the right of the LCD for showing the amount of gain reduction taking place.

EQ is essential for creating exciting effects, and FireworX is no slouch in this department. There are two extremely flexible EQ algorithms: Fixed Parametric and Modifiable Parametric. Fixed Parametric has one high-shelving filter, one low-shelving filter, and three bell filters (with adjustable bandwidths). Modifiable Parametric has only four bell filters, but they are all controllable by means of the Alpha Mod Wheel—very cool for doing live frequency sweeps and EQ adjustments during mixing.

DELAYS AND TEMPOS

FireworX provides two 2-channel delay algorithms: Stereo Delay and Dual Delay. (Stereo Delay has one delay time for both left and right channels, while Dual Delay has separate times for each channel.) There are three tap delays: Dual Three Tap, One Tap, and Six Tap. Although these effects are not true stereo (they only accept a monophonic feed), the panning of every tap is adjustable.

The stereo delays have a maximum delay time of 675 ms, and the mono delays yield a maximum of 1,350 ms. A full two seconds on all the delays would have been nice, but I can't really complain, considering how smooth these algorithms sound. There's also a reverse delay whose playback can be triggered by the Alpha Mod Wheel. A Grade parameter allows you to set the loop time of the reverse delay. (There is no feedback parameter for this algorithm, which is kind of a bummer.) All the delays feature high- and low-cut filter controls.

FireworX has a beautifully designed tempo-control feature for delays and other effects. Simply press the Tempo key and you are whisked directly to the Tempo Edit page, where you can choose a MIDI Clock source (external or internal). With the internal source, tapping the key generates a tempo. Alternatively, you can tap in the tempo with a footswitch. The Tempo key is fitted with an LED that constantly flashes to indicate the current tempo in bpm. Each program can have its own tempo or can be tied to the global tempo. Because the tempo function is so easily accessible, finding tempos in real time is a breeze.

CHORUS AND PANNING

The Chorus Block contains two chorus and two flanger algorithms, divided into Classic and Advanced effects. Classic Chorus and Classic Flanger offer basic parameters: speed, tempo, depth, mix, and input level. Advanced Chorus and Advanced Flanger add parameters such as delay, phase, LFO curve, LFO phase, and feedback. It's difficult to describe some of the incredibly creative sounds you can come up with using these advanced parameters—they are impressive, wild, and best of all, useful. Both choruses and flangers can have their tempos (or speeds) controlled by the Tempo Key.

There is a dedicated Effect Block for panning, which is where you will also

TC ELECTRONIC
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$2,195

FEATURES ■■■■■
EASE OF USE ■■■■■
AUDIO QUALITY ■■■■■
VALUE ■■■■
1 2 3 4 5

PROS: Great-sounding effects algorithms. Logical user interface. Alpha Mod Wheel provides customizable parameter control. High-quality, 24-bit converters. Matrix allows complex routing between algorithms and external devices.

CONS: No output meter. Audio blackout occurs when changing programs. Delay times are relatively short.

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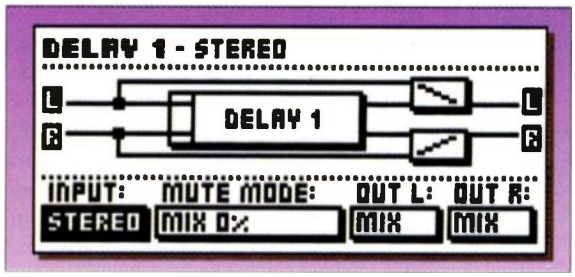

COURTESY TC ELECTRONIC

FIG. 3: Each individual algorithm's ins and outs can be separately defined, allowing complete flexibility for feeding and returning signals within the effects chain.

find tremolo effects. The Panning Block's algorithms are Simple Tremolo, Advanced Tremolo, Simple Panner, Surround Panner, and Stereo Enhancer. The Simple and Advanced Tremolos are based on the same algorithm; the Advanced just has more parameter controls. Simple has basic speed and depth controls, while Advanced includes goodies such as Curve (which lets you choose a square, triangle, or sine waveform), Pulse Width (which lets you shape the waveform), and LFO Phase.

Simple Panner has basic speed controls, while the Surround Panner adds parameters for Curve, Pulse Width, and Width. (Width lets you create imaging outside of the stereo field by changing the phase of the incoming signal. It's not true surround sound, but it's a neat effect.) The Stereo Enhancer widens the stereo field by delaying the left and right channels relative to each other. All algorithms except the Stereo Enhancer work with the global tempo controls.

FILTERS AND DISTORTION

One of the many strong points of this unit is the elaborate filter section, something that remixers and jungle and ambient composers will love. The Filter Block has five algorithms: Resonance, Bandpass, Phaser, Resonator, and Resochord. Resonance provides that classic, sweeping-frequency sound that's popular on synth pads and arpeggiated notes. Frequency sweeps are controllable by the Alpha Mod Wheel, making this algorithm a blast to work with in real time. Bandpass is a similar effect but a bit less dramatic. Phaser uses comb filters to create wonderfully lush phase shifting and has plenty of parameters for adjusting everything from speed to feedback. There's even a Range parameter that lets you adjust the amount of phasing occurring in the high and low bandwidths of the effect.

Resonator and Resochord are unusual effects that add a set of harmonics over your source material. Resonator produces overtones that are not tuned to your source, and Resochord produces overtones that can be tuned to your source.

The Formant Filter applies a filter effect that mimics human vowel characteristics, giving you the ability to create sounds like "eeyaa" or "oowee." This is a fabulous effect that opens the door to a whole new world of alternative funk and rhythm-guitar sounds (or anything else on which you would traditionally use a wah-wah-type effect).

Add some distortion to your filters and you have the makings of some hard-core underground sounds. FireworX has two distortion algorithms: Drive and Cruncher. Drive is a standard distortion effect, similar to what you find in a guitar preamp. Parameters include Drive, Brightness, Body (essentially a low-cut filter), and Smasher (an even-order harmonics booster). Cruncher is an interesting effect that is based on digital distortion: it turns any clean signal into low-fi digital garbage. Key features include the ability to create aliasing and quantization noise. Cruncher is great for making really nasty sounds—I love it.

REVERBS AND PITCH SHIFTING

Two effects I always scrutinize when listening to a multi-effects processor are its reverb and its pitch shifter; these effects generally reflect the overall sound quality of the unit. FireworX didn't disappoint: both effects sound good and are well implemented.

The reverbs are marvelously clean and clear, and they give you a translucent effect. There are two reverbs, Simple and Advanced, that are based on the same algorithm. The Simple Reverb parameters include Decay Time, Predelay, Reverb Level, and Color. Advanced Reverb also offers parameters for Diffusion, Reverb Frequency Response (low and high coloration), Room Reflection Control, Decay Start Time, and more. Although FireworX is not meant to be a dedicated reverb unit, it sounds good enough to be used as one. The only drawback is that the reverbs are both mono in/stereo out.

FireworX has two pitch-shifting algorithms: Single Voice and Dual Voice. Both sound nice and are definitely good enough to use for generating harmony parts (the true test of a pitch shifter). Pitches can be adjusted ± 2,400 cents, which is unquestionably a good range, although spinning the Value knob to reach 2,400 cents takes some time. Adjustable parameters include Delay, Pan Position, Level, and Feedback. My only complaint is that Dual Pitch isn't MIDI controllable, which would be ideal for working out harmony lines on a keyboard.

FireworX Specifications

Analog Inputs/Outputs	(2) XLR)/(2) XLR
Digital I/O	(1 pr.) AES/EBU on XLRs; (1 pr.) S/PDIF on RCAs; (1 pr.) S/PDIF/ADAT (switchable) on optical Toslink
Input Sensitivity	-22 to +10 dBu
A/D and D/A Converters	24-bit (128x oversampling)
Sample Rates	44.1 or 48 kHz
Frequency Response (analog I/O)	10 Hz–20 kHz (+0/-0.5 dB)
Frequency Response (digital I/O)	20 Hz–20 kHz (+0.01/-0.1 dB @ 48 kHz)
THD (analog output)	-86 dB @ 1 kHz
Dynamic Range (analog output)	>104 dB (A weighted)
Other Connections	footswitch (¼" TS), word clock In (RCA), PC card slot (68-pin, Type 1)
LCD	56 x 128-dot graphic
Dimensions	1U x 8.2" (D)
Weight	5.2 lbs.

SYNTHS AND VOCODERS

FireworX can also generate waveforms that can be used for a variety of purposes, from creating ambient noise and emulating classic monophonic synths to functioning as the carrier wave for the Ring Modulator algorithm. The Synth Block algorithms include a Curve Generator, Chaos Generator, and a Noise Generator.

The Curve Generator produces a single tone from 2 Hz to 2 kHz, using one of four available wave shapes: sine, triangle, square, and sawtooth. Combining this algorithm with a flanger or delay and controlling it via MIDI yields some crazy analog-synth sounds. The Chaos Generator produces random noise that is based on a fractal formula; it sounds a little like really bad static on a radio. The Noise Generator outputs white noise and pink noise, and it works quite well for adding analog background noise, something akin to tape hiss.

FireworX's Vocoder Block contains three algorithms. They include Vocoder, Ring Modulator External, and Ring Modulator Internal. The Vocoder sounds terrific, and I had a lot of fun singing and playing my guitar through this effect. The control and carrier channels are swappable between the analog left and right inputs. Ring Modulator External requires an external control source (for example, a guitar), whereas Ring Modulator Internal can use the Synth Block as a controller source (for example, the Chaos Generator).

BURNING UP

The space of a single review doesn't do this unit justice; an entire book could be dedicated to its effects and potential applications. However, the manual is quite good and the machine itself is very intuitive. Depending on your imagination and level of technical savvy, there's no telling the crazy things you can dream up.

I loved the 24-bit sound quality of FireworX so much that I often employed it as a simple A/D/A. Using it with my computer, I was able to monitor sound files through 24-bit converters, input 24-bit source material, and process sounds digitally, all of which is way cool. FireworX's many digital connections also enabled me to use it as a format converter, transferring files between formats by simply assigning ins and outs right from the unit.

If you decide to check FireworX out at your local music store (and I highly recommend that you do), plug a microphone into the unit, and be sure to take a listen to these presets: "Devils Voice," "Japanese Toys," and "Bad Record." For a real head trip, remember to spin the Alpha Mod Wheel while you're listening. And if you have the time, you ought to flip through the other 197 presets; they are all very nicely done.

In a word, FireworX is incredible. I can't say enough good things about this unit; its sound quality, internal architecture, professional specs, and user interface are all top-notch. It's definitely the best multi-effects unit I've ever tried.

Erik Hawkins *is a musician/producer in Los Angeles County and the San Francisco Bay Area. You can check out his indie label at www.muzicali.com.*

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TL AUDIO

5051

A hybrid tube/solid-state, all-in-one voice processor.

By Rob Shrock

THE IVORY SERIES

In addition to the 5051 Mono Valve Voice Processor, TL Audio's Ivory Series currently consists of the 5001 4-Channel Tube Mic Preamp ($699), the 5013 2-Channel Valve Parametric EQ ($699), 5021 2-Channel Valve Compressor ($699), and the 5050 Mono Valve Mic Preamp and Compressor ($449). The components are similar throughout the Ivory Series, with the primary differences being in the configuration.

TL Audio is known for its professional yet affordable products. Its new Ivory Series line of processors consists of five separate units, each designed to serve as a front end for recording. Created mainly for tracking vocals, the 5051 Mono Valve Voice Processor incorporates a microphone preamp, compressor, 4-band equalizer, and expander/gate into a 2U rack-mountable unit. Utilizing a hybrid tube/solid-state design (a design that has become quite popular), the 5051 can maintain a clean and quiet signal path while introducing the effect of tube coloration into the source.

NEED A BOOST?

Although TL Audio calls the 5051 a "voice processor," they obviously had other applications in mind, as well. The front panel includes a handy, ¼-inch instrument-level input, while the rear panel has XLR and ¼-inch line-level inputs, as well as an XLR mic-level input. There are two input settings for mic-level sources (Mic+48V turns on the phantom power), a line input setting, and an instrument setting for the front-panel jack.

Switching between the inputs causes a loud pop, so care must be taken to lower the monitors and mute any headphone sends before using the switch. Also, when turning off the phantom power to change microphones, I found it best to switch to the line setting: switching to the nonpowered mic setting occasionally caused a continuous output of white noise that only went away by switching to the line or instrument settings.

The Input Gain knob controls the amount of tube coloration of the signal. A yellow Drive LED and red Peak LED illuminate appropriately as the input level is pushed higher. The 5051 has an Output Level control so that you can tweak the amount of saturation using the Input Gain, while maintaining command over the level going to your recorder. The 5051 is a mono device, with both an XLR and an unbalanced, ¼-inch output.

I liked the warm sound I heard when the yellow Drive LED was illuminated. The sound was noticeably thicker and had a slightly fuzzier quality. When signals get hot enough to illuminate the red Peak light, watch out. There's not much headroom left at this point before the signal breaks up in a nasty way. If you want maximum saturation, turn up the input pot until you get a few flashes of red, then back it down a hair. This should keep you in a comfortably "warm" spot, without risking unwanted peaks during a take.

With the push of another button, a mild highpass filter (-3 dB at 90 Hz, 12 dB per octave) allows you to roll off low-end rumble in the signal. I found this particular highpass filter to be less obtrusive than those on many other preamps I've used. In fact, when the filter was engaged, vocal signals actually felt fuller in the low end, without being rumbly.

GET A GRIP

Knowing that most vocals need a bit of squeezing on the way to a recorder, TL Audio included a compressor on the 5051 that is both versatile and easy to use. In addition to the standard threshold and ratio controls, a Gain Make-Up knob has been added to help compensate for level reductions during compression. Although the highest ratio available is 30:1, the 5051 didn't seem capable of true, brickwall limiting.

Similar in design to several vintage compressors, the attack and release times on the 5051 are limited to four possible presets, ranging from slow to fast. The attack times range from 0.5 ms to 40 ms, while release times range from 40 ms to 4 seconds. Although it's unclear what the two intermediate attack and release settings are, I still used them the most. These intermediate compression settings worked exceptionally well for vocals. I found that the compressor sounded best in the milder settings (for instance, tapering off the rough edges of a vocal track). But, if you're looking for serious, vintage smash, you may be better off using a dedicated compressor/limiter.

The 5051 Mono Valve Voice Processor is a hybrid tube/solid-state preamp that adds tube coloration to the signal while keeping a relatively clean signal path. Added features include a 4-band equalizer, a compressor, and an expander/gate.

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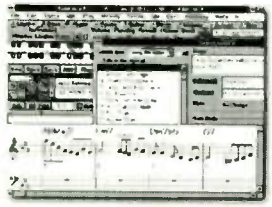

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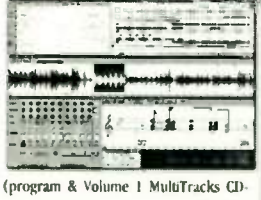

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5051 Specifications

Frequency Response	10 Hz–40 kHz
Noise	-80 dBu
Dynamic Range	106 dB (line input @ 0 dB gain)
Highpass Filter	-3 dB @ 90 Hz, 12 dB/octave
Phantom Power	+48V
VU Meter	switchable between input, output, output +10 dB, and gain reduction
Input Level	mic +48V, mic, line, or aux
Inputs	(1) XLR mic level; (1) XLR line level; (1) ¼" line level; (1) ¼" instrument level
Outputs	(1) balanced XLR; (1) ¼" unbalanced
Power Requirements	110–120V/60 Hz or 220–240V/50 Hz selectable
Dimensions	2U rack-mount x 7.9" (D)
Weight	5.51 lbs.

two 5051s can be used in tandem for stereo operation by connecting the Stereo Link jacks on the back of the two units with a cable and pressing the Link button on the front panels. This will link the control voltages of the machines so that both channels receive the same amount of gain reduction.

Because the 5051 has no light it to indicate when the threshold is crossed, you can switch the VU meter to G/R (gain reduction), set the ratio and envelope times, and visually adjust the threshold for the desired amount of compression. In addition, the VU meter can be set to read the input or output level.

Wedged in between the compression and equalization sections is an expander/gate, with only a threshold knob to control it. Perhaps due to the lack of envelope control, I could never find a setting that didn't chop off initial transients or the first part of a vocal breath. This left me feeling that the expander was an unnecessary add-on, and I ended up leaving the threshold off. Subsequent to my tests on this particular unit, however, TL Audio informed me that the response of the onset and release of the expander/gate has been smoothed out, which may make this feature more useful.

ALL THINGS BEING EQUALIZED

In keeping with the vintage vibe, the 5051 provides a parametric EQ with preset frequencies rather than continuously variable ones. I tend to like this method of equalization—especially when the settings have musically useful frequencies and bandwidth—because the settings are easily reproducible, and it gives the unit a reliable sonic character.

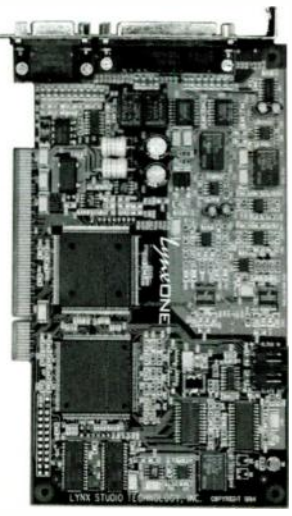
The 5051 has four bands of EQ: two shelving-type (low and high) and two midrange (see the table "5051 Processing Features"). Each band allows for a continuously variable cut and boost of 12 dB, although you have no control over the bandwidth. Interestingly, the EQ On/Off button is located not in the EQ section but under the VU meter along with the EQ Pre and Link buttons.

Overall, TL Audio has chosen good, useful frequencies and bandwidths for its EQ. The sound of the EQ is neutral and is at its best when minimal amounts of boost or cut are used. If you're hitting the compressor pretty hard, the EQ is good for restoring some of the lost high end.

One thing was immediately apparent with the 5051: it intensified nuances in the characters of each of my microphones. I have several mics that usually sound similar when plugged in to my various mic preamps. However, when patched into the 5051, I noticed great differences in overall response between these same mics. Oddly, some of my better mics didn't always sound so great, while a few of my cheaper mics sounded better than usual. If you're considering buying a 5051, be sure to audition it with your own microphones. It may not be the ideal

For manufacturer information, please see Contact Sheet, p. 163.

LynxONE



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5051 Processing Features

COMPRESSOR	
Threshold	-20 to +20 dBu
Attack	0.5–40 ms (4-position switch slow to fast)
Release	40–4 sec (4-position switch slow to fast)
Ratio	1.5:1 to 30:1 variable
Make-up Gain	0 to +20 dB
EQUALIZER	
Low Band	±12 dB shelving @ 60 Hz, 120 Hz, 250 Hz, or 500 Hz selectable
Low-mid Band	±12 dB peaking @ 250 Hz, 500 Hz, 1 kHz, or 2.2 kHz selectable
High-mid Band	±12 dB peaking @ 1.5 kHz, 2.2 kHz, 3.6 kHz, or 5 kHz selectable
High Band	±12 dB shelving @ 2.2 kHz, 5 kHz, 8 kHz, or 12 kHz selectable
EXPANDER/GATE	
Threshold	-20 dB to Off (variable)

preamp for all of your mics, but it might make some of them sound better than ever.

HEY, WHAT ABOUT THE BAND?

Not many people record only vocals, so I auditioned the 5051 with a few other instruments, as well. I tried trashing up some drum loops, but the 5051 is too mild a processor for creating big, distorted, industrial-type loops. However, I did manage to fatten up a few kick drums before resampling them.

I also tried the 5051 on an electric guitar running through a Boss GT-5 effects processor. The 5051 did an admirable job of fattening up the clean sounds. The best effects were created by altering the Drive amount at the input stage, with the EQ helping to further sculpt the tone. I didn't care for the compressor in this configuration, though.

IF THE SHOE FITS

The 5051 packs a lot of useful features into a single box, making it well suited for recording vocals or instruments direct to disk. As a preamp, the 5051 adds tube warmth, while giving you the choice of adding compression, EQ, and limited gating when needed. The compressor has switchable, preset attack and release times that seem optimized for vocal recording. The EQ section has preset frequencies that are musically useful, even though their bandwidths are fixed. Considering the 5051's tendency to enhance a microphone's characteristics, my suggestion would be to audition the unit using samples from your mic closet. Overall, the 5051 is well worth the money.

Composer and producer **Rob Shrock** *recently produced the Bacharach/David song "All Kinds of People" for Dionne Warwick's upcoming release. He is currently playing keyboards with Burt Bacharach and Elvis Costello, promoting their new album,* Painted from Memory.

TL AUDIO
5051 hybrid tube/solid-state mic preamp
$699

FEATURES ■■■■
EASE OF USE ■■■■
AUDIO QUALITY ■■■■
VALUE ■■■■
1 2 3 4 5

PROS: Affordable. Quality construction. Good compressor and EQ presets. Easy to reproduce settings. Front-panel instrument input.

CONS: Fixed EQ bandwidth. Minimal gate/expander control. Accentuates mic differences. Small VU meter.

CIRCLE #439 ON READER SERVICE CARD

Midi Quest v7.0 gives you complete control over all aspects your MIDI setup with unparallelled SysX editing and organizational tools. Midi Quest includes both 16 and 32-bit versions and supports Windows 95, 98, 3.1 and NT 4.0 and includes over 85 program enhancements. You can easily create new patches, multis, combinations, drum setups, etc. for each of your instruments or the computer can create them for you. The Midi Quest v7.0 CD even includes over 31,000 unique patches (no duplicates) to get you started.

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For complete online information on Midi Quest v7.0 and Sound Quest's other products, please visit our web site, send an email, or give us a call.

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CAKEWALK

In Concert 1.0 (Mac/Win)

Take the lead with your own virtual backup band.

By John T. Poultney

Performing in an ensemble can be a challenging and rewarding experience, but most of us don't have access to a backup band all the time—at least we didn't until now. Cakewalk's new interactive MIDI accompaniment program, *In Concert*, enables you to play keyboard parts with virtual musicians that follow your lead.

In Concert lets you play along with a MIDI file, which, of course, is no big deal by itself. What makes this program unique is the way that it adjusts its MIDI playback to accompany you. Aside from adapting to changes in tempo and Velocity, *In Concert* actually keeps track of where you are in the piece. If you play a passage and then decide to repeat it or skip to another one, you don't have to wait for the MIDI file to play through; *In Concert* will follow you, just like a well-trained backup band.

It's easy to see how useful such a program might be. For rehearsing, you can play a difficult passage over and over without stopping or shuttling around. In live performance, if the audience responds particularly well to a chorus, you can repeat it for best effect. You might say that *In Concert* makes you master of the machine, even though you still rely on it.

Keep in mind that *In Concert* is not an algorithmic composing program—it always uses an existing MIDI file for its accompaniments. What distinguishes this program is the way it turns the MIDI file into an active accompaniment that follows your playing.

FIG. 1: With *In Concert*, you decide which track to play; the program then adjusts its playback according to your performance. The Tapped Beats option lets you control playback tempo by tapping your keyboard or mouse.

If you're already a pretty good keyboardist, *In Concert* can make practicing less tedious, and it can make you less reliant on other musicians when you perform. On the other hand, if you're not much of a keyboardist, or if you don't thoroughly learn the ins and outs of the program, *In Concert* may confuse you by changing the background accompaniment and tempo willy-nilly in response to your playing.

FOLLOW THE LEADER

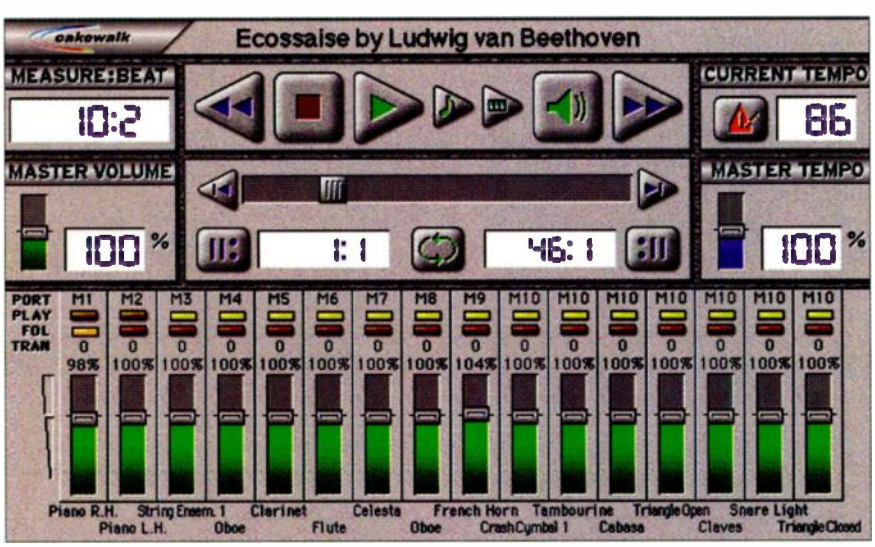
In Concert works with any Standard MIDI File and lets you select which of the tracks to play (one or two, for left- and right-hand keyboard parts). To set up a file, simply load it into the program, tell it which parts you'll be playing, and start making music. (Cakewalk has aimed the program primarily at keyboard players, but *In Concert* also works with other MIDI output devices, such as guitar or wind controllers.)

The main operating mode is called Play and Follow, which is pretty much what it does: you play, it follows. Conveniently, the software senses the instruments that are present in your MIDI file, and a simple pop-up menu allows you to easily choose which one to play. The Following dialog box (see **Fig. 1**) also lets you adjust the accompaniment sensitivity in terms of tempo and volume, so the background won't change too much if you don't want it to.

TAKE IT TO THE BRIDGE

In Concert allows you to start from anywhere within a piece. If you begin somewhere in the middle, though, you might need a couple of seconds to get yourself oriented. I was occasionally taken off guard when I was merely twiddling about, and the program's accompaniment suddenly started. Thankfully, you can turn this function off. If you do turn it off, however, you'll be forced to play the piece in its intended order. Despite the possible pitfalls, I liked being able to start anywhere within a piece. I could focus on one part for a long time and practice it repeatedly. That still meant a lot of starting and stopping, though, and if you're going to play a section over and over, you're probably better off using *In Concert*'s looping function.

In order to loop a selection, you simply set the start and end points as the piece is playing. You can also set up a short pause between loops, which



***In Concert*'s main window offers controls for setting track volume, current location, and looping. A dedicated Play Performance button in the transport section plays back your most recent performance.**

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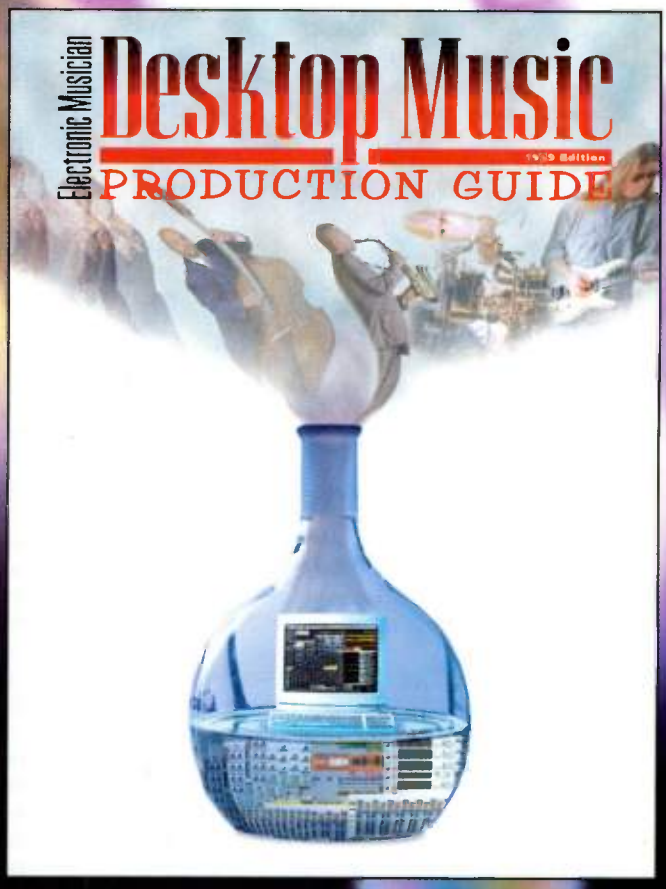

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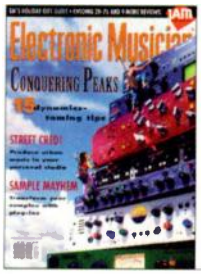

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Conquering Peaks
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Urban Players
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comes in quite handy at times. After all, if you're working on a challenging passage, it can be nice to get a short break to collect your thoughts before diving in again.

Aside from looping, the software also lets you jump to a specific point by entering that measure in a dialog box. It keeps track of the last four points that you've started from, so navigating a piece is quick and easy.

Despite *In Concert*'s extensive looping capabilities, the auto-accompaniment functions are what make the program so innovative. The further you delve into the program, the more functions you find. For example, the Wait for Soloist marker lets you play along normally, and when you're ready for the solo section, the program waits for your opening notes before continuing. In other words, the file vamps until you're ready. That's pretty nifty. It's easy to imagine how this could be worked into a show. Typically, a song (especially in popular genres) builds as it approaches the solo; with *In Concert* you can keep doing your James Brown footwork or your dedications until the proper time arrives.

HIT IT AND QUIT IT

In Concert not only will wait for your solo but will stop playing when you do—if you tell it to, of course. This is called Automatic Stop, and you can adjust how many seconds the file will continue to play (after you stop playing) before it stops. It's best to experiment with this control a bit, so the playback won't stop too quickly if you happen to miss a couple of notes. That happened to me a lot at first, but setting the Automatic Stop value to four or five seconds solved the problem. It also let me stop playing wherever I wanted. Moreover, if you resume playing before your time limit is up (as set in the dialog box), the file continues playing as if nothing had happened.

Looping and Automatic Stop are great options, but *In Concert*'s ability to jump between passages is by far its coolest feature. Using the Following dialog box, you can turn that function off, then set it so you can either jump anywhere in the piece, or limit it to jumping only within one or two beats of your current location.

Say you're chugging along and you want to elongate a certain passage (maybe you're playing with a soloist who's doing a good job and you don't want to stop the magic). With the Jump Several Beats option checked, you can simply replay what you were just playing, and the software backs up a few seconds. This function also comes in handy for repeating difficult passages without the need for setting up a loop.

With the Jump Anywhere in Piece option selected, it was easy, perhaps a bit too easy, to jump hither and yon. And if you're the type of keyboardist who likes to interpret the music rather loosely in terms of pitches and timing, you might find yourself suddenly and unexpectedly transported to a whole different part of the song. Or if you throw in a little Leon Russell riffin', the software might interpret that as a directive to vary the tempo upward. That happened to me; at one point the tempo accelerated 58 percent from the speed at which I had begun playing.

MARKY MARK

To help you make the most of all its options, *In Concert* allows you to assign various markers to a song. Rehearsal Points, for example, are like bookmarks that you can assign anywhere in a piece. *In Concert* keeps a sequential list of these, and you can skip to any one by using the Jump Ahead or Jump Back transport controls.

Rehearsal Points are useful for getting around in a song, but they can be distracting if you have to take your hands off the keys to use them. Fortunately, *In Concert* lets you turn your MIDI keyboard into a remote controller for Rehearsal Points and other navigational functions. You can assign infrequently used notes (such as the very upper and lower keys) to do things like rewind, fast-forward, and jump to the next Rehearsal Point. You must be careful, though, about how you assign the keys; one false move during a live performance, and you could end up in an unexpected place.

In Concert
Minimum System Requirements
Mac: 1.5 MB RAM; System 7.1 or higher (7.1.2 or higher for Power Mac); CD-ROM drive
PC: 66 MHz 80486/DX2 CPU; 16 MB RAM; Windows 95/98; CD-ROM drive

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In Concert 1.0
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FEATURES
EASE OF USE
DOCUMENTATION
VALUE
1 2 3 4 5
PROS: Innovative way to rehearse music and "customize" a performance. Good looping functions. Responds to tempo and Velocity data. Allows jumping to anywhere in a piece. Records performances automatically.
CONS: Potentially confusing. Can radically alter construction and tempo of a piece without warning. Not effective for beginning keyboardists.
CIRCLE #440 ON READER SERVICE CARD
For manufacturer information, please see Contact Sheet, p. 163.

As I mentioned earlier, the Wait for Soloist marker instructs the software to vamp at a certain point until a solo begins. You can set as many of these markers as you like, and you can also combine them with the Ignore Soloist marker. The Ignore Soloist marker defines a set of measures in which the software ignores the soloist's input, so the other tracks don't change in response to his or her playing (see **Fig. 2**). That feature makes a lot of sense, especially for jazz, a genre in which you need a predictable set of changes to play against. After all, a solo is your spot to go nuts, and with this feature you can get crazy without fear of messing up the playback.

In a similar vein, the Restore Tempo marker allows you to assign a point at which playback reverts to the piece's original tempo, regardless of whether a ritard or other timing variation is currently in effect.

BONUS POINTS

An unexpected bonus that *In Concert* offers is the ability to save and play all of your passes. (In Play and Follow mode, the program is always automatically recording.) When you want to hear a performance, you can play it back exactly as you recorded it, or you can play it so that your track matches the backing tempo. You can even create a whole new Standard MIDI File with your new track in place of the original. I liked the last option a lot, because I could try out different melodies and save my improvisations along with the accompaniment. Moreover, if you want to conduct, you can do that, too. *In Concert* allows you to vary the playback tempo by simply tapping on your computer keyboard, MIDI keyboard, or mouse button.

▼

In Concert actually keeps track of where you are in the piece.

All things considered, *In Concert* is an impressive package. The dual-platform CD includes 40 MIDI files from beginning to advanced levels in a wide range of styles. The 165-page owner's manual is well written and covers both Mac and Windows computer platforms. A separate spiral-bound songbook provides the printed piano parts and a few lead sheets. Once you get the hang of the ins and outs of the program, *In Concert* can help improve your playing whether you're practicing, rehearsing for a performance, or just playing around.

As a rehearsal tool, it lets you repeat or skip passages according to your needs, and it provides a number of ways to navigate a piece on the fly. Performers can customize a song's structure, tempo, and dynamics to fit the gig, and to play the same piece in many different ways. As long as you can avoid jumping from place to place unnecessarily, you'll find *In Concert* a challenging musical partner. You may even decide that it's fun to have your own interactive virtual backup band. And you don't have to leave home to put on a show.

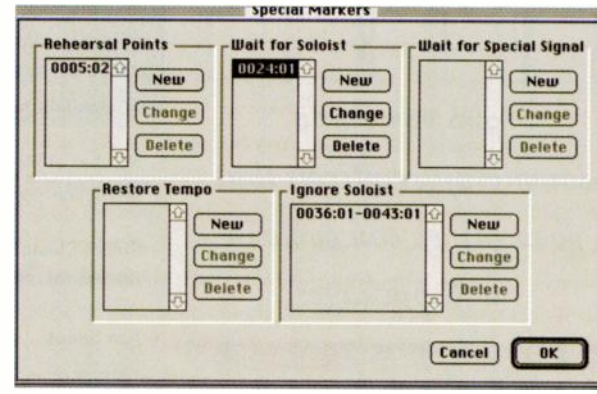

FIG. 2: The Special Markers dialog box lets you define areas in which something specific should happen. This can include such things as waiting for a soloist to start or ignoring a soloist's playing so that the accompaniment isn't altered in response.

John T. Poultney *is a San Francisco–based musician and writer whose migratory patterns range throughout the New World. Like a MIDI module, he is capable of making more than 256 distinct sounds.*

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SPIRIT

Folio Powerpad

Soundcraft reaffirms that good things can come in small packages.

By J.J. Jenkins

Who says bigger is better? Sure, big mixers are great sometimes: it does indeed impress when you wheel that 48-channel behemoth into your local club. But after the first gig—or the first visit to the chiropractor—it gets old fast. Small mixers are where it's at for live shows, and the Folio Powerpad from Spirit by Soundcraft is one of the smallest I've seen. It's actually kind of cute.

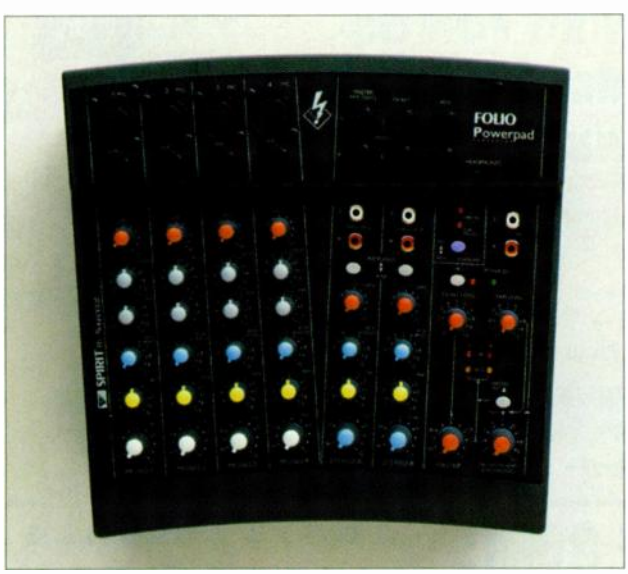
But don't let the size fool you; the Folio Powerpad is a versatile little tool that could satisfy many of your live needs. There are some great studio possibilities for this board, too, because it's quite a clean machine.

Folio Powerpad Specifications

Number of Mono/Stereo Channels	4/2
Mono Channel Inputs	(4) balanced, XLR, mic level; (4) balanced, ¼" TRS, line level
Stereo Channel Inputs	(2) stereo pairs, RCA unbalanced line
Additional Inputs	(2) RCA stereo tape in; (2) balanced, ¼" effects return
Aux Sends	(1) postfader, unbalanced, ¼"
Outputs	(2) unbalanced, ¼" powered main L/R; (2) impedance-balanced, ¼" TRS L/R master mix; (2) RCA monitor amp; (1) ¼" TRS impedance-balanced aux send; (1) stereo TRS, ¼" headphone
LED Indicators	(2) red, peak level; (2) yellow, average level; (1) red, thermal (amp); (1) red, LED clip protect (amp); (1) red, LED phantom power status; (1) green, power on
Amplifier Power	30W/side into 4Ω
Frequency Response	20 Hz–20 kHz (line in to master mix out, ±1 dB)
Crosstalk	fader cutoff: >90 dB aux send: >90 dB pan isolation: >75 dB
Noise	EIN (150Ω source): 128.5 dBu output: -84 dBu aux out: -80 dBu mix (masters at max): -80 dBu
THD	<0.005% (mic sens. -30 dBu, +14 dBu at output) Dimensions (at max.) 9.76" (W) x 9.33" (D) x 4" (H)
Weight	10 lbs.

THE ENGLISH CHANNELS

The Powerpad is essentially a powered version of the British manufacturer's Folio Notepad mixer. All ins and outs, except for the powered left and right outputs, are on the top of the board, where they are easily accessed. (The powered L/R outputs are on the rear.) You get four mono channels with simultaneously available balanced XLR mic and balanced ¼-inch line inputs; preamp gain pot; 2-band shelving EQ; postfader aux send; pan pot; and rotary level pot.



Spirit's Folio Powerpad powered mixer is extremely versatile thanks to its clean circuitry, small size, and well-thought-out features. It could find applications both live and in small, desktop studios.

The microphone preamps are surprisingly clean for a board that's under $400. In fact, they sound a lot like the mic preamps in the big Soundcraft board that I have in my home studio. The 2-band channel EQ is reminiscent of old hi-fi bass and treble controls in that the bandwidth is fairly broad.

Phantom power is globally switched, so it sends +48V down all four mic inputs. Keep that in mind if you are planning to use condenser and dynamic mics simultaneously. I would have preferred phantom switching on each input, but global phantom power seems to be the trend in small mixers.

In addition, there are two stereo channel strips with switchable RIAA inputs for feeding in a turntable; preamp gain; postfader aux send; balance pots; and level pots. With the RIAA circuit in the up position, you can feed your synth, CD, or cassette player into the phono jacks (see **Fig. 1**). Depress the RIAA switch, and presto: it's DJ time.

I think the RIAA circuit is a nifty feature, because I like being a DJ every now and then. However, the volume controls are rotary pots, so you lose the coolness factor that comes with regular faders. The RIAA input also comes in handy for multimedia gigs when only the sound on that old 45 will do. In fact, this facet of the board could be very useful in the studio all around.

The aux-send outputs and aux returns are on ¼-inch jacks. If you are using a mono effect, you can connect it to the left aux return, and the signal will be sent to both the left and right mix buses. An effects-return level pot controls the overall level in the mix.

For manufacturer information, please see Contact Sheet, p. 163.

A WEALTH OF PORTS

A stereo pair of Tape In RCA jacks brings the total number of inputs to twelve (four mono channels, two stereo-channel pairs, stereo aux returns, and Tape Ins)—a lot of entry points for such a small mixer. The Tape Ins are typically for stereo tape machines, DAT recorders, CD players, outputs of computer sound cards, or any other line-level stereo signal. They're useful for listening to playbacks of recording masters or for piping in preshow or presentation/walk-on music in a live situation. A rotary pot sets the playback level for these inputs.

The L/R Master Mix outputs are typically routed to a stereo mastering device, such as a DAT machine, so you can record the mix. If you need extra audio power at a live performance, these ¼-inch outputs can be connected to an additional amp and pair of speakers. A level pot for these outputs is provided. A Master Mix/Tape switch toggles your monitor between the master mix and the tape inputs.

The stereo headphone jack is somewhat inconveniently located at the top of the board, so make sure your headphone cable is long enough to drape around the sides so that it doesn't dangle over the mixing surface. You can use headphones of 200 ohms or higher impedance. When headphones are connected, the Monitor Amp output is muted to prevent feedback, and the same level pot controls both circuits.

Of course, there is a rotary Master level pot, which affects the rear-panel powered outputs.

YOU GOT THE POWER

Let's not forget the power amp. (This thing *is* called the Powerpad, isn't it?) It's amazing how small and clean (and the two have to go together, or else it doesn't count) amplifiers have gotten in recent years. It doesn't seem that long ago that I had to lug racks of gear up endless flights of stairs just to do the sound at some lecture on how to make it in the music industry. (Hey, at least I got paid.) At 30 watts per side into 4Ω, the Powerpad's amp is powerful enough to fill a small house just fine.

The amp is mounted on one circuit board and is fairly straightforward. The best thing about the amp is the built-in power supply, with a regular AC cable. Hooray! No wall wart!

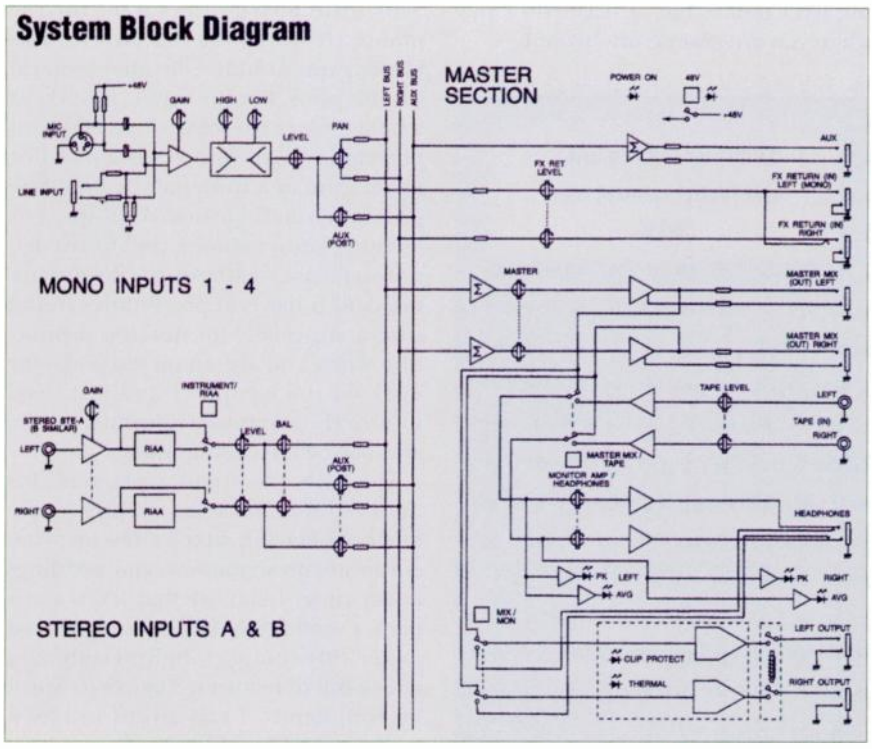


FIG. 1: This system block diagram shows several of the Powerpad's special features, including the switchable RIAA circuit (lower left) and various signal-routing alternatives. Note that if you plug into the left effects return but not the right, the left-channel signal goes to both buses (upper right).

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A Power Amp Mix/Mon switch on the front panel changes the input source to the amp. When the switch is up, Powerpad's amplifier derives its signal from the master mix; pushing the switch down sends the monitor/headphone signal to the amplifier. I'd like to see a bridged, 60W, mono output on the back for those instances when a mono house mix would make more sense.

Soundcraft has done a good job of providing thermal protection, which is very important for a powered board that could be used for long hours on outdoor gigs in the summer heat. A Thermal LED lights on the front panel to warn that the amplifier is overheating, and if the amplifier becomes too hot, it automatically cuts out. The fan accelerates when the heat sink gets hotter than 65 degrees centigrade (149 degrees Fahrenheit).

While we're on the subject of LEDs, the metering on this board is pretty minimal. Normal operating levels are indicated by a pair of yellow LEDs (one each for the left and right buses); red Peak LEDs light to warn that an overload is imminent. A single Clip Protect LED flashes to warn when either Powerpad amplifier input is overloaded because an input signal is too high. The metering isn't much, but at least you know when you are getting into trouble.

SPIRIT BY SOUNDCRAFT
Folio Powerpad powered mixer
$399.95

FEATURES ■■■■
EASE OF USE ■■■■■
AUDIO QUALITY ■■■■
VALUE ■■■■■
1 2 3 4 5

PROS: Portable. Small footprint. Good, clean audio quality. Power amp switchable between main and monitor outs. Mic and line inputs on all mono channels. Switchable RIAA circuit on stereo channels. Good thermal protection for power amp. Onboard power supply.

CONS: Limited 2-channel EQ. Phantom power is globally switched. No bridged mono mode. Headphone jack location is somewhat inconvenient.

CIRCLE #441 ON READER SERVICE CARD

OFF TO WORK WE GO

I checked out the Powerpad in a variety of situations and found it especially useful as a replacement for the rack-mount mixer and amp I've been using at a series of coffeehouse shows. Moving this 10-pound unit sure beats lugging that big rack around. For the times that I needed to fill larger venues, I used the built-in amp for the monitors and gave the house a stereo feed from the master mix out. That's one way to make sure that the balance in the house is what you want.

Portability is the operative word, as the molded plastic top piece that forms the mixing board surface also becomes a handle at the bottom of the board, making it easy to just pick up and go. The board has a relatively small footprint, which makes it easy to place on stage. Given the Powerpad's small size and light weight, I would love to have a mic-stand mount, so that the mixer could just sit in front of you at desk level while you're playing. Making adjustments on the fly would be fairly convenient this way. You definitely could not do this with a larger board.

THAT'S THE SPIRIT

This little board offers a lot for the money. If it had the features I'd like to add, you wouldn't be able to get it for this price. For live music, it works as a house mixer for solos, duos, and trios playing in small venues; as a monitor mixer; and as a submixer. It would be great for small keyboard setups. For lectures, presentations, and festive (or not-so-festive) gatherings, it's a natural. And it has real possibilities in the studio, especially for desktop production when you are doing most of your work on the computer and just need to mix the computer outputs, a mic, and maybe a sound module.

The Folio Powerpad works great for music shows, and it also shines for industrials. Having mixed a few lectures, corporate presentations, and weddings in my time, I can say that a few years back, I would have killed for a powered mixer this compact, light, clean, and chock-full-o'-features. Thanks to Spirit by Soundcraft, I can afford to buy it without shedding blood.

J. J. Jenkins *is an independent producer, engineer, and musician who lives on an island in the San Francisco Bay.*

MERGING TECHNOLOGIES

Audio Magic Ring 1.1 (Win)

Draggin' and droppin' from one format to another.

By Scott R. Garrigus

The great advantages of working with digital audio are at least partially offset by the unfortunate lack of standardization in file formats. For most desktop musicians, having to deal with myriad file types, resolutions, and sample rates has become an accepted way of life. Even so, processing multiple files can become an overwhelming task, especially when you're working with a large library of sounds.

Merging Technologies aims to solve that problem with an easy-to-use, high-end solution to your file conversion hassles. Its *Audio Magic Ring* software offers a specialized, customizable, drag-and-drop interface that is designed to simplify and speed up the task of converting and processing audio files directly from the Windows 95/NT desktop.

Audio Magic Ring 1.1
Minimum System Requirements
Pentium-based computer with Windows 95/NT 4.0

WHAT'S UP DOC?

Audio Magic Ring is confusing to use, mainly because there is no documentation to guide you. The program includes a "Getting Started" file in Microsoft *Word* format, but it provides a mere seven sentences of relevant information. A context-sensitive Help file provides a little more assistance, but only to the extent of providing brief descriptions of some of the program's features. Merging Technologies offers a little bit more information on *Audio Magic Ring* at its Web site.

To be fair, however, it should be mentioned that the program is sold primarily online as an electronic download (although you can also order a copy by phone from Merging Technologies). That explains the lack of printed documentation, but it doesn't excuse the absence of a more robust Help file or a more informative text file.

DRAG AND DROP

Another reason why you might find the program confusing initially is that it isn't a "regular" Windows 95 program; that is, unlike most other products, you don't access it from the Windows 95 Start menu. Instead, *Audio Magic Ring* is integrated into Windows 95 as a drag-and-drop application. The program is represented by an initial set of icons that are placed on the Windows 95 desktop; each icon has its own specific processing properties. Merging Technologies refers to these as separate Audio Magic Rings.

You simply select a file (or group of files) and drag it onto the appropriate Ring. The file is then processed according to that Ring's specific settings. In addition to individually selected files, you can drag and drop entire folders full of files. When you do that, all the files in the main folder are processed along with all the files in the subfolders. Processing is done in the background, so you can continue working in another application as your files are converted. This is a nice feature that can save you a lot of idle time. Once you get used to it, you'll find this approach much more elegant than having to deal with the usual dialog-box scenario that other programs of this type employ.

MAKING MAGIC

Aside from the initial set of icons that the program installs, you can create your own Audio Magic Rings, which you configure to your specific file-processing needs. You can have as many Rings as you want and place them anywhere within your system, not just on the Windows desktop.

You create a Ring by using the same method you would to create any type of new file in Windows 95: click the right mouse button and select New from the pop-up menu. In the submenu that opens, select Audio Magic Ring, and an icon called New Audio Magic Ring appears. You can then rename your Ring as you would any other file. It's a good idea to give a descriptive name that represents the new Ring's settings (such as "16-bit 44.1 WAV"), so you'll know how your files will be processed when you drag and drop them there.

Just naming the Ring won't change its settings, though. For that, you must click the Ring and select Properties from the pop-up menu. That displays a settings dialog box with three tabs: Target, Process, and Behavior, representing the processing preferences for that Ring (see **Fig. 1**). The Target section allows you to define the destination location and format of your processed files. You can have the program replace your original source files, save the new files to the same directory as your source files (but under a new name), or have the processed files placed in a different directory.

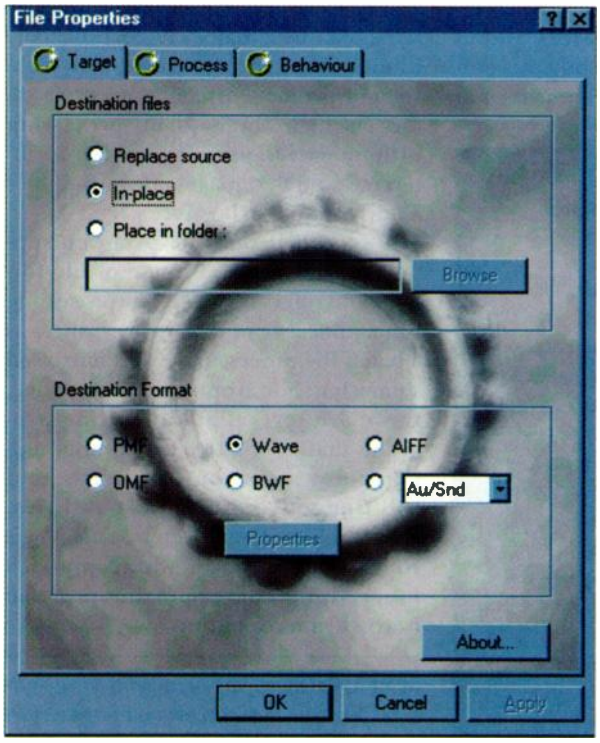


FIG. 1: Each *Audio Magic Ring* has a set of adjustable properties that allows you to define presets for a variety of file conversion scenarios.

The destination file format can be set to the typical WAV, AIFF, and AU/SND formats. Three other high-end formats are also available: PMF (Pyramix Media Format, for Merging Technologies' Pyramix Virtual Studio digital audio workstation), BWF (the European Broadcast Union's Broadcast Wave Format), and OMF (Open Media Framework format with support for versions 1.0 and 2.0). Unfortunately, some of the more popular multimedia formats, such as MPEG, RealAudio, and Microsoft *Netshow*'s ASF, are left out. These are essential for developers working on CD-ROM or Web-related projects. *Audio Magic Ring* also lacks support for compressed WAV formats such as ADPCM.

The Process section shows a list of available processing filters, which you can use to change various aspects of your audio files (see **Fig. 2**). The program includes three filters: the Wordlength (bit-depth) Converter, Samplerate Converter, and Normalizer. You can apply as many filters as you'd like (even multiples of the same one) and in any order, simply by highlighting an available filter and adding it to the selected-filters list. Each filter comes with its own set of properties. The Wordlength Converter lets you select different resolutions, including 8-, 16-, 18-, 20-, and 24-bit. You can also add dithering and noise shaping to the process.

The Samplerate Converter has several options (from 8 kHz to 96 kHz), but there is no user-defined setting box in which you can type in any value. The Normalizer allows you to normalize your processed files by setting a slider to a level from 0 to -12 dB. Other options include Group Normalize (for multitrack file processing) and DC Offset Removal.

Finally, the Behavior section of the dialog box lets you establish how the Ring will function during the processing procedure. You can have the settings dialog box appear at the start of each conversion so you can adjust the properties. You can also have the program notify you of any errors that occur during processing by showing the file list in progress, displaying an error warning, or keeping a log file.

TEST RESULTS

The converted files that *Audio Magic Ring* produces are of excellent quality. The program is clearly using some high-end algorithms. However, I also found a few quirks in the functioning of the program, and that sometimes made it difficult to work with.

One bug forces you to rename a newly created Ring, otherwise it won't save any changes that you make to its processing properties. Apparently, the selected-filters list just gets erased somehow. The way around this is to always rename every new Ring that you create, and to always do so before you make any properties changes.

You can drag and drop entire folders full of files.

Another bug that is a little more annoying is the program's inability to handle long folder names. Because it's a Windows 95–based application, it shouldn't have any problem in this area. However, when I tried to convert files that were located in a folder whose name had more than eight consecutive characters, I either got a strange error message, or the conversion process would go through the motions but the output files would only have their format changed—all other processing was left undone. Even more strange, this only happened some of the time; usually the program worked fine.

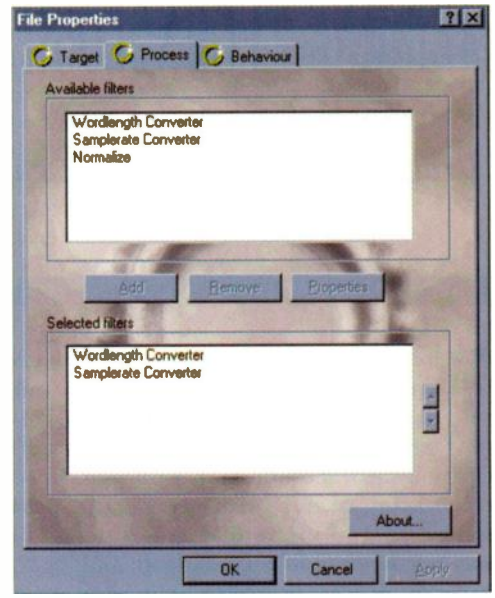


FIG. 2: The Process dialog box displays a list of plug-in filters for changing various aspects of an audio file.

END OF PROCESS

With the overwhelming number of audio file formats in current use, converting your sound library into the necessary format for a client's specific needs can be a major chore, especially when working on multimedia or Web-related projects. *Audio Magic Ring* offers excellent, high-quality processing with an easy-to-use, drag-and-drop interface, and that makes converting files a fairly simple procedure.

It's too bad that the program supports such a limited range of file formats and offers relatively few processing filters. Because of this, its usefulness as a batch file processing tool is narrowed somewhat. For around the same price, there are several audio editing programs that offer batch processing, support for a variety of file formats, and full-fledged editing capabilities. Nonetheless, if you prefer *Audio Magic Ring*'s simple drag-and-drop approach to speedy file conversion, this program is worth consideration.

Scott R. Garrigus *has been reviewing software for more than ten years and publishes his own online computer software publication called Comp-media. You can reach him via e-mail at scott@garrigus.com or via the Web at www.garrigus.com/scott.*

MERGING TECHNOLOGIES
Audio Magic Ring 1.1
audio file format conversion software
$99

FEATURES ■■■
EASE OF USE ■■■■
DOCUMENTATION ■
VALUE ■■■
1 2 3 4 5

PROS: Easy drag-and-drop file conversion. Multiple-file batch processing. High-end parameter support. Excellent processing algorithms. Works in the background.
CONS: Very poor documentation. Supports a limited number of file formats. Still a bit buggy.
CIRCLE #442 ON READER SERVICE CARD

For manufacturer information, please see Contact Sheet, p. 163.

QUICK PICKS

ZERO-G

Vocal XTC

By Jeff Obee

I was greeted by huge red lips on the cover of Zero-G's *Vocal XTC* ($99.95; audio CD), reminiscent of the Rolling Stones' logo. But these vocals are a far cry from Mick Jagger's; instead, they are in the R&B, dance, and gospel styles. This disc features a large variety of solo vocal riffs, harmony work, and more. If you enjoy using vocal samples, read on.

"Wooh Yeah," "Ooh Baby," "We're Gonna Bring the House Down"—vocal samples with soul are dished up on Zero-G's *Vocal XTC*.

Tell You All About It

Vocal XTC contains a bushel of single-singer phrases, both male and female, in various keys. The phrases, which are short bits of lyrics generally oriented toward the R&B and dance genres, could certainly be used in any way your creative mind can muster. There are phrases like "We Got It Goin' On," "Turn It Around Baby," "Yes, I Got the Notion"—you get the idea—as well as lots of "yeahs," "ooohs," and the like, sung with rich, bluesy inflections.

The vocal work is impressive here. The singers are top quality, and the harmonies are gorgeous. All the singers were recorded digitally to ADAT using Neumann U87s through a TL Audio CLC1 valve compressor. The audio quality is up to today's standards: clean and clear with no audible anomalies.

The Reality Gospel Choir dishes up some superb ensemble samples that I found especially pleasing. When I scanned the listings for any weird stuff—lo and behold—I found a bunch of effects-processed opera bits and multitap improvisations that sated my appetite for the unusual.

Sing It, Sistah

The disc gets really interesting when you enter the female harmony sections: the vocal sonorities work beautifully, and the performances are perfectly in tune. The female vocals blend superbly, particularly on the Female Chants by Sarah Carter. All the effects-infused vocals are female voices, and that area of the disc has some cool selections. These processed vocals are run through multitap delays, distortion, and vocoder-type programs. I found myself wanting more.

Some of the male vocalists weren't to my taste, but the harmonies by Simon Jinadu were very well done. The male singers do some scatting that is solid and competent and gives you a bit of jazz energy to sample. All told, though, the female voices were stronger.

Break It Down

The track indexing, unfortunately, did not leave me feeling "XTC." There are up to 32 samples per track, with very little time between each sample. The CD booklet indicates key and tempo for the samples but does not list their start times or duration, so cueing your CD player to capture a specific sample is a bit of a pain.

The phrases on each track are listed by their main lyrics; however, many of the samples begin with words that actually precede the main lyrics. This also makes it difficult to locate a particular sample.

Documentation aside, *Vocal XTC* is a well-produced collection that is priced reasonably in the range of most audio sampling CDs. If you are producing gospel, R&B, or dance music—or any related genres—this disc could serve you well.

Overall EM Rating (1 through 5): 3.5

CIRCLE #443 ON READER SERVICE CARD

NORTHSTAR

Graham Lear's Latin Rock Drumscapes

By Jeff Obee

It's hard to choose from the dozens of Latin drum and percussion sampling CDs on the market today. Among these, Northstar Productions' *Drumscapes,* vol. 3 ($89.95; audio CD), is a fine collection, brimming with burning grooves and quality kit and percussion samples.

The Whole Enchilada

Graham Lear's Latin Rock Drumscapes starts off with fifteen full-kit song tracks and several song snippets in different Latin styles, such as Latin rock, guajira, cha-cha, songo, and Mozambique. All samples are recorded in clear, high-quality stereo and sound great.

As you listen to the songs, you'll instantly recognize beats from some of Carlos Santana's recordings. No wonder—drummer Graham Lear has recorded and toured with Santana, as well as with numerous other well-known bands.

Each song has between four and fourteen sections, including count-ins, intros,

Northstar's latest *Drumscapes* CD, *Graham Lear's Latin Rock,* provides a heaping helping of well-recorded drum and percussion samples.

A and B sections, "re-intros," choruses, a bridge, and a fade-out. That's a healthy number of choices, which I appreciate. The grooves have an excellent feel, and they're professionally and authentically performed by Lear on kit, with world-class percussionist Orestes Vilato and others joining in on some tracks.

The songs have no breaks between the various sections, so you will need to perform some chopping and looping if you want to create longer tunes. However, Northstar thoughtfully assigned digital index numbers to each section; if your CD player can read them, this will simplify the chore of copying and pasting.

Tingling Timbales

The songs are followed by a legion of Latin drum and percussion samples. Nine pages of documentation list more than 700 sounds to choose from, with one track for each style category. Each of these tracks contains from 2 to 97 digitally indexed samples, with short pauses between each one. Three to five velocity levels are provided on most samples throughout the entire CD; this is the kind of forethought that I admire in a product.

A Pearl kit is featured first, and every aspect of the kit was painstakingly recorded. There are eleven snare samples, including five velocity levels, a short buzz roll, two crescendo buzz rolls, and three velocities of cross stick. The high, mid, and two floor toms precede twenty Zildjian hi-hat samples and numerous cymbals, including mallet rolls. Suffice to say, you won't be left wanting.

The remaining samples are percussion instruments. There is a seemingly endless array of percussion in the Latin idioms previously mentioned, and there is a small selection of loops after each section of individual samples. The variety here is impressive. If you want Latin percussion, your cup runneth over.

¿Que Pasa?

The thorough documentation clearly lists the style, track number, duration, and precise start time of the downbeat; the song listings include bpm, song section, and the number of bars (referred to as "beats"—a minor error). It is refreshing to encounter a sample CD that gives the user a lot of detailed information, including biographies of the players, the equipment used to record the samples, and even an "at a glance" track directory on the back of the booklet.

The producers' love of Latin music is evident on this edition of *Drumscapes*. I highly recommend this incredibly comprehensive collection of samples. The playing has great feeling, and the sound quality is superb. *¡Sabroso!*

Overall EM Rating (1 through 5): 4.5

CIRCLE #444 ON READER SERVICE CARD

KEYFAX

Twiddly Bits General Instruments, vol. 1 (Mac/Win)

By Jeff Obee

Do you find it difficult to reproduce horn parts, drum fills, or rhythm-guitar lines from a keyboard? Maybe you're too busy with your workload to input all of your parts and then tweak them to make them sound realistic. Perhaps you're simply experiencing a creative block with a certain piece of music. Who ya gonna call? Keyfax.

Bucket o' Bits

Twiddly Bits General Instruments, vol. 1 ($39.95; Mac/Win), is an assortment of Standard MIDI Files that comes on a floppy disk. Each file contains an unquantized sequence that was recorded by a musician on a MIDI instrument. These aren't your average players, either—for example, Bill Bruford played the drum sequences—so you get top-notch, realistic performances.

These versatile "Bits" consist of guitar, piano, percussion, woodwinds, organ, and string sequences. There are bass bends, slaps, licks, trills, riffs, and slides; brass riffs, falls, rises, stabs, swells, endings, and fast runs; drum rolls, hi-hats, flams, fills, tom fills, and patterns, and more.

Although the amount of material in each category isn't exhaustive (for example, there are a total of fourteen percussion patterns), what is here is well played and useful.

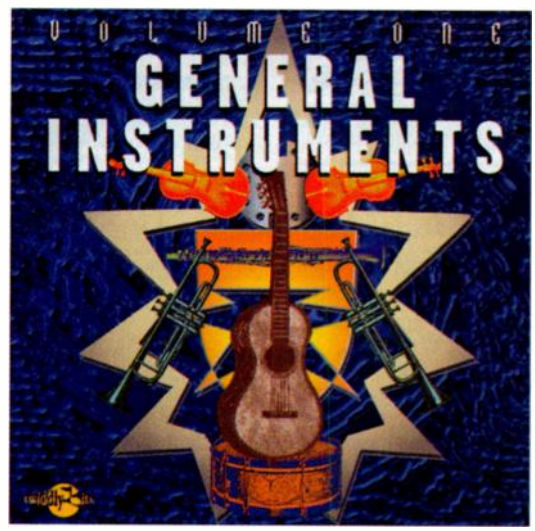
Just import the files into your sequencer, and then copy the tracks you want into a song. It's that simple. The SMFs are very flexible; you can tweak, dissect, and mutate to your heart's content. Go into the Event editor and change a few notes on a scale, or cut the scale in half and piece it together a different way.

Sound Bits

I auditioned each file and found all of them to sound realistic. Everything was professionally performed and convincing, from the brass licks to the piano riffs and chord vamps. I dug the detail in files like "woodwind tonguing," and the Program Change message at the beginning of the first track in each file was a nice touch. When I imported a brass SMF into my sequencer and played it, for instance, I automatically got a brass patch on my synth.

Creating a short composition quickly with *Twiddly Bits* is easy. I was able to put together a very pleasing bit of music in no time by exploring and importing assorted files from the GM section of the disk. The drum groove was musical, the brass crisp, the organ soulful, and the guitar strumming natural. Merging two piano riffs into one created a great lead-in to a verse.

One file I particularly like is Gate Effects. This replicates the often time-consuming task of gating a sound in step with the rhythm. Here, the Keyfax developers used Volume (CC 7) messages on every beat, then set them to high and low Velocity levels at different intervals to give a rhythmic gating effect. Another file that's pretty savvy enables keyboard Aftertouch on the Roland Sound Canvas.



The SMF performances on Keyfax's *Twiddly Bits General Instruments,* vol. 1, are top-notch and convincing.

Last Bits

This general volume was Keyfax's initial foray into the market when it was released four years ago. Since then, however, the company has released fourteen subsequent volumes in more specific idioms, such as jazz, funk, and country. *Twiddly Bits General Instruments,* vol. 1, has many practical applications,

For manufacturer information, please see Contact Sheet, p. 163.

and at such a reasonable price, you could add other volumes and build a sizable collection of *Twiddly Bits* for use on nearly any project.

Overall EM Rating (1 through 5): 4.5

CIRCLE #445 ON READER SERVICE CARD

DISCOVERY FIRM

Oriental Groove

By David Rubin

For most American musicians, capturing the sounds and styles of the Far East is like grappling with chopsticks for the first time. The instruments appear strange and exotic, and the playing styles often seem arcane. And yet the Far East, India, and the Middle East continue to provide fertile ground for cultivating new sounds and rhythmic patterns that can add spice to Western-style compositions.

To help you bridge the cultural gap, Discovery Firm has released *Oriental Groove* ($59.99), an audio CD providing loopable stereo phrases for use with samplers and digital audio software. The disc contains approximately 43 minutes of material divided among ten rhythmic "grooves." Unfortunately, the grooves are not named; they're simply labeled with the letters *A* through *J* and listed with tempos (from 116 to 136 bpm). Moreover, the only documentation included with the disc is a list of tracks without timings.

Groovin' Around

As with many rhythm-oriented sampling CDs, the ten "full production" grooves are followed by the same phrases played on individual instruments or smaller combinations of instruments. (Altogether, you get 90 individual tracks.) That makes these phrases quite useful in a variety of situations.

I often find that it's hard to capture the right feel when composing in Asian styles. With *Oriental Groove,* I can use just the backing rhythm or accompaniment parts without the lead instrument, which allows me to capture the proper feel while still supplying my own solos. Furthermore, these grooves are no 4-measure snippets: they're full-length rhythm sections that last around 30 seconds each. That makes them ideal for commercials, film cues, and multimedia spots, because you can play them straight through without having obviously short loop sections. As they play, the grooves evolve nicely; some change textures, most incorporate subtle variations in rhythm and syncopation.

Discovery Firm's *Oriental Groove* effectively blends modern dance rhythms with traditional Eastern sounds.

Exotic Sounds

Oriental Groove is the creation of recording artist Susumu Ueda, who also produced the music for the Nagano Olympics. He combines traditional Japanese, Chinese, and Indian instruments with an array of high-tech hardware and software to produce grooves that effectively blend modern dance rhythms with traditional Eastern sounds.

Ueda sampled and edited individual notes, riffs, and phrases using a Power Mac, MOTU *Digital Performer,* BIAS *Peak,* a Digidesign Audiomedia card, Akai DR-8, Akai and Kurzweil samplers, and a long list of other hardware. He then recombined those elements into new, modern-sounding grooves that retain much of the character of the original music.

The first eight grooves are clearly based on Japanese musical styles inspired by such traditional Japanese forms as Kabuki, Noh, and Matsuri. The complement of instruments includes shakuhachi and other Japanese wood flutes, koto, taiko drums, tsuzumi, simedaiko, okedou, hyousigi, and shamisen. In the ninth groove, Ueda combines large gamelan bells with tabla and oud to produce a lush yet rhythmic track with a decidedly Middle Eastern character. I felt that the oud had a bit too much reverb, but that's really nit-picking. Overall, the recording, mixing, and performances on this CD are quite good.

The final groove combines gamelan bells with tabla and tambura for an evocative, Indian-style background. The disc wraps up with a few short samples of shakuhachi motifs; koto strums, flourishes, and arpeggios; and a couple of classic shamisen sounds.

West Meets East

Oriental Groove does a fine job of capturing the essential qualities of Eastern music and combining them in up-to-date patterns, which blend with a variety of other modern styles. Some phrases, for example, could work well as underscoring for industrial films; others would feel right at home in a New Age setting. Several phrases, although undeniably Japanese in style, have rhythmic patterns that are reminiscent of the forward and reverse clave patterns in Latin music.

The CD offers many possibilities. Whether you're writing dance music or scoring videos, *Oriental Groove* provides fresh and exotic material for building your tracks and challenging your imagination. ❁

Overall EM Rating (1 through 5): 4

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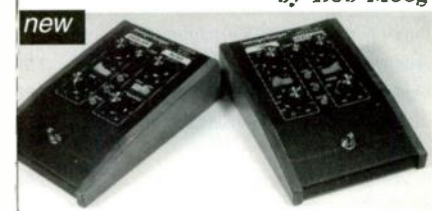

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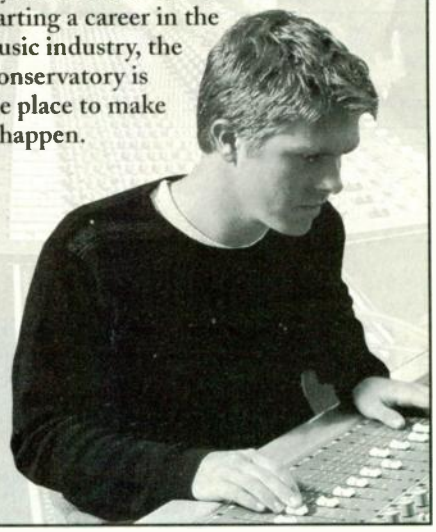

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DIGITAL MIXERS

MACKIE

Digital 8 Bus Mixing Console

New

Well, it's finally here and just like the analog 8 bus a few years back, it's everything you've anticipated! Great sound quality, full recording and mixdown capabilities, motorized faders and an array of digital features geared to take you flying into the next century.

FEATURES-
- 48 channels of automated compression, gating, EQ and delay
- Built in 3-way meter display keeps you on top of your mix.
- Built-in meter bridge,
- Ultramix II automation for complete control, hook up an S-VGA monitor and you'll feel like you spent a lot more money.
- All functions can be automated, not just levels and mutes. Store EQ, reverb, compression, gating and even Aux send information.
- Fast SCENE automation allows you to change parameter snapshots on every beat.
- Reads Standard MIDI tempo maps, displaying clock info on the built-in position counter.
- Truly the cutting edge of mixing technology.

Panasonic

WR-DA7 Digital Mixing Console

New

Stop dreaming about your digital future, it's here! The Panasonic WR-DA7 digital mixer features 32-bit internal processing combined with 24-bit A/D and D/A converters as well as moving faders, instant recall, surround sound capabilities, and much more. Best of all, it's from Panasonic.

FEATURES-
- 32 Inputs/6 AUX send/returns
- 24-bit converters
- Large backlit LCD screen displays EQ, bus and aux assignments, and dynamic/delay settings.
- 4-band parametric EQ
- Choice of Gate/Compressor/Limiter or Expander on each channel
- 5.1 channel surround sound in three modes on the bus outputs
- Output MMC
- Optional MIDI joystick

TASCAM

TMD1000 Digital Mixing Console

New

You want to see what all the digital mixing buzz is about? The NEW TMD100 from Tascam will have you smilin' & automatin' in no time. It features fully automated EQ, levels, muting, panning and more in an attractive digital board with an analog 'feel'. Your digital future never looked, or sounded, so clear.

FEATURES-
- 4 XLR mic inputs, 8 1/4" balanced TRS inputs.
- 20-bit A/D D/A conversion, 64x oversampling on input, 128x on output.
- Store all settings, fully MIDI compatible.
- Optional **IF-TD1000** adds another 8 channels of TDIF and a 2-channel sample rate converter.
- Optional **FX-1000** Fx board adds another 4 dynamic processors and another pair of stereo effects.

MIC PREAMPS

Focusrite

Green 3 "Voicebox MKII"

New

The Voicebox MKII provides a signal path of exceptional clarity and smoothness for mic recording, combining an ultra-high quality mic amp, an all new Focusrite EQ section optimized for voice, and full Focusrite dynamics. The new MKII now includes a line input for recording and mixdown applications.

FEATURES-
- Same mic pre section as found on the Green Dual Mic Pre includes +48V phantom power, phase reverse, and a 75Hz high-pass filter. Mute control and a true-VU response LED bargraph are also provided
- EQ section includes a mid parametric band with frequency and gain control as well as a gentle bell shape to bring out the character of the voice.
- Dynamics section offers important voice processing functions of compression and de-essing combined with a noise reducing expander
- Single balanced Class A VCA delivers low distortion and a S/N ratio as low as -96dBu

EFFECTS PROCESSING

t.c. electronic
ULTIMATE SOUND MACHINES

Finalizer Plus

New

Improving on the multi-award winning Finalizer platform, The Finalizer Plus delivers an unprecedented level of clarity, warmth and punch to your mix. Inserted between the stereo output of your mixer or workstation and your master recording media, the Finalizer Plus dramatically rounds out your material, creating that "radio ready" sound.

FEATURES–
- Balanced Analog as well as Digital outputs including AES/EBU, S/PDIF, & TOS
- 24-bit precision A/D & D/A Converters
- 5-band 24-bit stereo EQ
- Enhance - De-essing, stereo adjust or digital radiance
- Real-time gain maximizer
- Variable slope multi-band expander
- Multi-band compressor
- Word Clock Sync
- MIDI section useful for controlling sequencer fades or any of the Finalizer's parameters from a remote MIDI controller.

lexicon

PCM81 Multi-Effects Processor

New

The PCM-81 has everything that made the PCM80 the too choice among studio effects processors, and more. More effects, more algorithms, longer delay and full AES/EBU I/O.

FEATURES–
- 300 Presets include pitch, reverb, ambience, sophisticated modulators, 20 second stereo delays, and dynamic spatialization effects for 2-channel or surround sound applications
- 2 digital processors including Lexicon's Lexchip for the reverb and a second DSP engine for the other effects.
- 24-bit internal processing
- Dynamic patching matrix for maximum effects control.
- PCM card slot

EQUALIZERS

Focusrite

Green 2 "Focus EQ"

New

The Green 2 Focus EQ is suitable for a variety of applications combining a Focusrite equalizer section with a multi-source input section. Use it as a high-quality front end for recording applications or patch it into the send/return loop to upgrade a single channel of console eq, either way, it sounds great.

FEATURES-
- XLR & 1/4" inputs are similar to the Dual Mic Pre but have been adapted to cope with a wider range of levels.
- VU metering via a 10-LED bargraph
- EQ section derived from the Red and Blue range processors for superb audio quality.

COMPRESSORS

JOE MEEK

VC1 Studio Channel

got meek?

The Joe Meek Studio Channel offers three pieces of studio gear in one. It features an excellent transformer coupled mic preamp, a great compressor and an enhancer unit all in a 2U rackmount design. Find out why more and more studio owners can live without one.

FEATURES-
- 48V phantom power, Fully balanced operation
- Mic/Line input switch
- Mono photo-optical compressor
- High pass filter for large diaphragm mics
- Extra XLR input on front makes for easy patching
- Compression In/Out and VU/compression meter switches
- Twin balanced XLR outputs with one DI XLR output for stage use
- Enhancer In/Out switch and enhance indicator
- Internal power supply 115/230V AC

dbx

Blue Series 160S Stereo Compressor

The dbx 160S combines the best features of all the great dbx compressors in a well-built unit where the craftsmanship is as stunning as the engineering is innovative. This is truly a desirable compressor.

FEATURES-
- 127dB dynamic range • Program dependent "Auto", or fully variable attack and release
- Hard knee/OverEasy switchable.

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HARD DISK RECORDERS

Roland VS1680 Digital Production Studio

New

The new VS-1680 Digital Studio Workstation is a complete 16 track, 24-bit recording, editing, mixing and effects processing system in a compact tabletop workstation. With its advanced features, amazing sound quality and intuitive new user interface, the VS-1680 can satisfy your *wanderlust*.

FEATURES–

- 16 tracks of hard disk recording, 256 virtual tracks.
- 24-bit MT Pro Recording Mode for massive headroom and dynamic range.
- Large 320 x 240 dot graphic LCD provides simultaneous level meters, playlist, EQ curves, EFX settings, waveforms and more.
- 20-bit A/D D/A converters
- 2 optional 24-bit stereo effects processors (VS8F-2) provide up to 8 channels of independent effects processing.
- 12 audio outs: 8x RCA, 2x stereo digital & phones.
- New EZ routing function allows users to create and save various recording, mixing, track bouncing, and other comprehensive mixer templates for instant recall.
- 10 audio inputs: 2 balanced XLR-type inputs w/ phantom power, 6 balanced 1/4" inputs, and 1 stereo digital input (optical/coaxial)
- Direct audio CD recording and data backup using optional VS-CDR-16 CD recorder.

KORG D8 Digital Recording Studio

New

The new D8 Digital Recording Studio features an 8-track recorder, a 12-channel mixer, onboard effects, and basically everything else you'll need to record and mix your music, you supply the talent.

FEATURES–

- 8-track recorder, 12-channel mixer.
- 1.4GB hard disk for up to 4.5 hours of recording on a single track.
- High and low EQ on each channel.
- 130 high-quality stereo digital effects for complete recording in the digital domain.
- MIDI clock sync, SCSI port and S/PDIF digital interfaces all standard.

DIGITAL MULTI-TRACK RECORDERS

TASCAM DA-98 Digital Audio Recorder

The DA-98 takes all the advantages offered by the DTRS format and significantly ups the ante for the professional and post-production professional alike. With enhanced A/D and D/A convertors, a comprehensive LCD display and full compatibility with the DA-88 and DA-38, the DA-98 delivers the absolute best in digital multitrack functionality.

FEATURES–

- Confidence monitoring for playback and metering
- Individual input monitor select switch facilitates easier checking of Source/Tape levels
- Switchable reference levels for integration into a variety of recording environments with internal tone generator
- Digital track copy/electronic patch bay functionality
- Comprehensive LCD display for easy system navigation
- Dedicated function/numeric keys make operation easier
- Built-in sync with support for MMC and Sony P2
- D-sub connector (37-pin) for parallel interface with external controller
- Optional RM-98 rack-mount ear for use with Accuride 200 system

DA-88 A standard digital multitrack for post-production and winner of the Emmy award for technical excellence, the DA-88 delivers the best of Tascam's Hi-8 digital format. Its Shuttle/Jog wheel and track delay function allow for precise cueing and synchronization and the modular design allows for easy servicing and performance enhancements with third-party options.

DA-38 The DA-38 was designed for musicians. Using the same Hi-8 format as the highly acclaimed DA-88, the DA-38 is an 8 track modular design that sounds great. It features an extremely fast transport, compatibility with Hi-8 tapes recorded on other machines, rugged construction, ergonomic design and sync compatibility with DA-88s.

ALESIS ADAT XT20 Digital Audio Recorder

New

The New ADAT-XT20 provides a new standard in audio quality for affordable professional recorders while remaining completely compatible with over 100,000 ADATs in use worldwide. The XT20 uses the latest ultra-high fidelity 20-bit oversampling digital converters for sonic excellence, it could change the world.

FEATURES–

- 10-point autolocate system
- Dynamic Braking software lets the transport quickly wind to locate points while gently treating the tape.
- Remote control
- Servo-balanced 56-pin ELCO connector
- Built-in electronic patchbay
- Copy/paste digital edits between machines or even within a single unit. Track Copy feature makes a digital clone of any track (or group of tracks) and copies it to any other track (or group) on the same recorder.

CD RECORDERS

HHB CDR-800 Compact Disc Recorder

The new CDR-800 Compact Disc Recorder from HHB is built rock-steady for the best recording on this widely accepted format. You can record direct from either analog or digital sources and it comes loaded with features, making it ideal for professional studios looking to output quality CDs.

FEATURES–

- Built-in Sample rate converter
- Analog and digital inputs and outputs
- 1-bit A/D converters for lowest possible distortion
- Synchronized recording and editing
- Digital fader for natural fade-in and fade-out.

STUDIO DAT-RECORDERS

Panasonic SV-3800 & SV-4100

The SV-3800 & SV-4100 feature highly accurate and reliable transport mechanisms with search speeds of up to 400X normal. Both use 20-bit D/A converters to satisfy even the highest professional expectations. The **SV-4100** adds features such as instant start, program & cue assignment, enhanced system diagnostics, multiple digital interfaces and more. Panasonic DATs are found in studios throughout the world and are widely recognized as the most reliable DAT machines available on the market today.

FEATURES–

- 64x Oversampling A/D converter for outstanding phase characteristics
- Search by start ID or program number
- Single program play, handy for post.
- Adjustable analog input attenuation, +4/-10dBu
- L/R independent record levels
- Front panel hour meter display
- 8-pin parallel remote terminal
- 250x normal speed search

TASCAM DA-30MKII

A great sounding DAT, the DA-30MKII is a standard mastering deck used in post-production houses around the world. Among many other pro features, its DATA/SHUTTLE wheel allows for high-speed cueing, quick program entry and fast locating.

FEATURES–

- Multiple sampling rates (48, 44.1, and 32kHz).
- Extended (4-hour) play at 32kHz.
- Digital I/O featuring both AES/EBU and S/PDIF.
- XLR balanced and RCA unbalanced connections.
- Full function wireless remote.
- Variable speed shuttle wheel.
- SCMS-free recording with selectable ID.
- Parallel port for control I/O from external equipment.

Fostex D-15

The new Fostex D-15 features built in 8Mbit of RAM for instant start and scrubbing as well as a host of new features aimed at audio post production and recording studio environments. Optional expansion boards can be added to include SMPTE and RS-422 compatibility, allowing the D-15 to grow as you do.

FEATURES–

- Hold the peak reading on the digital bargraphs with a choice of 5 different settings
- Set cue levels and cue times
- Supports all frame rates including 30df
- Newly designed, 4-motor transport is faster and more efficient (120 minute tape shuttles in about 60 sec.)
- Parallel interface • Front panel trim pots in addition to the level inputs

D-15TC & D-15TCR

The D-15TC comes with the addition of optional chase and sync capability installed. It also includes timecode reading and output. The D-15TCR comes with the further addition of an optional RS-422 port installed, adding timecode and serial control (Sony protocol except vari-speed)

SONY PCM-R500

Incorporating Sony's legendary high-reliability 4D.D. Mechanism, the PCM-R500 sets a new standard for professional DAT recorders. The Jog/Shuttle wheel offers outstanding operational ease while extensive interface options and multiple menu modes meet a wide range of application needs.

FEATURES–

- Set-up menu for preference selection. Use this menu for setting ID5, level sync threshold, date & more. Also selects error indicator.
- Includes 8-pin parallel & wireless remote controls
- SBM recording for improved S/N *(Sounds like 20bit)*
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8x8 Mac/PC MIDI Interface

The MTP AV takes the world renowned MTP II and adds synchronization that you really need like video genlock, ADAT sync, word clock sync, and even Digidesign superclock!

FEATURES–
- Same unit works on both Mac & PC platforms
- 8x8 MIDI merge matrix, 128 MIDI channels
- Fully programmable from the front panel
- 128 scene, battery-backed memory
- Fast 1x mode for high-speed MIDI data transfer

Digital Time Piece™
Digital Interface

Think of it as the digital synchronization hub for your recording studio. The Digital Timepiece provides stable, centralized sync for most analog, digital audio, and video equipment. Lock together ADATs, DA-88's, ProTools, word clock, S/PDIF, video, SMPTE, and MMC computers and devices flawlessly. It ships with "Clockworks" software which gives you access to its many advanced features and remote control of some equipment settings such as record arm.

OPCODE

Studio 64XTC
Mac/PC MIDI Interface

The Studio 64XTC takes the assorted, individual pieces of your studio-your computer, MIDI devices, digital and analog multitracks and even pro video decks, and puts them all in sync.

FEATURES–
- 4 in / 4 Out, 64 channel MIDI/SMPTE interface/patch-bay with powerful multitrack & video sync features
- ADAT sync with MIDI machine control
- Simultaneous wordclock and Superclock output, 44.1kHz or 48kHz for perfect sync with ADAT, DA-88 and ProTools
- Video and Blackburst in (NTSC and PAL)
- Cross-platform Mac and Windows compatibility

SAMPLING

AKAI
S-Series
Rack Mount Samplers

Starting with 64X oversampling, Akai's S-Series Samplers use 28-bit internal processing to preserve every nuance of your sound and the outputs are 18- and 20-bit to ensure reproduction of your sounds entire dynamic range. These three new samplers add powerful capabilities, ease-of-use, expandability and affordability to set the standard for professional samplers.

KEYBOARDS & SOUND MODULES

Roland®

XP60 & XP80 Music Workstations

The XP-80 delivers everything you've ever wanted in a music workstation. An unprecedented collection of carefully integrated features provide instant response, maximum realtime control and incredible user expandability. The XP-80 features a pro-quality 76-note weighted action keyboard while the NEW XP-60 features the same sound engine in a 61-note keyboard.

XP80 FEATURES–
- 64-voice polyphony and 16-part multitimbral capability
- 16 Mbytes of internal waveform memory; 80Mbytes when fully expanded (16-bit linear format)
- 16-track MRC-pro sequencer with direct from disk playback. Sequencer holds approx. 60,000 notes
- New sequencer functions like "non-stop" loop recording and refined Groove Quantize template
- Enhanced realtime performance capability with advanced Arpeggiator including MIDI sync and guitar strum mode and Realtime Phrase Sequence (RPS) for on-the-fly triggering of patterns
- 40 insert effects in addition to reverb and chorus
- 2 pairs of independent stereo outputs; click output jack with volume knob
- Large backlit LCD display

SR-JV80 Series Expansion Boards

New

Roland's SR-JV80-Series wave expansion boards provide JV and XP instrument owners a great-sounding, cost-effective way to customize their instruments. Each board holds approx. 8Mb of entirely new waveforms, ready to be played or programmed as you desire.

Boards Include–
Pop, Orchestral, Piano, Vintage Synths, World, Super Sound Set, Keys of the 60's & 70's, Session, Bass & Drums, Techno & Hip-Hop Collection.

KURZWEIL
K2500 Series Music Workstations

The K2500 series from Kurzweil utilizes the acclaimed V.A.S.T. technology for top-quality professional sound. Available in Rack mount, 76-key, and 88 weighted key keyboard configurations, these keyboards combine ROM based samples, on-board effects, V.A.S.T. synthesis technology and full sampling capabilities on some units.

FEATURES–
- True 48-voice polyphony
- Fluorescent 64 x 240 backlit display
- Up to 128MB sample memory
- Full MIDI controller capabilities
- 32-track sequencer
- Sampling option available
- Dual SCSI ports
- DMTi Digital Multitrack interface option for data format and sample rate conversion (Interfaces with ADATs or DA-88s)

KORG

Trinity Series Music Workstations DRS

Korg's Trinity Series represents a breakthrough in sound synthesis and an incredible user interface. It's touch-screen display is like nothing else in the industry, allowing you to select and program patches with the touch of a finger. The 24MB of internal ROM are sampled using ACCESS which fully digitizes sound production from source to filter to effects. Korg's DSP based Multi Oscillator Synthesis System (MOSS) is capable of reproducing 5 different synthesis methods like Analog synthesis, Physical Modeling, and variable Phase Modulation (VPM).

FEATURES–
- 16 track, 80,00 note MIDI sequencer
- Flexible, assignable controllers
- **DRS (Digital Recording System)** features a hard disk recorder and various digital interfaces for networking a digital recording system configured with ADAT, DAT recorder and hard disk.
- 256 programs, 256 combinations
- Reads KORG sample DATA library and AKAI sample library using optional 8MB Flash ROM board

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TRINITY — *61-key*

**(Digital I/F, SCSI, Hard Disk Recorder, and sample Playback/Flash ROM functions are supplied by optional upgrade boards)*

MONITORS

Hafler

TRM-8

Winner of Pro Audio Review's PAR Excellence Award in 1997, Hafler's TRM8s provide sonic clarity previously found only in much more expensive speakers. They feature built-in power, an active crossover, and Hafler's patented Trans•nova power amp circuitry.
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HR824

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TANNOY

Reveal

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The latest playback monitor from Tannoy, the Reveal has an extremely detailed, dynamic sound with a wide, flat frequency response.

FEATURES-
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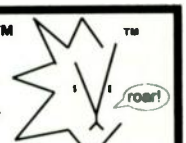

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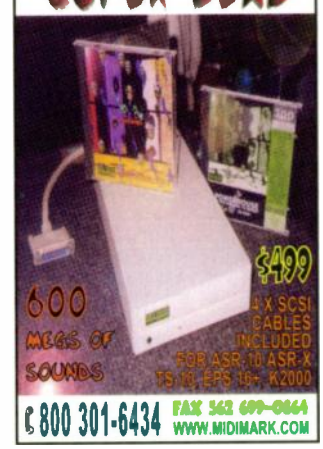

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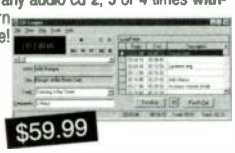

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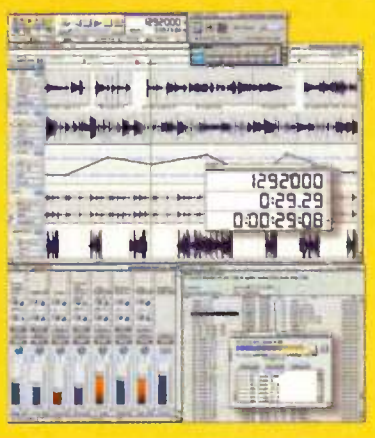

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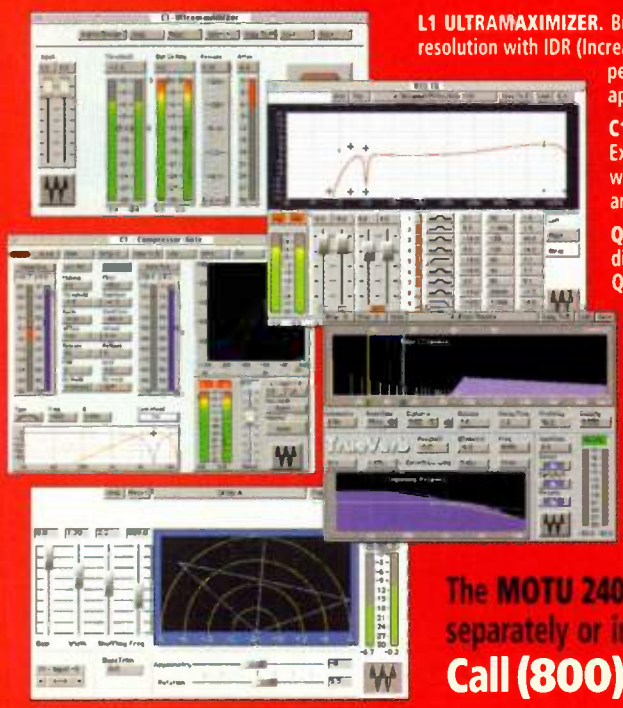

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FINAL MIX

By Larry the O

Everything's Under Control

Digital mixing makes me happy. Sure, nothing sounds as sweet as a nice, old Trident or Neve console, but I haven't the space, money, or maintenance facilities to deal with one of those beasts. On the other hand, the new breed of digital mixers offers pristine sonics, extensive features, and automation—all at a price I can look at without my blood draining to my feet. Modern DAWs offer real-time automation, EQ, dynamics, and other signal processing. The world is a beautiful place.

That is not to say that it's a simple place. I find all the options to be confusing and often am left feeling (I am risking rotten tomatoes here) mixed up. Can I meet all my mixing needs in a DAW alone? If not, how extensive an outboard mixer do I need? Once I have an outboard mixer, which automation should I use: the DAW's or the mixer's? What about the card approach, like Yamaha's DSP Factory? That's a lot of mixing power *and* a DAW rolled into one affordable card.

There is, of course, no single right answer; there are many right answers, and a number of wrong ones, too. As always, you must analyze your own needs and resources, and use patterns to decide which way to go; here, however, are a few thoughts I found helpful.

Mixers are very complex pieces of equipment, but their most important functions break down to these: input/output, routing and combining, signal processing, monitoring and communications, and, most important, *tactile control*. The emphasis placed on this last function is deliberate and significant. Tactile control is so important that an entire genre of products has grown up to meet that need alone. From JLCooper and Peavey MIDI fader boxes to Mackie HUI, Digidesign ProControl, and the like, things you can touch and move are the kernel of the mixing process. This idea is the key to deciding on mixing equipment and procedures.

Consider the DSP Factory. It provides incredible functionality, but accessing it comfortably requires a control surface. Sure, you can use a mouse or trackball, but any serious number of mixing hours makes the necessity of faders and knobs abundantly clear.

Similarly, your total purchase price for a card and HUI-type control surface is close to that of a stand-alone digital mixer (more, in fact, than some digital mixers). The system might be a great value, but that extra cost could be a rude surprise if you fail to factor it into your budget.

The question of automation comes under the same scrutiny. DAW breakpoint editing with a mouse can achieve precision and subtlety that is difficult to achieve with a fader, but it is slow and awkward and can be a repetitive-stress pain in the hand for general-purpose mix moves. That's a large reason that HUI and ProControl came into existence. But why should you have two control surfaces, one for your DAW and one on a digital mixer? The addition of preset HUI-like control capabilities between digital mixers and DAWs would make it nearly seamless to use the mixer and DAW automation in tandem.

There is no question that we are currently blessed with an embarrassment of riches in mixing. But purchase decisions can be bewildering unless you do your homework, and that starts at home. Take some time to sit down and just *think*, while not *doing* anything else. Visualize yourself mixing, and make notes (on paper or a computer, not just in your head) of the things you do a lot, the things you wish were easier to do, and the things for which you already have adequate tools. Armed with those notes, you will be pleasantly surprised how much easier it is to thread your way through the glorious maze.

Larry the O *is a musician, producer, engineer, and sound designer whose San Francisco–based company, Toys in the Attic, provides a variety of musical and audio services. He does not have a TV, VCR, cell phone, or Web page, but he holds the distinction of introducing the term* stud muffin *to audio writing.*

ILLUSTRATION BY STEVE CURL

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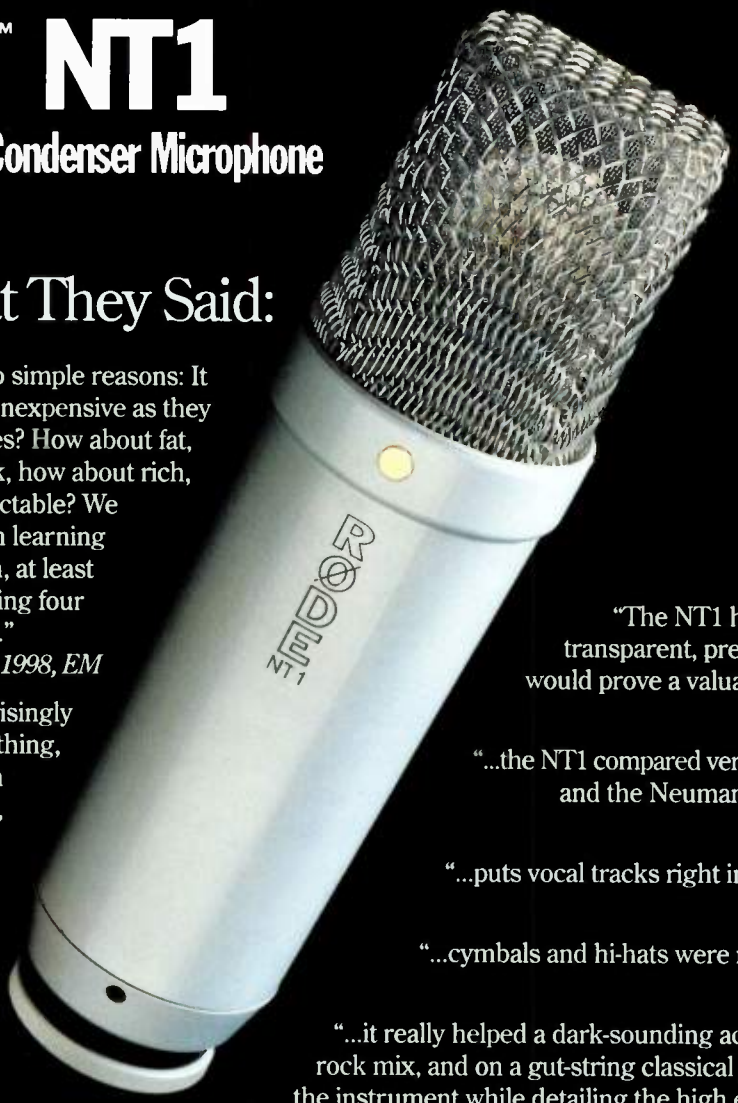

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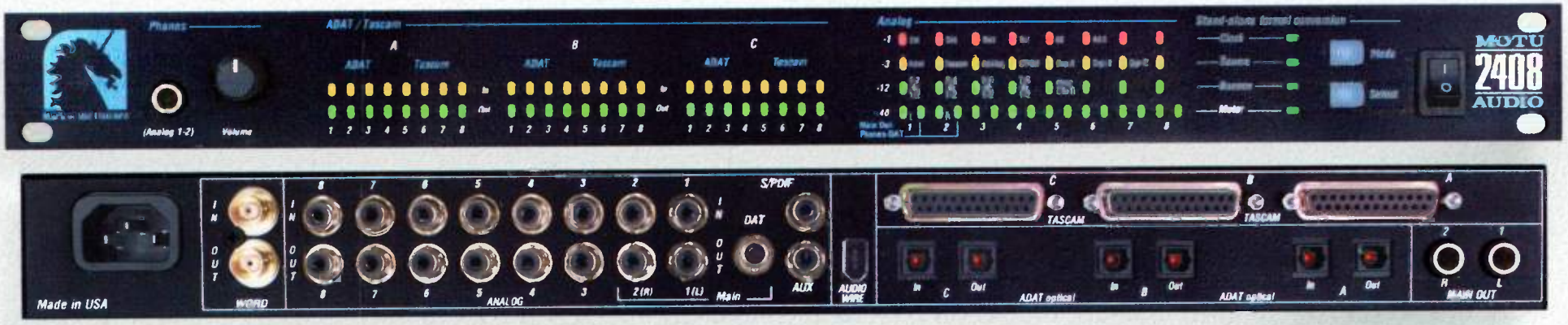

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