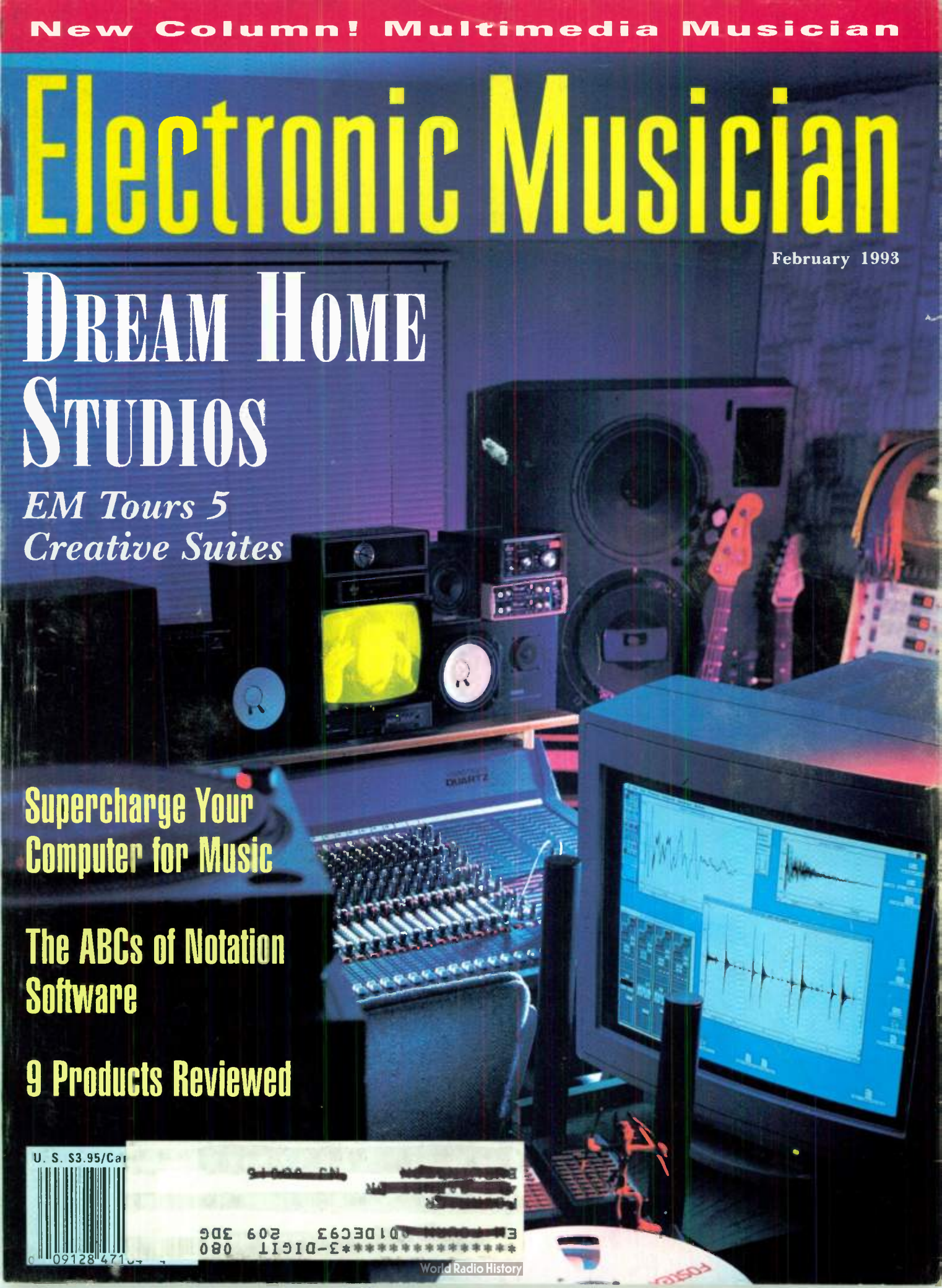
New Column! Multimedia Musician

Electronic Musician

February 1993



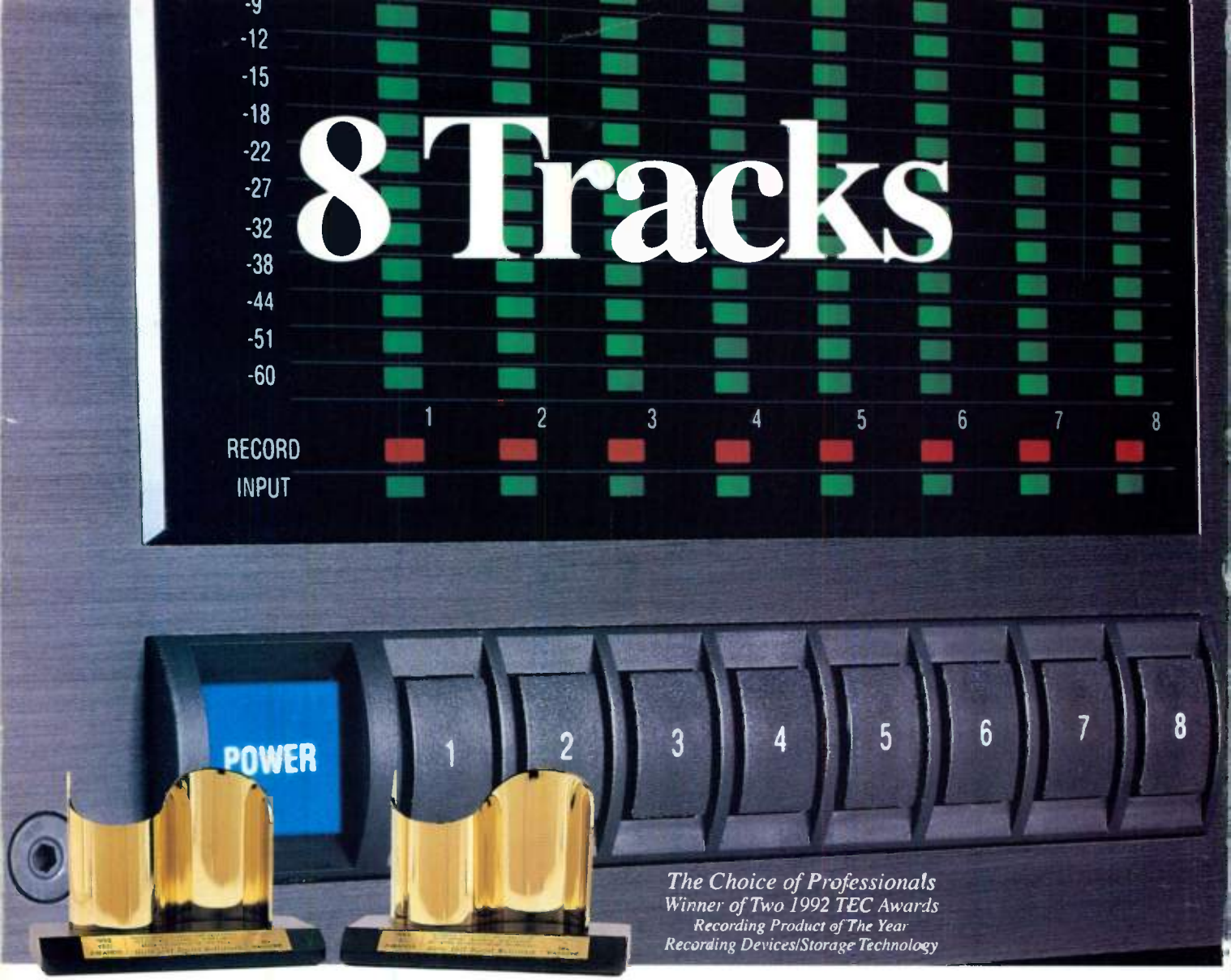
Dream Home Studios

EM Tours 5 Creative Suites

Supercharge Your Computer for Music

The ABCs of Notation Software

9 Products Reviewed



Demos to masters. Creativity to tape. Dreams to reality. Magic phrases for those who want to make music that sounds as good as it feels.

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To Megatracks

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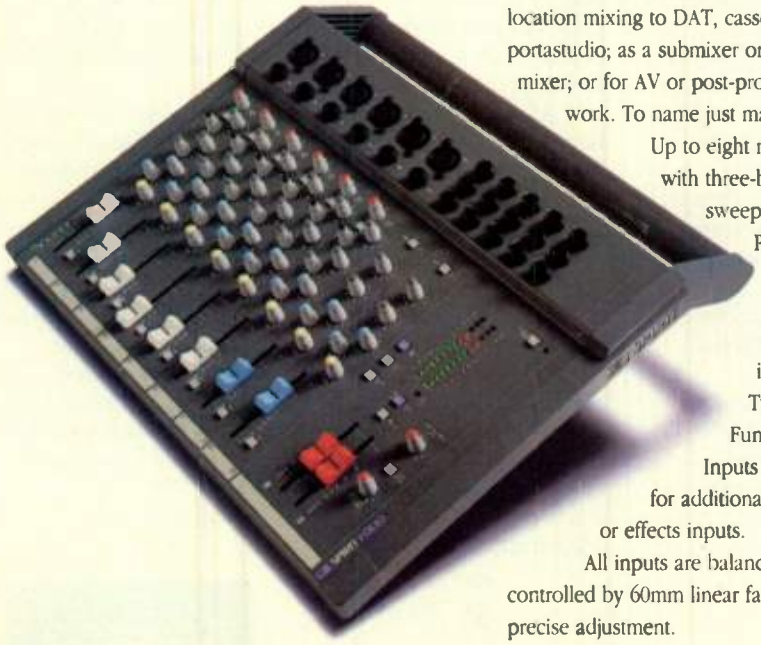

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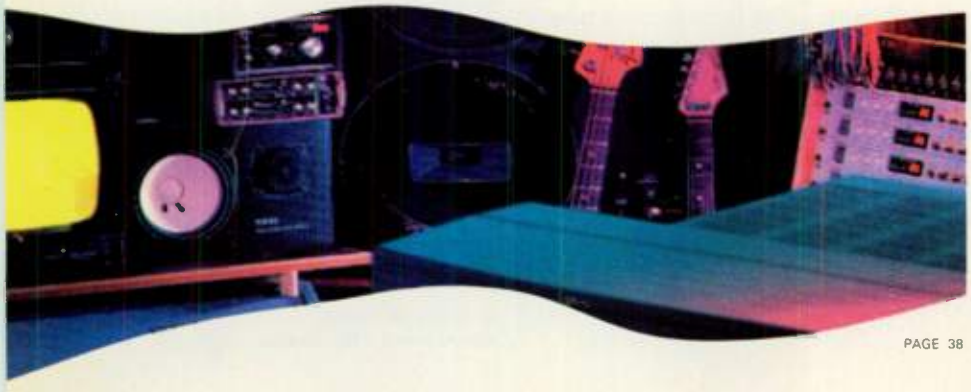
CONTENTS

FEATURES

COLUMNS



PAGE 38

Electronic Musician
FEBRUARY 1993 VOL. 9, NO. 2 · AN ACT III PUBLICATION

PAGE 50

REVIEWS

DEPARTMENTS

Cover: Photo by Anne Hamersky.

Synths R Us

Sound and music herald a major change in the computer industry.

ANNE HAMERSKY

I have seen the future, and it is us. After years of dishearteningly sterile beeps, computer users are discovering sound. Actually, they're embracing sound with a fanatic zeal. Nearly everywhere I looked at the recent COMDEX computer convention in Las Vegas, I saw computer-oriented audio gear. According to one count, 41 different manufacturers were showing sound cards for the PC. In addition, powered speakers, MIDI sequencers, digital audio editors, and other familiar tools were all over the place. At times, it seemed like I was at a NAMM show.

The implications of this trend are staggering; *millions* of PC owners will soon have multitimbral, General MIDI-capable synthesizers and digital recording capability on their desktops. That number is in the same neighborhood as the total number of synth buyers in the last decade. Undoubtedly, the vast majority of these new users will simply employ their new audio cards to supply music and sounds for computer games. However, a certain percentage will try out the music software provided with the cards. Even if it's a small percentage, that could mean tens or hundreds of thousands of people joining our ranks.

Many argue that it still takes a lot of work to become a musician, and there's no question that many eager starters will quit in frustration. I certainly don't expect the general public to suddenly become fascinated with MIDI and electronic music because they have a sound card in their computer. But as more tools enter the market that let people make music without too much effort (such as Software Toolworks' The Miracle Piano Teaching System, PG Music's *Band-in-a-Box*, and Midisoft's *Music Mentor*), we could see a reasonable number of newcomers creating electronic music.

In addition, inexpensive sound cards will establish a much wider audience for original music. Millions of people will be equipped with everything necessary to hear your General MIDI-compatible Standard MIDI File. Of course, it won't be easy to sell sequences to them directly, but larger software companies will undoubtedly be on the lookout for musical material that they can incorporate into their products, demos, and presentations. In particular, music for multimedia titles will be in ever greater demand with a large installed base of synth-equipped computers.

EM readers can do more than generate music or create sound effects for these products. With an understanding of synchronization, in particular, electronic musicians are well-equipped to participate in the production of multimedia titles. Many computer developers are visually oriented and not well-skilled at coordinating sound elements over time, which is an essential characteristic of most multimedia products.

In order to reflect and help foster these developments, we're introducing a new column this month: "The Multimedia Musician." This regular monthly feature will explore the new frontier of multimedia from the musician's perspective. Each month, the column's focus will alternate between a specific multimedia-related technology or product and the creation of a specific multimedia title. We inaugurate the column with a behind-the-scenes look at the development of a Mac-based title called *So You Want to Be a Rock and Roll Star*. As always, we are eager to hear what you think.

Bob O'Donnell

Electronic Musician

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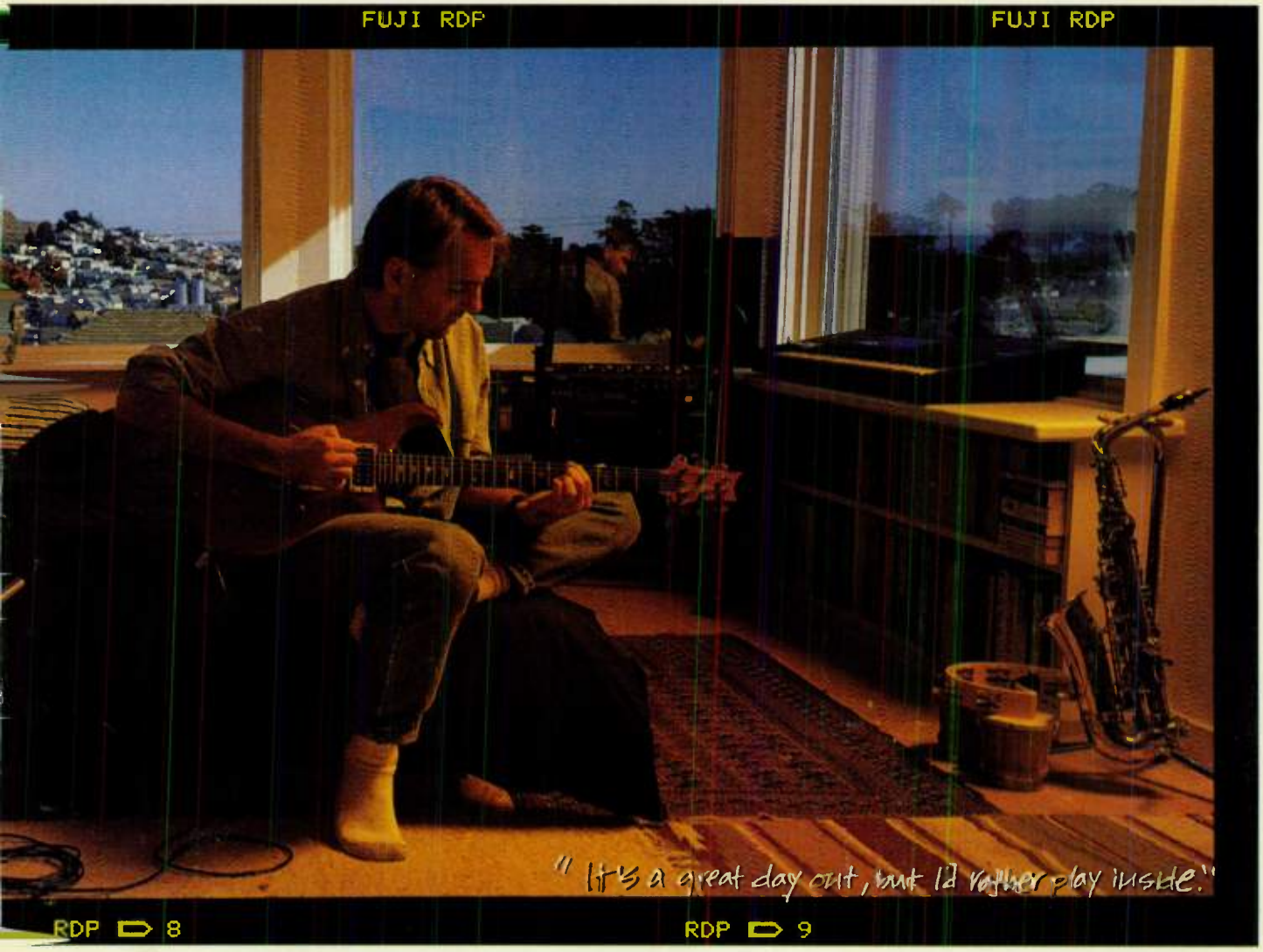

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That's why TASCAM chose the newer 8mm tape format for digital multitrack recording. It's simply better than anything else. Why? The 8mm transport is the most compact and is designed to take the beatings of the start-stop-start-stop operations that characterize studio and post production environments. And we should know, because TEAC makes transports for both VHS and 8mm. We tried them both. In fact, tests show 8mm to be superior for digital audio multitrack recording. That's just the start. The 8mm format is superior in many ways. Like "Auto Track Finding" (ATF)—an innovative technology that ensures consistent, error-free operation by imbedding important control information during the helical scan. This maintains a perfect relationship between the tracking and program signals on your tape. What does that mean? Precise editing for punching in and out as well as the ability to exchange tapes between musicians and studios without synchronization concerns.

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We could go on. But the point is that with over 20 years experience, TASCAM has quite an investment in multitrack recording. An investment that has paid off for musicians, recording studios and post production houses worldwide. We've put this experience to work in defining the future of affordable studio quality digital multitrack recording. And you can take advantage of it now.

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LETTERS

DAPPER DECEMBER

Lots of good stuff in the December issue, especially "What's New," "From the Top," and "Musicians as Programmers" ("Computer Musician," December 1992), which has inspired me to get back into programming again.

Kenneth McGee
Eatontown, NJ

TWISTED CLICHE

Reading Michael Drapkin's article "Musicians as Programmers" brings a new twist to an old cliche: "Those who can, play; those who can't, program."

Ralph Foster
Foster Music Service
Dallas, TX

USER'S GROUPS

Thank you for the user's group article ("From the Top," December 1992). Hopefully, as musicians are able to band (no pun intended) together, we'll eventually be able to get those wacky manufacturers to do such crazy things as build a master keyboard with polyphonic aftertouch, supporting the whole MIDI standard (even SysEx or panning). Bob O'Donnell's December "Front Page" editorial is on the mark: We musicians (fickle for technology though we are) have to let manufacturers know how we feel. Can user's groups get some muscle? We'll find out.

On the other side, so sorry Kitaro ("Pro/File," December 1992) hasn't found the space to mention his Synclavier and Neve console. If he's not using them, give him my address. (I'll pay shipping.)

PS: Are you sure the "Technology Page" photo on p. 20 isn't from a Kraftwerk album? Musique non stop....

Tom Eaton
Spotunes Productions
Newburyport, MA

In 1987 I started a Theremin User's Network through the pages of **EM**. Since then I've been in touch with hundreds of people throughout the U.S. and the world regarding all aspects of the Theremin.

The latest news is Bob Moog's Big Briar MIDI Theremin and Steven Martin's upcoming film on the life of Professor Theremin.

I'd appreciate it if you'd include the following Theremin User's Network info and address again in **EM** for your new readers:

Theremin User's Network, c/o Eric Ross, 259 Oak St., Binghamton, NY 13905; tel. (607) 722-1457; fax (607) 785-6643.

Eric Ross
Binghamton, NY

SOUNDING OFF

I was pleased to be interviewed for your December 1992 article regarding buying sounds for your synthesizer ("Sounds for Sale"). However, some information got mixed up. First, Ensoniq has contracted both Eye and I and Sound Source Unlimited to do both factory patches and after-market libraries for our VFX^{SD}/SD-1 and SQ instruments. But we have not released libraries made by Livewire Audio or Greytsounds.

Second, my comment about customers liking a dozen sounds in a given library was taken out of context. I had been discussing the fact that, because the industry produces so many sounds for any given product, people have a ravenous appetite for new sounds. I did not mean that we expect people to only like a few sounds, or that we voice our products with that in mind. I also strongly disagree with Mr. Seeley's comment that followed; Ensoniq, for one, takes sound development very seriously. Sounds may be the single most important feature that a musician reacts to.

Jerry Kovarsky
Ensoniq Corp.
Malvern, PA

RECYCLE OR DIE

Regarding Christine Pare's sidebar "The Electronic Environmentalist" in the November 1992 "Letters" column, I must express my disappointment that **EM** has wimped out on the recycling issue. Pare's statement that "the evolution of recycled paper is not complete" is quite true, but it raises the question of whether **EM** would prefer to be known as a leader among publications, or a follower. Those of character pioneer revolutions rather than cling to the coattails of evolution. I recommend you demonstrate your integrity and help lead the world into the recycling age.

The bleaches, dioxins, and other chemicals required to recycle paper into magazine stock are indeed still question marks in the equation. However, when one considers the toxicity of the inks that you (and all publishers) already dump on your products (and mail to our homes), isn't this a hypocritical approach to the question? Yes, there is work to be done in creating innocuous methods of processing recycled paper, but such research will only take that much longer if the recycled-paper industry isn't pressed into action by publishers' demands.

Finally, regarding your assertion that today's recycled paper cannot produce exceptionally high-quality printing, I suggest that you check out *Garbage* magazine. If that's not high-enough quality for advertisers, tell them to take a hike; we don't need such entities in

MARK FOX

our global community.

Please show some spine on this matter! Don't try to rationalize our inevitable future away—we will all ultimately have to face the naked truth: Recycle or die.

Curtis C. Long
Austin, TX

EM publisher Peter Hirschfeld responds: *Curtis—We greatly appreciate your concern and wish the world were as simple as you describe—that intent and interest in an area created instant results. In fact, we want to do our part to protect the environment; we're willing to pay a higher price for recycled paper when and if it meets our criteria. At present, there are still factors that inhibit us from using it.*

Our hesitation stems mostly from questions about the availability and quality of recycled paper. To date, no real standard exists that defines what recycled paper is. The majority of paper that is labeled "recycled" consists of 50 percent "preconsumer" (unprinted) paper scraps and 50 percent new paper. At best it contains ten percent of post-consumer (printed) paper. This hardly is what most people imagine recycled paper to be.

As for your hopes that **EM** *will be a leader in the field, you'll be happy to know we are indeed a very ecologically sensitive publishing firm.* **EM** *was one of the first magazines in the country to be desktop published (early 1988); this decision was partly made because we knew desktop publishing, which uses less paper and ink, was better for the environment. We also have resisted the popular trend of coating our magazine cover with plastic—which both protects it and improves its appearance—because the coating is not biodegradable. And we have committed to paying the premium price for using recycled paper in all our insert cards. In addition, we are experimenting with nontoxic, soy-based inks and are pressuring our printer to implement these as soon as feasible. As our record shows, we will welcome a change to recycled paper when the bugs are ironed out.*

IT JAMS

I am writing to express my disappointment with the review of Soundtrek's *The Jammer* software (October 1992). Though author Bob Lindstrom presented an adequate overview of the program, he failed to fully explore the creative tools *The Jammer* contains. As a songwriter, I have found that *The Jammer* has dramatically increased my productivity in writing, arranging, and recording. I can type in my chord sequence and quickly apply different style files (many of which I created myself) to gauge possible arrangements. After I have worked out an arrangement, I load it into *Cakewalk* for more sophisticated editing and synchronization with my tape machine.

Some specific quibbles:

—Mr. Lindstrom notes that applying the Composer parameters to different instruments "could lead to some interesting results." Exactly. Transpose a Bass Composer note range two or three octaves and assign a string patch. Keep *The Jammer* recomposing until you get a string line that underscores the main melody. Assign a saxophone patch to the Bass Composer and come up with bluesy licks, which can then be copied and transposed into tight sax and horn sections.

—There is no discussion of MIDI channel sharing. You can avoid the "clawing approach to keyboard" by tweaking the two Piano Composers to accentuate the left- and right-hand ranges. The left hand picks or strums the chord, while the right hand plays melodic licks courtesy of the assigned Bass Composer.

—Bass lines need not sound "a bit repetitive." Mr. Lindstrom failed to discuss the Bass Composer transition menu, which allows the bass line to become more or less busy. Judicious use of these variables can improve the range of feels.

—No mention of *The Jammer* as an idea generator.

—Failure to recognize the educational value of the program.

For a songwriter who does not wish to spend hours plunking out a keyboard bass line and programming a serviceable set of drum patterns, *The Jammer* is a godsend.

Fred Grittner
St. Paul, MN

Author Bob Lindstrom responds: *As Mr. Grittner implies, it is impossible in a 2,000-word review of two different products to explore fully all of their "creative tools." Rather, a writer can, at best, offer an "adequate overview," as he describes my original review.*

I'm delighted to see that Mr. Grittner uses The Jammer *as I suggested in my article: as a musical "sketch pad." His suggestions are excellent tips to help current and future users of* The Jammer *get the most out of the product. He holds a slightly higher opinion of the program's compositional skill than I do—even altering transitions and styles, it is easy to recognize repeating patterns in the* The Jammer's *musical repertoire—but we do agree that* The Jammer *is a convenient and effective way to generate "serviceable" accompaniments.*

ATARI ADDENDUM

I am a relatively new subscriber to **EM**, having recently switched loyalties from one of your main competitors, and I want you to know that I am really impressed with the quality and depth of your electronic music coverage.

I must confess, however, that I'm continually disappointed that the Atari ST platform always gets such short shift in this country. Both in Germany and in the United Kingdom, the ST nearly rules the electronic music world, as well it should, in my opinion. I cannot understand the ongoing bias against what is a very high-quality, dependable, fast, and economically reasonable machine.

Charles O. Beck
Portage, OH

Charles—Over the years **EM** *has given a tremendous amount of coverage to ST-related products, but the current shortage is simply a reflection of the market: Development for the ST has come to a virtual standstill in the U.S. Yes, some efforts are being made, and we will continue to cover them as they happen, but there simply isn't as much interest in the U.S. as there is in Europe. With the imminent introduction of the company's impressive new Falcon030 computer (look for a special report on it in next month's "Computer Musician" column), however, the situation will undoubtedly change.—Bob O'D*

We welcome your feedback.

Address correspondence to "Letters," Electronic Musician, *6400 Hollis St. #12, Emeryville, CA 94608. Published letters may be edited for space and clarity.*

Corrections to articles are listed at the end of "Letters." We compile these published corrections annually; to receive a copy, send an SASE to "Error Log Listing" at the above address.

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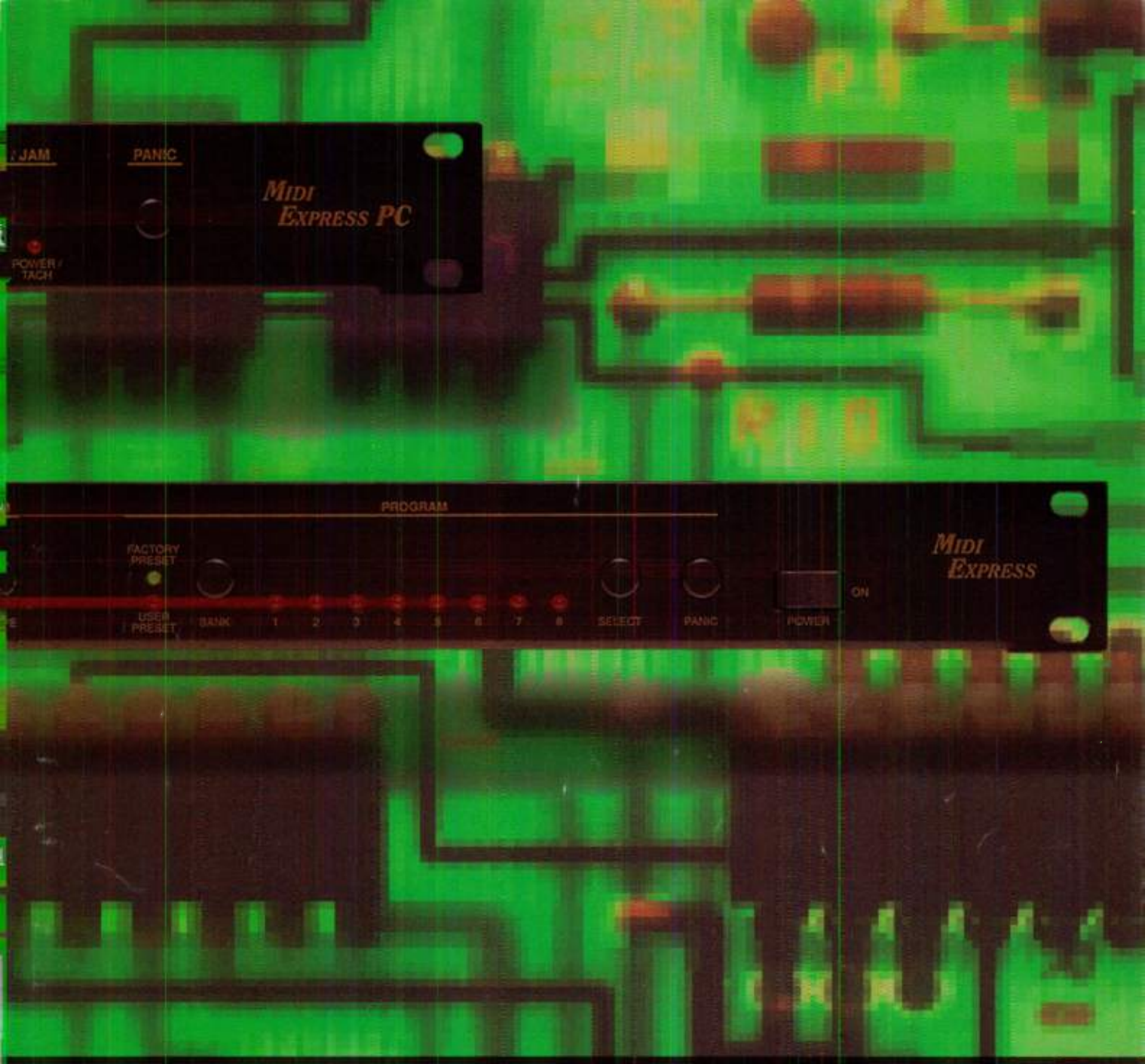

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TO MUSIC PRODUCTION

- Lock to your favorite MIDI sequencer regardless of computer platform? ☑ Yes ■ No
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- Auto-mix hundreds of tracks, plus unique fades and volumes for each listed music event? ☑ Yes ■ No
- EQ and digital signal process in real-time internally, & patch external via digital or analog? ☑ Yes ■ No
- Scrub smoothly and precisely, back and forth, with a mouse, trackball, or scrub wheel? ☑ Yes ■ No
- Pitch shift and time compress/expand an entire song, musical phrase, or just a single note? ☑ Yes ■ No
- Create seamless vocal or solo composites from an unlimited number of takes? ☑ Yes ■ No
- Copy and paste song verses, choruses, or just phrases or riffs to build a finished piece? ☑ Yes ■ No
- Easily align downbeats in cross-faded or over-dubbed music tracks? ☑ Yes ■ No
- Quickly reorder CD mastering song lists complete with cross-fades and segue effects? ☑ Yes ■ No
- Customize the interface to match your working style? ☑ Yes ■ No
- Show clients a great looking work environment that does their job every time? ☑ Yes ■ No
- Create on the most flexible, most complete system in the world for less than going analog? ☑ Yes ■ No

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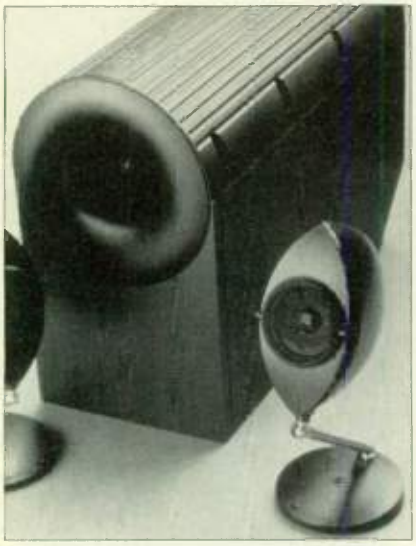
WHAT'S NEW



▲ ROCK SOLID SOUNDS OVALE

Rock Solid Sounds introduced Ovale monitor speaker systems. The Ovale ($399/system) is a 3-piece, subwoofer-plus-satellite monitor system that uses two long-throw, 6.5-inch woofers mounted inside an acoustic bandpass enclosure.

Each of the two satellite enclosures contains one 2.25-inch driver. The satellites are shielded and protected by an electronic overload system. Power-handling is rated at 100W (peak), sensitivity at 88 dB (2.83V @ 1 meter), and frequency response at 57 Hz to 20 kHz (±3 dB). Nominal impedance for the Ovale system is 4 ohms. Rock Solid Sounds; tel. (416) 771-6608; fax (416) 882-8397.

▼ LYNC76 MIDI PALETTE

Lync Systems' LYNC76 Midi Palette MIDI master keyboard ($999) features a 76-key, weighted, Velocity- and Aftertouch-sensitive action. Each of the four overlapping key zones have settings for MIDI channel, Program Change number, Velocity sensitivity, Transposition (+99/-28 semitones), starting MIDI Volume, and the various controllers. The 23-pound keyboard offers 100 user programs, two independent MIDI Outs, a merging MIDI In, sixteen Velocity curves in ROM and sixteen in user RAM, and 25 Aftertouch curves. The Midi Palette's continuous controllers include two spring-loaded wheels, two assignable sliders, and a master volume slider. Jacks are supplied for an assignable footswitch, assignable CV pedal, and sustain pedal. An unusual Randomize function varies the sounds of multitimbral instruments by assigning values (in what Lync describes as a "random, yet intelligent" fashion) for Program Changes, Velocity, Transposition, and Volume of a layer. Additional LYNC 76 Midi Palette features include Compare, Record/Copy, SysEx load/dump, and a Panic button. Lync Systems; tel. (518) 452-0891; fax (518) 452-0980.

▼ DIGIDESIGN SESSION 8

Digidesign released the Session 8 Multitrack Recording System ($3,995), an 8-track hard-disk recording package for PC-compatibles designed for the home music-recording market. The system consists of two plug-in boards, a stand-alone box with audio connectors, and *Windows*-based software. The audio board routes eight tracks to a single SCSI hard disk (18 ms access time), with level and pan automation and four single-band, parametric EQs. The card connects directly to a hard-disk drive via an onboard SCSI controller.

A second card connects to the Session 8 audio interface, which features a total of twenty inputs, eight individual outs, and stereo monitor and tape outs. Together, these provide 16-bit recording at 44.1 or 48 kHz. The audio interface includes S/PDIF digital inputs and outputs, eight analog line inputs, and eight analog line outs. In addition, the front panel has four line and four balanced XLR mic inputs, all of which have trim controls. Four TRS insert connectors on the back panel are provided to interface with outboard analog signal processors. The Session 8 also includes a 10 x 2 analog submixer (five stereo inputs) on the back panel that can be routed to a pair of A/D converters and added to the digital mix. The analog inputs can be reconfigured as effects returns, and the outputs can be used as a stereo mix out, stereo cue mix out, and four effects sends. The inputs and outputs connect to an analog routing matrix under software control.

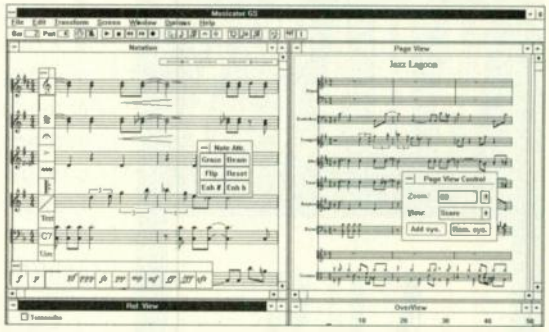
The software provides nondestructive, multitrack waveform editing with zoom and a graphic playlist. You can bounce tracks in the digital domain and mix to disk, though not in real time; the only real-time DSP is EQ. While recording, you can play Standard MIDI Files.

Digidesign also offers an enhanced system, Session 8 XL ($5,995), which offers high-fidelity, balanced XLR analog inputs and outputs and AES/EBU digital I/O. Digidesign; tel. (415) 688-0600; fax (415) 327-0777.

▼ MUSICATOR GS FOR WINDOWS

Musicator announced *Musicator GS for Windows* ($299), an enhanced version of the company's DOS-based *Musicator GS* integrated music-notation/sequencing software. The program requires *Windows* 3.1 and supports the Roland GS standard and General MIDI. It offers sixteen tracks, with real-time and step-time entry. Mixer settings, instrument selection, and other parameters can be changed during playback.

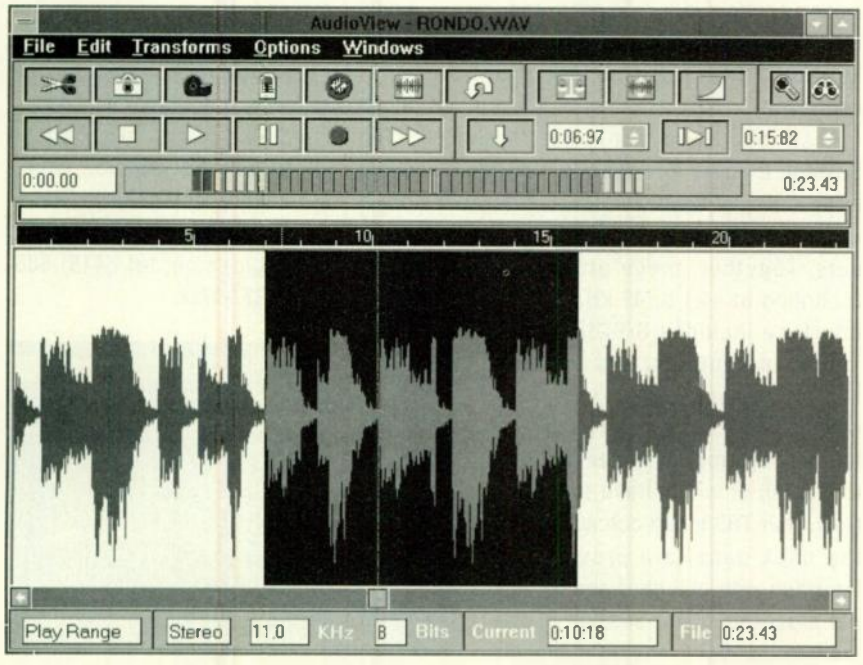
An overview window shows all measures in a sequence, and a graphical piano-roll editor displays notes as rectangular bars, with cut-and-paste editing in both windows. Graphical controller windows let you draw in controller data with the mouse. MIDI controllers can be edited, and the program can interpolate between controller events, generating new events to accomplish smooth value changes.



The program permits independent editing of standard notation and MIDI data. Beams, rests, and note-alignment are automatically adjusted, and the notation is automatically reformatted when notes are moved, deleted, or inserted. User-defined drum notation is provided, with special symbols. The program provides part-extraction and prints scores and parts on any *Windows*-compatible printer. *Musicator GS for Windows* comes with its own TrueType and Adobe Type 1 fonts and can use any *Windows* fonts. Musicator A/S; tel. (916) 756-9807.

▼ VOYETRA AUDIOVIEW

Voyetra's *AudioView* hard-disk audio-recording software package for *Windows* 3.0 or 3.1 ($129.95) includes three utilities. The main *AudioView* program is a graphical digital audio waveform editor that supports 8- and 16-bit soundfiles and .WAV and .VOC file formats. The program supplies *Windows* 3.0 drivers for a variety of sound cards. Editing features include cut-and-paste, sample trim (truncate), and Mix Paste, which combines the contents of the Clipboard with the current soundfile. Transforms include Normalize, Find Peak, Scale (by 0.01 to 10), Fade (with linear or any of ten exponential taper rates), Invert Sample, Crossfade, and more. The program has a noise gate and can create delay and reverb effects. Conversions include halving the sample rate, 16-bit to 8-bit, and stereo to mono. Voyetra Technologies; tel. (914) 738-4500; fax (914) 738-6946.



▲ TANNOY SYSTEM 6 NFM

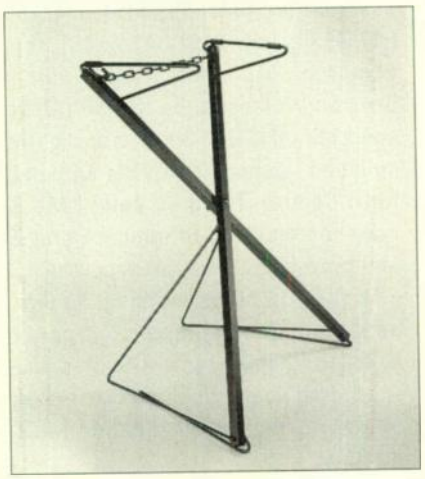
Tannoy is now shipping its System 6 NFM reference monitors ($795/pr.). The system features a single 6.5-inch, Dual Concentric speaker with a new high-frequency waveguide and layered, molded cone surround. The System 6 NFM is a true point-source, phase-coherent system that offers constant directivity and linear, symmetrical, off-axis dispersion. It effectively replaces the company's System 2 NFM speaker system. Frequency response is rated at 58 Hz to 20 kHz, sensitivity at 90 dB (1W @ 1 meter), and power-handling at 100W RMS. Tannoy; tel. (519) 745-1158; fax (519) 745-2364.

▼ DBX 760X DUAL MIC PREAMP

The dbx 760X Dual Microphone Preamplifier ($349) offers two channels of preamplification for applications such as sampling, field recording, and direct-to-DAT recording. The half-rack unit also can be used to improve the sound of low-cost mixers that have inferior microphone preamps. Frequency response is rated as flat (+0/-0.15 dB) from 20 Hz to 20 kHz, with a bandwidth of 2 Hz to 200 kHz. The dbx 760X includes gain control, 48V phantom power, and polarity switches for each channel. It also offers balanced, ¼-inch and XLR outputs and an overload indicator. Rack-mounting hardware for the unit is included. dbx Professional Products/AKG; tel. (510) 351-3500; fax (510) 351-0500.

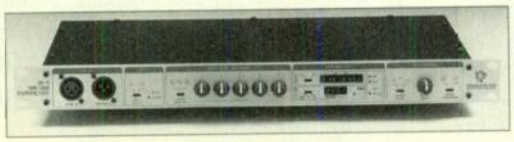
▶ INVISIBLE PRODUCTS LIGHTNIN

Invisible Products unveiled Lightnin ($79), a lightweight, fully assembled, all-steel, single-tier stand designed for full-size keyboards, racks, speakers, and other large equipment weighing up to 125 pounds. The stand's chain-link height adjuster/tensioner provides twenty height settings between 22 and 36 inches. The extra chain stores inside the support tubes. Lightnin uses no knobs, locks, nuts, etc.; it simply unfolds for instant setup and breakdown. Invisible Products; tel. (800) 468-4742 or (617) 969-8400; fax (617) 332-5461.



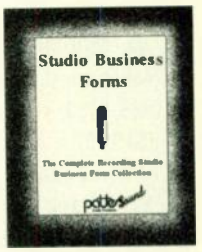
▼ BRAINSTORM ELECTRONICS SR-15

Brainstorm Electronics' single-rack-space SR-15 Time Code Distripalyzer ($1,195) comprises a 1 x 5 time-code distributor/reshaper, a pilot-tone stripper, and a time-code analyzer. The distributor sends the reshaped time code through five individually buffered outputs and can drive long cables. The reshaped signal's waveform can be switched between SMPTE, EBU, and square wave. The analyzer identifies the format, stability, and frame rate of incoming time code, verifies its sync with video, and reports time-code errors. The device can be set to beep when an error is detected, and a report (including address and error description) can be sent to a printer through its RS-232 port. An 8-digit display shows code and user bits, and a 4-digit display reveals frame rate and potential problems, such as jitter. The pilot tone stripper can extract a 50 or 60 Hz pilot tone from time code, video, or the AC power line for film sync. The pilot tone is synchronous with its source and can be switched between sine and square waves. Brainstorm Electronics; tel. (310) 475-7570; fax (310) 670-8855.



▼ PATTEN STUDIO BUSINESS FORMS

Patten Sound has produced *Studio Business Forms* ($32.95) and *Music Business Contracts* ($39.95), a pair of 3-ring binders full of useful paper templates protected in individual plastic jackets. The templates also are provided as text files on a Mac, IBM PC, or Atari ST disk. *Studio Business Forms* offers 44 forms for scheduling, booking sessions, contracts, time logs, inventory, maintenance history, setup sheets, take sheets, etc. For film and TV jobs, there's a spotting sheet, cue sheet, and frames-to-bpm converter. *Music Business Contracts* provides 40 contract templates for royalties, production agreements, publishing, mechanicals, performances, and so on. Patten Sound; tel. (818) 287-7424; fax (818) 285-1095.



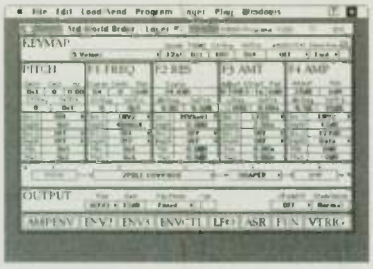
▲ PARKER ADAMS SONGCANVAS DELUXE

The Parker Adams Group is shipping *SongCanvas Deluxe* 2.0 ($99.95), an IBM PC-compatible editor/librarian for all sixteen Roland Sound Canvas products. The program permits editing of all Sound Canvas parameters, and the manufacturer includes 256 original Multi-Part sounds. Patches (setup snapshots) can be saved into *SongCanvas* format and the MIDIEX format used by *Cakewalk* and *Sequencer Plus*. A Standard MIDI File player is included, and all sixteen Parts can be edited during playback. *SongCanvas Deluxe* is available for DOS and *Windows* 3.1. The Parker Adams Group; tel. (310) 450-2175; fax (310) 450-8526.

REV UP

▲ MIDIMAN

Midiman (tel. [818] 449-8838; fax [818] 449-9480) released *Syncman Remote* ($19.95), a Macintosh desk accessory that operates with the company's Syncman, Syncman Plus, Syncman Pro, and Mac Syncman. The program lets you choose a SMPTE write offset, start and stop striping, select the SMPTE format, and set the user bits.



▲ OPCODE SYSTEMS

Opcode Systems tel. [415] 856-3333; fax [415] 856-3332) released *Editor Update Set #2* (*Galaxy Plus Editors* set $99; free if *GPE* purchased on or after August 1, 1992; *Galaxy* librarian modules $29), a package of editor and librarian modules for *Galaxy Plus Editors*. Editor/librarians have been added for the Kurzweil K2000, E-mu ProCussion, E-mu Proteus/3 World, Alesis D4, and Roland U-220. The librarian modules, which also are available for *Galaxy*, support the Korg 03R/W, Roland JV-80, and Roland Sound Canvas.

▲ ENSONIQ

Ensoniq (tel. [800] 553-5151 or [215] 647-3930; fax [215] 647-8908) has acquired KMX's line of MIDI patch bays and released the KMX-8 ($295) and KMX-16 ($579), which are slightly modified versions of KMX's 8X8 and MIDI Central. The 8-in, 8-out KMX-8 now has merging of inputs 1 and 2 and provides 30 user presets. The 15 x 16 KMX-16 offers merging, 99 presets, and an enhanced front-panel layout. Both units come with Mac and Atari graphical editing software that allows naming of presets and MIDI devices.

▶ SCORES UNLIMITED

Scores Unlimited (tel. [212] 242-1275; fax [212] 242-1508) is shipping *Clicktracks* 2.6 ($99; upgrades from version 1.x $89; upgrades from version 2.x $40), a film-scoring program formerly distributed by Passport Designs. The upgraded program supports 29.97 non-drop SMPTE time code, color QuickDraw, and the PowerBook sleep feature. It is 32-bit clean and System 7.0-savvy, including core Apple Events. The Preference file now saves font choice and hit tolerance, and hit tolerance is displayed in the Hitlist header. Check marks appear in the Hitlist for hits that are "made." Improvements also have been made for large-screen monitors.

BIG NOISE SOFTWARE

Big Noise Software (tel. [904] 730-0754; fax [904] 730-0748) announced version 2.0 of *Cadenza for Windows* ($299; upgrades $30). The sequencing software now lets you edit standard notation and print charts. Other additions include swing quantize, multitrack recording, an event filter, and auto-save. Standard MIDI File handling has been improved, and so has the user interface.

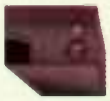
JLCOOPER

JLCooper (tel. [310] 306-4131; fax [310] 822-2252) upgraded the firmware of its PPS-2 synchronizer to allow MTC-to-SMPTE time-code conversion. The enhanced system is called the PPS-2+ (upgrades $49.95). The enhancement is user-installable.

▶ SABINE FBX-1200

Sabine released the FBX-1200 Feedback Exterminator ($1,595), the latest in its line of automatic feedback-control systems. As with the company's original FBX and FBX-900, the device senses acoustical feedback and automatically reduces the levels of the offending frequencies. The 2U rackmount FBX-1200 uses twelve independent filters, each of which can be parametric, fixed, dynamic, or unused. Bandwidth for each filter is adjustable from one-twentieth of an octave to one octave, and depth is adjustable from 0 dB to 96 dB. The filters' frequency range is rated at 30 Hz to 20 kHz. According to Sabine, the FBX causes less tonal distortion than a graphic or parametric EQ. An LCD displays, in real time, the position, width, and depth of all filters. The unit offers balanced XLR inputs and outputs. Sabine; tel. (904) 371-3829; fax (904) 371-7441.

There are 15 sounds in this space.



550 In this one.

More Sounds In Less Space

There have never been more sounds in a single rack space. The new SR is packed with 550 powerful Wavestation sounds. Each one a deep and complex "Performance," a blend of unique waveforms, realistic instruments, WaveSequencing, dynamic digital effects and a lot more.

A one rack space giant, the SR has the same expanded memory as the Wavestation-EX keyboard and A/D rack. And it's smart enough to read old and new Korg card formats, including the potent new 01/W 2 Meg PCM cards.

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In seconds, call up the SR's great sounding 550 presets with a touch of your finger. No more puzzling over complicated menus, misguided pages or martian algorithms. Or program your own customized sounds.

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With the SR, you have all the sounds and power of the legendary Wavestation-EX and A/D, plus useful new features like improved effects routing – at a user-friendly price.

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Because it's a Wavestation, the new SR has sounds you can't get anywhere else. Plus Advanced Vector Synthesis and all the same features and sound creation tools that helped the Wavestation *win awards for technical innovation* – all in one rack space!

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It's enough to drive you crazy.

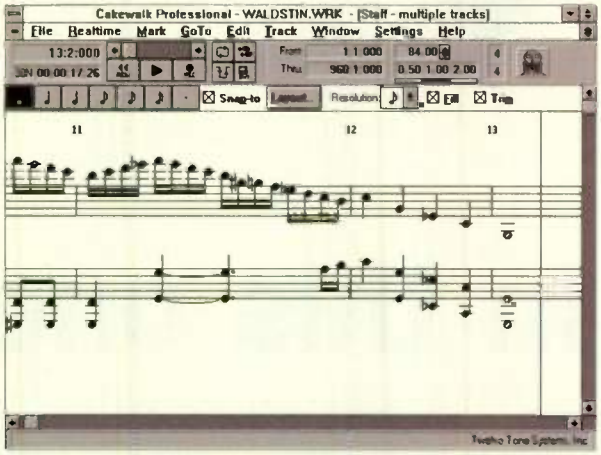
You've been searching for software that will help you turn your musical ideas into polished performances. But the first program you tried wasn't powerful enough. And the other was so complex, you didn't know where to start.

Maybe it's time to see a Professional.

Cakewalk Professional for Windows™ is the 256-track MIDI sequencer that's powerful *and* easy to use.

Express Yourself

The detailed **Event-list view** lets you view and edit all MIDI events on multiple tracks at once. You can even insert non-MIDI "special" events like digital audio waves (voice, special effects) that play back on .WAV-compatible sound cards.



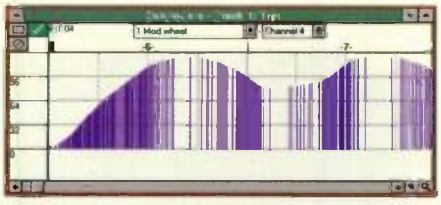
Staff view

Tempo

Take Control

Cakewalk Professional also has a graphic tempo map and **Controllers view** for drawing tempo and Controller changes with your mouse.

Use up to 16 assignable faders to send out MIDI Controller events while recording or during playback. Fader positions update in the **Faders view** during playback to show Controller values.



Controller view

Professional Staff

A multi-track **Staff view** lets you edit up to 10 staves of standard notation. You can insert, delete, and move notes with your mouse. Like all views, the Staff window scrolls during playback.

Use the **Piano-roll view** for inserting, resizing, and moving notes in a piano-roll grid. You hear the notes change pitch as you move them. And you can redraw note velocity levels as well.

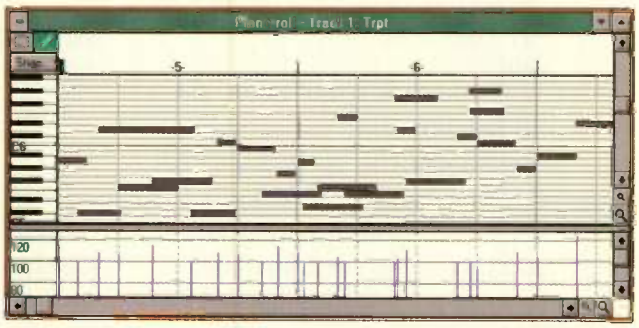
Markers

Get On Track

Use the **Track/Measure view** for assigning track parameters like MIDI channels and patches. And you can adjust parameters in real time, like volume, pan, key offsets, and velocity levels. All Track parameter columns can be moved and sized. Use the Measure pane for fast "drag-and-drop" editing of selected measures.

Professional Experience

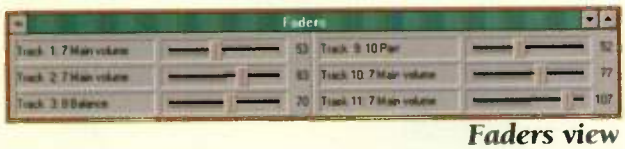
Cakewalk Professional works hard to earn its "professional" status: a variable timebase of up to 480 pulses per quarter note; support for all SMPTE/MTC formats; a Meter/Key map; a **Markers view** for creating a text list of "hit points"; and a powerful



Piano-roll view

PROFESSIONAL HELP.

Event Filter for selective edits, like splitting out drum notes onto separate tracks.

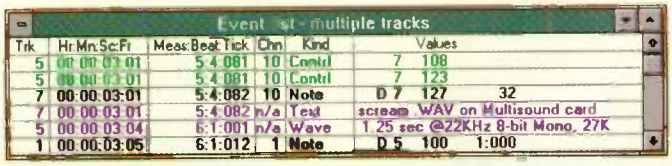


Faders view

(edit CAL)

CAL-SWING 16.CAL

Cakewalk Professional has a 256-bank System Exclusive generic librarian, for storing and sending your instrument sound banks and presets.



Event-list view

And the built-in Cakewalk Application Language (CAL) even lets you create your own editing commands, like chord generators, drum maps, and "swing quantize" routines. (A free library of CAL routines is available to all registered users.)

Sysx

4/4

Meter/Key

Get Help Fast

Unlike some sequencers, Cakewalk Professional has context-sensitive, on-line help available at any time. Just press the F1 key to get help with what you're working on. Examples, definitions, and even a list of answers to common questions are a mouse-click away, supplementing the comprehensive *User's Guide*.

Comments

See A Professional Today

Cakewalk Professional for Windows ($349) is sold at finer music and computer stores worldwide. For more information, or for the name of a dealer near you, call

800-234-1171 or
617-926-2480.

A demo disk is available for $10.

System Requirements: IBM PC with 10 MHz 80286 or higher, 2 MB of RAM, hard drive, mouse; Microsoft Windows 3.1. Supports any combination of up to 16 MIDI ports on devices with Multimedia Extensions drivers (including Roland MPU-401 compatibles and Music Quest MQX interfaces).

Twelve Tone Systems, Inc.
P.O. Box 760 Watertown, MA 02272
Fax: 617-924-6657

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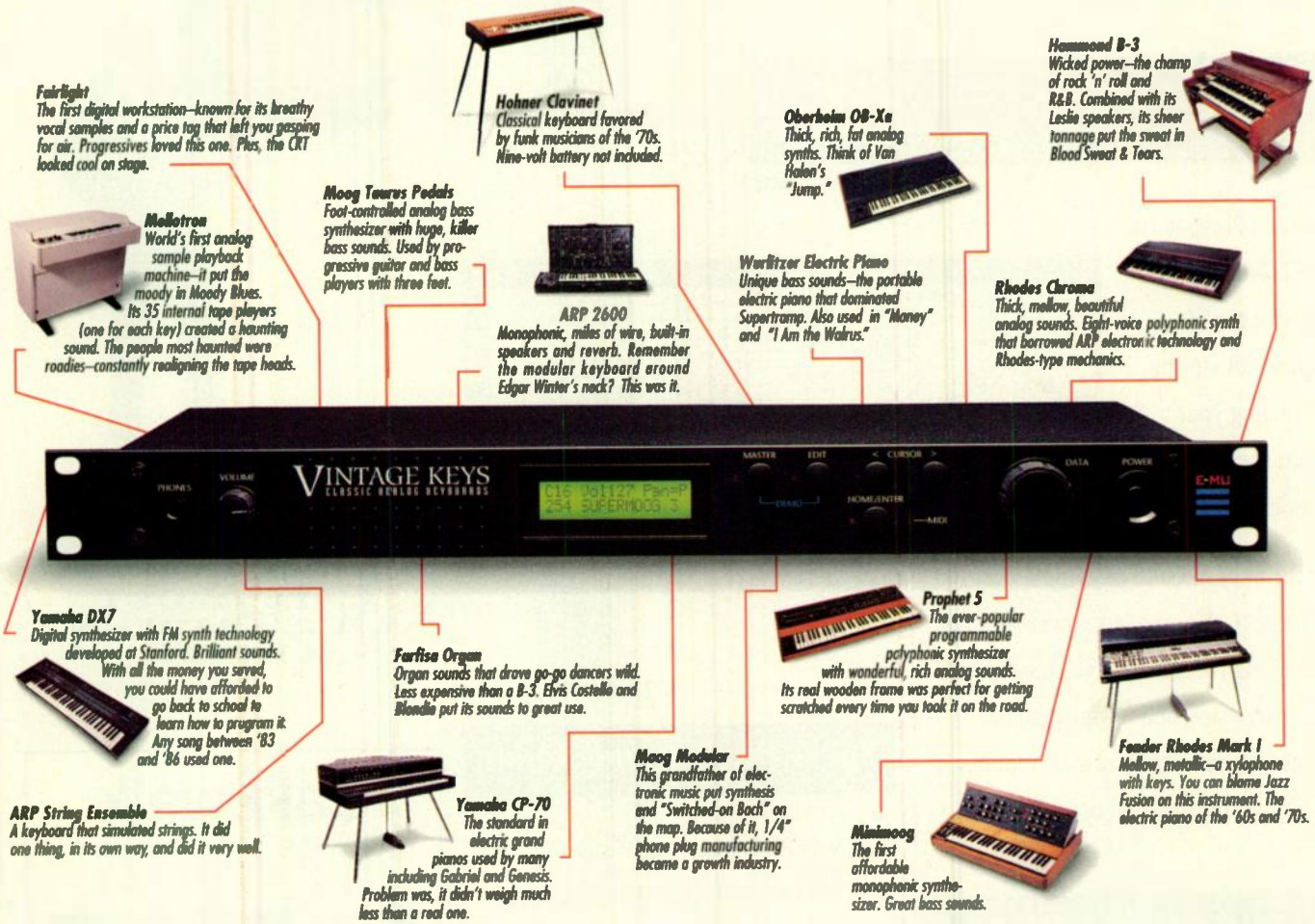
THINK OF IT AS THE WORLD'S LARGEST COLLECTION OF CLASSIC ANALOG KEYBOARDS.



Ahhhh... the warm, rich sounds of classic analog keyboards bring back a lot of sweet memories. And those same fat basses, thick pads and sizzling leads are taking a commanding role in today's music. But how quickly you forget their incredible weight and size, their terrible reliability, and the fact that they would go out of tune at the drop of a hat. To give you the pleasure without the headaches, E-mu created Vintage Keys.

Think of it as a truckload of the world's coolest analog keyboard gear–all in a single sound module.

Vintage Keys delivers 8 megabytes (expandable to 16) of the highest quality, digitally sampled classic analog keyboard sounds from the past 30 years. Look no further for dozens of Hammond B-3 organs, Wurlitzer and Rhodes pianos, ARP, Prophet, Moog and Oberheim synthesizers, Mellotrons and much more. 384 sounds in all!

Vintage Keys features the same great sound quality you've come to expect from E-mu, but that's only the beginning. We've added 32 of our dynamic analog-sounding digital filters to give you the kind of expressive control these instruments were famous for. Combined with special features like polyphonic portamento and our unique MIDIPatch™ modulation system, Vintage Keys lets you recreate the analog mood and feel. And just try to find a classic analog keyboard that offers you 32-voice polyphony, 16 channel multi-timbral capability and 6 assignable polyphonic outputs.

Of course, like most of those great analog keyboards, Vintage Keys is incredibly easy to use and designed and built in the U.S.A.

So visit your E-mu dealer and listen to a demo today. Get ahold of your dream sounds without the nightmare.

VINTAGE KEYS
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Sony Super Bit Mapping

When does a 16-bit CD sound like 20-bit audio?

By Scott Wilkinson

Digital recording is here to stay. It offers a fantastic dynamic range, and the absence of tape noise and generational loss are significant improvements over analog recording techniques. Ironically, though, these virtues are double-edged. A wide dynamic range and low noise floor can accommodate very low-level signals, but the signals suffer from a problem endemic to all digital audio systems: quantization errors that arise from the process of digitizing an analog signal into discrete steps.

In digital recording, the instantaneous level of an analog signal is measured many times per second. Each level measurement is represented by a fixed number of bits, which is called the *resolution* or *word size*. The greater the resolution, the greater the number of steps between a level of zero (all bits = 0) and the maximum level that can be represented (all bits = 1). However, no matter how many bits are used, there are instantaneous level values that can't be accurately represented. They fall between consecutive digital steps, so they must be approximated by the closer step value. This results in quantization errors.

At high signal levels, quantization errors manifest themselves as low-level white noise that usually does not present a significant problem. There is also a loss of sonic detail, which is represented in the last few least significant bits (LSBs). At low signal levels, quantization errors result in audible artifacts called quantization noise, which appear as additional frequency components in the spectrum of the signal. This type of noise is most pronounced in quiet passages and during a sound's final decay.

Although it can't be eliminated, quantization noise can be reduced by using more bits to represent the signal. Professional digital recording systems are starting to use 20-bit resolution. However, the nearly universal method of delivery—compact disc—uses 16-bit resolution. How can the quality of 20-bit recordings be retained in a 16-bit format?

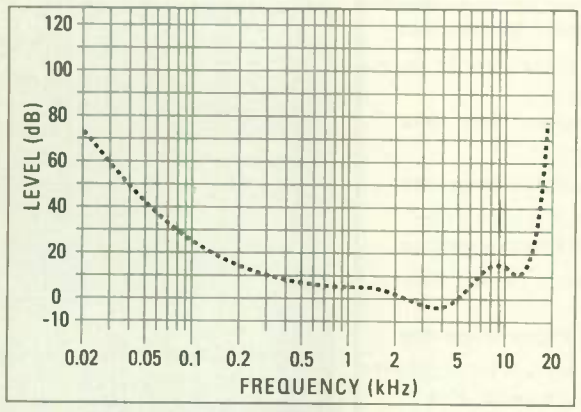

FIG. 1: The dotted line is the equal-loudness curve for sounds at the limit of audibility. Any frequency at a level below the curve is inaudible.

It's easy to truncate the signal by simply removing the four least significant bits, but this results in some serious harmonic distortion. Rounding the 20-bit value to sixteen bits is better, but it offers no sonic improvement over original recordings with 16-bit resolution. In the quest for sonic superiority, Sony has devised a new technique called *Super Bit Mapping* (SBM). This technique relies on an important psychoacoustic principle called the *equal-loudness curve*.

The human auditory system does not exhibit a flat frequency response. The relationship between perceived loudness and frequency is illustrated in a graph of the equal-loudness curve (see **Fig. 1**). This graph reveals that the perception of loudness depends on frequency, as well as sound-pressure level (SPL); sounds at different frequencies with levels that follow the curve are perceived as equally loud.

In SBM, a process called *noise shaping* is used to distribute the quantization noise to different regions of the audio spectrum. This is possible as long as the total power of the noise remains unchanged. The four LSBs in the 20-bit signal are treated as quantization noise, which is shifted to the high and low ends of the spectrum, where the ear is least likely to perceive it.

SBM is relatively expensive: The Sony K-1203 performs SBM conversions for approximately $17,000. But the benefit is 20-bit fidelity from 16-bit CDs, which should silence noisy critics once they hear the results. Super Bit Mapping is an ingenious solution to one of the most vexing problems in digital audio, paving the way toward an even wider acceptance of the medium.

EM *technical editor* **Scott Wilkinson** *has studied and taught psychoacoustics for fifteen years.*

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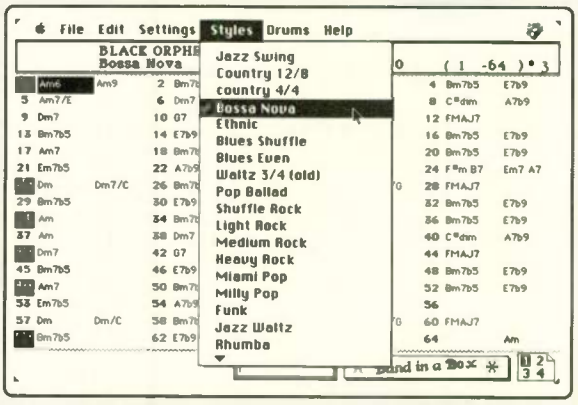

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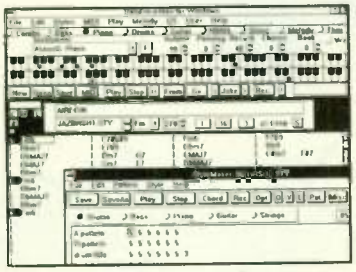

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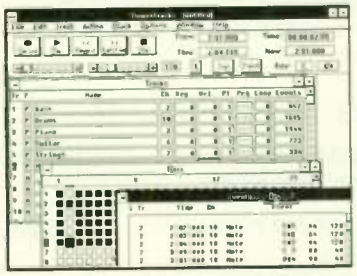

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"What makes this program different is the fine degree of control available to the user. The **JAMMER** lets you take your computer where no computer has gone before."

Scott Wilkinson
Electronic Musician
December 1992

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PC Magazine, October 27, 1992

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INFO WORLD, September 1992

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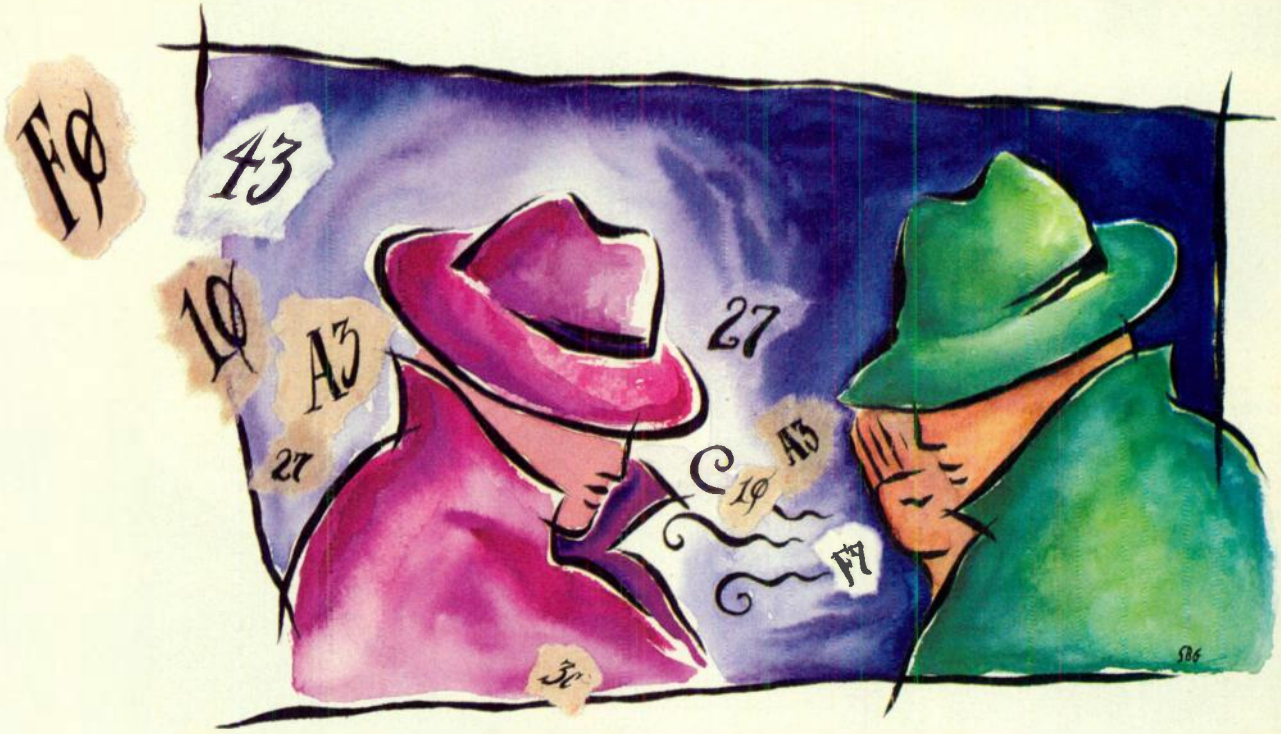
By Scott Wilkinson



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Instrument-specific MIDI messages help solve problems in the studio.

It has always amazed me that competing manufacturers could come together and develop MIDI. This required unprecedented cooperation among companies that individually sought to dominate the electronic musical instrument market. Of course, MIDI turned out to be good for business by boosting sales for most of these companies, and it helped create many more businesses besides.

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Illustration by Susan Gross

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TWO SEPARATE HEADPHONE SECTIONS can be used totally independently of each other with source selection between Control Room & any combination of Aux 1, Aux 2, Mix-B or External source. Solo allows control room to hear what musicians are hearing in their headphones.

MIX-B/MONITOR section on each channel effectively doubles number of inputs during mixdown.

SPEAKER section with separate Control Room & Studio levels. Source selection between L/R mix, Mix-B, Tape & External. Can be switched to Mono.

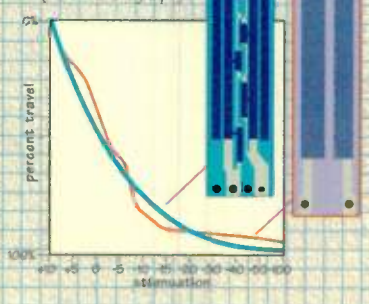
TALKBACK with assign to all Tape outs, Aux 1, Aux 2 or Phones.

−20 to +10 bar graph LED **DISPLAYS** for each stereo channel & Solo/Main (with +28dB CLIP LEDs).

ALTHOUGH there are 8 buses, 16 tape outs are created by a second set of output jacks.

Built-in talkback MIC.

Conventional faders are overscreened with a second layer of resistive material in an attempt to create a logarithmic taper. Our **PRECISION NETWORK FADERS** are single-layer screened with both the primary resistive element and also a complex auxiliary element to create the true logarithmic curve found in ultra expensive console faders (blue line on graph).



THANKS TO ADVANCES in component technology and quality, our ability to buy parts in large quantities – and a lot of fanatical Mackie engineering – you can "have it all" without hocking the proverbial farm.

BECAUSE WE SPECIALIZE IN MIXERS (and because we're probably a little crazy), we began the design of these consoles by first asking ourselves, "What is it that makes the finest British consoles perform the way they do? — And how much of that can we duplicate (using modern materials and methods) on far less expensive boards?"

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* Meter bridge additional. Equally phenomenally low prices for the 16-8 ($3195) and the 32-8 ($4795). Neve is a trademark of Neve, a Siemens Company.

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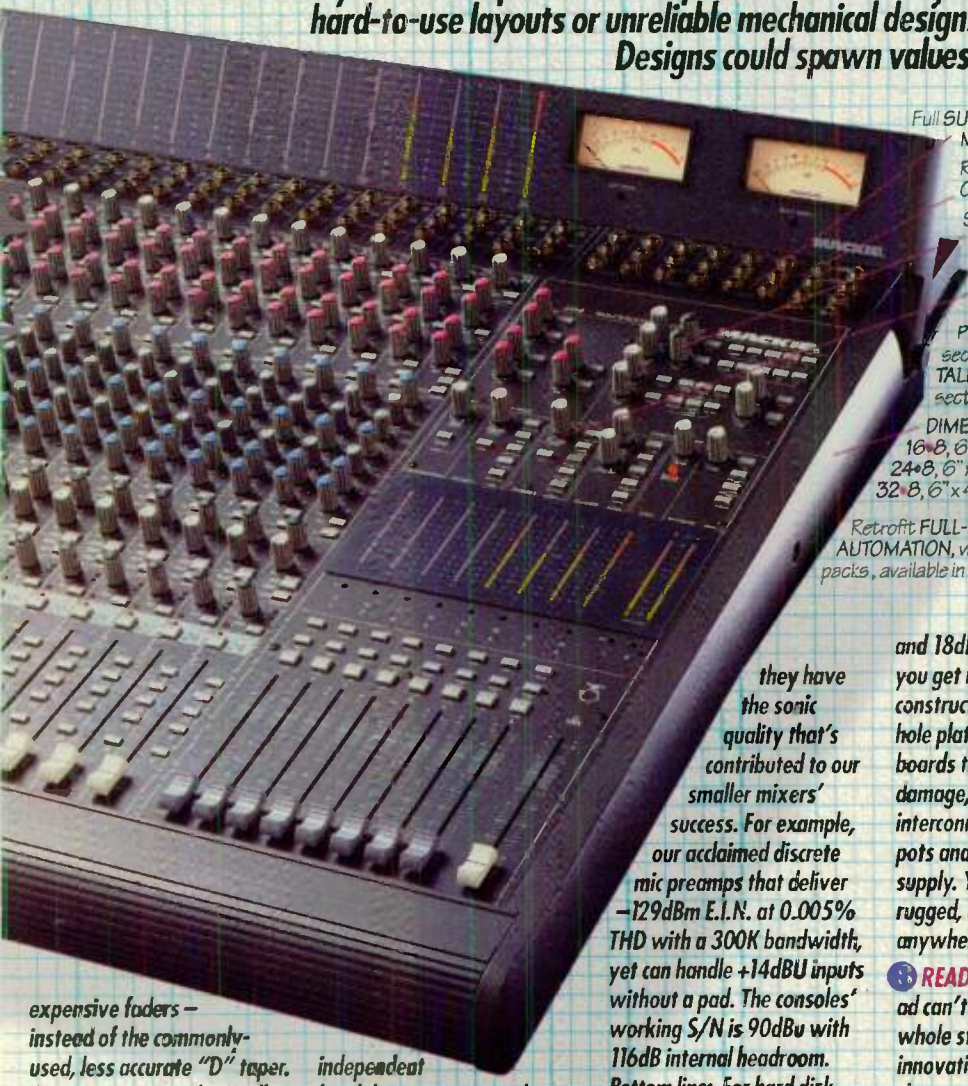

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AUX SENDS 1-2. PRE button selects pre-fader/post EQ or post-fader/post EQ.

AUX 3-4 / 5-6. SHIFT changes 3-4 to 5-6. SOURCE selects signal source of AUX 3-4/5-6 from ch. strip to ch. Mix B/Monitor send so you can build an effects mix to assign to phones during tracking.

True 3-control parametric HI MID EQ with ultra-wide 500-18k frequency sweep range. Bandwidth can be adjusted from a very wide 3-octave width to a very narrow 1/6-octave width. 15dB boost/cut.

LO MID EQ with ultra-wide 45Hz-3K sweep, 15dB boost/cut.

±15dB shelving HI (12kHZ) & LO (80Hz) EQ.

Multi-purpose 18dB/oct. LO CUT filter @75Hz. Cleans up "mix mud," creates a "neo-pealing" bass control, cuts PA rumble, etc.

MIX-B (Monitor) section with pan, level & source. Functions as independent monitor section, extra stereo Aux send during mixdown or doubles number of inputs during mixdown.

Mix-B SPLIT EQ assigns HI & LO EQ to Mix-B.

Constant power, buffered PAN pot for rock-solid panning.

Selectable SOLO with CHANNEL METERING not only allows soloing in full stereo perspective but also displays soload channel operating level on master L/R meters so input trims can be adjusted for optimum levels.

At last! HIGHLY ACCURATE 100mm FADERS on an affordable console! (See explanation at left).

L/R MIX assigns channel directly to master L/R mix for ultra-quiet mixdown.

expensive faders – instead of the commonly-used, less accurate "D" taper. So we commisioned a totally new custom 100-mm fader with the same taper as the most expensive British faders, yet at a fraction of the cost.

DOUBLE THE INPUTS & MORE. Each channel has In-line monitoring that effectively doubles the number of inputs (48 on our 24•8, for example). We also added features we personally find useful such as dual independent headphone systems and separate MIX-B monitor section with Split EQ. The consoles' internal –10dBV to +4dBU level conversion allows use with semi-pro tape decks without the inherent noise penalty found in semi-pro mixers that operate at –10dBV internal levels.

BEST OF THE CR-1604. Though we designed these consoles from the ground up, they have the sonic quality that's contributed to our smaller mixers' success. For example, our acclaimed discrete mic preamps that deliver –129dBm E.I.N. at 0.005% THD with a 300K bandwidth, yet can handle +14dBU inputs without a pad. The consoles' working S/N is 90dBu with 116dB internal headroom. Bottom line: For hard disk recording, ADAT or DAT, you've found your board.

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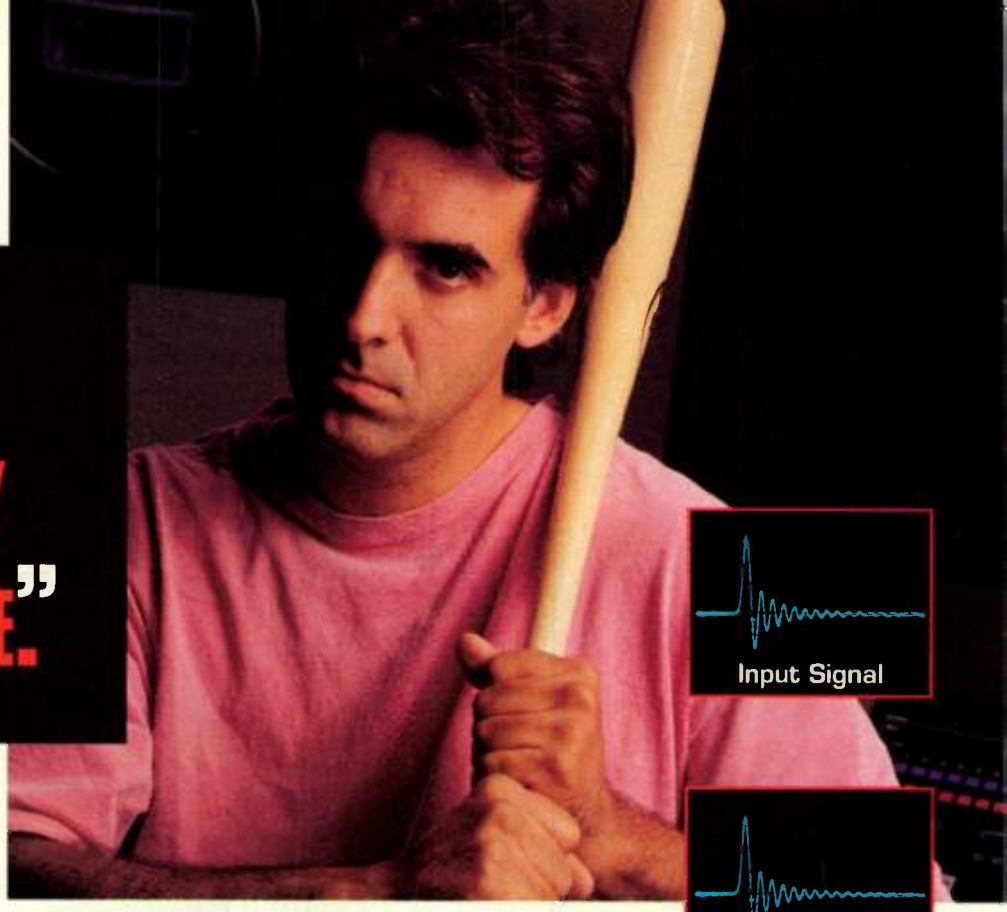
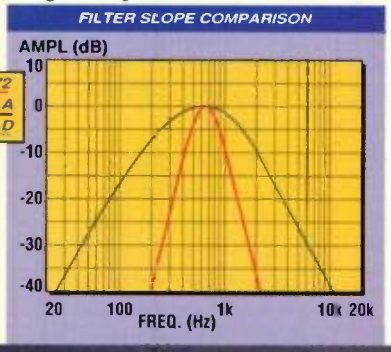


because dbx's real engineering advances mean your 172 will pull sparkling, clean output from material other gates can't touch. You won't want to let go of your SuperGate because it sounds better, sets up faster and does more for you than those other gates can.

You'll be more selective with Voltage Controlled Filters.

The SuperGate uses sophisticated VCFs to produce steep slopes that are TWICE as selective—dramatically reducing false triggering. They're also faster to set up because the PARAMETRIC design lets you zoom in on exactly the instrument or part of the attack you want to catch.



You'll stop time with Transient Capture Mode.™

You can see and hear the difference TCM™ makes compared to other gates. With real-world filter and threshold settings, it attacks so quickly you'll actually catch those critical transient wavefronts that give percussive signals their life and definition.

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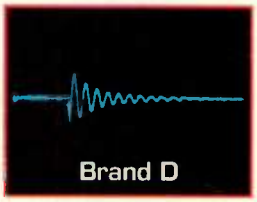
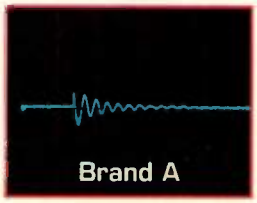
In One-Shot mode, the 172 gives muscle tone to that drummer with the not-so-steady hand or foot, so you get solid, even output from erratic input. There's more—we'll fax you the whole story. But with all of the people who want to get their hands on a SuperGate, it may be awhile before you can test one for yourself. When you do get yours, you may find yourself going to extremes to hang onto it.





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form of System Exclusive messages that manufacturers use to represent a device's specific parameters. This proves quite useful in a variety of ways.

BASIC STUFF

The MIDI protocol consists of coded messages that are divided into two types: Channel and System. Channel messages are the most common, consisting of Note On, Note Off, Aftertouch, Program Change, Control Change, and Pitch Bend. System messages are divided into three categories: Common, Real Time, and Exclusive. Unlike Channel messages, System messages include no MIDI channel information; they are meant for the whole system.

With the exception of System Exclusive, all MIDI messages are identical for all devices. But in order to represent the specific functions of each instrument, manufacturers codify their parameters in System Exclusive, or SysEx, messages that are unique to each instrument.

Most MIDI messages have a fixed length, while SysEx messages can be any length. They consist of several different parts. The initial byte says, "This is a SysEx message," and the next bytes indicate the manufacturer's unique ID number (assigned by the MIDI Manufacturers Association [MMA] and the Japanese MIDI Standards Committee [JMSC]).

Next comes a message identifying the intended instrument. SysEx messages are received by all devices in a MIDI system, but are ignored by those for which the messages are not intended. Some manufacturers, such as Yamaha, use a separate device ID number that is set on the instrument itself; others, such as Korg, use the basic MIDI channel to which the device is set (although it is also called the device ID rather than the MIDI channel in this case). Either way, this allows you to send different SysEx messages to separate but identical instruments in your system.

After the device ID or basic channel number, the message can include any number of bytes that represent the parameter values, sample data, or any other information. A SysEx message is terminated by a System Common message called EOX, which stands for End Of eXclusive.

BULK DUMPS

One of the most common applications of SysEx is storing and organizing the patches for your MIDI devices in a computer running a librarian program. The parameter values for a single patch, or all patches in an instrument's memory, are sent to the computer in a *bulk dump* from the instrument.

The data is received by the computer and stored on disk. Within the librarian program, individual patches can be organized into banks according to your needs. The patches or banks can then be sent back to the MIDI device. This allows you to save and restore the current state of all MIDI devices in your studio. Most MIDI devices (including synths, samplers, master controllers, signal processors, and MIDI patch bay/processors) can send and receive bulk dumps. Depending on the device, bulk dumps may require a bidirectional connection to the computer in order to accommodate handshaking and error correction.

Jeff Rona, a synth programmer who also does extensive sampling for many film and video projects, uses this application regularly. "I use Opcode *Galaxy Plus Editors* for everything I do with synthesizers. I keep all my sounds organized by type; I have a bell bank, a bass bank, a brass bank, a sound-effects bank, and so on.

"*Galaxy* uses what it calls 'Bundles,' which are snapshots of every patch in every synth in the studio. When I work on a particular project, I create a custom Bundle for that project. When I'm done with the project, I go back to my default Bundle. I think most librarians let you link the bulk dumps from all your synths and save that as a single document. Otherwise, you could put all the bulk dumps in the same folder or directory of your computer hard disk to keep track of them."

Jeff Rona

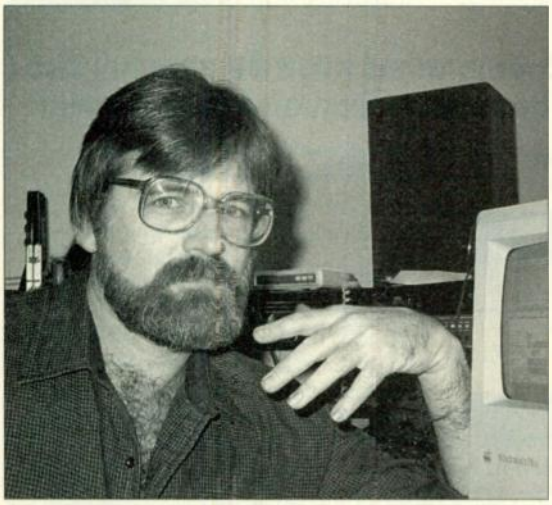
Bulk dumps can also be recorded directly into most sequencers, along with notes, Aftertouch, and other MIDI messages. If you record a bulk dump from an instrument at the beginning of a sequence, the parameter values are sent to the instrument before the music begins. This ensures that the proper sounds are loaded into the instrument, after which Program Change messages can be sent to select specific sounds during playback. If you rely strictly on Program Changes, you could be unpleasantly surprised if different sounds are loaded into the instrument's memory.

According to Dan Phillips, a musician and composer who designs user interfaces and writes manuals for Korg, using basic channels on the master controller to address different instruments can lead to some SysEx bulk-dump problems if you're not careful. "Many people use a keyboard as a master controller, and they change the basic channel on the keyboard to play different instruments in their setup. However, if you send a SysEx bulk dump from the keyboard to the computer while the keyboard is set to one channel, change the channel to play another instrument, then try to send the SysEx dump back from the computer, the keyboard might not accept it because its basic channel has been changed. This is an argument for keeping things on the same basic channel and addressing different instruments with channelization in the computer or a MIDI processor."

Many librarian programs are accompanied by an editor module that displays a "virtual front panel" of the device in question on the computer screen. This editing feature allows you to see many more parameters at once than with most synthesizer and signal processor displays, and it offers graphic representation of envelopes, velocity curves, and other parameters. As you adjust a parameter value on the screen, the computer sends SysEx messages that change the parameter in the MIDI device. The edited sound can then be stored in the librarian module.

effective to change the vibrato rate during a passage; most instruments don't let you assign a controller to the LFO rate. With SysEx, you can ride the LFO rate in your sequence as you would MIDI Volume or Panning, so the vibrato speeds up and slows down. It's another way to provide a little more expression."

These techniques may be of particular benefit when working with older instruments that have limited controller routing; many of these dinosaurs offer SysEx access to their parameters. According to Persing, "The Super Jupiter [a vintage Roland analog synth module] doesn't have a lot of controller routing in it. But all the parameters can be accessed with SysEx. With *Notator*, you can convert continuous controller messages into SysEx, which lets you adjust SysEx-based parameters with continuous controller messages."



Richard Zvonar

Persing warns that too much of a good thing can bog the system down. "You have to be judicious about how much real-time SysEx you use because a synth can only respond to a certain amount at a time. If you overdo it, the data stream gets clogged, and the response slows down. It's not really meant to be a controller. If you do SysEx filter sweeps while changing the attack and release times along with wave sequencing, it can really get screwed up."

There's another important consideration that many people fail to understand. According to Persing, "If you're going to make parameter changes, put the whole patch into the instrument first by sending a SysEx bulk dump. Then you can change the parameter values because they only move relative to a given starting point."

FX CONTROL

Another useful application of SysEx is the real-time control of signal processors. The Lexicon LXP-1, LXP-5, and LXP-15 can be controlled using the MRC MIDI Remote Control, which sends SysEx messages to control many of the units' parameters. Rona puts this capability to good use. "I have an LXP-1 and LXP-5 with the MRC remote, which sends small SysEx messages that can be sequenced. Changing the reverberant space while a piece is playing can add a nice nuance. When the room gets a little bigger, the reverb gets a little heavier. It adds a riding-off-into-the-sunset quality to strings or other synthesizer parts that can be very pretty."

Like many signal processors, the parameters in an LXP can be programmed to respond to MIDI continuous controllers such as Mod Wheel and Aftertouch, but Rona finds this to be less convenient than SysEx. "You have to set it up ahead of time. With SysEx, it's all right there in the MRC; I only need to think about it in one way."

The real-time capabilities of older signal processors can also be enhanced using SysEx. Richard Zvonar is a performance artist who does a lot of electro-acoustic improvisation with some serious signal processing. "I use SysEx to control the parameters of the T.C. Electronics TC2290, which is a high-quality, mono digital delay with lots of memory and a sampling mode, so it can function as a one-shot sampler. The MIDI implementation was designed before it was common practice to control parameters with continuous controllers in real time. However, in addition to bulk dumps, you can use SysEx to 'press' any of the front-panel buttons."

Zvonar uses Opcode's *MAX* on the Macintosh to send SysEx to the TC2290. "Before I had *MAX*, I used *Vision* [a Mac sequencer from Opcode], because it lets you play a sequence by typing a key on the Macintosh keyboard. I was able to stick a SysEx message in a sequence and play that sequence. It was a little funky, but it worked." Now that he has *MAX*, Zvonar can create his own editor/librarians. "I've been writing editor/librarians for different devices in *MAX*. I've got one for the TC2290 and the Lexicon PCM70. Other people have done them, as well. There's one for the E-mu ProCussion and the LXP-5."

But Zvonar's top priority is live performance. "I work with other performers, particularly a bass player named Robert Black. He turned me on to the TC2290, which he used in his solo performances. By sending 'button presses' very fast through MIDI, I can change parameters on the fly and give the appearance of having completely continuous control over every parameter. For example, I can hit the Return key twice, and the time in between is the delay time. If it's in sampling mode, I can enable recording from one key on the Mac keyboard and then hit the Return key to start recording. When I hit the Return key again, it stops recording."

Like Persing, Zvonar converts Control Change messages into SysEx, but he uses a JLCooper FaderMaster processed through *MAX*. "I map continuous controllers into my SysEx-message formatter. It takes a controller value, scales it, and then separates it into the values to be sent as key 'presses' followed by the enter key. The scaling is calculated using a multiplier or a look-up table. I use one fader to control delay time, six faders to control the rate and depth of the three LFOs, and one fader to control feedback."

EOX

The whole point of SysEx is to represent the unique characteristics of each MIDI device. This allows manufacturers, third-party developers, and sophisticated end users to control and organize their electronic sounds. Perhaps some of the techniques revealed here will find their way into your bag of tricks, opening new doors of opportunity into the world of MIDI.

EM *technical editor* **Scott Wilkinson** *served on the executive board of the MIDI Manufacturers Association for three years.*

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Dream Home Studios

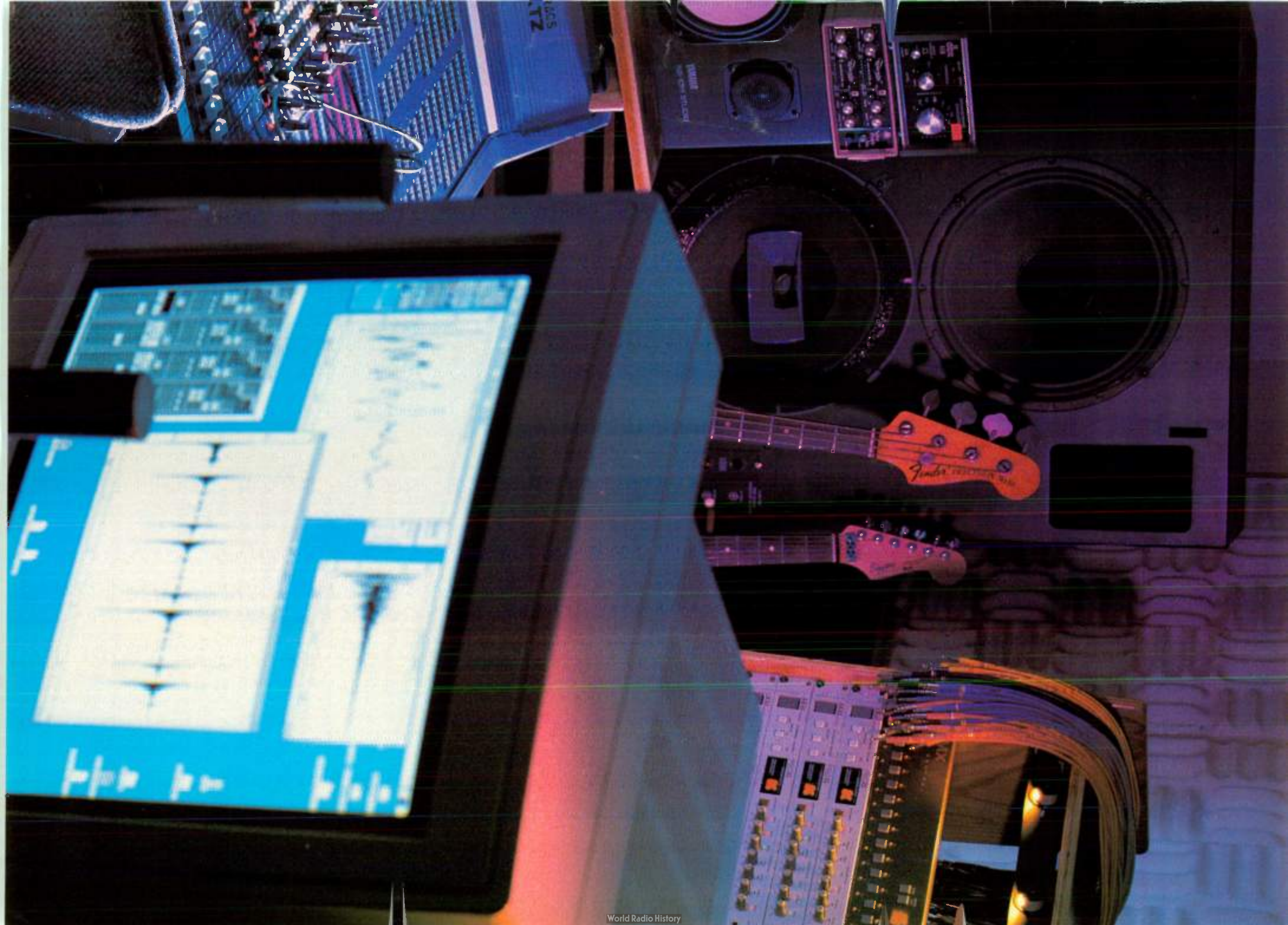
By Michael Molenda

EM looks at five variations on a personal recording theme.

Language can be woefully inarticulate when defining the mysteries of sound. One of legendary recording engineer Fred Catero's favorite war stories involves Carlos Santana's request for a guitar sound like a "flower opening up onto the sun." No recording school can tell you which button to push for *that* timbre.

Catero's anecdote illustrates the difficulty of getting a second party—a recording engineer, bandmate, or producer—to decipher someone's idea of a particular sound. Let's face it, until mind reading is included in the audio-engineering curriculum, realizing an artist's aural desires shall remain an exercise of experimentation and compromise. Some musicians deal with this sonic

Photography by Anne Hamersky



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KAWAI

Digital Magic.

frustration by slamming recording engineers and blaming "the sound" for every rejected demo or missed hit. The smart ones build home studios.

The home studio, or personal recording environment, is a den of liberation. Within its walls, nothing stands between the artist and the artist's vision, except ingenuity and talent. In addition, the artist can configure the home studio to precisely complement his or her work habits. But if you're *still* not sold on the concept, **EM** crashed the home studios of five diverse artists to offer practical insights into the value of a personal recording environment.

THE BASEMENT STUDIO

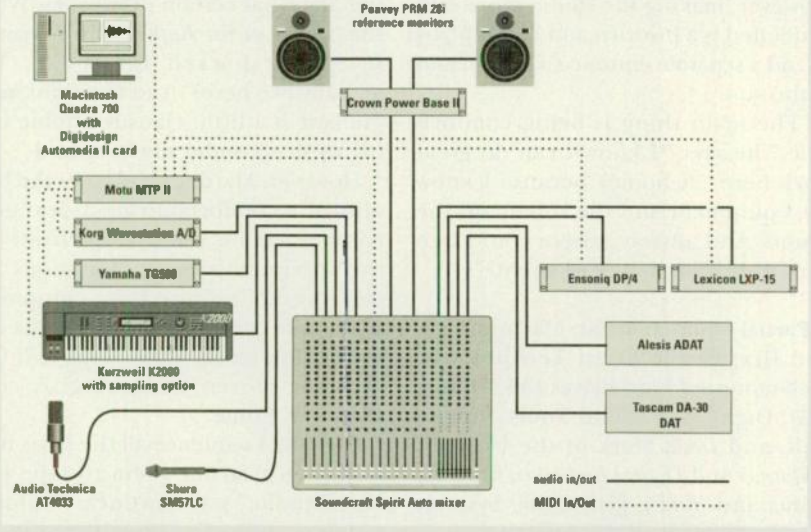
Al Eaton

"I set up my home studio primarily to record demos and have some fun, but it took on a life of its own," muses independent producer and remix artist Al Eaton. "The place has expanded into a

DREAMING THE IMPOSSIBLE DREAM

Well, it's not *impossible* to attain a "dream" studio, but it helps if you can win the lottery first. The following diagram is a purely informational overview of the equipment today's happening home studio might include. Obviously, many fine products can be substituted for what we've chosen as representative samples. So, by all means, feel free to mix and match when equipment lust invades your peaceful dream world.

Apple Macintosh Quadra 700 4/230	$5,039
Digidesign Audiomedia II card	$1,295
Kurzweil K2000 keyboard with sampling option	$3,500
Yamaha TG500 sound module	$1,495
Korg Wavestation A/D sound module	$2,499
Mark of the Unicorn MIDI Time Piece II MIDI patch bay/processor	$595
Ensoniq DP/4 multi-effects processor	$1,495
Lexicon LXP-15 multi-effects processor	$1,050
Soundcraft Spirit Auto mixer (16-channel model)	$5,995
Crown Power Base II amp	$1,099
Peavey PRM28i monitors	$499/pr.
Alesis ADAT 8-track digital recorder	$3,995
Tascam DA30 DAT recorder	$1,299
Audio-Technica AT4033 condenser microphone	$699
Shure SM57LC dynamic microphone	$141
Total System Price	**$30,695**



A signal flow chart of a possible dream home studio set-up.

Dream Home Studios

full-blown 32-track studio with more equipment than some large commercial facilities."

Happily, Eaton's home studio has grown along with his career. In addition to overstuffed equipment racks (see opening photo), Eaton's studio walls are adorned with gold and platinum records awarded for his engineering and production expertise on albums by rapper Too Short and other artists. Recent projects included remixes for Hammer and the production of an Ice-T "Mega Mix" for Rhino Records.

The studio, nestled in the basement of Eaton's tri-level home in the hills of El Cerrito, California, comprises a control room and a large, comfortable vocal booth. Because most of Eaton's projects are sequencer-based, live recording rooms were not a consideration when the studio was planned. (Although the vocal booth is certainly large enough to accommodate drums, guitar amps, and group background vocals recorded in separate passes.)

"I went house shopping knowing that I'd be putting in a studio," says Eaton. "This place won out because it had a two-bridge view of the San Francisco Bay and an entire floor that could be turned into a studio without disturbing the rest of the house."

Because Eaton is at a career juncture where he can pick his projects, he isn't concerned with wigged-out artists rampaging through his living room. ("If I don't trust you, you don't work here.") However, making the studio more self-contained is a priority, and Eaton plans to add a separate entrance, kitchen, and bathroom.

"The main thing is being comfortable," he says. "I know I can do great work here (at home) because I know the equipment and the room and the sound. And anyway, where could I go and find this much equipment?"

Partial equipment list: Macintosh IIx and IIfx; Pacific Coast Technologies rack-mounted hard drives (30 MB to 2 GB); Digidesign Sound Tools, Sample Cell, and *Deck*; Mark of the Unicorn *Performer* and *Digital Performer;* Opcode *Vision* and *Studio Vision;* 360 Systems MidiPATCHER; KMX MIDI Central; Akai S1000HD; Roland JX-8P; Roland D-550; Roland U-220; Roland S-550; E-mu Proteus/1 and 2; Yamaha DX7; Korg EX-8000; Ensoniq SQ-R; Oberheim Matrix-1000; Alesis SR-16; Linn LM-1; Roland TR-808; DeltaLab Effectron JR 1050; Eventide H3000SE Ultra-Harmonizer; Yamaha REV-5; Yamaha SPX90II; Roland SRV-2000; Roland DEP-3; Orban 526A Dynamic Sibilance Controller; BBE 422A Sonic Maximizer; dbx 165 compressor/limiter (2); Furman QN-44 Quad Noise Gate (6); Soundtracs Quartz 48 × 24 × 48 mixer; Tascam ATR-80 2-inch 24- and 32-track recorders; Hafler PRO5000 power amp (2); Yamaha NS-10M, JBL 4412, and UREI 813 studio monitors; Panasonic SV-3500 and SV-3700 DAT recorders; Neumann U87A and AKG 414 B-ULS (3) microphones.

THE APARTMENT STUDIO

Cliff Martinez

A 13 × 25-foot studio apartment isn't exactly the live/work space you'd expect a successful film composer to inhabit. But the $270-per-month room in West Hollywood has housed Cliff Martinez throughout his tenure as a drummer with the Red Hot Chili Peppers and Captain Beefheart, as well as housing the MIDI studio where he produced the film scores for *sex, lies, and videotape; Kafka;* and *Pump up the Volume.*

"I'm a prisoner of rent control," admits Martinez. "When I moved here in 1976, the apartment was $135 per month. It's kind of hard to let go. You see, I've starved throughout most of my career, and I believe the secret of surviving one's devotion to music is to keep your overhead very low. Of course, the place has certain drawbacks. When the producer for *Kafka* came to visit he was pretty shocked. It was like, 'You actually live here?' And I'm thinking; I guess it *is* a little claustrophobic having to sleep under my keyboard."

However, Martinez feels that the benefits of a comfortable acoustical environment more than compensate for the apartment's space limitations. He has recently acquired the equipment to allow recording and mixing his current soundtrack, *King of the Hill* (for director Steven Soderbergh), completely at home.

"Usually I sequence all the parts here and then transfer them to tape in a large studio," says Martinez. "Unfortunately, I always feel disoriented in the big studios because everything sounds

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Dream Home Studios

a lot different than it does in my apartment. Also, it's very stressful trying to mix 40 cues in one week at commercial studio rates. When I mixed *Kafka*, I spent $25,000 in studio time in ten days. Today, for a fraction of that cost, I can *buy* gear that produces pro-audio quality. So now I can simultaneously compose, record, and mix at home. When I get something I like, all I have to do is punch Record on the (mastering) deck."

To date, Martinez's film scores have not included acoustic instruments—"Everything comes out of a black box," he says—so recording and monitoring can be done at relatively low volumes. Such consideration lowers the threat of eviction. Even so, the apartment's thin walls are far from soundproof.

"I'm very lucky my neighbors are quite tolerant about hearing the same four measures of music repeated endlessly over 10-hour stretches," says Martinez.

Partial equipment list: Macintosh Quadra 700; PS Systems and Micronet 45 MB removable hard drives; Opcode *Vision*; Opcode Studio 5; JLCooper FaderMaster; Passport MIDI Transport; Kurzweil PX1000 synth; E-mu Proteus/2; Akai S1000 and Prophet 2000 samplers; E-mu SP-1200 sampling drum machine; KAT drumKAT; Roland Octapad; Lexicon PCM70 (2); Alesis QuadraVerb; Mackie 1604 mixer (2); Yamaha NS-10M studio monitors; Alesis ADAT; Sony TCD-10 Pro DAT recorder; Sony SLV-696HF VCR.

THE OFFICE STUDIO

Russell Bond

"The recording environment doesn't limit the talent of a good engineer," says independent producer and co-owner of CornerMarket Productions, Russell Bond. "It always boils down to the talent of whomever is twiddling the knobs. Good engineers can record great tracks in unconventional places."

Bond should know. His "studio" is in his office at the Music Annex recording complex (Menlo Park, California). Bond's hard-disk recording system is built into a rolling cabinet that can be wheeled to any number of acoustic environments, but many of the voice-overs used in his industrial video soundtracks are tracked right in the office.

"Actually, if the office was better soundproofed, I'd never need a conventional studio," says Bond. "Today, it doesn't really matter how many tracks you can record, or what audio format you use. It comes down to whether you have a good listening environment or not. That's the critical factor in producing great audio, and I'm comfortable with the sound of my office. The only problem is that I'm in the same area as the gear, so the (recorded) noise floor is sometimes masked by equipment hums and computer noises. The ideal monitoring environment would allow me the space to isolate the

Russell Bond

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Partial equipment list: Macintosh Quadra 950; Digidesign *Pro Tools* 8-track system; JLCooper CS10 MIDI console; Summit Audio TPA200A dual tube preamp; Lexicon 300; Neumann U47 condenser microphone (2); AKG 460 microphone; Sony 2500 DAT modified with Apogee filters. Tannoy PBM 6.5 studio monitors.

THE BUNGALOW STUDIO

Reek Havok

Leave it to a drummer to construct an entire studio around a drum stool. When percussionist and sound designer Reek Havok decided to turn a detached 14 × 23-foot bungalow into a home studio, the ergonomics were determined by his playing position.

"I built the studio around a 'center of the universe' concept," says Havok. "Basically, everything is within arm's reach from my drum seat. I can spin around and work at the Macintosh, or the mixer, or the keyboard controller. My monitor speakers are hung from the ceiling and tilted at a 45-degree angle so I can hear them at each position."

Originally, the system was composed of an electronic drum kit hooked up to a Macintosh. However, Havok's increasing success as a sound designer necessitated the acquisition of more MIDI and recording gear. "Everything kept evolving around the circle," he says.

The natural evolution did not extend to the bungalow itself, which was renovated to provide suitable sound isolation. The interior was stripped down and replaced with insulated double walls and a window—which Havok wanted for natural air and sunlight—was soundproofed by mounting two

EM EDITORS AT HOME

Recently, someone (who should know better) tried to upset me by implying that failed musicians become music journalists. Very funny! But just in case there are a few readers out there with similar ideas, rest assured that the EM editors are *very* intimate with faders, EQ, signal processing, MIDI magic, and rolling tape (or hard disks). And when we get intimate with inspiration, we document the spoils of creativity in our own personal recording environments.

Bob O'Donnell
Editor

The home studio I've put together is a typical in-an-apartment-corner system that I use for equipment reviews, composing, creating sequences for live performances, and just fooling around. The nerve center is a CD ROM-equipped Mac with a multiport interface.

My main controller is a MIDI guitar, but I often have a number of test and/or review keyboards available, as well. I use these to control a sampler and assorted synth modules. Because I recently sold my cassette multitrack, my recording efforts now involve experiments with hard-disk systems.

Steve Oppenheimer
Products Editor

My studio is oriented toward live performance, MIDI sequencing, and arranging. I didn't invest in a lot of recording gear, because I'd rather prepare sequences at home and take a rack and a Macintosh SE/30 to a pro studio for audio tracking. Therefore, my major equipment considerations are portability—it's essential that equipment be moved in and out with minimal disruption—and comprehensive MIDI control.

A deep, top-loaded road rack with eight rackspaces below holds my 16-channel mixer, sound modules, signal processors, MIDI interface/patch bay/processor, and power conditioner. Additional racks hold amps and devices that stay home. I rely heavily on a blend of sampling and analog synthesis, especially my antique Rhodes Chroma and Chroma Expander. (The Chroma Expander also travels to gigs.) The whole rig is controlled from a master keyboard, a strap-on keyboard, and a custom XYZ pad, routed and processed in the MIDI patch bay. Review products plug into preconfigured "guest" locations and patch points.

Michael Molenda
Managing Editor

I don't have a home studio because I own a professional recording facility. This isn't as great as it sounds. For one thing, I can never get in when the muse strikes. The studio is almost always booked, which means if *I* want to record something, I often have to sneak in late at night or early in the morning. In addition, the sheer scope of the operation—turning on all the equipment, de-gaussing and aligning the deck, grabbing mics from the storage cabinet, patching up signal processing, and so on—is not conducive to the casual "notebooking" of musical ideas. (I always feel guilty unless I'm striving to record incendiary performances.) Consequently, my real demo studio is comprised of a Walkman tossed on the living room couch to record acoustic guitar and voice.

Scott Wilkinson
Technical Editor

Mine is hardly a "dream" home studio, but it serves its two major applications quite well: testing and evaluating products for EM reviews and recording demos for my wife, who is a singer/songwriter.

The studio is designed primarily for sequencing with a computer, MIDI wind controller, one keyboard, and various synth modules. (Most of my synths are microtonal, which lets me experiment with alternate tunings.) I record acoustic parts onto a ¼-inch, 8-track tape deck and mix to DAT or cassette. The next step in the evolution of the studio will be the addition of hard-disk recording and CD-ROM.

Although the equipment is not intended to be portable, a rack—containing a synth module, signal processor, and MIDI processor—and the wind controller can be quickly disconnected from the studio and taken to a gig, jam session, or class demonstration.

Jon Plutte

Partial equipment list: Macintosh IIx (8 MB RAM/60 MB hard disk); Digidesign *Sound Tools*; Opcode *Studio Vision*; Lone Wolf MIDITap (3); JLCooper SyncMaster; Dynacord ADD-Two sampler; E-mu Emulator III; E-mu Proteus MPS; Kawai K1; Yamaha DX9; E-mu Proteus/1, 2, 3, and ProCussion; Simmons SDE; E-mu SP-1200 sampling drum machine; Lexicon PCM 41; Ibanez HD-1000 Harmonizer; Dynacord DRP-20; DigiTech DSP256XL; Roland SRV-2000; Marshall 9000 guitar preamp; KAT drumKAT; KAT MIDI Mallet Controller; custom "Reek Havok" drum pads; Dynacord MCX 16 × 4 × 2 mixer; Yamaha 1602 submixer; BGW 250B and UREI 6290 power amps; JBL 4410 studio monitors; JBL 4699B Cabaret loudspeakers; Sony DTC-700 DAT recorder.

double-glazed, sliding glass plates.

"You do whatever it takes to produce great sounds, but it seems easier to break the rules when you're the lord of the manor, so to speak," says Havok. "For instance, I just finished a rave track for Dr. Fiorella Terenzi using sampled radio waves from her *Sounds of the Universe* CD. For this track, I played drum samples on the keyboard instead of my (electronic) kit and performed keyboard pads on the drums because my sticks are faster than my fingers. Who's going to know?"

THE MOBILE HOME STUDIO

Jon Plutte

"I was sick and tired of getting hung up by technology," says Jon Plutte, guitarist and songwriter for the up-and-coming alternative country duo Bolshoi Rodeo. "For years I was a prisoner of

Dream Home Studios

my Macintosh, my MIDI gear, and a sequencing program. I finally realized that I was messing with machines instead of writing music."

To focus more on composing, Plutte sold his MIDI studio and replaced it with a simple "songwriter's system." The revised studio fit perfectly against a living room wall inside the mobile home he shares with his wife and three-year-old son, Max. Renovations were limited to construction of an equipment cabinet and mixer/recorder desk.

"The simplicity of the system allows me to do what I do best, which is play guitar and write songs," says Plutte. "Also, because I'm working in a familiar place, all the recording parameters are second nature. I know where to place the vocal mic to get the best sound and how to preset my guitar levels. Everything is set up so that nothing interferes with getting song ideas on tape, and the living room provides a cozy recording environment."

The sketchbook system matches the organic method that Plutte and Bolshoi partner and singer/songwriter Denise Bon Giovanni use to develop songs. "Stupid" drum tracks are programmed to establish tempos, and time code is recorded to facilitate revising the percussion after bass and guitar parts are tracked.

"We generally go around and around in circles until the song feels right," explains Plutte. "It's kind of like sculpture. We keep chipping away until the right performances and ideas are discovered."

Partial equipment list: Tascam 488 Portastudio; Harmon Kardon HK395i power amp; Boston Acoustics A60 stereo speakers; JBL Control SB-1 subwoofer; Alesis SR-16 drum machine; JLCooper PPS-1 synchronizer; ART Multiverb; dbx 363X Dual Gate; Mesa-Boogie Caliber 22 guitar amp; Shure SM57LC dynamic microphone.

PERSONAL BEST

As you can see, a "dream" home studio is just about any system that allows an artist the freedom to produce better work. It's as simple as that. For Al Eaton, this means having a virtual toy store of technology, while Jon Plutte desires only basic documentation gear.

At its highest technical level, a home studio empowers the creator to determine the end product—a perk that, until fairly recently, remained the province of commercial recording facilities. Society can only be enriched by audio productions that are nurtured—beginning to end—by talented and visionary artists. Why shouldn't musicians be as self-sufficient as painters, who surely do not want, or need, an intermediary to mix the colors awaiting the canvas?

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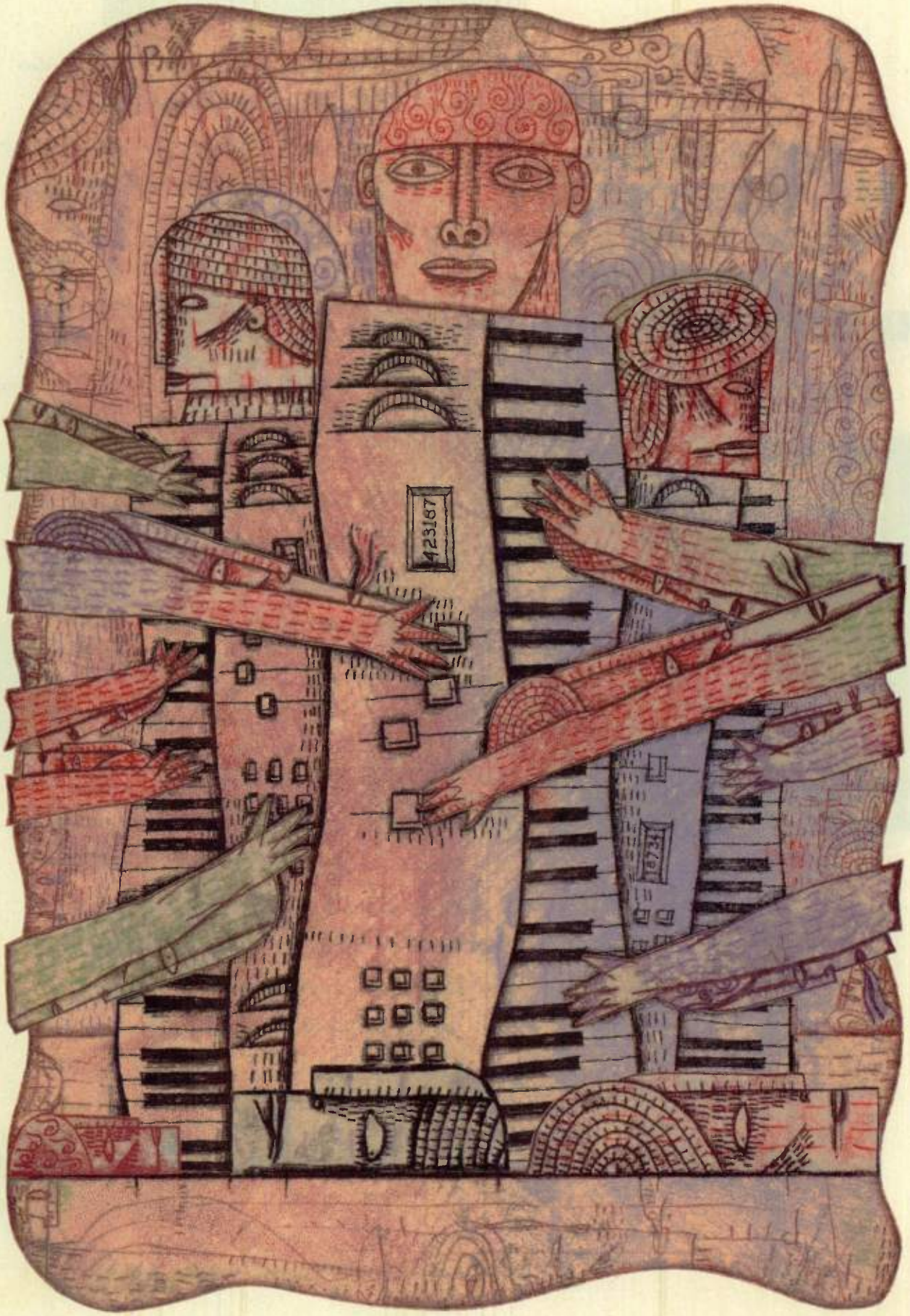


By Dan Phillips

The Virtuoso Synthesist

Synthesist, know thy instrument.

et's get one thing straight right from the start: It's okay to play synthesizers without programming them. Acoustic musicians are perfectly capable of producing beautiful, new, innovative music using the same sounds night after night, and there's no reason that playing a synthesizer should be any different. The factory sounds of today's instruments are by and large superb, and musicians should feel free to use them in clubs and on records without guilt.

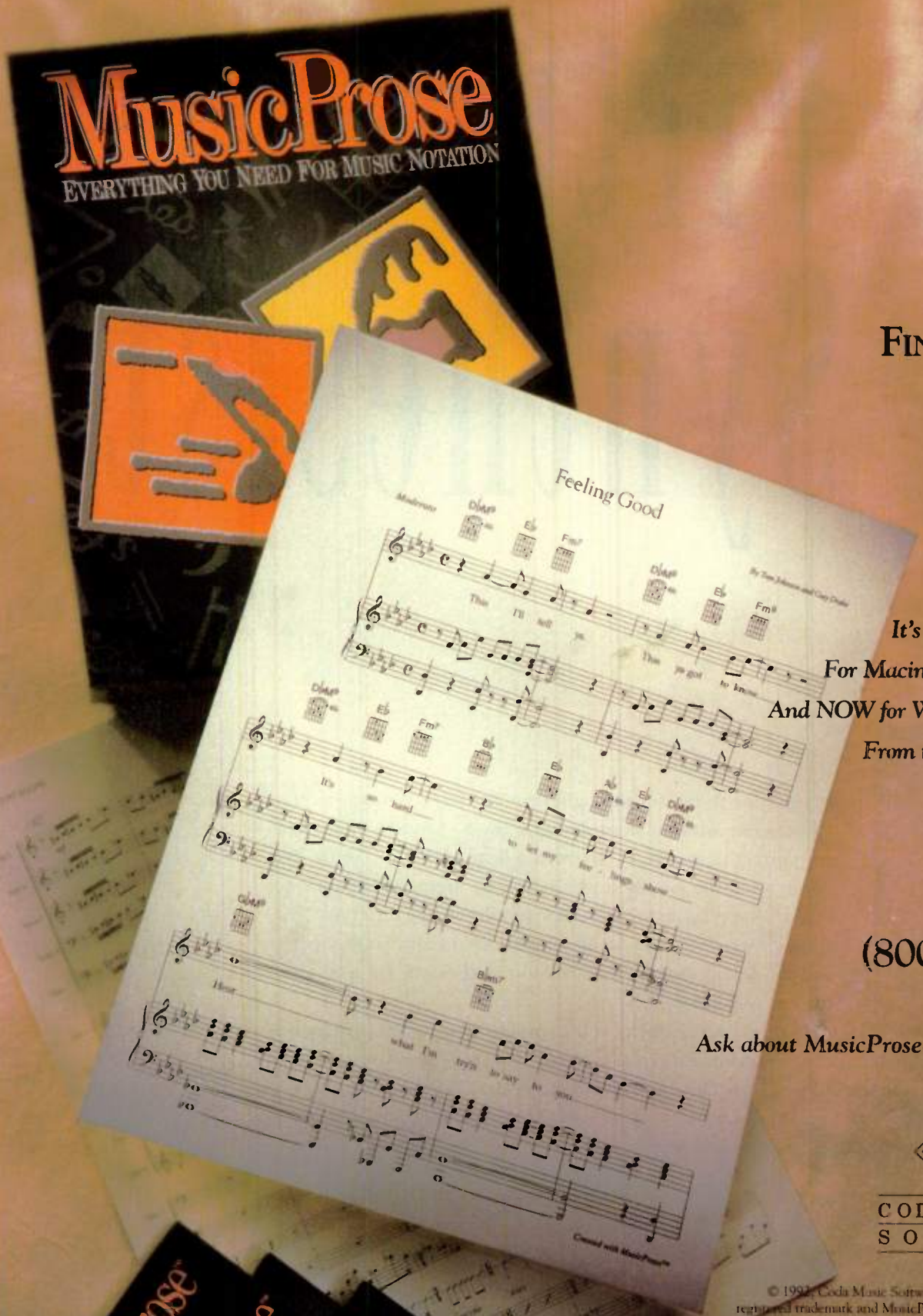
However, the flexibility of the synthesizer is part of what makes it such a uniquely expressive instrument. The ability to create your own virtual instrument—or just to add a few strings, bells, or Tibetan monk choirs to an existing one—is an opportunity unavailable to acoustic musicians. This capability can help make your music even more expressive and personal.

SOUNDS IN CONTEXT

Even if you don't program your own sounds from scratch, you can still make a measurable difference in your music by modifying sounds to complement each another and the piece in which they are used. For instance, Thomas Dolby, a long-time innovator in

Illustration by Richard Downs

THE RIGHT PLACE TO START



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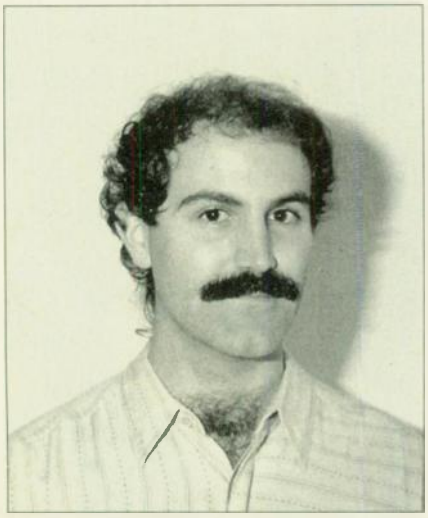
synth pop, carefully controls the amount of space that a particular sound takes up in the mix.

"I tend to exaggerate whatever I consider to be the dominant characteristic of a sound. If I have a sound with a lot of resonance, I'll make sure that the EQ in the mix supports that. If its function is resonance in the middle frequencies, I won't add any top to it at all. The toppy sounds are the percussive sounds, brassy synth sounds, and vocals or backing vocals. On the bass part, there's quite often nothing to EQ above, say, 3k or 4k. Be aware of the function the sound is performing; the best way to economize is to make it efficient in that function and not bother with other areas, so that it doesn't compete with other sounds.

"Another effect that I like a lot is to take a sound that's quite low in register, such as a bass, and take all the bass out of it, either with a highpass filter or with EQ on the mixing board. That way, it doesn't take up a lot of space like it would if you left it bassy, but it's still quite low in register, and you can pick out the melody it's playing down there; it almost becomes invisible or transparent."

Manny Fernandez, an independent sound designer who has worked with a number of companies (including Yamaha, Korg, and Kurzweil), cautions against building an arrangement out of sounds with similar envelope characteristics. He warns that similar attacks and decays can make sounds blur together in the mix, just like the "spectrum clutter" that occurs when too many sounds are placed in the same frequency range.



Manny Fernandez

Conversely, editing envelopes to give each sound its own contour helps keep sequenced parts distinct, making the individual instruments easier to hear. Because changing the attack often alters the apparent Note On time, you may want to slip some tracks forward or backward in time to reestablish the groove.

Gerry Basserman, formerly of E-mu Systems and now the proprietor of Opus 9 Productions, adds that "too many people use sustain levels that are too high, like horn players with tremendous diaphragms. That screaming sustain is a dead giveaway for electronics. Lower sustain levels give new notes a chance to sing, to be heard as they come in, in addition to being more realistic."

We all take care that our synths are in tune before going to tape, but Mike Peake of Technosis (who has created sounds for a long list of synths from Ensoniq, Kawai, Korg, and Yamaha) suggests a few types of tuning that one might overlook. "The (Roland) TR-808's kick drum has a pitch, an actual tone, which can be dissonant with other notes. One thing that makes the 808 sound so good is that the snare drum is tuned to a precise, consonant interval with the kick. If you've got a snare drum tuned to something like a seventh above the kick, that will add dissonance and tension to the song that doesn't resolve.

"Also, when creating a sound with a strong, resonant-filter attack, such as a bass sound, start the resonance at a frequency that's in the key of the song. Set the filter-envelope sustain to maximum, bring in the resonance, and adjust the filter frequency until you hit a properly tuned harmonic. Once you have the harmonic, take the sustain back down and set up the envelope and filter modulation to create the attack 'pluck.' That will create a much more effective bass sound than doing it by guesswork."

MODULATION

The ability to control synth sounds with performance gestures—Velocity, After-

touch, wheels, pedals, and so on—is crucial to expressive, organic sounds. Basserman is an advocate of what he calls "subliminal real-time control." The idea is to add small nuances to the sound—some performer-controlled and some not—to "relieve the tedium of samples and give them some ebb and flow on a very basic level," according to Basserman. For instance, he invokes a slow modulation of pitch with very slight pressure. He also likes to route a single controller to multiple destinations, such as having the mod wheel invoke volume modulation as well as vibrato, so the vibrato effect itself isn't as overt.

If your synth modulates envelope times and levels, you can use this to your expressive advantage. Jack Hotop, product manager of keyboards for Korg USA and a veteran programmer, suggests some applications. "For a piano sound, use Velocity to lengthen the decay segment of the filter and amplitude envelopes. When you strike a piano key with more force, it's certainly going to ring for a longer time and have more harmonic content. You also can use Velocity to shorten the decay time for certain sounds, to make them punchier, more percussive. This kind of modulation can add more realism to an emulative sound, or a purely synthesized sound, for that matter."

Wendy Carlos, a driving force within electronic music since the field was born and a Grand Master Synthesist if there ever was one, is a firm believer in the values of real-time control. While working on her latest album, *Switched-On Bach 2000*, she frequently maintained continuous and separate control over the volume and brightness of a sound, using two footpedals as she recorded into the sequencer. Although this approach is quite labor-intensive, it allowed her a great deal of freedom in phrasing and note-shaping, in stark contrast to the normal routing of Velocity to both parameters at once.

She uses a string sound as an example. A "normal" modulation routing might have Velocity controlling brightness, volume, and attack time. This means that all notes with fast attacks also are bright and loud, and all notes with slow attacks are dark and soft. Carlos points out that real string players have a wide variety of articulations at their disposal; a loud note might have a slow attack.

To allow such choices, Carlos controls all of the parameters with

Wendy Carlos

separate controllers; two foot pedals for volume and brightness, and Velocity controlling the attack. In this way, she can swell into and out of a note, which is impossible using just Velocity. The trade-off is the fact that the sounds rely much more on the performer (no more sloppy playing saved by a great sound) and require a great deal more effort in performance.

OUTBOARD PROCESSING

When we think of using outboard processing on synth sounds, effects such as reverb and chorus are probably the first to come to mind. However, Dolby uses dynamics processing for expressive purposes. "There's an effect in 'I Love You Goodbye' (from the new album *Astronauts and Heretics*) that is created with an organ chord gated from the track. That's something I do quite a lot, actually. I'll have a sequencer open a noise gate in eighth notes, or possibly sixteenths. By messing around with the attack, decay, and mix settings of the noise gate, you can add a little throb to the sound, which helps to propel the song along.

"On a lot of my sounds, the envelopes are crucial," Dolby continues. "It's hard to get a floaty, dreamy envelope, one that's just long enough to give you some space and perspective and yet still has that impact at the front of it." One of his solutions is to use a compressor to alter the envelope. "I'll have a single synth playing stabs, or a chord with a long release on it, and really slam it into the compressor. By varying the compressor's attack time, you can get a really good 'clunk' on the front of the sound, while it brings the level at the end of the sound back up. So with the compressor, you get a very different kind of envelope."

Thomas Dolby

Wendy Carlos often uses external filtering to further refine the expressive or emulative characteristics of a sound. For instance, on *Switched-On Bach 2000*, she modulated a synth through a phase vocoder when simple, dynamically controlled filters proved insufficiently expressive. She also frequently uses EQ to simulate the formants (fixed, characteristic resonances) of an acoustic instrument.

COMPONENT SYNTHESIS AND LAYERING

"The idea of component synthesis is to

The Virtuoso Synthesist

take sonic elements—not necessarily simple elements, but elements that occupy their own frequency range—and combine them to create an awesome, complex sound," explains Eric Persing, a studio synthesist and longtime sound developer for Roland. He notes that this can be done either within a single instrument, or by layering different synths via MIDI.

"For instance, you could start with a sound from a Super Jupiter (an analog synth module). A wide-open sawtooth is a typical analog sound. Close the filter way down, so it's just a sort of rumble; that particular rumble is different, you can't get it from a digital synthesizer. Then, if you use a really wide-open sound from an M1 or a JD-800 or something that's really bright, and you mix that in just a little bit, you get a sound that's unique."

Hotop likes to inject some serendipity into the layering process. "After I've accumulated a lot of patches, programs, and tones, I'm ready to assemble complex layers. The first thing I do is play a roulette game. I pick a sound and then go through the remaining sounds and try layering them in different ways, in unison or octaves, say. If something stimulates me, I'll work on refining it further."

Stacking sounds should be done with caution, however; excessive layering can result in muddy sound. "I almost never use more than two layered instruments for a bass sound," says Persing. "If you get a lot of things happening on the fundamental, then everything just goes out the wazoo."

Dolby concurs. "Very often when you keep adding sounds, there comes a point when it gets smaller instead of bigger. If you find some really dynamic and individual sounds, then just a handful of them used correctly gives you a bigger sound than 64 virtual tracks of different synths. I think if you restrain yourself a bit and go for individuality, you end up with a much bigger-sounding track."

> "I tend to exaggerate whatever I consider to be the dominant characteristic of a sound."
> —*Thomas Dolby*

STRETCHING PCM

Most of the instruments available today are based on some form of sample-playback technology. Samples are often designed as emulative sounds, but with some creative mangling, they can be turned into something unique, eminently useful, and remarkably far from the purpose intended by their creators.

"I think it's important that PCM sounds cover an 88-note range, even if the sound normally wouldn't exist over that entire range," observes Hotop. "A bass doesn't sound the same played at

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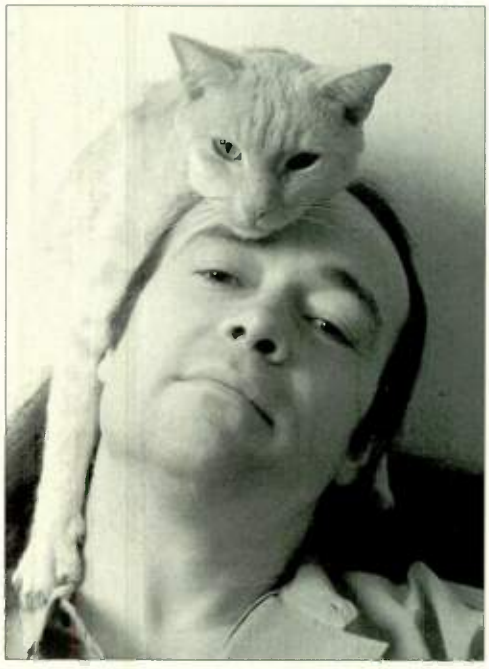
the top of an 88-note keyboard. This allows the sound to become an important component in another patch. I just created a pedal steel sound based on an electric guitar sample, but I used a fretless bass with a very soft attack to create the sound's body."

The realism of sampled attacks led to the popularity of sample-based synthesizers, but Fernandez points out that those attacks have their drawbacks as well. Their character can be so strong that it's hard to modulate them effectively, and their transients can become splayed and unnatural if transposed too far.

When this problem arises, Fernandez utilizes only the looped portion of the sample and grafts on a new, synthesized attack, not unlike L/A synthesis in reverse. He then crafts the attack to his own specifications for a sound that tracks the keyboard better or responds more naturally to the player's touch. "Some of the strangest things you do," Fernandez comments, "are in the quest for normalcy."



Jack Hotop

HARMONIC SYNTHESIS

All synthesis techniques have their own strengths and weaknesses; it's a common trick to combine several different types of synthesis to achieve sounds that no one technique could do alone. Witness the L/A component synthesis of Roland's D-50, for instance, or Yamaha's hybrid FM/sample-playback SY77 and SY99. Peake, an enthusiastic student of additive synthesis, has developed a new and effective combination. He uses a few, carefully placed, additive-style harmonics to enhance sampled sounds. He calls this technique "harmonic synthesis."

"One of the things I did that illustrates harmonic synthesis was my M1 bank on the K4," he explains. "The M1 has two samples of electric pianos, each with its own distinctive timbre. To

duplicate these sounds on the K4—and I think I came pretty close—I took the mellow electric-piano sample and then tuned a sine wave oscillator until I heard it match the strong harmonic on the M1 electric piano sound."

Peake suggests a relatively easy procedure for identifying key harmonics. "Take a sample of an acoustic sound and send it through a bandpass or lowpass filter with very high Q. While sustaining the note or retriggering it, slowly sweep the filter upward. When you suddenly hear a tone, that's a harmonic; the ones that jump out are the more important ones.

"Then tune additional oscillators on a synth to those harmonics, hopefully with their own envelopes and filtering," continues Peake. "I typically suggest using a sine wave, unless you want special effects. Also, the higher harmonics should be lower in volume and less complex waveforms.

"Sometimes the harmonics are out of tune with the fundamental, which gives acoustic instruments some very interesting properties. Standard electronic waveforms such as a sawtooth have harmonics that are always in perfect mathematical ratios. Acoustic instruments have harmonics that often go sharp or flat, sometimes depending on velocity. For instance, you might use a pitch envelope to make a harmonic slightly sharper at the onset of a note."

Harmonic synthesis also can be used for subtle enhancement. "I've worked with the ESQ-1, which doesn't have a lot of bass," Peake recalls. "There are bass samples, but they don't have any bottom. To get around this, you can take a sine wave from an extra oscillator and tune it to the fundamental, which adds some 'oomph' and thickens the sound up a lot.

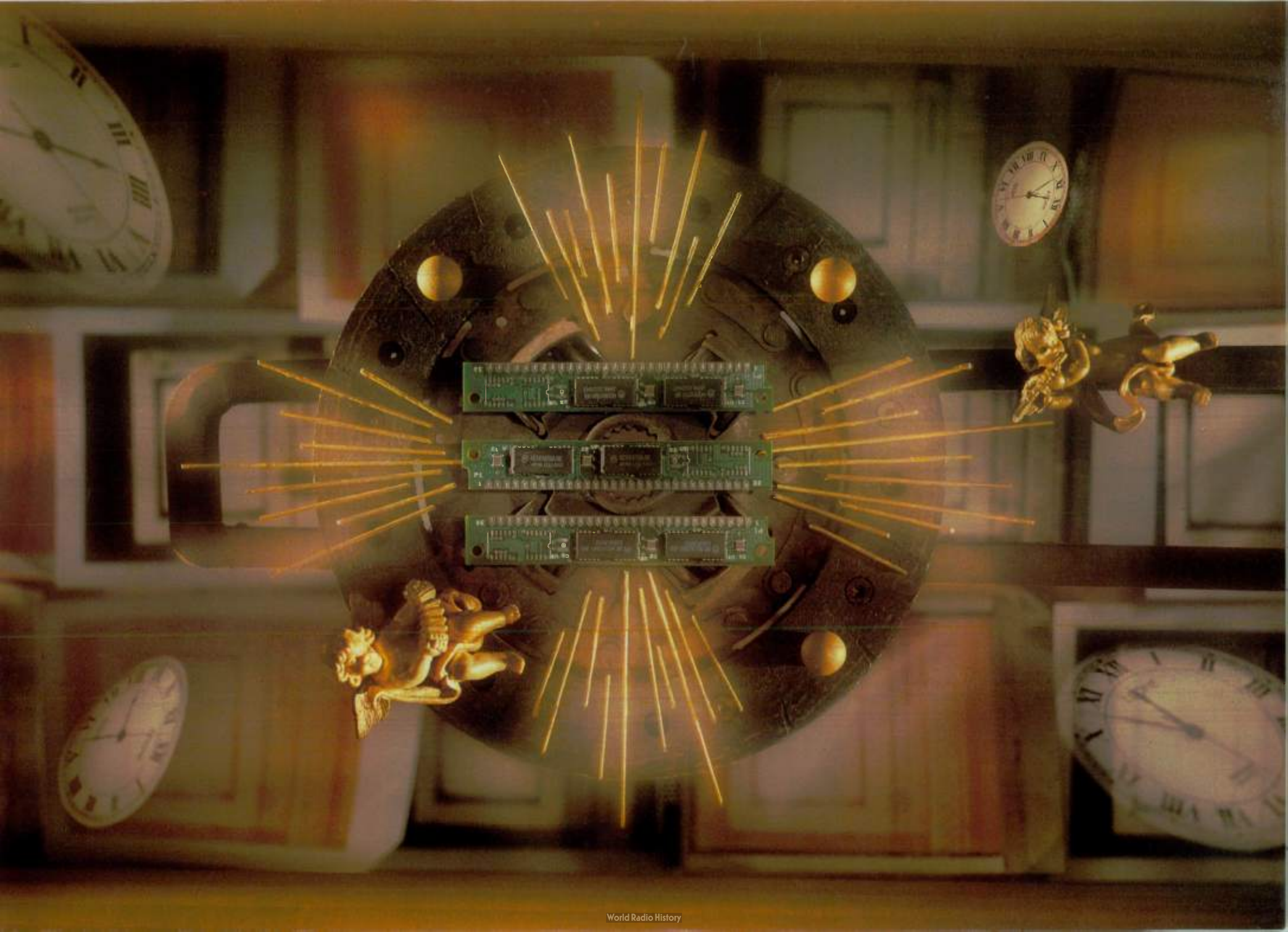
"If you want to make the sound a little rounder and not necessarily as heavy, add a sine wave on the harmonic an octave above the fundamental. That's the harmonic that makes the Fender bass sound so cool. Similarly, if you want to make a really cool bass sound on the Minimoog, take two sawtooth waves and tune them an octave apart. Lower the volume of the higher one a bit, and tune it slightly sharp. That's much more powerful than just putting them at the same frequency and detuning them."

PUT IT INTO RAM

A final tip from Basserman: As soon as you decide to use a sound from a ROM bank, move it to RAM. When a sound is in ROM, it's too easy to say, "Well, that's the way it is; it's okay if it's not quite right." If you ever feel the need to modify the sound, having it in RAM ensures that there are no barriers—or excuses—in your way.

So put those sounds in RAM. You needn't feel committed to changing them; after all, there's nothing wrong with using factory patches. But then, if you ever feel like the sound isn't sitting in the track as you'd like it to, or if you want just a little bit more Velocity sensitivity, or if you sense the need for a few more chanting Tibetan monks in your digital pad of doom, just reach in and yank. Your music will be all the more your own.

Dan Phillips *is a product specialist at Korg Research and Development. Special thanks to mentor and synthesist extraordinaire John Bowen for his help on this article.*



The Power Within

By Bob O'Donnell

Use these tips to supercharge your computer for music.

In this digital age, power may still corrupt, but absolute power is pretty rare because few know how to tap into it. Multi-thousand-dollar computers sit on our desks and in our studios awaiting our active involvement, yet much of their potential remains unfulfilled, and much of their processing power goes to waste.

If you're like nearly 90 percent of our readers, you own a computer that you use at least part of the time for music. You've probably invested a good chunk of money in the hardware, software, and accessories. But unless you've worked to enhance its capabilities, you're not receiving the best return on your investment.

Thankfully, this situation is not difficult to rectify. The first step in turning your vanilla PC, Mac, ST, or Amiga into a chocolate-covered, cherry-topped, music-making machine is assembling the right

Photography by Tetsuji Yoshida

The Power Within

components, both hardware and software. Once that's done, you can take additional steps to optimize your system's performance for music. (A lot of the suggestions included here also apply to non-music applications.)

THE RIGHT STUFF

Before diving in too far, assess your current gear. Do you have enough computing power to last you a few years? If so, pass Go and collect $200; if not, consider supercharging yourself into a new computer. It's a big step, but with the price/performance ratios of computers improving nearly every week, you can certainly get good value for your dollar. In fact, you may find it's less expensive to buy a new machine than make massive enhancements to an under-powered computer.

Should you decide to purchase a new system, remember one word: expandability. Make sure the computer you buy has room for more RAM and hard-disk storage, a better display, several expansion cards, and connections for external hardware (see "Music Boxes" in the February 1992 **EM** for more).

PUMPING UP

Without question, the most cost-effective way to improve your computer's productivity is by adding RAM. Extra memory gives your machine more breathing room for processing and lets you open several applications and switch between them without quitting one and starting another.

For example, by running your sequencer and universal editor/librarian program simultaneously, you can tweak patches while you work on a sequence. RAM costs about $40 per megabyte (although at press time RAM prices are rising) and is typically user-installable. I recommend 4 to 8 MB as a practical minimum, but 20 is by no means extravagant.

Apple's Quadra 950 offers impressive processing power but requires a Serial Switch system extension to work properly with MIDI.

Unfortunately, many DOS programs don't take advantage of memory beyond 640 KB, so adding more memory won't improve performance. However, you can load drivers and DOS into this extra RAM (called "high RAM"), leaving more standard memory available for programs. (See sidebar "Stupid DOS Tricks" for more information.) *Windows* applications can take advantage of whatever memory the system has available.

You'll need a memory manager to access the extra RAM in a DOS machine. For expanded memory, try *EMM386.EXE* (included with DOS 5.0). If you're using *Windows*, use an extended memory manager like *HIMEM.SYS* (also included with DOS 5.0). QuarterDeck's *QEMM* can make more memory available when used with or without DOS 5.0's memory managers.

The next consideration is your hard disk. If you work only with sequencer and notation files, 120 MB should be enough, but if you do any work with 8-bit digital audio, multimedia applications, and other disk-hungry activities, 250 MB should be considered a minimum requirement. Adding large-scale, 16-bit hard-disk recording to the equation increases the capacity requirements even further. Recording CD-quality digital audio eats up hard-disk space at a rate of about 5 MB per track-minute. (Don't forget to include the cost of an efficient back-up system such as a data DAT drive, optical drive, or other large-capacity removable device.)

Large monochrome monitors such as the Radius two-page display work very well with music programs.

You can increase your hard-disk capacity by replacing your internal drive, adding an external unit, or both. Large hard disks have the added benefit of increased speed due to shorter access times; you should notice a general performance boost in almost everything you do. If you're doing serious hard-disk recording, consider a large, separate hard disk dedicated to the task, leaving programs and other data on another disk.

THE NEED FOR SPEED

Speaking of speed, an accelerator board and/or math coprocessor can really supercharge your computer's performance. Many PCs offer easy microprocessor upgrades by swapping the existing one with a faster model. Intel's new Overdrive processor, which doubles the speed of the resident microprocessor's internal calculations, is an attractive option for newer PCs. Several hardware developers for the Mac, ST, and Amiga offer accelerators that can significantly increase performance at a price much lower than buying a new machine. Mac users can look at DayStar Digital products (tel. [800] 972-8711; or [404] 967-2077), ST users should consider Fast Technologies (tel. [508] 475-3810), and Amiga users can call Great Valley Products (tel. [215] 337-8770). Apple even offers upgrade paths to turn yesterday's models into today's wonder machines by swapping the motherboard.

Music programs do not universally work with all accelerators, so call software manufacturers to check compatibility before you invest. For example, some 68040-based accelerators for the Mac don't work well with Digidesign products.

Math coprocessors are a less-expensive option and make a big difference in most digital audio applications. However, they generally have little or no effect on sequencers and notation programs. Consequently, if you don't do a lot of digital audio work, you're better off spending that money elsewhere.

THE BIG PICTURE

Many music programs are graphically oriented, so a large monitor makes a big difference. The more you can see at once, the more you can do. As a recent graduate to a 16-inch monitor, I can testify to the benefits of a larger display area, particularly with notation software.

New Amiga graphics chips (already available on the Amiga 3000, 4000, and some 500/2000s) add high-resolution modes when used with the appropriate monitor. The addition of a de-interlacer to the Amiga 500/1000/2000 fills the screen with 640 × 400 detail without the annoying interlace flicker.

Many electronic musicians prefer large monochrome monitors because music software sometimes takes poor advantage of color, and monochrome monitors are less expensive. On the other hand, some products use color to make the screen more readable. If you want color, invest in an accelerated graphics board to improve the monitor's performance. The built-in video support on many of today's Macs and PCs may be convenient, but it can dramatically slow the computer's overall speed.

Commodore's new Amiga 4000 is based around Motorola's powerful 68040 microprocessor.

Even if you have a color system, try switching it to monochrome or 16-gray-scale mode when using music software; sixteen shades of gray maintain the cool 3-D look that many new programs and operating systems employ. In addition to speeding up screen redraws, this reduces the eye fatigue that can result from extended exposure to color monitors.

If you have a Mac, PC, or Amiga and want to stay on the cutting edge, buy a CD-ROM drive (there is virtually no support for CD-ROM on the Atari at this time). Now that access times and prices have fallen to reasonable levels, invest in a fast, XA- and Photo CD-compatible drive. Look for drives with access times of 350 ms or less for best performance. More and more products are appearing on disc, including multimedia titles, sample and sequence collections, clip music, and more, and you need a CD-ROM drive to be able to use them.

You may want to pick up a pair of powered computer speakers. The best speaker systems are those with multiple inputs, which let you connect the output from your computer or sound

The Power Within

board and a CD-ROM drive without swapping cables or using a mixer. If you have a mixer and sound system near your computer, you can always use it for this purpose, but it's nice to have a separate set of speakers. Make sure your speakers are well-shielded, or the speaker magnets may erase the information on nearby floppies and possibly even hard disks, and they can induce noise from RFI and EMI interference.

SOUND AND MIDI

If you own three or more MIDI devices, invest in a multiport MIDI interface or programmable MIDI patch bay. With separate MIDI Ins and Outs for each device, you can quickly and easily send SysEx bulk dumps and increase efficiency by reducing the amount of data flowing in any one cable. Many multiport interfaces also function as MIDI patch bays and processors, which can help organize and streamline your entire studio. (See "Making Connections" in the January 1993 **EM** for more information on MIDI patch bay/processors.)

PC owners should consider investing in one of the latest generation of 16-bit sound cards. (See "Computer Musician: Multimedia PC Sound Cards" in the January 1993 **EM** for a chart listing recent models.) These cards provide low-cost hard-disk recording and sound playback for multimedia titles and games, although the hard-disk recording capabilities of cards in the under-$400 range tend to be minimal. In addition, these sound cards often function as inexpensive synth sound modules. More and more music programs directly support these onboard synths, which makes them convenient for quickly checking out MIDI files or fleshing out a rough arrangement without firing up all your gear. Additional synthesizer cards for the Mac and Amiga should be available by early 1993.

If you're serious about digital audio, consider purchasing a dedicated hard-disk recording card instead of a sound card. These are currently available for the Mac, PC, and Amiga. The new Atari Falcon030 includes the necessary hardware for 16-bit digital recording. A dedicated system offers improved reliability and audio quality, an upgrade path to more tracks (in most cases), and better editing software. Even if you decide to buy a multitrack analog or digital tape recorder, a hard-disk system can complement the recorder's capabilities with unparalleled flexibility for editing and processing digital audio.

Atari's new Falcon030 can do 16-bit stereo hard-disk recording right out of the box.

SOFTWARE BOOSTERS

Equipped with a sequencer, notation package, universal editor/librarian, and a sample editor (if you own a sampler or instrument that supports user samples), you should be ready for just about any musical situation. To enhance your musical computing experience, you'll also want to investigate "system integrators." Several music companies have come up with pieces of software that integrate various types of programs into a cohesive system. Dr. T's *Multi-Program Environment* (*MPE*) for the ST and Amiga, Steinberg's *M.ROS* for the ST, Blue Ribbon SoundWorks' *Bars&Pipes* architecture for the Amiga, and the *Opcode MIDI System* (*OMS*) for the Macintosh are examples of such programs. *OMS* goes one step further than the rest by integrating an Opcode MIDI interface and any connected MIDI gear, as well.

These systems are not without their drawbacks. To get the most from them, you must stick with one manufacturer's programs. (Several companies have announced that they intend to support *OMS*, but none have released such products yet.) In other words, you can't use Company X's sequencer and Company Y's editor/librarian with Company X's system integrator; all must be Company X products.

However, in most cases the benefits outweigh the drawbacks. All programs work together in a coherent fashion and, in the case of *OMS*, share the same studio setup information. This feature allows *OMS*-compatible programs to maintain a list of active patch names and online instruments and quickly reroute sequencer tracks from one system setup to another if you take your sequence to a different *OMS*-equipped studio. (See "Computer Musician: The Opcode MIDI System" in the March 1992 **EM**.)

In an ideal world, all programs on all platforms would have these and even more powerful integration features, such as the ability to send out a message requesting information, to which all connected devices respond with a list of patch names, polyphony, and other relevant info. But until then, manufacturer-specific integrators are a good start. (It *is* possible to run multiple programs from different manufacturers with the native multitasking capabilities of the Amiga or PC under OS/2, but the level of operational integration is lower.)

Other important system extensions

Compaq's 486 portable packs impressive processing power in a small package.

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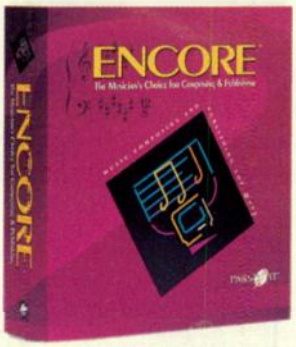

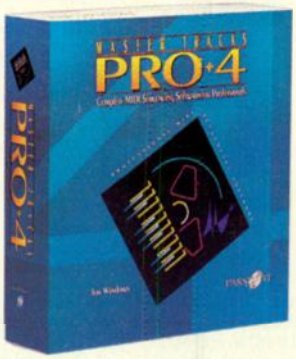

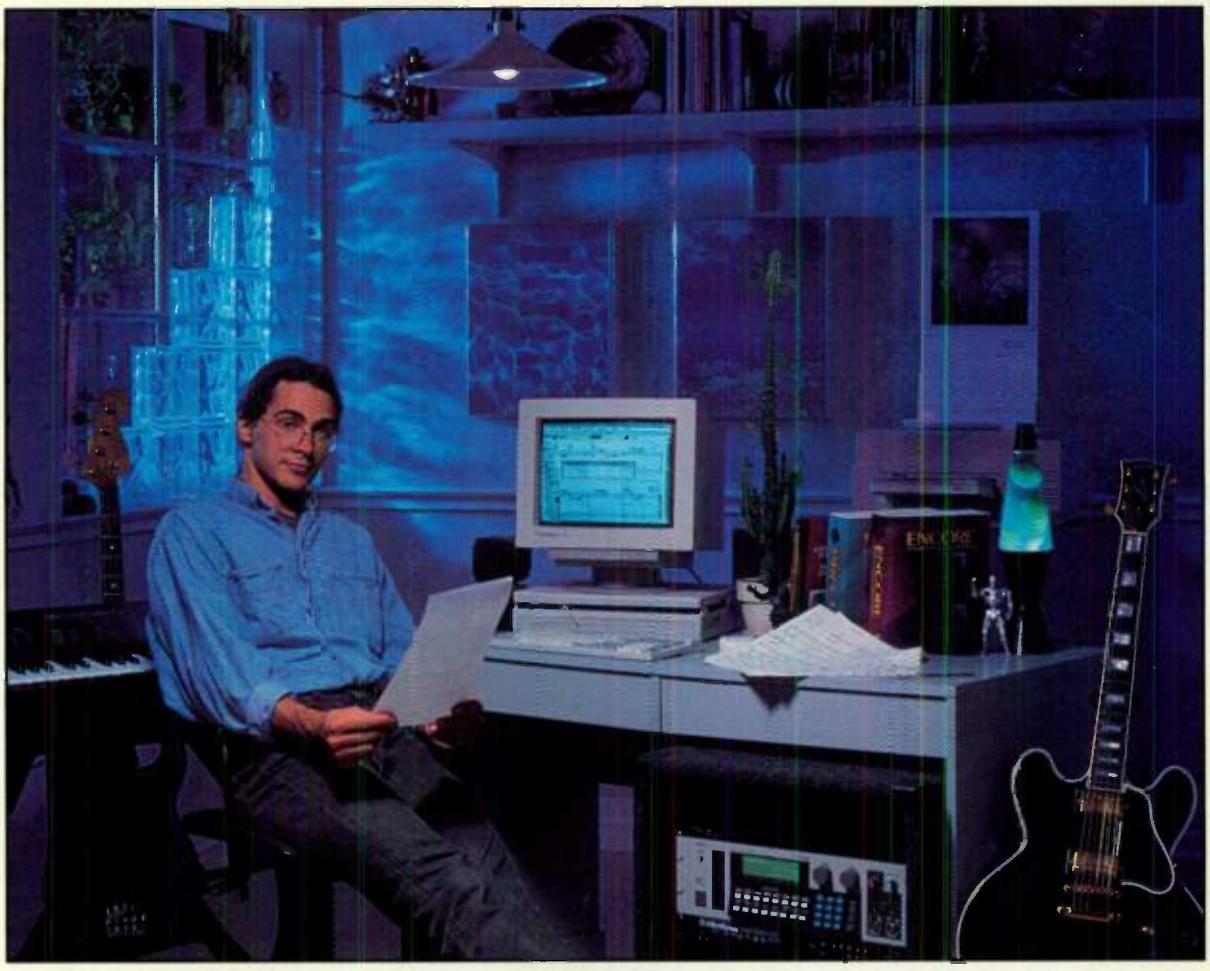

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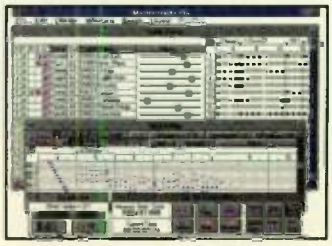

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for music include Apple's *MIDI Manager*, which routes MIDI data from one program to another within a Macintosh. *MIDI Mangler* for the Macintosh is a freeware extension from EarLevel Engineering that resolves the unfortunate conflict between *MIDI Manager* and the Chooser; it also lets you clear the modem and printer ports if a program like *MIDI Manager* fails to release a port when it's done.

DO THE TWEAK

Once you've assembled all the appropriate pieces, focus your efforts on tweaking the performance of the operating system. Unlike most computer software, music programs often demand real-time operation, so timing issues are critical. Anything that takes up a large chunk of the CPU's time or demands a lot of overhead can affect a music program's performance.

For example, a '286 PC may be able to run a *Windows* word processor or spreadsheet (albeit rather slowly), but it normally can't handle a *Windows* sequencer. The overhead required by *Windows'* graphic interface puts too many demands on the processor, preventing it from sending accurately timed MIDI data. It's also important to avoid running an application in the background of any multitasking system during time-sensitive MIDI operations.

In addition, be careful about loading too many RAM- and processor-hungry utilities and other operating-system extensions (called AutoBoot folder items on the Atari) when running music software. Adobe's popular *Adobe Type Manager* font-scaling program for the Mac and *Windows*, for example, uses up a lot of processing time and power to do its thing. Of course, if you're working with a notation program that benefits from *ATM* and you're not as worried about perfect timing, this is power well-spent. Amiga users should be careful of public-domain programs that make extensive use of the system timer.

As handy and well-loved as many of these utility and system-enhancement programs may be, music software is usually better off without them. In

some cases, they conflict with the MIDI drivers that get MIDI data in and out of the computer. However, if you just can't give some of them up, the best solution is, ironically, another utility. On the Macintosh, extension managers such as Now Utilities' *Startup Manager* allow you to create groups of system extensions and choose among them at startup. Using extension managers allows you to create a relatively clean system for use with music software and a more feature-packed, but slower, system with other programs.

You can achieve similar results on the Mac by maintaining two different System Folders on your hard disk and "blessing" the appropriate one before you restart the computer. To "bless" a System Folder, simply make sure it's at the hard disk's main level (or root directory). To "de-bless" the other System Folder, just hide it in another folder. Be careful not to bless or de-bless both folders at the same time or your Mac won't start up properly. If you switch between System 6 and System 7, you'll want to pick up a piece of shareware called *Desktop 6/7*, written by Opcode's Doug Wyatt, to avoid having to rebuild the desktop file each time.

ODDS AND ENDS

Another bit of general advice is to disconnect your computer from networks. Even when you're not directly working on the network, the processor has to deal with a fair amount of overhead to maintain its network services, which can slow the computer's operation. On the Mac, turn off AppleTalk in the Chooser, even if you're just using the modem port for MIDI.

PC users who are short on RAM may want to use the virtual memory capabilities built into the Enhanced Mode of *Windows* 3.1. Virtual memory "fools" your computer into thinking you have more RAM by using a portion of your hard disk as a work area, or "swapfile." Data in RAM is automatically written to a designated area of the disk and read back into RAM when it's required. Several Apple developers I spoke with recommend against using virtual memory with music applications on the Mac because it slows down the system too much.

To make the most efficient use of virtual memory, start by running a hard-disk optimizing program (which is a good idea anyway) to create a large contiguous block of free space. *Windows* users should then activate the Virtual Memory button in the Control Panels/Drivers application and select a configuration that best suits their needs. When making this selection, remember that hard disks are much slower than RAM, so a swapfile that's too large can slow the system down and adversely affect MIDI playback.

There is another check-box in the *Windows* Control Panels/Drivers application that allows the hard disk to be addressed in 32-bit mode. This can speed data transfer between the disk and computer. DOS 5.0 includes a disk-cache utility called *SMARTDRIVE.EXE* that can also improve the throughput of the computer's hard disk.

If you've taken the plunge into laptop or notebook MIDI and you have enough RAM, try running your MIDI software from a RAM disk. This reduces the amount of disk access required to run the program and should increase both performance and battery life. If you have enough free real estate on your keyboard (the Korg M1 is a good example), you might perch the laptop there for convenient access.

If your sequencer supports multiple recording and playback resolutions, try reducing the recording resolution (e.g., from 480 ppqn to 240 or 120) so the computer isn't overloaded trying to maintain an unnecessarily high resolution. In some instances, reducing the timebase may actually improve the overall timing stability of the program. The tradeoff is coarser quantization, which may be noticeable on solos and other exposed parts.

Of course, no supercharged music computer is complete without a few gratuitous fun things. As a group, electronic musicians have access to an enormous variety of audio files and should have the best start-up sounds, system beeps, and other aural enhancements around. A fair amount of music and sound-related shareware also is available on bulletin-board services (BBSs), including several very handy MIDI utilities.

Finally, in your quest to create the ultimate music computer, don't forget the obvious things. Register your products, especially software. Software developers are constantly working to improve the functionality of their products; if you don't register, you may not learn of these improvements. And read the manuals; how can you possibly hope to optimize your system's performance if you don't even know what it's supposed to do in the first place?

OVER AND OUT

Computers have become amazingly potent musical tools over the last few years, and their influence on music will only grow as time moves on. Unfortunately, they're often difficult to use, despite many advances, and making them as effective as possible isn't always easy or cheap. But once the work is done and the money is spent, sitting down to a well-configured computer can be a moving musical experience.

(Special thanks to Jim Kometani of Twelve Tone Systems, Jan Leger and Rain Taylor of Apple, Evan Brooks of Digidesign, Paul de Benedictis of Opcode, Tom Johnson of Coda, Todor Fay of The Blue Ribbon SoundWorks, and Bob Lindstrom for their help with this article.)

EM *editor* **Bob O'Donnell** *tries hard to heed his own advice.*

STUPID DOS TRICKS

To load DOS 5.0 and other drivers into high RAM, you need to adjust your CONFIG.SYS file. Twelve Tone Systems' Jim Kometani offered the following listing as an example.

```
SHELL=C:\DOS\COMMAND.COM C:\DOS /E:512 /P
DEVICE=C:\WINDOWS\HIMEM.SYS
DOS=HIGH,UMB
DEVICE=C:\WINDOWS\EMM386.EXE NOEMS
LASTDRIVE=G
STACKS=9,256
FCBS=20,0
FILES=30
BUFFERS=10
DEVICEHIGH=C:\WINDOWS\MOUSE.SYS /Y
DEVICEHIGH=C:\DOS\SETVER.EXE
```

DO ✦ IT YOURSELF

Build the EM MIDI Drum Brain

New firmware turns the EM MIDI Fader into a versatile trigger-to-MIDI drum brain.

By Kent Clark and John Simonton

It's time to use the EM MIDI Fader (EMMF) controller board again. This low-cost, Intel 8031-based computer was introduced in the February 1991 **EM**. Its 8-channel analog-to-digital converter (ADC) and MIDI In and Out ports make it the perfect platform for a number of dedicated applications.

It takes only a PROM change to turn the EMMF controller board into a trigger-to-MIDI device that converts voltage pulses from percussion sensors (such as those in the EM FingerDrum DIY project, described in the March 1992 **EM**) into MIDI Note On and Note Off messages. The new firmware has eight sensor-to-note maps, two of which conform to General MIDI, and it is possible to remap them. Linear or logarithmic velocity curves are available, and merging is included in the firmware, so you can daisy-chain multiple controllers for more sensors. The controller board's small size lets you mount it inside the FingerDrum case for a completely self-contained, MIDI-speaking controller.

Complementing the firmware are new plans for building a separate drum brain that can use any of the common drum transducers. Piezoelectric disks, force-sensing resistors (FSRs), or electret microphones can be mixed and matched interchangeably to meet the needs of any situation.

PETER DIGGS

Finished EM MIDI Drum Brain.

HOW IT WORKS

The key to using a variety of sensors lies in the wiring of the stereo phone jacks used for inputs to the peak detectors of the processing amplifier (see **Fig. 1** on p. 75). The resistor R2 and its siblings at the "ring" connections of all input jacks provide a positive voltage that can power FSR and electret-microphone transducers. Electrolytic capacitors C11 through C18 decouple the sensor circuitry from the rest of the processing amp.

The simplest sensor is a piezoelectric disk (see **Fig. 2a**). "Piezos" generate their own voltage when struck; no additional circuitry is necessary to connect them to the peak detectors. A stereo plug is used as the connector in the illustration, but a mono plug can be used, which shorts the "ring" resistor (such as R2) to ground. The extra milliamp or so of current this draws from the power supply is insignificant.

FSRs don't produce a voltage directly; they change their resistance when struck. To generate a voltage, the FSR and a 4,700Ω resistor (R) are wired as illustrated in **Fig. 2b** to form a voltage divider between ground and the supply voltage from the "ring" resistor (e.g., R2). When the FSR is struck, its resistance goes down, and the voltage across R goes up. This signal is then applied to the peak detector in the processing amp.

A sensor that uses an inexpensive electret microphone as the transducer is shown in **Fig. 2c**. The transistor Q1

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and resistors R3 through R6 form a simple amplifier to boost the signal from the microphone (M1) to the levels required by the processing amp. The low values of capacitors C1 through C3 provide some highpass filtering, which favors the higher frequencies of a percussion attack over background sounds, such as speech and more-distant drum sound sources. Trim pot R1 sets the sensitivity of the pickup.

All three of the sensors produce the same kind of output: an oscillating voltage with a peak amplitude proportional to the strength with which the transducer is hit. The processing-amp circuitry shown in **Fig. 1** does two things to prepare these signals for the computer: It normalizes them to a 0 to 5V range consistent with the ADC on the controller board and holds the peak voltage long enough for the computer to deal with it.

Most of the action happens in the eight peak detectors built around the op amps in IC1 and IC2. This circuitry is essentially the same as that of the FingerDrum; you can find a detailed analysis in that article. Keep in mind that these circuits produce voltage pulses with amplitudes proportional to the peak output of the sensor.

COMPUTER AND FIRMWARE

Technical details of the controller board were published in "Creative Contol With the EM MIDI Fader" in the February 1991 **EM**. The computer's biggest job is monitoring the eight peak-detector outputs for rising and falling voltages, which indicate that a sensor has been hit. It must do this by scanning the outputs; otherwise, pulses at one input might be ignored while another input is processed. Each input is checked about every 2 ms.

To find the maximum value of the peak detector outputs, which are used to calculate velocity, the firmware saves the last two readings from the ADC as the pulse is starting to rise. If a reading is larger than the previous one, the old value is discarded and the new one is saved. When the software sees two consecutive readings that are smaller than the largest reading, the pulse is assumed to be decaying, and the largest ADC value is saved for use as velocity data.

Since the ADC is an 8-bit device, and the MIDI data byte for velocity is only seven bits, the least significant bit (LSB) of the ADC output is discarded. To get well above the noise floor of the sensors, the next bit is discarded, as well. This massaged data is saved for use as a velocity value.

As the input pulse begins to decay, the firmware sends a Note On message on the channel set by the lower four positions (D0 through D3) of the controller's programming DIP switch (DS1). Next, the firmware fetches and sends the MIDI note number assigned to the sensor in the map selected by D4 through D6 of the DIP switch. Finally, the velocity data is fetched and either sent directly, or used as a pointer to a logarithmic value in a look-up table, depending on the lin/log option selected by the last switch (D7) in DS1. After about a third of a second, the

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All of the sixteen MT-16X inputs can be merged without limits and they can be distributed to any outputs. The programs can be recalled either via MIDI, remote or the foot switch. Every input has its own seperate MIDI on/off function with an integrated ALL NOTES OFF generator.

PROCESSING:

SPLIT: 8 SPLIT zones per input.
TRANSPOSE: Up to +/- 64 halftones.
FILTER: Individual filtering of MIDI data for every input, output and MIDI channel.
VELOCITY: switch/limit/offset.
DATA CONVERTER: Controller Converting.
MANIFOLD: Multiplies the MIDI transmit channels.
SEND FUNCTIONS: PROGRAM CHANGE, VOLUME, MIDI CLOCK SEND DATA, TR-Transparent MIDI reset.

OPTIONAL EXPANSIONS:

On request, the MT-16X can be optionally upgrated to a combination of a MIDI Matrix/Processor and a Sequencer Player. It uses the universal MIDI File Standard for its internal format. This assures full compatibility to top software sequencers. Its built in 3,5" floppy drive (720 KB/1,44 MB) is PC compatible and allows loading of songs from this computer system.

PLAYBACK:

Hundreds of songs can be loaded into, if expanded to full 16 MB. Once loaded, any of them can be started instantly by the footswitch, MIDI program change or from the included remote control. Any of the 64 tracks can be assigned to any of the MT-16X outputs simultaneously.

RECORDING:

Recording of MIDI data is possible with high resolution simultaneously on all inputs. With UNIVERSAL DUMP any system exclusive data of different MIDI instruments can be safely stored and archived.

FURTHER OPTIONAL EXPANSIONS:

- FORNET, Fibre Optical Realtime Network:
  (MIDI, Network to expand up to 64x64 IN/OUTPUTS)
- SMPTE
- SCSI HARD DISC
- MEMORY CARD

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C O U P O N

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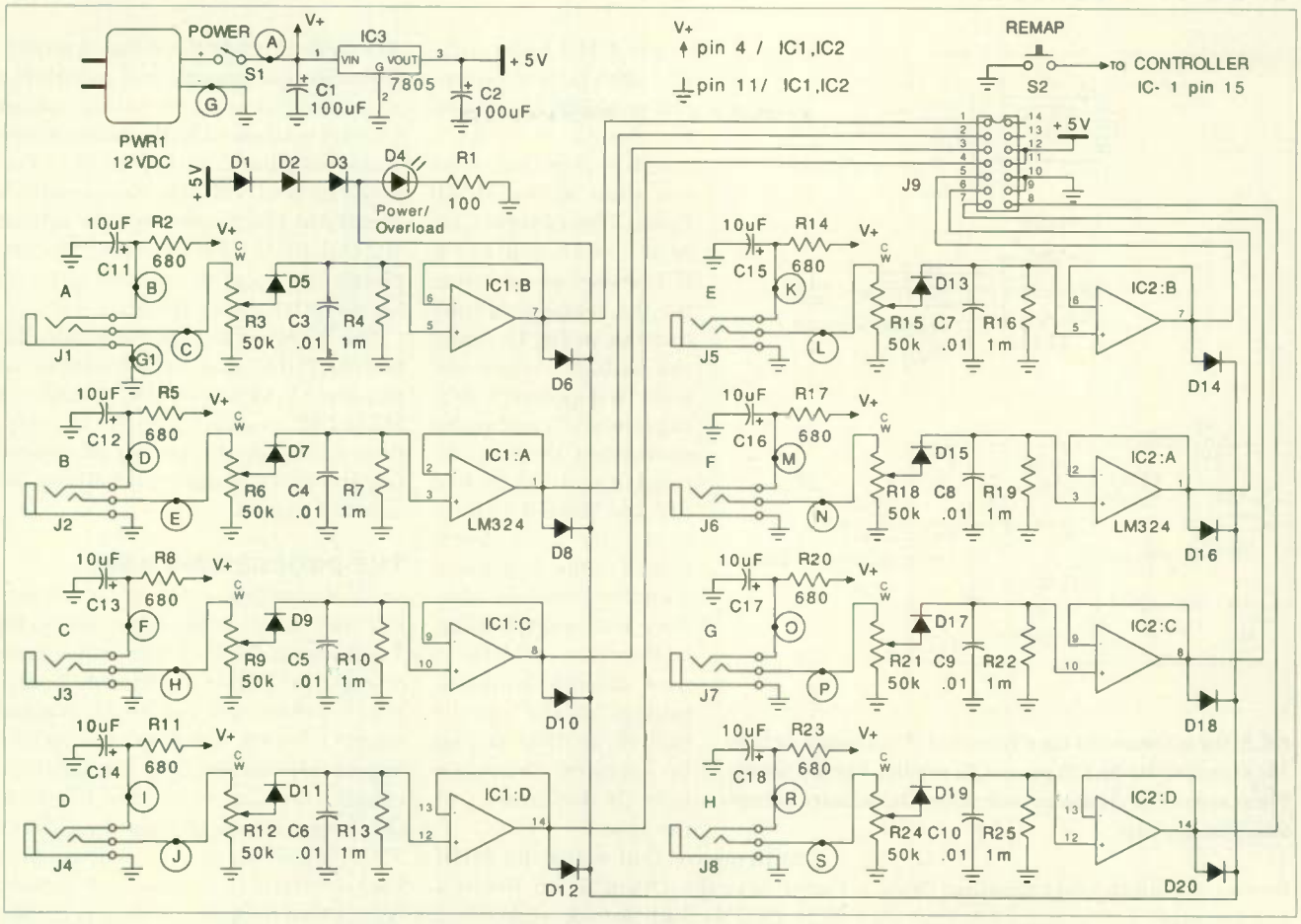

FIG. 1: The schematic for the processing amp detects peaks in the input voltage from any combination of three sensors.

PARTS LIST

Processing Amplifier

Capacitors

C1, C2	100 µF/16V electrolytic
C3-C10	0.01 µF ceramic disk
C11-C18	10 µF/16V electrolytic

Diodes

D1-D3, D5-D20	1N914
D4	Red LED

Semiconductors

IC1, IC2	LM324 quad op amp
IC3	7805 +5V voltage regulator

Connectors

J1-J8	Stereo phone jack

Potentiometers

R3, R6, R9, R12	50 kΩ
R15, R18, R21, R24	50 kΩ

Resistors (1/4W 5%)

R1	100Ω
R4, R7, R10, R13	1 MΩ
R16, R19, R22, R25	1 MΩ
R2, R5, R8, R11	680Ω
R14, R17, R20, R23	680Ω

Other Components

S1	SPST slide switch
S2	N.O. push-button switch
PWR1	12 VDC wall-wart
Circuit board	Knobs
Case	Wire

Electret Microphone Sensor

Capacitors

C1-C3	0.1 µF mylar

Resistors (1/4W, 5%)

R2	470Ω
R3	150 kΩ
R4	15 kΩ
R5	33 kΩ
R6	2200Ω

Other Components

D1	1N914 or 1N4148
M1	Electret microphone
Q1	2N4124 NPN silicon transistor
P1	Stereo phone plug
R1	10 kΩ trimmer potentiometer
Circuit board	Heat-shrink tubing
Twin-ax cable	

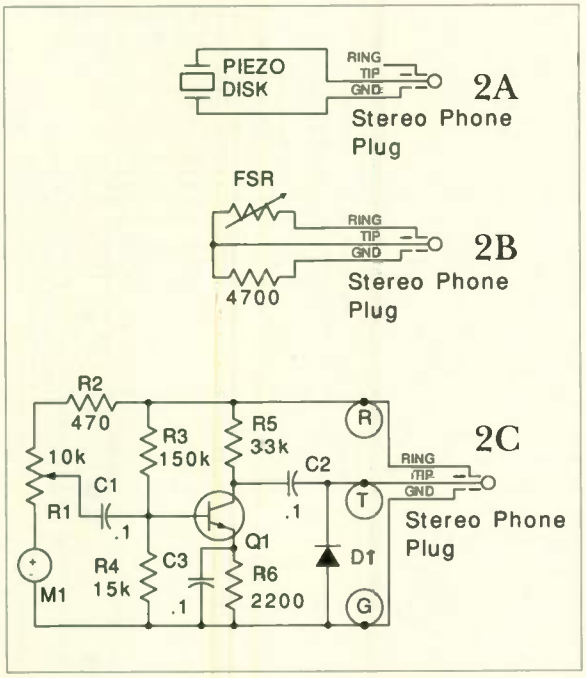

FIG. 2: The schematic for the piezo sensor (2a) is simplicity itself. The schematic for the FSR sensor (2b) requires a single resistor. The schematic for the electret mic sensor (2c) includes a simple transistor amplifier.

firmware sends a corresponding Note Off message.

The firmware also checks for additional volatile or nonvolatile RAM and sets the remapping capabilities accordingly. In addition, it merges the Note On/Off messages generated by sensor activity with MIDI data appearing at the second MIDI In port on the controller.

ASSEMBLING THE CONTROLLER BOARD

Whether you plan to build the Drum Brain or add trigger-to-MIDI capabilities to the FingerDrum, begin with the MIDI Fader controller board as described in the February 1991 DIY. Standard construction practices such as wire-wrap or perf-board are appropriate, and construction details are included with the original article. Circuit boards for this computer are commercially available, but notice that the source for boards and PROMs mentioned in the original article is no longer operative. These items are now available from PAiA Electronics (see the sidebar "PAiA Kits").

The controller board is identical for the FingerDrum or Drum Brain and can be built following the instructions in the MIDI Fader article, with a few minor changes. The board has provisions for extra switch inputs that were not used in the MIDI Fader. One of these (T1 of the 8031, pin 15 of IC1) is used as the input for the remapping button (S2 in **Fig. 1**). Also, the voltage regulator IC5, first power filter-capacitor C7, and isolation diode D9 are not needed and can be left off the board. Their functions have been moved to the processing amplifier board. In addition, the programming DIP switch (DS1) is now mounted on the bottom of the circuit board, so that it can be accessed through a hole in the bottom of the case.

The firmware that turns the MIDI Fader into the Drum Brain fits in a 2764 PROM. Both source and object code can be downloaded from the EM SIG on the PAN bulletin-board service, either for the educational experience of looking at the full listing, or for burning your own PROM. (Instructions accompany the downloaded file.) Preprogrammed PROMs are available from PAiA Electronics (see the sidebar "PAiA Kits"). The new PROM completely replaces the one that was used for the MIDI Fader firmware.

The RAM socket on the controller board (IC11) may be left empty, or populated with a 6116 volatile or MK48Z02 nonvolatile RAM chip, depending on the extent of desired remapping capabilities. Details will be covered shortly.

THE PROCESSING AMP

In the Drum Brain, the processing-amp circuitry shown in the schematic in **Fig. 1** is built on a board that is the same size as the EMMF controller board, which allows the two to be stacked using 1.5-inch machine screws and appropriate spacers. The comments on construction techniques and caveats in the FingerDrum DIY article (March 1992) apply to this board, as well. Please review that article for details. Notice that the potentiometers R3, R6, and so on are vertical PC-mount types,

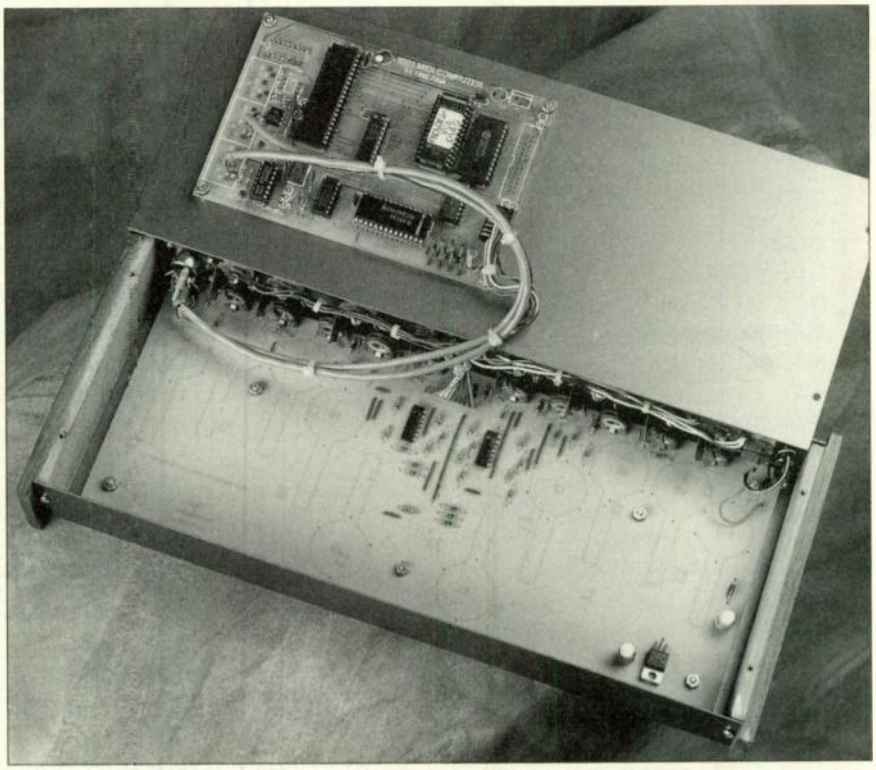

FIG. 3: Controller board installed inside the FingerDrum.

and their shafts protrude through the top of the Drum Brain case without actually attaching to it.

The 14-pin DIP configuration at J9 provides outputs from the peak detectors and power outputs. These points connect pin-for-pin to JP2 on the controller board. Individual wires or 14-conductor cables terminated with DIP headers on each end may be used for the connections. You must solder the DIP header directly to the board at the peak detector end, because there's not enough space between the top of the board and the case for the header and a socket. The controller end of this cable can be mated with a socket installed on the board.

Using 22 AWG stranded, insulated wire, make the connections from the stereo phone jacks that serve as inputs for the sensors to the processing amp board.

BUILDING THE SENSORS

Use a small-diameter coaxial cable, such as RG-174/U, between the piezo disk and the phone plug. Solder the shield of the coax directly to the brass disk and the center conductor to the silver-white active face. To make the assembly more robust, it can be potted in flexible, silicon casting compound (see Fig. 4).

The same kind of coax can be used for the FSR sensor. It makes no difference which side of the FSR connects to the shield and which connects to the center conductor. A small piece of heat-shrink tubing placed over these connections and heated to shrink in place will protect them. The 4,700Ω resistor (R) associated with this sensor can be mounted inside the stereo phone plug that terminates the coax (see Fig. 4).

The electret mic sensor can be built on a small piece of perf-board or a circuit board. Take care with the orientation of the transistor Q1 and diode

PAIA KITS

Complete kits for this project are available from PAiA Electronics, 3200 Teakwood Ln., Edmond, OK 73013; tel. (405) 340-6300; fax (405) 340-6378.

Drum Brain (9212/K): $158.50
Piezo sensor (PSENS): $7.75
FSR sensor (FSENS): $18.25
Electret mic sensor (MSENS): $11.75

Controller board for FingerDrum (9201/K): $89.50 (incl. Drum Brain PROM)

Drum Brain PROM for MIDI Fader controller board: $20

Please include $4.50 s&h per order.

Individual components also available. Call for prices.

For the processing amp and electret mic circuit board foil patterns, please send an SASE to PAiA.

FIG. 4: Four assembled percussion sensors (L to R): piezo, FSR, electret mic without shrink tubing, and electret mic with shrink tubing.

D1 when installing them. The circuit board we made for this sensor is laid out so that the electret microphone element can be mounted flush against the board or pointing off the end.

The microphone sensor connects to its plug with twin-axial cable such as Belden 9501. The red lead is used for the ring connection, black for the tip, and the drain wire connects to ground. A piece of 0.5-inch diameter heat-shrink tubing can slide over the whole assembly for protection. Cutting a small hole in the heat shrink for access to the trimmer is a nice touch (see Fig. 4).

INSTALLING THE CONTROLLER BOARD

There is ample room in the FingerDrum case for the controller board (see Fig. 3). The analog circuit board that holds the piezo disks mounts in the top of the case, and the controller board mounts on the bottom with 4-40 screws and nuts and ¼-inch standoffs. A rectangular cutout in the case bottom provides access to programming DIP switch DS1. In the prototype shown, remap button S2 is mounted on the rear of the case, as are the two 5-pin DIN jacks for MIDI In and Out.

In the original FingerDrum, eight phone jacks provided connections to an external drum brain or trigger-to-MIDI converter. These jacks can now be eliminated if you wish, but they might still be useful, so we left them in place and used their solder lugs as

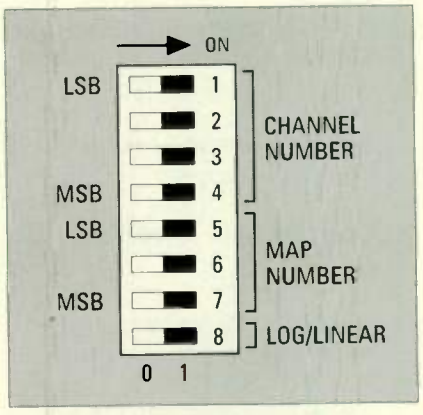

FIG. 5: DIP switch assignments for setting the MIDI channel, map number, and velocity curve (logarithmic or linear). The linear curve is selected when switch 8 is "on."

Like the dinosaur, conventional mixers have bodies that are bigger than their brains. But now there's a leaner, smarter, faster species of mixer for both stage and studio: the DCM-100 Digitally Controlled Mixer and MIXTAB™ Controller.

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The DCM-100/MIXTAB combination is a whole new kind of animal – after all, dinosaurs belong in museums. To find out more about the latest evolution in mixers, see your favorite Fostex dealer.

FOSTEX

tie-points for the input connections to the controller board. Whether you leave the jacks in place or not, there is a one-to-one correspondence between the connector P1 on the FingerDrum board and JP2 on the controller board. That is, pin 1 of P1 connects to pin 1 of JP2, pin 2 to pin 2, and so on. Pins 9 and 10 make the common ground connections between the two boards, while pins 11 and 12 take regulated 5V power from the analog board to the controller board.

PUTTING IT TO USE

When you've finished assembly, connect the MIDI Out port to your favorite MIDI sound source, turn everything on, and you're ready for a test drive. Make sure that DS1 is set for the same MIDI channel as your sound source, and set the map number and log/lin response as shown in **Fig. 5**. The preprogrammed maps are shown in **Fig. 6**. They're presented with special thanks to frequent **EM** contributor Charles R. Fischer, who configured them.

MAP 1: BASIC DRUM KIT A (GENERAL MIDI KIT)

C1	KICK
D1	SNARE
C2	HIGH-MID TOM
A1	MID TOM
F1	LOW TOM
C#2	CRASH CYMBAL
F#1	CLOSED HI-HAT
A#1	OPEN HI-HAT

MAP 2: BASIC KIT B (ROLAND STANDARD)

C1	KICK DRUM
D1	SNARE
B1	TOM 1
F1	TOM 2
E3	RAP TOM
C#2	CYMBAL
F#1	CLOSED HI-HAT
G#1	HI-HAT

MAP 3: BASIC KIT C (E-MU DRUMS)

C1	BASS DRUM
D1	SNARE
C2	TOM 1
A1	TOM 2
D#2	TAMBOURINE
A2	CHOKE CYMBAL
F#1	RAP HI-HAT
C3	TABLA

MAP 4: BALLAD KIT

C1	BASS DRUM
C#1	RIMSHOT
D1	SNARE
A1	HI TOM
F1	LO TOM
D#2	RIDE CYMBAL
F#1	CLOSED HI-HAT
C#2	CRASH CYMBAL

MAP 5: LATIN KIT A (GENERAL MIDI)

E3	LO CONGA
D#3	OPEN HI CONGA
D3	MUTED HI CONGA
F3	HI TIMBALE
C#3	LOW BONGO
C3	HI BONGO
A#3	MARACAS
A3	CABASA (SHAKER)

MAP 6: LATIN KIT B

C1	KICK DRUM
D1	SNARE
G3	AGOGO 1
G#3	AGOGO 2
F3	HI TIMBALE
C3	LO WOODBLOCK
D3	HI WOODBLOCK
A3	CABASA (SHAKER)

MAP 7: BASIC KIT D (PENTATONIC SCALE)

C1 D1 D#1 F1 G1 A#1 C2 D#2

MAP 8: C MAJOR SCALE

C3 D3 E3 F3 G3 A3 B3 C4

FIG. 6: The MIDI Drum Brain includes eight pre-programmed maps.

If you're working with the Drum Brain, plug in the sensor or sensors of your choice. Set the level trimmers to about mid-range and strike a sensor; you should hear a sound from the synth. Setting the level trimmers is very important. Signal levels greater than 5V produce unpredictable results, such as all the drums being sounded at once. The power LEDs on both the FingerDrum and Drum Brain provide an indication of this overload condition, as detailed in the FingerDrum article. When the power LED glows brighter than normal when a sensor is struck, it means that the signal is too hot.

There isn't enough space to go into sensor selection and placement in detail, but here are some guidelines. The FSRs are sturdy and light enough to cement to a drum head. Piezos are heavier and more fragile, but they can be placed in practice pads. The microphone sensors should not be placed in contact with a surface; they are useful if you're concerned about the effect permanently installed sensors might have on the drum's timbre. If the mic sensor is mounted inside the drum, its sensitivity can be turned down to make it less likely to be triggered by other noises in the environment. For a more complete look at the various sensors, see "From the Top: Drum Pads and Controllers" in the September 1992 **EM**.

REMAPPING

Remapping the note numbers is easy, but it requires a MIDI source, such as a keyboard, to be connected to the MIDI In port. To change the MIDI note assigned to a sensor, hold the remap button, and play the note on the keyboard. Release the remap button, and within five seconds, hit the sensor to which you want the note assigned. If you decide you don't want to make a change after hitting the remap button, just release it and wait five seconds.

If you haven't installed any RAM on the controller board, you can only change map 8, and the change will be lost when the power is turned off. If you populate IC11 with a 6116, you can change all maps, but this data is volatile. If you install an MK48Z02, all maps can be altered, and changes will not be lost when the power is turned off.

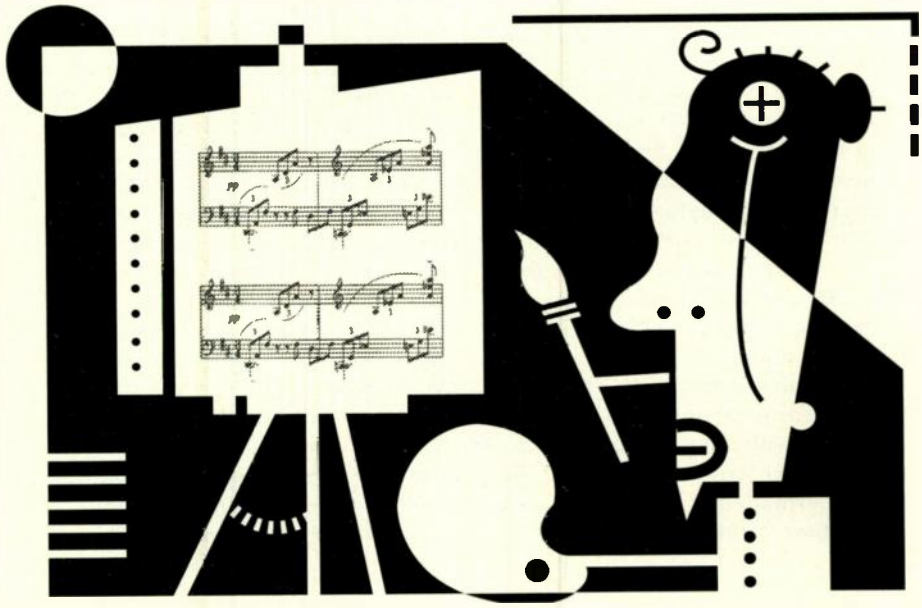
Kent Clark *is a frustrated musician and electronics engineering manager trying to do MIDI and audio projects in the time leftover after tending to his family, job, cars, motorcycle, and sleep.* **John Simonton** *is the owner of PAiA Electronics and founder of* **Electronic Musician** *magazine.*

If you do not have the issues of **EM** referenced in this article, you may purchase them from Mix Bookshelf, (800) 233-9604 or (510) 653-3307. A complete **EM** back-issue listing may be obtained by sending a self-addressed, stamped envelope to: **EM** Back Issues, 6400 Hollis St., #12, Emeryville, CA 94608.

Software of Note

By Scott Wilkinson

Getting started with notation software.



It's the dream of every musician in the computer age: instant, flawless transcriptions of live performances, and an end to tedious copying, transposing, and arranging with pen and paper. After all, word processors have changed the face of writing with words; why not apply this idea to music notation?

Of course, many software companies have been working hard to do just that. Spawned by the inherent graphic orientation of the Macintosh and MIDI's representation of musical performance gestures, music-notation software has come a long way since its inception. There are titles for all four major platforms, and their capabilities are far more advanced than earlier attempts. However, the dream has yet to be fully realized.

BACKGROUND

Let's face it, we're asking the computer to perform a daunting task. The written language of music is extremely dense and two-dimensional, unlike the written language of words. In addition, the relationship between written music and its performance depends on convention and interpretation. For example, eighth notes in swing jazz are written as equal in length, but they are played long-short-long-short. Not only that, humans are notoriously inaccurate by computer standards; in effect, we want notation programs to transcribe what we mean, not what we actually play!

Nevertheless, notation software can help musicians in many ways. These programs do not resemble word processors as much as page-layout software; their strengths lie in the manipulation of musical symbols for printing. With one of these programs and some time, you can generate lead sheets, ensemble scores, and parts. You can also rearrange existing music for different instruments, key signatures, and so on.

One important element is the inevitable tradeoff between ease of use and power. It seems that the more powerful and feature-laden a notation program is, the harder it is to use. This is partly due to the nature of the process; music notation is not a trivial pursuit. Some companies offer simpler, scaled-down versions of their more powerful products for those who don't need the more sophisticated features; Coda's *Finale* and *MusicProse* (Mac, PC) are examples of a powerful program and its simpler sibling.

INPUT

The first step in using any notation software is getting musical data into the program. In addition to a symbol palette from which you select and place notes, rests, etc., virtually all notation programs include a sequencer of some sort. This feature lets you enter notes in real time or step time from a MIDI instrument. (For more on sequencing, see "From the Top: Sequencing Made Easy" in the March and April 1992 **EM**.)

The sequencers in most notation software are designed to get MIDI data into the program; they normally don't have the full capabilities of dedicated sequencer programs. Several programs, such as Emagic's *Notator* (Atari), try to perform both functions equally. Some programs, such as Steinberg's *Cubase Score* (Mac, PC, Atari) and Coda's *Finale* and *MusicProse*, will even transcribe your performance on the screen as you play.

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Another common method of entering data is to import a Standard MIDI File (SMF) from another sequencer. Simply save the file in SMF format within the sequencer and open it in the notation program. This method lets you tweak the data before it gets to the notation software, which can result in a more accurate initial transcription.

Speaking of transcription, the accuracy varies widely from one program to the next, but it's safe to say that no program gets it perfect on the first try. In fact, no program gets it perfect without some help. For example, enharmonic "spellings" (e.g., F# or Gb) often need to be fixed, and it's difficult to determine whether short eighth notes should be notated as eighth notes with staccato marks or sixteenth notes with rests between them (see **Fig. 1**).

MANIPULATION

Once the raw data is input, the data must be massaged before it is printed. The first step is to set up the score. Depending on the instrumentation, you typically can combine different types of staves. For example, a piano solo is notated on a "grand," or piano,

NOTATION SOFTWARE MANUFACTURERS

alla breve
Musicad (PC)
tel. (708) 524-9441
fax (708) 848-0220

Barefoot Software
EZ Score Plus (Atari)
tel. (818) 727-7143
fax (818) 727-0632

Coda Music Technology
Finale, MusicProse (Mac, PC)
tel. (800) 843-2066
or (612) 937-9611
fax (612) 937-9760

Dr. T's Music Software
Copyist Apprentice (PC, Atari, Amiga)
The Copyist Professional/DTP
(PC, Atari, Amiga)
Quick Score Deluxe (PC)
tel. (800) 989-MIDI (6434)
or (617) 455-1454
fax (617) 455-1460

Education Software Consultants
Basic Composer (PC)
tel. (708) 848-6677
fax (708) 383-4650

Electronic Arts
Deluxe Music Construction Set
(Mac, Amiga)
tel. (415) 571-7171
fax (415) 571-8004

Emagic
Notator (Atari)
distributed by Ensoniq
tel. (215) 647-3930
fax (215) 647-8908

Erato Software Corp.
Music Manuscriptor (PC)
tel. (801) 328-0500

Grandmaster, Inc.
MusicEase (PC)
tel. (509) 747-6773

Great Wave Software
ConcertWare+MIDI (Mac)
tel. (408) 438-1990
fax (408) 438-7171

Mark of the Unicorn
Composer's Mosaic (Mac)
tel. (617) 576-2760
fax (617) 576-3609

Midisoft Corp.
Studio for Windows (PC)
tel. (206) 881-7176
fax (206) 883-1368

Musicator
Musicator GS Windows (PC)
distributed by ThinKware
tel. (415) 255-2091
fax (415) 255-6199

Passport Designs
Encore (Mac, PC)
MusicTime (Mac, PC)
tel. (415) 726-0280
fax (415) 726-2254

Personal Composer
Personal Composer for Windows (PC)
tel. (206) 778-9266
fax (206) 284-3898

Pygraphics
Music Writer (Mac, PC)
tel. (800) 222-7536
or (817) 481-7536
fax (817) 488-9658

San Andreas Press
Score (PC)
tel. (415) 856-9394

Softronics
WinSong (PC)
tel. (800) 225-8590
or (719) 593-9540
fax (719) 548-1878

staff. A lead sheet or accompanied solo might include a grand staff and a single staff, while an ensemble score includes several staves, one for each instrument or group of instruments.

Most programs offer at least two ways to view the score. A "scroll" view displays the score as if it were on a continuous horizontal roll of paper. The "page" view displays the score as it appears on individual sheets of paper.

The initial clefs, key signature, and time signature are all specified at the beginning of the score. Some programs, such as Teach Services' *Laser*

SongWright
SongWright (PC)
tel. (800) 877-8070
or (703) 777-7232
fax (703) 478-8946

Steinberg/Jones
Cubase Score (Mac, PC, Atari)
MasterScore II (Atari)
tel. (818) 993-4091
fax (818) 701-7452

Teach Services
Laser Music Processor (PC)
tel. (518) 358-2125
fax (518) 358-3028

Temporal Acuity Products
MusicPrinter Plus (PC)
Nightingale (Mac)
tel. (800) 426-2673
or (206) 462-1007
fax (206) 462-1057

The Blue Ribbon SoundWorks
Bars&Pipes Professional (Amiga)
tel. (404) 315-0212
fax (404) 315-0213

Theme Software
Theme (PC)
tel. (804) 474-9203

thoughtprocessors
The Note Processor (PC)
ShowTune (PC)
tel. (718) 857-2860
fax (718) 398-8411

University of British Columbia
NoteWriter (Mac)
tel. (604) 822-6308
fax (604) 822-4884

Music Processor (PC), allow different key signatures for each part and/or odd key signatures like those in Balkan music (e.g., F# and Bb). Other programs, such as Passport's *Encore* (Mac, PC), Dr. T's *The Copyist* (PC, Atari, Amiga), and Barefoot's *EZ Score Plus* (Atari), also allow complex time signatures such as 2+3/4. Most programs let you insert clefs, key signatures, and time signatures at any point in the score, as well.

The next symbols to deal with are the notes themselves. MIDI represents each pitch with a unique number, so the transcription of pitch is generally quite accurate (with the possible exception of enharmonic accidentals). More problems arise with respect to rhythm. Even slight inaccuracies can bring unexpected results.

The nature of transcription requires that the displayed notes be "quantized"; each note must be assigned a certain standard rhythmic value. Each program has a rhythmic resolution, which determines the shortest note that can be represented in the score. Most programs stop at 128th notes, which is fine for virtually all applications; *Finale* goes up to 4,096th notes!

Alternate noteheads are important for percussion and spoken-word parts. These noteheads often consist of diamonds and/or "x's". Diagonal slashes are used in comping chord parts for keyboards, guitar, and bass. Grace notes are also available in some programs; these appear in a smaller-than-normal size and represent very short, ornamental notes.

Consecutive eighth, sixteenth, and shorter notes are usually beamed in groups of one or two beats. In some programs, these notes are initially transcribed with individual flags, after which you select the appropriate groups and apply a beaming function; others do this automatically. *Copyist Professional* for the PC and several other programs allow "cross-staff" beaming. This allows you to connect notes across staves, an important feature for piano music.

Rests are sometimes inserted automatically, or you may have to insert them manually after the initial transcription. If they are inserted automatically, you will almost certainly have to adjust them as you tweak the notes in the score.

The next step is the addition of any lyrics. Most programs let you type in lyrics directly, but it's usually better to type them into a word processor, save them as a text or ASCII file, and import them into the notation program. Unlike normal writing, all multi-syllable words must be completely hyphenated. This is how lyrics are associated with music; one syllable per note. Some programs, such as *Finale*, automatically attach

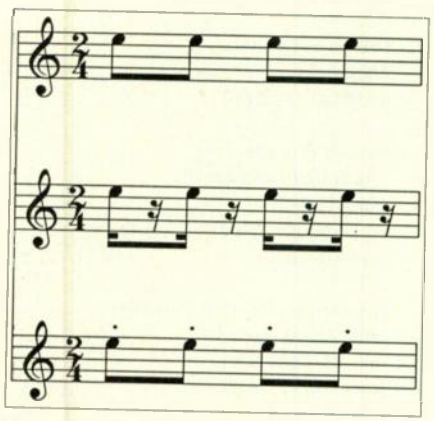

FIG. 1: If you play four short eighth notes in a row, do you intend it to be sixteenth notes with rests, or staccato eighth notes?

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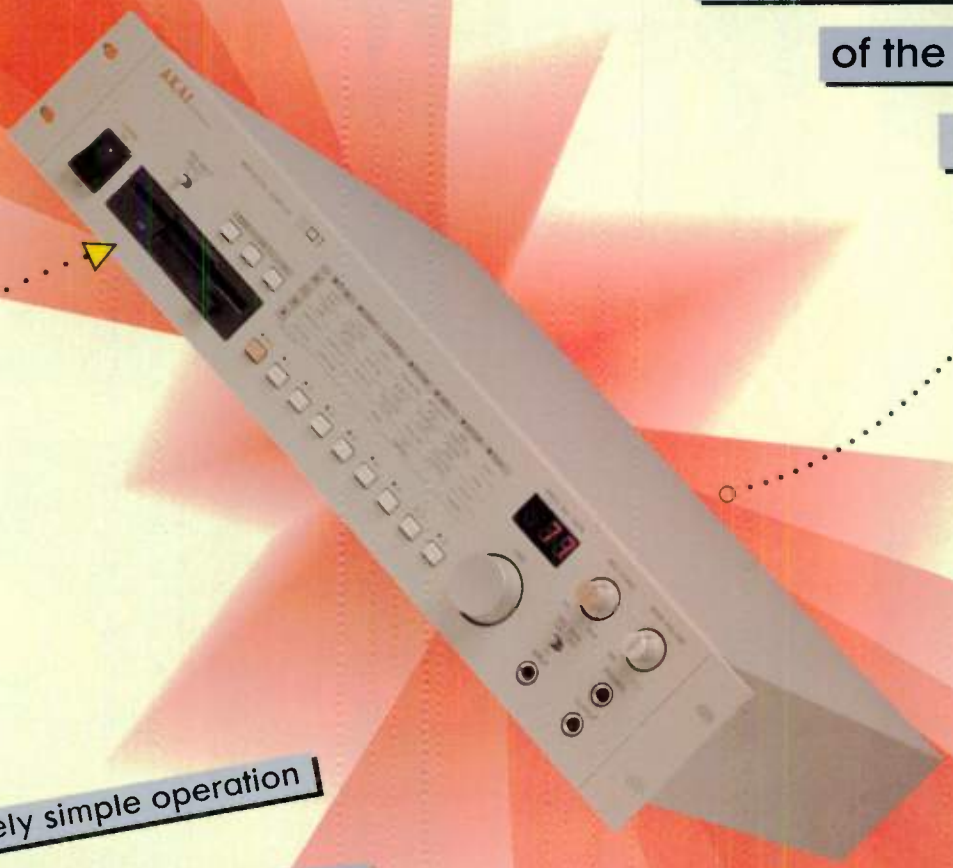

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syllables to notes, while others require you to place them manually. Either way, lyrics can affect the placement of notes, so they should be added before any other symbols (see Fig. 2).

After the notes, rests, and lyrics, other symbols can be added. These symbols include dynamics and articulations, such as tenuto and staccato. Chord symbols are usually in the form of text and/or guitar fretboard graphics, depending on the program. All of the standard symbols are usually included in a special music font, the most common of which is Adobe's Sonata. (For more, see "Computer Musician: Musical Typography" on p. 102.) Some programs also provide a custom symbol editor that lets you create your own symbols.

Among the last steps is the placement of slurs and ties. While ties are usually included in the initial transcription, they often require some tweaking. On the other hand, slurs must be placed manually. This is usually accomplished by marking the start and end points of each slur on the screen; some programs let you specify the "high" point of the arc, as well.

PARTS

Many programs automatically extract instrumental parts from the score and create separate part files. Some programs even "concatenate" several measures of rest into a single multi-measure rest symbol with the number of measures over the symbol. A few programs can even extract monophonic parts from chords played on a keyboard.

Some instruments require transposed parts, so many programs transpose individual parts according to your specifications. Some, such as Mark of the Unicorn's *Composer's Mosaic* (Mac), can transpose the parts while leaving the score at concert pitch. If you use a lot of chord symbols, make sure the program you select transposes them along with the rest of the music. Unfortunately, some programs wreak havoc with a carefully formatted part or score in the process of transposition. This process sometimes yields incorrect enharmonic names and may wipe out all beaming.

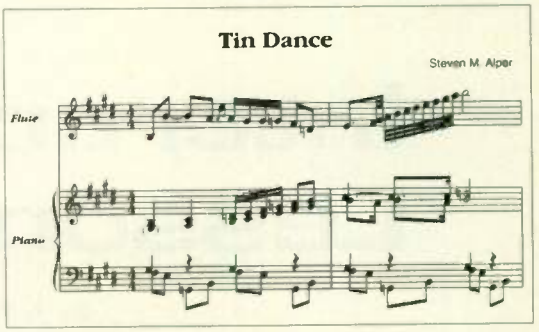

FIG. 3: Laser printers produce fine-looking output at 300 dpi.

OUTPUT

Once the score and parts are saved in the appropriate format, it's time to print. If you have access to a phototypesetter and the program supports PostScript printing, the output will look gorgeous; these machines have a resolution of 1,250 to 2,500 dots per inch (dpi), which is fully adequate for professional publication. Laser printers normally have a resolution of 300 dpi, which results in fine-looking parts and scores (see Fig. 3). Many inkjet printers have 300 dpi resolution and look almost as good as laser printers if high-quality paper is used. If you print on a dot-matrix printer, photocopying the output will darken the symbols.

> Many programs automatically extract instrumental parts from the score and create separate part files.

Some symbols, such as slurs, are problematic for most programs. Many people use notation software to print notes, rests, and other easy symbols, after which they add slurs and other difficult symbols to the printed output by hand. This process is easier than trying to position slurs within the program.

Most programs provide some form of MIDI playback capability in addition to printed output, allowing you to audition the music before printing. Several programs, including *Musicator*, provide separate quantizing features for the display/printout and MIDI playback. This option lets you optimize the data for printing without quantizing the MIDI sequence itself, which retains the human feel of the performance. A few programs, such as Temporal Acuity Products' *MusicPrinter Plus* (PC), assign appropriate MIDI messages to symbols such as dynamics and accents, which are reflected in the MIDI playback.

CONCLUSION

Some day, you will be able to scan a piece of sheet music into a computer and compile the image into meaningful musical data. Some day, artificial intelligence, desktop supercomputers, and fuzzy logic will provide near-perfect transcriptions with virtually no human intervention. But today, computers running the current generation of notation software can ease the burden of transcription and copying, which is a blessing for anyone who works with musical notation.

(If you're interested in pursuing this subject further, check out "Computing the Score" in the August 1992 EM and "EM Guide to Notation Software" in the September 1991 EM for more tips and tricks to use with notation software.)

EM *technical editor* **Scott Wilkinson** *uses notation software to generate parts for various ensembles.*

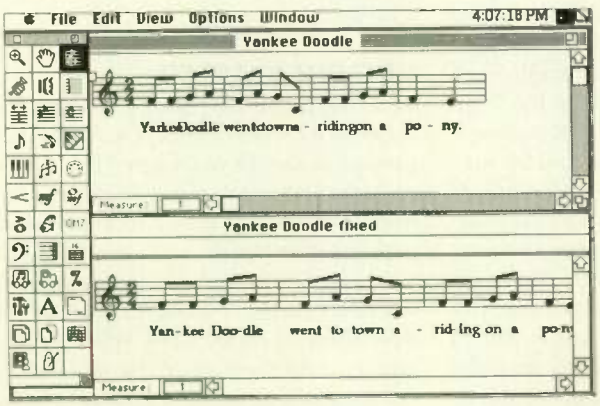

FIG. 2: Lyrics affect the spacing of notes on the screen and printout.

Interactive Music Lessons

By Jeff Burger

A behind-the-scenes look at the making of "So You Want to Be a Rock and Roll Star."

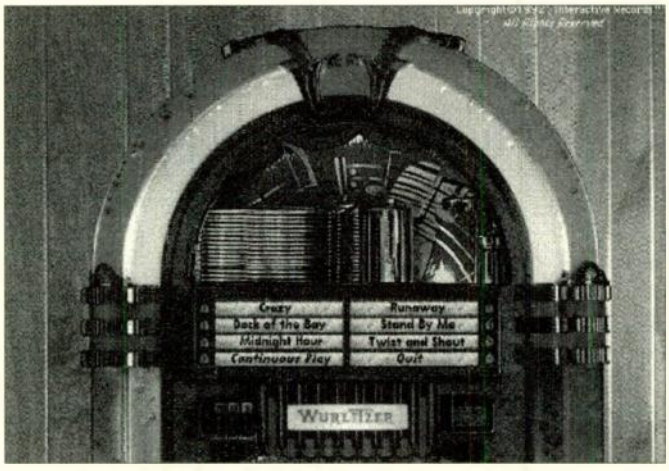

FIG. 1: The opening screen from *So You Want to Be a Rock and Roll Star.*

The term "multimedia" has been appearing with increasing frequency in the mass media lately; newspapers, magazines, even the morning television shows are buzzing about this new technology. It promises to change the face of entertainment and education, bringing a new level of interactivity to our leisure time. Multimedia consumer products already have appeared on the market, with many more predicted in the months to come.

But despite all the hype, the definition of multimedia remains unclear. Most people describe it as the combination of still pictures, animated computer graphics, full-motion video, text, and sound in a delivery system that allows the user to interact with the program, controlling the flow of information. The amount of data used in this type of product is enormous, so the storage medium of choice is the optical disk, usually in the form of CD-ROM or CD-Interactive (CD-I).

Truth is, this technology is still being defined, and electronic musicians have a unique opportunity to get in on the ground floor. To help you take advantage of this opportunity, **EM** has started a new column: "Multimedia Musician." Each month, we'll plug you into the audio side of multimedia, so you can learn about and participate in this exciting new field. We start with an inside look at *So You Want to Be a Rock and Roll Star: Volume One* from Interactive Records (921 Church St., San Francisco, CA 94114; tel. [415] 285-8650).

THE PRODUCT

So You Want to Be a Rock and Roll Star is an interactive CD-ROM for the Macintosh that serves as a cybernetic music teacher. The title screen (see **Fig. 1**) shows an old Wurlitzer jukebox (complete with animated bubbles) playing the song "Rock and Roll Music" and offering a choice of six classic rock songs: "Crazy," "Dock of the Bay," "In the Midnight Hour," "Runaway," "Stand by Me," and "Twist and Shout." Clicking on one of these selections takes you into the lesson for that song.

Each lesson is taught with a combination of several modes. The first variable is the mix you want to hear: full mix including vocals, mix without vocals, mix without keyboard, and mix without guitar. The second variable is the nature of the display and associated information during playback: animation, sheet music, analysis, guitar lesson, or keyboard lesson.

Sheet Music mode not only displays the piano score, but lets you audition any measure by clicking on it. Analysis mode shows the entire structure of the song: Buttons take you into *QuickTime* movies presenting relevant music theory or an artist/song biography (see **Figs. 2** and **3**). Guitar Lesson mode shows digitized images of a guitarist's hand playing the appropriate chords on a fretboard as the music plays. Keyboard Lesson mode provides a similar treatment for the ivories. Needless to say, there's a lot to the program.

GETTING STARTED

Veteran musician/producer Steven Rappaport began conceptualizing the project about six years ago. "For twenty years, I have longed for a way to impart my love of music to many people simultaneously and in a process that captivates me. Six years ago, I learned that there was a technology in development called CD-I. While I ultimately didn't get involved in CD-I, I started thinking about what might happen if you have a color computer, 600

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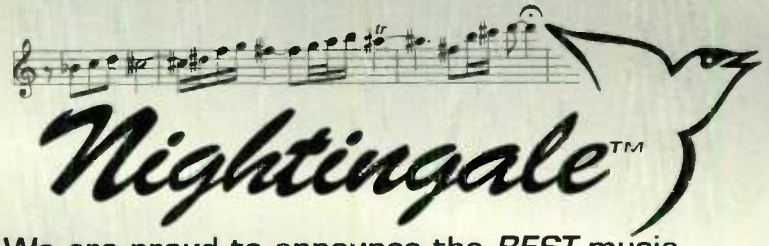

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MB of storage on a compact disc, and the availability of sound, interactivity, animation, and that kind of thing. It was immediately clear to me that this would be a way for me to share the knowledge I have."

After waiting for technology to mature and performing extensive tests with products such as *HyperCard* and *SuperCard*, Rappaport and programmer Greg McGee began development in earnest about a year ago with Macromind *Director* 2.0 on a Mac IIcx and IIci. Synchronization of the media was an important criterion. *Director* uses the concept of a "score," consisting of a series of frames, to time all events. Specific graphics, animation frames, sound effects, and Lingo scripts (*Director*'s programming language) can be executed on specific frames. Frame scripts can also be written that execute automatically on every frame.

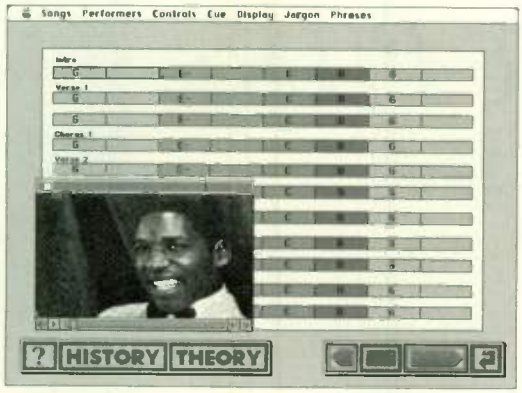

FIG. 2: The program's analysis screen shows the chord changes for the selected song and offers *QuickTime* movies explaining some of the song's history.

One of the major challenges was sound quality versus storage space. While the team wanted the best quality, 16-bit audio throughout would have exceeded even the 600+ MB capacity of a CD-ROM. A compromise was necessary: 16-bit Red Book CD audio was used for the main music, while native 8-bit Macintosh audio was employed to impart information such as narration and incidental sound. Playback thus requires audio output from the CD-ROM drive to a sound system or headphones, in addition to the Mac's output for the 8-bit audio.

RECORDING AUDIO

The 8-bit audio tracks were recorded onto 44 MB removable SyQuest cartridges using a Sennheiser 421 mic and a MacRecorder connected to an unassuming Mac Plus. The digitized audio was then edited using Farallon's *SoundEdit*, and later, Macromedia's *SoundEdit Pro*. This process allowed the audio to remain entirely in the digital domain. The 11 kHz sampling rate was selected because it required half the storage space of the 22 kHz option. However, experimentation revealed that much better results were achieved by recording at the higher rate and converting to 11 kHz, rather than simply recording at the lower rate.

Each of the six songs had to be mastered in four different versions to accommodate the variations without vocal, guitar, or keyboard. Including the "Rock and Roll Music" introduction, the end result included a total of 25 cuts. This pushed the CD-ROM to its limits, so only "Rock and Roll Music" was recorded in stereo.

The recording sessions were relatively straightforward, using an almost all-digital process at In-House recording

studio in San Francisco. All tracks were MIDI-sequenced using *Master Tracks Pro*, with the exception of Lorn Leber's guitar track and the vocal performances, which were recorded on a Fostex sixteen track with the aid of a sync track. (Sound-alikes for Otis Redding, Del Shannon, etc., were found through an advertisement in *BAM*, a Bay Area music magazine.) The various mixes were then mastered to DAT.

SYNCING THE VISUALS

The next challenge was to synchronize the graphics to specific points in the audio. The chords and animation had to change on the screen in sync with the audio in order to be effective. The DAT masters of the 16-bit variations were taken to Optical Media International in Los Gatos, California, where they were recorded on an audio CD-R (CD-Recordable). Using *Director* and the Apple CD XOBJ to display the addresses, every moment of the CD tracks that required synchronization with on-screen graphics was painstakingly logged for each of the versions.

It's hard enough to log all of the critical hit points and dictate that certain visual events occur at those points. However, the timing of graphics and animation vary with the different processor speeds in various models of the Macintosh.

To ensure proper synchronization, a frame script was created that automatically executes Apple's CD XOBJ to poll the CD for its current address on each frame of the *Director* score. The returned address is compared with the expected position in an "if/then" construct: If the position is ahead, a delay is invoked; if the position is behind, the animation moves ahead. The application also employs the GestaltLook! XCMD to determine the Macintosh model on which it is running. This allows the program to tailor the graphics to a 12- or 13-inch screen and compensate for the disparate display refresh times associated with various models.

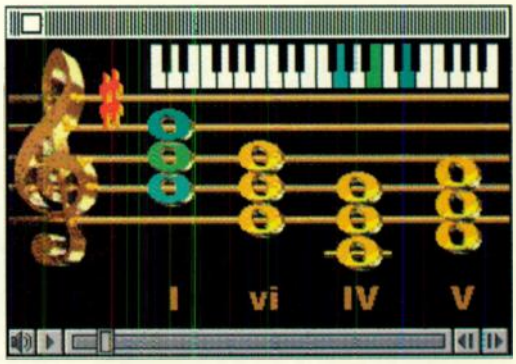

FIG. 3: In addition to keyboard and guitar lessons, the program offers help with general music theory.

Another hurdle was accessing program data on the CD while it was busy playing 16-bit audio passages. Playback from RAM was determined to be an ideal solution, but Rappaport and McGee couldn't rely on all machines having enough RAM to make this possible. They chose to transfer the graphics and related programming for each lesson to the user's hard drive before the lesson begins. Unfortunately, this causes an unavoidable delay between lessons. The team took some of the tedium out of the user's wait by implementing a rock 'n' roll trivia game during these pauses. (The game can also be played by itself.)

The portions of the lessons that

include 8-bit audio, such as the theory and history sections, require synchronization as well. For example, the theory lessons cover chord structures and scales that relate to the songs. The individual notes on the scale light up as they sound on the Mac's sound system.

This effect was accomplished using the ability of Macromedia *Director* 3.1 to play *QuickTime* Movies. *QuickTime* allows compressed animations and videos to play back at the same speed on any processor. Priority is given to the audio, and image frames are dropped as necessary to keep the overall timing of the presentation uniform. The *QuickTime* soundtrack and imagery were edited using Adobe *Premiere* and dropped into *Director*.

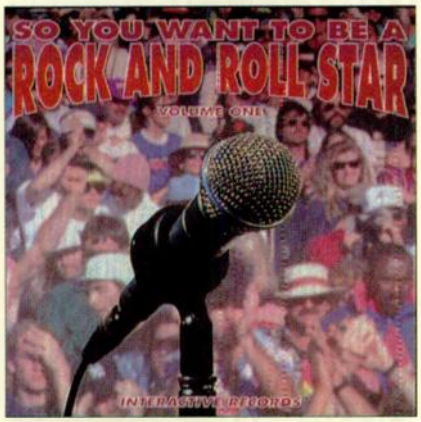

FIG. 4: The final packaging for *So You Want to Be a Rock and Roll Star.*

After everything was assembled, synchronized, and tested on more than half a dozen machines, the original DAT and a 500 MB hard drive with the remaining data was taken back to OMI. Having ensured that the 16-bit audio tracks retained addressing identical to the CD-R, the various audio tracks, graphics, *QuickTime* movies, and *Director* scores were turned into the final CD-ROM master used for mass duplication. The project indeed pushed the limit of CD storage; only 8 MB of free space remained on the disc.

THE FUTURE

Looking back on the project, Rappaport muses that half of the battle had nothing to do with technology, but negotiations with music publishers over usage rights. "It came down to three basic questions. What is multimedia? Who is Steven Rappaport? And what do multimedia rights look like?" At the moment, there are few precedents in this new media arena. Fortunately, after about nine months of negotiating, Rappaport finally secured rights from Warner Brothers that served both as a model and door-opener for other publishers.

After all is said and done, Rappaport and McGee estimate that about 8,000 hours of work went into realizing their labor of love (see **Fig. 4**). Was it worth it? "I know how much music has brought to my life," says Rappaport, "and it's a blessing to be able to share that with other people. I'm at a point in my life where it's important to make some kind of contribution if I have the opportunity. And for better or worse, this is my contribution. I am driven to do this." Obviously. Armed with that enthusiasm, an evolving technology, and tricks they learned the hard way, the team is already hard at work on *So You Want to Be a Rock and Roll Star: Volume 2.*

Jeff Burger *owns Creative Technologies, a multimedia production and consulting firm based in Northern California. His book,* The Desktop Multimedia Bible, *is now available from Addison-Wesley.*

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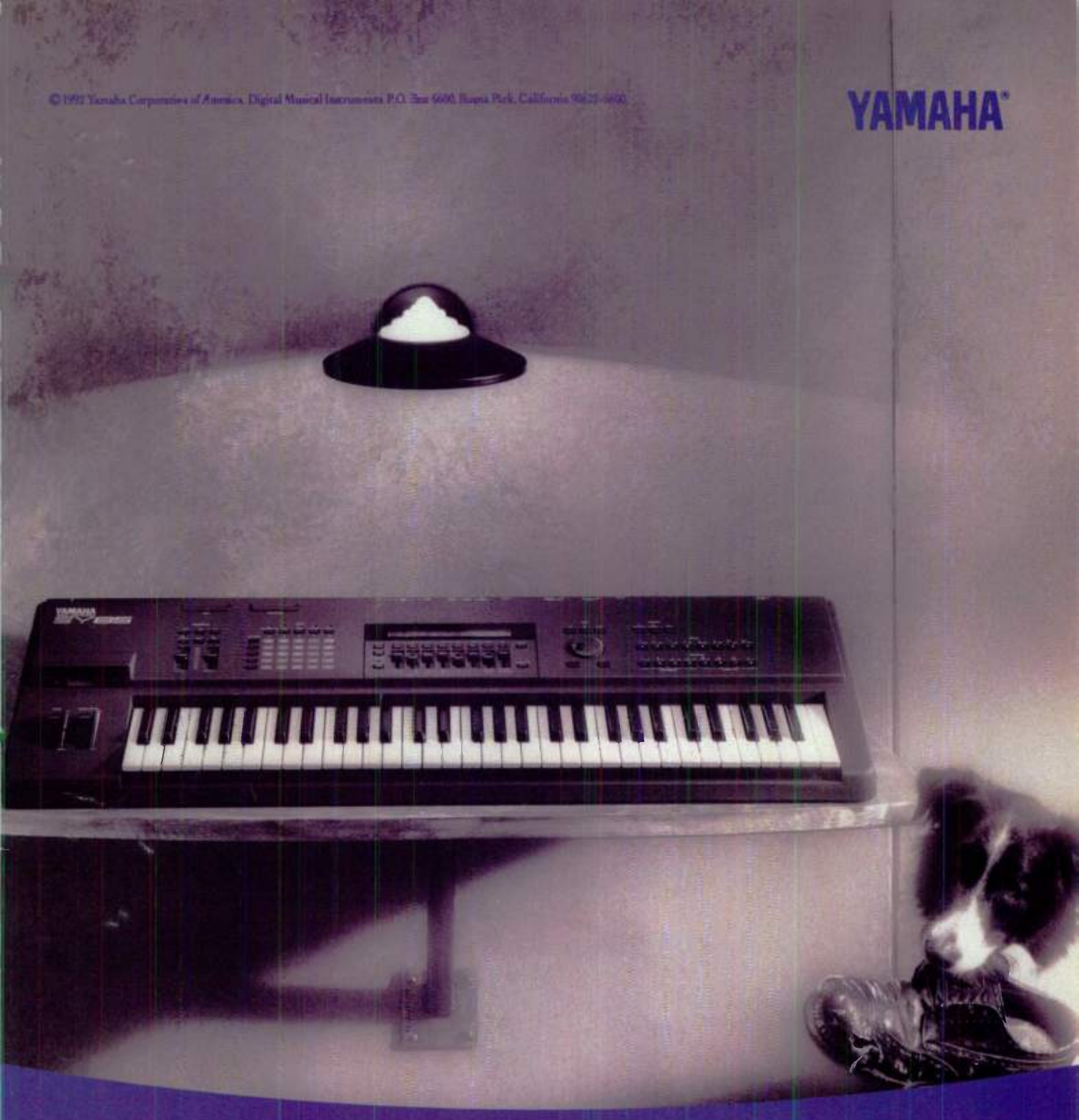

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Vocal Acoustics

By Joanna Cazden

Knowing something about the acoustics of the voice helps you record better vocal tracks.

Bobby McFerrin and Mariah Carey are icons of vocal virtuosity, but for most of us, cutting pristine vocals in the recording studio is an iffy proposition. Poor technique and/or preparation, detrimental health habits, emotional pressure, or common colds can turn a vocalist's dulcet tones into timbral trash.

Unfortunately, all the tricks and toys available in modern recording studios can't turn a savaged voice into a Caruso or Callas. The beauty and power of the voice comes from within. Literally. Basic knowledge of the body's sound-producing inner mechanism not only inspires better vocal tracking, but can help circumvent problems such as sibilant distortion and mic popping.

TECHNOLOGY MEETS BIOLOGY

The human voice is an exquisitely expressive instrument, and recording its wide dynamic range and variable frequency spectrum can frustrate even the best engineers. In addition, recordists must predict split-second shifts in amplitude and resonance produced by lyric articulation *and* compensate for the voice's betrayal of a singer's emotional state and general health. To make matters worse, the process of vocalization has been poorly understood because its mysteries are hidden inside our bodies.

However, advances in computer technology and digital signal processors now permit voice scientists to take electrical readings of throat muscle activity, measure airflow, and analyze the spectral content of speech sounds. A recent development, *videostroboscopy*, finally revealed the rippling vibration of the vocal folds (or cords) in slow motion, using a fiber-optic tube carrying a tiny video camera and strobe light inserted into the throat.

Fundamentally, the voice is a wind instrument, producing both an acoustic waveform and a variable airstream. The voice box, or *larynx*, is situated in the airway between the lungs and mouth. What we call the "Adam's apple" is a complex structure of cartilage approximately the size of a walnut that houses two small folds of muscle tissue. These vocal folds can be positioned to remain silent, or positioned to vibrate in response to exhaled air.

Pitch and some aspects of timbre are established by minute adjustments in the length, tension, and stiffness of the vocal folds. These adjustments are not entirely under conscious control, which is why most vocalists rely on metaphoric imagery or trial-and-error to achieve a desired sound.

FUNDAMENTALS AND MORE

The fundamental frequency F_0 (pronounced "F-sub-zero") produced by the vocal folds can range from approximately 80 to 700 Hz in young adult males and from 140 Hz to 11 kHz in young adult females. Normal speech is produced in the low-mid portion of these ranges and generally uses a narrow band of frequencies rather than a precise pitch.

In addition to the fundamental frequency, the vocal folds also generate harmonics. The entire complex waveform then travels up into the partially enclosed chambers of the throat, mouth, and nose. These vocal-tract enclosures resonate at certain frequencies that become amplified if present in the arriving waveform.

The harmonics that resonate within these chambers are called *formants*. Formants appear as strong peaks in the radiated frequency spectrum, labeled F_1, F_2, and so on. When vocalists move their lips, tongues, and throat muscles to articulate vowels and consonants, they change the shape of the resonating chambers, altering the frequency, intensity, and proportions of these formants. The resulting changes are recognized

JOHN NELSON

by listeners as words (see Fig. 1).

The existence of formants explains why a perfect EQ setting for a singer's "ah" may not sound as good on the vowel "ee"; the shifting formants produce a kind of body-cavity EQ. So it's particularly important to audition vocal miking and EQ settings on long sections of a lyric passage rather than isolated syllables.

POP, WHISTLE, BOOM

Some changes in vocal sound are not related to F_0 or formants. For instance, certain consonants are produced by interrupting the airstream itself. These sounds occur in the range of 2 to 6 kHz, and consist of fluctuating, pressurized air turbulence.

Although this turbulence often causes significant miking hassles in the studio, it is a necessary evil. According to speech scientists, "intelligibility rides on the consonants," so without these airflow noises, lyric content would be lost. Unfortunately, a few consonants, such as "p" and "s," are especially troublesome when recording vocals.

"P" belongs to a class of speech sounds called *plosives*, in which the outflowing air is stopped and then suddenly—and violently—released. (Put your hand in front of your mouth and say "pa-pa-pa"; you'll feel it!) While "b," "t," "d," "g," and "k" also are plosives, "p" often packs the biggest punch, distorting microphones with a virtual sonic boom of tonal frequencies.

Skilled singers diminish plosives by reducing their airflow, but windscreens can rescue less-savvy vocalists by breaking up the turbulence. Other solutions often bring compromises in tow. For example, using EQ to cut a few dB at 100 Hz can tame the boom, but the adjusted timbre may "thin out" the vocal sound. Placing the mic slightly to the side of a singer's mouth also reduces pops, but room tones can sneak in and produce an unnatural timbre. Audition all the options before deciding which method works best for the song and the singer.

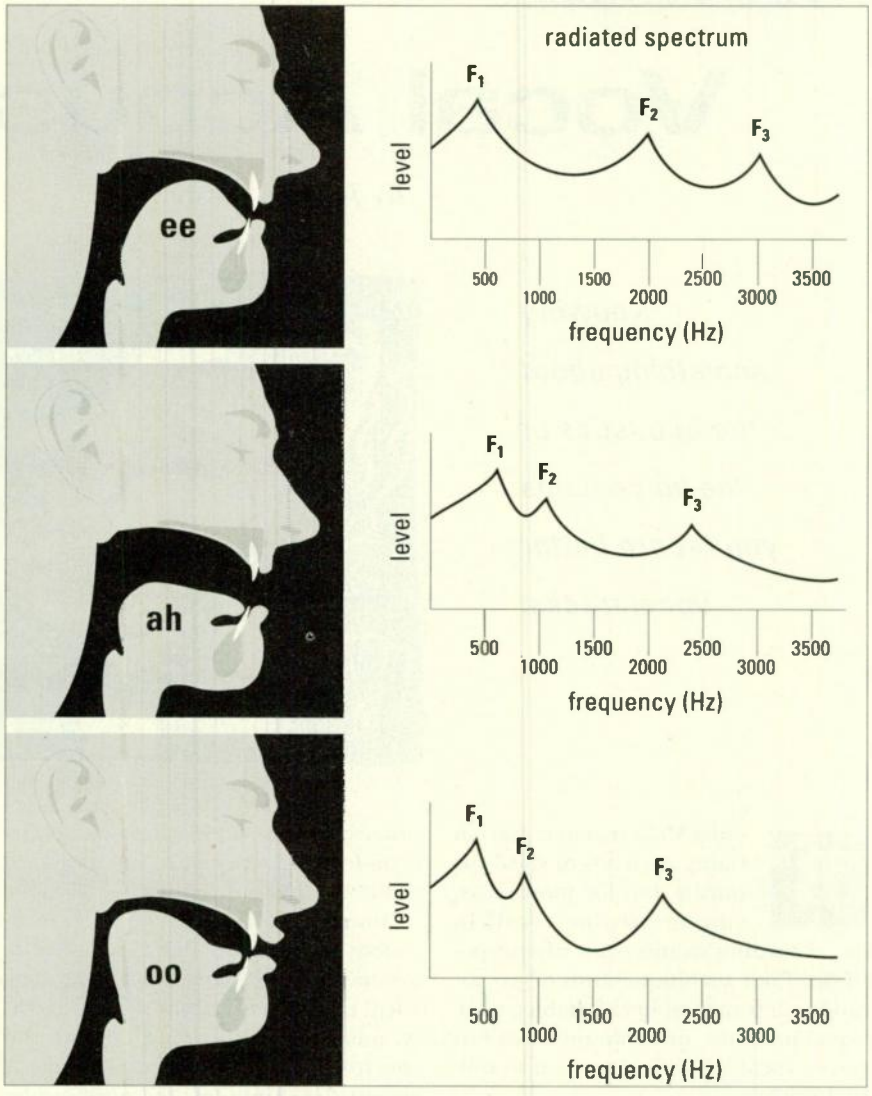

FIG. 1: Tongue position and audio spectrum of three spoken vowels. The shaded areas are the throat and mouth resonating chambers.

Another class of consonants called *fricatives* includes "s," "z," "sh," "th," "v," and "f." These sounds are created by continuous pressurized turbulence in the airstream, rather than a single explosion. As the fricative highest in

CARE AND FEEDING OF STUDIO SINGERS

1. Smoke, dust, and extremely cold or dry air take their toll on a singer's endurance. Try to air out the vocal booth before sessions, and limit smoking to outdoor or reception areas. In cold weather, get the room temperature up to 70 degrees or so before the singers arrive.

2. Most singers know to drink fluids throughout a session to keep throat tissues moist. Warm or moderately hot beverages are preferable to cold or iced drinks. Providing a teapot, microwave, or other hospitality—herbal tea is better than coffee—shows singers that you understand and value their work. Don't forget to ask if they need a refill.

3. A significant (but often overlooked) strain on singers is too much *talking*. However tempting it is to socialize during breaks, allow vocalists some peace and privacy, and encourage colleagues to do the same.

4. Studies prove that inadequate training is a leading cause of vocal damage in pop singers. If you are impressed with a singer's skill, find out who they study with so you can offer referrals to less-experienced singers.

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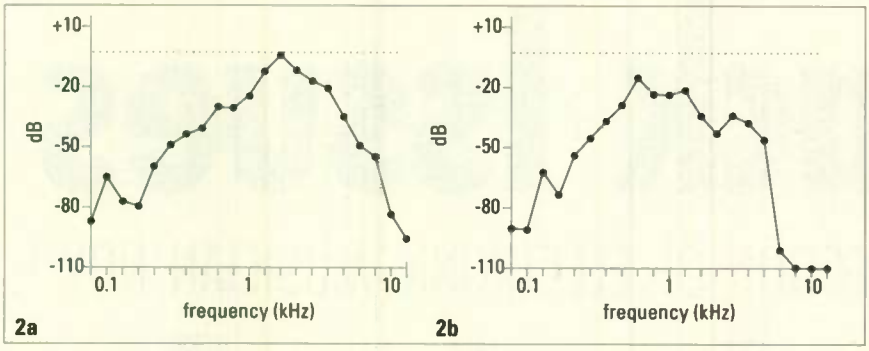

FIG. 2: Typical audio spectrum of country-western singing (2a) and operatic singing (2b). Notice the peak around 2 kHz in the first example and the "singer's formant" around 3 kHz in the second example. (Based on data reported in Colton, Estill, and Gertsman; 1981.)

frequency and intensity, "s" often disrupts vocal recordings by producing sibilant distortion.

If you don't have a de-esser in your signal-processing rack, cutting the EQ slightly around 6 kHz during troublesome phrases can help. However, the exact "sibilant" frequency varies greatly from person to person (it may be as high as 10 kHz for some people), so be sure to test your vocalist's "s" sound to discover the best frequency range to cut.

GRAND NEW OPRY

Using EQ to compensate for a singer's off days or poor timbre is still an inexact science. Up to now, most singing research has measured operatic voices, in which the ideal mouth position and resonance spectrum are significantly different from typical pop, rock, folk, and country sounds.

One study located a "nasal twang" between 2 and 2.4 kHz (see **Fig. 2a**). If a male tenor sounds too nasal, try cutting around these frequencies. Conversely, a country singer with an unconvincing sound may be helped by boosting the vocal EQ at 2 kHz and backing off the mellowness at 500 Hz.

In the world of classical music, a "singer's formant" around 3 kHz has been identified in baritones, tenors, and contraltos. It is believed to help singers project over a symphony orchestra (see **Fig. 2b**).

A recent demonstration at the Pacific Voice Conference involving a trained singer and a spectrum analyzer showed that this formant can be added to any F_0 and vowel spectrum. (Sopranos have difficulty producing it, but they apparently don't need the boost!)

Obviously, there is much to be learned about the wide variations in individual body structure, personality, training, pronunciation, and style that affect a vocalist's output. With ongoing advances in technology, musicians and voice scientists can face this challenge together.

Joanna Cazden *is an L.A.-based singer/songwriter, recording artist, and speech pathologist.*

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Musical Typography

By George F. Litterst

Using the proper fonts can help you refine your music notation.

At the dawn of desktop publishing, many enthusiastic neophytes dove headfirst into the revolution, creating their own newsletters, flyers, and other printed material. Unfortunately, the tools available at the time were limited—as was the experience level of most desktop publishers—and the results showed it. Long-established principles of page layout, letter kerning, and font selection were swept aside by the newly empowered masses, and the world was inundated with some pretty ugly stuff.

Thankfully, a lot has changed since then. Popular programs have been greatly refined, and experienced DTP folks are producing beautiful work, stretching the boundaries of print design in the process. Music desktop publishing, however, has lagged behind. Many current notation programs ignore conventional standards in music publishing, making it difficult to produce engraver-quality work.

As with traditional desktop publishing, though, music-notation programs and users are growing more aware of the time-honored principles of music publishing. To help encourage this process, we've compiled a number of tips you can use with today's programs to create more attractive scores.

MUSIC FONTS

The biggest visual impact on your score comes from the music font included with the notation program. Ideally, you should be able to change music fonts as easily as DTP programs allow you to change text fonts. Unfortunately, with the exception of Coda's *Finale*, every music-notation package limits you to the font that comes with the program. (Unofficially, a few publishers have indicated that their new programs and updates to existing programs will support substitute music fonts in 1993.) Some of these fonts are well-designed, but some are not, so be sure to check them out before purchasing a program.

Despite the currently limited audience, there are several PostScript music fonts on the market. These include Adobe's Sonata (Mac and *Windows;* $95), Coda's Petrucci (Mac; $149), Casady and Greene's GraceNotes (Mac; $89), and ergo sum's Susato (Mac and *Windows;* $199).

Adobe's Sonata was the first widely available music font, and other music font manufacturers modeled their basic character sets after it. As a result, all the principal characters in the aforementioned fonts are mapped to the same ASCII locations. (For example, if you were to access a music font in your word processor and type lower-case "w," you would get a whole note in all cases.)

If your music-notation program allows you to swap one of these fonts for the built-in font, you can significantly alter the appearance of your entire score in one operation. (*Finale* users should look at the sidebar "Tips for *Finale* Users.") Take a look at the music symbols in **Fig. 1**. Note, for example, the differences in the overall weight of the various characters and the width of the eighth-note flags.

EXTENDING YOUR SYMBOL SET

So many different symbols are used in music that no single music font contains a complete set. This is probably why three programs—Coda's *Finale,* Dr. T's *The Copyist,* and thoughtprocessor's *The Note Processor*—let you create additional font characters from within the program.

GORDON STUDER

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If you're not up to creating your own characters from scratch, there are many other solutions. First, locate one or more music fonts that contain the additional characters that you need. Sonata, Petrucci, GraceNotes, and Susato all contain varying numbers of lesser-used music symbols in addition to the basic set. In addition, a number of specialty music fonts have symbols for everything from early music neumes to avant garde performance expressions. Some fonts to consider are Crescendo, Tabulatur, Akkordeon Register, Metronome, Rameau, Newport, and Midicom. For samples of each, see the "Specialty Fonts" sidebar.

If you use *Finale*, you can add additional music characters from other fonts to the programs' standard expression tools and define a MIDI playback capability for them. If you're using another program, you'll need to use some form of text entry, such as text blocks, lyrics, chords, or note expressions. For example, the tool used for lyric entry in your program may be the best choice for entering figured bass symbols because the symbols stay aligned on a common baseline, and they stay attached to the correct spot in the measure.

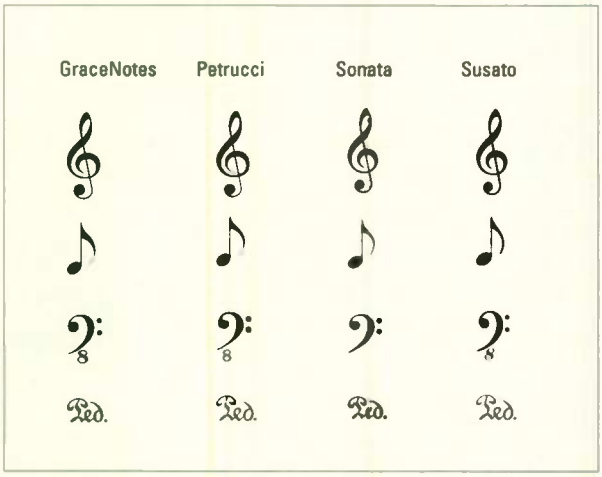

FIG. 1: Examples of the four main PostScript music fonts.

Ideally, you should be able to add a music symbol with a tool that is appropriate to the symbol (such as an expression tool for adding accents to notes), and you should be able to define any given symbol for MIDI playback. Realistically, however, that may not be possible. If you get stuck, be imaginative.

GUITAR NOTATION PROBLEMS

Guitar fretboards pose an interesting challenge for music-notation software. Most programs provide a way to enter chord symbols, such as Cm7, but few allow you to enter guitar fretboard frames. The few programs that offer this capability utilize a guitar-symbol font, such as Coda's Seville (a PostScript font for the Mac; $149), entered as text.

Finale, however, can "listen" to a chord you play on your MIDI keyboard (or MIDI guitar) and then pop the appropriate guitar fretboard into the music.

The problem with existing guitar fonts is that there are many more chord voicings possible than there are characters. Ideally, a program should be able to give you any fretboard frame

that you can play on your guitar. Even better would be having the ability to simply strum a chord on a MIDI guitar and have it instantly appear in the score.

TIPS FOR TEXT FONTS

To create good-looking scores, you also need to make good use of basic text fonts. Below are some tips from both my own experience in music publishing and from master engraver Ted Ross' authoritative book, *The Art of Music Engraving and Processing* (Hansen House).

- Use a serif font in the bold/italic style for tuplet numbers. Make sure that the number is 1⅓ spaces high. (The engraver's term *space* is a relative term that refers to the distance between two staff lines.)
- For words such as *crescendo* and *ritardando*, use a serif font such as Times in the bold/italic style.
- Chord symbols stand out nicely if they are in a bold style and slightly bigger than the typical font for lyric text.
- *8va* and *15ma* should be in the italic style. The numerals should be 1½

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spaces high.

- Titles are traditionally printed in boldface, upper-case letters. I prefer a serif font. Three to four spaces is a good height.
- Tempo markings such as *Allegro* should be in a serif font in the bold style. The first letter is normally capitalized.
- Lyric text is generally quite readable when it is between 1½ and 2¾ spaces high. Serif fonts enable the eye to follow the line of lyric text more easily than sans serif fonts.
- The *M.M.* of metronome markings is generally capitalized in a bold serif font about the size of lyric text. Both the equals sign (=) and the metronome number that follow are generally set in plain text at the same point size.

LOOKING AHEAD

In the evolution of music desktop publishing, we are at the stage where musicians have the amazing capability of producing publication-quality scores with their computers. Regrettably, the current generation of music-notation

TIPS FOR FINALE USERS

Finale 2.x ships with Petrucci 24 as the default music font. If you wish to update existing documents, templates, or your *Finale* Default File to Sonata, GraceNotes, or Susato:

- Open the document in question and choose "Data Check..." from the Edit menu.
- Use the "Switch Default Font..." function to replace Petrucci 24 with your desired font in the 24-point size. Save your changes to disk.

If you follow these guidelines, a few other program settings will be automatically changed to accommodate Sonata. In the cases of GraceNotes and Susato, carefully follow the documentation that comes with the font to make a few other small, but important, changes in *Finale*.

Note that you can mix and match characters from different music fonts in *Finale* by using the Music Characters option in the Special menu.

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Ultimate Support Stands, Workstations
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Zoom Digital Processing
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SPECIALTY FONTS

AkkordeonRegister (bundled)
AkkordeonRegister comes with the Susato package for Mac or *Windows* and contains symbols for accordion music.

Crescendo (bundled)
A Macintosh font that comes with the GraceNotes package, Crescendo contains symbols for percussion instruments, Gregorian Chant, organ, damper and harp pedals, and various modern music symbols. It also contains special versions of standard music characters for use in a word processor.

Metronome ($24)
This bargain-priced, stand-alone package from DVM Publications is available for Mac or *Windows*. It contains all of the special music and Roman characters for typing metronome markings—such as "♪=126"—into a music program or a word processor. In addition, it contains characters for typing time signatures, rhythmic examples, staff lines with or without clefs, figured bass, and pedal markings.

Midicom ($69)
This Macintosh font from Coda contains a unique collection of symbols for MIDI controllers and the like. In *Finale*, you can define these characters for MIDI playback.

Newport ($69)
Another Macintosh font from Coda, Newport contains an extensive set of symbols for jazz and percussion.

Rameau ($69)
Yet another Macintosh font from Coda Music Software, Rameau contains special characters for creating figured bass.

Tabulatur (bundled)
This font comes with the Susato package for Mac or *Windows* and contains symbols necessary to create guitar tablature.

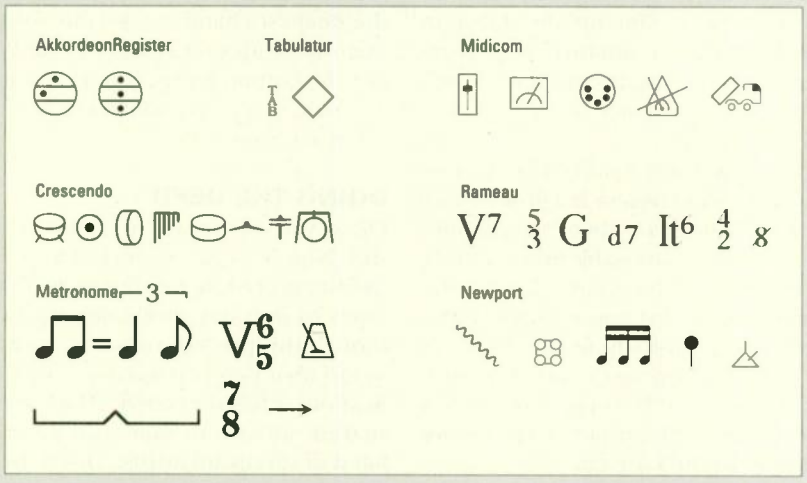

FIG. A: The large selection of available specialty fonts lets you put almost any symbol into your scores.

programs still rely on the user to understand and manually implement many of the time-honored traditions that music engravers have used to create good-looking scores.

I hope we can look forward to the day when the computer does more of the work for us. Until then, your present setup should keep you plenty busy.

George Litterst *has written extensively on music desktop publishing. He wishes to thank Steve Peha of Music Technology Associates for his help on this article.*

Shopping Your Demo Tape

By Michael Molenda

Don't keep those potential hit songs to yourself.

Be honest. How many demo cassettes or master recordings are hiding in your closet? Don't play dumb. Every musician has recorded a demo that seemed destined to win a label or publishing contract. But something happened. Maybe the vocal failed to send shivers down your spine, or the mix didn't sound right, or the song—after countless listens—just didn't seem good enough. In short, you chickened out. The tape was tossed into your secret garden of "lost masterpieces," and no industry ears heard even one note.

Well, you'll never get a break if the industry is deaf to your work. You've got to get those demos out of the closet and into someone's hands, or you're just teasing yourself about seeking a career in music. So, for the sake of *your* career, I'm going to be your drill sergeant. I'm going to tell you how to submit a demo and where to send it. All you need are the guts to drop a package into the mail.

TAKING THE HEAT

The reason some musicians cower at the prospect of shopping their work is simple: Submitting demo tapes to industry pros is an excruciating experience. It is not an A&R person's job to deliver polite comments about unsuitable material or nurture your commercially unproven talents. If you don't have what it takes, they're not shy about telling you.

Here's a quick reality check. The entertainment business is a profit industry and record executives are commissioned to find marketable artists and/or songs that will increase a label's revenues. I'll make things a little clearer: The music industry is not run by artists for the sole purpose of enriching society, it is directed by corporate business interests who crave profit margins wider than the Grand Canyon.

Locked in mortal combat with the balance sheet, an A&R executive's job security is often measured in minutes. Signing one artist that doesn't meet sales projections can mean the "former" executive ends up working at K-Mart before the next *Billboard* hits the newsstands. This situation explains why many A&R people should be excused for not empathizing with your artistic pain and suffering. Give them hits and (maybe) they'll give you a shoulder to cry on.

Few musicians understand that pursuing a commercial music career opens the deepest chambers of your soul to the often-witless criticism of The Public. The bottom line is, if you can't take a punch, you're excused from reading the rest of this article.

DOING THE DEED

Okay, you've survived the horror stories. Now let's get to work. There is a definite procedure for submitting demo tapes to industry professionals. Even though this procedure is documented in just about every music-business publication, it has remained a dark secret shared only by an increasingly small band of successful artists. This must be the reason my production company continues to receive countless unsolicited tapes and handwritten inquiries scrawled on binder paper.

Hey, wake up! No one gets points for messing with professional etiquette. When I receive sloppy submission letters I can only assume two things: The artist cares so little about his or her work that they can't manage a proper submission query, or the artist disrespects my position in the industry *and* the value of my time. I know many

JOHN NELSON

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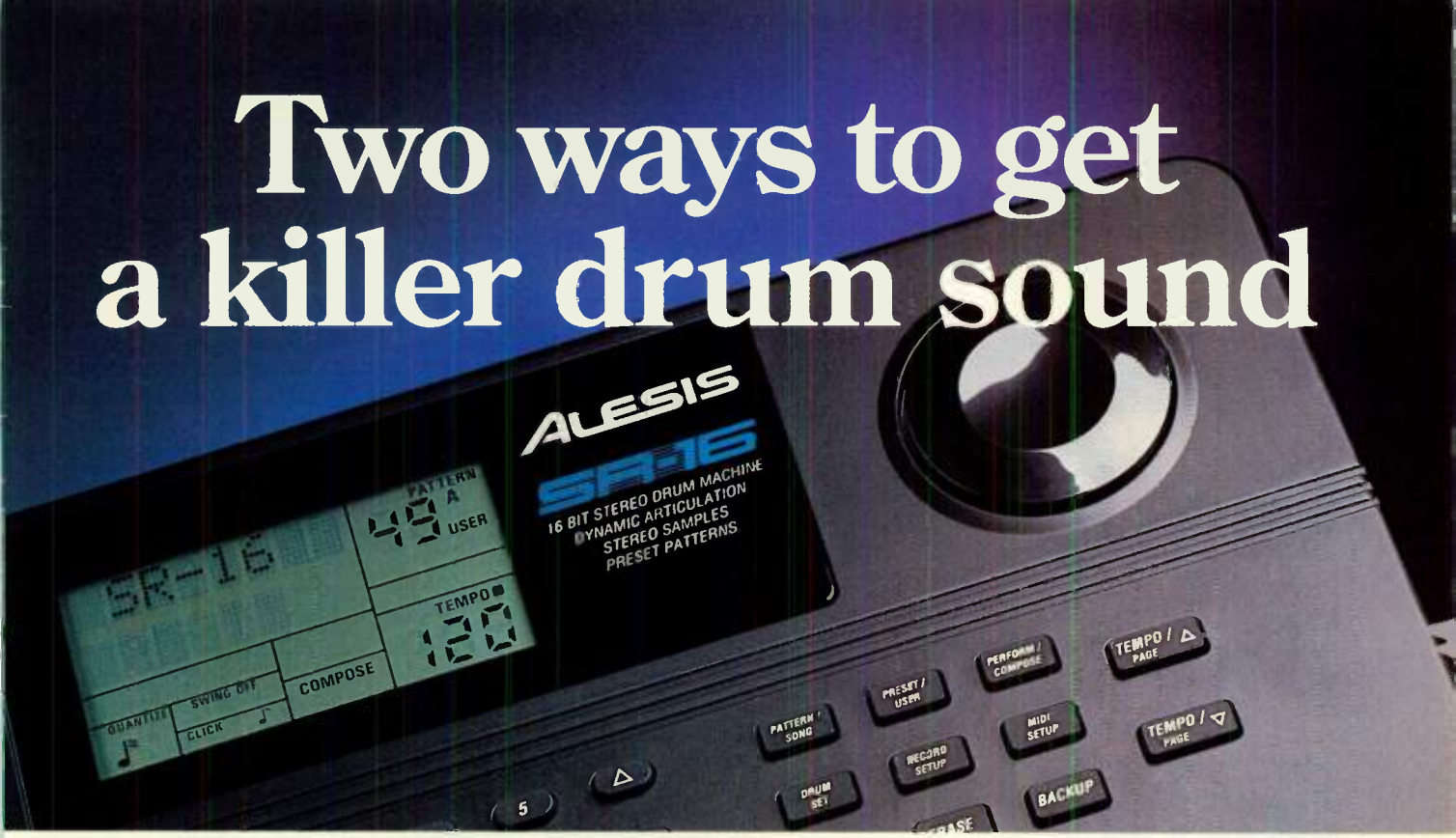

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Electronic Musician

other industry pros feel the same way. Believe me, no one enjoys deciphering penciled ramblings from artists who "guarantee" that their tape is chock full of hits. So, to save myself (and others) from dealing with the bitter fruits of ignorance, here is the "secret" submission procedure.

Ask permission. Never send a tape without first getting approval. Even if a publisher claims to accept unsolicited material, be courteous and forward a query letter before you send off your tape. Query letters should be typewritten and include the contact person's full name. ("To whom it may concern" is not an appropriate greeting.) Do not put your creative history in the text of the letter. Simply state that you are seeking permission to submit a demo tape consisting of, for example, three songs. Be sure to include a self-addressed (and stamped) reply postcard.

Send a clear message. If you receive permission to submit your work, compile a well-documented package. First, type a brief cover letter thanking the contact person for his or her interest. Be concise. If a biography is requested, make it short (one or two paragraphs is ideal) and include a black and white, 8 × 10 glossy photo. Be sure that your name, address, and telephone number are marked on the cassette cover and on the cassette itself. Don't forget to include a stamped, self-addressed envelope big enough to facilitate return of all your materials.

Follow up. Two weeks after you mail the package, call the contact person to confirm receipt of your materials. Do not badger them or seek a personal critique over the telephone. If they haven't received your package, politely inform them that you'll check again in another week. Also, you should always be sure that your package makes it into the right hands.

Be patient. Once you've confirmed the contact person has your tape, relax a bit. With most industry people, the squeaky wheel gets tossed into the "low priority" bin. If you don't hear anything within a month, call to inquire about your status. Do not sound anxious or pushy. You'll find that many executives actually apologize for delays and may even offer a timeline for getting back to you.

Be gracious. If an industry pro rejects your tape, type them a short letter thanking them for their time and consideration. Professionals appreciate such common courtesy—even if they don't reply—and may remember your name fondly when you ask to submit your next demo. (You weren't thinking of giving up after one try, were you?)

PATHS OF GLORY

Now that you've got the submission procedure, you'll need some places to submit. Some of these ideas are obvious, but I've included a few practical insights for each venue. Do not hope for a home run on your premiere submission.

"What you're beginning is a dialog with the industry," says record promoter and label publicist Nadine Condon. "If an A&R rep thinks you have talent, they'll *ask* you to stay in touch, hoping that down the line you'll come up with something they can work with."

> Do you have the guts to shop your own work?

Record labels. A direct submission to a record company puts the chances of scoring a deal into the same statistical stratosphere as breaking the bank at Monte Carlo. But people *do* get signed, so why not you? However, be smart. Don't "shotgun submit" to every label in the world. Such lunacy only wastes time and money. Do some market research and determine which labels routinely exploit your style of music. Once you've narrowed the market focus, religiously follow all rules of submission. Remember that in seeking notice from overworked A&R departments—who must swim through thousands of unsolicited tapes from whiny, untalented dream weavers—one misstep equals doom.

Music publishers. Publishing companies are often-overlooked pathways to a record deal, so don't consider these entities as solely "tune traders." Many publishers sign up promising artists and producers—as long as they can write their own material—and help them seek record contracts. The payback is obvious: A full album of artist-penned tunes can generate sizable revenue because the publisher is entitled to publishing royalties based on sales and airplay. To distinguish yourself

from the legions of non-performing songwriters seeking staff writing or single-song deals, be sure to include the appropriate "slashes" in your submission letter (i.e., producer/songwriter, artist/songwriter, artist/producer/songwriter, etc.).

Management firms. Good managers constantly look toward the future. A firm may represent today's hottest acts, but today's superstars often turn into tomorrow's has-beens. Ambitious artists can win a manager's support by nurturing a casual relationship based on increasingly commercial demo tapes.

Entertainment lawyers. Some music attorneys aspire to be artist managers, record company executives, and even producers. Of course, pulling off such a career change requires a marketable "flagship" artist. Get the picture? But even if a music lawyer doesn't become directly involved in your career, he or she can refer you to valuable industry contacts. It pays to keep reputable attorneys updated on your career, but beware of less-dignified lawyers who charge fees to listen to demos. If they're seriously looking for acts to shop or develop, they should listen to your demo for free.

Performance rights societies. ASCAP, BMI, and SESAC offer many services to aspiring songwriters and recording artists. BMI, for example, offers frequent new-music concerts that showcase unsigned artists to the industry. In addition, each society has executives who routinely monitor up-and-coming artists. Make sure these people have your latest demo. A&R executives often seek counsel from these societies, so it pays to be the next name on their lips when the labels call.

Songwriter associations. Songwriter associations can be life buoys for frustrated composers. If you're having difficulty getting industry pros to listen to your material, most songwriter associations sponsor events—often called "demo derbies" or "cassette roulette"—where members can play their demos face-to-face with A&R executives or publishers. In addition, many associations also sponsor open-mic performances and songwriter conferences. Non-members can usually check out events by paying a nominal fee.

"We provide a valuable networking conduit for songwriters and the industry," says Ian Crombie, executive director of the Northern California

Songwriter's Association. "When you're not in a music capitol such as L.A. or Nashville, it's important that songwriters share resources. And even though our members are competitive, there's a sense of community. For instance, if one of us hears about a good opportunity, it gets around."

Something a little different. This is a new concept, so I didn't even know how to categorize it. Taxi is a fee-based computer network that plugs members directly into the recording industry. Record labels and publishers notify the Taxi staff about specific needs, and these listings are released to members through the network. (A listing service for non-computer owners should be in place at local recording studios and music stores by press time.) The revolutionary system is great for both industry and musician because every submission is targeted to an actual industry request.

Of course, the network's client labels and publishers don't want to drown in submissions, so Taxi maintains an in-house A&R staff that auditions members' demos and forwards only the best tapes to the listing company. Taxi takes no additional fees if one of their listing companies cuts a deal with you, and every tape is critiqued by the A&R staff, whether it is forwarded or not.

"We're like a computer 'personals' column for the recording industry," says Michael Laskow, Taxi president. "A label asks for, say, an uptempo R&B song and that's what we send them. So far 42 percent of our members have had tapes forwarded to major labels and publishers, and six percent have been offered deals."

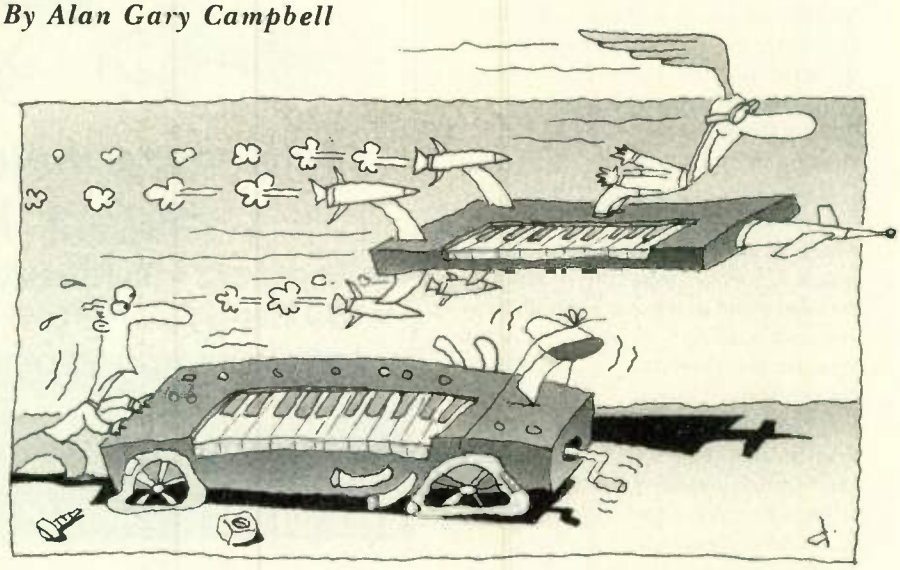
THE LONG AND WINDING ROAD

The grand battle cry of hungry musicians is the fact that every successful artist was trashed by someone. Quite a few record companies passed on the Beatles before EMI took a chance. However, it can take months, or even years, between submitting your first demo and the signing of your first contract. Perseverance is critical: Keep writing, keep improving, keep submitting. If you give up, you're finished. And Sergeant Molenda won't *let* you give up. So take those demos out of the closet and *submit!* I'll be watching.

Questions & Answers

By Alan Gary Campbell

Our musical medic lectures on minor E-IIIxp surgery and Heimlich maneuvers for choking dinosaurs.



Q. My older MIDI-retrofitted synthesizers (including a Moog Memorymoog Plus and a Sequential Circuits Prophet-5) sometimes "choke" on the MIDI data from other controllers, especially those that send aftertouch data and multi-channel Note On/Off commands. Will an external data filter alleviate this?

Q. I have several "dinosaurs" that have been retrofitted with MIDI interfaces, but they're all slow. One—a Memorymoog Plus—is positively somnambulistic. Is there some way to speed them up?

A. The simplest solution to data-clogging in older MIDI synths is to use a MIDI data filter such as the Pocket Filter from Anatek (400 Brooksbank Ave., N. Vancouver, B.C., Canada V7J 1G9; tel. [604] 980-6850) to remove all but the absolutely essential data. This approach has several advantages: low cost, ease of use, and adaptability for use with more than one instrument when used in conjunction with a Thru box or switcher. (Some MIDI patch bays include data filters. For more information, see "Making Connections" in the January 1993 issue of EM.) But many MIDI-retrofitted synths are simply sluggish, even after filtering. Some of the more recent MIDI retrofits for vintage keyboards, such as those from Big Briar, Inc. (Rt. 3, Box 115A1, Leicester, NC 28748; tel. [704] 683-9085) and Wine Country Productions (1572 Park Crest Ct., Suite 505, San Jose, CA 95118; tel. [408] 265-2008), provide some performance improvements, but they are relatively expensive and complex.

An alternative solution: Use non-MIDI units (which are faster), and play them by hand. Pretty radical, eh?

Sequential Circuits Prophet-5

Q. I have an E-mu Emulator IIIxp module with 8 megabytes of internal RAM, and I'd like to add the internal hard drive. Do I also have to install additional RAM to make this work? Will an internal hard drive affect the use of an external SCSI drive? Also, can the analog sample inputs be added to an older unit? If so, do they require additional RAM? Are these user-installable upgrades?

A. The Emulator IIIxp is currently available in three versions: an 8 MB version without an internal hard drive and without the analog sampling inputs (Model 6100); a 32 MB version with an internal 105 MB hard drive, but without analog inputs (Model 6101); and a 32 MB version with an internal 105 MB drive and with analog inputs (the E-IIIxs).

Any of these features may be retrofitted independently, so it is possible, for example, to have a unit with the internal hard drive and analog sampling inputs with only 8 MB of RAM. (RAM can be increased in 8 MB chunks.) This allows the user to add features as his or her budget allows, though the total labor charge for installation probably will be less if all the upgrades are installed at the same time. The various upgrades are, on the whole, straightforward to install: There are existing sockets and panel punch-outs for the analog sampling inputs, and the new operating

continued on p. 146

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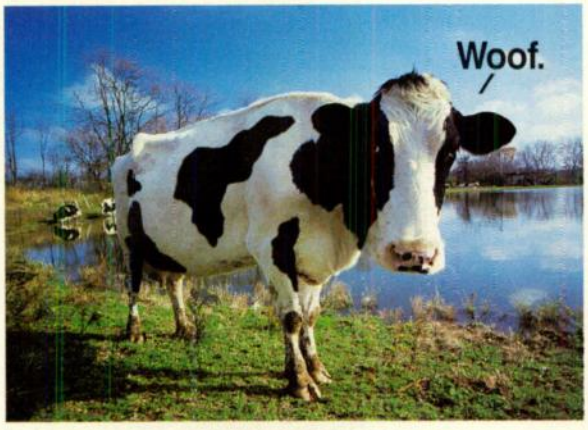

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Reviews

Roland GR-1 Guitar Synthesizer

By Michael Molenda

Finally, a MIDI guitar workstation that won't bust your chops.

My aversion to guitar synthesis can be summed up in two words: *Total Recall.* That's the name of a movie in which Arnold Schwarzenegger is subjected (clandestinely) to a mental overhaul that makes him believe he's someone he's not. What a mess! Poor Arnold doesn't know whether he's a freedom fighter, a government agent, or a simple construction worker. Few things are as terrifying as losing your identity. And that's why I've always hated guitar synthesizers.

Roland's GR-1 uses voltage, rather than MIDI, to trigger its onboard sounds from the GK-2 pickup, evading tracking delay problems. Its MIDI Out also lets it control external synths and signal processors.

In the past, playing a guitar synthesizer meant tossing away your identity as a guitarist in exchange for a new tonal frontier. At best you were forced to conceptualize sound like a (ugh!) keyboardist, and at worst you had to give up your own axe to play a dedicated guitar controller. But that's not all. The mercurial pitch-tracking of most units often denied guitarists the basic tricks of their trade, such as bends and hammer-ons. Even Faust wouldn't make this deal.

But Roland's GR-1 changes everything. The unit is arguably the first guitar synthesizer designed to expand a guitarist's horizons on his or her own terms. You can use your favorite guitar as a controller; perform bends, trills, and hammer-ons without fear; edit patches in real-time, with actual knobs; and change programs (and some parameters) stomp box-style. It's the first guitar synthesizer I'd consider making friends with.

THE BASIC TOUR

The GR-1 is the guitarist's equivalent of a keyboard workstation. It offers 200 internal sounds (Roland calls them "Tones"), expandable to 400 with an optional internal expansion board; 64 user memory locations; a 4-track, 2,000-note sequencer; and onboard signal processing (reverb, chorus, flanging, and short delay).

Cosmetically, the GR-1 looks no different than familiar, floor-controlled, multi-effects units. Any guitarist who can program one of these grand stomp boxes (or a rack-mount signal processor) should be able to simply plug in and play. The intuitive layout prompted me to muddle through the unit *sans* manual. Within twenty minutes, I was able to figure out enough features to audition the GR-1 for the engineers at my recording studio without looking completely incompetent. (However, the GR-1 is quite deep, and comprehensive use requires aid from the surprisingly well-scripted manual.)

The front panel is distinguished by six sturdy pedals that—depending on the chosen mode—select programs, effect real-time pitch shift and hold functions, enable the onboard guitar tuner, or start/stop the internal sequencer. A switch on the Roland GK-2 pickup that drives the synth from your guitar (more on this later) selects the pedal mode. Well-labeled control buttons handle the majority of editing and sequencing commands, but limited real-time sound-editing can be enacted via knobs (the guitarist's friends) located at the top of the unit. All functions are shown on a bright, easy-to-read LED display that combines alphanumeric information, patch numbers, and status lights.

In the rear are the power-supply jack; power switch; MIDI Out and In jacks;

PETER DIGGS

the GK-2 port; two external pedal jacks (for volume and expression pedals); an unprocessed, ¼-inch, mono Guitar Output; ¼-inch, left/right effects-return jacks (Roland calls them Guitar Returns because the effects send is considered to be the Guitar Output routed to an external signal processor); ¼-inch, left/right stereo output jacks (left is mono); and a ¼-inch, stereo headphone jack. A side-panel slot accepts optional memory cards.

THE SETUP

Despite all the fancy controls and the promise of things to come, nothing happens until the performance gestures enacted on your guitar are sent to the GR-1. The messenger is the optional GK-2 Guitar Synthesizer Driver. (The GR-1 is sold without this essential component because the GK-2 also works with Roland's GR-50 guitar synth.)

The GK-2 assembly comprises a pencil-thin hex pickup containing six individual pickups for each guitar string. A control pod includes a ¼-inch input jack for the regular guitar signal; the output jack for the GK-2 cable; a power-indicator light; a synth volume knob; and a switch that outputs guitar only, synth only, or a mix of the two signals (the levels of which are set by adjusting the GK-2's synth volume and the volume on your guitar). Switches S1 and S2 move the GR-1 between Pedal and Play modes and act as increment/decrement buttons when the GR-1 is in Edit mode.

The GK-2 must be attached to your guitar, and two options—screw-on or double-sticky pads—are available. I opted for the less-permanent option, as Roland still owns the review unit. Luck was with me: Installation took just a few seconds, and the pickup tracked perfectly. However, some guitars may take a few adjustments before optimum tracking is achieved.

CUTTING TO THE CHASE

I could continue describing the GR-1's features, but I can feel you're getting antsy. I realize that most guitarists only *really* care about the GR-1's playability. So calm down; here's the scoop.

Pitch-tracking for the internal sounds is triggered via direct voltage, which allows lightning-fast and accurate note translation without the time delays associated with MIDI guitar synths. But the GR-1 is not an isolationist; expandability is ensured via the unit's MIDI In and Out facility (and the optional SR-GR1-01 expansion board). If you use the MIDI ports to access outside sound modules, you will encounter the slight signal delays necessary to translate performance gestures and string vibrations into MIDI information.

Although pitch-tracking in this type of design necessarily involves translation delays, I wasn't aware of any drop-outs as I ran through the GR-1's guitar, bass, and brass sounds. I played full-fretboard scale runs clocked to a metronome at 160 beats per minute without note glitches or false triggers. (Okay, I'm no Al DiMeola.) I even performed rapid, single-note, flamenco trills—although I cheated by using a pick—and every note seemed to ring through.

Next, I performed a series of bends into hammer-ons into trills, and when my technique was clean enough, every nuance was faultlessly translated. I even got ridiculous with the whammy bar and achieved reasonable results. (Although the synth sound dropped off if the string tension—or lack thereof—was too severe.)

In Play mode, the GR-1's pedals become real-time performance controllers that effect pitch shifts and several hold functions. Pitch-change parameters can be programmed to sweep up or down to a preset pitch, or sound instantly. The limits are one octave up and two octaves down from the fundamental note. All pitch and hold features are enacted very musically—no annoying clicks or mutes are audible—and pitch sweeps are performed with minimal zipper noise.

Anytime I played the GR-1's basic patches, my normal performance technique remained uncompromised. Obviously, certain patches require some adjustment of style: It's unreasonable to expect Slow Strings to match blistering picking lick for lick. (Although it was fun trying.) However, in a fair fight, I couldn't trick the GR-1 into mistracking.

Using external sound modules (a Roland D-550 and an Oberheim DPX-1 sample-playback unit) required MIDI translation between the GR-1's internal pitch tracking and the receiving units, which resurrected a few of the old guitar-synth bugaboos. Occasionally, notes performed on the low E string failed to sound, and rapid scale

runs produced noticeable glitches. Lush patches, such as strings and synth pads played at moderate tempos, were more successful.

The GR-1's MIDI capabilities are limited, but I found them sufficient. The instrument can send Program Changes and Velocity. Real-time parameter changes can be performed via MIDI General Purpose Controller 16, and an optional expression pedal sends Modulation (Controller 1) messages. The sound module supports sustain pedal messages via MIDI, but there is no sustain pedal jack. Fortunately, the GR-1 recognizes All Notes Off and supports SysEx load and dump.

There are times when the GR-1's programming power *did* seduce me to adapt my playing technique. For example, I could use velocity-switching to change Tones simply by picking harder or softer. In addition, the GR-1 allows velocity mixing, where a Tone sounds continuously until harder picking mixes in a preselected second Tone. Programming Tones and matching sensitivity to pick dynamics isn't difficult, and I never heard a glitch.

PATCH WORK

I'll say it up-front: I liked the GR-1's sounds. A studio client lamented that most of the sounds were not robust, and indeed the GR-1 is *not* a killer sound module. However, the GR-1's facility for layering and editing internal sounds promotes sonic sculpting. That is, if you don't mind twisting a few knobs and/or patrolling some nested parameter menus.

Product Summary

PRODUCT:
GR-1 Guitar Synthesizer
PRICE:
GR-1 $1,295
GK-2 pickup $199
MANUFACTURER:
Roland Corporation
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Los Angeles, CA 90040-3696
tel. (213) 685-5141
fax (213) 722-0911

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

If simplicity is paramount, you can call up one of the 200 PCM-based Original Tones. Most of these Tones are clean representations of actual instruments. For the most part, strings, basses, brass, and woodwinds sound nice, while the acoustic pianos and some of the GR-1's guitar Tones are too thin for my taste.

The synth offers a few basic sound-editing parameters. The Guitar section Tones use an attack-sustain-release amplitude (volume) envelope that is programmable from a front-panel knob. Other knobs control the filter's cutoff frequency and resonance and the vibrato rate and depth. However, the real kick is combining two Tones into a Patch. A little fearless imagination can produce absolutely huge pads and searing lead sounds.

The "in-house" reverbs, chorus/flange, and short delays won't deliver lush timbres, but they're fine for adding a little presence to your patches. There are six reverbs (three rooms, two halls, and a plate), one simple delay, and a panning delay in which the repeats alternate between the left and right channels. Parameters include the number of repeats (feedback) and reverb time and level. It's also a simple matter to set level, depth, rate, and feedback for the chorus/flange effects. You can commit 64 of your sonic creations to the GR-1's internal memory and an additional 64 patches on an optional memory card.

In addition, the GR-1 allows a limit of two Tones to be assigned, layered, or split anywhere on the guitar. You could play a slap bass on your sixth and fifth strings and a saxophone on strings 1, 2, 3, and 4; or you could set up a complex layer where the slap bass remains on strings 5 and 6, but the other strings perform a sax Tone with some slap bass mixed in.

Maximum polyphony is 24 voices. The GR-1 also offers a Voice Reserve function that prevents random note-stealing if you use up all the voices recording parts to the internal sequencer (or an external module). For example, you could ensure the Rhodes Tone that restates a song's hook always has two voices. Reserving its voices should prevent the important motif from disappearing when your polyphony hits the wall.

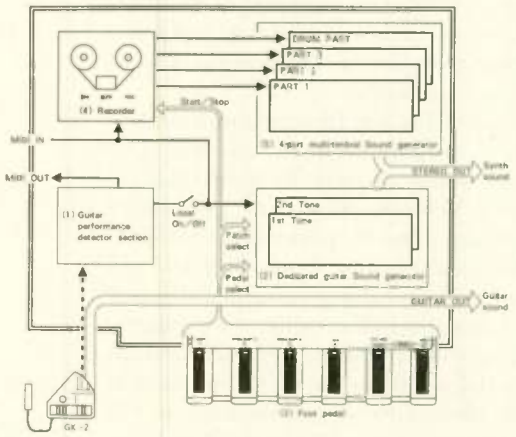

FIG. 1: The GR-1's internal hierarchy. Note that the guitar section and onboard sequencer have completely independent sound generators. (Courtesy of Roland Corporation.)

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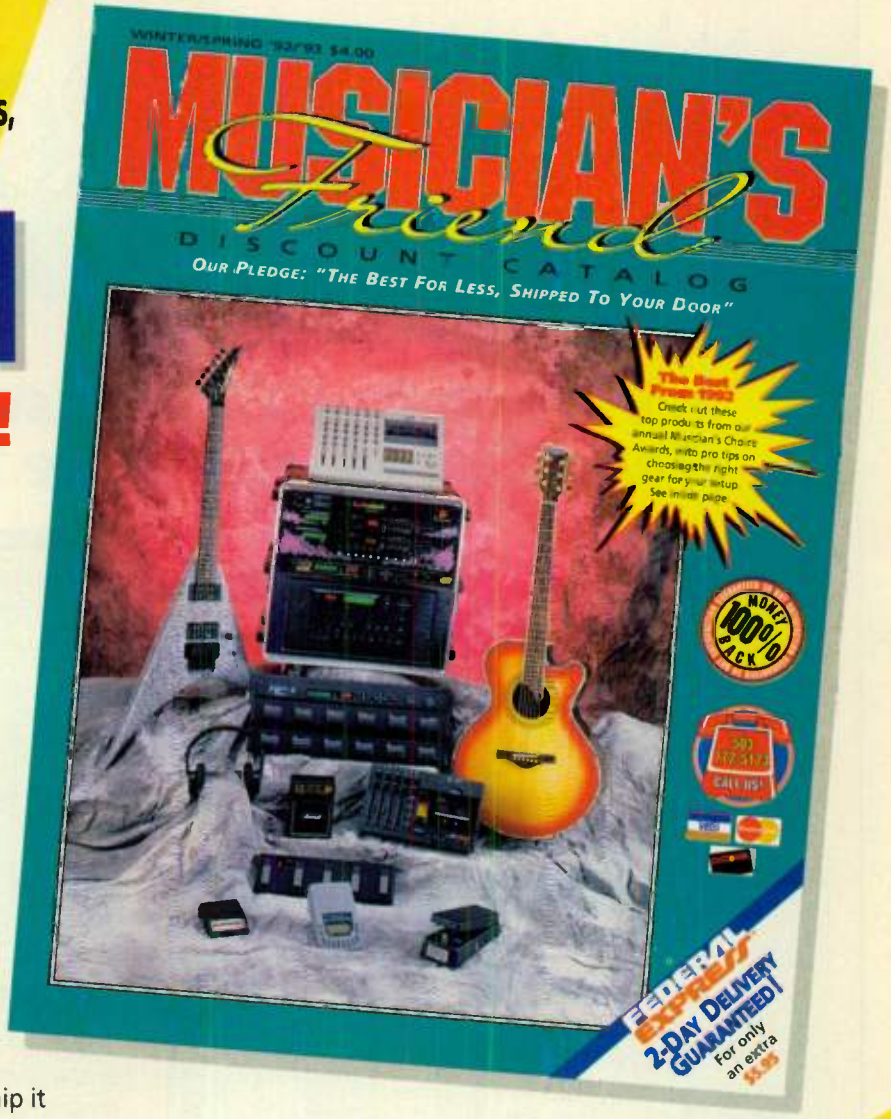

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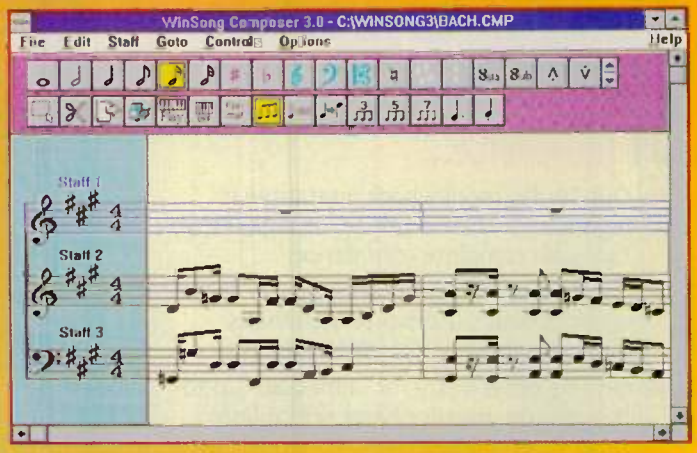
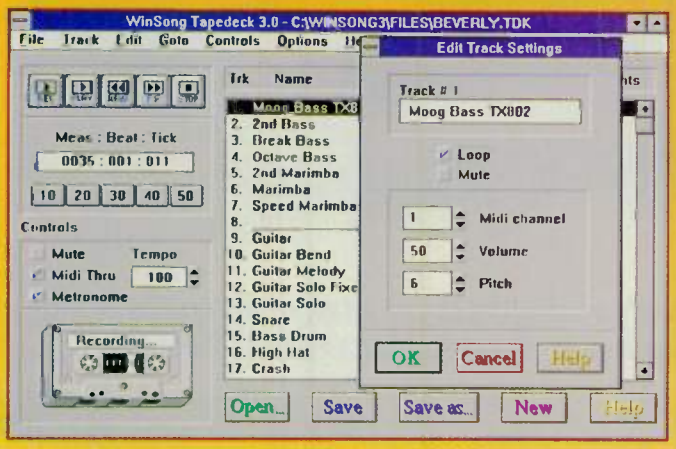


Sequencer

The Tape Deck is a full-featured 64 track MIDI Sequencer and a complete recording studio. As you can see, arranging music with WinSong is a guided path. You don't have to memorize musical or computer commands. WinSong will not let you make mistakes.



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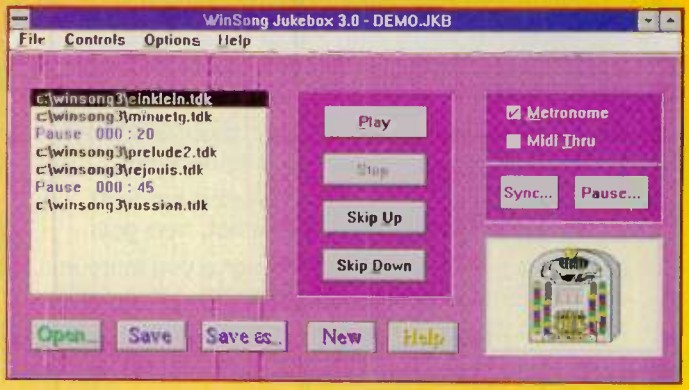

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THE SEQUENCE OF EVENTS

The GR-1 includes a rudimentary sequencer that records four tracks (three instruments and a drum part) to match its 4-part multitimbral sound module. The sequencer has a dedicated bank of Original Tones at its disposal—called the Multi-Timbral section—that, unlike the Tones available in the Guitar section, cannot be edited or layered. Also, you cannot record any of the more-complicated Guitar-section patches into the sequencer. (Of course, you *can* record the Guitar-section patches into an external sequencer.) Basic song-editing functions include copying, quantizing, erasing, and deleting parts for each track.

As a notebook, the sequencer works just fine. The limited Tones are serviceable as tonal "place holders"—if you take a song sketch a higher level, you probably will replace the sounds—and the drum sounds are tough enough for demos. When I forgot my Recording Walkman at a band rehearsal, the GR-1 saved the day because I could record a new song arrangement into the sequencer.

Although the GR-1 allows you to record drum parts from the front panel, the keys are not velocity-sensitive, which is a minor drag. (The drums *are* velocity-sensitive when triggered from the guitar.) And because the GR-1's internal memory only saves one song at a time, you're stuck paying for an optional memory card when your demo repertoire expands beyond a single tune. This is an expensive method of data backup, especially when the memory cards also are maxxed out at a single song. Of course, the GR-1 allows you to dump your sequence to an external sequencer or data filer, but this can be inconvenient and frustrating if you have a run of inspiration and no such beast is available.

NO MIXED MESSAGES

Quibbles aside, the GR-1 is truly an instrument that respects the heritage of the guitar. That's important. Roland's sensitivity to guitarists may do more to advance guitar synthesis than any impending technological breakthroughs. The GR-1 allows us old codgers to meet the future on our feet.

Mark of the Unicorn MIDI Time Piece II

By Geary Yelton

The first multi-port MIDI interface advances to its second generation.

When Mark of the Unicorn introduced the MIDI Time Piece, it was a breakthrough. It connected to a single Macintosh serial port, but its 8 × 8 patch bay made 128 channels available if your music software supported it. It also included some MIDI filtering and data processing and a SMPTE time-code generator/reader.

Since the MTP made the scene, several companies have produced multi-port interfaces for the Mac, PC, Atari, and Amiga. Now, Mark of the Unicorn has responded with the MIDI Time Piece II for Mac and PC. Like the

original, it's a rack-mountable MIDI patch bay with eight independent inputs and eight independent outputs, offering 128 discrete MIDI channels. Up to four MTPs, including combinations with the original model, can be networked (by daisy-chaining their Network ports) for 512 channels of MIDI. The MTP II also retains and improves upon the earlier MTP's SMPTE generator/reader and MIDI processing features.

The original MIDI Time Piece was available in Mac or PC versions and controlled from a Macintosh desk accessory or MS-DOS application. Unlike its predecessor, the MIDI Time Piece II can be programmed from either software, or the front panel, making it much more practical as a stand-alone device in situations where a computer isn't needed. Four knobs, four buttons, and a backlit, 32-character LCD handle many of the same tasks as the *MTP II Console* software for the Macintosh, though it's still much easier to set up cable routings, channel mapping, sync parameters, and other control settings on the computer. (Incidentally, a *Windows*-based *MTP II Console* is in the works.) Other improvements over the original MTP include internal patch memory, response to MIDI Program Changes, two footpedal inputs, a click-to-MIDI converter, a Panic button, and an internal power supply. By adding front-panel control and a new architecture of Setups and Modifiers to the MTP II, MOTU has reclaimed its lead over the competition.

CABLE ROUTING

The MTP can route a MIDI source from any input to any number of outputs. The *Console* software's Cable Routing window lets you establish what goes where. Inputs are listed on the left side, with outputs on the right. To make a connection, simply click an input and drag the cursor to an output. A source can be mapped to any or all destination MIDI channels on each output. You can also make or break connections to your computer in this window.

All inputs and outputs can be named to correspond to your equipment. It's much more elegant to be able connect "Yamaha KX88" to "S1000" than to connect "Cable 1" to "Cable 5."

NEWS FROM THE FRONT

The primary use of the front-panel controls is to duplicate most functions of the editing software. Instead of windows on the computer screen, the 2 × 16-character LCD is your window into the MTP II. The Window knob steps through eleven main screens. Most of these have sub-windows with additional parameters, which you step through with the Cursor knob. (A chart in the manual shows how windows are related to their sub-windows.) The Cursor knob also selects variable parameters within a window. Individual parameters are chosen with the Select knob, and their values are determined with the Value knob. If all this seems confusing at first, that's because it is. You discover which knobs to use by using them.

If you press the Shift button, the four knobs take on a different set of programmable functions. Along with the pedal inputs, they may be assigned to generate notes, controllers, Program Changes, Pitch Bend, Aftertouch, or System Exclusive data.

To program a knob or pedal, open the Knobs & Pedals window in *MTP II Console*, select the knob or pedal, and, from a list in a pop-up menu, choose the type of data you want it to send. If you choose "Controller," another pop-up list appears with 22 controllers from which to select. If you choose "Note" or "Poly Pressure," you can enter the note name. If you choose "System Exclusive," a window appears that lets you type in a SysEx message up to 27 bytes long (including F0 and F7). You can define a variable byte within the message that changes in value when you turn the knob or press the pedal. Other fields in the Knobs & Pedals window let you define the default or initial value, the range of values, and the number of steps per click.

If you're programming a pedal input, you can define whether it's a Roland- or Korg-type continuous-controller pedal, or a momentary footswitch. You can also define its polarity and range. Another choice lets you redefine a footpedal input as an audio click input for recording a tempo map into a sequencer, or slaving a sequencer to a real-time click track.

A Panic button was lacking on the original MTP, and its presence on the MIDI Time Piece II is welcome. If you press the Panic button once, it transmits an All Notes Off message. If you double-click it, it also sends a Note Off message for every note on every channel, which is useful for instruments that don't respond to All Notes Off. Oddly, it doesn't send a Reset All Controllers message, an oversight I'd like to see corrected. (According to MOTU, the next version of *MTP II Console* will let you customize the Panic button with a Modifier to send any MIDI messages you want.)

SETUPS AND MODIFIERS

The MTP II's overall configuration, including cable routing, rechannelization, SMPTE time-code parameters, and so on, is termed a Base Setup. The unit can contain up to eight Base Setups. A Modifier is a command, or a set of commands, that changes the Base Setup by altering one or more internal parameter settings (see **Fig. 1**). For

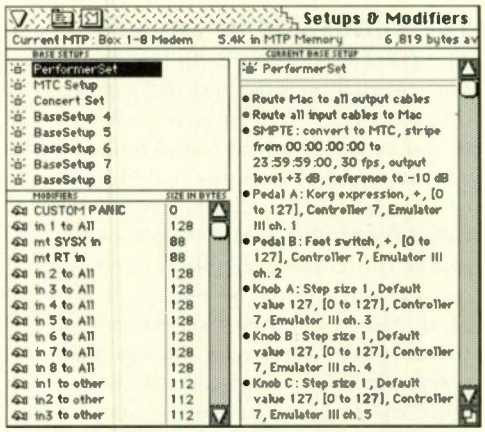

FIG. 1: *MTP II Console*'s Setups & Modifiers window lets you create Base Setups containing the unit's basic configuration. A Setup can be altered with up to four Modifiers, each of which changes one or more internal parameter settings.

Mark of the Unicorn's MIDI Time Piece II is a major upgrade from the company's stalwart MTP. New features include front-panel controls, user patch memory, a more flexible signal-routing and data-processing architecture, and response to MIDI Program Changes.

example, a Modifier could mute Polyphonic Aftertouch on cables 1 to 4 only, or route cable 5's input to all outputs. When you need to make minor changes to the MTP's configuration, there's no need to change its entire setup; just change a Modifier. Up to 127 Modifiers can be saved, depending on how much internal memory they use.

Each Setup and Modifier is made up of a scrolling list of individual commands called a "Script." Scripts are shown in the Setups & Modifiers window, where commands can be added and deleted.

Setups and Modifiers are assigned to Patch numbers and can be recalled via Program Change messages. A Patch can be made up of a Base Setup, or one to four Modifiers, or a Base Setup accompanied by up to four Modifiers. In addition, each Patch can be assigned an independent receive cable and MIDI channel, so that it only responds to Program Changes from a specified source.

▼

The "One Time" Jam Sync option allows you to extend the length of a SMPTE track, which can be a real life-saver.

SYNCHRONIZATION

In addition to its functions as a MIDI interface and patch bay, the MIDI Time Piece II's most important use is synchronizing computer software with time code recorded on video and audio tape. It reads and writes 24, 25, 30, and 30 drop-frame SMPTE time code. According to MOTU, it can read 29.97 non-drop time code, but can't stripe it. (I didn't have an opportunity to test it with 29.97 non-drop.) The LCD and the *MTP II Console* software can provide a running update of SMPTE time when reading and writing time code.

Right out of the box, the MTP II is ready to lock to time code by converting SMPTE to MTC. It also supports Enhanced Direct Time Lock (DTLe)

for use with Mark of the Unicorn's *Performer* sequencer. Time code can be routed to the computer, the network port, and to any output cables.

If you have a tape with drop-outs on the sync track, the MTP has adjustable "freewheeling." If frames are missing or unreadable, this feature generates time code to "fill in the blanks" and maintain lockup. It can be made to freewheel for 0, 1, 2, 4, 8, 16, or 32 frames. With freewheeling turned on, the MTP continues to generate time code for the specified number of frames whenever it stops receiving SMPTE. This means that every time the tape stops, the sequence continues to run for a moment.

It's also possible to regenerate fresh time code, one of a family of processes commonly referred to as "jam synching." (For more on jam synching, see the sidebar "Jammin' With Sync," on p. 108 of the March 1992 **EM**.) Whenever you copy a tape, the MTP takes incoming SMPTE and generates new code, automatically freewheeling over any drop-outs it encounters. If you select the "One Time" Jam Sync option, it locks to existing code but begins to generate new code at the first sign of a drop-out. This option also makes it possible to extend the length of a SMPTE track, which can be a real life-saver.

DATA PROCESSING

Though not as full-featured as some dedicated MIDI processors, the MTP II is capable of merging inputs, muting messages, and remapping MIDI channels. It does not handle MIDI processing functions such as splitting keyboards into zones, thinning data, scaling Velocity, remapping controllers, and Program Change mapping. (Apparently MOTU is adding Program Change mapping to the next version of the *Console* software.)

You can merge inputs by dragging more than one input to a single output in the Cable Routing window (see **Fig. 2**). All eight inputs can be merged to any output or outputs. As with the original MTP, each input and output cable has a grid of check boxes in the Channel Mapping window, where you click the intersection of the source and destination channels.

The Event Muting window has a similar grid. You can mute channelized events such as Note On and Note Off, Program Changes, all controllers, Pitch Bend, and Poly or Channel Aftertouch. You can also mute system messages such as Active Sensing, Song Select, Tune Request, MIDI Time Code, System Reset, and System Real Time.

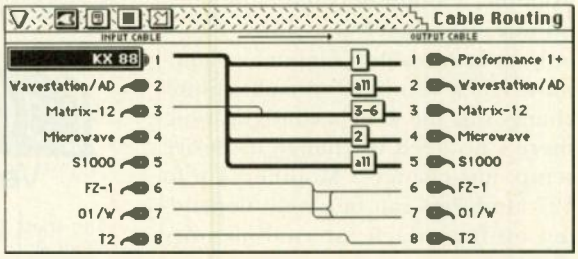

FIG. 2: In *MTP II Console*'s Cable Routing window, all eight MIDI inputs can be routed and merged to any output. To merge two or more inputs, drag their onscreen "cables" to a common output.

NETWORKS AND PLATFORMS

Up to four MTP IIs can be networked via a dedicated Network serial port and programmed from a single *Console* application or set of front-panel controls. If you have a standard MIDI interface, you can connect it to the network port for sixteen additional MIDI channels. The network also allows two Macs to share the same interface. In fact, if you have both the Mac and PC versions of the MTP II, it's possible to connect both computers and transfer MIDI information from one to the other.

For $100 more than the Mac version, the IBM-compatible MTP II includes a *Windows* driver and a three-quarter-size expansion card. It uses software for the old MTP, which doesn't take advantage of the new features, but the new editor will be a free upgrade when completed. The MTP II can be used with *Cakewalk* for DOS or any *Windows*-based sequencer that supports multi-port MIDI interfaces.

The Mac version of the MIDI Time Piece II includes a driver for use with Apple's *MIDI Manager*. The MTP II runs at either normal (1 MHz) or fast (commonly called "1x") speed. The original MTP had a switch for changing speeds, but on the new one, you enter the Global Hardware Setup window on the front panel to make changes.

TO BUY OR NOT TO BUY

Every computer-based MIDI studio needs a MIDI interface. If you have more than a few synthesizers, you probably need a MIDI patch bay that offers additional channels. If you work with tape, you need a synchronizer. The MIDI Time Piece II performs all three tasks well. Even if you require twice as many MIDI ports, two MTPs could still be less expensive and more flexible than a 16 × 16 patch bay.

Some owners of the previous MIDI Time Piece complained of occasional problems getting tape to maintain lockup, but I never encountered any difficulties with the new model. Mark of the Unicorn explains that the original was sensitive to sync track level and drop-outs, but the new version offers flexible freewheeling and SMPTE level settings to alleviate these problems.

The user's manual, though well-written, could use more editing. Errors are not uncommon, and I found paragraphs repeated on facing pages, incorrect grammar, and several typos. At least it has an index.

The MTP II delivers everything it promises. It's not the most full-featured MIDI processor around—there are several units with a lot more processing features—but it's more than just a MIDI processor, offering 128 MIDI channels, time-code features, and more. It definitely simplifies life in the studio. For live use, it performs all the basic functions I want from a MIDI patch bay. The MIDI Time Piece II is a well-designed, multi-purpose device, and MOTU offers it at a decent price.

Geary Yelton *authored the book* Music and the Macintosh.

Product Summary

PRODUCT:
MIDI Time Piece II
PRICE:
Macintosh version $595
PC version $695
MANUFACTURER:
Mark of the Unicorn
1280 Massachussetts St.
Cambridge, MA 02138
tel. (617) 576-2760
fax (617) 576-3609

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ●
DOCUMENTATION	● ● ●
VALUE	● ● ● ●

Eventide H3500 Dynamic Ultra-Harmonizer

By Larry "the O" Oppenheimer

This unique device takes you where no effects processor has gone before.

Since the original Ultra-Harmonizer's introduction in 1989, Eventide has introduced several variations and significant upgrades that have turned the product into a complete product line. The H3500 is the latest version, adding a new class of processing algorithms that use the dynamics of the input signal to control aspects of the effect. (Reviews of the H3000S and H3000SE appeared in the January 1989 and April 1990 issues of EM.)

The H3500 is a 2U rack-mount package that weighs a hefty thirteen pounds. The rear panel is clean and straightforward, with balanced XLR inputs and outputs; MIDI In, Out, and Thru connectors; a standard, IEC detachable power-cable connector; a voltage-select switch; and a fuse. Curiously, there is also a large heat sink that projects about 1.5 inches beyond the rear panel, giving the H3500 a total depth of 13.5 inches. If the unit is mounted in a rack and left there, the heat sink will pose no real problem. But if it has to be moved, as in a multiroom studio, watch out that the heat sink doesn't hit or snag anything (including you).

The front panel is also tidy. The right side has the power switch and Bypass button, while the left side has the input-level meters and a button for accessing the input-level adjustments. Between these lie a 16-key number and command pad; a large parameter-adjust dial; three mode buttons; an 80-character, backlit LCD; and four soft keys with context-dependent functions.

Obviously, inside the box is where all the fun is. The H3500 houses twenty signal-processing algorithms, including various combinations of pitch shifting, delay, reverb, and filtering. The unit offers unparalleled programming flexibility for users, with several algorithms being basically "toolkits" of processing modules that the user can patch at will. The H3500 DFX comes standard with 22 seconds of sampling, and the expanded H3500 DFX/E offers 95 seconds.

SHIFTING THE PITCH

Several pitch-shifting programs are included, most with built-in delay capabilities, including some with "intelligent" (sensitive to musical context) shifting and true stereo shifting. And we're not talking wimpy: Pitch shifts range from one cent to up or down three octaves, and delays of up to a second can be simultaneously available. The MultiShift algorithm is probably the most "bread-and-butter" of the H3500's pitch shifters, but the Reverse Shift is my personal favorite for fun stuff.

Pitch shifting involves some tricky

processing, and I have yet to find one pitch shifter that is right for all applications. The H3500 worked well on voice, synthesizers, and drums. In some cases, however, the artifacts were pretty ugly, most notably when my voice was rough from a cold. For those who can afford only one pitch shifter, the H3500's pitch shifting works in a wide variety of applications, even with fairly large intervals.

Delay is one of the H3500's strongest suits. Running the new Mod Factory algorithms (which can be added to any existing Ultra-Harmonizer for $250), the review model was capable of a remarkable 32 seconds of delay on each of two delay lines. But the H3500 is not simply about massive amounts of delay; this unit is sophisticated. Accordingly, some of its algorithms offer unusual combinations of delay capabilities, sometimes combined with reverb, in addition to a few more-traditional programs.

Although you can get dense and realistic reverb from the H3500, especially room and ambient sounds, it's not quite as facile at halls, plates, and chambers as other reverb devices. The subjective quality is not especially natural, and it has fewer of the common parameters found in most reverbs.

On the other hand, the H3500's delay and reverb programs are excellent—perhaps even unparalleled—in producing effects. The Expert mode (which presents advanced parameters for each algorithm) offers direct access to much lower-level parameters than any other reverb on the market. Most users won't know how to use these to make the reverbs more natural, but I got some fabulous sounds with swells and sweeps out of algorithms such as Reverb Factory and Ultra-Tap. The Swept Combs algorithm gave me some wonderful, swimming echoes that were wild, yet controlled.

More esoteric programs include a Vocoder, String Modeller (based on the Karplus-Strong method, which produces essentially very resonant, short delays), and Stutter. All of these were intriguing, and the String Modeller and Stutter offered more interesting uses than I originally noticed. For example, the String Modeller can be played like a MIDI sound module, but I had much more fun playing with the tunings and feeding in string and wind sounds to excite the resonances as the sound

The Eventide H3500 can produce quality chorusing, pitch shifting, ambience, and reverb, but its ability to modulate effects parameters in response to input-signal dynamics sets it apart.

evolved, adding life to it. Stutter can be programmed to do random pitch shifts and bends and can produce up to four stutter effects at a time, which was fun. Unfortunately, it exhibited a fair amount of quiescent noise (nothing in, garbage out).

The Vocoder works well, but exhibits a lower output level than the other algorithms, unless the inputs are driven very hard. Fortunately, the H3500 has programmable input and output levels for each stored preset, which allows the user to compensate for this problem. Many other things could have been done in the Vocoder, such as offering differing amounts of delay for the synthesis bands, but vocoding takes a lot of processing power as it is.

▼

Pitch shifts range from micro-pitch shifting to up or down three octaves, and delays of up to a second may be simultaneously available.

IN THE FACTORY

Perhaps the most intriguing and powerful algorithms are the "Factory" programs, Patch Factory and Mod Factory, which give the user a collection of functional blocks that can be interconnected in a virtually arbitrary manner. Patch Factory provides a pitch shifter, two filters, two delay lines, and a noise generator, plus the wherewithal to interconnect them. Mod Factory, one of the major additions to the H3500 over previous Ultra-Harmonizers, actually comprises two algorithms that offer slightly different combinations of delays, filters, LFOs, envelope followers, amplitude modulators, detuners, mixers, and so forth.

The addition of dynamics-based processing is something I've wanted for years, and I am happy to see it surface in such a versatile form. I initially sought a way to prevent vocals and instruments with long reverb and/or delay tails from turning into mud. I have often used an external compressor to duck effects by a few dB when the signal is present. Mod Factory not only allows you to achieve this easily, but it is emphatically only the beginning. For example, I constructed a preset in which the input level was used to control pitch detuning to fatten drum sounds. When mixed with the original sound, this made loud hits a little brighter and more exaggerated and gave soft hits more body.

I also constructed a sort of "Panning Flange-Wah" effect by feeding the input to two modulated bandpass filters. Each filter then fed a modulated delay, and I combined the filtered delayed signals with autopanned direct sound. Building this effect was time-consuming, but it would have taken more time and trouble to have done it by combining several different processing devices. Composer Richard Zvonar has written an editor for the Ultra-Harmonizer in *MAX* (Opcode's MIDI programming language). It is easy to see where editing software would greatly simplify the programming process. (Information on Zvonar's software can be obtained from Eventide.)

Finally, the H3500 can act as a powerful sampler, offering (on the DFX/E) up to 47.5 seconds of stereo sampling, triggerable from MIDI, audio, or the

front panel. Samples can be pitch shifted up to ±3 octaves without changing duration, or changed in time without changing pitch (in real time), although I did notice more artifacts shifting pitch in the sampler than in some of the other algorithms. The sampler offers less versatility than a dedicated sampling device, but it is easy to use and superb for tasks such as drum replacement: flying in vocals, solos, and sound effects; or even dialog.

AND MIDI, TOO

As if the vast processing flexibility of the H3500 were not enough, the Ultra-Harmonizer family features the most comprehensive MIDI implementation I've ever seen in a signal processor. Of course, controllers can be used to modulate parameters, but the implementation includes many other possible modulation sources, particularly various interpretations of note messages. The rate of MIDI Clock messages can be used to modulate any parameter, not just to sync delay times. The same broad interpretations are brought to bear in using MIDI messages to trigger events in the H3500. The only significant improvement I could suggest is MIDI Time Code capability (i.e., the ability to load and execute event lists in sync to MTC).

The MIDI spec fails to provide a way to transmit periodic signals such as LFO output for control purposes. The H3500 contains a sophisticated function generator that is not only capable of five continuous waveforms, but eleven triggered functions, sample-and-

Product Summary

PRODUCT:
H3500 Dynamic Ultra-Harmonizer
PRICE:
H3500 DFX $3,495
H3500 DFX/E $4,495
MANUFACTURER:
Eventide, Inc.
One Little Ferry Way
Alsan, NJ 07643
tel. (201) 641-1200
fax (201) 641-1640

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

ADVERTISER INDEX

Advertiser	Reader Service #	Page
Access II	501	118
Akai	502	87
Alesis (adat)	503	2-3
Alesis (MIDIVERB III)	504	57
Alesis (SR-16)	505	109
Antex Electronics	506	59
Sam Ash Music Stores	-	112
Bananas at Large	507	84
Behringer	508	37
Big Noise Software	509	125
Century Music Systems	510	125
Cheetah	511	54
Coda Music Software	512	52
Computers & Music	513	100
Cool Shoes Software	514	146
D.A.T. - Audio Gallery	515	120
dbx Professional	516	32
Digidesign	517	8-9
Digital Audio Labs	518	72
Digital Piano Buyer's Guide	-	110
Disc Makers	519	131
Discount Distributors	520	141
DOD	521	155
Dr. T's Music Software (Quick Score)	522	44
Dr. T's Music Software (X-oR)	523	56
DynaTek Automation Systems	524	88
EarLevel Engineering	525	144
EFXX Products	526	118
Electronic Musician Back Issues	527	99
E-mu Systems	528	24
Encore Electronics	529	111
Ensoniq (ASR-10)	530	13
Ensoniq (DP-4)	531	65
Ensoniq (KMX-16)	532	133
Europadisk	533	143
E.U. Wurlitzer	534	119
Eye & I Productions	535	85
Eye & I Productions	536	141
Fatar	537	35
Five Pin Press	538	129
Fostex	539	79
Furman Sound	540	123
G.H.S. Corporation	541	86
Goodman Music	542	146
Grandma's Music & Sound	543	139
Gulbransen	544	137
Howling Dog Systems	545	106
Ibis Software	546	107
Island Cases	547	112
Kawai	548	40
Key Electronics	-	105
Korg	549	21
Kurzweil Music Systems	550	96
Leigh's Computers	551	135
LT Sound	-	143
MacBeat	552	129
Mackie Designs	553	30-31
Marantz	554	83
Mark of the Unicorn (MIDI Express)	555	14-15
Mark of the Unicorn (Awards)	556	156
Micro Technology Unlimited (MTU)	557	135
MIDIMAN (Interfaces)	558	81
MIDIMAN (Syncman Pro)	559	142
MIDITEMP	560	74
Mix Bookshelf	561	153
Mix Master Directory	562	147
Musicator A/S	563	94
Music Quest (MQX-32M)	564	48
Music Quest (MIDI Card & MIDI Strip)	565	73
Musician's Friend	566	121
New Sound Music	567	145
NRI/McGraw Hill	-	71
Oktal (Multitude Intro)	568	47
Oktal (Multitude Pro)	569	55
Oktal (Multitude Pro/Notation)	570	63
Passport (Encore & Pro 4)	571	66-67
Passport (Producer)	572	103
Peavey Electronics	573	101
PG Music	574	26-27
PolyQuick	575	145
PS Systems	576	80
QCA	577	119
Quik Lok	578	104
Rane	579	92-93
Rhythm City	580	137
Roland (Sound Brush & Canvas)	581	7
Roland (DM-80)	582	49
Roland (A-30)	583	115
Romeo Music International (RMI)	584	140
Sabine Musical Manufacturing	585	127
Samick	586	116
Softronics	587	122
SongWright Software	588	48
Sonocraft	589	144
Soundcraft	-	4
Sound Quest	590	68
Soundtrek	591	28
Soundware	592	45
Spectral Synthesis	593	16
Starr Switch	594	140
Steinberg/Jones	595	43
Stick Enterprises	596	42
Sweetwater Sound	597	41
Tascam	598	10
Taxi	599	77
Tech 21	600	85
Temporal Acuity Products (TAP)	601	91
Thoroughbred Music	602	106
thoughtprocessors	603	139
Tran Tracks	604	53
Twelve Tone Systems	605	22-23
USCO Audio	606	113
Voyetra	607	78
The Woodwind & The Brasswind	608	113
Yamaha	609	95
Zeta Music	610	84
Zoom	611	58

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FEBRUARY 1993

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d. "The Power Within: Supercharge Your Computer," p. 60	713	714	715	716
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hold, and random modulation. Functions can be triggered from MIDI or the front panel. Completing the H3500's internal control capabilities, the soft function buttons on the front panel can be programmed to make the parameter-adjust knob control a selected effects parameter.

The documentation included with the unit is complete; it covers every parameter and option available. It could use a little more detail on procedures such as patching in the Mod Factory algorithms, but that simply means there is room for applications notes or a book on the Ultra-Harmonizers.

THE BOTTOM LINE

The tradeoff for a device with the H3500's programming power is always ease of use. Good factory presets are essential to those who don't want to program. Eventide has done exceptionally well on this score, with literally hundreds of presets, ranging from simple delay and pitch-shifting setups needed every day, to bizarre effects that demonstrate the H3500's ability to get sounds that aren't on anybody else's records. Every preset is described briefly in the back of the manual, which I found extremely helpful. For those who enjoy doing extensive programming, the H3500's ability to meet a unique demand puts it head and shoulders above anything else on the market.

It is important to differentiate the H3500—which is actually a single-effect device, even though it allows you to achieve several effects in one preset—from multi-effects processors that can execute several effects simultaneously. It is definitely an apples-and-oranges situation. If I had to choose between this box and something like the Ensoniq DP/4, I would be hard-pressed. For all the power offered by the DP/4's multiplicity (and its much lower price), the H3500 offers many unique algorithms and features. The H3500 covers bread-and-butter delay, chorusing, pitch shifting, and ambience demands without breaking a sweat. It also performs other utilitarian tasks, such as multiband compression. But special effects are where it outshines the competition.

The Eventide H3500 may not be perfect—nothing is—but its algorithms' range and programmability, combined with its deep MIDI implementation and excellent audio quality, make this the most versatile, flexible, and powerful effects processor available on the market.

Larry the O *thanks the great producers and artists, such as George Martin and Jimi Hendrix, for teaching him how to use equipment that didn't exist when they did their most historic recordings.*

Peavey DPM-C8 MIDI Master Keyboard

By Steve Oppenheimer

A superb master keyboard combines function, form, and value.

By the time I finished hauling Peavey's DPM-C8 into my studio, I suspected I had in my possession one of the world's heaviest MIDI master keyboards. After working with the unit for a few hours, I was sure of it. I can think of patching and control possibilities not included in this unit, and there may be better ways to implement some features, but they are relatively few and unimportant. This is one killer MIDI keyboard.

Among other things, it could kill your back if you're careless. The C8 has an 88-key, weighted action with full-size, wooden keys and comes in a beautiful wooden cabinet (available in black or red). The velocity-sensitive, channel pressure-sensitive action is one of the unit's greatest strengths and feels as close to a real piano as I've experienced in a MIDI keyboard.

The price you pay for all this wood is the C8's elephantine weight (allegedly 82 pounds, but it feels heavier); if you want to move it to gigs in a road case—adding yet more heft—you need strong roadies or foolish bandmates. Besides, although its features make it a fine live controller, the C8 is much too pretty to tear up playing dives. Clearly, this instrument is best used by well-staffed concert acts, or in semi-permanent installations such as studios, churches, or schools.

HOME ON THE RANGE

The C8 offers 64 user Presets, each of which includes a complete set of parameters: zones, controller assignments, channel and output assignments, etc. As with most master keyboards, the C8 lets you create chains of Presets and step through them with a footswitch. Unlike most of the competition, however, it lets you create and select between two independent Preset chains. Each chain can include up to 128 Presets (you might want to use some Presets more than once during a gig).

Each Preset includes up to eight completely independent zones, which Peavey calls "Ranges." For each Range, you set high and low note limits, assign a MIDI Out port and channel, and enable and disable the pedals, wheels, sliders, aftertouch, etc. You can also send a Program Change for each Range whenever the Preset is recalled.

A Mute feature lets you enable and disable each Range, so you can have several Ranges set up in a Preset and just activate a few of them at a time. This feature lets you change Ranges without changing Presets, but this seems to be an advantage only if you need more than 64 Presets per gig. It takes two button presses (with both hands, due to the distance between the Mute and Range buttons) to unmute or mute a Range, while you can change Presets with one hand or a footswitch. A Solo feature lets you hear just the selected Range.

Each Range is assigned one of seventeen ROM-based Velocity curves. Although you can't create your own curves directly, you can scale Velocity (1 to 200 percent), set high and low Velocity limits, and assign an offset (±100). (Velocity-curve offsets are explained in "The Master Touch" in the November 1992 EM. They are especially valuable if you want to customize a sound's Velocity response for a heavier or lighter touch, while retaining the desired response curve.) Combining these features gave me all the Velocity curves I wanted and then some.

FROM THE FRONT

The C8's front panel looks clean and uncluttered. The left side, above the wheels, is wide open and designed to accommodate Peavey's PC1600 MIDI fader box. A 5 × 1.5-inch LCD display (with adjustable view angle) is in the center. Just below it are five soft keys for navigating the LCD. (Soft keys change functions depending on the current menu page.)

Flanking the display are two pairs of programmable sliders. I found the dual-bank slider setup to be a great boon, as it let me tweak settings with either hand while performing with the other. For each Preset, the sliders can be assigned to any MIDI continuous controller from 1 to 120, and you can reverse their polarity.

Unfortunately, you can't assign different controllers or reverse polarity for each Range. As a result, you can't use the sliders to crossfade between synths, open the filter on one synth while closing the filter on another, or modulate two different things with one move. Of course, you can find other ways to achieve these ends in a well-equipped MIDI studio, but it's a bit more problematic onstage.

A programmable button resides beneath each slider and can send MIDI controllers 1 through 119. In addition, for each Preset, these buttons can act either as momentary Hold switches (operating as long as you hold the button), or as toggles (the first press activates, the second press deactivates) that serve any of three special functions (see Fig. 1). First, you can mute the associated slider's effect on all MIDI Outs with hold or toggle. Second, you can hold the slider at its maximum value, or toggle between its maximum and current values. Finally, you can hold the slider at its minimum value, or toggle between its minimum and current values. Unfortunately, you can't use the buttons to send Program Changes or Start/Stop commands.

I found the dual-bank slider setup a great boon, as it let me tweak settings with either hand while performing with the other.

Peavey gives you three wheel controllers, one of which is spring-loaded with a center detent. The spring-loaded wheel has a good feel, and I had no problems getting smooth pitch-bends. The wheels have the same programming features and limitations as the sliders, but they can also send Channel Pressure or Pitch Bend.

With the exception of Velocity, you can't scale C8 controller messages (including Pitch Bend), which is a drag. Scaling is especially useful for Pitch Bend: if one of your sound modules just has a global pitch-bend range (e.g., Ensoniq synths), you may regret this omission.

To the far right of the front panel are ten numbered keys (0-9) for calling up Presets. Above these are a set of ten Function keys, including increment/decrement, Enter, Exit (which

PETER DIGGS

Peavey pulled out all the stops on the DPM-C8, which features an attractive wooden case, a weighted action with full-size wooden keys, eight independent zones, and a wide assortment of programmable buttons, sliders, wheels, and pedals.

gets you out of any page), a Panic button, and buttons that access modes for Copy, Sequence, Global, and MIDI parameters and the MIDI Status (monitor) screen. We'll go over these features shortly.

AT THE REAR

A glance at the rear panel reveals four independent MIDI Outs and two MIDI In ports, plus a view angle control for the LCD and jacks for two control voltage pedals and two double footswitches (using TRS connectors). All are labeled on the edge of the front panel as well as on the rear, which makes repatching a lot easier.

The CV pedals are programmed to send MIDI controllers 1 through 119 and Channel Aftertouch, but unfortunately, you can't reverse their polarity. As a result, you can't use CV pedals to crossfade between two synths unless you can reprogram the polarity in one of the synths.

The first pair of footswitches can be programmed to send MIDI controllers 1 through 119. The second set of footswitches increment and decrement parameter values or step through Presets or Preset chains. The pedal "sense" is reversible for all four switches, so you can use a combination of normally-open and normally-closed switches. It's a good implementation, but Peavey missed a bet here by not letting you send sequence Start/Stop commands from a footswitch.

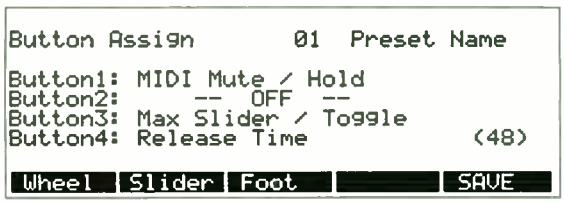

FIG. 1: The C8 provides a programmable button associated with each of the four sliders. In addition to sending MIDI controllers 1 through 119, each button can mute its associated slider, or switch between the slider's maximum or minimum value and its front-panel setting. (Courtesy of Peavey Electronics.)

In an attempt to make an already friendly interface more accessible, Peavey included a 9-pin D-connector serial port that accepts a Microsoft-compatible mouse for navigating through the screens. I didn't have the requisite rodent for the review unit, but I had a chance to play with one in Peavey's booth at the 1992 Audio Engineering Society convention. Based on that brief encounter, I think you're better off using the front-panel buttons. Perhaps Peavey will modify the operating system so this connector could be used with a cool alternative controller, such as an XYZ pad or joystick. In any event, you have to give the company credit for making an innovative effort.

MIDI IN PORTS

The two MIDI In ports can serve several functions, the most obvious of which is accepting SysEx dumps from an outboard device. You can dump and load C8 Presets through the MIDI ports and

load SysEx from external MIDI devices into a 128 KB data buffer. The data can then be saved to the C8's MS-DOS-compatible, double-density, floppy-disk drive, which can format disks and save multiple, named System Exclusive files with text comments. An especially nice touch is that the LCD shows how many messages and bytes of data are in the buffer and how much of the buffer is filled (see **Fig. 2**). All the SysEx functions proved easy to use and worked flawlessly.

In addition, MIDI note and controller messages entering the In ports can be filtered, channelized, and transposed (or left unaltered) and routed to any combination of Out ports. Alternatively, you can route incoming MIDI data through the current Preset for zoning and processing before sending it to the Out ports. (I used the latter feature to process data from a strap-on MIDI keyboard.) For each MIDI In, the data filter can eliminate any or all of several types of MIDI messages, including Volume, Pitch Bend, Sustain, System Exclusive, System Common, System Real Time, All Notes Off, Reset All Controllers, Channel Pressure, Poly Pressure, and note messages.

Two MIDI data monitors are incorporated into the software. The first displays icons for the six MIDI ports and simply indicates which In and Out ports have MIDI signals present. The second monitor identifies the MIDI messages as they stream through the MIDI Ins.

An unavoidable problem is that the moderate-sized LCD quickly fills up with data, sometimes scrolling faster than you can follow it. This fact of C8 life is especially true with System Real Time messages; I tried a Roland AX-1 strap-on keyboard with the C8, and the AX-1's indomitable stream of Active Sensing messages completely flooded the monitor. This problem could have been avoided if Peavey had placed the monitor after the data filter, which would let you check the MIDI data you're actually dealing with.

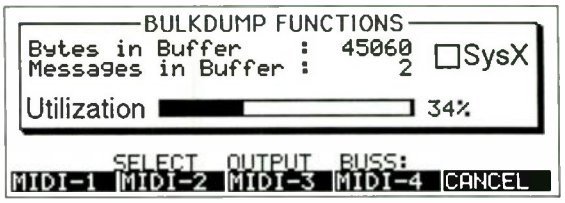

FIG. 2: A 128 KB data buffer can hold SysEx from external MIDI devices for storage to floppy disk or retransmission. The display shows how many messages and bytes of data are in the buffer and how much of the buffer is filled. (Courtesy of Peavey Electronics.)

SPECIAL FEATURES

Several special features can be accessed from dedicated front-panel buttons. Of these, the extensive Copy features are particularly noteworthy and real time-savers. You can copy a single Preset, one Range, all Ranges in a Preset, any Controller setting, or the Sequence control data to any similar destination. In addition, you can save all data, just the Presets, or just Global data to disk or via SysEx.

You can stop and start a sequencer or drum machine from the C8, but with some inconvenience. The Sequence button displays a menu from which you can assign a Song Select message to be sent as a Preset is called up, transmit MIDI Clocks at a selectable tempo (between 40 and 211), and select which MIDI Output will carry the Clock messages. The soft buttons trigger Stop, Start, and Continue messages. Unfortunately, you have to be in the Sequence page to send these messages, which is sometimes impractical. As noted earlier, I'd like to be able to assign the programmable buttons to send Start/Stop/Continue, or at least trigger these messages from footswitches.

The C8 gives you the option of sending an All Notes Off command whenever a Preset is called up. Defeating this option lets you sustain a chord with one synth timbre while changing to another timbre. But you might change MIDI channels and/or Out ports in the new Preset, so Note Offs might not reach the first synth, resulting in hung notes. Even if you opt for an All Notes Off command with each Preset, instruments that don't understand All Notes Off can get hung up.

For those times when you want everything to shut up, Peavey provides a conveniently located Panic button. A short press resets Pitch Bend and sends All Notes Off and Reset All Controllers commands on all channels and active outputs. If you hold the button down, it also sends individual Note Off commands on all channels to silence all recalcitrant offenders. That's how a Panic button should work, and I wish more manufacturers would follow suit. Thanks, Peavey.

CONCLUSIONS

When you power up the C8, it displays the smiling, bearded visage of company CEO Hartley Peavey. This sets the tone for what quickly proves to be a friendly machine. When I get a new piece of gear, I usually begin with an "idiot test": I patch the device into my setup, power up, and see how far I can get without the manual. Considering its extensive feature set, the C8 passed with flying colors. I'm not saying a complete idiot could jump right in, but if you know what a MIDI keyboard should be able to do, you'll find your way around quickly. When I stopped playing the idiot and read the manual, I found it clear and well-written, although it contains a few minor inaccuracies.

Peavey stocked the C8 with lots of easy-to-use, well-implemented features; plenty of inputs and outputs; an innovation or two; a real wooden action; and an attractive wooden case. Sure, it weighs a lot, and you wouldn't want to haul it around by yourself, but its feature set is even heavier. And the deal (under $2,000) is hard to beat. Without question, the DPM-C8 is a superb value.

EM *products editor* **Steve O.** *has hauled the DPM-C8 from his studio to two photo shoots. He also has been visiting a chiropractor.*

Product Summary

PRODUCT:
DPM-C8 MIDI System Performance Controller
PRICE:
$1,999
MANUFACTURER:
Peavey Electronics
711 A St.
Meridian, MS 39302
tel. (601) 483-5365
fax (601) 484-4278

EM METERS	RATING PRODUCTS FROM 1 TO 5
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EASE OF USE	● ● ● ● ◖
DOCUMENTATION	● ● ● ●
VALUE	● ● ● ● ●

Yamaha TG100 Tone Generator

By Jim Pierson-Perry

General MIDI compatibility with computer connectivity for the rest of us.

As synth manufacturers race to embrace General MIDI and the hoped-for mass-consumer following, it's no surprise to see Yamaha stride onto the track. What is a surprise is how tightly focused their first offering is for its target audience.

The TG100 Tone Generator was created to be a plug-and-play sound module for computer owners who just want a useful sound palette so they can make music. These include educators, students, multimedia authors, computer-game players, and hobbyists. Its design emphasizes simplicity and consistent access to sound sets that are compatible with several existing standards. Yamaha has kept its focus on the intended market and appears less concerned with the more involved needs of performing musicians and sound designers.

ON THE SURFACE

The TG100 is a half-rack unit that fits readily on a desktop among a stack of computer gear. Its front panel holds a 1 × 16 LCD display; the power button; six edit buttons; a master volume knob; and a stereo, ⅛-inch miniplug headphone jack. A second stereo miniplug jack allows an external audio source to merge with the TG100 output, with a level control and an LED clipping indicator. During play, the LCD can be turned into a VU meter that shows overall note velocity for all sixteen MIDI channels. Unfortunately, the LCD is not backlit and is virtually useless on stage.

The back panel has MIDI In, Out, and Thru ports; a power adapter connection; ¼-inch, L/R outputs; an LCD contrast-adjust knob; and a surprise: an 8-pin mini-DIN MIDI interface that is compatible with Macintosh or PC computers. A slide switch sets the TG100 to respond to external MIDI or the computer interface. The power adapter includes a bulky plug that

needlessly takes up two spaces on an outlet strip. This is especially inconvenient for computer users with outlet-hungry peripherals.

The internal computer interface, which connects the TG100 directly to a Macintosh or PC serial port (cables not included), is a real bargain. In addition to driving the TG100, it gives your computer an interface for other MIDI devices. It worked flawlessly with all Mac MIDI software I tested.

The situation is more complicated for PC users, as their MIDI software must be upgraded to use the TG100 interface. There are two PC modes: one for PC-9800 computers (popular in Japan), the other for IBM PC-compatibles. Yamaha has a driver that allows *Windows* 3.1-based MIDI software to work with the TG100, and a variety of DOS software developers support the machine.

UNDER THE HOOD

The TG100 is a 16-part multitimbral, sample-playback device with 28-note polyphony and dynamic voice-allocation. It uses Yamaha's proprietary Advanced Wave Memory synthesis engine, which is related to the AWM technology used in the SY77 synthesizer. The unit has 2 MB of ROM sample memory, with no provision to add more samples.

The module can respond in one of three modes: General MIDI, Yamaha Disk Orchestra, and Roland CM-64. This allows it to work with sequences or software created for any of these standards. The mode determines the default sound bank, drum kit, assignment of MIDI channels to parts, and pitch bend range. However, all of these parameters can be overridden by the user, so you can play any preset sound on any channel.

The overall sound synthesis process is shown in **Fig. 1**. Sampled waveforms in ROM are used to make Elements, a building block corresponding to a single oscillator. Voices are built by combining one or two Elements. Roughly half of the presets use two Elements per Voice, which cuts the polyphony in half. This could present a problem for certain complex GM sequences because the GM spec calls for 24 simultaneously available voices.

Parts play a specified Voice on an assigned MIDI channel, with control of the stereo placement and mix. All Parts go through the same reverb algorithm, each with an individualized wet/dry mix, before being combined into the final stereo output. Thus, Voice editing defines sound timbre, and Part editing defines how the Voice is used in ensemble.

The TG100 can play up to sixteen Parts simultaneously. These can be across all sixteen MIDI channels, or multiple Parts can be assigned to the same channel for layered sounds. Part 10 is reserved for drum kits (in accord with General MIDI, which assigns drum parts to channel 10), though it can be assigned to any MIDI channel.

An onboard DSP chip provides eight flavors of digital reverb, including two each of hall, room, plate, and delay. The reverb algorithms are shielded from user adjustment; your only controls are the global reverb level (-40 to +6 dB) and effect depth (via Controller 91 messages) for each Part. Changing the type of reverb from the front panel resets the global reverb level (but not the Part effect depth) to a default setting specific for each algorithm, regardless of the reverb level you have set previously.

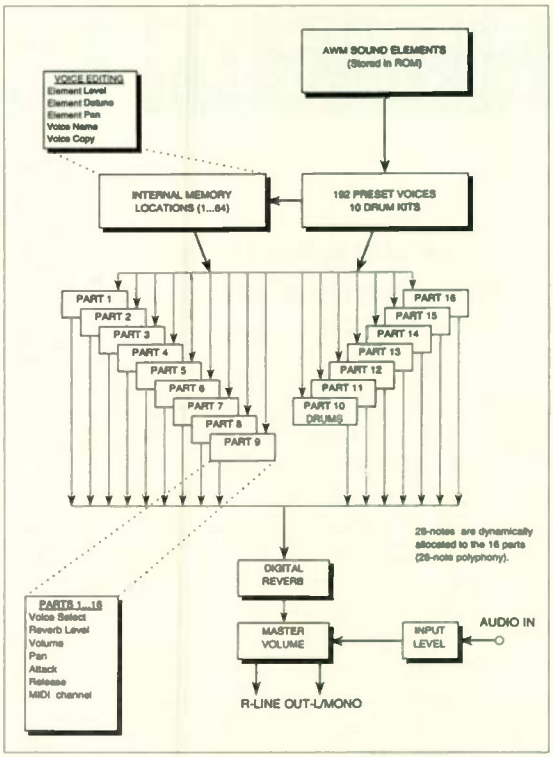


FIG. 1: Yamaha TG100 voice architecture and signal flow. Sampled waveforms make up Elements, and one or two Elements combine to form a Voice. Parts play a specified Voice on an assigned MIDI channel, with control of the stereo placement and mix. (Courtesy of Yamaha Corp.)

The synth provides scant editing capabilities from the front panel. Within a Voice, you can only specify a pan setting and adjust the volume level and detune for individual Elements. You cannot change the Elements used by a Voice. Part editing is equally minimalist: You can set the MIDI channel, pan (which overrides the Voice pan setting), level, wet/dry mix for the reverb effect, and then alter the Voice attack and release rates.

If you are willing to play with SysEx, however, a whole new world of patch-editing becomes available. You can change the waveforms, envelopes, LFO effects, velocity curves, and note transpositions for Voices, or individual Elements. SysEx drum-kit edits let you set the level, pan, and reverb depth for individual kit sounds. At the Part level, you can set key-range limits, transpose notes up or down two octaves, and change the LFO effects.

While I understand Yamaha's desire to keep costs down and have users focus on the preset Voices, I wish they had followed the Sound Canvas example of allowing access to these hidden parameters via front-panel controls. It

Yamaha optimized the TG100 Tone Module for computer users by including a PC- and Mac-compatible serial interface. The module offers good audio quality and a modest, easily accessed set of features.

is frustrating to know how much more the unit could do if the firmware permitted it.

In terms of MIDI control, the TG100 adheres to the General MIDI Level 1 standard. It responds on all sixteen channels to Attack Velocity, Channel Pressure, Pitch Bend, Mod Wheel, Portamento, Data Entry, Volume, Pan, Expression, Hold, All Notes Off, All Sound Off, and Reset All Controllers. Controller 91 governs reverb depth. Pan messages affect the next note played, rather than the note currently sounding. The device responds to registered parameter messages for Tuning and Pitch Bend sensitivity and to SysEx messages that select between the three modes and control Master Volume.

SOUNDS

There are three banks of 64 preset Voices each, for a total of 192. In addition, there are ten drum kits. An additional internal bank holds 64 Voices for user edits. The first 128 Voices are selected and assigned according to the General MIDI specification, covering all the "essential" sounds. (The General MIDI spec, including the specific instrument assignments, is described in "MIDI for the Masses" in the August 1991 **EM**.) The remaining 64 Voices fill the gaps for the Disk Orchestra and CM-64 emulations. About two-thirds of the presets imitate acoustic instruments.

While you still tend to get what you pay for in synthesizer sound quality, your dollars go surprisingly far these days. The TG100 offers a solid set of

Product Summary

PRODUCT:
TG100 Tone Generator
PRICE:
$449
MANUFACTURER:
Yamaha Corporation of America
6600 Orangethorpe Ave.
Buena Park, CA 90620
tel. (714) 522-9011
fax (714) 739-2680

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

presets, largely culled to fill its General MIDI Voice roster. The sounds are clean and quiet, even when used with the reverb. Though none will make you toss your high-end synth, virtually all are immediately useful and well-suited for the target users.

In general, the presets sound noticeably better in ensemble than solo. Some seem a bit too bright and lacking bass definition on their own. It turns out that Yamaha equalized the samples to optimize their use in mixes. What seems decent by itself becomes downright dynamite as you flesh out a sequence.

The drum kits are set up for General MIDI, Disk Orchestra, and CM-64 modes. In addition, there are variations for the Yamaha RX drum machine standard and for electronic, power, and orchestral kits. There are about 57 sounds per kit, and most sounds appear in several kits, with substitutions such as timpanis for tom-toms, or brush hits for snare hits. The drums are quite good, with lots of punch. While you cannot edit them without SysEx, several drum sounds are doubled as preset Voices that can be edited for level, pan, and reverb.

Unfortunately, as with Roland's Sound Canvas, the TG100 does not store user sound edits or changes to Part setups when powered off. You must save these changes via a System Exclusive dump to some form of external librarian program or device.

BOTTOM LINE

Many people wonder how well the TG100 stacks up against the Roland Sound Canvas family. While these are quite similar products, there are design differences that could favor one over the other in different situations. The superior LCD display, remote controller, and tie-in with the Sound Brush makes the Sound Canvas better-suited for performing musicians. Desktop composers, computer-music hobbyists, and multimedia authors, however, will appreciate the low cost and built-in computer interface of the TG100. The two units are comparable in sound quality and cover the same general range of timbres. Though the Sound Canvas has 125 additional presets, they are largely just variations of other sounds the two units have in common.

Several third-party developers have already adapted their programs to support the TG100, and more are expected to follow. The latest release of Opcode's *Galaxy Plus Editors* for the Mac includes a TG100 librarian module. Branching out into the business world, Yamaha has established a comarketing agreement for the TG100 with Word Perfect Corporation's *Presentations* 2.0 multimedia software for the PC.

Yamaha has also announced the first spin-off of the TG100 line, the T3. Functionally equivalent to the TG100, it is designed for computer-music applications and has no front-panel controls; everything is controlled by software from a Mac or PC. The T3 will retail for $449 and comes bundled with Passport Designs' *Hello Music* Standard MIDI File playback software.

Yamaha may have gotten started a bit later than others in the General MIDI race, but they've delivered a good product with a lot of bang for surprisingly few consumer dollars. The TG100 is well-suited for its target audience. It should attract many converts, especially when patch editor/librarian software appears that gives easy access to its deeper functions.

Jim Pierson-Perry *is a research clinical chemist, musician, and semi-regular* **EM** *contributor.*

DOD 1642 Professional Mixer

By Neal Brighton

This compact console is a lean, clean, mixing machine.

The recent deluge of compact, rack-mountable mixers is a welcome development in the home recording market. After all, home studios are notoriously stingy on space. But that's not all. These condensed mixers fight obsolescence by acting as submixers if a home recordist decides to buy a larger master console. In addition, their rack-readiness makes them handy, "pack-up-and-go," live-performance mixers.

One of the latest entries in the compact-mixer field is DOD's 1642. The 1642 is a 16 × 4 mixer that can be reconfigured to 16 × 2 × 2. The mighty mite also includes six aux sends and four stereo aux returns in a frame that fits onto a small tabletop or into an 8-space, 19-inch rack.

HOOKING IT UP

I tested the 1642's capabilities as a submixer by integrating it into the MIDI room at Sound & Vision studios in San Francisco. Hooking up the 1642 is simple and convenient, thanks to a pivoting connector strip that allows all connections to be made either at the top panel, or rear panel, simply by removing some screws and changing a cover plate. The first eight line inputs accept balanced or unbalanced, ¼-inch lines, while inputs 9 through 16 accept only unbalanced, ¼-inch lines.

The insert points for the sixteen channel inputs, the stereo bus, and the subgroups are unbalanced and use a ¼-inch tip-ring-sleeve wiring scheme. Their levels are set at +4 dBu, which is great if you're looking for a mixer that is compatible with professional gear.

Unlike some other boards in its class, the 1642 offers eight mic preamps with standard XLR connectors. These eight channels offer 48-volt phantom power that can be switched on or off. However, when phantom power is selected, all eight channels are activated; you cannot turn power on or off for individual inputs. The stereo bus and the two subgroups use ¼-inch connectors that can be run as either TRS balanced, or tip-sleeve unbalanced.

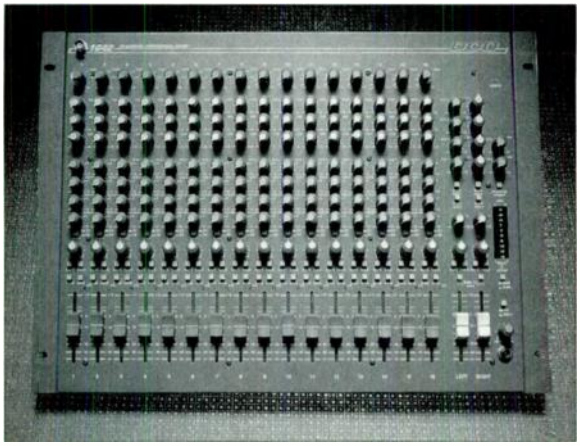
The 1642 includes an external power supply that can either rest on a counter (or the floor), or attach to the back of the mixer when rack-mounted.

THE SIGNAL PATH

A single knob on each input section serves as the line or mic gain. The mic trims offer up to 58 dB of gain, while the line trims deliver 30dB. For equalization, the 1642 employs three fixed bands: a high-frequency band offering ±15 dB at 12.5 kHz; a midrange band offering ±12 dB at 2.5 kHz; and a low-frequency band delivering ±15 dB at 80 Hz.

Every input channel and subgroup master has a mute and solo button. An LED announces whether a solo has been activated, but there is no LED for mute status. The four aux returns also

have solo buttons, but no mutes. The 1642's solo feature is quite versatile, in that it can be run PFL (Pre Fader Listen) or solo-in-place. However, the solo and PFL features are available only through the headphone jack, which has a dedicated volume knob. In true solo mode, the 1642 routes all soloed channels and auxiliaries to the headphone output, while simultaneously muting all non-soloed channels. In PFL mode, the board sends the selected channels to the headphone output, but does not mute unsoloed channels.



RON MILLER

DOD's 1642 mixer sounds good, but its construction is not heavy-duty.

TRAFFIC CONTROL

Signal-routing is simple on the 1642. There is a button for each subgroup: Button 1 sends signal to the subgroups, while button 2 sends signal to the mains. The subgroup level controls are two rotary pots located above the stereo-bus master faders. (I prefer subgroup levels to be controlled by faders because they allow smoother adjustments.) A switch dumps the subgroups into the stereo bus, transforming the board into its optional 16 × 2 × 2 configuration.

The aux sends are configured with four pots controlling six sends. A switch turns aux 3 and 4 into aux 5 and 6. Factory settings are as follows: aux send 1 is pre-EQ; aux send 2 is post-EQ; and aux sends 3, 4, 5, and 6 are all post-fader. These configurations can be changed, but the job requires circuitry adjustments and should be done by an authorized service center.

Master controls are provided for all aux sends, but there are no level controls for the four stereo aux returns. All you get is a pan pot that dumps the returns into the stereo bus. The unfortunate lack of dedicated aux-return level controls forces you to adjust effects levels from the processing units. If your 1642 is positioned an inconvenient distance from your effects rack, going back and forth between the mixer and signal processors can be a drag.

Metering on the 1642 is somewhat limited. Each channel has a single "overload" LED, and the stereo bus has a dual, 10-segment LED. The meter can be switched between the stereo bus and the output of the subgroups, but you cannot monitor both levels simultaneously.

SOUNDCHECK

The 1642 sounds pretty good for a mixer in this user niche and price range. It maintains suitable clarity on keyboard and other virtual tracks, without adding audible hiss or distortion. The mic preamps proved clear and clean with a Shure SM57, but produced slightly increased, audible hiss when a high-quality condenser mic (an AKG C414) was used. The EQ is clean and smooth on its set frequencies, but the lack of sweepable mids makes it difficult to effect more than basic sonic sculpting. (It was frustrating mixing a live ensemble and attempting to do a full "master" mixdown in the studio.)

Product Summary

PRODUCT:
1642 Professional Mixer
PRICE:
$1,099
MANUFACTURER:
DOD
5639 South Riley Lane
Salt Lake City, UT 84107
tel. (801) 268-8400
fax (801) 262-4966

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

CRITIC'S CORNER

A great deal of thought undoubtedly went into the design of the 1642, but a few features drove me crazy. To begin with, I didn't like the garish colored knobs, and the faders wobbled and scraped so much I thought they might break off in my hand. It's unfortunate that the weak faders impose demerits on an otherwise well-designed and good-sounding unit.

Also, the all-in-one design of the 1642 means the posts from the pots on the PC board must fit through precisely drilled holes in the top of the mixer faceplate. When the faceplates were painted, some of these holes "shrank" due to paint buildup. Consequently, some of the pots have quite a bit of drag. To be fair, most of the pots feel fine, and a DOD rep stated that current production models are "drag-free." Still, I recommend checking all the knobs before purchasing a 1642 to make sure you're not taking home an earlier model.

▼

A great deal of thought undoubtedly went into the design, but a few features drove me crazy.

For the most part, I liked the 1642. It's a versatile and good-sounding unit. I'd be happier if the mixer had rugged, smooth faders, but I realize these considerations add to the price. However, I believe the *real* compact-mixer revolution will begin when these mini-brutes sound and feel almost as good as larger pro and semi-pro consoles. With the 1642, DOD proves they have the design chops to make this happen. Now, let's get this hardware problem handled.

Neal Brighton *is an independent engineer/producer and co-owner of Sound & Vision studios in San Francisco.*

Yamaha RY10 Rhythm Programmer

By Dave Bertovic

Yamaha jumps into the drum-machine-for-the-masses market.

Drum and percussion sound sources take on many forms these days, from traditional stand-alone units to rack-mountable percussion modules and keyboard workstations. One of the more compact drum machines is the RY10, which measures about 8 × 8 × 1.5 inches.

The unit can be powered by an optional external AC power supply or six AA batteries for true portability. The RY10 connects to a sound system in mono or stereo (via ¼-inch jacks) and includes a headphone output. A built-in speaker (switchable on/off) allows operation without a sound system, and a slider controls the volume. A ¼-inch, line-level audio input (*sans* level control) routes the signal from an electric guitar, synthesizer, etc., through the RY10. The input is used for the RY10's onboard chromatic tuner (which is reasonably good), and the combined signal appears at the speaker and audio outputs.

SOUNDS

Most electronic musicians who buy this machine will do so for its portability and sounds. The RY10 contains 250 drum, percussion, and bass sounds in ROM. The sounds' overall level, tuning, panning (except toms), and accent level can be edited, and they can be grouped into sixteen different user-defined "Pad Banks." Each bank contains up to twelve drums, twelve percussion instruments, and a bass patch; pressing a button rotates between these three sets of sounds, making them available on the twelve playing pads. There are also sixteen preset ROM Pad Banks, including various examples of Rock, Reggae, Rap, Dance, Jazz, Funk, Latin, Techno, and R&B kits. They're well-arranged, and many users will find them useful right out of the box.

With an exception or two, the RY10 sounds wonderful. The samples are as

clean and noise-free as any drum box I've encountered. The snares are crisp, and the kick drums have a solid attack without being too boomy. The electronic effects and ambient samples (sounds that include room acoustics) have excellent stereo imaging, presence, and depth. On the electronic side, there are some interesting mono and stereo effects including explosions, hammer hits, gurgles, scratches, and growls. (Thrashers and rappers should take note.)

The unit's sound has a few drawbacks, however. The crash cymbals sound a little thin and weak; about half of them are too short in duration, and the longer cymbal samples suffer from audible looping. But it should be noted that, with a few exceptions, the majority of currently available drum machines have this shortcoming to some degree.

The RY10 also includes nine different bass samples, including various electric bass guitars and synthesizer-type bass patches. This bank of basses, coupled with acoustic and electronic drums, traditional percussion instruments, and contemporary effects, makes the RY10 a well-equipped rhythm section. A few more bass sounds would be welcome, though. Fretless and acoustic bass (plucked or bowed) are missing, as is a good, solid rock bass or two.

OPERATION

The RY10's controls are obvious and easily accessed. They're divided into three groups of front-panel buttons. The first group controls the Pattern, Song, and Utility modes. Sixteen

Product Summary

PRODUCT:
RY10 Rhythm Programmer
PRICE:
$299
MANUFACTURER:
Yamaha Corporation of America
6600 Orangethorpe Ave.
Buena Park, CA 90620
tel. (714) 522-9011

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

numeric keys in a line across the front select specific, clearly labeled functions within the three modes.

The second group of buttons include Start/Go (record, play, or execute a function) and Stop/Continue. In addition, there are buttons that let you add a fill, select a memory bank, and select between drum, percussion, and bass sounds within a Pad Bank. You also get decrement/increment keys.

The third group consists of twelve trigger pads, arranged like an octave on a piano. On either end of these keys is an Accent/Octave button that adds a user-defined volume accent to a drum pad, or transposes the bass range up or down one octave. The pads are neither velocity-sensitive nor pressure-sensitive; Yamaha understandably had to cut costs somewhere, but tapping in drum tracks without velocity sensitivity is a pretty colorless affair. Fortunately, the sound samples do respond to MIDI Velocity messages from an external controller.

Above the numeric keys are two rows of LED indicators. The first row includes sixteen LEDs that serve two functions. During Pattern, Song Play, or Real-Time Record, these LEDs indicate which pad is being activated at any time. During Step-Time Record, they indicate the sixteenth-note rhythmic position on which each note in the sequence occurs. The second row of four triangular LEDs indicate the beat in Real-Time Record or Play; all four LEDs light on the downbeat, after which they light in succession for the rest of the measure.

All operational modes and functions are displayed on an easy-to-read LCD screen that even has a miniature piano keyboard graphic for a visual cue of the bass-line notes. A normally-closed, momentary footswitch jack permits foot control of sequencer Start/Stop, Fill, or Next commands.

Yamaha's RY10 Rhythm Programmer makes a dandy traveling companion, with potent percussion sounds, big bass sounds, simple sequencing features, and a built-in speaker.

PATTERNS

The RY10 comes with 50 preset drum Patterns in ROM, a bank of 50 user Patterns, and 36 user Song memories. Each Pattern (ROM and user) has an associated Fill Pattern that plays in real time when the Fill key is pressed. The RY10's ROM Patterns/Fills are accurate examples of the musical styles that they represent; they're certainly not

flashy, but they have a nice feel.

The pattern sequencer is strictly bare bones, bread-and-butter stuff. It gets the job done, which is all you could ask. The shortest duration the machine will record is a thirty-second note.

As is standard with rhythm units, the RY10 has programmable tempo (40 to 250 bpm) and time signature (ranging from 1/4 to 5/4, plus odd times from 1/8 to 7/8 and 1/16 to 15/16). The machine automatically quantizes input from its pads.

MINI MIDI

A MIDI In port lets you play the RY10 sounds from an external MIDI device, but the machine does not record incoming MIDI data. Note On messages with Velocity (triggering the drums and bass notes) are recognized, as are Program Changes (for selecting a Pad Bank), Song Select, Active Sensing, and MIDI Timing Clock with Start/Stop/Continue commands.

Here's the shocker: The RY10 has no MIDI Out. The user can't save data to an external MIDI recorder, and the unit can't be used as a timing master in a system. Obviously, this was a cost-control measure, but it was an unfortunate decision. An ⅛-inch tape in/out stereo minijack enables memory backup to and loading from data cassette. To top it off, the RY10 does not respond to Song Position Pointer, a significant omission.

CONCLUSION

While Yamaha has aimed the RY10 primarily at first-time buyers and guitar players, the unit may also find favor with the songwriter-on-a-budget. Even pro users might find the RY10 handy now and then for an occasional kick, snare or percussion hit; the majority of the sounds are high caliber.

Although the control capabilities and user memory aren't particularly impressive, they are sufficient. The lack of a MIDI Out is unfortunate, however; if you go mobile and come up with a great pattern, you can't transfer it to an external sequencer. Your only option is to have the RY10 follow MIDI Clocks, without SPP.

The $299 price would be acceptable even if you just considered this unit a good, portable drum-sound module. The drum-pattern sequencer and speaker are more than a throw-in because, along with the machine's small size and excellent drum sounds, they provide highly mobile accompaniment for recreational purposes. With that goal in mind, the RY10 gets high grades.

Dave Bertovic *is a freelance writer, synth addict, and sound mixer in L.A.*

Rolls Rotorhorn

By Alan Gary Campbell

Meet the latest "Leslie-in-a-rack."

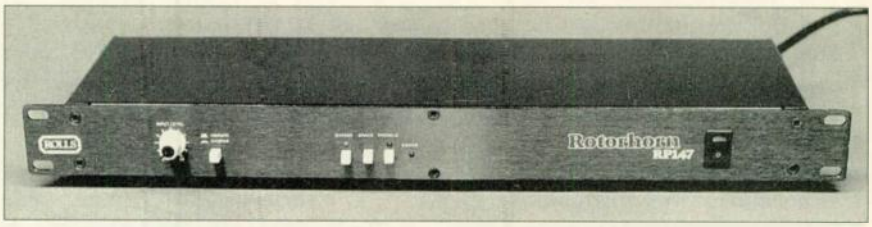
Something about the swooshing, liquid sound of the Leslie is mesmerizing. But lugging 100-plus pounds of funeral parlor-grade hardwood cabinetry is not the average musician's idea of fun. So for years, engineers have zealously sought to electronically simulate the Leslie's complex interaction of reflections, bass and treble Doppler-shifts, and artificial spring-reverberation. Products ranging from the early UniVibe to the Dynacord CLS222 and the Brianizer have resulted.

The Rotorhorn is Rolls Corporation's "Leslie-in-a-rack." The single-space, simulated-stereo Leslie simulator is based on a design that uses bucket-brigade delays (BBDs), which, the manufacturer claims, provide a warmer sound than their digital counterparts.

The Rotorhorn's appearance is workmanlike, rather than elegant. The unit is sturdy, and the few front-panel buttons have a good feel. Unbalanced, line-level, ¼-inch inputs and outputs connect the Rotorhorn, and stereo footswitch and MIDI In jacks provide external control. An internal power supply and front-panel power switch are a refreshing change from wall warts and on-all-the-time designs.

OPERATION

Operation is simplicity itself: Just plug the unit in, turn it on, set the input level, and wail. Press the Tremolo button to speed up the Leslie effect, and press it again to slow it down. The Brake button gradually "stops" the effect, from slow or fast speed. A Bypass



Rolls' inexpensive Rotorhorn offers a workmanlike Leslie simulation with a warm sound, good speed-up and slow-down curves, and pleasing analog distortion.

button connects the inputs directly to the outputs, with unity gain. A switch selects Chorus (Leslie effect) or Vibrato mode, though the latter seems less likely to find use. The Tremolo and Bypass functions can be controlled by a standard, dual footswitch.

Several functions can be controlled via MIDI. Program Change numbers 1 to 5 affect the Bypass, Active (current settings), Slow, Fast, and Brake functions, respectively. Controller 4 can be used to set the rotation speed at any of 128 values. The MIDI jack also provides phantom power when used with a Rolls MIDI foot controller. Unfortunately, the Rotorhorn can only receive on channels 1, 9, or 16, or in Omni mode. Worse, the receive channel is selected with a 3-pin header with a shorting clip that is accessed through a rear-panel cutout. Depending on how you work, this ranks somewhere between mildly inconvenient and an unnecessary pain; Rolls should implement a front-panel rotary switch and support all sixteen channels.

HOW ACCURATE IS IT?

Mixed properly with the right instrument sounds, the Rotorhorn sounds convincing, even in mono. The speed-up and slow-down curves are good approximations, but the simulated inertial effects are not exact, and the experienced ear might hear the difference.

No alternate or user-programmable curves are provided, but there are internal trimpots to set the slow and fast speeds. Compared to my Leslie 147RV, the slow speed was right on, and the fast speed was very close, as set at the factory. Few users will resist the temptation to fiddle with the trims, but I recommend marking the original positions lightly with a felt-tip pen.

The sound of the unit is warm, and the input can be overdriven to give a pleasing analog distortion with an "organic" quality that really beefs up digital-synth B3 simulations. The tradeoff is that the bucket-brigade circuitry is noisier than that of digital effects and generates a very low-level "thump" at the modulation rate. Such artifacts are tolerable on stage but might be a problem in the studio. To be fair, the Rotorhorn is quieter than the real thing.

The ultimate Leslie simulator? Not yet; the Rotorhorn is a better live box than a studio tool. But for live performance, it is an inexpensive, solid product that is fun to use.

Product Summary

PRODUCT:
Rotorhorn Model RP147
PRICE:
$199
MANUFACTURER:
Rolls Corporation
6995 South 400 West
Midvale, UT 84047
tel. (801) 562-5628
fax (801) 562-5655

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

Eye & I Merger Plus

By Jim Pierson-Perry

Sometimes a humble MIDI merger can save the day.

When MIDI users build their setups, they frequently wish to send the combined MIDI output of two instruments into a single

Eye & I's low-priced Merger Plus combines two hearty MIDI datastreams and includes a Panic button.

input. This allows them to jam with a friend into a MIDI sequencer. I often merge two keyboards together: One is set to Local Control Off and operates my sequencer through MIDI remote commands; the other is for playing. Or maybe you want to incorporate an alternative controller, strap-on keyboard, or a MIDI fader box into a simple stage rig.

A quick trip to the local music shop for a MIDI Y-cord proves in vain; there aren't any. Unlike audio lines, MIDI signals comprise a flow of individual data packets, like highway traffic; if two roads intersect, drivers must wait for a pause in traffic to get through safely. Otherwise, it's a demolition derby in the form of doubled or hung notes and assorted unpredictable MIDI garbage.

The Merger Plus from Eye and I Productions acts like a traffic cop in that intersection, forcing the two lanes of MIDI messages to alternate and combine safely. Sometimes it holds up one lane a bit longer while a string of fire engines (SysEx data dumps) rush by, but order is maintained.

The compact (2.5 × 3-inch) device has two MIDI In ports and one MIDI Out; an LED shows active MIDI at either input. It is powered passively through the MIDI line connected to the first In port.

The Merger Plus incorporates a welcome Panic button to silence hung notes, the poltergeists of live performance. Pressing the button sends a global All Notes Off message, Sustain Pedal up on all channels, and—just in case—sends a string of individual Note Off commands for all notes on all channels. Unfortunately, it does not send Reset All Controllers or zero Pitch Bend.

▼

MIDI signals are like highway traffic; if two roads intersect, drivers must wait for a pause in traffic to get through safely.

The acid test of a merger device is how it reacts when both MIDI inputs are running hot. I threw everything at the Merger Plus: Aftertouch, Pitch Bend, Mod Wheel, pedals, MIDI Clocks, and even SysEx dumps. It just smiled and kept the traffic moving without a hitch. An internal buffer memory holds data in check during a SysEx dump so nothing falls through the cracks.

If you need a MIDI traffic cop, the Merger Plus is a good choice. It's inexpensive, looks good, works well, and is darn near idiot-proof. What more do you want? ❦

Product Summary

PRODUCT:
Merger Plus
PRICE:
$99.95
MANUFACTURER:
Eye and I Productions
930 Jungfrau Ct.
Milpitas, CA 95035
tel. (408) 945-0139
fax (408) 945-5712

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ● ● ●
DOCUMENTATION	● ● ●
VALUE	● ● ● ●

(continued from p. 146)

system simply loads from floppy disk. But user installation voids the warranty, so I highly recommend that the upgrades be installed by an E-mu service center.

An internal hard drive does not affect SCSI operation, but you are limited to a maximum of seven SCSI IDs for external hard drives, CD ROM, other E-IIIs, etc.

Techno Trivia: The E-IIIxp uses ZIP ("Zigzag" Inline Package) RAM, which also is used in some recent PCs.

Q. I have several vintage Moog synths that use numerous transistors in their circuitry. I've found the often-used 2N3904 NPN type at Radio Shack, but not the complementary 2N3906 PNP type. They do carry the MPS2907 PNP; will this substitute? When is substitution acceptable? The Minimoog uses matched pairs of transistors in the contour generator and voltage-controlled filter circuits, but the Rogue apparently uses unmatched 2N3904's in its filter. How important are the matched transistors to the Minimoog's sound? Where can I obtain exact replacement transistors, and how can I get specs for them?

A. In simple switching and amplifying circuits (such as trigger converters, mixers, noise sources, line amps, etc.), the PNP-type MPS2907 (Radio Shack part 276-2023) can substitute for the 2N3906. Also, the heftier NPN-type 2N2222 (Radio Shack part 276-2009) is a good substitute for the 2N3904 (Radio Shack part 276-2016) in subcircuits that "talk" to external gear (e.g., a switch-trigger out). In more critical circuits—such as the voltage-controlled oscillators, voltage-controlled filter, and contour generators—it is important to use replacement transistors of the same type (or a close substitute).

Matched transistor pairs, as indicated in the Minimoog parts list (refer to a *Minimoog Service Manual*), are vital to the proper performance of the contour-generator timing circuits and, to a lesser extent, to the performance of the VCF ladder network. When a single transistor in a filter ladder fails, it is advisable to replace both the failed part and its companion with a matched pair to keep the filter operation in spec. TIS97 transistors can be replaced by 2N3392's, but when this substitution is made, a matched pair is mandatory. (Replacement of only the failed transistor is sometimes done as an emergency measure. This may alter the filter

performance somewhat, but it won't harm the unit.) In addition, a voltmeter-based method for transistor-matching that utilizes a simple, do-it-yourself circuit is detailed in the *Minimoog Service Manual.*

Note that in later Moog products, such as the Liberation, Source, Prodigy, and Rogue, the top and bottom pairs are common-substrate "chip transistors" that are precisely matched by definition. The remaining ladder transistors are unmatched. The Rogue's ballsy, overdriven filter sound is not, however, related to the unmatched transistors. The base pair is designed to be highly overdriven when the oscillator mix sliders have reached their maximum level.

Incidentally, EJE Research, which carried Moog parts and service manuals, has gone out of business. At press time, no information was available regarding future parts and service availability, though it seems likely that someone will pick up this historic line.

A superb source of comprehensive, comparative, tabular specifications for foreign and domestic transistors is *Tower's International Transistor Selector.* This was previously available from TAB Books in a somewhat condensed, paperback form. Currently, Trans-Atlantic Philadelphia offers the 1989 version, published in England by W. Foulsham. This is a rather expensive reference ($60) that is not often found in libraries, but it is indispensable.

A fairly comprehensive mail-order source for transistors is Mouser Electronics (2401 Highway 287 North, Mansfield, TX 76063-4827; tel. [800] 992-9943. Use this number for catalog requests only.)

Q. When I had the SQX-70 Memory Expander installed in my Ensoniq SQ-1 synth, the technician said I also needed the ground-wire update, which he apparently installed but didn't charge me for. What is it, and should I be glad I got it?

A. Ensoniq SQ-1 synths with serial numbers 15250 and below should have the ground update installed when they are opened for service, if it has not previously been added. This update, described in *Ensoniq Service Bulletin #10,* provides an enhanced star ground for the SQ-1, which improves the unit's noise immunity and its resistance to static damage. The update is desirable but not critical. Parts for the ground update are available at no charge from Ensoniq.

Tech tip: Be careful when connecting the added ground lead at the rear of the main board mounting bracket. The existing cables in that location are under tension and slightly cover the mounting location, and it is easy to slip and send the mounting screw and lock washer flying. I discovered this the hard way. Unknown to me, the errant lock washer, amazingly, sailed through a tiny slot in the frame of the left end-bell and, after a few telltale rattles, lodged silently inside it. Needless to say, I became intimately familiar with total disassembly of the SQ-1. Of course, the left end-bell was the last place that I looked for the lock washer, and the scene on the bench reminded me of the episode in *Short Circuit* where Number Five completely disassembles a car on the lawn.

EM *contributing editor* **Alan Gary Campbell** *is owner of Musitech, a consulting firm specializing in electronic music product design, service, and modification.*

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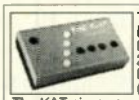

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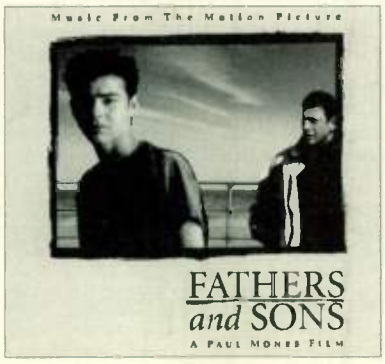

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The Anatomy of a Break

An unsigned singer/songwriter goes Hollywood.

By Michael Molenda

First came the song. Well, more accurately, first came the personal tragedy that inspired the song.

Nancie De Ross, an unsigned San Francisco solo artist, retreated inside her tiny apartment to mourn the end of a relationship. One of the fruits of her sorrow was the song "I Don't Know Why." The melancholy ballad ultimately found its way onto the soundtrack of *Fathers and Sons*, a film starring Jeff Goldblum. Now anyone will tell you that it is almost impossible for an unsigned, unknown artist to score a track on a major movie soundtrack. This is the story of a miracle.

"I had broken up with my boyfriend, and I was feeling this incredible loneliness and fear," says De Ross. "But I didn't want to distract myself from the pain. I thought about all the great, sad ballads and 'I Don't Know Why' came out of me completely written—lyrics and music—in about five minutes. I never changed a thing."

As fate would have it, an A&M Records executive saw De Ross open a concert for Todd Rundgren and offered her $3,000 to record a development demo for the label. Finally given enough of a budget to "do things right," De Ross chose James Calvin Wilsey—who also happens to play guitar for Chris Isaak—to produce the project.

"I Don't Know Why" and two other compositions were recorded in Wilsey's home MIDI studio. Song arrangements were sequenced on Mark of the Unicorn's *Performer*, and the final MIDI tracks and De Ross' voice were recorded into a hard-disk recorder (Digidesign's *Deck*).

"I just came in and sang the vocal right in Jimmy's apartment," she says. "If you listen hard, you can hear traffic in the background."

Wilsey played the completed demo for Jim Dunbar, a friend and Sony Music executive. Dunbar liked "I Don't Know Why" enough to champion the song to director Paul Mones, who was making *Fathers and Sons* for Pacific Pictures (a division of Sony Entertainment). Mones not only put the song in the film (and on the soundtrack album), he used the very demo track that was recorded and mixed in Wilsey's apartment.

"I was chewing up my fingernails for about a year-and-a-half waiting to hear if the song made it," says De Ross. "I read about it in a local music paper before anyone told me a thing. That's how much they (the label executives) communicate with artists."

The big payday is yet to come. Sony gave De Ross an artist royalty advance of $500 and an additional $500 advance for writing the song. She also is entitled to 1/11 of the sales royalties set aside for the eleven artists on the soundtrack album.

"Basically, I've earned enough money from this deal to buy some toothpaste," jokes De Ross.

EPILOGUE

Dunbar has said he'd consider signing De Ross to Sony Music if her track generates some heat. Unfortunately, the limited distribution of *Fathers and Sons* is unlikely to earn hit status for the soundtrack album. The A&M deal faded silently away, but the "never-say-die" De Ross plans to record more demos with Wilsey.

"The next break will come whenever it's ready," she says. "I'm just happy this (soundtrack) was finally released. It was like holding a baby inside me for a year-and-a-half."

Nancie De Ross

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