Multimedia Sound • Patch Bays • Reviews: Roland JV-80, Peavey SP, and 5 More

Electronic Musician

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May 1992

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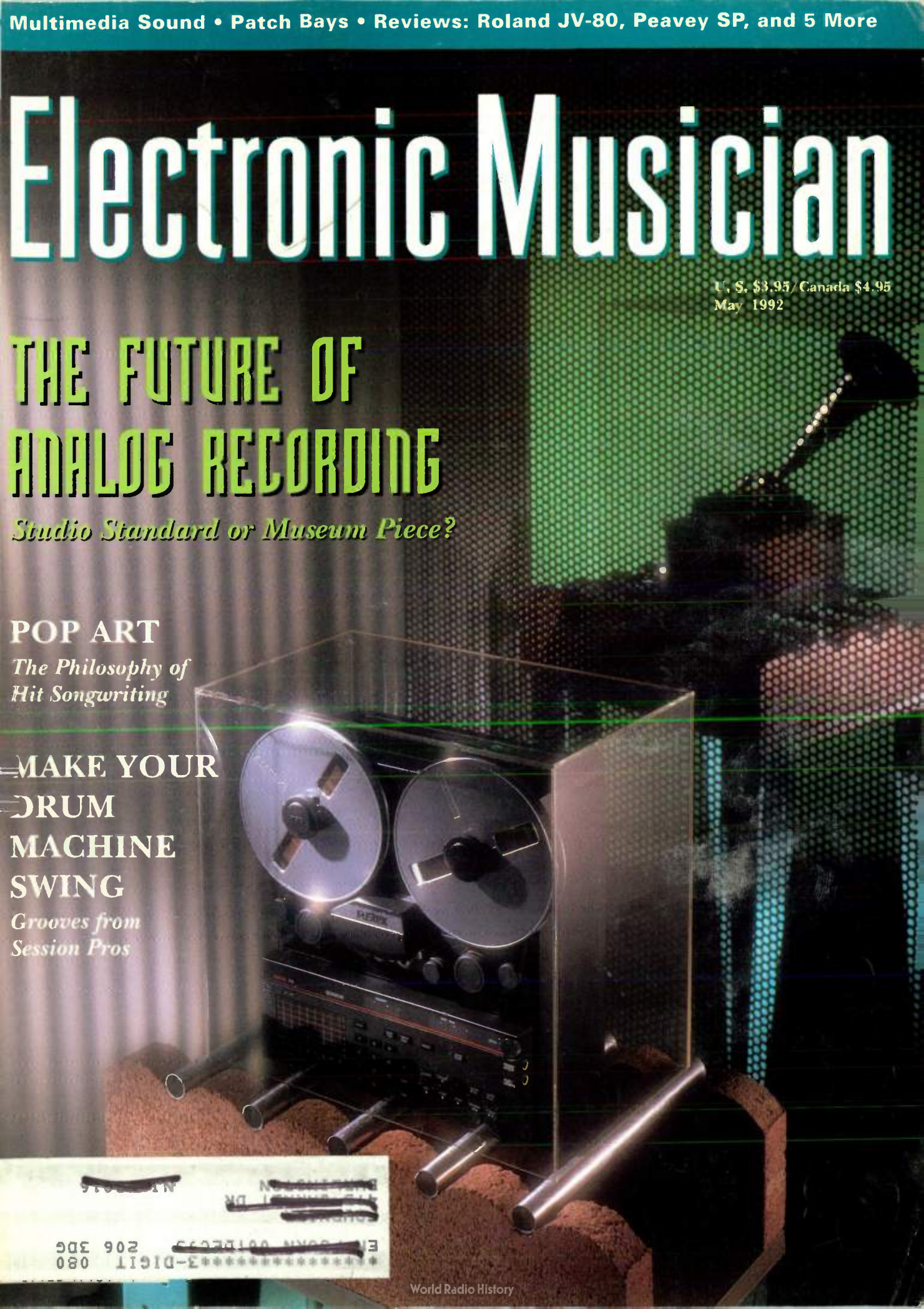
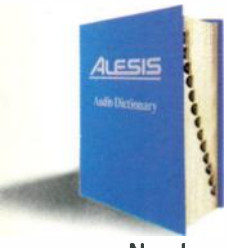


mix·er

(mik′sĕr) *noun*. An electronic device used to *mix* music. Must be clean, transparent and punchy. See Alesis 1622 Mixer. Better yet, listen to it.



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STUDIO ELECTRONICS

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The Top 500

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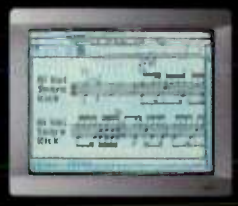

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ALESIS THE TOP 500 DRUM SOUNDS

THIS WEEK	LAST WEEK	WKS. ON CHART	TITLE / ARTIST	DRUM PRODUCTION
1	2	208	HONEST SNARE / HR-16	ALL WOOD-BRASS RIM
2	NEW ▶		STUDIO TOM / BRAND NEW D4	16" MAPLE TOM w/VERB
3	NEW ▶		BIG "O" / BRAND NEW D4	DOUBLE HEAD KICK w/VERB
4	5	52	RIM SHOT ROOM / SR-16	BRASS PICCOLO w/VERB
5	10	156	BIG FOOT / HR-16:B	SINGLE HEAD 26" MAPLE
6	NEW ▶		SLAM / BRAND NEW D4	POWER TOM w/VERB
7	23	156	COMBO SNARE / HR-16:B	PICCOLO PLUS WOOD
8	NEW ▶		BIG BALLAD / BRAND NEW D4	WOOD SNARE w/BIG VERB
9	NEW ▶		FAT CITY / BRAND NEW D4	SUPER FAT SNARE
			CLOSE TO OPEN	ARTICULATED HI HAT

THIS WEEK	LAST WEEK	WKS. ON CHART	TITLE / ARTIST	
302	NEW ▶		RAW HIDE / BRAND NEW D4	CUSTOM S
303	450	52	HI ROOM TOM / SR-16	10" MAPL
304	NEW ▶		WET HALF / BRAND NEW D4	HALF OPEN HA
305	327	52	RIM 2 CENTER / SR-16	ARTIC
306	123	208	DOUBLE HEAD	DOUBLE HEAD KI
307	223	15(		
308	401	5'		
309	NEW ▶			
310	175	1		
311	NEW			
312	171			

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Cover: Photo By Mark Johann.

Talk of Standards

Refining current standards and specs could greatly simplify the electronic musician's life.

ANNE HAMERSKY

In the world of computers and music, technical standards and specifications serve as a lifeblood, allowing various levels of communication to occur between pieces of equipment and software. Foremost among these is MIDI, which essentially brought the commercial electronic music industry into a new era. But other standards and specifications exist that also affect how we create music and share our creations with others. Several of these could benefit from additional development or refinement.

An especially interesting development on the Macintosh, for example, is the *Opcode MIDI System* (*OMS*, detailed in **EM**'s March 1992 "Computer Musician" column). *OMS* is a smart extension to the Mac's operating system that allows multiple MIDI applications to share data about a person's MIDI setup (available devices, channel assignments, patch names, etc.). *OMS* allows you to do things like select a particular patch on a specific instrument without having to worry about channel numbers, program change numbers, and other inane details. This allows you to focus on making music.

Unfortunately, *OMS*' system-level functionality is currently limited to Opcode software and a few other manufacturers that have licensed the technology from Opcode. Apple offers some capabilities of *OMS* in its *MIDI Manager* system software. However, the company should reward Opcode for their efforts and integrate *OMS*' functionality into *MIDI Manager* to make it a system-level standard from which all Mac developers and users would benefit. Particularly now that Apple is free from the constraints of the Apple Records lawsuit, they need to make their music-related system software as strong as possible.

The General MIDI specification (described in "MIDI for the Masses" in the August 1991 **EM**), which has just begun to be utilized, is currently embroiled in a controversy regarding its polyphony requirements. The spec calls for 24-voice polyphony. Roland's popular Sound Canvas module doesn't quite meet the spec because, although it can play 24 partials, or waveforms, simultaneously, a few patches use two waveforms. Thus, if certain combinations of patches are used at once in a composition, the polyphony could be reduced to 21 or 22 voices. I appreciate technical correctness as much as anyone, but I believe the concerns voiced by certain members of the MIDI Manufacturers Association (MMA) are wasted energy. As a great-sounding, low-cost synth, the Sound Canvas is exactly the type of instrument the GM spec was designed to inspire. To quibble over its exact polyphony and deny it an official GM certification is to ignore both the spirit in which GM was created and the jumpstart the instrument provides to the GM market. Plus, the Sound Canvas has begun to establish itself as a *de facto* GM standard anyway, just as the MT-32 did before it, and the marketplace will not be swayed by these objections.

An important specification that remains to be set is Standard MIDI Files incorporating digital audio. Today, with many sequencers incorporating digital audio into their realm of control, the electronic music community needs a comprehensive spec that allows combined files to be shared across applications and platforms. Whether the AIFF standard can be incorporated into SMFs, or a new specification is created, something clearly needs to be done.

Standards and specifications simplify the process of sharing information. In this respect, the electronic music industry has done a remarkable job. Nevertheless, a bit more effort could make the creation of music even easier.

Bob O'Donnell

Electronic Musician

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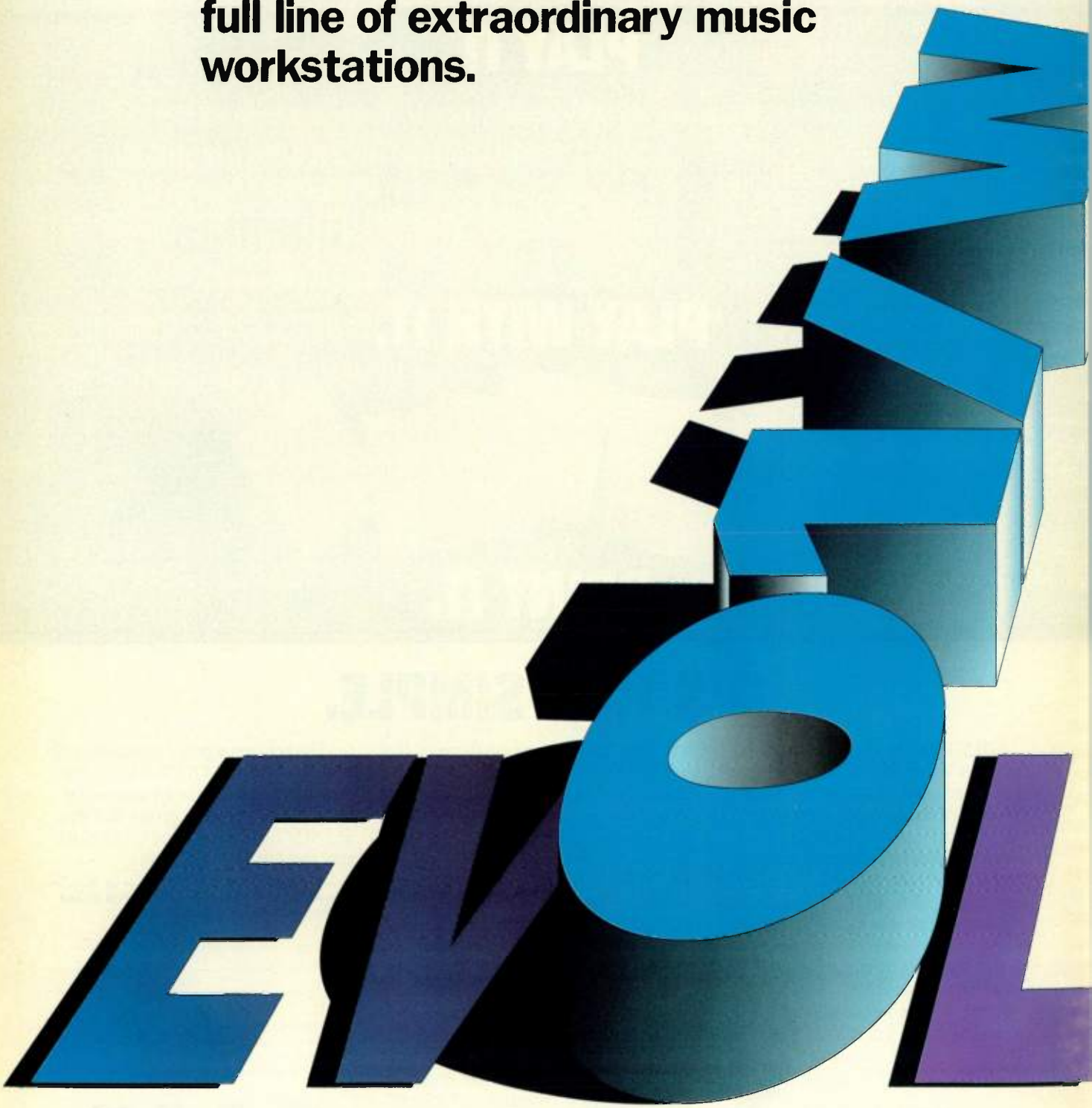

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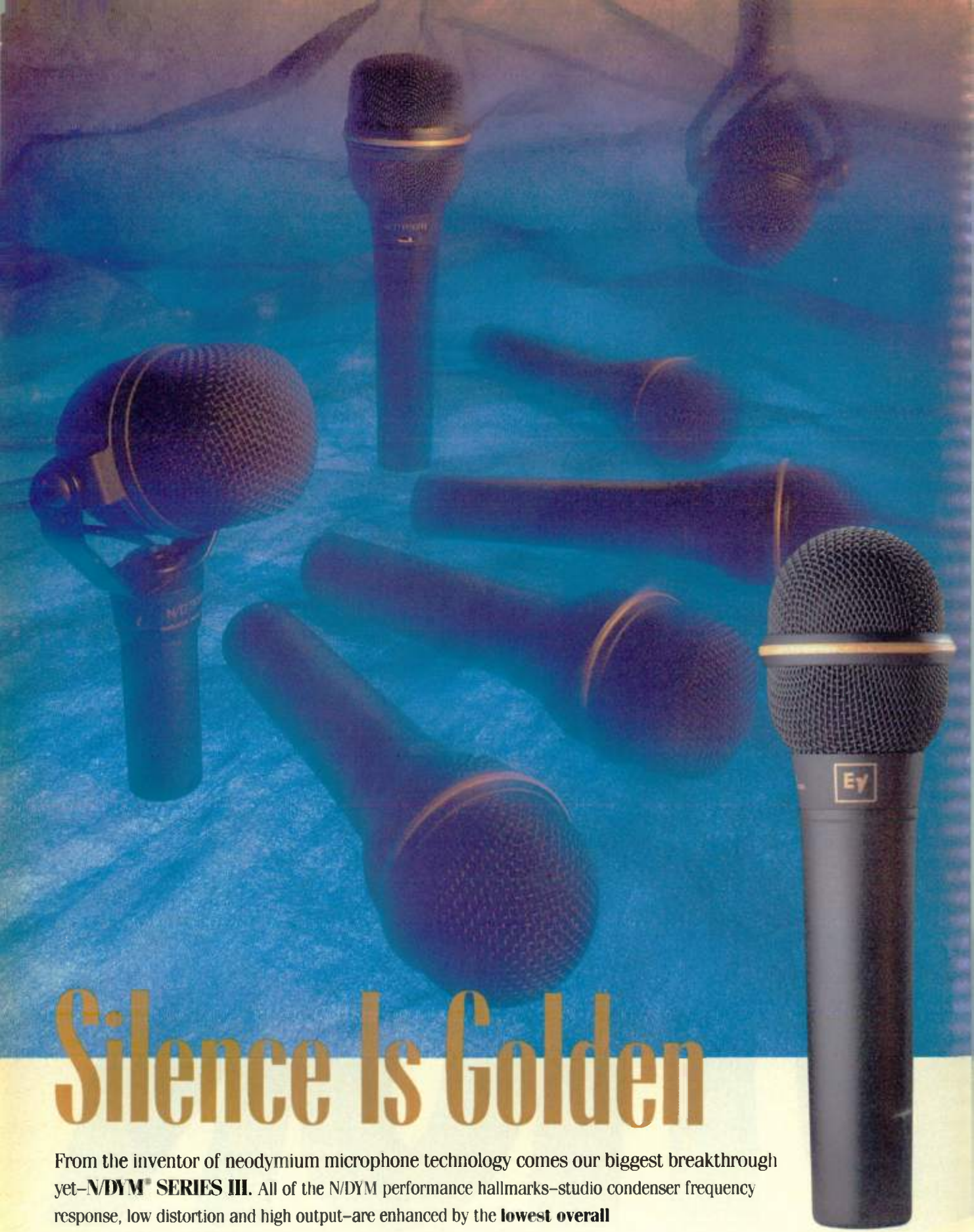

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LETTERS

FLAT BOXES

In EM's March 1992 "Music Boxes" article, you fail to do a fair evaluation of the different platforms for computer music. Certainly your article emphasizes commercially available music software and general MIDI support for each of the main computer platforms. If we stop there, then your article is somewhat accurate in your bias toward the chosen ones. But since you have gone all the way to include topics such as multimedia, hard-disk recording, and CD-ROM support, your article falls flat on its face.

I'm amazed that having done articles on the NeXT workstation in past issues didn't lead you to examine that option more carefully for today and tomorrow's promising path.

Otto Gygax
Blodgett, OR

Otto—Though I would agree that the NeXT computer offers impressive raw computing power and is an excellent platform for those individuals interested in writing their own software, I don't believe it currently represents a viable option for musicians interested in plug-and-play systems. Several major music software developers originally planned to support the NeXT, but all of them dropped their original plans. I have heard of several interesting programs being developed for the NeXT. However, until they actually appear, I believe most readers would be better off with a mainstream computer.—BO'D.

I read "Music Boxes" and was taken back by the description of Silicon Graphics IRIS Indigo. I'd like the company's address so I can find out where to purchase one of their computers.

Thomas Tremblay
Willimatic, CT

Thomas—The IRIS Indigo is indeed impressive. You can contact Silicon Graphics at 2011 Shoreline Blvd., Mountain View, CA 94039-7311; tel. (415) 960-1980. In addition, our October 1991 "What's New" column features the Indigo in a sidebar on new computers—Anne-Marie P.

TEACHER KNOWS BEST

In the "Virtuoso Sequencist" (March 1992), Vince Clarke points out a very important issue regarding the limitations of MIDI: the timing problems that arise due to the nature of a serial communications protocol. There is, however, an error in the timings as given. It takes .320 ms to transmit a single byte of MIDI data. Clarke seems to have overlooked the start and stop bits required to transmit a single byte. As such, a single Note On message takes .960 ms. A 3-note chord takes 2.88 ms (2.24 ms with running status). A 32-note chord takes 30.72 ms (19.52 ms with running status).

This in no way takes away from the value of Vince Clarke's observation. In fact, it helps to make his point even stronger. We appreciate the high level of discussion of MIDI and electronic technology in EM.

Martin Sweidel
Director of Electronic Music
Southern Methodist University
Dallas, TX

THE MIDI TRAP

I am in complete agreement with Paul Lehrman when he warns of laziness in the music-making process ("The MIDI Trap," February 1992). Nothing is more boring than a perfectly quantized piece of music. Wendy Carlos has been warning us of this for years. It is the slight imperfections of human performance that make perfection of the whole.

The following idiom needs to be added to *The Electronic Musician's Book of Universal Truths*: Music played perfectly right sounds perfectly wrong.

David Pike
Washington, DC

I agree with Paul Lehrman about the delicate phrasing possible with legato/single trigger mode. Players are not necessarily to blame: Ninety percent of manufacturers haven't bothered to spend a little extra time to implement MIDI Mode 4 (Mono Mode) on their sampler/sample playback units. Akai and Yamaha manufacture wind controllers but don't support legato on their units. Other companies simply ignore this issue.

MIDI manufacturers, we'd like you to couple legato mode with expressive, resonant filters. Then we can squeeze more expression out of your gear.

Bob Durham
Tokyo, Japan

I am responding to Paul D. Lehrman's article. I am somewhat of a beginner to electronic music, but I know enough to say that the article was quite stupid. While I agree enormously with what Lehrman said about collaboration and lazy musicians refusing to experiment, I also feel his criticism could apply to any realm of music. Couldn't he criticize the uncreative laziness of the muted-fifth MTV bands and the boring, uncreative recent work of Eric Clapton and Genesis?

I also would like to address the completely ignorant attack of quantizing. I am so tired of listening to the moronic, Berklee College of Music, jazz-musician criticism of the quantize feature. Unquantized electronic music either sounds like new age music, or Edgard Varèse (whom I like very much). Sure, quantized MTV music sounds boring, but Top 40 music always has been dull. What attracted me to electronic music in the first place was its ability to be dehumanized. Quantizing is an art form. It is obvious you haven't heard such challenging, innovated [sic], and quantized artists like Front 242, Chris and Cosey, or Skinny Puppy.

I played sax for many years, and part of why I gave it up for synthesis was to escape the egotistical "musicians only" attitude that prevails among fellow musicians. Good music is good, and lousy music is lousy—quantized or not.

Justin Beck
Forestville, CA

SUSAN GROSS

Paul Lehrman responds: *If the purpose of all electronic music is to sound dehumanized, as you seem to think it should be, you might have a point. However, the issue is that electronic music tools are now being used to create all kinds of music, not just experimental stuff. If those tools are being misused, then whatever music they produce—whether it's new age, MTV, film music, post-industrial, or reworkings of classics—will be in danger of sounding inhuman. And that's lousy.*

I read with great interest your article "The MIDI Trap." Was the "respected independent film journal" mentioned in the article The Society of Composers and Lyricists Guild's *Score?*

Ron Grant
Los Angeles, CA

Ron—Actually, the article in question was written by Michael Sahl for The Independent*'s May 1991 issue. For information on this magazine, write: The Association of Independent Video and Film Makers, 625 Broadway, 9th Floor, NY, NY 10012—Anne-Marie P.*

ALESIS ADDENDUM

I enjoyed your review on the Alesis D-4 (February 1992). However, you fail to mention a couple of things.

First, you state how interesting it would have been to combine a timpani with pitch bend, had such a sample been included. I gather you are referring to the sound a timpani makes when struck and then tuned up or down. Unfortunately, the pitch bend on the D-4 does not work that way. You must first set it, then strike a note. The pitch will not bend during the playback. This is an important fact that readers should have been aware of.

Second, it should be known that a large number of the sounds, such as the dual crash cymbal you mention and sounds that change with velocity, are merely individual samples that are layered. I see nothing wrong with this, as these sounds are good. But it does mean a fair number of them bear striking resemblance to one another. Also included in the 500+ sounds are identical samples with different tunings. This was necessary to compensate for the limited user tuning ability found in the D-4 and SR-16, another fact that you forget to mention. The implementation of pitch bend doesn't really solve this problem, because you can't selectively bend individual notes. You must bend the entire kit up or down. In spite of these criticisms, your overall rating of "5" was still pretty accurate. At $395, this is a great machine.

Chris Stevens
Eugene, OR

LIBERATED

Thank you for Laurie Spiegel's editorial "Music: Who Makes It? Who Just Takes It?" ("Back Page," January 1992). In the spirit of that article, I would like to introduce an approach that I hope will liberate more "non-musicians" to create, including myself.

First, I am one of those "grassroots" people who loves music and would love to play it but, due to whatever reasons,

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never seriously studied it. Further, my musical impulse was frustrated early by cerebral palsy, which fortunately only mildly affects my right side but is enough to limit finger dexterity and make most musical instruments intimidating. It also led adults to discourage me from music when I was a child. But my love of music continued, and computer controlled synthesizers have renewed my interest in making music as an active art.

For me, the ultimate promise of computer control lies not in the sequencers and the compositional approach to music (still great for editing and enhancing), but in using the power of the computer for real-time playing. Eliminate traditional interfaces like keyboards and strings and play the synth directly through the computer. But how? The approach I am developing uses a combination of voice and touch screen.

I'll use the MIDIVOX, by SynchroVoice, to voice-feed a MIDI stream into a high-speed PC, and the touch screen (made by Elographics) to manipulate and send, in real time, modified MIDI information (such as chords, key- and scale-corrected notes, pitch shifts, and presets) to a Peavey SP. This concept will make it relatively easy for professional musicians, in addition to people with minor dexterity problems or no formal music training, to play expressive music through the Peavey or any other MIDI instrument. It also will be a good learn-as-you-play training tool because of the immediate audio feedback to vocalizations and touches.

By the time you read this, I'll have met with a C/assembly language programmer who will help me with the project. There is also something perhaps you could help on. The programmer I found is fluent in C but has no MIDI experience and a weak music background. Could you recommend some MIDI programming books or articles that might reduce the learning curve?

John Freeman
Merrimack, NH

John—I have good news and bad news. Jim Conger wrote two PC-programming books, C Programming for MIDI *and* MIDI Sequencing in C. *Unfortunately, the former—an excellent book—is out of print, but you might find it in a library. (While at the library, look for another discontinued book,* MIDI Programmer's Handbook, *by Steve DeFuria and Joe Scacciaferro.) Conger's sequencing book and several other useful books on the MIDI spec and System Exclusive are available from Mix Bookshelf; tel. (800) 233-9604 or (510) 653-3307. There is a slim chance Mix Bookshelf has a copy left of the first book, but don't depend on it. Jim Conger also wrote a series of PC C-programming articles for our September, October, and November 1989 issues. Again, back issues can be ordered from Mix Bookshelf.—Steve O.*

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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1992 Winter NAMM Report, Part 2

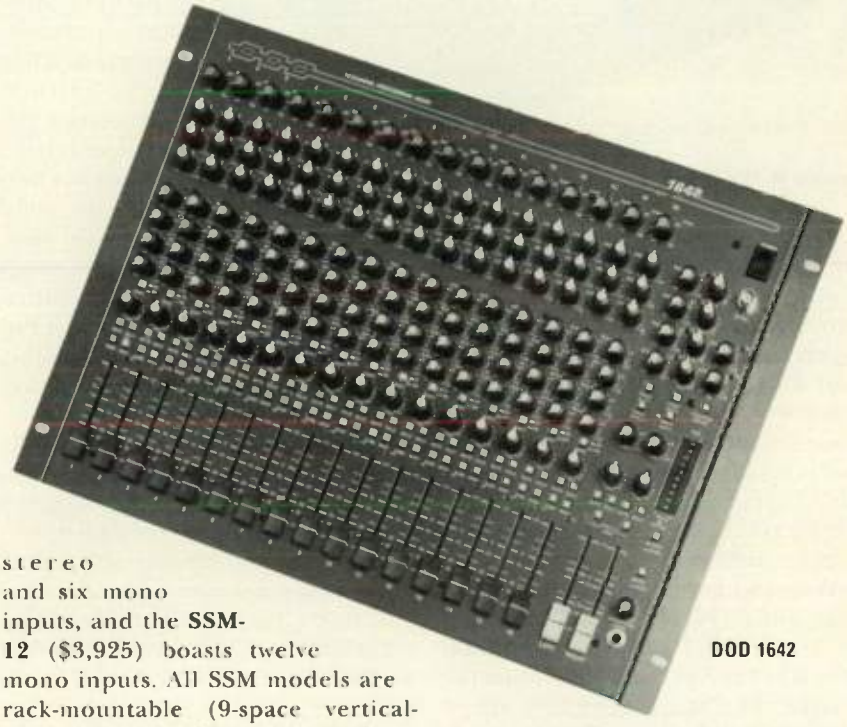
In our continuing coverage, we marvel at miniscule mixers and miscellaneous MIDI devices, browse among the beatboxes, and pore over effects processors.

By the EM Staff

COMPACT MIXERS

Evidence suggests that the multifaceted, inexpensive mixers pioneered by Alesis and Mackie Designs have revitalized the home recording/live performance console market. Small wonder the 1992 NAMM show played host to countless manufacturers hawking versatile, moderately priced mini-mixers. Ah well, build a better mousetrap...

DOD Electronics (tel. [801] 268-8400) released their 8-input **822** ($429) and 12-input **1222** ($599) series of compact mixers in rack-mount and tabletop configurations. The mixers feature color-coded knobs, 60 mm faders, a 15 dB cut/boost for high and low EQ (midrange EQ is a 12 dB cut/boost), two effects sends per channel, and switchable phantom power. Also unveiled was the 16-input **1642** mixer ($1,099). The 1642 features the same EQ as the 822/1222 series and maintains the identical knob color-code. The 1642 can be configured as 16 × 4 or 16 × 2 × 2 and offers six aux sends, inserts on all channels, a PFL/Solo switch, channel muting, and a front-panel headphone output and level control.



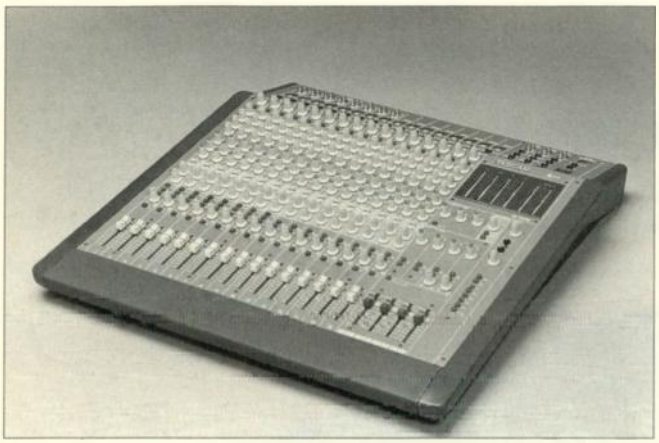
DOD 1642

ART (tel. [716] 436-2720) moved into the mixer arena with their 16-channel **Phantom 1608**, 24-channel **Phantom 2408**, and 32-channel **Phantom 3208** (prices tba). All models offer 3-band EQ with sweepable parametric midrange, full channel soloing and muting, inserts on all channels, phantom power, eight dedicated line returns, four subgroups, and eight aux sends. The 1608 and 2408 are rack-mountable.

Expandability is the hallmark of Speck Electronics' (tel. [619] 723-4281) **SSM** dedicated synth/sampler mixer systems. The "nerve center" is available in three models: The **SSM-24** ($4,975) offers twelve stereo inputs, the **SSM-18** ($4,450) combines six stereo and six mono inputs, and the **SSM-12** ($3,925) boasts twelve mono inputs. All SSM models are rack-mountable (9-space vertical-mount; 4-space with custom horizontal slide-mount). Speck claims frequency response of 12 Hz to 160 kHz (-3 dB). The mixers include 60 mm faders, stereo solo-in-place, eight effects sends, two bands of sweepable parametric EQ, mutable effects returns, and a built-in talkback mic. The SSM series includes three expander modules with features identical to the main mixer. The **SSMEX-32** ($4,195) offers sixteen stereo inputs, the **SSMEX-24** ($3,490) combines eight stereo and eight mono inputs, and the **SSMEX-16** ($3,000) provides sixteen mono inputs. In addition, Speck unveiled the **XTRAMIX** compact synth/sampler mixer ($3,295), which packs 40 synth inputs, eight assignable subgroups per channel, eight effects sends per channel, eight stereo effects returns, and an 8 × 2 monitor mix into a 4U rack chassis. Also, a 2U, 32-input rack expander ($2,190) will be available soon.

Tascam (tel. [213] 726-0303) introduced two compact mixers, the rack-mountable **M-1508** ($1,149) and the tabletop **M-1516** ($1,849). The M-1500 series consoles feature 3-band EQ with sweepable midrange, four aux sends, assignable direct outputs on channels 1 through 8, and four subgroups. Both models employ a dual-bus system that allows signal-routing via the main fader and a separate stereo path. In addition, Tascam added to the line a 4-bus recording mixer, the **M-108** ($799). The M-108 features twelve input channels (eight mono/two stereo), eight tape returns, two effects buses, and 2-band EQ. Tascam also debuted two 16-channel, rack-mountable keyboard mixers. The **MM-100** ($599) offers eight stereo inputs on linear faders, four effects sends, and high and low EQ. The **MM-200** ($799) adds switchable stereo/mono effects sends, BBE sonic-enhancement circuitry for improved high-frequency definition, and a MIDI patching system.

Targeting the home recordist, Vestax (tel. [707] 427-1920) introduced



Tascam M-1516 Mixer

their **RMC** series of rack-mountable mixers. The **RMC-88** ($899) features eight input channels with selectable direct outputs, 3-band EQ, three aux sends (one pre-fader, two post-fader), and PFL. The **RMC-108** (price tba) offers ten input channels, 100 mm Alps faders, four aux sends (two pre-fader, two post-fader), 3-band EQ with sweepable midrange, and a separate 2-band EQ for tweaking either the master outputs or aux returns.

You can't get much more compact than a single rackspace, and Rolls Corporation's (tel. [801] 562-5628) **RM81 Mix Max** fits eight channels into a 1U chassis. The Mix Max ($300) offers eight XLR and 1/4-inch inputs, tone (20 dB treble or bass boost; 450 Hz center) and volume knobs for each channel, and 12 VDC phantom power.

DRUM MACHINES

Although drum machines didn't make a big splash at the show, those that were introduced followed the trend toward lower cost. This is good news for anyone who hasn't got the room (or amenable neighbors) for a live drummer.

No stranger to drum machines, Roland (tel. [213] 685-5141) introduced several new units. The Boss **DR-550MkII** ($325) is nearly identical to the original DR-550, with the addition of almost twice as many sounds, including jazz brushes and sound effects. Boss also unveiled the **DR-660** ($499), with 255 sounds, 1,024 sound locations, 14-note polyphony, comprehensive sound-editing, built-in effects, and sixteen velocity-sensitive pads with aftertouch. Velocity switching, mixing, and layering provide over 65,000 different sound combinations. Also from Roland, the **R-70 Human Rhythm Composer** ($799) features 210 internal sounds, 32 copy locations, digital effects, 14-note polyphony, 5-part multitimbral operation, comprehensive sound-editing, and sixteen velocity-sensitive pads with aftertouch. In addition, the Rhythm Expert System automatically creates patterns and songs for those who are unfamiliar with drum programming. A unique Positional Pad changes parameters such as volume, pitch, panning, decay, and nuance, depending on where it is struck.

Across the hall, Yamaha (tel. [714] 522-9011) announced the **RY10** drum machine ($299). With 250 sampled sounds (including some bass sounds), twelve pads, and 28-note polyphony, this unit was designed to be easy to use and has a large LCD display. Also included is an audio input, internal amplifier/speaker system, and guitar tuner.

MIDI INSTRUMENT CONTROLLERS

New MIDI instrument controllers weren't a big rage this year. The few offerings ranged from keyboards to unique guitar-like items. A new MIDI accordion made the scene, but the once-promising VideoHarp (discussed in July 1990) didn't.

Akai Professional (tel. [817] 336-5114) displayed the **MX1000 MIDI Master Keyboard** ($2,299), a 76-key, weighted, velocity and channel aftertouch-sensitive, MIDI keyboard controller. The keyboard can be split into as many as four zones, and its data can be routed to four independent MIDI outputs. The MX1000 also features eight preset and eight user Velocity curves, pitch and mod wheels that can be disabled separately for each zone, four programmable sliders, four programmable front-panel switches, four assignable footswitch inputs (which can operate in latched or unlatched mode), and four assignable CV-pedal inputs. The data from its MIDI Input can be merged with MIDI data from any zone. A large, backlit LCD displays the editing parameters. Akai also showed the **PM76 Piano Module** ($999), an add-in board for the MX1000. The PM76 contains ten 16-bit, PCM sounds (sampled at 44.1 kHz), including grand, upright, and electric pianos; vibraphone; cembalo; electric organ; and pipe organ.

The Baldoni **MIDI Accord** ($2,495; tel. [414] 276-4969) is a MIDI accordion controller that sends on up to nine MIDI channels at once. The keyboard supports three polyphonic MIDI channels and one monophonic channel (top-note priority); the chord buttons play two polyphonic channels and can be programmed for standard accordion triads or bass lines; the bass section, which rotates on a hinged universal joint, plays one polyphonic channel; and Devices 1 and 2 send Program Change commands. The keyboard is velocity-sensitive and has a sensitivity-control potentiometer. Channel controls include MIDI Volume and three octave-transposition settings for keyboard, chords, and bass. Global controls include master volume and transposition (±12 semitones), and program changes can be sequenced and stepped through with a footswitch. The settings

Boss DR-660 Drum Machine

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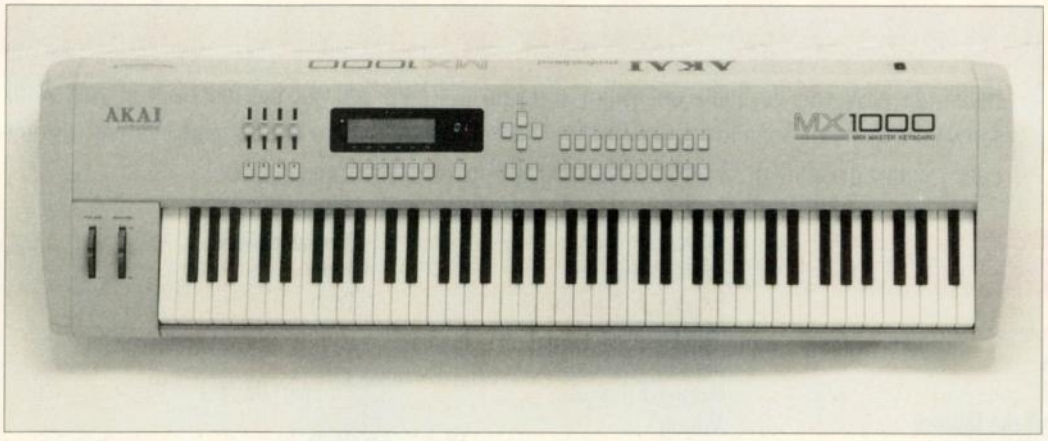
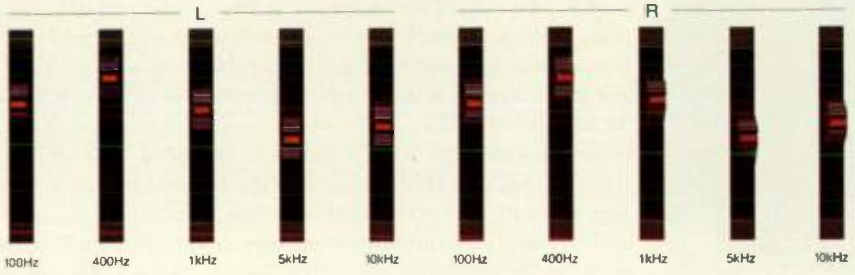
can be saved in 256 user program locations, and 128 presets are included. The 39-inch-long, 8-pound MIDI Accord is strictly a MIDI controller and has no tone generator.

Starr Switch Company (tel. [800] 428-8884 or [619] 233-6715) showed two innovative MIDI fingerboard controllers. The **Datapump 620** ($1,695) has a guitar-like body and tapered, fretted neck, but instead of strings, the neck has six rows of twenty keys. The fingerboard operates in any of four modes that allow you to play single or multiple notes per string and make use of six trigger bars at the base of the neck to trigger open-string and hammer-on effects. Depending on the mode, the trigger bars send Polyphonic Aftertouch, or trigger selected MIDI Note messages on MIDI channel 10 for use with drum machines. The Datapump also has a bank of six large pressure pads that produce a variety of messages, including Pitch Bend, Increment/ Decrement, Mod Wheel, Stereo Pan, Sustain, and Channel Aftertouch messages. A rack-mount box houses the power supply and four filtered AC outlets.



Akai MX1000 MIDI Master Keyboard

Starr Switch also showed the **Magnatar 1223** ($2,495), which offers twelve rows (called "strings") of 23 keys in a tabletop case, designed for two-handed playing. Spanning six octaves and a fourth (from low C), its 276 notes are color-coded in black and white, just like a piano keyboard, with the rows programmed a perfect fourth apart. The Magnatar includes a 2-line by 40-character LCD display, data-entry keys, a data-slider, four programmable pres-



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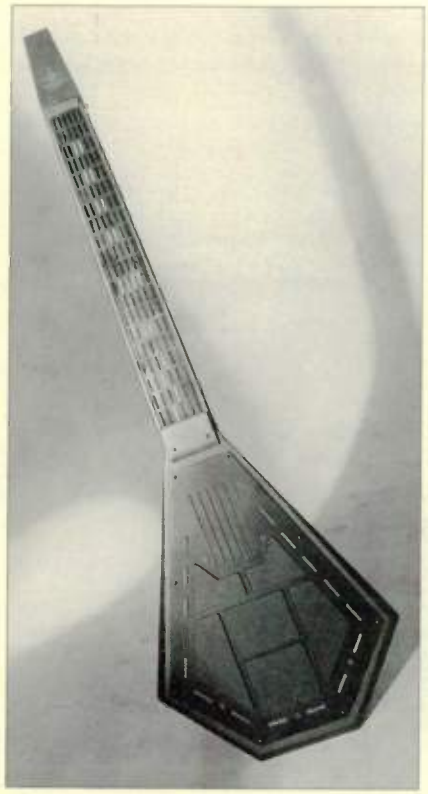


Starr Datapump 620

sure pads, and footswitch jacks.

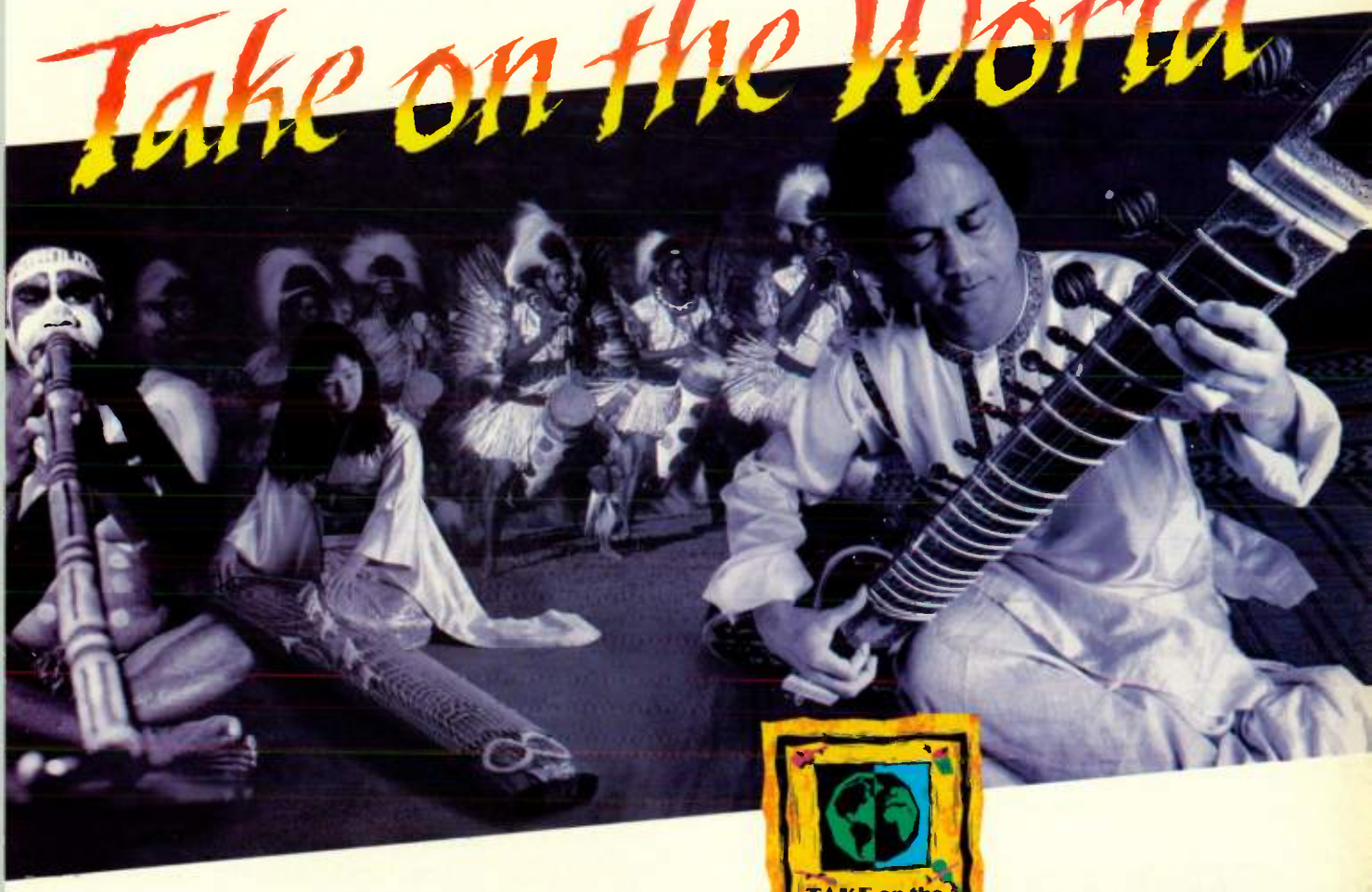
EFFECTS PROCESSORS

We sensed no major new directions, but digital effects processors continue to become cheaper and more flexible. Single-rackspace devices seemed to dominate this year, but sometimes interesting things came in even smaller packages.

Peavey (tel. [601] 483-5365) released the 1U rack-mount **Pro-Fex II preamp/effects processor** (est. $549), which incorporates all 128 effects from Peavey's Pro-Fex. Up to eight effects may be used simultaneously, in any order, and combined in series or parallel. New features include an effects loop that can be placed anywhere in the effects path; a noise gate that can be moved anywhere in the chain; and a stereo simulator with lowpass filter for processing mono inputs. The **Bass-Fex preamp/effects processor** (est. $549) offers eight simultaneous effects that can be placed in any order. It has 22 effects algorithms which include compression, two types of distortion, chorus, delay, pitch shifting, reverb, five simultaneous types of EQ, exciters, noise gate, speaker, simulator, and more. A Chain Splitter/Biamp parameter lets you split an effects chain at any point and assign effects to either chain. RAM cartridges provide 128 new presets and a third program bank. An optional, 14-button MIDI foot controller is available for both the Pro-Fex II and Bass-Fex.

T.C. Electronic (tel. [805] 373-1828) displayed the **M5000 Digital Audio Mainframe** ($3,734 for 2-channel analog I/O and one DSP engine; digital I/O option $258), a true stereo, modular, digital signal processor. Programs include reverb, ambience, pitch shifting, chorusing, and flanging. The M5000 provides AES/EBU (sample rates of 32, 44.1, and 48 kHz), S/PDIF, and optical digital I/O; a RAM card slot; serial remote port; MIDI In, Out, and Thru; and SMPTE time code input. Options include SCSI, LAN, and a 1.44 MB floppy disk drive. Additional expansion slots permit the M5000 to be customized with additional mod-

Take on the World



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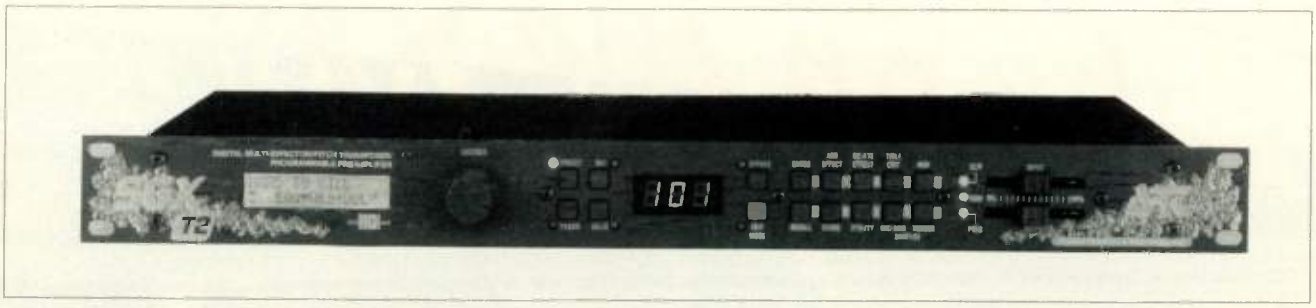
*The World of Music Arts and Dance was founded in 1981 with the help and inspiration of Peter Gabriel. WOMAD sponsors wordwide festivals, performance events, music recordings and educational projects.

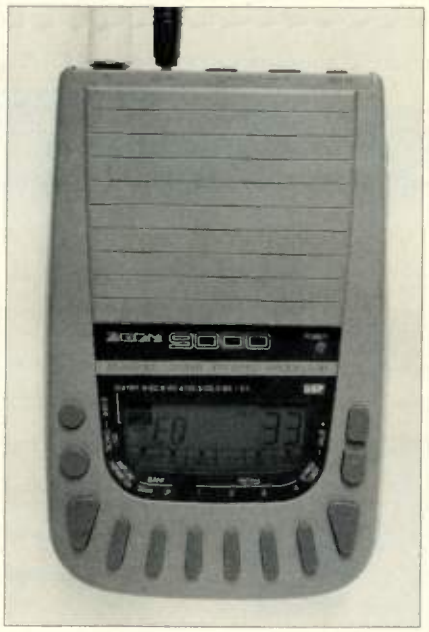


ART SGX-T2 Multi-effects Processor

ules. The standard configuration of one stereo A/D-D/A module (18-bit, 64-times oversampling in, 20-bit out) and one DSP module leaves two empty slots; adding another pair of converter and DSP modules gives 4-channel operation. Additional sets of modules can be added for about half the price of the main unit, with a maximum configuration of eight channels. Powered by a Motorola 56001 DSP chip and T.C. Electronic's proprietary Digital Audio Reverb Coprocessor (DARC) chip set, the M5000 should provide serious processing-power overkill.

The ART **SGX-T2** ($629; tel. [716] 436-2720) is a single-rackspace multi-effects processor with twelve simultaneous effects, including a compressor/limiter, noise gate/expander, envelope filter, distortion, delay, sampler, pitch-shifter, panner, chorus, flange, a MIDI data monitor, and reverb. Based on the SGX-2000, the T2 features a solid-state preamp and adds new reverb and chorus algorithms, a digital guitar tuner with reference oscillator, over two octaves of multi-interval pitch-shifting, programmable mixing and levels, triggered sampling, a new distortion section, a "space phaser" that re-creates classic phase-shifter effects, and eight additional real-time controllers. Up to eight parameters can be mapped to up to eight MIDI controllers. The company also displayed the **SGX LT** ($379), another SGX-2000 offshoot. The LT offers a programmable preamp with switchable clean and distortion channels, an effects processor with up to four simultaneous effects, a long list of effects algorithms, and 200 presets. Finally, the **DR-X 2100** ($619) offers the same effects and features of the SGX-T2 with the exception the speaker simulator and distortion. It has a digital crossover and a tuner with reference oscillator. Processing algorithms include an exciter, reverb, EQ, flange, expander, noise gate, and compressor.

Zoom Corp. (tel. [415] 873-5885) followed up its popular, clip-on 9002 processor with the wedge-shaped **9000 Guitar Processor** ($399), a palm-sized multi-effects box with a dozen programming buttons in a crescent pattern around its display. Like its predecessor, the new unit has a programmable



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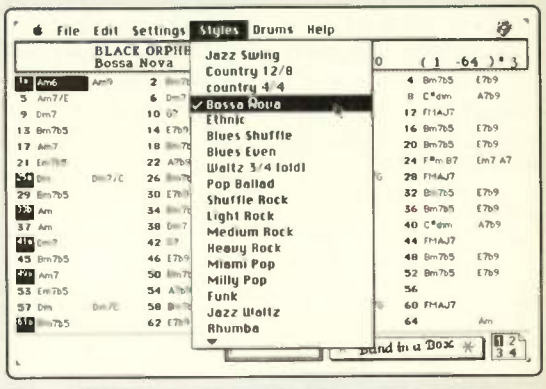

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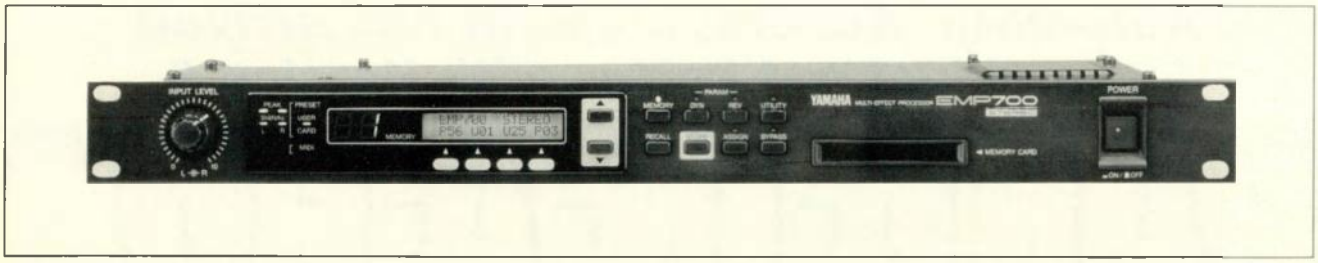


Yamaha EMP700 Digital Multi-Effects Processor

analog preamp stage and 16-bit digital processing. The 9000 provides 21 editable effects, five of which can be used simultaneously, including analog compression, distortion, and overdrive; and digital tremolo, amp simulation, pitch shifting, phase shifting, chorusing, flanging, delay, and stereo reverb. Twenty user memory locations complement twenty guitar-oriented factory presets. Mix inputs, a headphone jack, a built-in chromatic tuner, and the FC01 Remote Foot Controller (included) that switches patches, banks, and a bypass control, complete the package.

Rolls Corporation (tel. [801] 562-5628) presented the **Rotorhorn** ($200), a 1U rack-mount processor that simulates a rotating horn effect. Features include simulation of the Leslie fast, slow, and brake effects; front panel and momentary-footswitch control of all functions; MIDI control of speeds and bypass; chorus and vibrato modes; 180 degrees of phase shift; 6 ms delay time; and dual, 1/4-inch phone-jack inputs and outputs.

Yamaha (tel. [714] 522-9011) announced the **EMP700 multi-effects processor** ($550), a single-rackspace, true stereo processor with 28 effects types, including compressor/limiter, EQ, reverb, delay, enhancer, distortion, panner, rotary speaker, pitch shifter, wah, phaser, and various modulation effects. Separate processors are used for the compressor/EQ and reverb/delay/modulation effects groups, so programs from different groups can be used simultaneously in serial, reverse serial, or parallel. The device has 50 user memory locations, expandable with optional RAM cards. Other features include MIDI Program Change and continuous control over most parameters and switchable input and output levels.

MISCELLANEOUS MIDI

Rolls Corporation also showed the **MP1288 MIDI Wizard** ($200), a floor box that converts eight analog switch and pedal inputs to eight channels of MIDI Continuous Controller messages. The unit's controller jacks accept 0 to 5V inputs or potentiometers, and the voltages can be converted to any Continuous Controller number on any MIDI channel. A merging MIDI In is provided, and the device can be phantom powered. The MIDI Wizard also maps and sends MIDI Program Change messages.

Corrigan Marketing (tel. [615] 459-2960) is distributing the **MIDITEMP MT-16Xpandable** ($1,499), a combination Standard MIDI File recorder/player and 16 × 16 MIDI patch bay/processor with remote controller. The sequencing section records and plays Standard MIDI Files using an optional SCSI port or the onboard 3.5-inch Atari ST- and IBM PC-compatible, HD floppy-disk drive. The number of MIDI Files is limited by memory, which can be expanded to 16 MB via an optional memory-expansion card. The patch bay/processor offers complete matrix merging and patching between all inputs and outputs. The unit offers 256 user programs, which can be recalled via MIDI, the remote-control box, or a footswitch. Processing functions include eight split zones per input, data filtering for each input, output, and MIDI channel; transposition (up to ±64 semitones); velocity switching, limit-

ing, and offset; and channelizing. Presets also send MIDI Program Change, Volume, Clock, SysEx Request; Omni/Poly/Mono mode change; and Local On/Off messages. An All Notes Off ("panic") button also is provided. Additional options include SMPTE support and FORNET (Fiber-Optic Real-time NETwork) support for the PC, Atari ST, and Macintosh.

MIDITEMP also showed the **MP-44** ($1,099), which combines the MIDI File functions of the MT-16Xpandable with a 4 × 4 patch bay/processor; the **MP-88** ($1,440), which has the MIDI File box and an 8 × 8 patch bay/processor; as well as the **PMM-88E** ($799), which just has the 8 × 8 patch bay/processor.

Yamaha (tel. [714] 522-9011) introduced the **MDF2 MIDI Data Filer** ($449), which can store MIDI data from any device with SysEx bulk dump capability. The unit also can record MIDI data in real time, making it serve as a non-editable hardware sequencer. The portable, battery-powered device (an AC adapter is available) stores the data on 3.5-inch floppy disks, each of which holds up to 99 sequence files. Playback tempo is variable between 30 and 250 bpm.

The Time Designs **MIDINOME** ($349; tel. [408] 258-1460) is a programmable metronome that displays MIDI Clock beats using front-panel LEDs. The tabletop device displays tempos and time signatures and can use an external MIDI clock or its internal clock.

Q-Logic's **MIDI-Metro** ($399; U.S. distributor Euro-Stuff; tel. [800] 726-6491 or [310] 542-6490) is a 1U rackmount digital metronome that reads MIDI Clock, or operates from its internal clock, and flashes the beat on a 3-color LED display. The display is designed such that the lights flash in a swinging, pendulum-style pattern, which simulates the movement of a conductor's baton. A 4-character LED display indicates tempo and time signature.

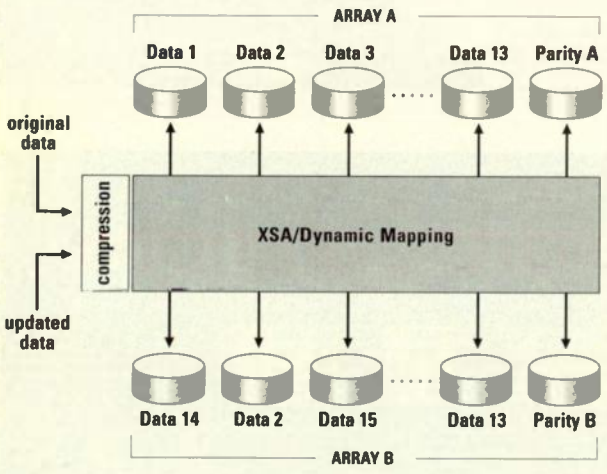
Anatek (tel. [604] 980-6850) added the **Wind Machine breath control interface** ($99) to its Pocket Product line. The Wind Machine makes a breath controller (not included) generate Aftertouch, Modulation, Volume, Pitch Bend, Breath Control, Expression, Foot Controller, and Pan messages on any MIDI channel. ●

Multiplying Memory With Disk Arrays

When one drive can't do the job and even ten drives aren't enough, disk arrays bring the data home.

By Gary Hall

As a high-tech musician, you probably are aware of the amazing explosion in hard-disk storage capacity. Just a few years ago, anyone who had a hard disk with a capacity of 10 megabytes was a high-flyer. Now you can't even find a disk that small: Most folks consider it challenging to get along on less than 40 MB, and it seems that my friends all have at least a couple of hundred megabytes around.



Storage Technology uses advanced control and data-processing techniques in their large-capacity Iceberg disk array.

But it's a rule of technology development that demands always expand to fill any available memory. Hard-disk recording systems routinely use disk capacities in excess of 1 gigabyte (1,024 MB), but I recently entertained a request for "enough disk capacity to keep our entire collection of 37,000 compact discs online at the same time." For those of you with itchy calculators, the arithmetic is as follows:

50 minutes/CD (average) × 60 seconds/minute × 44,100 samples/second × 2 audio channels × 2 8-bit bytes/16-bit sample-word × 37,000 = 18,236 GB.

At a (quantity) price of $2,500 for a 1.6 GB drive, my prospective client had to trim his plans back a bit.

But what do you do if you just *have* to have the big capacities, and money is not an issue? If you can't get the storage you want in a single disk drive, the obvious solution is to string together a lot of disk drives. SCSI (Small Computer Systems Interface) is designed for multiple drives, but its maximum capacity is eight drives on a SCSI chain, which gives between 10 and 15 gigabytes maximum with commonly available drives. Theoretically, you could have a bunch of separate SCSI chains, but few computers today are equipped with multiple SCSI controllers. Even if you had the hardware, the software involved in managing many separate data storage devices is staggering. Considering these many factors, what's the solution?

For those in the know (and with the bucks to roll the big dice), today's buzzword in data storage is *disk array*. A disk array is exactly what it sounds like: a collection of individual hard disks tied together with a dedicated high-performance computer that does nothing but manage data transfers and addressing. To the main computer, the disk array looks like one gigantic disk drive.

Storage Technology Corporation of Louisville, Colorado, has been a leader in large-capacity disk technology for a long time, and they are at the head of the pack when it comes to disk arrays. Their Iceberg disk array, scheduled to begin shipping this summer, is eagerly awaited by the memory-capacity-is-all crowd as the very last word so far in storage technology. In its minimum configuration, the Iceberg uses 32 Hewlett-Packard drives with a capacity of 1.2 gigabytes apiece to deliver 100 GB of total storage. "Wait a minute," you say, "32 times 1.6 GB is only 39 GB. How do you get 100 GB?"

Just to show that too much is never enough, the Iceberg uses data compression to nearly triple the storage

continued on p. 31

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(continued from p. 28)

capacity of its array. To ensure that nothing is lost in the translation of uncompressed to compressed data (see "The Technology Page: Data Compression and the New Audio Media," in the September 1991 **EM**), the Iceberg's controlling computer first compresses the data and immediately decompresses it. It then compares the decompressed data with the original to make sure they match. Compressed data is stored onto the disk only if original and decompressed data match to the last bit.

Besides data compression, the Iceberg uses a host of fancy data-manipulation techniques to get the ultimate in performance and reliability. A technique called *dynamic mapping* is used to squeeze unequal-sized chunks of compressed data into the equal-size blocks that computer operating systems expect to see on a disk drive. Multiple data paths break the bytes of data up so that each drive only stores a piece of the digital word. These are reassembled as they stream from the separate drive, multiplying disk transfer rates.

What if one of the drives should fail? Anyone who has had a head crash on a medium-sized drive would shudder at the potential for disaster involved in spreading your data out over more than 30 separate drives. But not to worry: The Iceberg features total redundancy such that if any one drive fails, the array can completely reconstruct the lost data. To that you can add total hardware redundancy, with duplicate power supplies, controller boards, and so on. This is one *serious* storage device.

As you might expect, this kind of technology comes at a high price. The basic Iceberg array, with 100 GB online, rings in at a cool $1.3 million. The top-of-the-line model sports 400 GB and goes for nearly $4 million. Even so, this ultra-tech monstrosity cannot satisfy the voracious demand for online storage. Yes, even the mighty Iceberg only has the capacity to hold about 1 ½ percent of the CDs my friend would like to keep online. I guess he'll just have to wait.

Contributing editor **Gary Hall** *works within a mile of San Quentin prison, a prominent address in prestigious Marin County, California.*

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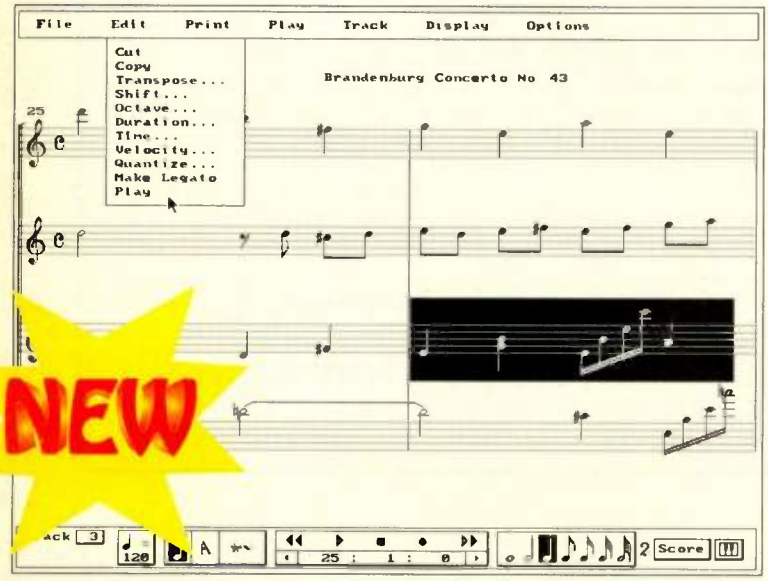

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Programming the Yamaha TX81Z

Don't let your TX81Z gather dust in the corner.

BY PETER FREEMAN

The TX81Z was Yamaha's second foray into the low-cost sound-module market (the first was the FB-01). Based on their now-famous FM synthesis, the 81Z offers plenty of sonic potential. Unfortunately, the unwieldy user interface can be frustrating to work with, making programming a tedious task, especially for those without the advantage of computer-based editing software. This article encourages those of you with a TX81Z lying around your studio to power it up and create some sounds.

If you want to get the most out of this article, you should have a basic working knowledge of Yamaha FM programming. If you are not familiar with FM, see the sidebar

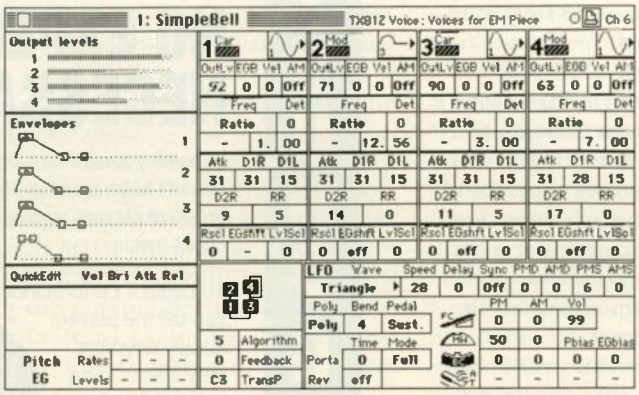


FIG. 1: This SimpleBell single Voice was created from scratch.

operator's output is fed back to itself at a high level). **Fig. 2** illustrates this Voice after the suggested modifications.

Try changing the frequency of operator 4 to 5.00. This transforms the high overtones into a meatier, midrange component of the overall timbre. Next, try shortening the Decay 1 Rate (D1R) of operator 4. Doing this shortens the attack portion of the sound, giving it a more staccato feel.

The only carrier in this algorithm (Alg. 4) is operator 1, which produces a sine wave. Because a sine wave is the simplest waveform (it contains no overtones whatsoever), it is a good choice for the fundamental component of a bass sound. Nevertheless, you might try different waveforms to hear their effect.

In this algorithm, operator 4 modulates operator 3, which in turn modulates operator 1. The structure of this algorithm results in a more complex sound than a single modulator/carrier pair produces. This is another key to the TX81Z's flexibility: The "stacked modulator" algorithms can be used to produce many different types of attacks and tones. It is well worth some experimentation.

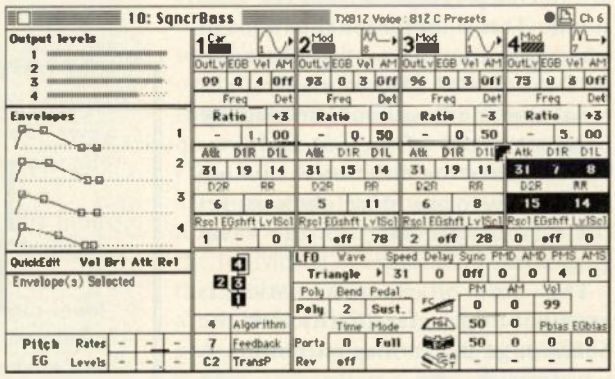


FIG. 2: The SqncrBass single Voice is a modified ROM preset.

PERFORMANCE POSSIBILITIES

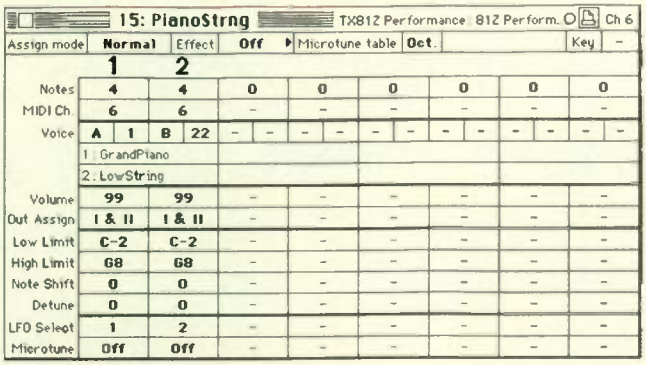
Taking the "operator-as-sound-component" approach a step further, it often can be rewarding to combine two or more Voices in a Performance to produce a larger composite sound. In this technique, all the Voices are set to the same MIDI channel. They can be layered or split across the keyboard using note limits.

A simple example of this technique is illustrated in **Fig. 3**, which represents a Performance called "PianoStrng." In the PianoStrng Performance, two 81Z preset Voices (A01 "GrandPiano" and B22 "LowString") are layered together to produce a pad-type piano/string combination. Only two Voices are used in this Performance, so up to four notes (assigned on the MAX NOTES page in Performance Edit mode) can sound simultaneously, which is enough for many situations.

Depending on the needs of a specific musical context, the attack and release times (or any other parameters) of the individual Voices can be altered to taste, by modifying the Voices separately in Voice Edit mode.

Once in the Performance Edit mode, the relative tunings and levels of each Voice can be altered using the NOTE SHIFT and VOL pages, respectively. Note that both Voices are set to receive on the same MIDI channel, so they sound simultaneously. Although both Voices are assigned to both audio outputs in **Fig. 3**, it may be useful to assign them to separate outputs (on the OUT ASSIGN page) in recording situations, if you want each Voice to be on its own track.

In addition to layering, you also can use different Voices in a Performance



15: PianoStrng	TX812 Performance	81Z Perform.	Ch 6

Assign mode	Normal	Effect	Off	Microtune table	Oct.	Key

	1	2						
Notes	4	4	0	0	0	0	0	0
MIDI Ch	6	6	-	-	-	-	-	-
Voice	A 1	B 22	- -	- -	- -	- -	- -	- -
	1: GrandPiano							
	2: LowString							
Volume	99	99	-	-	-	-	-	-
Out Assign	I & II	I & II	-	-	-	-	-	-
Low Limit	C-2	C-2	-	-	-	-	-	-
High Limit	G8	G8	-	-	-	-	-	-
Note Shift	0	0	-	-	-	-	-	-
Detune	0	0	-	-	-	-	-	-
LFO Select	1	2	-	-	-	-	-	-
Microtune	Off	Off	-	-	-	-	-	-

FIG. 3: This PianoStrng Performance combines two ROM preset Voices into a layered sound.

to provide different parts of a single overall sound. For example, create three or four single Voices that provide different components of a Bass sound: a short, staccato "click" for the attack, a pure bass tone with few high harmonics for the bottom end, and a midrange, clear tone for the body of the sound.

Another advantage of Performance mode is the ability to create chorused sounds by layering two slightly detuned copies of the same Voice. Start with a single Voice and copy it to a user memory location (anywhere in the "I" bank). Then set the Pitch Mod Sens (PMS) of the original Voice to 0; the PMS of the duplicate Voice should be set to about 5.

Once in Performance Edit mode, assign your original Voice and the duplicate to Voices 1 and 2 in the Performance. On the INST DETUNE page, detune one of the Voices a few steps above or below the other one. Set the MIDI channels for each Voice to the same channel, so that both Voices play together. When you play the TX81Z, you should hear a chorus effect. Engaging the modulation wheel produces a more pronounced chorusing, as one voice "beats" against the other.

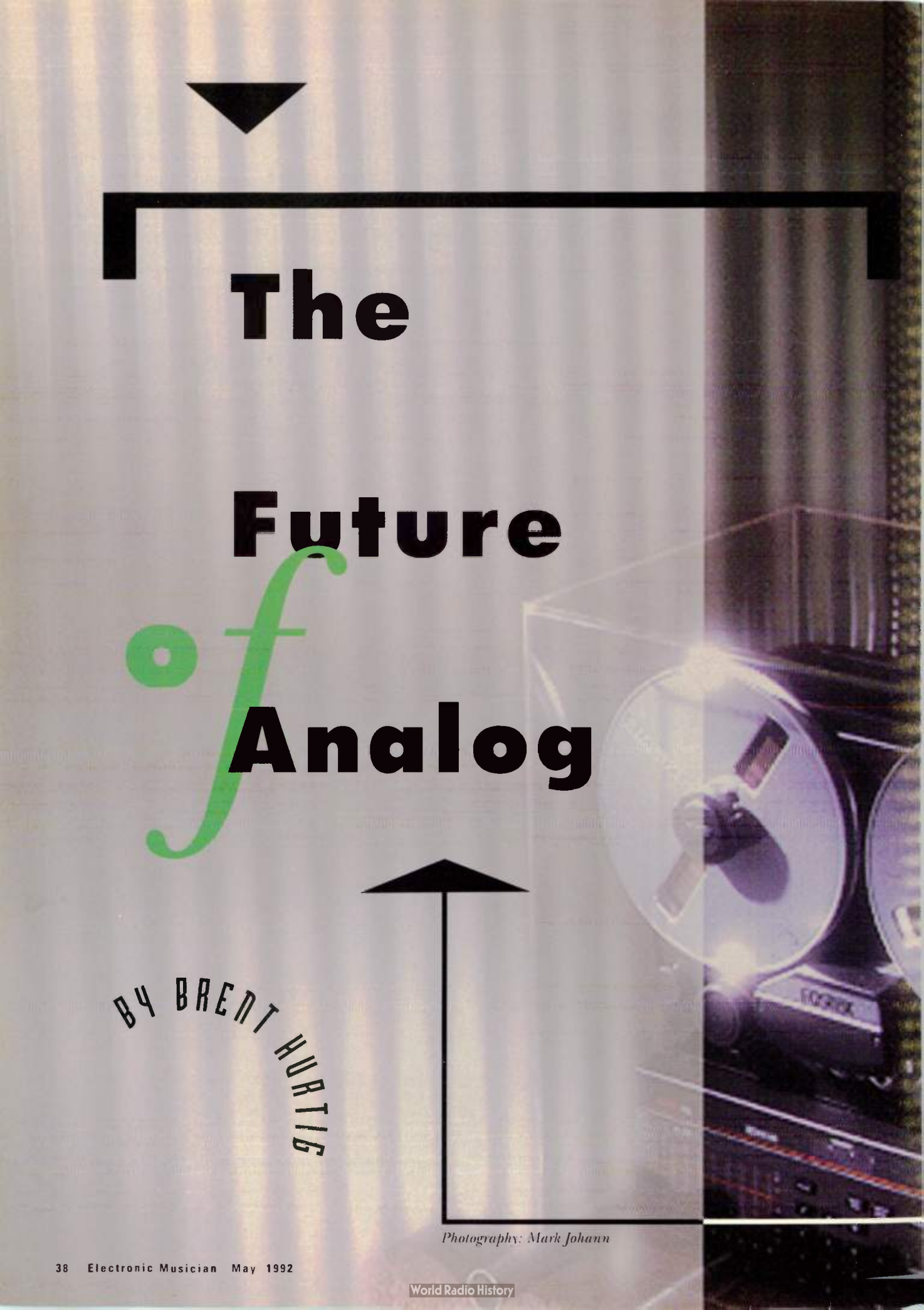
It is also possible to achieve this effect by using the synth's microtuning tables. As before, create a copy of a Voice and edit its microtuning table so that various notes are slightly sharp or flat relative to their normal pitch. Create a Performance with the original and duplicate Voices, and you'll hear a musical, unpredictable chorus effect.

ON YOUR OWN

These are just a few ideas to get you started. You should continue to explore the potential of this instrument, which can give you years of satisfying sound sculpting.

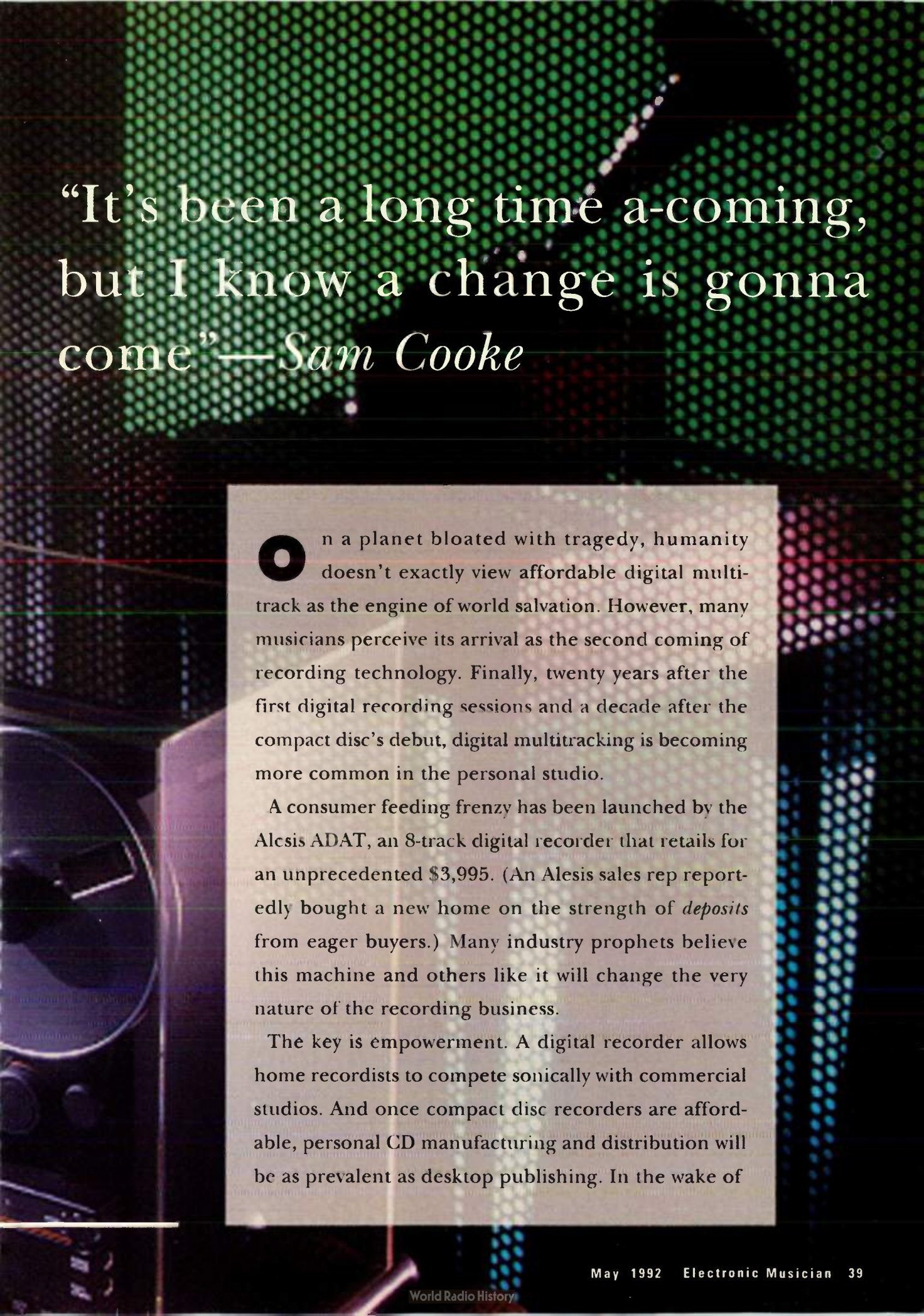
Peter Freeman *is a freelance bassist/synthesist and composer living in New York City. He has worked with John Cale, Chris Spedding, Hipsway, Jon Hassell, L. Shankar, Sussan Deihim, and Richard Horowitz.*

The Future of Analog



BY BRENT HURTIG

Photography: Mark Johann



"It's been a long time a-coming, but I know a change is gonna come"—*Sam Cooke*

On a planet bloated with tragedy, humanity doesn't exactly view affordable digital multitrack as the engine of world salvation. However, many musicians perceive its arrival as the second coming of recording technology. Finally, twenty years after the first digital recording sessions and a decade after the compact disc's debut, digital multitracking is becoming more common in the personal studio.

A consumer feeding frenzy has been launched by the Alesis ADAT, an 8-track digital recorder that retails for an unprecedented $3,995. (An Alesis sales rep reportedly bought a new home on the strength of *deposits* from eager buyers.) Many industry prophets believe this machine and others like it will change the very nature of the recording business.

The key is empowerment. A digital recorder allows home recordists to compete sonically with commercial studios. And once compact disc recorders are affordable, personal CD manufacturing and distribution will be as prevalent as desktop publishing. In the wake of

these developments, expensive 24-track studios may become naked monarchs, as small project studios churn out master quality for less money.

This is exciting news. But every revolution extracts a price, and getting into digital still costs (see sidebar, "The Digital Studio"). However, people who sell music services may not have a choice. Aware that digital multitrack is available, clients may demand it. And what about the old guard? Does analog have a future when digital is accessible to everyone?

THE STATE OF ANALOG

Not everyone thinks digital is so peachy. A 1984 article from the Anstendig Institute entitled "The Truth About CD and Digital" cautioned the public to "avoid all products using digital sound processing." The article claimed, "The current technology is incapable of preserving all of the information necessary for the accurate reproduction of a musical performance or any other real-life sound event."

Before all you digital devotees laugh this off as poppycock, consider those who feel that digital sounds brittle and harsh. Several years ago, these people were dismissed as whackos. Now we know the whackos were right: Some analog-to-digital and digital-to-analog converters (especially those from several years ago) suffer from phase shift, quantizing noise, and other problems.

Ken Pohlmann, a leading authority on digital recording, believes some people hear things that others don't. "As a culture, we are biased towards analog audio," he maintains. "For example, vacuum tubes bias [our ears] to a special sound. When we don't hear that sound, we think something's wrong or missing. Now, we know the something 'special' is distortion, which technically shouldn't be there. But emotionally, we expect and want it to be there. Digital lacks analog's distortion, noise, and wow-and-flutter, and some people miss hearing those elements."

Many of those who miss hearing analog distortion are high-level audio engineers and producers. No technology is too expensive for pop-star record budgets that eagerly consume the best of everything. However, many creative minds working on these projects choose to record either totally analog, or sync analog and digital recorders together. Scores of producers swear by the compressed sound of drums recorded on analog tape, so percussion often is tracked on the analog machine, and everything else on digital. High-output tape formats also may prolong the productive life of analog recorders (see sidebar "High-Output Tapes"). This subjective selection confuses the concept of the "fully digital" CD but proves that analog still has a few good years left.

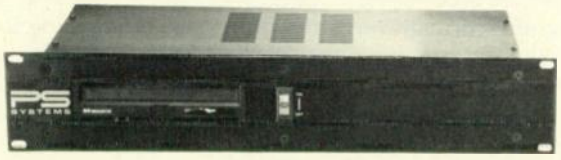
THE DOLBY DEFENSE

The handsome brickwork gracing the headquarters of Dolby Labs in San Francisco harkens to an era when engineers used drafting tables and pencils, instead of computers. Furthermore, brick is hardly the best construction material for unstable ground. However, Dolby is braced against the odds. Inside, a crisscross of metal girders forms a skeleton designed to protect its occupants from the forces of inevitable change.

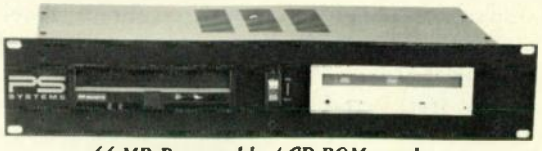
In a listening room deep in the building's torso, Dolby's Dennis Staats played a solo piano recording so I could compare the sound quality of compact discs and analog cassettes. These were not just any cassettes, but samples encoded with Dolby's new S-type noise reduction, an affordable version of the professional SR-type. Introduced in 1986, Dolby SR ("spectral

The machine that may fuel the palace revolution: the Alesis ADAT 8-track digital recorder.

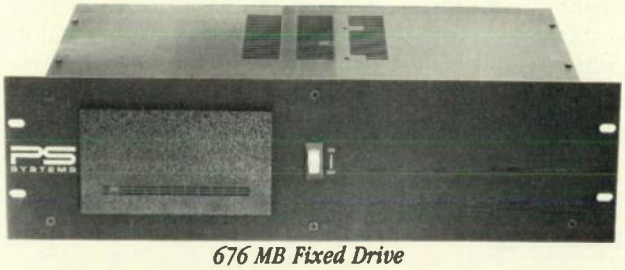
SCSI SOLUTIONS



44 MB Removable



44 MB Removable / CD-ROM combo



676 MB Fixed Drive

The Musician's Drive

Nothing can compare to the convenience of a SCSI hard drive. At PS Systems, we make SCSI simple. That's why PS Systems continues to be the Professional's Choice...worldwide. We custom-build your drive in a durable, lightweight aluminum case, with up to two drives of removable, optical or fixed media, in any combination.

Then we support it with professional, accessible and courteous customer service. Finally, we back it all with a one year, no hassle warranty. This commitment to the professional musician has made us the fastest growing rackmount SCSI drive manufacturer in the world.

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- Custom made twisted pair cables
- Lightweight aluminum case
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- External SCSI ID switches
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recording") revitalized the analog market by virtually eliminating tape hiss and crosstalk without audible compromise. (For more information, see the two-part series "The Last Noise Reduction Article?" in the October and November 1991 issues of EM.)

In a blind test, I couldn't discern between the cassette and the CD. During a quiet passage, I perceived a slight tonal shift when Staats switched mediums but could not decide if the sound was better or worse. If I had left the room, it would have been impossible to tell which format was playing when I returned.

Dolby's business focuses on overcoming the deficiencies of analog recording, and they've banked a lot on S-type. Technically, they've accomplished their goal: SR- and S-equipped multitrack recorders suffer virtually no tape hiss and have better frequency response than competing digital recorders costing thousands of dollars more. S-type-equipped 1-inch 24-track and 1/2-inch 16-track machines from Tascam and Fostex also sound superb and cost even less.

But price soon may not be a factor, so I posed the inevitable question: With affordable digital recording on its way, why should anyone buy into analog?

"I don't look at analog and digital as being enemies. They are essentially complementary," states Ken Gundry, senior project engineer at Dolby Labs. "Also, there are still people who care about formats, and analog 2-inch 24-track remains a world-wide standard. Furthermore, an SR- or S-equipped analog deck outperforms any commercially released medium, whether its FM radio or a compact disc. Ultimately, it comes down to the practical benefits of digital, and it's going to be a long time before humans *hear* in digital. However, I don't think I'm letting any cats out of the bag if I tell you we have more engineers working on digital projects than on analog ones."

HIGH-OUTPUT TAPES

While music hardware companies are escalating the war between analog and digital recording equipment, two major tape manufacturers are raising the stakes in the analog realm. The challenge of high-output tape begins with 3M's 996 and Ampex's 499.

New oxide formulas developed (separately) by 3M and Ampex are unique because of the amount of signal they accept before reaching tape saturation. Since these tapes can record such hot signals, it's possible to run your deck's operating levels at +6 or higher without worrying about tape distortion. These tapes also possess improved noise floors that yield better signal-to-noise ratios than previous formulations and exhibit amazing dynamic ranges.

Michael Gore of B.A.S.E. (Bay Area Studio Electronics) and I tested some of the product specifications from both companies, and our numbers matched or exceeded the published specs. In fact, the competing tapes tested almost identical right down the line. For example, the Total Harmonic Distortion (THD) at +10dB (above 250 nw/m) was 1.05 percent for 3M 996, while Ampex 499 posted 0.92 percent.

Since science couldn't render conclusive results, we decided to get crazy. Samples of 1/4-inch tape were frozen, left overnight in water, and baked near a quartz space heater. Ridiculous tests? I don't know about you, but I've had clients leave tapes overnight in car trunks in freezing weather, transport unprotected tapes tied to the seat of a motorcycle during a rainstorm, and store finished masters by heating ducts.

These are tough tapes. After letting the tapes dry and return to room temperature, there were no critical problems (except a few minor edge crinkles). Even when editing tape was removed from edits performed on the samples, the back coatings did not peel off. (This was a bit of a surprise, since previous batches of 3M 996 exhibited an unreliable coating; it would pull off with the editing tape.)

So, the final test: What do these tapes sound like? I set my 1/4-inch deck to run at +6 levels, taking care to adjust the proper bias for each tape, and slammed down mixes of rock, rap, and classical music at levels that would have fried the "old" formulations of Ampex 456 and 3M 226. Both the Ampex 499 and the 3M 996 handled the brutal levels without flinching.

Although it was difficult to elicit tape distortion, both tapes exhibited harshness on the top end when pushed to maximum levels. However, at (slightly) more reasonable levels, the samples offered more dynamic impact than any other tape I have used. In addition, audible hiss was practically nonexistent. It was hard to believe I was playing back analog tape (without Dolby SR noise reduction); the sound quality was astounding.

The results of this confrontation? It's too close to call. Both Ampex 499 and 3M 996 sound brilliant, spec out like twins, and cost about the same. Some engineers like 3M's neat black plastic shipping box (Ampex comes in a standard cardboard box), and although they'll never admit it in print, they buy it just for that reason. Other engineers choose Ampex because they've always used it.

These new breeds of high-output tape certainly help analog tape decks in their battle against the digital machine, but there are a few things a semi-pro engineer should keep in mind. First, to get the most benefit from these tapes, your deck must be properly aligned to accept hotter levels. (If you don't know how to align your tape deck, have a qualified technician do it.) Second, if you want to run a high-output tape without a realignment, check your manual to see which manufacturer's tape was used to align your deck at the factory. It's important to continue using the same tape to maintain bias specs. (And even if you run normal levels, the improved noise floors of Ampex 499 and 3M 996 will make your tapes sound cleaner.)

Lastly, keep in mind that the input stages of some consumer and semi-pro decks are not designed to handle high signal levels. If you slam levels, audible distortion may result from overloading the input of your deck, rather than tape saturation.—*Neal Brighton.*

TCD-D10 Pro II
Portable DAT Recorder

The TCD-D10 Pro II is the smallest professional DAT recorder from Sony. Yet, while it weighs only 4 lbs. 7 oz., the TCD-D10 Pro II is no lightweight when it comes to performance.

Built to withstand the rigorous demands of field work, the TCD-D10 Pro II allows you to stay in the digital domain from acquisition to studio. It also features absolute time (A-time) recording/playback which places a continuous time code on tape, allowing you to locate recorded segments faster and more easily.

Plus, A-time is compatible with SMPTE time code DAT recorders like our PCM-7000 Series. There's even an improved digital I/O and LCD multi-display with a combination of safety/warning indicators to help insure fail-safe operation. And when combined with one of Sony's high quality microphones, you're fully equipped to meet the most demanding challenges in the field.

KEY SPECIFICATIONS

DYNAMIC RANGE: MORE THAN 85 dB
FREQUENCY RESPONSE: 20 Hz-22 kHz
THD: 0.06%
I/O: ANALOG—MIC/LINE BAL, DIGITAL—AES/EBU
ACCESSORIES: BATTERY (X2), CHARGER, REMOTE, AC SUPPLY, CASE

▼ SHOWN WITH OPTIONAL SONY ECM-MS5 STEREO MICROPHONE.

PCM-2700
Studio DAT Recorder

Taking advantage of Sony's latest innovations in digital technology, the PCM-2700 is the first affordable professional 4-head DAT recorder.

Featuring Sony's advanced HDLC (High Density Linear Converter™) System, the PCM-2700 delivers superior sound quality. The PCM-2700 also employs a 4-motor direct drive transport to insure tape stability, accuracy and reliability. Its 4-head design provides off-tape monitoring to verify your recordings.

There's even a duration adjustable digital auto fader for fade-in and fade-out times as well as an A-time search function for rapid access to any recorded A-time location—all giving you the utmost in professional performance.

KEY SPECIFICATIONS

SIGNAL TO NOISE RATIO: MORE THAN 90 dB
FREQUENCY RESPONSE: 20 Hz-22 kHz
THD: <0.045%
ANALOG I/O: +4 dBs (+24 dBs MAX.) ADJUSTABLE
PARALLEL REMOTE: TTL COMPATIBLE, D-SUB 37

DPS-D7
Digital Hyper Delay

If you want to take your creativity in exciting new directions, Sony's DPS-D7 Digital Hyper Delay is the way to go.

Featuring seven sophisticated algorithms, there's virtually no limit to the number of uniquo and complex digital delay effects you can create. The DPS-D7 incorporates an 18-bit oversampling A/D and 1-bit HDLC D/A converter system with digital filters for excellent linearity, ultra low noise and wide dynamic range.

Second generation LSI's allow for high-speed 32-bit digital signal processing. And with its large graphic display and help button for assistance on any function, the DPS-D7 is always simple to use.

KEY SPECIFICATIONS

DYNAMIC RANGE: MORE THAN 94 dB
FREQUENCY RESPONSE: 10 Hz-22 kHz
THD: <0.0035%
ANALOG I/O: BALANCED +4 dBs (+24 dBs MAX.), UNBALANCED –10 dBs (+10 dBs MAX.)
MEMORY CAPACITY: 100 FACTORY PRESETS, 256 USER LOCATIONS

DPS-R7
Digital Reverb

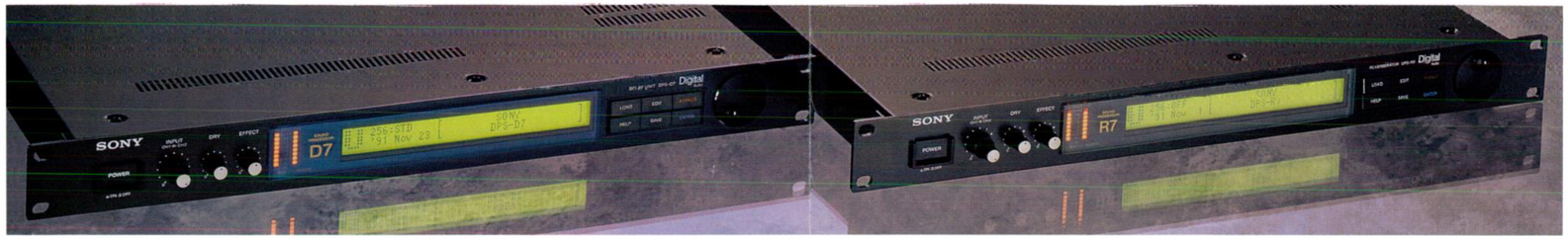
If you want to add even more power and versatility to your audio system, Sony's DPS-R7 is right on the money.

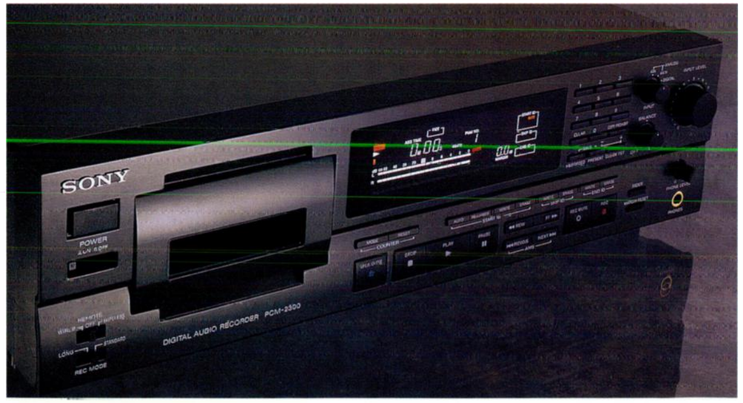
Offering two discreet channels of advanced digital reverb effects, the DPS-R7 is an invaluable tool for the audio professional. As with the DPS-D7, the DPS-R7 employs HDLC D/A converters for superior sound reproduction as well as high-speed 32-bit digital signal processing, which deliver sophisticated, multiple reverb effects.

It also includes 100 factory presets as well as 256 memory locations for your own presets. In addition, the DPS-R7 features an ingenious "data wheel" and large graphic display for easy operation.

KEY SPECIFICATIONS

DYNAMIC RANGE: MORE THAN 90 dB
FREQUENCY RESPONSE: 10 Hz-18 kHz
THD: <0.004%
ANALOG I/O: BALANCED +4 dBs (+24 dBs MAX.), UNBALANCED –10 dBs (+10 dBs MAX.).
MAXIMUM SIMULTANEOUS EFFECTS (TEN): 4 PRE EFFECTS (2 PER CHANNEL), 2 REVERB (1 PER CHANNEL), 4 POST EFFECTS (2 PER CHANNEL)





PCM-2300
Studio DAT Recorder

As Sony's most affordable professional DAT recorder, the PCM-2300 is ideally suited for a wide variety of applications where high quality recording and playback are necessary.

Like the PCM-2700, the PCM-2300 incorporates the latest conversion devices—1-bit delta Σ A/D converter and HDLC 1-bit D/A converter—for outstanding sound quality. The PCM-2300 also incorporates a sophisticated 3-motor transport design for solid reliability. And in 32kHz long-play mode, it delivers twice the normal recording and playback time—a full four hours.

Plus, its analog and digital I/O's provide a wide range of flexible interfacing possiblities.

KEY SPECIFICATIONS

SIGNAL TO NOISE RATIO: MORE THAN 86 dB
FREQUENCY RESPONSE: 20 Hz-20 kHz
THD: <0.05%
ANALOG I/O: +4 dBs (+24 dBs MAX.) ADJUSTABLE
SUPPLIED ACCESSORIES: WIRED/WIRELESS REMOTE, 19" RACK MOUNT, POWER AND REMOTE CABLES

CDP-2700
Compact Disc Player

The CDP-2700 compact disc player delivers a multitude of professional features for a very compact price.

Like all Pro Standard equipment, the CDP-2700 is rugged and reliable while delivering superb sound quality. Ideal for on-air applications in radio broadcasting and sound sweetening in video post, the CDP-2700 includes important features such as variable speed playback, fader stop/start control from a mixing console and an auto cue function for instant start.

And because its digital output conforms to both the AES/EBU and IEC-958 formats, the CDP-2700 directly interfaces with other professional equipment for flexible system expandability.

KEY SPECIFICATIONS

DYNAMIC RANGE: MORE THAN 110 dB
CROSSTALK: 100 dB
THD: 0.04%
VARI-SPEED RANGE: ± 12.7% (0.1% STEPS)
D/A CONVERSION: DUAL 18-BIT 8X OVERSAMPLING

Including The Price.

Introducing The New Pro Standard Digital Audio Series From Sony

If you've been looking to expand your capabilities with a new professional DAT recorder, CD player or signal processor, Sony quality is now within your reach.

Featuring some of the most highly advanced, great sounding digital audio products in the world, the Pro Standard™ Series covers a wide spectrum of the needs of today's audio professional. Making it easier than ever for studio recording, post-production and radio broadcasting to benefit from the advantages of digital.

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PRO/STANDARD DIGITAL AUDIO SERIES

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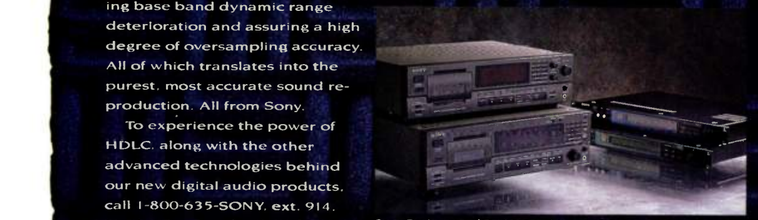
Representing a breakthrough in high-performance D/A conversion, Sony's new High Density Linear Converter™ (HDLC) System defines a new level of performance in sound quality.

More specifically, HDLC, a single-bit technology, recreates an analog wave form from digital data by representing it as a rapid series of pulses, overcoming differential non-linear distortion and glitch-induced distortion as well as zero-cross distortion inherent in previous technologies.

The HDLC system also employs Sony's proven 45-bit noise-shaping digital filter, circumventing base band dynamic range deterioration and assuring a high degree of oversampling accuracy. All of which translates into the purest, most accurate sound reproduction. All from Sony.

To experience the power of HDLC, along with the other advanced technologies behind our new digital audio products, call 1-800-635-SONY, ext. 914, for the Pro Standard dealer nearest you.



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Everything About Our New Digital Audio Equipment Is Designed To Sound Better Than Ever.

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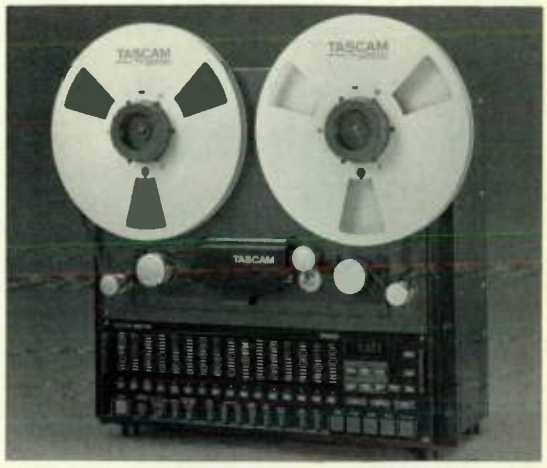
THE DIGITAL FRONT

By the time you read this, Alesis' ADAT digital audio tape recorder should be setting sales records that match the hype it generated when a prototype was displayed a few years ago. Most people know from its barrage of publicity that ADAT records eight tracks on a standard ½-inch S-VHS tape. Up to sixteen ADATs can be connected, without external synchronizers, to deliver 128-track recording.

In the meantime, Digidesign is shipping several Macintosh-based products, including Sound Tools, Audiomedia, *Deck*, and Pro Tools. The last item is a multitrack digital audio workstation (DAW) that sells for under $6,000 (4-channel version, plus computer and hard drive). Despite a few bugs, Pro Tools is comparable to DAWs costing ten times more.

While the ADAT is designed to integrate into the current studio, Digidesign wants to redefine the personal studio and base it around a personal computer. (Having shipped nearly 10,000 hard-disk systems to date, they're doing a good job.)

Understandably, the people who build analog tape recorders are joining the digital party, and the current crop of analog multitrack decks may be the last of their breed. Otari claims it will continue to focus on the high end of the market, with both hard-disk and tape-based multitrack digital recorders. Studer-Editech is introducing new versions of its Dyaxis hard-disk recorder, with more bang for less buck. Tascam and Fostex are building both tape-based and tapeless solutions, while Yamaha and Akai continue to develop tape-based and hard-disk digital recorders. At the recent NAMM show, Tascam let dealers peek at a hush-hush prototype of a digital 8-track deck that records on 8mm tape.



Dolby S-type noise reduction on the Tascam MSR-16S makes this analog recorder sonically competitive with digital decks.

COPING WITH CHANGE

Many of you already have taken the first steps into digital. You may own a DAT recorder, or be among the thousands currently using a hard-disk recorder. (Don't forget that MIDI sequencing is a type of digital recording: It records, edits, and plays back synths, samplers, and other instruments digitally, with no loss of fidelity.)

But before you commit to digital mul-

titrack recording, you should be aware of a few things. Barely noticeable problems may suddenly stand out, thanks to digital's extended dynamic range. The "safety net" of analog's noise floor is no longer available to shroud street noise and equipment buzzes. Be sure to budget for correcting your system's electronic and background noise problems before buying a digital multitrack recorder.

Also, whether you record analog or digital, "garbage in" means "garbage out." A noisy mixer can sabotage any digital recorder by producing poor signal quality. Remember, four grand buys many things that may improve your tapes more than a digital multitrack: A high-quality mixer, signal processing, additional MIDI gear, sound proofing, professional-quality microphones, vocal lessons, and so forth. If your budget is tight, be realistic about which investment will improve the quality of your work.

In addition, no matter how robust these new digital tape formats may be in the long run, they are untried. Owners of disk-based systems have lost important music to disk crashes or other data corruptions. In short, no one knows about the long-term reliability of the new digital recording systems coming to market. It's difficult to replace a perfect musical take, and it's even harder to repair a damaged reputation. Personally, I would need six to twelve months of trouble-free recording on a new digital machine before I would forego backing up important tracks onto a synchronized analog multitrack. And even then, I'd be taking a risk.

All tape-based recorders share a common weakness: They are not random-access. In other words, unlike a digital audio workstation, tapes have to be wound to access portions of music, and rapid cut-copy-and-paste audio editing is impossible. For these reasons, DAWs are quickly displacing "linear" audio tape recorders in many audio-for-video post-production facilities.

DAWs also can work in tandem with another type of cut-and-paste recording: MIDI sequencing. If you earn (or would like to earn) a living doing sound for video or film, you should invest in a digital audio workstation. Similarly, if you're heavy into MIDI sequencing, integrated recording makes sense. The most popular system to date is Opcode's *Studio Vision*, which integrates MIDI sequencing with Digidesign's disk-recording hardware.

While most disk-based workstations offer some form of digital mixing, it will be several years before a stand-alone digital mixer is a good sonic and economic investment. Currently, most analog mixers outperform digital mixers by a large margin, not only in terms of frequency response, but also in terms of signal-to-noise. Ultimately, digital mixing makes sense and brings considerable signal-processing power to the studio. For now, don't be afraid to invest in a good-quality analog mixer. It won't be obsolete for a long time. (And expect to see relatively affordable, digitally controlled analog mixers modeled after the $100,000 Euphonix Crescendo on the market within a few years.)

Despite cautions and concerns, affordable digital multitrack machines are simply the best thing to happen in recording since the advent of MIDI. However, one last tip is in order. You should buy a digital multitrack only when you're comfortable with the state of the technology and have made necessary improvements to your existing gear. You also must decide whether to go with linear or random-access and feel confident that a digital system makes economic sense for you.

THE DIGITAL STUDIO

Want to join the digital generation? Here are some basic entry-level system costs for living in a digital world.

Digital 8-track recorder: $3,995 (Alesis ADAT)

Digital 8-channel mixer: (with onboard digital signal processing): $5,995 (Yamaha DMP7D)

Digital Audio Workstation: $5,000 (Hybrid Arts Digital Master turnkey system) to $12,000 (Digidesign Sound Tools with Macintosh and hard disk)

Professional DAT Recorder: $1,500 to $2,500 (many to choose from)

Compact Disc Recorder: $7,500 (Marantz CDR600); $8,000 (Carver PDR10)

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Whether you're recording, composing, playing live or just getting started, you owe it to yourself to voice your music as fully as possible. That's why you should do it with an ENSONIQ synthesizer.

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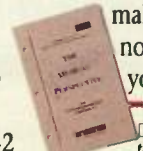
Or our SQ-1 PLUS and SQ-2 Personal Music Studios, which now come with an additional Megabyte of new 16 bit waves, offer a complete range of musical possibilities to the budget-conscious musician. And for the perfect addition to your existing MIDI setup, there's the SQ-R PLUS, giving you the great sound of the SQ instruments in a rack-mount.

Of course, ENSONIQ has long been an acknowledged leader in affordable samplers, such as the EPS-16 PLUS Digital Sampling Workstation and EPS-16 PLUS rack-mount unit.

So no matter what kind of music you make, we've got you covered, with notes to spare. For the dealer nearest you, call 1-800-553-5151.



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THE TECHNOLOGY THAT PERFORMS

THE ANALOG STUDIO

Digital be damned; analog still sends shivers up your spine, and you won't let go. That's fine, but to compete sonically with the digital demon, you need a reasonably high level of analog equipment.

16-track recorder (with Dolby S-type noise reduction): $8,995 (Fostex G-16S); $8,500 (Tascam MSR-16S)

24-channel professional-quality mixer: $6,000 and up (there are many to choose from)

2-track 1/4-inch recorder: $1,750 (Tascam 32)

THE FUTURE IS NOW

January 1992. Inside the Jetsonesque Anaheim Convention Center, the talk of the NAMM show is ADAT, just as it was last year. At the Alesis booth, a slick, but homey, video features the company president, waxing rhapsodic about American ingenuity. The video climaxes with a bevy of people running about Alesis headquarters, cheering that ADATs are finally coming off the assembly line. Still, dealers no longer believe Alesis' promised ship dates (the ADAT was to have shipped in the autumn of 1991), and some bemoan that customers have all but stopped buying analog multitrack recorders.

Allen Wald of Alesis says the holdup is simply a matter of quality control. An accomplished bluegrass and country musician, Wald is excited about the promise of "personal" digital multitrack. "It will give people a chance to record acoustic music as cleanly as MIDI sequenced tracks," he says. "Music-making will come full circle. Prior to the home studio, a person's musicianship mattered, not their technical chops. With digital recording, there are no more excuses for poor sound quality. It's finally back to 'Do you have any talent?'"

Yes, we'll see. Yes, we'll all own digital studios one day. Yes, the future of analog recording is grim. Yes, digital will be worth it. And yes, we should make the most of what we have today, not counting on tomorrow's technology to spur today's creativity.

Brent Hurtig, *a widely published author and editor, lives in San Francisco.*

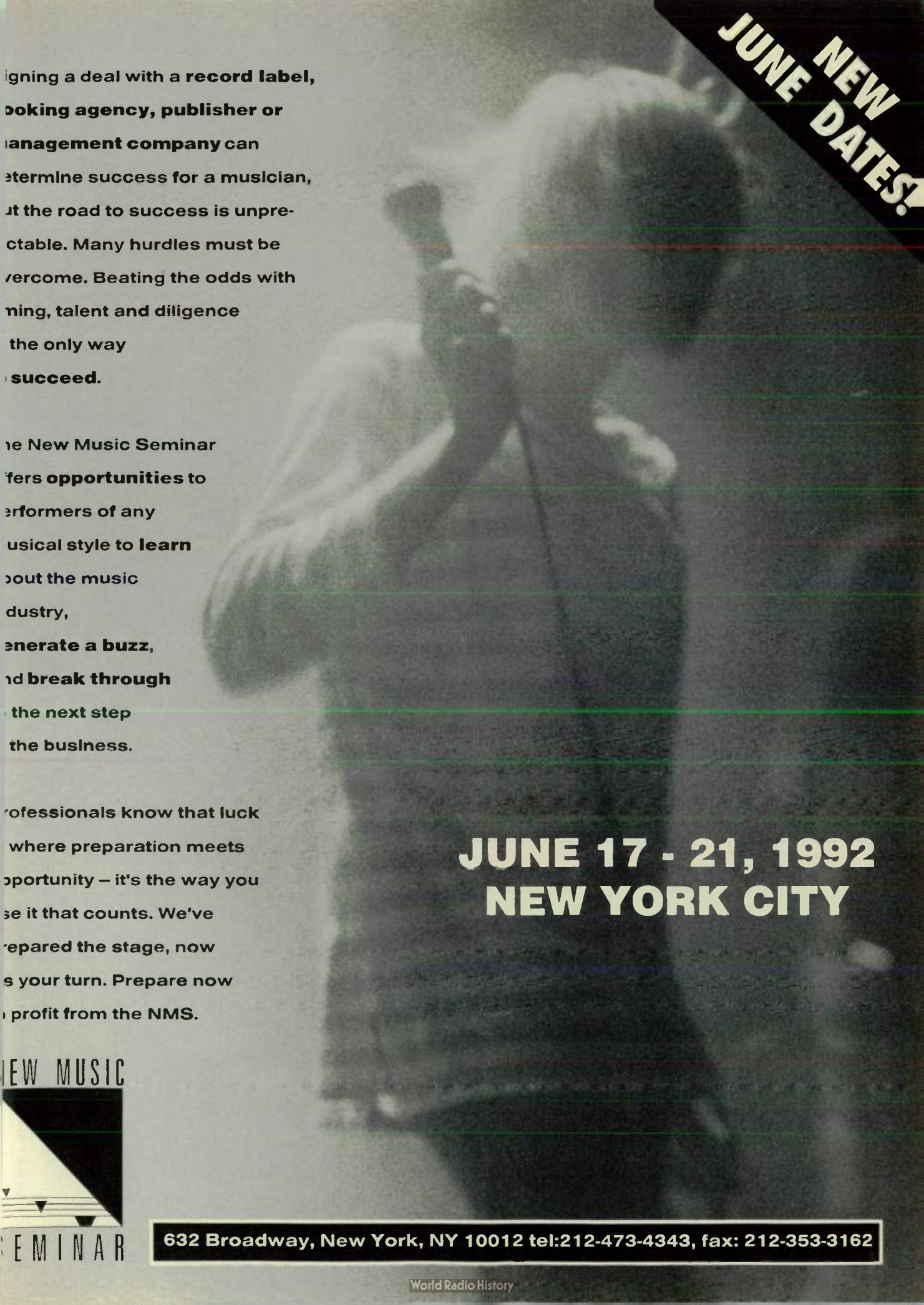

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ILLUSTRATION BY BOB HAMBLY

BY MICHAEL McFALL

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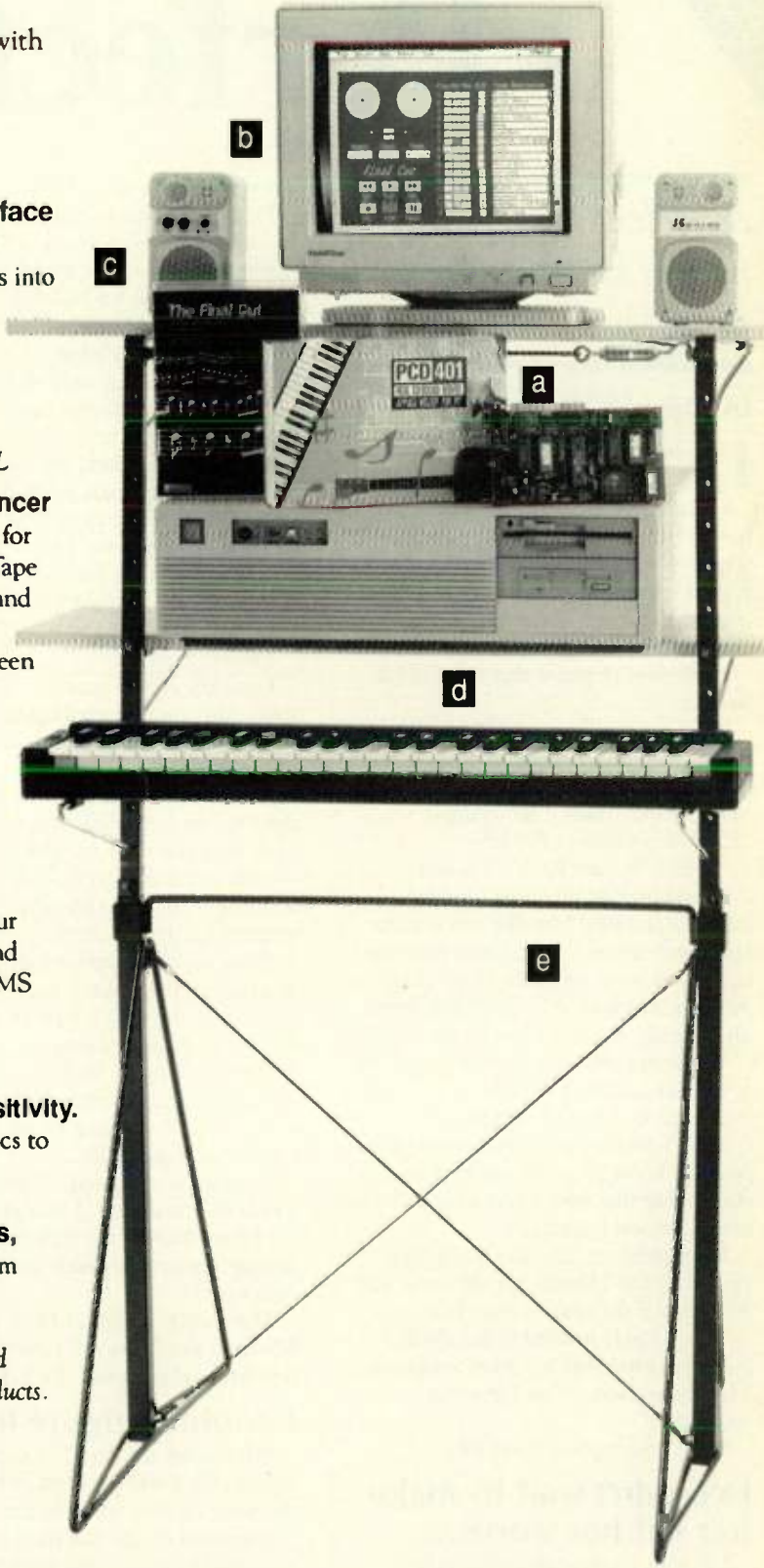

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The true story behind Burge's best-selling Perfect Pitch method

"How I discovered the secret to Perfect Pitch"

A perfect ear for music means knowing how to listen.

by David L. Burge

It all started in ninth grade as a sort of teenage rivalry.

I was practicing the piano about five hours daily. Linda practiced far less. But somehow Linda always seemed to have an edge which made her the star performer of our school.

It was frustrating.

What does she have that I don't? I'd wonder.

Then one day I ran into Sheryl, Linda's best friend. She bragged on and on about Linda, adding fuel to my fire. "You could *never* be like Linda," she taunted. "*Linda's* got *Perfect Pitch*."

"What's Perfect Pitch?" I asked.

Sheryl told me all about Linda's *uncanny* abilities: how she could name tones and chords—*just by ear*; how she could sing tones on pitch—*from sheer memory*; and how she could play songs after merely *hearing* them on the radio!

My heart sank. *Her fantastic ear is the key to her success* I thought. How could I ever hope to compete with her?

Then I doubted it all. How could she *possibly* know F# or B♭ just by *listening*? An ear like that would give mastery of the entire musical language!

It bothered me. Did she *really* have Perfect Pitch? I finally got the nerve and asked her if the rumors were true.

"Yes," Linda nodded to me aloofly.

Perfect Pitch was too good to believe. I rudely pressed, "Can I test you sometime?"

"OK," she replied cheerfully.

I couldn't wait to make her eat her words...

My plan was ingeniously simple:

I picked a moment when Linda least suspected. Then I boldly challenged her to name tones for me—*by ear.*

I made sure she had not been playing any music. I made her stand so she could not see the piano keyboard. I made certain other classmates could not help her. Everything was just right so I could expose her claims as a ridiculous joke.

Nervously, I plotted my testing strategy. Linda seemed serene. With silent apprehension I selected a tone: F#. (She'll *never* guess F#!)

I had barely touched the key. "F#," she said.

I was astonished.

I quickly played another tone. She didn't even stop to think. *Instantly* she announced the correct pitch. I played more and more tones here and there on the keyboard, and each time she knew the pitch —without effort. She was SO amazing—she could identify tones as easily as colors!

"Sing an E♭," I demanded, determined to mess her up.

Quickly she sang the proper pitch. I made her sing more tones (trying hard to make them increasingly difficult), but still she sang every one perfectly on pitch.

I was totally boggled. "*How in the world do you do it?*" I blurted.

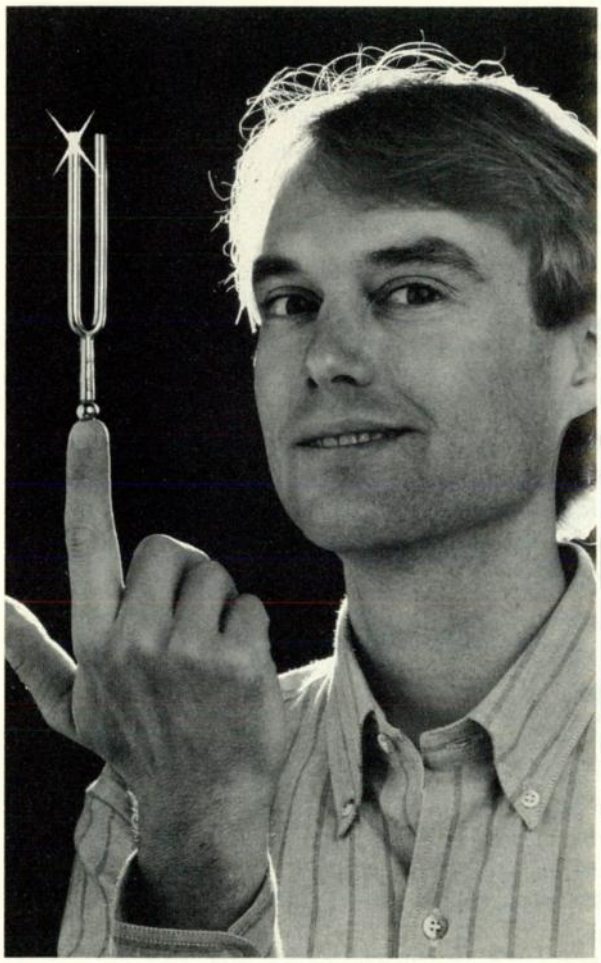
"I don't know," she sighed. And to my dismay that was as much as I could get out of her!

The reality of Perfect Pitch hit me hard. My head was dizzy with disbelief, yet I now knew that Perfect Pitch is real.

I couldn't figure it out...

"How does she do it?" I kept asking myself. On the other hand, why can't *everyone* identify tones by ear?

It dawned on me that most musicians can't tell the sound of C from C#, or the key of A major from F major—like artists who brush painting after painting without knowing green from turquoise. It seemed odd and contradictory.



I found myself even more mystified than before. Humiliated and puzzled, I went home to work on this problem. At age 14, this was a hard nut to crack.

You can be sure I tried it myself. I would sweet-talk my brothers and sisters into playing tones for me so I could guess each pitch by ear. Most every attempt failed miserably.

I tried day after day to learn the tones. I tried playing them *over* and *over* in order to memorize them. I tried to feel the "highness" or "lowness" of each pitch.

But nothing worked. I just could not recognize the tones by ear. It was hopeless.

After weeks in vain, I finally gave up. Linda's gift was indeed extraordinary. But for me, it was out of reach.

Then came the realization...

It was like a miracle. Once I had stopped *straining* my ear, I started to listen NATURALLY. Then the incredible secret to Perfect Pitch jumped right into my lap.

I began to notice faint "colors" within the tones. Not *visual* colors—but colors of *pitch*. They had always been there. But this was the first time I had ever "let go" —and just *listened*—to discover these subtle differences in the sounds.

Soon I could name tones by ear! It was simple. I could hear how F# sounds one way—while B♭ has a different quality. It was as easy as seeing red and blue!

The realization struck me: THIS IS PERFECT PITCH! This is how Bach, Beethoven and Mozart could mentally envision music—and identify tones, chords, and keys at will—*by listening for these pitch colors*.

I became convinced that *anyone* could gain Perfect Pitch by learning how to unlock this simple secret of "color hearing."

When I told my friend Ann that *she* could have Perfect Pitch, she laughed. "You have to be *born* with Perfect Pitch," she asserted.

"How in the world do you do it?" **I blurted. I was totally boggled.**

"You don't understand what Perfect Pitch *is*," I explained. "It's easy!"

I showed her how to listen. Timidly, she confessed that she could hear the colors too. Soon she also had Perfect Pitch. We became instant celebrities; everyone was amazed.

As I continued with piano, my Perfect Pitch allowed me to progress faster than I ever thought possible. (I would later *skip over* required college courses.) Perfect Pitch made *everything* easier—performing, composing, arranging, sight-reading, transposing, improvising—and it skyrocketed my enjoyment as well. Music is definitely a *hearing* art.

Oh yes, and as for Linda—well, time found us at the end of our senior year of high school, with my *final chance* to outdo her.

Our local university sponsored a music festival each spring. That year, I scored an A+ in the most advanced performance category. Linda scored only an A.

Sweet victory was mine at last!

How *you* can have Perfect Pitch too:

By now, thousands of musicians and research at two universities have shown that my easy method really does work (please call our studio for research info).

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Order your own **Perfect Pitch® SuperCourse** and listen to the first two tapes. I'll *personally guarantee* you will hear the Perfect Pitch colors I'll start you on—*or you can return the Course for a full refund*. You've got my word on it.

You can even read the short handbook and monitor your progress at no risk. You must notice a *dramatic improvement* in your sense of pitch within 40 days, or return the Course and *I'll make sure you get your refund—no questions asked!*

If you decide to keep your **Perfect Pitch® SuperCourse** and continue your ear-training, listen to the remaining three tapes (included) for more advanced instructions.

Try the Course *right now*, and you'll also receive my 90-minute companion tape on **Relative Pitch**—yours to keep FREE—*even if you return your* **Perfect Pitch® SuperCourse** *for a refund!*

Think of the possibilities that Perfect Pitch can open for you musically. Imagine how it can improve *your* playing, *your* singing—*your* creativity and confidence.

And picture the look on your friends' faces when YOU can name tones and chords with laser-like precision!

Don't laugh! Just wait until you hear the simple secret for *yourself!*

Are you ready to discover your *own* Perfect Pitch?

Then order your Course *now* on a 40-day trial basis!

Research references: *A study to determine the effectiveness of the David L. Burge technique for development of Perfect Pitch*, M. E. Nering (1991), The University of Calgary; *An experimental investigation of the effectiveness of training on absolute pitch in adult musicians*, M. A. Rush (1989), The Ohio State University

they program the tracks you regularly hear on records and radio will help you apply an advanced degree of rhythmic alchemy to your own efforts.

THE BASICS

For the most part, live drum-set playing involves three elements: kick (or bass) drum, snare drum, and hi-hat. You can create practically any type of pop groove with just these three voices. Toms, cymbal crashes, and hand percussion are colors to blend in later, after you take care of the basic groove.

The best place to start programming is the kick and snare. Probably 90 percent (or more) of all rock and pop music includes some variation of a pattern in which the kick is on beats 1 and 3, and the snare is on beats 2 and 4 (see **Fig. 1**). Select your sounds according to the style of the song. For example, a big, fat kick drum along with a monster snare with a long reverb might be a good choice for a rock ballad; a skinny, high-pitched, staccato snare with a clicky, hard-edged kick generally works better for a rap or hip-hop tune. Let your ears guide you, but remember that choosing sounds is important. Sometimes the sounds have more effect (positive or negative) on the groove than the rhythm patterns you program.

Once the kick and snare are nailed down, you need to tie everything together. With respect to real drum-set playing, the hi-hat is the glue that binds the other drum voices into a homogeneous whole. It bridges the gaps, implying or outlining smaller subdivisions that define the style of the music.

Take a rock song. Often you've got a big kick drum hammering out the downbeats (1 and 3) and perhaps an even bigger snare drum cracking on the backbeats (2 and 4). That's powerful stuff, and you want it in a rock song, but you can retain that power *and* smooth out the edges a bit by adding a splashy, half-open hi-hat

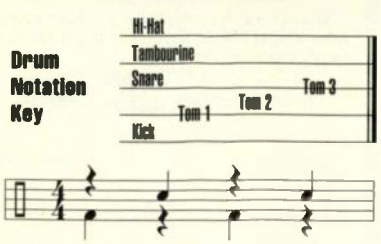

FIG. 1: A basic pattern with kick on 1 and 3 and snare on 2 and 4.

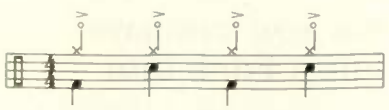

FIG. 2: Add a half-open hi-hat on the quarter notes to the pattern in Fig. 1 to cut the edge.

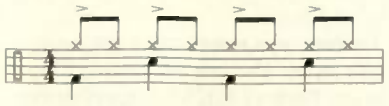

FIG. 3: A hi-hat on the eighth notes increases the tension of the pattern.

sound on the quarter notes (see **Fig. 2**). When you try it, you'll notice that the ringing of the hi-hat paves the way between the downbeats and backbeats, making the groove a bit less squared off, without losing the hard edge.

Playing eighth notes using the same type of sound imparts a more frenetic feel (see **Fig. 3**). For a tighter, more focused feel, use a closed hi-hat sound to play the eighth notes. Often, rock drummers play eighth notes on the closed hi-hat for the verse and open up the chorus with quarter notes on the bell of the ride cymbal or half-open hi-hat.

For dance tunes, the same rules apply. However, the hi-hat part usually consists of eighth notes or sixteenth notes, or some combination of the two. In **Figs. 4a** through **d**, you see some common examples of dance hi-hat patterns. Try different accent patterns along with the combinations of eighths and sixteenths, and you'll discover an infinite variety of hi-hat parts.

The hi-hat part need not be played by a hi-hat. You can use any number of percussive sounds—cabasa, shaker, tambourine, metal pipes, plates clicking together—to make the feel happen. Use your imagination and your ears, and remember that dynamics and accents play an important role in the feel of a song. **Figs. 5a** through **d** illustrate some common kick-drum variations on the one-and-three theme. Try using each one with all of the hi-hat patterns, and notice how different combinations alter the feel.

A multitude of drum pattern books are available, from swing to rock to funk to Latin. Pick one up and start programming the patterns into your drum machine or sequencer. Then experiment with different sounds and techniques to make the rhythms really groove. Use your ears and listen, listen, listen.

THE PRO APPROACH

I talked with a couple of guys in the forefront of programming drums for records and jingles—Jimmy Bralower and Joe Franco—both of whom have worked with most big-name artists in the industry.

According to Bralower, creative drum-programming requires simplicity and extensive listening. "My usual method of programming a song in the studio begins with listening to the general feel of what they're playing—the keyboard part, the melody, etc. If it's straight-ahead pop, I try to find a 2- or 4-bar phrase that is the essence of the song. Then I'll start jamming along, find a tempo that works, and get a kick and snare going to get some time happening. Next, I'll go to the top end; the hi-hat and the percussion become a key issue at this point.

"I usually start with less, maybe a backbeat on 2 and 4, and a downbeat on the kick. I try to leave space to fill in

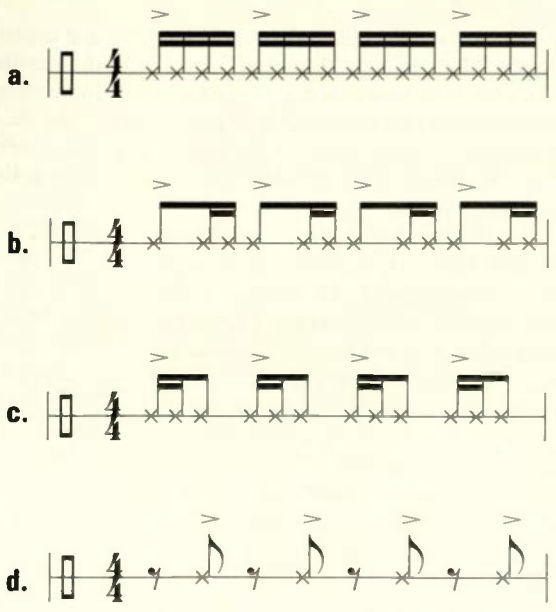

FIG. 4: Different hi-hat patterns can be used to help develop the feel .

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the blanks later. A lot of people tend to overplay parts. It's a lot easier to fill in the blanks than it is to get rid of things. I'm always looking for the simplest way out, because a lot of other parts are going to be played around what you're doing. If there's a specific bass line or rhythm being played by the melodic instrument, I'll work off of that. I don't try to dictate what I think the song should be, rather I listen to the song and have it speak to me. I usually like to get a bass line playing along so that I'm not just humming the song in my head."

It's often crucial to capture the feel of a real drummer. If you're a drummer, or have access to one, you can program with real feel by playing triggered acoustic drums or MIDI pads into a sequencer. Franco has the ideal setup. "For a rock thing, I'll play real drums and trigger the Forat F-16 sampler, which responds in less than a mil-

DRUM PATTERNS OF THE STARS

Jimmy Bralower has created drum parts for many of today's top recording artists. **Fig. A** is the basic pattern used to create the drum track on "Pretending" from Eric Clapton's *Journeyman* album. According to Bralower, "The drum program was written to a pre-recorded track. Because of this, I manually recorded a quarter-note click on the multitrack and synchronized the final sequence to tape with a Garfield Time Commander.

"The hi-hat and tambourine parts were played with sticks on a drumKAT into an Akai MPC60 and then quantized with a shuffle value of 55, which is very subtle. This value was determined by trying out various quantizing options and listening to each one. Once I got a groove that felt good, it was used as the basis for the whole drum track. The tambourine is a sample of a shake, not a strike. The kick and snare are pretty ambient and aggressive for this track.

"The track is basically a 2-bar loop with an extra kick drum at the end of every four bars. This loop plays through the whole song except the chorus, which was written using bars 4 and 5 as the foundation. This put the extra kick drum every two bars and gave the chorus a feeling of lift without really changing the parts. Any deviations in the kick and snare parts were written using the hi-hat/tambourine loop as the foundation. Fills were played on the pads into the sequencer with whatever quantization suited each fill."

Joe Franco provides an example of his drum programming from Taylor Dayne's recent album, *Can't Fight Fate*. Apparently, producer Ric Wake had a few guidelines for the first single, "With Every Beat of My Heart." According to Franco, "He told me the groove had to have the kick on one and three and the snare on two and four. So I had to use other ways to spice it up. He also asked me to come up with a cool drum intro since this tune would kick off the album.

FIG. B: Joe Franco's basic pattern for "With Every Beat of My Heart" from Taylor Dayne's *Can't Fight Fate*.

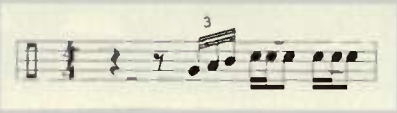

FIG. C: This fill finishes the intro to "With Every Beat of My Heart".

"Because this was a dance-pop tune, I came up with a broken sixteenth-note hi-hat part (**Fig. B**), which I played on a drumKAT into an Akai MPC60. Quantizing to sixteenth notes with a swing factor of about 58 percent gave the groove a certain hop. I also played a conga rhythm with accents on the upbeats between the kick and snare, which added some bounce to it.

"For the intro of the tune, I thought four bars would be enough to grab their attention. I wanted the percussion to float in order to obscure the downbeat until the end of the intro. To achieve this, I started bar 1 on beat 4 with a floor tom combined with a deep Simmons V white-noise tom. This gave a strong downbeat effect that leads you to think that beat 4 is beat 1. You're led through the next three bars with occasional bongo riffs, conga grooves, and hi-hats, wondering where the downbeat is until the end of the fourth bar, where the last drum fill (**Fig. C**) kicks into the song."

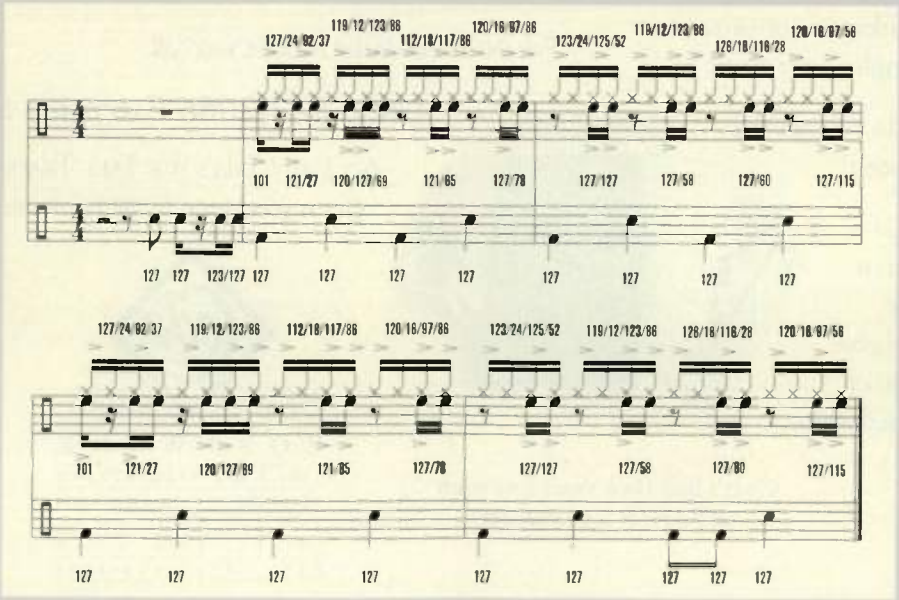

FIG. A: Jimmy Bralower's basic pattern for "Pretending" on Eric Clapton's *Journeyman* album. The numbers near each note indicate its MIDI velocity, illustrating the effective use of random dynamics. (The top staves are hi-hat and tambourine, the bottom, kick and snare.)

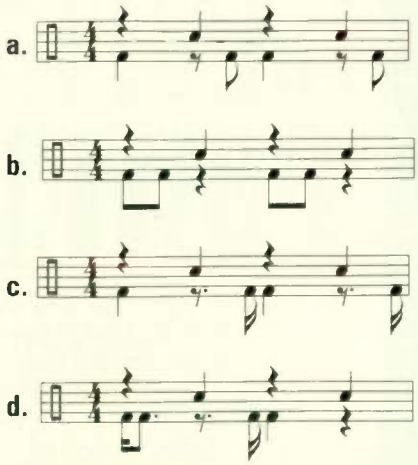

FIG. 5: Try combining these kick and snare patterns with the hi-hat patterns in Fig. 4.

lisecond. That way, you've got real feel, real cymbals, real everything.

"I've also started experimenting with Digidesign's *ProTools* on the Macintosh. It provides four tracks of digital recording when combined with Opcode's *StudioVision* MIDI sequencer. I play a pad kit with acoustic cymbals, hats, and rides. You put up four mics: two overheads, a hi-hat mic, and a ride cymbal mic. The MIDI information from the pads goes into the sequencer, and all the cymbal stuff is real, recorded direct-to-disk. I'm using that on the new Taylor Dayne album."

SAMPLES

Playing the correct notes or rhythmic combinations isn't enough: That's still only a small part of the overall feel. A good drummer *draws* the sound out of the drums by the way he or she strikes the drums. How do you draw the sound out of a black box? You can't, at least not in the acoustic sense of sticks or hands on skins. But you can learn to fake it pretty well.

For example, have you ever noticed that the pitch of a drum changes depending on how hard you strike it? Hitting a tom or kick drum hard produces a slightly higher pitch than hitting the same drum softer. The sound also changes in pitch and timbre, depending on *where* it is struck. In addition, successive hits on the same drum do not cut each other off, but continue to ring through their entire decay cycle. Simply using your drum machine's velocity curves to simulate dynamics helps, but you only get loud and soft versions of the same sound.

You need several samples of the same drum being struck at different volume

LASTING POWER

In a field where products come and go as often as Madonna changes hairstyles, it's remarkable to find two keyboards that continue to perform as industry top sellers year after year. The Kawai K4 and KIII Digital Synthesizers.

Frankly, we aren't surprised. There are good reasons why the K4 and KIII have been so popular with musicians and why they continue to be. First of all, they offer the kinds of sounds most in demand. Both are highly flexible in sound programming, easily updatable with tons of new sound programs that show off that flexibility, and best of all, sensibly priced.

Just take a quick look at the specs: KIII: 16 Voice Digital Synth, Multi-Timbral, Multi-Layering, 256 Waves, Digital FX, Velocity and Aftertouch, Retail Price $895.00. K4: 16 Bit, 16 Voice Digital Synth, 256 DC and PCM Waves, Multi-Sampled, Multi-Timbral, Multi-Layering, Resonant Filter, Digital Drums, Digital FX, Velocity and Aftertouch, Release Velocity, Analog, Acoustic and Digital Sounds, Retail Price $1445.00. Both units are also available in rack-mount form as the K4R and KIIIR.

But great specs are only part of the answer. The bottom line on the continued success of the K4 and KIII is something thousands of musicians already know: THEY PERFORM — consistently, professionally and reliably. And while they don't try to be the flavor of the moment, they do provide an unbelievably rich arsenal of sounds to complement setups from the most miniscule to the most fully blown. Get some lasting power out of your keyboards — add a K4 or a KIII to your set up. Better yet, a K4 *and* a KIII.

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Prices shown are suggested retail.

levels and perhaps at different points on the playing surface. This requires getting involved with the actual samples themselves, which often is possible only on samplers; many drum machines don't let you edit, or or even add to, their internal sounds. "Use your drummer smarts when you're making the samples," Franco says. "You can switch into different samples as you play harder (velocity-switching). There are lots of great samples out there, but the way the samples are programmed into your sampler is what makes them come alive.

"For example, if you were playing eighth notes on the closed hi-hat of an acoustic kit, you would probably play the downbeat with the side of the stick and the upbeat with the tip of the stick in order to get heavily accented downbeats. So you make one sample hitting the closed hi-hat with the shoulder of the stick, which you only want to trigger at, say, MIDI velocity 95 and up. Then make another sample of the tip of the stick on the top of the hat and use that whenever your velocity is under 95. I use two hard samples and two light samples, so I get four different closed hi-hat samples when I'm playing sixteenth notes.

"Then you need slightly open hi-hat samples and very open samples," explains Franco. "I want some of my slightly open hi-hat samples to be polyphonic, meaning that one stroke doesn't cut off the previous stroke. This is useful if I want to play a sloshy hi-hat and have each stroke ring out. Other times, I want the closed hat to cut off the open hat, which requires a monophonic program. So I divide my hi-hat samples into two different programs—monophonic and polyphonic. I use the entire drumKAT to play a hi-hat part."

Brawlower offers an additional tip on hi-hats, "There's usually no ambience in machine hi-hat sounds. Your drums appear to be in all this space, but the hi-hats are right in your face. Sometimes I'll play a live 2-bar hi-hat groove and sample it in the tempo of the song, which gives you a bar or two of actual playing. But you have to listen. The simple act of playing to a click and plugging it in doesn't mean it will feel better."

Franco elaborates on controlling samples. "Say you're playing an upbeat-and-downbeat, kick-drum figure, ba-boom. The downbeat is not only going to have a higher volume, but a higher pitch as well. Most samplers allow you to control the pitch with velocity, so when you play harder, the pitch of the drum goes up. Naturally, you don't want to do it drastically, but in a subtle way. You can program that stuff into a sampler like the Akai S1000. I also tweak the sample so that when I hit the drum lightly, I don't get the full attack; it doesn't start at 00, but farther into the sample.

"You can also assign three different MIDI note numbers to the same pad on the drumKAT," adds Fraco. "Every time you hit the pad, you get a different sample, up to three consecutive hits. You can put your toms on a separate MIDI channel and have three samples for each one, which gives you three different nuances. Every time you hit that pad on the KAT, you get one of the three tom sounds. And three is a good number because you never get the same sound on the downbeat if you're playing groups of four, such as sixteenth notes."

Bralower adds, "For ride cymbals, use a different sample for the accents. For snare drums, have a couple of samples of the same drum so you can use different sounds for fills. It's the quirky things about sounds that make them sit well in the track. A kick that's all attack and a snare that's all crack sound very one-dimensional in the track. A snare drum has the element of the stick hitting the skin, then there's the 'boink.' You don't want it to be too pure. Any quirks in a snare sample usually get eaten up as soon as you add the bass. If you truncate that extra little glitch out of it, sometimes it loses its personality in the track. Unless it's going to be a drum record and nothing else, it must be listened to in context. Don't treat drums as an isolated entity! Making it sound less than perfect by itself usually makes it sound better in the track."

PROGRAMMING FEEL

Tweaking sounds is important, but how do you program patterns that have a human feel? Perhaps the best way is to hire a real drummer to play the track. Barring that, here's what Bralower says on the subject. "You can make a machine play with feel; it's in the interaction of certain parts. On any good record, there are usually a bunch of simple parts that are interweaving with each other, not a bunch of complex parts. It's just how certain elements interact with each other that makes it feel good or not.

"I'll shuffle some things, taking one element and giving it a little bit of swing. Taking a straight sixteenth-note hi-hat and putting one or two notches of shuffle on it will take the edge off. Dynamics have a lot to do with it, as well. A knowledgeable musician will tend to smooth out the rough edges of a drumbeat in a rock tune. The rap guys leave this real nasty edge on it and quantize it to make it a little more nervous and jagged, so it slaps you in the face.

"Sometimes it's good to have a hi-hat playing eighth notes that are quantized and a cabasa playing sixteenth notes with accents and maybe a slight shuffle. Then you could have some congas or other percussion shuffling a little differently than that. So you get all these elements that are not quite mechanically locked up. But the trick is to listen and see if it feels okay. The simple act of shifting things so they're not dead-on is not going to make the part seem more live. I've come across sequences in which everything has been shifted so that nothing is on the downbeat. But in order for shifting to mean anything, something has got to be on the beat."

Franco adds, "The whole beauty of human feel is the hesitation and anticipation. You have a note that comes in a little bit before you expected it, and that surprises you. When you lay back a little, you build up anticipation and tension. If it's laid back by the same amount all the time—as it would be if you used track shifting—then that just becomes mechanical, too."

Even so, Franco finds track shifting useful. "You just put all the drums on different tracks, then you shift them around and play with them until they feel the way you want. The most common thing is to shift the snare. I'll lay back the snare a couple of clocks to make it feel better.

"Also, you don't always have to quantize 100 percent. Depending on the sequencer, you can 'soft' quantize. For example, you can quantize everything that's outside of a ten percent range. So everything that's further than ten percent from the nearest quantization point gets moved, while everything else stays where it is. It doesn't have to be quantized all the way, either. For example, if a note is ten ticks away from the quantization point, you can quantize by 80 percent and move it eight ticks closer instead of ten ticks. That's a really cool feature of *Vision*.

"You can also scale time with *Vision*," adds Franco. "Say I'm just playing along with the click for eight bars, but I'm not staying exactly with the click. I'm feeling the groove. Then I come down on bar 9 with a crash, but I didn't come out on bar 9, beat 1, click 0—maybe it was on click 20. With *Vision*, I can take the whole sequence and compress it to fit perfectly into eight bars. It's not quantized, it just takes your natural feel and compresses it slightly. Very cool for drummers. You can do that for each pattern and then string them together."

IN THE STREETS

Of course, there *are* some applications in which simulating a live drummer is not the desired goal. "The street stuff, the rap and dance stuff, is really based

around rhythms, not drum parts," Bralower says. "They're using the machines as beat boxes. It's just a bunch of rhythms with the sounds they choose. These guys have probably adapted to the technology better than traditional musicians who still feel that they have to use it as they would use a live set of drums. Creativity is the key. These guys are doing some amazing stuff, having freed themselves of feeling like they have to simulate what they'd play if they were sitting at a kit."

Franco echoes the growing acceptance of the drum machine as a new instrument with its own unique possibilities. "I used to try to make everything feel like a real drummer," he says, "but that's silly. If it's a dance track, it shouldn't feel like a real drummer. The machine is a different instrument. There's no way you're going to make it sound like a real snare drum, because the snare drum has so many different nuances. Some programmers fail to take the machine for what it is. There's nothing wrong with programming something that a drummer couldn't play. If I'm doing a pop song, and it sounds weird to stop the hi-hat, I'll keep the hi-hat going during the fill. Sometimes you don't want to disturb the groove for the fills. It depends on what you're going for.

"When I programmed the tune 'Someday' for Mariah Carey, I started out with a simple groove on the MPC60 and played with the swing factor until it felt right. After the overdubs and vocals were done, the original simple groove felt great so I just threw in a few fills, letting the hi-hat play throughout, and it was done."

FINALE

Whether it's a heavily quantized hammering of sixteenth notes that makes your body sweat with anticipation, or a silky smooth groove displaying all of the subtle nuance of a live drummer, there's a place for both extremes and everything in between when trying to program a drum part. The main thing is to know the capabilities of your equipment so you can let your music smarts take over and guide you to nirvana: the perfect groove.

Michael McFall, *former editor of* Rhythm *magazine, heads VDO Productions, a video production company specializing in music instruction videos.*

The Architecture of Pop

BY MICHAEL MOLENDA

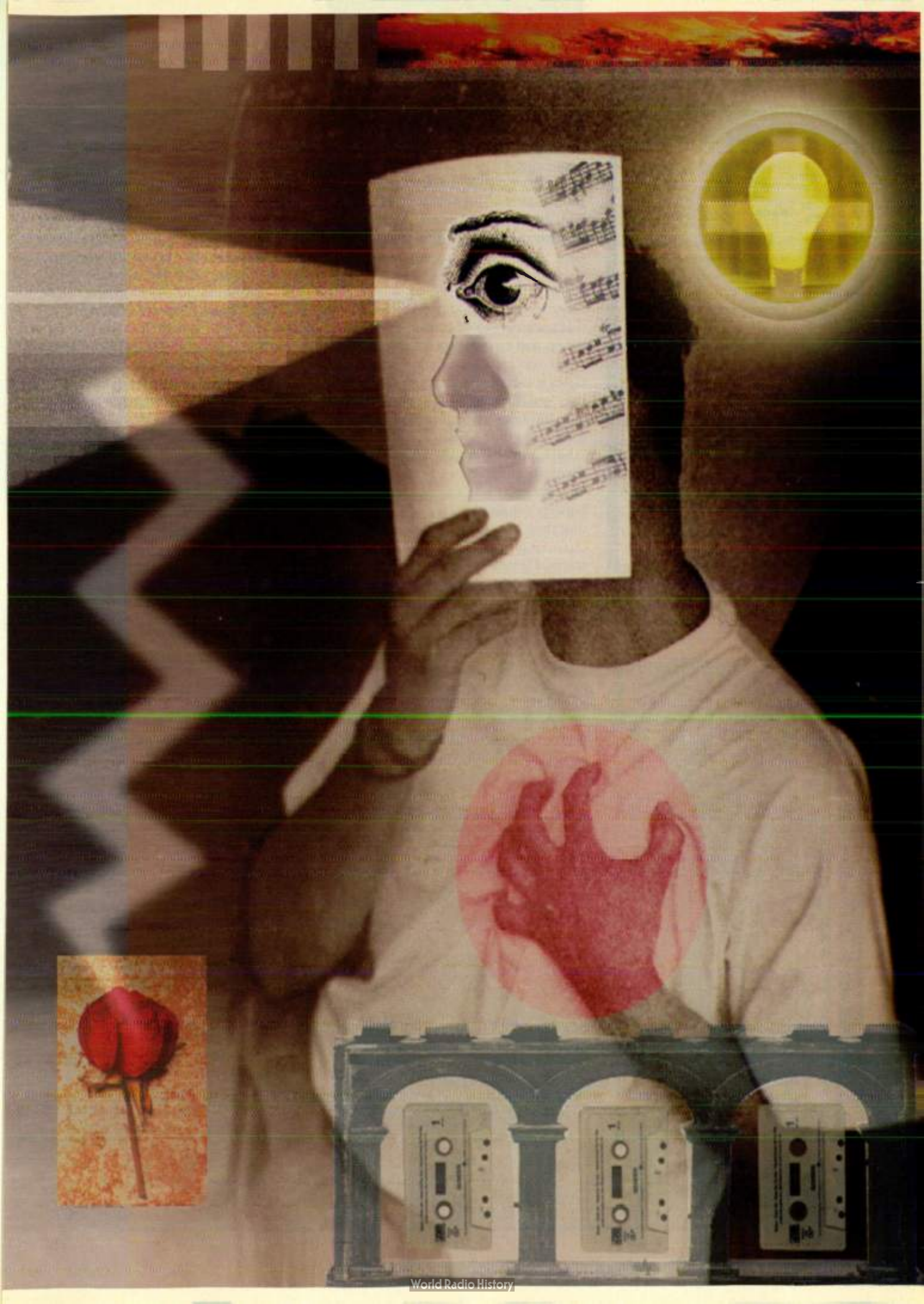
Musical chops alone can't build a house of hits. A sharp eye and a heart full of soul are important tools for successful songwriters.

I thought songs just happened. Divine inspiration. Little kisses from the muse. So I'd sit in a darkened room, awash in the misery of a shattered love affair, and wait for my hands to strum the chords of truth. Sometimes it actually worked. I never channeled finished masterpieces, but the main chord and melody structures blossomed like stop-action photographs of budding wildflowers.

Unfortunately, coherent automatic writing sessions are rare enough to be filed as miracles. Pop songwriting is a craft, a brutal mix of inspiration and refinement. Successful songs are forged by rewrite

ILLUSTRATION BY GORDON STUDER

COLLAGE PHOTOS BY FRANNIE JANE



NOT FOR SALE

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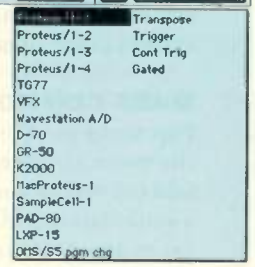
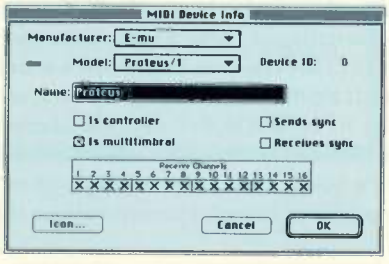
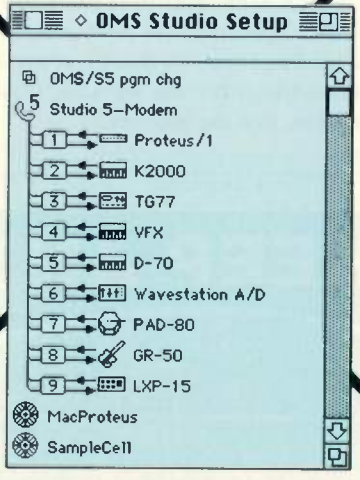
The Opcode MIDI System is software for the Macintosh that gives you a central location to store information about your entire MIDI studio. OMS shares this information with all OMS compatible applications, keeping track of "who's on first" while you get to play music.

OMS is included free with Opcode products such as Vision, Studio Vision®, Galaxy, Galaxy Plus Editors, MAX, Track Chart, and the Studio 5...with more to come in the future.





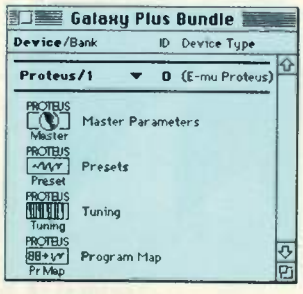
MIDI devices are described in OMS: manufacturer, name, controller, sync, and more. Each MIDI channel you set will automatically become a MIDI Instrument setting in Vision.



VISION

Each OMS compatible application uses the device names for your own MIDI setup and lets you choose them from simple pop-up menus. When you add a new piece of gear to your studio, tell OMS and all your programs will know about it.

In addition, OMS allows Vision to continue playing a sequence while you audition patches in Galaxy, or even edit patches in Galaxy Plus Editors!



GALAXY

OMS tells Galaxy which port each of your MIDI devices is on and what ID number it's set to, so you can get and send patches without a second thought.

OMS

OMS automatically searches for and then describes your MIDI interface. Using OMS with multiport interfaces such as Opcode's Studio 5 gives your applications easy access to hundreds of MIDI channels.

Now other developers, including Digidesign and Steinberg, are making their software OMS compatible too for the ultimate integrated MIDI studio setup.

OMS has integrated control of the Studio 5 and lets you test your studio and confirm connections; it says, *"MIDI received."* So get your free copy of OMS today — set it up and forget about it — and play music.

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homeless. However, it requires endless observation to visualize the fingerprints of a society. Read newspapers, go to the theater, check out art galleries, and frequent hip cafes.

Also, don't deny an important microcosm of society: yourself. How you relate to happiness and heartbreak is invaluable material. Everyone has suffered a broken heart, lost a loved one, or pined for simpler times. By writing about these subjects, the songwriter not only comes to terms with personal traumas, but enriches the experience of those similarly affected.

TITLES

The title of your song is extremely important. It is the first thing a music publisher sees, and arguably, the first thing the public actually hears when the tune hits the airwaves. This is your headline, so make it interesting. The less music-industry clout you have, the more you have to wow them. Barry Manilow can probably get away with submitting a song entitled "I Love You," but if you have no track record, *your* version will probably elicit a yawn and a quick toss into the no-no box.

There are many hunting grounds for unique titles. Anthologies of films and theatrical productions offer great ideas, as well as ancient books haunting the dusty stacks of libraries. Read everything you can get your hands on and write down phrases that catch your eye. It doesn't hurt to develop an ear for popular jargon. Above all, read, read, read. Devour billboards, ad campaigns, popular novels, museum catalogs, and supermarket tabloids. Great ideas are everywhere.

When I was developing a title for a song (co-writers) Neal Brighton and Jerry Stucker were composing for Huey Lewis' last album, I checked *Halliwell's Film Guide* and spotted a 1949 MGM movie entitled "Shadow on the Wall." I liked the idea, but the title didn't zing. After reworking the lyrics, the song metamorphized into "Shadows in Paradise." The title intrigued a representative of SBK Publishing, who agreed to shop the song to Lewis. Unfortunately, the song didn't make the album, but we developed a relationship with one of the largest music

publishing companies in the world.

LYRICS

The old truism about genteel people avoiding discussions of religion and politics should be enlarged to include lyrics. When I wear my producer hat, it's easier to convince artists to rearrange entire songs than get them to delete two words from a lyric. This is understandable. Lyrics are tremendously personal, and even silly lines can be sacred. (Once I witnessed near-fisticuffs over whether to leave all the "babies" in the line: "Baby, baby, baby, baby, baby, baby, you're fine.")

To date, I haven't seen a single lyric sheet that didn't need polishing. It's amazing how many people don't really *think* about what they are saying. Would you buy this magazine if the prose confused you? A pop song lyric should operate under the same rules as a newspaper. It should disseminate information with a concise, logical narrative. Say what you want to say with precision and, hopefully, wit. Obscure thematic references are great for theater works and literary snobs, but they often weigh down pop songs.

One of my old journalism teachers had a great rap about newspaper feature-writing that applies to lyrics: "Don't tell them, *show* them. I don't want to read that Ms. Movie Star smoked a cigarette, I want to know which brand, how she held it, and whether she sighed when she exhaled." You may not want to go as over the top as that, but I support the main point. Be visual. You're bringing a song to life, so use descriptive words. Other things to ask yourself: Have I avoided cliches ("you're sweet as honey," etc.)? Or have I twisted a cliche to advantage, a common technique in country songwriting? Does every word count? Is the narrative flow consistent? (Tangents are deadly in a three-minute song.)

MELODY

Every songwriting class and instructional book stresses the importance of "hummable" melody lines. They're right. A memorable melody is your best offense towards conquering the charts. Unfortunately, there are many opinions about what constitutes an effec-

tive pop melody. This is one of those things that is difficult to teach. However, I use a couple of tests to ensure my melodies are as hummable as possible.

First, remove any psychological effects imposed by the lyrics. I've found that a great lyric can make a melody "sound" better than it is. Play your melody on a piano (or other instrument) and tape it. Listen back. Does it capture your interest? Be sure to look for superfluous notes or sloppy construction.

When you're satisfied with the "naked" melody, edit the lyrics to match your rewrite and sing the song *a capella*. Do the words and music stand on their own? Be brutal. You should be able to walk around the block, singing your song to yourself, and have it knock you out. Don't stop refining until you catch your spouse, roommates, and friends humming the

THE EFFECTIVE DEMO TAPE

Nobody will know you've written a masterpiece unless they can hear it. A well-produced demo of a great song is money in your bank account. Yet few songwriters treat the demo tape with respect. When I receive dime-store-quality cassettes with penciled labels, I can't help but wonder if the writer attends job interviews in torn jeans. I usually listen to the tapes anyway, if only to remind myself about the drawbacks of being a nice guy. Sure enough, 99 percent of these demos are either poorly recorded, or downright unintelligible. Even more heartbreaking is the fact that I'll receive country and blues songs when my publisher listings clearly state I work with alternative rock, pop rock, and dance music. Doesn't anyone know how to read anymore?

The first trick to selling a song is making it easy on the person reviewing your material. Here's some tips that may keep your demo out of the garbage can.

Get permission to submit. Instead of wasting upward of ten dollars (labor, cassette, and postage) sending a demo to someone who may not want it, do the right thing and inquire about submission policies. Professionals appreciate professionalism. Another tip: No means no.

Give them what they want. Publishers are not shy about requesting specific material. If they ask for rhythm and blues, trust them. Besides looking like a fool, you're wasting time and money sending a rap song to someone seeking country tunes.

Make your point. Forget lengthy introductions and endless guitar solos. You're selling a song, not your instrumental prowess. Get to the heart of the matter fast, or risk the dreaded cassette-eject button. Also, don't include your entire repertoire. Three songs per demo tape is enough.

Make a record. For most of us, the days of piano-and-vocal demos are over. A song has a better chance of selling if it sounds "radio ready." This is especially important if you're target-writing for a specific artist. Make sure your arrangements are clean (don't over-produce), the instrumental tracks are hot, and the vocalist is sweating pure emotion. The sight of a publisher's mouth dropping open when he or she pops in your demo is well worth the expense and hassle of dressing up a good song with great players.

A chain is as strong as its weakest link. If your song is really good, it deserves to sound good. Don't pinch pennies by duplicating your masterpiece on cheap, normal-bias cassettes that sound dull and lifeless.

Clarity is appreciated. Buy some blank cassette labels and type the name of your song, the name of the contact person (or songwriter), and a telephone number. Don't force a publisher to read a nervous scrawl. Typed lyric sheets are mandatory.

Do what you're told. When a publisher gives permission to submit your work, follow their instructions to the letter. If they request a stamped, self-addressed envelope (to facilitate return of your package), don't betray a lack of comprehension by not sending it. You won't make friends by messing with their system.

melody unconsciously. Another tip: Don't compose the melody beyond the range of the average pop singer. You're probably not going to sell your work to an operatic diva. If a singer can't reach your high notes, they may pass on the song.

RESEARCH

I'm always amazed when people who claim to want to be "hit" songwriters show me songs that possess absolutely no hit potential. The musical introduction chugs along for twelve bars, three verses appear before the chorus, and an instrumental solo rages on for days. Publishers want to hear commercial songs (after all, they're in the business of selling tunes) and don't care about instrumental chops or how cleverly you've deconstructed the pop format. Don't mess with them. If you are an act (either a solo artist or band), there's some leeway for personal style. But don't push it. Leave the artsy stuff to your future producer; it's better to give record executives a clear idea of your songwriting chops.

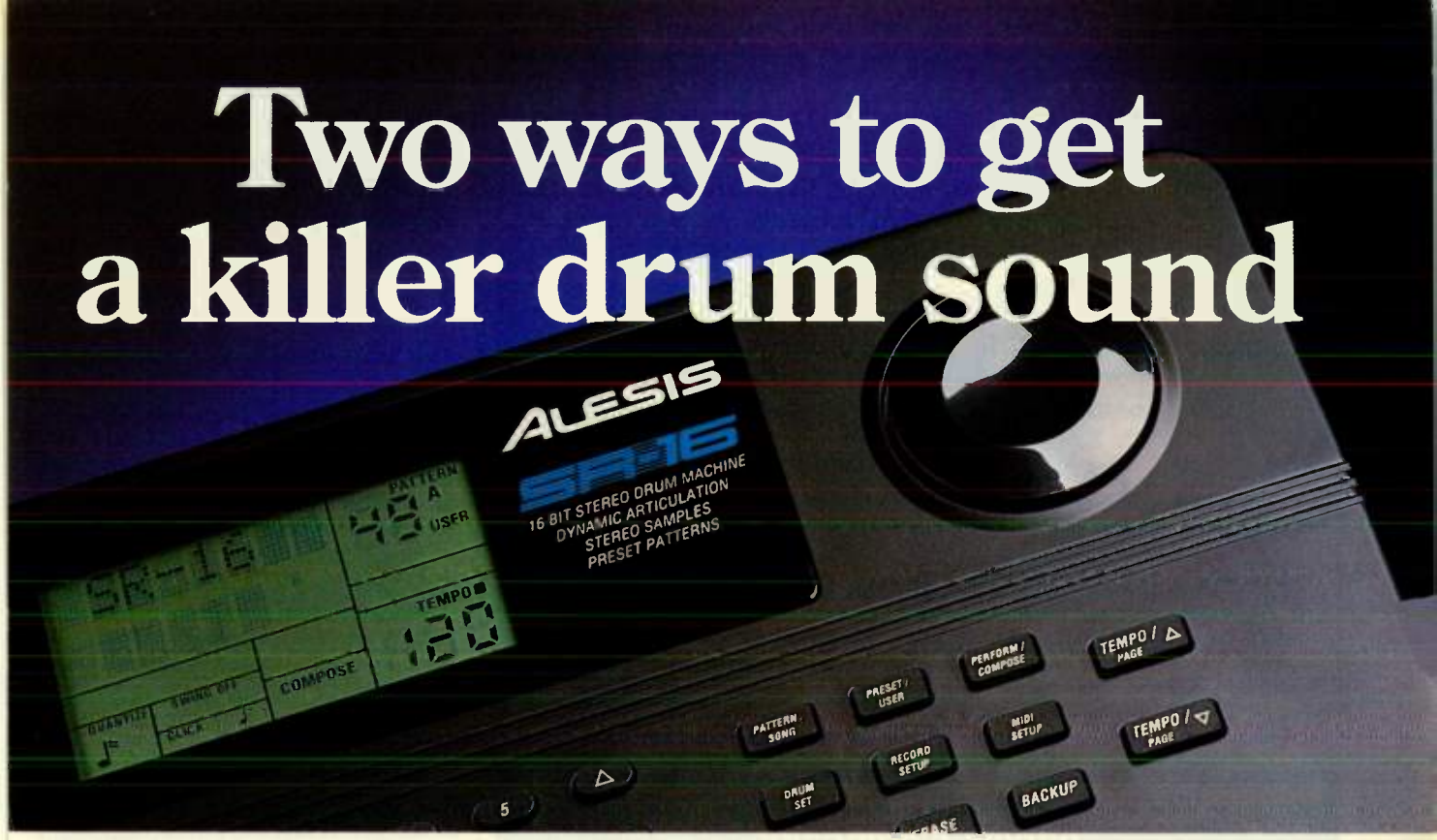
Again, study is the key. If you want to be a pop writer, memorize the *Billboard* charts, listen to the radio, buy the top ten singles (or albums), and dissect their formulas. It's so easy, and few musicians do it. I've met writers who tried to foist a "guaranteed" hit on me and could not name any of the top ten records that week. (Small wonder their songs always sound like retreads of bad 1970s-era blues rock, which is not a tremendously commercial medium in today's market.) *Billboard* is expensive, but the airwaves are free. Listen to stations that play the style of music you like and strive to write songs that sound better than what you hear.

TARGET WRITING

Sometimes opportunities arise to write a song for a particular artist or project. If you network enough and keep your ears open, all kinds of useful information may drop into your lap. We heard about Huey Lewis' song hunt because our studio clients were recording demo tracks for him.

Target writing is tricky. First, the song has to be better than anything

Two ways to get a killer drum sound



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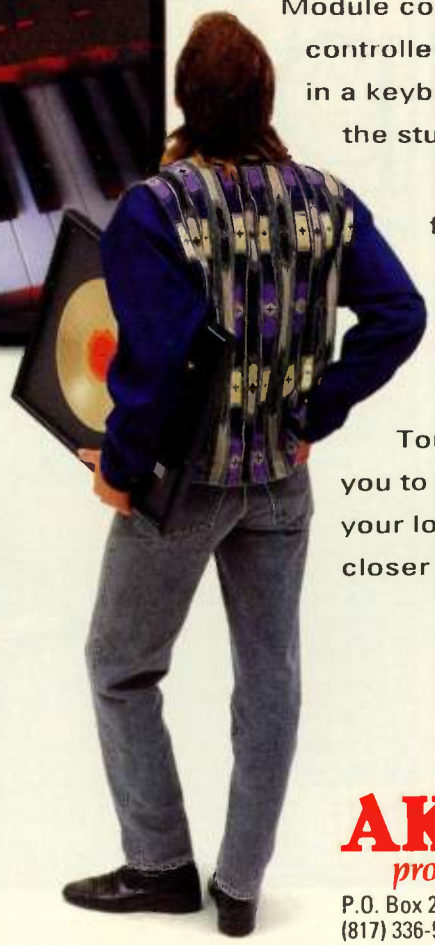
Now we could give you a list of fancy technical specifications, but without the product in front of you there's a lot left to be desired. After all, seeing is believing. Hearing is believing. Touching is believing. We invite you to put down this magazine, get to your local Akai dealer and take a closer look at some real masterpieces.



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MIDI Processing

By Scott Wilkinson

Slicing and dicing your MIDI signals may significantly enhance the potential of your MIDI studio.

PAUL DOLAN

Let's say you want to jam with a friend on two MIDI instruments and simultaneously record both parts into a sequencer. You plan to use a "Y" cord to combine the MIDI messages from the two instruments. Unfortunately, it's not that simple. Mixing MIDI messages is a tricky process requiring a specialized device dedicated to the task.

The type of device required, a MIDI merger, is one example of a *MIDI processor.* Similar in concept to an audio signal processor, a MIDI processor takes incoming MIDI messages, modifies them in some way, and sends them out to their next destination. This is useful in a variety of situations, so it pays to know something about MIDI processing if you use MIDI in any way. Obviously, it also helps to know a bit about MIDI itself, so you might want to review the basic concepts in "From the Top: What is MIDI, Anyway?" in the January 1991 EM.

Most MIDI processors resemble audio multi-effects processors in that they can perform several tasks at once. You can accomplish most processing functions described in this article with a single unit. However, each unit is slightly different in design and implementation, so have a clear idea of what you want a MIDI processor to do before you buy one. In addition, several available software programs turn a computer into a MIDI processor.

In **Fig. 1**, several MIDI devices and a computer are connected to a MIDI processor with four MIDI Ins and four MIDI Outs. Other processors range from those with one MIDI In and four MIDI Outs (e.g., Yamaha MEP4) to those with fifteen MIDI Ins and fifteen MIDI Outs (e.g., Opcode Studio 5). Some processors also can be connected directly to a computer's serial port, providing a MIDI interface in addition to their processing capabilities. Units in this category include the Lone Wolf MidiTap, Studio 5, and Mark of the Unicorn's MIDI Time Piece.

THE URGE TO MERGE

The solution to the problem described at the beginning of this article is a device called a *merger.* Mergers often are single-purpose devices, although most multi-processing units include merging capabilities. A merger has two or more MIDI In jacks from which it receives multiple streams of MIDI messages. These messages are combined, or *merged,* into one stream of messages that is then sent to a MIDI Out jack.

This process requires some sophisticated computer power to ensure that each message remains intact. A merger must keep track of MIDI message values and MIDI message types and merge different messages without breaking them up. Otherwise, the device that receives the messages from the merger might apply an incorrect value or become confused if the message isn't as expected.

Typically, MIDI processors also perform the opposite function, *splitting.* In this process, MIDI messages are sent to more than one device at a time, which obviously requires more than one MIDI Out. For example, this allows you to send a MIDI stream from the master keyboard to one or more of the sound modules and the computer for sequencing.

If a processor can send the data from any MIDI In to any MIDI Out, it provides the *routing* capabilities of a MIDI patch bay. In conjunction with merging and splitting, this allows you to send any MIDI signal to any device in the

Trevor Rabin says YES to DynaTek

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studio. Of course, beware of sending a MIDI signal from a device back to itself. This results in the dreaded MIDI feedback loop, which causes stuck notes and other weird problems, unless the device's *local* or *echo* function has been disabled.

COLD-FILTERED NATURAL DRAFT

Another important MIDI processing function is *filtering*, in which certain incoming messages are prevented from leaving the processor. You can filter all messages on a specific channel, specific types of messages on all channels, or specific types of messages on specific channels. In **Fig. 1**, for example, you might want to filter the MIDI Clock messages coming from the computer, because there is no other equipment that must be synchronized (for more on sequencing and synchronization, check out "From the Top: Sequencing Made Easy Parts 1 and 2" in the March and April 1992 issues of **EM**).

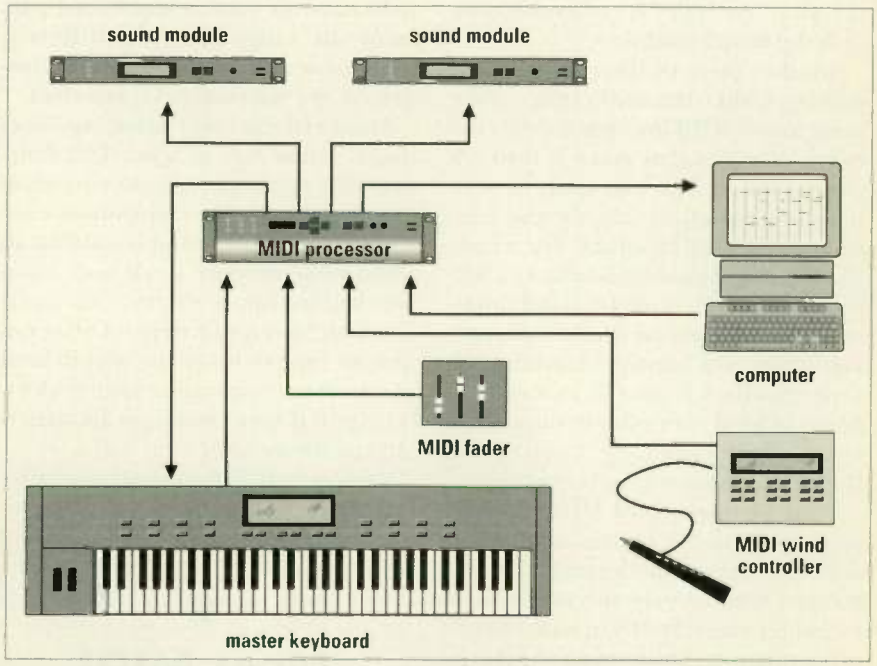
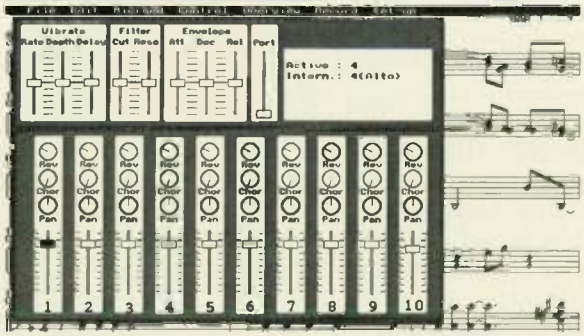


FIG. 1: A MIDI processor with an onboard MIDI interface is used to connect a master keyboard, wind controller, MIDI fader unit, computer, and two sound modules.

Filtering primarily is used to prevent unnecessary messages from clogging up the MIDI stream. For example, the wind controller in **Fig. 1** sends Aftertouch messages in response to changing breath pressure, but the sound module it's controlling doesn't respond to Aftertouch. The MIDI processor should be used to remove Aftertouch messages from the channel on which



The Mixer lets you change Volume, Pan, Chorus, Reverb and GS-parameters as the music is playing. The Drum Mixer (not shown) lets you change Volume, Pan, Pitch and Reverb for each individual drum (GS-instruments only).

the wind controller is communicating with the sound module.

Another form of filtering is called *limiting*. Unlike the audio effect of the same name, MIDI limiting restricts the range of values that make it through the processor. This can apply to note numbers as well as velocity and continuous controller values. For example, if a sound module produces a bassoon-like sound, it might sound unsatisfactory if played far outside the normal range of a bassoon. Limiting the note numbers from the master keyboard or wind controller to those within the appropriate range ensures that the module always sounds reasonable.

Some people record MIDI Volume messages into the sequencer to automate the mixing of electronic instruments. Unfortunately, this uses a lot of computer memory. If you want to conserve memory while using this technique, consider *thinning* the data stream from the source of the MIDI Volume messages.

For example, the MIDI fader unit in **Fig. 1** sends Volume messages to the computer, which records them in the sequence. By thinning the MIDI stream from the fader unit, some of the Volume messages are removed from the stream. The processor might remove only odd-value data bytes, which cuts the number of bytes in half. This conserves sequencer memory but can result in audible steps between values, so thinning should be used with care.

MIDI processors often are used to simulate an audio delay. Incoming MIDI messages are held in the processor's memory for a user-specified period of time and then sent on their way. This is used primarily with Note On and Off messages to create a delay effect. If you use this process to generate several delayed copies of the original notes, the polyphony of the receiving sound module decreases because it must play the same note several times.

MAPPING THE UNIVERSE

Most MIDI processors modify incoming MIDI messages in various ways, a process known as *mapping*. A common type of mapping is *channelization*, in which messages coming in on one channel are sent out on a different channel. This is particularly useful if your keyboard or other master controller is older and only can send on one channel. You also can use channelization to send a sequenced part from the computer to a different instrument without changing the channels on the instruments themselves.

Another important mapping function is called *bias*, or *offset*. This function adds a constant value to note numbers, velocities, or continuous controller values. For example, adding an offset value of seven to all note numbers will transpose all notes up a perfect fifth (seven half steps). Offset values can raise or lower the overall level of velocities or controller values, which is helpful if these messages are generally too low or high.

Velocity and Continuous Controller values also can be *scaled*, which multiplies each value by a user-specified number. For example, the original Yamaha DX7 sends Velocity values only up to about 95. Multiplying each Velocity value by about 1.25 will "widen" the range of Velocity values sent to any sound module.

▼

Most MIDI processors modify incoming MIDI messages in various ways, a process known as *mapping*.

Scaling also reduces the range of values. For example, the wind controller might reach the maximum Aftertouch value before you reach maximum breath pressure. In this case, multiply the Aftertouch values by 0.5 or 0.75 to accommodate the range of your breath pressure.

As you may already know, MIDI messages range in value from 0 to 127. Some MIDI processors provide a *reversal* function, which converts a high value to a low value and vice versa. For example, by reversing the note numbers of incoming Note On and Off messages, you can play an ascending scale on the keyboard and hear the receiving sound module play a descending scale. This function also can be applied to Velocity and any Continuous Controller message. The "midpoint" about which the values are reversed is usually 64; a value of 63 becomes 65, while a value of 107 becomes 20, and so on.

One of the most useful mapping functions is called *conversion*. In this process, any MIDI message is converted into any other MIDI message. For example, in the pictured system, the wind controller sends Aftertouch in response to changing breath pressure, but the receiving sound module only responds to MIDI Volume. The MIDI processor can take the incoming Aftertouch messages and convert them into Volume messages. You even can send both types of messages—Aftertouch *and* Volume—from the MIDI processor, but this often clogs the MIDI stream with lots of messages. It also can cause the receiving unit to audibly slow its response. To send both types of messages, consider thinning the stream.

GETTING IT TOGETHER

As mentioned earlier, most MIDI processors perform several tasks at once. Among many other applications, this lets you add sophisticated master controller functions to instruments that lack them. For example, the master keyboard in **Fig. 1** can transmit MIDI messages on only one channel across the entire keyboard. Using the limiting and channelization functions of the MIDI processor, notes from the lower and upper halves of the keyboard (called *zones*) can be sent on different channels. Not only that, notes with different velocity values can be sent on different channels as well. This is known as *velocity switching*.

As you can see, a MIDI processor is a highly useful addition to any MIDI studio. If you have a computer, you might consider a processor that acts as a MIDI interface as well. With processing, routing, and interface capabilities, MIDI processors offer considerable power and enhanced functionality. If you use MIDI, a processor just might become an indispensable part of your setup.

EM *contributing editor* **Scott Wilkinson** *channelizes all his messages to avoid miscommunication and merging errors. If only real life were so simple....*

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Multimedia Sound

By David (Rudy) Trubitt

Creating sound for multimedia projects requires knowledge of the tools and delivery platforms.

PAUL DOLAN

Multimedia may well change the way we interact with computers. If it does, part of the reason will be the increased use of sound in this new paradigm. As musicians, we're all aware of the significant difference that a soundtrack or any sonic element makes. But many computer jockeys aren't well-schooled in the world of audio.

To help them take best advantage of this new realm, they'll need assistance. That's where we come in. But how do you get started if you land a gig doing audio for a multimedia project? This column will run down the key points to consider when taking on such a project, but the focus will be on the most important aspect of multimedia sound: digital audio.

AUDIO MEDIUM

How is sound used in current multimedia projects? "We're trying to treat our projects like movies," says Mark Seibert, music director at game developer Sierra On-Line. "We use multiple layers of sound—music, sound effects, Foley, ambience, and dialog." Not all developers are creating interactive games, but the sonic elements described by Seibert are common to many projects.

Unfortunately, the low-level sound capabilities of most machines are not up to the task. Speakers mounted inside computers are meant to make warning beeps, not to play music or dialog. Concern for sound quality has increased, but the audio specs of many computer audio products are lower than they should be. Eight-bit audio at a 22 kHz sampling rate and 2-operator FM synthesis are the norm, although sophisticated products are available.

But remember, sound is just one medium among the multis. It's not practical or necessary to have CD-quality audio in every application. Even with lower-quality digital audio, sound takes up a lot of space. For this reason, most titles are delivered to end-users on CD in one of several formats (see sidebar "CD Formats"). Part of your job will be determining an appropriate level of fidelity for the project at hand.

Another major issue is synchronization between your audio and the other elements of the project. With the exception of *QuickTime* (see "Computer Musician: Computer Movies" in the November 1991 **EM**), reliable sync currently is a hit-or-miss affair. Although computer audio usually has a fixed playback speed, the attitude toward video typically is "make it go as fast as possible." In fact, faster screen redraw is a major reason people buy speedier computers. Without a single sync source for all parts of the project to follow, the timing will be at the mercy of the user's computer speed. Programmers can play some tricks without a "master clock," but it's a difficult proposition at best.

FOR EXAMPLE

Before we get into any more details, let's consider a brief case-study for a look at the overall flow of things. *Verbum Interactive* is a Macintosh-based interactive extension of *Verbum* magazine on a two-disc CD-ROM set. Terry Barnum was part of the team at GTE ImagiTrek in San Diego responsible for the Interactive Roundtable portion (essentially the whole second disk). The roundtable presents an interactive panel discussion with six multimedia experts from several fields. To control the roundtable, click on a question and then click on a panelist for their video and audio response.

"All the panelists were shot on Hi-8 video tape and edited on an Avid

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which includes graphics, music, sound effects, and animation intended for use in custom multimedia presentations. "The *Clip-Media* CD-ROM comes in Mac and *Windows* versions, which are roughly equivalent," says Chuck Walker, who worked on the project.

"The transfer of the *Clip-Media* sound files between the PC and Mac proved troublesome," he continues. Although the team had a rewritable optical drive connected to a PC and a Mac, the data was not read properly from the disk. Their solution? "We ended up stuffing everything over a serial cable with *Lap-Link*. It took two days. It was like moving the Pacific Ocean with a teaspoon."

Once the data was moved, things went smoothly. "The Microsoft Multimedia Development Kit comes with conversion utilities for graphics and sounds," adds Walker. "It takes any Mac AIFF file and converts it to a .wav file for *MME Windows* [a special version of *Windows* with Microsoft's *Multimedia Extensions*]. It's simple, and it works. Out of three or four hundred files, only one got blitzed."

You may need to accommodate a variety of playback hardware as well. On the PC front, there are many different audio cards, not all of which are compatible. Fortunately, *Windows* isolates individual applications from the specifics of the sound hardware by using device drivers that are written only once. Macs and Amigas are more standardized: They both have built-in digital audio playback capabilities (although Macs are limited to 8-bit playback without external hardware).

With luck, the final product comes out of a little bookshelf speaker. If not, all your work goes through a tiny internal speaker mounted inside a metal box with a noisy fan. Thankfully, manufacturers are taking greater note of audio's increasing role in multimedia projects. There are people who are actually trying to design computer cases that double as real speaker enclosures. Also, more external sound equipment of higher quality is becoming available. What all this means is that it's a good time to explore the possibilities, and maybe even make a little money while you're at it.

David (Rudy) Trubitt *grew up in Hawaii. He can be found on the Internet as trubitt@well.sf.ca.us.*

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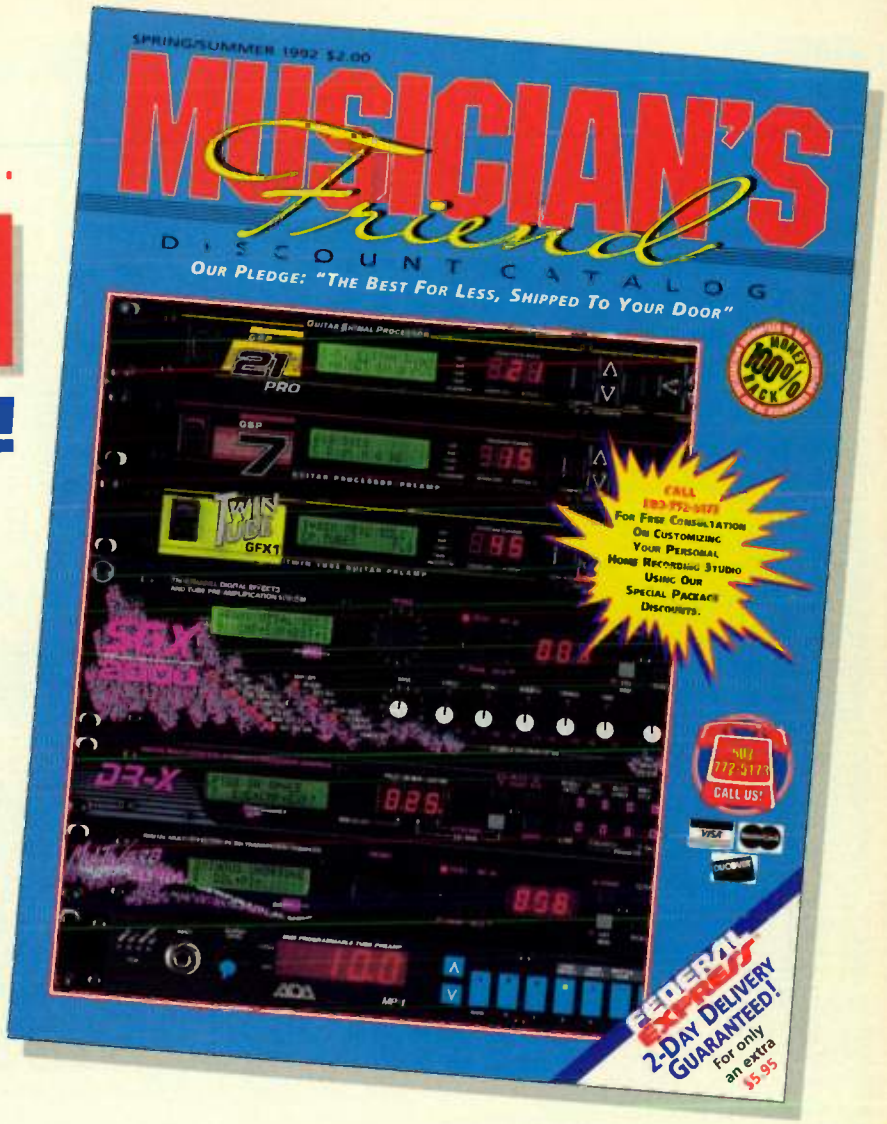

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Solo MIDI Performance

By Frank Macchia

The trials and tribulations of making music alone.

It's a warm, prehistoric night. The tribe is wild with anticipation as Og raises two hunting clubs to begin a solo rhythm performance on the cave walls. Thousands of years later, in a medieval grove, Eric the wandering minstrel sings of love's bitter sting to an audience of serfs. And today, in the Lizard Lounge of Anytown USA, Joey Blutowsky performs an emotional rendition of "Feelings" to an enthusiastic party crowd.

Solo performance has been an entertainment staple since the dawn of time, and the genre's crown jewel is the one-person band. Thankfully, modern technology has replaced multi-limbed percussion attachments with MIDI systems. Today's solo MIDI performer can team up with a sequencer (hardware or software) to conduct an entire "orchestra," slam down dance grooves, or riff over a bebop "band." It's also possible to do an entire solo performance in real time.

MUSIC FIRST

Don Lewis, one of the pioneers of solo synthesizer performance, not only began his career before MIDI, but before synthesizers. In 1966, Lewis performed one-person shows on a Seeberg organ with footpedals and a built-in rhythm unit. He eventually moved to a Hammond X-77, Wurlitzer electric piano, and an Acetone rhythm unit.

Then the fun began. When synthesizers entered the scene, Lewis consulted with ARP. He created his own live-performance rig by wiring the contacts of his keyboard to several different sound modules, including early ARP synths and organs.

"Today, everyone has access to the same equipment and sounds, so you must market your individual talents," stresses Lewis. "The music comes first; don't become a slave to your equipment."

Lewis doesn't even use sequencers because he feels they inhibit interaction with the audience. Instead, he plays along with a pre-programmed drum machine, allowing time for inspired moments to happen rather than being forced to move on to the next section of a song because the sequencer won't wait. This keeps the music fresh and spontaneous, and enlivens audience interest. (Remember, this *is* live music.)

VENUES

Once you have established your musical style, you must find suitable venues in which to perform. If you're into atmospheric music, you will find suitable venues in cocktail bars, hotel lounges, restaurants, shopping malls, and department stores. However, if you can't stomach the thought of fading into the background, add a drum machine and enter the Top 40 world of dance clubs, wedding receptions, and private parties. The inspired solo performer who wants to create and perform original music may want to aim for concert halls or churches.

GEAR

Okay, you've figured out where you'll play and the type of music you'll perform, and you've practiced all your tunes on the piano. What equipment do you need to put on a good show? Lewis recommends two keyboards. One should have 88 keys to provide the full range of a piano and an extensive bass range that won't interfere with another sound mapped higher on the keyboard. The second keyboard can be a 61-key unit and should include a variety of sounds.

Look for a keyboard or tone generator that lets you play a sound, hold it with the sustain pedal, and then switch to a new patch without cutting off the sustained sound. This feature allows smooth transitions between patch changes or even songs.

A drum machine usually is necessary, unless you're doing totally non-rhythmic music. The main features to look for are a vast number of programs and the ability to easily modify or change patterns in the middle of a song.

If you can't afford multiple keyboards, look for a single keyboard that offers multitimbral operation and the ability to switch sounds on the fly with easy accessibility. Lewis uses a Yamaha HX-1, an organ-style instrument with two keyboards in addition to bass pedals. His external sound modules include Roland's U-220, Sound Canvas, and R-8 drum machine.

There are always problems to overcome, and chief among them is power fluctuation. Always make sure that your gear is plugged into a power surge suppressor. This helps avoid those wonderful moments in the midst of a great performance when you have to tell the audience there will be a short break while you re-boot your synths. Also, try to keep your MIDI system as simple as possible, and keep cable runs short.

Sequencing has become more commonplace in live performance. As mentioned earlier, Lewis doesn't use a dedicated sequencer for his live performances in order to encourage spontaneity. Others disagree, saying that sequencers free them to solo while the bass line and other rhythm parts are played automatically.

If you decide to use a sequencer for live performance, be sure to consider how much song memory it provides and how much you need. Also, note the time it takes to access and load song files. You may have to keep a few jokes on hand to tell while awaiting the dreaded "Loading song file...this may take a moment" message.

IMPROVISATIONAL PRODUCTS

Creating a one-person band doesn't necessarily limit the player to static patterns. There are several products that automatically generate different accompaniment parts based on a user-specified "style" and chord progression. Most of these products are software programs for one computer or

another, which requires you to lug another piece of equipment to the gig. Fortunately, many of these programs can run on small laptop computers.

MiBAC Music Software (tel. [507] 645-5851) produces *MiBAC Jazz*, a jazz improvisation program for the Macintosh that composes authentic jazz rhythm parts (piano, bass, and drums) from user-specified chord progressions. These parts are sent over MIDI to external sound modules. In addition, the software provides a variety of jazz styles in which to play.

Band-in-a-Box from PG Music Inc. (tel. [416] 528-2368) also generates musical accompaniments from user-specified chord progressions. More than 100 pop and jazz styles are performed by a "rhythm section" of bass, drums, and piano or guitar, each of which is played back on your MIDI sound modules. *Band-in-a-Box* is available for the Macintosh, Atari, and PC.

A new company called Soundtrek (tel. [404] 623-0879) has introduced *The Jammer* for the PC. This program lets you enter the chords of a song and provides a high degree of control over the parts it generates and sends to external sound modules over MIDI. In addition, the program includes a 256-track sequencer. It even will generate a chord progression if you've run out of ideas.

SYbil (GHS Music Products, tel. [616] 968-3351) is real-time performance software for the Macintosh or PC that lets a musician control up to four instruments per note from a single MIDI controller. Unlike programs that provide traditional accompaniment parts, *sYbil* maps incoming MIDI messages in a variety of ways, extending the capabilities of your instrument. In essence, it causes the computer to follow you, rather than forcing you to follow the computer. For example, the program speeds up and slows down as you play at different tempos.

In the hardware department, Roland (tel. [213] 685-5141) has incorporated their Intelligent Arranger into a variety of products, including keyboards, sound modules, and stand-alone units. The Intelligent Arranger generates a 5-part arrangement in a variety of styles based on the notes or chords you play on the keyboard. Your progression can be stored, or the Arranger will generate one for you. The generated parts can be played on the internal sound module and/or any type of MIDI instruments.

THE BOTTOM LINE

As much as we love music and perform for the pure pleasure of it, all this equipment isn't free (unless you won it in a contest). Remember that this is the music *business*; it is important to decide what to charge for your services. You can check your local music union's wage scale, but generally a solo performer should get double or triple a regular sideman's pay. After all, the soloist often is playing multiple synths, laying down bass lines, and programming a drum machine. If you can sing, your value increases. Also, one night stands should pay considerably more than three- to six-night "residencies," due to equipment cartage costs as well as wear and tear.

A good formula to determine a reasonable net wage for a gig involves adding *all* your expenses and subtracting them from the gross pay. Be sure to include 20% tax, depreciation of equipment, insurance, promotion, phone calls, and other related business expenses. (If you end up losing $100, you may want to reconsider what you're getting paid.) Always try to "get what you're worth." Of course, this is very subjective and difficult to calculate. However, if you're bringing in a consistent crowd (and the club is making money), don't be afraid to renegotiate for suitable compensation.

In the midst of this recession, many musicians are beating their heads for ways to make more money. Admittedly, lounges and weddings seldom make a pro's wish list of dream gigs. But paying the rent (or having the funds to buy desired gear) is a strong incentive to maintain an open mind. If you already play keyboards in a band, or are MIDI-conversant, it pays (literally) to maximize your potential as a one-person MIDI orchestra.

I'll even give you a tip for psychological survival: Don't let the gig get you down. You should think only of the benefits. Once the set-up is completed, you get all the solos, no one steps over your vocal or complains about billing, and you get to spend all the money yourself.

Frank Macchia *is a composer and saxophonist who leads a double life as Frankie Maximum, purveyor of wild jazz/R&B music.*

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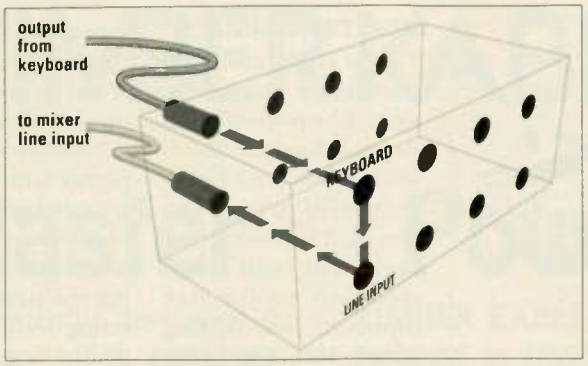


FIG. 1: A normalled patch point.

Not surprisingly, unnormalled patch points commonly are used to access outboard gear such as noise gates, delays, and reverb units.

To simplify home studio operations, I often normal (or dedicate) an aux send from the mixer to the input of a reverb unit. This makes mixing easy, since Aux 2 always is Reverb A. No patching is necessary. During tracking, if I want to feed a guitar directly into Reverb A, I simply break the normal on the patch bay with the guitar cord. The connection with the aux send is cut off, and the guitar is routed directly into Reverb A. Without benefit of a patch bay, the engineer would have to disconnect the aux send cable and replace it with the guitar cord.

If you don't want the signal to disappear when a patch cord is inserted, you can use *half-normalled points*. These continue to route signal through the patch bay, even when broken by a patch cord (Fig. 3). Half-normalled points are useful because they allow the engineer to "Y" a signal to two different locations.

SYSTEM SELECTION

Deciding which patch bay to use for your personal recording system sometimes comes down to a matter of free time. Most TT systems are wired via solder lugs or terminal blocks, and these require eons of wiring time to set up. However, one of the advantages of all this work is that you can wire normalled or unnormalled patch points wherever you need them.

Cost is another factor. While the price difference between TT and 1/4-inch patch-bay frames is negligible, cable costs are another matter. TT patch cables cost approximately ten dollars each. If you have a large patch bay, the patch cords alone can cost hundreds of dollars. (Just count all those signal processors you own.)

Since most semi-pro recording gear runs at -10 dBV, with unbalanced lines, 1/4-inch patch bays offer home studios a lot of advantages. First, the patch cables are inexpensive and easy to make. The price of one TT cord buys several 1/4-inch cables. On top of that, the rear panels of most 1/4-inch patch bays are prewired with RCA or 1/4-inch jacks. Since 1/4-inch jacks (both balanced *and* unbalanced) are the standard for most musical instruments, you're already wired and ready to go. You spend less time with a soldering iron and more time making music.

Unfortunately, every manufacturer configures their prewired patch bays differently, so exercise care when shopping. For example, Tascam makes 1/4-inch patch bays in rows of sixteen, while ProCo offers a similar frame with rows of 24. In addition, some manufacturers make it easy to switch prewired points between normalled and unnormalled, while others make it nearly impossible. So before you buy a prewired model, make

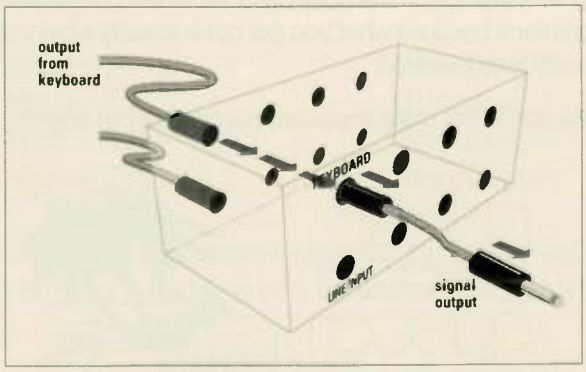
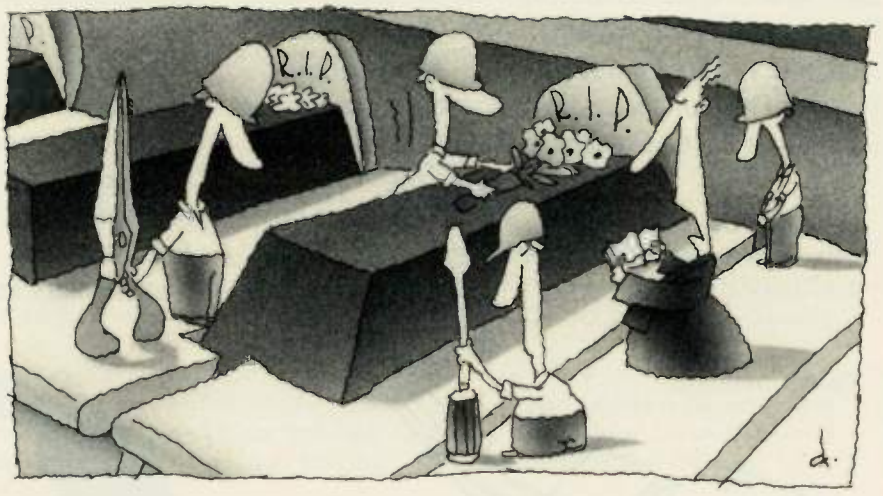


FIG. 2: To reroute a signal path, the user "breaks" the normal with a patch cable.

Questions and Answers

By Alan Gary Campbell

Our dean of service deals with dead D-70 keys, spots suspect solder joints, and corrects crumbling Clavinet hammer tips.



JACK DEROCHER

Q. I have a Roland D-70 with a key that goes dead at times. I had a service tech look at it, but he found nothing wrong. It's not really intermittent; at times it's just *dead*, and the problem affects all the sounds. The key feels okay. Any suggestions?

A. It seems likely the technician has checked for debris, a dirty contact, or a defective (torn) membrane switch. Since the problem affects only one key, that leaves in question only the associated matrix diodes and the PC traces that connect to the key contacts. Have the diodes replaced and the continuity of the traces checked. It may be necessary to replace the contact board, as an intermittent trace on a PC board of this type can be difficult to find and problematic to repair.

Troubleshooting tips: On matrix-scanned keyboards, failure of a single key generally is caused by contact/switch contamination or failure, a defective diode, or an open trace. Failure of a group of keys, usually eight, nine, or ten in a row (on 61/64-, 76-, and 88-note keyboards, respectively), usually is caused by a defective keyboard cable/connector or keyboard multiplexer/demultiplexer IC. Failure of one or more notes that move around (i.e., that affect different keys at different times) generally is caused by a voice-circuit failure and is not related to the keyboard circuit.

Q. I have an Ensoniq EPS sampler that has had the keyboard update installed, but sometimes it still exhibits keyboard-calibration errors on power-up, and sometimes it locks up. Obviously, this is not normal. The store technician says I need to have a new keyboard update installed. I like my EPS, and I don't mind taking it back in, but is this legitimate?

Q. Some VFX, VFX^{SD}, EPS, and EPS 16+ units exhibit keyboard-calibration errors and system glitches related to problems with the connectors used on the coil boards (keyboard PC boards). Since the polyphonic-aftertouch keyboard used in these models has its own microprocessor, and system data is routed through it, keyboard-circuit problems can cause a unit to lock up. Though the symptoms are annoying and disquieting, the problem is simple to fix and does not affect the subsequent reliability of the instrument.

An early update to fix this problem involved defluxing the connector contacts, upgrading the Poly-Key keyboard operating-system ROM, and changing two resistors. However, the update has been changed to simplify implementation and improve reliability. Currently, the coil-board connector is bypassed with hard-wired jumpers; no ROM upgrade or resistor change is necessary.

Ensoniq now uses a different type of connector that prevents this problem. It seems likely that the technician in question installed the early update and now wants to install the current one. It's legit. This is *not* a user-installable update; refer the work to an Ensoniq authorized repair station. Keyboard updates, in-warranty or not, are supplied at no charge to the original owner of the instrument.

Service techs: This update applies to coil boards that use the 12-pin, single-row connectors *only;* new production units use the 20-pin, dual-row connector. The current update is explained in detail in *Ensoniq Service Bulletin #12.* Note that keyboard ribbon-cable problems can mimic connector-defect symptoms, especially on the VFX. This also is covered in *Bulletin #12.*

Q. When soldering electromechanical

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components such as jacks and switches, I can't get a good solder joint. The joints are not "cold," and they seem sturdy if you pull on the wires, but they're not as shiny as usual. Are these joints reliable, and if they aren't, how can I make them better? I've noticed that the solder tabs on switches, especially, often are tarnished, and gentle cleaning (with an ink eraser) doesn't help.

Q. What should you use to clean component leads before soldering? I find that leads on all kinds of components often are nearly black with oxidation, straight out of the blisterpack.

A. Straight out of the package, the terminals of electromechanical components, especially full-size switches, often are coated with oxidation. This must be removed before soldering in order to provide a reliable solder joint. I often use a very fine, low-oil-content steel wool (Formby's, or similar) to clean terminals. This works, but steel wool filaments are highly conductive; if you use this method, *keep the steel wool miles from any electronic equipment.* Sometimes the oxidation is so thick you'll have to resort to more drastic measures, using an emery board or Swiss miniature flat file. Unfortunately, it is all too easy to become heavy-handed and remove not only the oxidation, but the terminal plating as well, thus exposing the difficult-to-solder base metal beneath.

It is not uncommon to find that, even after cleaning, some switch terminals do not solder well and may produce joints of less than first-quality appearance. Reheating the joint and adding a small amount of additional solder can help. If this proves ineffective, additional reheating is inadvisable; damage to the switch and to the insulation of the connected leads may result. If a joint feels sturdy but appears slightly dull, it probably is reliable (though I wouldn't use it on the space shuttle). It's a judgment call. Significantly dull or grainy joints are not reliable.

The leads of small, passive components—especially resistors, capacitors, and LEDs—often are oxidized, too. Steel wool is okay for cleaning them, but again, keep steel wool well away from electronic equipment and be very careful not to strain the somewhat fragile leads of these components during cleaning.

Note that using a soldering iron of inadequate heat capacity or poor-quality solder also can cause bad joints. A temperature-controlled, closed-loop, soldering station (Ungar 9000-series, Weller WTCPR, or similar) is fine. Such a system is safe for microcomponents, yet has sufficient capacity for mid-size electromechanical components, such as jacks and switches. While quality 60/40 solder (e.g., Kester or Multicore) commonly is used, 63/37 alloy gives superior performance.

Q. A have an ancient Hohner Clavinet D6, and some of the keys have started to stick badly. When you press a key, it gets stuck in place; then it comes loose, and the string makes a "thwap" sound. It's worse when the instrument has been sitting unplayed for awhile. Is this something a non-technician can fix, and are parts even still available for the D6?

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MAY 1992

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A. This symptom is related to the aging of the rubber hammer tips that strike the strings when the keys are pressed. The impact surface of a worn hammer tip can become highly grooved and, especially in warmer climates, somewhat tacky. These problems, in combination, can cause a hammer tip to "grab" a string when a key is pressed and release it rather violently when the key is released, producing an undesirable impact noise as the string overshoots its resting position and hits the anvil below. In colder climates, hammer tips can become brittle and crumble, which can result in impact noise as a key is pressed.

Replacement of the hammer tips is necessary to remedy these symptoms. Normally, all the hammer tips should be renewed at the same time. Fortunately, hammer tips and many other Clavinet parts still are available from the original manufacturer. Nevertheless, this repair is *not* for the novice, as the keyboard must be disassembled to replace the hammer tips, and the work required is tedious, somewhat delicate, and, in terms of mechanical force required, often difficult to judge. Refer the work to a qualified technician. To determine parts availability, contact Hohner, Inc., PO Box 15035, Richmond, VA 23227-5035; tel. (804) 550-2700.

MIDI VELOCITY RETROFITS

An experimental scheme to provide MIDI Velocity capability for older hybrid synths was discussed in the April 1991 "Service Clinic." Finally, Wine Country Productions (1572 Park Crest Ct., Suite 505, San Jose, CA 95118; tel. [408] 265-2008) has developed a commercial retrofit that adds MIDI Velocity capability (in most cases, Receive Velocity only) to a wide variety of classic synths, including the Oberheim OB-Xa, Sequential Circuits Prophet-5, and Moog Memorymoog. These semicustom kits are suitable for installation only by the most skilled and experienced technicians and are comparatively expensive ($219 to $559, excluding labor charges). Nonetheless, they promise a welcome modernization of vintage synths.

EM *contributing editor* **Alan Gary Campbell** *is owner of Musitech, a consulting firm specializing in electronic music product design, service, and modification.*

Reviews

Roland JV-80 Synthesizer

By Peter Freeman

The JD-800 gets an affordable little sibling.

In the current belt-tightening economic climate, high-end, pricey synthesizers are a tough item to market to an increasingly wary (read: "thrifty") public. This must be clear to the top brass at Roland: In an apparent attempt to build a more-affordable multitimbral synth, Roland has produced the next logical step in the evolution of their line of sample-playing synthesizers, the JV-80 (trumpet flourish).

The JV-80 offers a 5-octave, velocity- and pressure-sensitive keyboard and 16-bit, PCM samples.

The new synth uses PCM sample-playback and filter architecture (TVFs and TVAs) much like that in Roland's D-70 (reviewed in the September 1990 **EM**). It also incorporates the logical programming architecture and higher-quality waveforms of the JD-800 (reviewed in the September 1991 **EM**). Like the JD-800, it offers parameter sliders that double as real-time performance controls, but it has fewer of them.

The JV-80 is a 28-voice polyphonic, 8-part multitimbral instrument that uses 129 PCM sampled waveforms (stored in 4 MB of ROM) as the basis for its sounds. Of these waveforms, 46 are assorted drum and percussion sounds, while the rest vary from sampled sine and sawtooth waves to agogo bells, voices, flutes, strings, basses, guitars, and synth samples, among others.

The preset sounds (both Performances and Single mode Patches) stick firmly to the familiar, "contemporary" range of sounds that we have come to expect from boxes such as this. While this might be fine for most commercial situations, it doesn't give you much of a clue regarding the sonic potential of the instrument. Performance names like Jazz Combo (comprised of piano, acoustic bass, sax, vibes, guitar, trumpet, and drums), Movie Stab, Analog Pad, and BrassComeOn (come on!) should give some indication of the territory we're in.

Roland offers several types of user-installable expansion modules ($350 ea.) that add 8 MB of ROM multisamples, over 200 extra waveforms, and 128 Patches to the instrument. The modules provide longer, more elaborate multisamples than are in the stock ROMs. The Pop/Contemporary module is currently available and the Orchestral module is scheduled to follow shortly. The JV-80 can hold one module at a time, but they can be easily swapped with one another.

The device has a stereo pair of 1/4-inch output jacks and a headphone jack on its rear panel. Also sharing this strip of real estate are inputs for a sustain pedal (normally-open or normally-closed) and two control (CV) pedals and the MIDI In, Out, and Thru connectors.

The 5-octave keyboard is velocity-sensitive and (channel) pressure-sensitive. Unfortunately, it uses the same Roland Bender/Modulation lever as its predecessors (which I dislike), and includes an assignable control slider, located just above the lever. You also can program Portamento, the keyboard mode (Poly or Solo), and Pitch Bender range.

ARCHITECTURE

Program memory is divided into three sections: the user memory, Preset A, and Preset B. Each of these sections

PETER DIGGS

holds 64 Patches (single JV-80 sound programs) and sixteen Performances, which are combinations of up to seven Patches and one Rhythm Set. A Rhythm Set isn't a fiery gig by a bunch of frenzied percussionists: it's a collection of Rhythm Tones (the drum/percussion samples) mapped across various user-specified keys.

There also are slots for PCM waveform and program cards. The five currently available 1 MB PCM ROM cards ($79.95 ea.), which also work with the JD-800, are Piano, Guitar and Brass, Stereo Piano, Strings, and Drums. Roland plans to release 2 MB PCM cards soon. The program cards provide storage for an additional 64 Patches, sixteen Performances, and a Rhythm Set.

The JV-80's Patches consist of up to four Tones, each containing a single waveform and its parameter settings. This is conceptually identical to the layout of the JD-800. Tones can act as separate components that make up a sound, or simply can be layered together, depending on the type of sound you are going for. In Patch Edit mode, Tones are made audible by the Tone Switches (the first four of the row of eight keys under the LCD) and are made editable by the Tone Select keys (the last four in the row).

To shape its waveforms, the JV-80 employs the now-familiar Time Variant Filter (TVF) and Time Variant Amplifier (TVA) used on many of Roland's previous instruments, as well as a Pitch envelope generator (see Fig. 1). The unit also has two independent LFOs that can produce triangle, sine, square, sawtooth, or random waveforms. The LFOs can modulate Pitch, Filter Cutoff, and Amplitude. These parameters, accessed through the unit's Control key, can be set independently for each Tone in a Patch.

The TVF section boasts a choice (selectable per Tone) of two types of filtering—lowpass or highpass—that can be switched off when not required for a particular Tone. In addition to the usual cutoff and resonance controls, there is a parameter called "Resonance Mode," with Hard or Soft settings that yield two different types of filter resonance. As you might expect, Hard Resonance sounds more pronounced, while Soft is more subtle.

In an effort to combat the rather predictable, sterile sound of all-digital

instruments (and possibly in response to customer suggestions), Roland has added a parameter to the JV-80 called "Analog Feel." This enigmatically named control can add variable amounts of both pitch modulation to each Tone in a Patch, creating a subtle (or not so subtle) change in the relationship of the Tones. Aside from its obvious utility in string and other acoustic-instrument sounds, this parameter can help make many types of sounds less predictable and insistent. Good thinking, Roland.

Another unique JV-80 programming feature is Frequency Cross-Modulation (FXM), which modulates a sampled waveform with a ROM-based square wave. FXM allows complex overtones to be created, yielding a timbral effect similar to ring modulation. It produces slightly different results with each waveform which, in essence, widens the palette of available timbres. The feature is available in varying amounts for each Tone in a Patch and is quite helpful in making the JV-80's waveforms sound a bit more lively, unpredictable, and interesting. The only parameters are on/off and depth.

PERFORMANCES

In a JV-80 Performance, each Part can be set to receive on a different MIDI channel and can have its own Level, Pan, and Coarse and Fine Tuning settings, as well as the option of being sent to the effects section.

Each Performance has two main Zones: Internal and Transmit. The Internal Zone is the area that controls how the JV-80's sound source responds to incoming notes or data from its keyboard and controllers. The Transmit Zone allows this same data to be processed completely independently before being transmitted over MIDI. This is extremely powerful because it means the JV-80 can control its own sounds and external MIDI tones modules in completely different ways. Both the Internal and Transmit Zones allow separate Key Range, Transpose, Max Velocity, Velocity Sense, Velocity Curve (one of seven is selectable), and Local Switch settings for each Part.

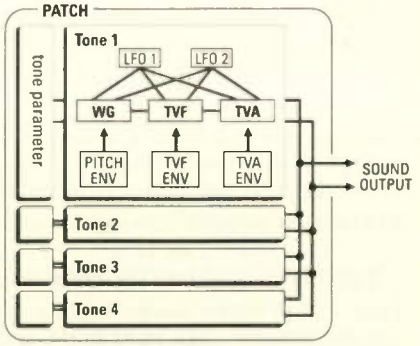


FIG. 1: The JV-80 uses familiar Roland Tone parameters. The TVF offers a choice (selectable per Tone) of lowpass or highpass filtering. The two independent LFOs can generate triangle, sine, square, sawtooth, or random waveforms.

Three keyboard modes are available in the instrument's Performance mode: Layer, Single, and Zone. In Layer mode, the key-range settings of the Internal and Transmit Zone become invalid; all keyboard and controller data is sent to all eight Parts and out the MIDI output. In Single mode, the

Internal/Transmit Zone settings also are ignored; only the Part at the LCD cursor position is audible, and the receive-channel setting for that Part is used for transmission. In Zone mode, the performance data within the key range set in the Internal and Transmit Zones is sent to the eight Parts and out the MIDI output.

Although the synth can produce a total of 28 voices, the actual number of available notes at any given time depends on what mode the JV-80 is operating in and the complexity of the current Patch (or Patches, in Performance mode). Because each Tone used in a Patch uses one voice, a hypothetical 3-Tone Patch could play a maximum of nine notes (3 × 9 = 27). Consequently, when in Performance mode, you must reserve voices in advance for each Part (a "slot" containing a single Patch) used in a Performance. If you set each Part to zero, the JV-80 allocates its voices dynamically.

EFFECTS

The limited, but useful stereo effects section contains independent chorus and reverb algorithms, and the reverb section also can produce delay and panned delay effects. The reverb is usable, but not high-quality, so don't throw out your favorite reverb box just yet. The chorus is good, though not spectacular.

One unique feature of the JV-80 that, incidentally, would have been great on the JD-800, is the ability to send different amounts of each Tone to the unit's effects processors, or leave them dry. This allows the different elements of a Patch to occupy their own sonic territory to some degree, as opposed to just sending the whole Patch to the effects.

USER INTERFACE

Programming the JV-80 is done by means of its 40-character by 2-line, backlit LCD display, a set of four cursor-control keys, and a pair of increment/decrement keys. The unit's eight sliders, each corresponding to a parameter field in the LCD, also assist the programming process. This is a definite improvement over the single-data-entry-slider method and makes the programming process less tedious. It's nice to see assignable sliders creeping back into synthesizer design, albeit in small numbers.

The eight sliders can provide a high degree of control over the JV-80's sounds, especially in a live performance situation. A group of eight keys on the

Product Summary

PRODUCT:
JV-80 synthesizer
PRICE:
$1,895
MANUFACTURER:
Roland Corporation
7200 Dominion Circle
Los Angeles, CA 90040
tel. (213) 685-5141

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

extreme left of the front panel can be used to quickly choose the parameter controlled by the sliders. For example, pressing the Level key in Performance mode turns each of the sliders into a volume control for each of the Parts in the Performance. Other parameters available for immediate, real-time control in both Performance and Patch mode include Pan and Coarse and Fine Tuning. TVA Attack and Release and Filter Cutoff and Resonance parameters are available in Patch mode, but not in Performance mode.

Among the notable convenience devices on the instrument is a feature that memorizes the last page accessed in each particular parameter area, so that when the user returns to that section of the instrument to edit a parameter (by pressing the appropriate function-select key), the JV-80 goes immediately to the last page worked on in that section of the instrument. This eliminates a lot of cumbersome page-hopping.

MIDI

The JV-80's MIDI implementation is good, though not spectacular. The unit's C1 control slider and pedal inputs can be assigned to any MIDI Continuous Controller between 0 and 95, or Aftertouch, up or down Pitch Bend, or Program increment or decrement. They can be used to control the JV-80 internal sound source only, sent via MIDI Out, or both. Patch and Performance data can be transmitted in bulk via MIDI.

Each Patch allows incoming MIDI Modulation Wheel, Aftertouch, and Expression Pedal data to be routed to various destinations, including Pitch, Filter Cutoff and Resonance, Volume, and LFO rate and modulation depth. The JV-80 can transmit and receive on different channels and has a Local Control parameter to disconnect the keyboard and controllers from its internal sound source. I would like to be able to send and receive instrument-specific parameters in real-time over MIDI (for instance, to and from a sequencer), which currently is not possible.

CONCLUSIONS

After only a short time programming the JV-80, I was surprised to find it could produce some unique sounds, as this programming power was not apparent in the presets. I soon found myself creating sounds, placing them in a Performance, doing a little sequencing, then going back and creating more sounds and adding them to the Performance. The whole process went smoothly after an initial adjustment period. As mentioned earlier, the ability to send different Parts in Performance to the JV-80's chorus and reverb helps give the overall sound of a Performance (or Patch) more dimension. I hope that other manufacturers follow suit with this sort of thing.

My main complaint is that the quality of the drum and percussion sounds is uneven. Although there are a couple of nice kick drums (the Verb Kick, in particular), I strongly disliked the open hi-hat, and too many of the Rhythm waveform locations are wasted on rather useless reversed percussion sounds. Having said that, it's possible that the JV-80's drums and percussion might be just the ticket for multimedia applications and jingles, where "quick 'n' dirty" music often is required.

This is a good-sounding and flexible synth that could prove to be a useful addition in performance and studio situations. It's sonically versatile enough to handle a wide variety of musical demands. Although the JV-80 breaks no new ground as a synthesizer, it can function as an excellent writing tool and has the potential to create many interesting, musical sounds. For preset-oriented musicians, the JV-80 will function well, provided you know what to expect. For the parameter-tweakers out there, this box can yield some interesting results, and the addition of sliders makes it fun to program and play.

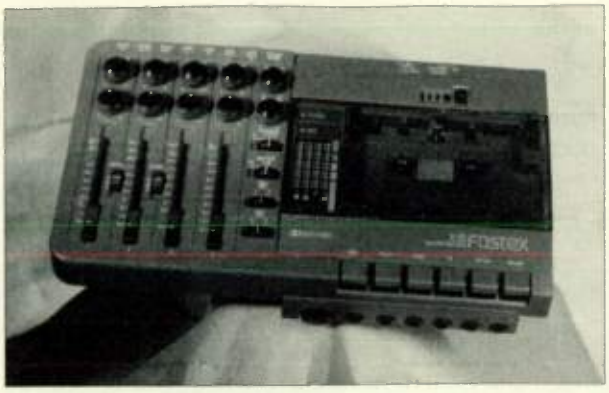
Fostex X-18 Multitracker

By Dave Bertovic

This simple ministudio makes notebook recording incredibly affordable.

Over the last few years, the ministudio concept has been taken to extremes. At the high end,

we have elaborate products with features such as 8-track simultaneous recording, sixteen mixer channels, multiple aux sends, MIDI automation, and backlit LCD displays. At the other end of the spectrum, there still is a healthy demand for entry-level machines that don't have all the icing and decorations (or the drop-dead price tags).



PETER D'IGGS

The Fostex X-18 Multitracker offers a 4-track cassette recorder and 4-channel mixer with a basic feature set. A unique Teach Buss input routes a mic directly to the headphone output so that students can hear an instructor while learning the art of recording.

With the X-18, Fostex has introduced a version of the ministudio—a cassette recorder with a built-in audio mixer—that is simple enough for the first-time user. Experienced users will see that its simplicity facilitates quick operation, putting the X-18 into the category of the "songwriter's notebook."

OVERVIEW

The X-18 meets the basic criteria for a true ministudio: a 4-track cassette recorder with a 4-channel audio mixer. Inputs are 1/4-inch, unbalanced jacks, with the exception of Sync In, Aux Return, and Teach Buss (which I'll explain shortly). These inputs use RCA connectors. The outputs also use RCA connectors, with the exception of the 1/4-inch stereo headphone jack.

The X-18 is designed to use high-bias (Type II) audio cassettes. The tape transport runs at 1 7/8-ips, the same speed as a standard stereo cassette deck. A pitch-control knob is mounted on the front of the unit and varies the tape speed ±10%. Dolby B noise reduction is always on and can't be defeated. The unit is powered by an external AC power pack, but it also can be operated with ten AA cells for true portability.

Four 10-segment LED bar-graph meters provide visual monitoring of the audio levels on all four tape tracks. Meters 1 and 2 also perform two additional functions: They indicate the overall level of the master stereo mix and the stereo mix of the input signals from all four mixer channels. Meter 4 doubles as a monitor mix indicator. The meters can be switched between Mix (for setting input levels) and Tape (during mixdown). A 3-digit mechanical tape counter indicates the tape's position.

As with most ministudios, the X-18 records on four tape tracks in one direction. However, the user can only record one or two tracks at a time. This 2-track-only recording limitation is common among ministudios in the X-18's price range.

In a welcome move toward the educational market, the Teach Buss input is ideally suited for a classroom/lab environment where several X-18s are used. The instructor's microphone signal is fed into this port and routed directly to the headphone output so that students can hear the instructor while learning the art of recording. Signals on the Teach Buss have no effect on recording or mixing.

MIXER SECTION

Each of the mixer's four input channels includes a level fader, Left/Right Pan pot, and Monitor Level pot. Channels 1 and 2 include an Input Level switch to accommodate microphone and line-level instruments. Channels 3 and 4 accept line-level instruments exclusively.

Unfortunately, there is no Input/Tape selector on the input channels. Such a control determines whether the channel's input signal, or its corresponding tape track, is heard. On the X-18, the selection is made with the front-panel input jacks. These jacks disable the corresponding tape track when a microphone or instrument is plugged in. When you want to play back the tape track, you must remember to unplug the mic or instrument in order to hear the track. This significantly compromises the convenience

of the unit.

Also absent are any kind of treble/bass or EQ controls. However, an outboard EQ device easily can be connected in-line during mixdown, if necessary. In addition, there is no master level control.

Tape tracks are enabled for recording using two Record Select switches. One switch selects Track 1 or 3, while the other selects Track 2 or 4. Each of these switches has a center off position that acts as a safety, disabling recording if the Record button is pressed accidentally. The Pan pots assign the inputs to one or both of the enabled tracks.

On the rear panel, the X-18 includes L/R stereo jacks and a mono monitor output jack. The L/R outs normally are connected to the mixdown deck, while the monitor out is connected to an amp and speakers. The monitor output derives its signal from the mixer channels' Monitor Level pots, which don't affect the levels going to tape during recording or mixdown. Depending on which mixer inputs are connected, the monitor output signal is a combination of mixer inputs and tape tracks.

If a separate monitor sound system is not available, you can monitor the X-18 from the stereo headphone jack on the front panel. In addition to a separate headphone volume control, a switch is used to select the signal that is sent to the headphone output. In the Monitor position, a mono mix of the tape tracks can be heard, with no contribution from any input signals. Of course, which tape tracks are audible depends on the mixer input connections and the Monitor Level settings. In the Monitor+L/R position, the mono monitor mix of tape tracks and the overall stereo mix are combined and sent to the headphone output. This is a bit deceptive, as the tape tracks appear twice in the signal, giving a false impression of their levels.

Although the X-18 does not have dedicated auxiliary send controls, the individual Monitor Level controls and output jack double as an aux send (though it's pre-fader). This line-level mono signal is returned to the X-18 through the left and right Aux Return jacks. A master Aux Return gain control sets the overall level of the processed signal. Also, the two Aux Return jacks can double as inputs during mixdown. If you want to add another instrument or two during the mix, these jacks can be used as additional line-level inputs.

RECORDER SECTION

As mentioned earlier, the tape speed matches that of a standard stereo cassette deck. According to the manufacturer, in conjunction with Dolby B noise reduction, this results in a signal-to-noise ratio of 58 dB and a frequency response of 40 Hz to 12.5 kHz (-3 dB). It also means that standard stereo cassettes can be recorded and played on tracks 1 and 2 of this machine; just remember to turn the output of tracks 3 and 4 down to zero, or you'll hear the other side of the tape played backward.

There are two methods for punching in and out. When the tape is rolling in Play mode, you can start recording on the enabled track(s) by stepping on the optional Fostex 8051 footswitch or other normally-closed momentary footswitch. Stepping on the footswitch a second time punches out. When the tape is rolling in Record mode, but no track has been enabled, you can select a track for recording, which automatically punches in. Disabling the record track punches out.

Track 4 can be used to record a sync signal such as FSK or SMPTE. When this signal is played back, it synchronizes the performance of a sequencer or drum machine. The sync signal source is connected to the Sync In port, which is hard-wired to track 4. On playback, the Sync Out port sends the sync signal to a sequencer, drum machine, or sync-to-MIDI converter. Although the noise reduction can't be

Product Summary

PRODUCT:
X-18 Multitracker
PRICE:
$399
MANUFACTURER:
Fostex Corporation of America
15431 Blackburn Ave.
Norwalk, CA 90650
tel. (213) 921-1112

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

defeated on track 4, it shouldn't pose a problem: Unlike dbx, Dolby NR primarily affects the upper frequency range. Both FSK and SMPTE are much lower in frequency and therefore unaffected by Dolby.

IMPRESSIONS

The Fostex X-18 Multitracker is a solid product. The sound quality appears as good as any entry-level machine that uses Type II tape. Although the manufacturer doesn't recommend it, I also tried using metal (Type IV) tape, which provided a noticeable increase in high end over the chrome variety. However, the machine isn't calibrated for metal tape and can't entirely erase hot signals on that medium. If you try, you'll be left with a "ghost" signal that won't go away.

Signal routing and metering on the X-18 are standard for this class of machine, and the ability to use the monitor output as an aux send is a real bonus. The front panel is well-laid-out and easy to use, with good-sized controls. The faders and transport keys feel good, and tape handling is tight and accurate.

Punch-ins are clean, but punch-outs leave audible gaps before the previously recorded material appears again. This is relatively common among machines of this type; I mention it as a point of interest to anyone who depends on punch-recording.

I found the owner's manual well-written, with excellent illustrations, function descriptions, and control definitions. The manual also provides step-by-step procedures and useful examples, including maintenance tips, a troubleshooting chart, and even a brief introduction to multitrack theory and tips on how to get the best recording. First-time users will have little difficulty understanding how to use the X-18.

What's missing? I was disappointed to see that no EQ controls were included. Even overall bass and treble knobs would have been sufficient for many recording situations. I also missed a master fader, although it's easy enough to adjust the input level of the mixdown deck. More important, the omission of Input/Tape selector switches seriously impairs the convenience of this machine.

Another important exclusion is the absence of a Record-Ready light. When a track is enabled, there is no LED to

remind you that a track is ready to record. You must be extra careful to set the Record Select switches to the center safety position when recording is not intended.

The sync function worked fine with both FSK and SMPTE signals but seemed to be a bit picky about the signal levels. I used a Mark of the Unicorn MIDI Time Piece as the sync source, which outputs a sync signal at a fixed level. This signal almost pinned the meter at about +3 VU (peak). At that level, I observed some stuttering from the drum machine and sequencer. After passing the signal through a mixer and bringing the level down to about +0, everything smoothed out and worked fine. The Sync In circuit includes no limiter, so excessive levels are not automatically tamed.

For its class, the Fostex X-18 packs a lot of recording into a compact box. First-time users will find the unit useful and easy to learn. And if advanced features are not critical, experienced users will find the X-18 to be a contender when shopping for a notebook recorder.

Dave Bertovic *is a freelance writer and sound mixer living in Los Angeles.*

Peavey SP Sample Player

By Allan Metts

Peavey completes its sampling system with a RAM-based playback device.

Peavey always has been known for its guitars, amps, and sound-reinforcement gear. A few years ago, the company entered the electronic musical instrument market with the DPM-3 synthesizer. Having established some credentials in the synth market, Peavey pushed into sampling with the DPM-SX Sampling Expander, a 16-bit, rack-mount, analog-to-digital converter with SCSI (reviewed in the July 1991 **EM**). Now, it has released a partner for the SX, the SP sample player.

The Peavey SP is a 1U rack-mount, multitimbral device that plays samples with 16-bit resolution. Its sounds are loaded into volatile RAM, providing much more flexibility than that of ROM-based instruments. Up to 32 MB of RAM can be installed in its eight Macintosh-type SIMM slots. (I loaded the SP with 8 MB of RAM, which was plenty for my purposes.) The device features modulation and filtering capabilities much like an analog synthesizer, but no built-in effects. Samples can be transmitted from other instruments via MIDI, using the Sample Dump Standard, or via SCSI, using the SMDI protocol (see sidebar).

The sample player offers 16-note polyphony, with excellent note-allocation features (discussed later). If you play more than sixteen notes at a time, a MIDI Overflow feature passes the extra notes to another SP or other sound module.

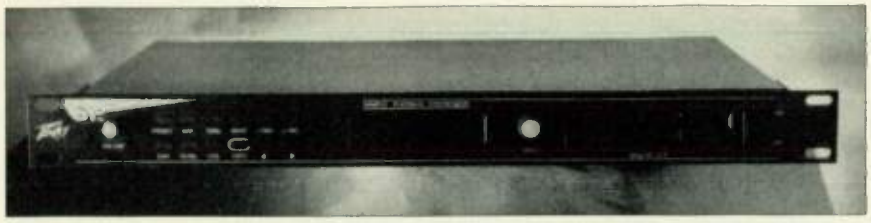
The front panel has twelve small buttons, eight that access various programming levels, two for parameter changes, and increment and decrement keys. Also up front are volume and data-entry knobs; a high-density, floppy-disk drive (which uses a proprietary format); and a 2 × 20-character, backlit LCD screen. The rear panel has MIDI In, Out, and Thru jacks; an LCD contrast control; two SCSI connectors; and four audio outputs, configured as two stereo pairs. The SCSI circuit is internally terminated, with a removable terminator.

ARCHITECTURE

The SP has a complicated bank structure with powerful sound-creation capabilities and extensive MIDI routing for musical performance. The hierarchy consists of ten different levels, including Waves, Tones, Zones, Groups, Maps, Levels, Layers, Presets, Multis, and Banks (see **Fig. 1**).

At the bottom of the SP's sound-generation structure lies the Wave, which is a raw sample. Waves can be loaded via SCSI (from a hard drive, CD-ROM, the Peavey SX, or a computer program or sampler that supports the SMDI protocol), MIDI, or floppy disk. All basic sample parameters can be altered in the SP, including sample length, start and end times, loop points, and pitch.

Waves are generated by one digitally controlled oscillator (DCO) per voice, which is processed with a digitally controlled filter (DCF) and a digitally



PETER DIGGS

Peavey's SP Sample Player loads and dumps samples via MIDI or SCSI into between 2 and 32 MB of dynamic RAM. A relatively painless user interface complements powerful sound-creation and MIDI features.

controlled amplifier (DCA). These three components can be modulated from a variety of sources, including two envelope generators, Velocity, Aftertouch, Continuous Controllers, and a low-frequency oscillator (see Fig. 2). The LFO can produce eight waveforms (triangle, square, sawtooth, sine, clipped sine, sample-and-hold, random, square, and grunge), and its speed and depth can be controlled via MIDI.

Once a Wave is processed with the SP's digitally controlled filters, amplifiers, and low-frequency oscillators, it becomes a Tone. Virtually any MIDI message can be used to control the Tone's digital processing and wave starting point, including MIDI controllers, keyboard position, polyphonic aftertouch, and even a random-number generator. An interesting feature lets you split a sample into several equal sections and use MIDI messages to control which sample "slice" is played.

One missing item is filter resonance; if you're hoping to generate those killer analog-synth filter sweeps from the SP, look elsewhere. In addition, those who are used to four or more stages in their envelope generators may find the two attack-decay-release EGs a bit stifling.

The SP's sound-mapping and control features are quite complete. Any Tone can be mapped to any MIDI note or contiguous set of notes (a Zone). Keyboard Zones can be programmed by pressing keys on a MIDI keyboard, which is a nice touch. But before you can edit the Zones, you must add them into memory. This process can get a bit cumbersome when building drum kits and other Maps that require many

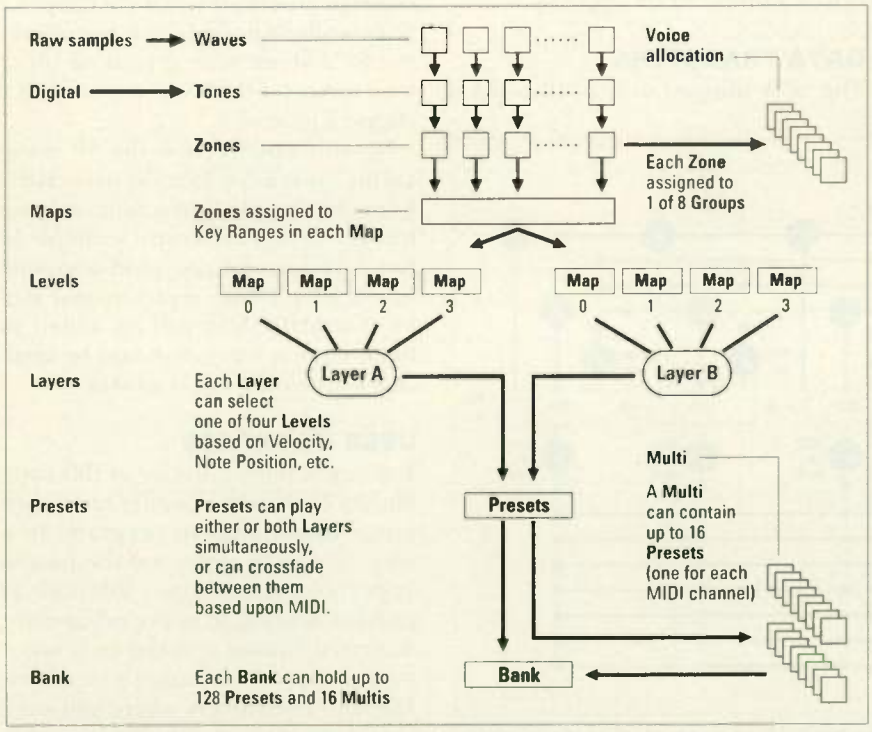


FIG. 1: The Peavey SP's complex organization allows up to four Maps per Layer. You can switch between any four Maps using keyboard position (MIDI note number), Velocity, Aftertouch, or any MIDI controller.

keyboard Zones, because the Zone Add function is several key-presses away from the Zone Edit function. This requires you to hop back and forth continuously between the Add and Edit pages.

As mentioned earlier, the note-allocation features add considerable flexibility. You can assign each keyboard Map to one of eight Groups. For each group, you can set MIDI Overflow on or off, assign a maximum number of polyphonic notes, and assign a priority status of Low, Medium, High, or Absolute (top priority, notes can't be "stolen").

The SP can switch between any four Maps, using keyboard position (MIDI note number), Velocity, Aftertouch, or any MIDI controller. Peavey calls this set of four Maps a "Layer." You also can use MIDI data to switch, or crossfade, between two Layers. If you play your cards right, you can have up to eight different Maps under your fingertips, although no more than two of them can sound simultaneously. Although Zones cannot overlap, you can use several Layers with different Maps to accomplish a similar objective.

The highest levels of the hierarchy are Multis and Banks. Multis simply are sets of up to sixteen Presets with their MIDI channel assignments, while Banks include everything in the SP's memory.

LINKED LOADS

The SP can intelligently mix and match data between sound files at all levels in the bank's hierarchy. For instance, you can add a Preset from a file on disk to the bank currently in memory. When you do so, you also can load the Waves, Tones, Maps, and other items that are related to that Preset. Before loading new samples, the SP checks to see if those samples already reside in memory and will not load them a second time.

This ability to share samples between different Tones, Maps, and Presets allows you to maximize the use of available memory. You also can delete items without fear, because the SP won't remove a Wave, Tone, or anything that is currently being used elsewhere. I heartily applaud Peavey for adding this intelligence.

These "linked loads" can occur at all levels in the sound-bank hierarchy, so you can make sound-programming more efficient, too. For instance, you could develop generic Maps for a particular drum kit or favorite split-keyboard configuration and just install the sounds that meet your current need.

One oversight in this unit is the fact the SP's main volume and MIDI channel settings are not saved to a disk bank and are not retained on power-down. Consequently, these two settings must be readjusted each time the SP is turned on. Hopefully, Peavey will mend this in a future ROM upgrade.

DATA TRANSFERS

The SP is shipped with 2 MB of RAM installed, which is enough to get you started. Additional memory can be purchased from a Mac SIMM dealer for less than $40 per MB, so you'll soon feel the urge to add more (believe me). Once you do, be prepared to add an external SCSI storage device, too; loading several megabytes of sound data from the built-in floppy drive is a slow, tedious process.

When it comes to external storage, you have plenty of options. The SP can connect to virtually any SCSI storage device. Any standard Mac- or PC-compatible SCSI drive should work; I connected a Maxtor 80 MB hard drive, and the SP "talked" to it without a hitch. However, there are differences in the SCSI implementation of the various devices on the market, so thoroughly test any questionable SCSI devices for compatibility with the SP before you buy a drive.

The SP fully supports data transfers from the Peavey SX Sampling Expander through its SCSI port, providing a complete sampling system. An entire set of menu pages lets you select the SX's sampling rate and sample length, request a sample, or retrieve the clipped wave count. (The SX automatically clips samples to eliminate input distortion when the device runs out of headroom, and it maintains a count of how many waves are clipped.) A particularly impressive feature turns the SP's menu screen into an input level meter for the SX, complete with a clipping indicator.

Notably absent from the SP is the ability to send a sample over MIDI using the Sample Dump Standard protocol. The SP can receive a sample in this manner and can send a sample over SCSI. A Peavey representative stated that MIDI SDS will be added in ROM version 1.2 and should be available by the time you read this.

USER INTERFACE

You might think a device of this complexity built into a single rackspace would be difficult to program. In a sense, you'd be right, but the people at Peavey made the user interface as painless as possible by providing eight dedicated buttons to access each major stage in the bank structure's hierarchy. The unit remembers where you were in each set of menu pages, which makes jumping around the SP a breeze. The data wheel can be used to move

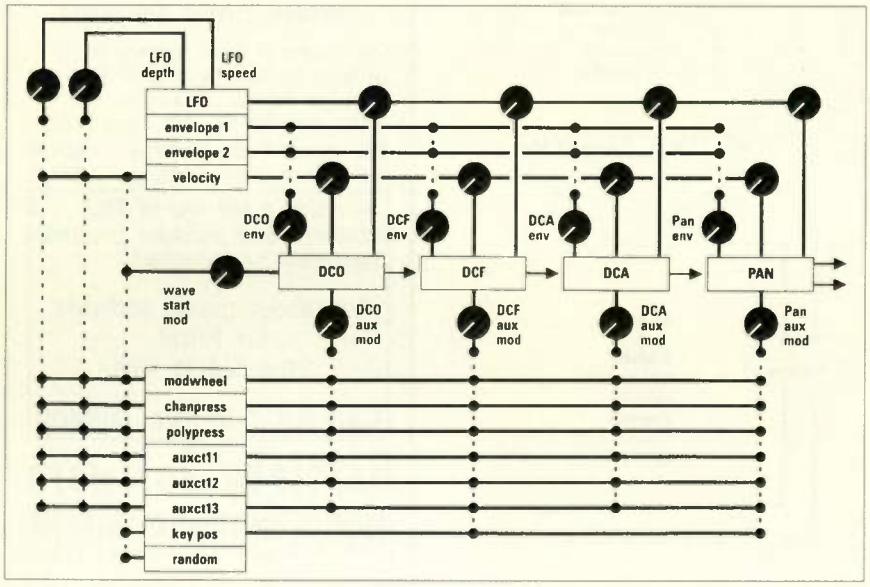


FIG. 2: The sample player's signal path, as displayed in the Tone menu, consists of one oscillator, one filter, and one amplifier per voice. You can adjust the Wave start time (to the left of DCO) and other voice parameters using a variety of modulation sources.

THE SMDI PROTOCOL

At present, sample-editing programs such as Passport's *Alchemy* and Digidesign's *Sound Designer* for the Macintosh use proprietary data formats to transfer sample data via SCSI. The programs have custom drivers for each sampler they support, and direct SCSI transfers between samplers of different brands is not possible.

SCSI Musical Data Interchange, or SMDI (pronounced smid-ee), is a new protocol developed by Peavey for transmitting samples between the SCSI ports of two devices. Peavey hopes SMDI will become an industry-wide standard that will allow different samplers and programs on all computer platforms to exchange samples freely via SCSI. The idea is basically the same as the MIDI Sample Dump Standard, except the data transfers 50 times as fast over SCSI.

In the plans for the SMDI specification is an extension that allows System Exclusive data to be included with the sample. This extension has an exciting implication for MIDI equipment users: Imagine being able to fill your sound module full of new samples, as well as parameters for your synthesizer and effects features, all in a few seconds.

Although not yet approved by the Japanese or U.S. MIDI associations (JMSC and MMA, respectively), SMDI already has made an appearance in the Kurzweil K2000 synth and Passport's *Alchemy*.

between menu pages, or between the parameters within a page, and to change each parameter's value. Shortcut keys are provided wherever possible, but you have to dig pretty deeply into the SP's user's manual to learn about them.

Despite the company's valiant efforts, a device with this much power begs for a more advanced user interface, with something larger than a 2 × 20 character display and "soft" buttons, even if

it means a 2-rackspace design and a slightly higher price tag. My neck, back, and eyes anticipate the day when someone develops a computer-based editor for the SP. According to a Peavey representative, such an editor is in the works by at least one software company.

DOCUMENTATION

The first SPs included only a sketchy preliminary manual and a promise that a final manual would be sent upon receipt of the SP's registration card. The final manual (written by former **EM** editor Craig Anderton) comes complete with several tutorials that take you step-by-step through some of the more basic operations. Only four tutorials for the SP were available as of this writing.

The reference section of the manual is complete, well-written and includes brief introductions to both MIDI and SCSI. The manual gets a bit repetitive at times, but such repetition can be quite helpful when you're looking for information on a specific feature. Missing from the manual is an index, a MIDI implementation chart, and a list of recognized System Exclusive messages. Apparently the SP's System Exclusive implementation is still under development, and full SysEx documentation will be made available at a later date.

Also absent from the documentation are details for adding more memory to the SP. Peavey's customer-service representative warned that attempting to install the SIMM modules yourself could result in a voided warranty, yet the manual provides detailed instructions for opening the unit to remove SCSI terminators or alter jumper settings, which seems inconsistent.

WRAPPING UP

The Peavey SP has enough sound-processing power to generate incredible sounds. Finding raw samples should be no problem, because sounds can come from any source that supports the MIDI Sample Dump Standard. But it remains to be seen whether third-party developers will offer sounds that utilize the SP's synthesizer-like processing and extensive MIDI-controller routing.

The SP is shipped with three excellent sound disks, which have acoustic piano, nylon guitar, and "ethereal voices" sounds on them. Peavey's sound library for the SP was not available in time for this review, but at least 50 sound disks from the critically acclaimed Prosonus library should be available when you read this.

The fidelity of the sampled sounds is impressive. I pulled my old, harmonically rich Yamaha CP35 electronic piano out of the garage, sampled it, and loaded the sample into the SP. I did an A/B comparison between the original sound and the raw sample in the SP and could hear no noticeable difference.

I also used the unit as a piano module, a multitimbral sound module, and a drum module, both in sequenced and real-time environments. I'm pleased to report that the SP performed admirably in all situations.

Overall, the Peavey SP represents tremendous value for the money. Sure, many of today's electronic musical instruments have at least 32 voices, but you can buy two or more SPs for the price of some of these instruments. Peavey has had a good track record of adding new features in the form of ROM upgrades, and hopefully the SP will be no exception. The engineers at Peavey are to be commended for designing and building such a highly capable sound module into a cost-effective, upgradable package.

(The author wishes to thank Micro Music in Atlanta for the use of a SCSI hard drive.)

Product Summary

PRODUCT:
SP Sample Player
PRICE:
$999
MANUFACTURER:
Peavey Electronics Corporation
711 A St.
Meridian, MS 39302-2898
tel. (601) 483-5365

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

Allan Metts *is an Atlanta-based MIDI consultant, musician, and electrical engineer. It took him a long time to write this review, mainly because he didn't want to give back the Macintosh PowerBook he borrowed to write it.*

Steinberg Avalon 2.0 (Atari ST)

By Jim Pierson-Perry

Welcome to high-end sample editing and synthesis for Atari computers.

While Atari computers are an excellent platform for many MIDI applications, sample editing has not been one of its brighter stars. After long inactivity, the release of *Avalon 2.0* from Steinberg shines like a nova, beckoning sample hounds back to their Ataris.

The first upgrade since *Avalon*'s initial release (reviewed in the December 1989 **EM**), version 2.0 serves to broaden the feature palette rather than enhance existing ones. On the hardware side, Steinberg has released their long-anticipated digital-to-analog converter for sample playback (see sidebar, "Ancillary Hardware").

GETTING STARTED

Avalon runs on all Atari computers except the new TT models. Steinberg does not guarantee the program will work with any computer enhancements, particularly accelerator boards. This is unfortunate because some of the program's coolest features require serious number-crunching. I reviewed the program and D/A unit using an Ensoniq EPS sampler and an Atari Mega4 ST running TOS 1.2.

Avalon requires that samples fit within available computer memory, sacrificing maximum sample size for program speed. The 4 MB memory limit of Atari computers translates to a maximum mono sample time of 37 seconds at 44.1 kHz. *Avalon* uses program overlays to conserve system memory.

The program consists of a system manager (which routes samples between the computer, storage devices, and samplers) and separate modules for time-domain editing, frequency-domain editing, and digital synthesis. All program modules are seamlessly integrated by a consistent and logical graphical interface. High marks go to Steinberg for design excellence.

Avalon runs under *M.ROS*, Steinberg's

multitasking MIDI system-extension software. Fortunately, version 2.0 corrects the problems that the original version exhibited with Atari system software. I had no trouble running *Avalon* with any desk accessories or system extensions. The program disks include drivers for Steinberg's SMP24 and MIDEX MIDI interfaces. A hardware key fits in the cartridge port for copy protection, which allows unlimited backup and hard-disk installation.

The manual is well-written, with a good section on digital sound basics. However, there is a conspicuous lack of tutorials. It dumps you straight into the reference section to sink or swim on your own. The program disks include numerous example files covering most of *Avalon*'s features, but these examples are not documented.

The samplers currently supported over MIDI include the Akai S700/S900/S950/S1000/S1100, Casio FZ-1/10, Dynacord ADD/ADS, E-mu E-II/Emax, Ensoniq EPS/16+, MIDI Sample Dump Standard (8- or 16-bit format), Sequential Prophet 2000, Roland S50/ S330/ S550/S770, and Yamaha TX16W. Missing is the Korg DSM/DSS-1; it's been two years since Steinberg promised support.

Unfortunately, Steinberg opted not to include the originally promised digital I/O on their digital-to-analog converter. All sample input to *Avalon* must come from a sampler or disk file. This limitation may concern pro users who would like to input directly from CD or DAT.

ICON SEE CLEARLY

Avalon uses a strong graphical interface, engaging most operations with icons. This works particularly well in the Mapping page, which is used to transfer sample files between disks, samplers, and RAM. Memory is dynamically partitioned to hold up to 32 separate samples in four banks of eight samples each. An additional memory location is reserved for the clipboard, which provides temporary storage when arranging banks.

Monophonic sample files are transferred to and from disk. Within the program, two mono files can be combined into a single stereo file for editing and signal processing. Stereo samples also can be transferred directly to and from samplers. *Avalon* saves and loads disk files in its native file format and Digidesign *Sound Designer* format. I'd like to see this include files in MIDI Sample Dump format, too. This would provide compatibility with Hybrid Arts' *GenWave/16*, the only other commercial sample-editor for Atari computers. Also, the *Sound Designer* routines should be upgraded to automatically recognize and trim MacBinary headers from files created on a Macintosh (found on many BBSs). Atari users now must trim the first 128 bytes from such files before they can use them.

Up to ten samplers can be on-line simultaneously, including any mix of models and multiple units of the same type. Clicking on a sampler icon returns a list of the samplers in the network, which you can configure by MIDI channel and port. Multiple units are differentiated on the screen only by an index letter from the sampler list, easily leading to confusion. I wish you could rename sampler icons as desired to improve visual recognition.

Unfortunately, there's a little bug in the sampler setup routine. If you start with a sampler icon at the bottom of the screen and add several new samplers, the resulting icons drop off the bottom of the screen. They appear in the sampler list but cannot be accessed or deleted; the only way to recover is to quit and reboot the program. Keep your sampler icons at the top of the screen, and you'll be okay.

Once in memory, any sample can be

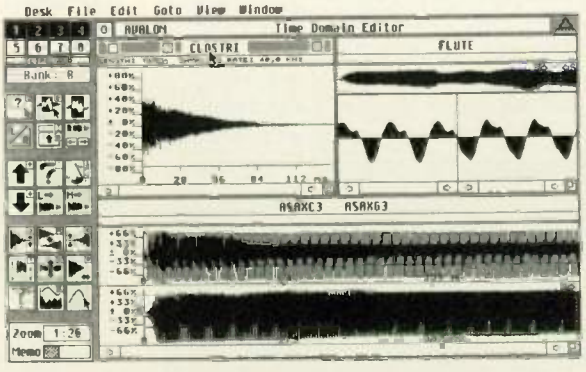


FIG. 1: The Time Editor, with some of the sample-display options: normal mono, looping, and stereo. Icons on the left activate various display or editing functions. Monitor boxes at the bottom left reflect the current zoom factor and available memory.

auditioned from the Mapping page through the internal monitor speaker, DMA channels (STe computers only), or the optional D/A unit. Fidelity through the monitor speaker is poor; serious users will need better playback quality. Unlike other Atari sample editors (commercial or public domain), *Avalon* does not support common, inexpensive, third-party D/A boards, locking users into the expensive Steinberg unit.

Contrary to the manual, stereo samples can be auditioned together only through the D/A unit. Playback is triggered with the Atari function keys or the mouse. Using the function keys worked fine with mono samples, but it was erratic or inoperative with stereo ones. The mouse always worked—after getting used to the program's sensitivity to mouse-click speed. Clicking slowly sometimes changed the mouse operation from playback into icon relocation. This seemed to be true for all of *Avalon*'s mouse operations: Fast clicks worked as expected, while slower ones often went awry.

TIME-BASED EDITING

The Time Domain Editor module supports all the "standard" sample-editing manipulations, such as cut/paste, looping, and signal processing. Edits apply to an entire sample, or can be restricted to a user-defined sample segment called a "block."

The Time Domain Editor provides access to the eight waveforms from the active bank plus the clipboard. There is no way to access samples in other banks, or on disk from the editor. A versatile screen display (see **Fig. 1**) provides quick and accurate visual feedback. Up to nine independent sample windows can be open at one time, but multiple window displays are not always properly updated after closing a window. Clicking on a remaining window triggers the proper redraw.

Avalon displays a text label in the upper right corner of the screen to identify the function of each icon as the mouse passes over them. Alternate icon sets for block and stereo editing operations are called up by an icon in the primary set. Unfortunately, this leads to a potential problem in the block-editing icon set. The Erase Block icon appears in the same location as the primary Block Edit icon, which means you can easily erase your sample if you're not careful. The Undo command will restore the sample if you catch it in time.

You can apply a hand-drawn envelope to a sample, but this is fairly limited. I'd like an envelope library and the ability to extract an envelope from one sample and apply it to another; after all, these features are available in the Synthesis page (which I'll explain in a moment). Steinberg also should address the lack of stereo-image editing, one of *Avalon*'s few omissions.

The initial version of *Avalon* offered only a single crossfade algorithm: adjusting the same region around both loop points. Two new options are available in version 2.0: adjusting only around the loop end-point, and adjusting start/end regions after averaging the entire loop region with its time-reversed counterpart. The latter option often introduces wide timbral diversions from the parent sample, which normally is not desired when looping but is well worth experimentation.

Pitch detection is a new feature in version 2.0, and it works well. *Avalon* returns a pitch estimate of the selected sample or block and the probability of its accuracy. It is smart enough to give up on samples of widely varying pitch, rather than returning a bogus value.

Sample-rate conversion works well but suffers from inadequate control. You cannot enter the new rate directly; instead, it's necessary to specify a ratio relative to the starting rate. Unfortunately, the ratio's resolution extends to only two decimal places (0.00 to 3.00) and may not hit the new rate with acceptable accuracy. For example, taking a sample from 33.750 kHz to 44.100 kHz, my only options were ratios of 1.30 or 1.31, yielding new rates of 43.875 kHz or 44.212 kHz, respectively. Both of these options caused an undesired pitch shift when played through the EPS at the target rate of 44.1 kHz. I'd like to see the ratio eliminated in favor of directly entering the new sampling rate.

ANCILLARY HARDWARE

With *Avalon*'s initial release, plans were announced for a companion hardware unit to provide 12-bit sample playback and accept digital AES/EBU stereo input. Two years later it's finally here, and there's good news and bad news: The digital-to-analog conversion resolution was increased to full 16-bit CD quality, but the AES/EBU digital input was dropped.

The unit consists of a metal box with 1/4-inch jacks for the left and right channels. It plugs into the Atari cartridge port with a 10-inch ribbon connector, which is a commendable and flexible alternative to the direct connection required by other bulky add-ons. A pass-through slot on the unit holds the program's copy-protection dongle.

Audio quality from the unit is excellent. My only complaint is the lack of a volume control, as the device pumps out a hot signal. For its initial test, I made the mistake of listening through headphones and almost blew out my ears. Even through the mixer, I had to keep the gain way down to avoid blasting the speakers.

The D/A option ($625) greatly enhances Avalon's utility, especially when experimenting with the sample synthesis capabilities. The price is a bit hard to swallow, considering that it works with no other Atari applications. Michtron has released a stereo, 16-bit sample and playback cartridge for Atari computers at $180 (including software that certainly is not of *Avalon*'s caliber). Steinberg might do well to look into this hardware and find a way to use it with *Avalon*.

When it finally arrives, Steinberg's DMA/SCSI adapter will provide high-speed communication between *Avalon* and samplers with SCSI ports. It is available in Europe, but has not yet reached North America. SCSI drivers included with *Avalon* support the Akai S1000/S1100 and Dynacord ADD/ADS; support for the Ensoniq EPS 16+ should follow soon. Although other DMA/SCSI adapters are commercially available, *Avalon* only works with the Steinberg model. When the program is upgraded for TT compatibility, it hopefully will use that computer's SCSI port rather than the DMA/SCSI adapter.

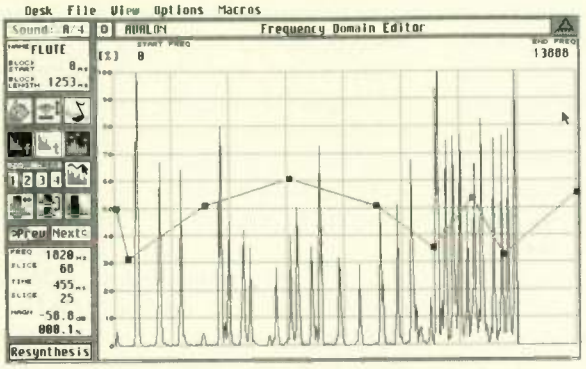


FIG. 2: The Frequency Domain Editor allows a hand-drawn envelope to be applied across the entire frequency range at a particular time. General sample information is provided in the upper left, while the current frequency and time slices are identified in the lower left.

Time correction is a major new addition that allows you to expand or compress the playing time of samples or blocks without altering pitch. Only monophonic samples can be corrected; left and right stereo elements must be processed separately. Quality results are promised for changes within ±30% of the initial play time. I had excellent results with vocal and instrumental samples: Even at compression and expansion up to two times, *Avalon* consistently delivered high-quality sound.

FREQUENCY-BASED EDITING

The Frequency Domain Editor works on a single mono sample or block, displaying a three-dimensional array of frequency, time, and amplitude. It generates 512 frequency bands between 0 Hz and half the sampling rate (e.g., 0 to 24 kHz for a sample recorded at 48 kHz). The time axis has coarser resolution, about 60 slices for a 1- second sample. Display options include a 3-D graph with real-time control of viewing angles and display size, or a 2-D contour grid. The display provides a useful overview and lets you select frequency and time slices for subsequent editing. Edits are done on 2-D graphs along the frequency or time axis; just click on an icon to switch between them.

Avalon offers three levels of editing functions: modifying individual frequencies one at a time, working on all frequencies in a given time slice (or vice versa), and performing complex macro operations. Simple point-and-click drawing tools are used to create frequency and time envelopes, which can be saved for later use (see Fig. 2). You can use the mouse to select a frequency range and perform cut/paste, reverse, and erase operations similar to block edits in the Time Domain Editor. Watch your step, though: The Undo command is not supported in the Frequency Domain Editor.

The real fun begins with the macros, which are algorithms that operate over the entire sample spectrum to provide wondrous and varied effects. They also make it quite easy to transmute a good sample into debris, so back up regularly and learn by experimentation. *Avalon* provides macros that emulate common signal-processing effects such as pitch shifting, compression/limiting, expansion, delay, and exciting. There are also more adventurous routines for filtering, reshaping frequency response, harmonic editing, and averaging.

Despite the intense number-crunching, most macros run in two to three minutes (depending on sample size). *Avalon* thoughtfully provides a countdown timer and progress scroll bar during each operation so you know how long you'll have to wait. This also is provided during the initial frequency

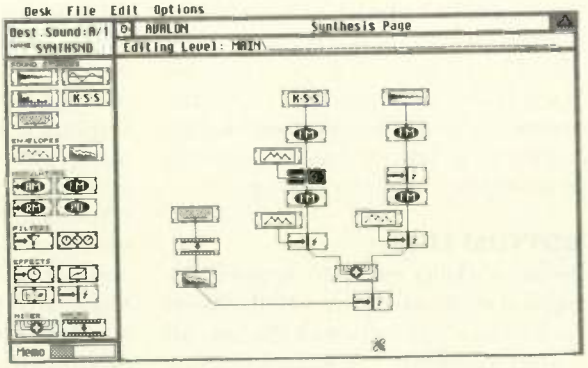


FIG. 3: An example from the Synthesis page. The chain on the right starts with a sample waveform from the Mapping page, while the middle chain starts with the Karplus-Strong algorithm, and the left chain uses fractal synthesis. Icons for synthesis modules are in the toolbox along the left border.

analysis and the resynthesis process.

The Frequency Domain Editor cannot perform operations on intact stereo samples. While this is understandable in terms of memory conservation and processing time, I would like to see support for cutting-and-pasting between two samples and running macros on stereo samples.

Version 2.0 now allows resynthesis without exiting the Frequency Domain Editor. (The earlier version automatically took you back into the Time Domain Editor.) This saves time when evaluating a series of edits or just experimenting. As with the earlier version, however, the resynthesized sound overwrites the parent sample in memory. Be sure to save your samples before venturing into the Frequency Domain Editor.

SYNTHESIS PAGE

Going beyond sample editing, *Avalon 2.0* includes a new program module for sample-based synthesis *a la* Digidesign's *Turbosynth*. Working in the Synthesis page is like programming sounds on an old analog synthesizer. You grab modules from the "parts box," tweak their internal parameters, and connect them to build the overall sound (see **Fig. 3**).

The parts box includes modules for sound sources, envelopes, modulators, filters, effects, and a mixer. You also can define macros with their own connection schemes, including other nested macros, and use them as a single module. From these components, you can craft sounds using a variety of synthesis techniques. Examples of FM, subtractive, additive, wavetable, and fractal synthesis are provided.

Sound sources can be mathematical functions or existing waveforms from the Mapping page. *Avalon* includes generators for a variety of basic waveforms, including sine, triangle, and rectangle. Other sources include Karplus-Strong, Fourier, and fractal algorithms. You can apply hand-drawn envelopes, or use one derived by extracting the envelope of another signal or sample waveform. Other modules include phase distortion and ring modulation, along with lowpass filtering and parametric equalization. Effects include delay lines, pitch shifters, distortion, and amplifiers.

The first time you audition a synthesis "patch," *Avalon* goes through the patch and computes the final sample data. It highlights each icon as it goes through the connections, providing visual feedback on its progress. You also can audition individual modules separately, which is useful for surveying sound sources, checking mix levels, etc. The final synthesized sample can be taken into the Time Domain Editor or saved to the Mapping page.

Calculation time depends on the complexity of the patch. Some examples I tried (without nested macros) took from about 30 seconds up to a few minutes. The faster processing speed of a TT computer or a suitable accelerator would make a big impact here. Users who want to do a lot of synthesis should buy the D/A board from the start. With all the pieces in place, the system is a joy to use and offers enough capability to keep the most jaundiced soundcrafter happy for a long time.

BOTTOM LINE

Avalon is a killer system for sample editing and synthesis. It covers all the basics and extends the state-of-the-art, all within a smooth, integrated graphic framework. Earlier compatibility problems with Atari system software have been corrected, and in over two months of testing, I never had a crash.

As with any program, there is still room for improvement, particularly in terms of stereo functions, TT compatibility, and digital I/O. *(According to Steinberg in Germany, these concerns will be addressed in future versions.—SW)* Even so, *Avalon* is a great piece of work, bringing sample editing on the Atari firmly up to date for the 1990s.

After years of writing on MIDI applications for Atari computers, **Jim Pierson-Perry** *has become a convert to the Macintosh. It was nice, however, to go out with a winner.*

Product Summary

PRODUCT:
Steinberg *Avalon 2.0* sample-editing and synthesis software

SYSTEM REQUIREMENTS:
Atari ST computer; 1 MB RAM minimum; monochrome monitor; TOS 1.2 or higher; hard disk strongly recommended

PRICE:
$450

DISTRIBUTOR:
Russ Jones Marketing
17700 Raymer St.
Suite 1001
Northridge, CA 91325
tel. (818) 993-4091

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

Opcode Galaxy Plus Editors 1.2 (Mac)

By Dave Bertovic

Opcode's universal editor/librarian smoothly integrates your MIDI system.

Editor/librarian programs never have been the most exciting MIDI software, and in the days when you had to buy numerous individual programs for your various pieces of gear, they weren't convenient, either. Universal ed/libs have changed all that. Now you can control all (or at least most) of the gear in your studio with a single program.

Opcode long has been an important player in the Macintosh editor/librarian market, so it was no surprise when the company bundled all its librarians into *Galaxy*, then added editing features to produce *Galaxy Plus Editors*. The surprise is how well they've integrated the various products within the package and as a part of a total MIDI software system. Thanks to compatibility with the *Opcode MIDI System* (*OMS*), which provides the Mac and *OMS*-compatible programs with information about the user's synthesizers and peripheral gear (see "Computer Musician: Opcode's OMS" in the March 1992 **EM**), you can create a completely integrated music-making environment.

GETTING STARTED

The beauty of *Galaxy*'s modularity is apparent immediately. Once installed,

simply pick the librarians you need from a list in a standard Macintosh dialog box, and custom-configure the program. Every librarian Opcode has developed is bundled with the package, and new modules constantly are being developed. If you purchase a new MIDI device, its librarian module can be installed at any time using the Configure Galaxy menu item. If that wasn't easy enough, Opcode provides a feature called "Easy Config," which instructs *Galaxy* to gather a list of devices from the *OMS* Studio Setup file and install them in one simple routine.

Galaxy Plus' librarians are central to its operations. Version 1.2 includes librarian modules that handle over 120 MIDI synthesizers (both keyboard and rack versions), drum machines, sample players, effects devices, and MIDI patch bays. Sounds usually are stored as a Bank, one set of Single sounds or one set of Multi sounds that contain the number of sounds the instrument can store in its memory. (For example, the Korg M1 module can store 100 Single sounds in its Program Bank and 100 Multi sounds in its Combi Bank.) A patch or group of patches can be copied or cut-and-pasted among two or more open Banks, permitting custom Banks.

A complete Library can be created by pasting all the individual patches into a single file. Patch names in a Library are listed in alphabetical order, whereas in a Bank they are listed in numerical order.

You can instruct a Library to identify duplicate patches by checking patch parameter data and can rename the duplicates or delete them altogether. Patches that are different but have identical names also can be identified, and their names can be changed manually or automatically.

Banks or Libraries also can be created for global functions, sequencer data, effects configurations, drum kit setups, and so on. With the Roland D-70, for example, Banks and Libraries can be created for the D-70's seven memory types (Channel Names, Patches, Performances, Rhythm Setup, System, Tones, and User Sets). For many instruments, *Galaxy* distinguishes between internal memory and data-card memory and communicates with both types accordingly.

Galaxy provides a method of combining numerous Bank types within a single file called a Bundle. This incredibly simple and fast method provides a means to back up the entire memory of the instrument into one convenient document. The Bundle also can be used to compile data from several different devices, in other words, a complete backup of supported devices (see **Fig. 1**). This is a great way to back up and reset your whole studio.

Additional librarian functions include Opcode's Patch Factory, which generates random patches from existing patches in a Bank; Opcode's proprietary Publish-and-Subscribe functions (but not Apple System 7.0 Publish-and-Subscribe), which allow Opcode's *Vision* and *Studio Vision* sequencers direct access to patch names in real time; and control of virtually any MIDI patch bay. The program also provides PatchTalk, a programming language that permits the user to create a librarian for any MIDI device that supports System Exclusive. Real-time controls include the ability to audition patches by playing any synth remotely from Opcode's MouseKeys onscreen keyboard, or by recording and playing a simple Standard MIDI File sequence.

THE GPE EDITORS

Galaxy Plus Editors functions almost identically to Opcode's *Galaxy* universal librarian program. The difference is

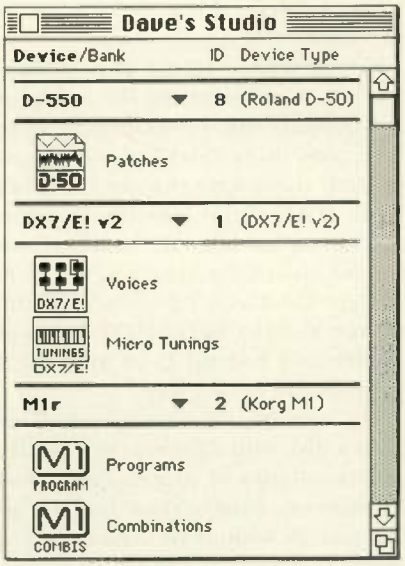


FIG. 1: Bundles combine numerous Bank types within a single file. This lets you back up the entire memory of the instrument into one convenient document and compile data from several different devices.

that once one of the 55 available editor modules is installed, you simply click the Edit button within a librarian to open the editor window for a selected patch. The editor window is identical to Opcode's well-respected, stand-alone editing programs; you'll find no compromises in look or function.

For most products, the *GPE* Editor window (see **Fig. 2**) displays all instrument parameters at once, which permits incredibly fast patch-editing. In addition, *GPE* editors provide editing of digital effects, graphic and numeric editing of envelopes, and copy-and-paste between patches of all parameters and envelopes. Changes the user makes to the patch are sent immediately to the instrument for instant auditioning, and the Compare command in the Edit menu allows instant comparing of the edited version of the patch with the original.

NEW IN 1.2

Version 1.2 does not represent a quantum leap in new functions. The enhancements improve patch-cataloging and integration with *Vision* and *Studio Vision*. The Publish-and-Subscribe functions that link *Galaxy Plus Editors* to *Vision* and *Studio Vision* are automatic in version 1.2. Previously, patch names that were used in specific sequence tracks had to be manually published in *Galaxy* or *GPE*. (You still have to manually subscribe to them in *Vision*.)

The Export to Clipboard command allows patch data to be pasted into a *Vision* sequence. A complete Bank, or a selected patch or patches, can be copied directly to the Mac's Clipboard as a Standard MIDI File. When pasted into a *Vision* sequence, or a track within a sequence, this function keeps all the music's related patch data with the sequence.

Galaxy and *GPE* now permit the creation of Banks that contain sample names. Owners of digital samplers often find that the amount of sample disks gets out of hand; version 1.2 allows the cataloging of sample file names, disk contents, descriptive comments about the samples, and so on. Although the actual sample data is not handled, *Galaxy* and *GPE* permit sample names to be published and subscribed to in *Vision*.

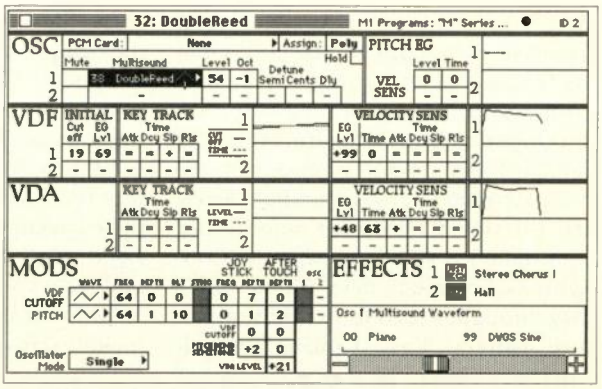


FIG. 2: Korg M1 Program Editor window. In addition to the program parameters, you can edit the digital effects. Changes are sent immediately to the instrument for instant auditioning.

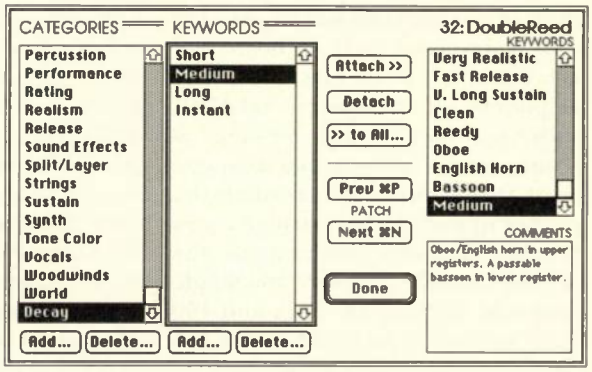


FIG. 3: The Patch Info box contains numerous categories and keywords that describe a patch, in addition to the standard comments. Add and Delete buttons below the Category and Keywords columns let you create or remove custom categories and keywords.

New to version 1.2 are 22 new librarian modules, twenty of them submitted by users who developed them on their own, using PatchTalk. (Does anyone out there have one for the Oberheim DMX drum machine?) Three new editor modules are included, one for the Oberheim Matrix-6/6R/1000, one for the Casio CZ series, and one for the Yamaha SY77/TG77. Kurzweil K2000 and Roland D-70 and U-220 modules are on the way.

The version 1.2 package also contains a disk with 21 complete Bundles and two Banks of sounds for various instruments. Nine of these Bundles are the factory sounds of various instruments that were annotated to demonstrate version 1.2's enhanced Find command.

In earlier versions, the Patch Info command in the Edit menu allowed the user to type in a text comment about the patch. Version 1.2 displays an elaborate Info Box containing numerous categories and keywords that can be used to describe the patch, in addition to the standard comments (see **Fig. 3**). Add and Delete buttons below the Category and Keywords columns let you create or remove custom categories and keywords.

CONCLUSIONS

Galaxy and *Galaxy Plus Editors* are comprehensive programs and good values. Version 1.2 of *Galaxy* offers everything within Opcode's 7-year librarian technology in one package, with virtually nothing left out.

Version 1.2 of *GPE* is more of the same. I own five Opcode ed/lib packages and found every feature of the separate software packages intact in *GPE*. Using a modular program is much more advantageous, though. For example, constructing Bundles with multiple device types is much easier and cleaner now. Opcode's develop-

Product Summary

PRODUCT:
Galaxy Plus Editors
universal editor/librarian
PRICE:
$399.95
SYSTEM REQUIREMENTS:
Mac Plus or higher; System 6.0.4 or higher; 1 MB RAM, 4 MB if running System 7.0; hard disk; MIDI interface
MANUFACTURER:
Opcode Systems
3641 Haven Dr., Suite A
Menlo Park, CA 94025-1010
tel. (415) 369-8131

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

ment of the Bundle concept alone is worth the price of the program.

I used *GPE* running Apple's System 7.0 for over a month with no problems whatsoever. (The program is not System 7.0-savvy, however.) My initial problems were pilot error, having mostly to do with cables and the first attempt at interfacing the Mac with my JLCooper MSB+ MIDI patcher.

My only criticism of the package is that it may be a little confusing to the first-time user. Because *Galaxy* requires prior installation of *OMS* files, the initial setup involves many decisions and several procedural steps. The time involved depends upon the complexity of your studio, but a word of caution is in order.

That matter aside, *Galaxy* and *Galaxy Plus Editors* are truly remarkable products. When it comes to compiling or editing MIDI device memory, Opcode has done wonders in simplifying my life in the patch lane.

Clarity Retro and PAiA MV-8

By Peter Freeman

Two MIDI-to-CV converters resurrect the great dinosaurs.

A synthesist in the all-digital, all-multitimbral world of 1991 has a vast range of instruments from which to chose. But as powerful and convenient as many of today's digital synths are, many electronic musicians feel that virtually none of the new synths offer the rich, subtle sounds and programming flexibility of the modular, analog behemoths of the 1960s and 1970s. The frequently large (and expensive) systems by companies such as Aries, ARP, Serge, Moog, and Buchla afforded synthesists a formidable degree of sonic control.

Nearly all of these systems were developed long before the advent of MIDI, and they are not easily integrated into MIDI setups. Pre-MIDI synths (and some signal processors) were designed to accommodate external voltage control of their parameters. Since the appearance of the Roland MPU-101 in the mid-1980s, MIDI-to-control voltage (CV) converters have offered a convenient solution, bridging the gap between older, pre-MIDI synths and the MIDI world. Although appreciation for the analog, CV-driven systems has increased, the availability of comprehensive, full-featured MIDI-CV converters has not. The new Clarity Retro and PAiA MV-8 represent two contrasting approaches to this task.

RETRO PERSPECTIVE

Clarity's Retro is a lightweight, tabletop unit that is controlled via the 24 purple, membrane-style buttons on its top panel. I initially raised an eyebrow at the choice of membrane switches, fearing a return to the dreaded horrors of the DX7 (unreliability, no tactile feedback, unwieldy in live performance, etc.). However, my fears were largely unfounded: The membrane switches used on the Retro are high-quality, industrial-grade stainless steel and have a definite clicky feel that makes them comfortable to work with.

Fourteen of the Retro's keys—the numeric keys 0 to 9, Enter, =/- (for changing positive and negative values), Q (Quit, for cancelling the current function), and A (Alternate, which allows access to the MIDI display and special functions)—are grouped together in a numeric keypad. Arrow-shaped increment/decrement keys, MIDI channel, Bypass, CPT (Corresponding Program Table), and Program- and Patch-select keys are located next to a 2-digit LED display. The unit's other three identical displays are arranged in a horizontal row beneath the first. Each display has a key that activates it for data entry.

As an aid to programming, all the Retro's possible MIDI sources, scaling options, and destinations are printed underneath the displays on the front panel. This is helpful, but it would have been much nicer to have a large, backlit LCD display here, especially considering the box's potential complexity. Of course, this would have driven up the price tag.

The rear panel holds eight 1/4-inch phone jacks for CV and gate outputs. The first four outputs produce between zero and ten volts and are optimized for trigger and gate applications, but also produce control voltages. Outputs

5 to 8 produce from zero to 7.03 volts and are optimized for control-voltage applications, but can function as triggers. Clarity also manufactures, on special order, a version of the Retro that produces a 10-volt range on all eight outputs. Called the Retro 10, this unit is designed for applications that don't require precision pitch-tracking, such as VCA control for mixer automation, lighting controllers, and certain signal processors.

Also on the rear panel are the Retro's power switch, MIDI In and Out jacks, 4-pin DIN power connector, and two 9-pin serial connectors labeled "To Mainframe" and "Remote Control," which presumably will be used in the future. I am sorry to report that the unit is powered by an AC adapter of the familiar wall-wart type.

The Retro seemed slightly daunting at first, but I was able to learn the unit in an evening. The manual is arranged in a logical fashion and provides, in a clear and concise way, all the information necessary to operate the unit. Basic programming is simple; the unit's complexity lies in its multitude of programming options.

BASIC RETRO MODES

Each of the Retro's 32 Programs contains sixteen Patches, the first of which is called the Status Patch. This Patch selects one of the Retro's two main modes of operation, Polyphonic or Direct.

Polyphonic mode is one of the Retro's most useful and powerful features, as it allows up to four monophonic analog synths to be treated as one polyphonic instrument. This might not sound like a large number of instruments, but if the four instruments being controlled are, for example, a Serge modular, Aries modular, ARP 2600, and Roland System 100, the potential is staggering. In addition, if less than four synths are being addressed as a Poly instrument, the remaining CV and gate outputs can be addressed by Patches in Direct mode, providing even more flexibility.

In Direct Mode, the Retro can convert MIDI data to eight independent control voltages, each with its own scaling factor, on separate outputs. Say you have a modular synth with four filters; you can modulate all four filters in the same direction (opening or closing) but out of sync, creating an incredibly dynamic filter sweep. The Retro also can convert Continuous Controllers or MIDI note numbers above a user-selectable threshold into a trigger (above the threshold is on, below is off). For instance, you can trigger analog drum machines using MIDI note numbers.

TRANSLATION PATCHES

Patches 2 through 16, the Translation Patches, translate incoming MIDI data to voltages. Each Translation Patch has four main parameters: the MIDI source, scaling factor, MIDI channel, and output destination. Possible MIDI sources in a Retro Program include Continuous Controllers 0 to 31, Switch Controllers 64 to 95, Note On for all MIDI note numbers, Channel Pressure, and Last Velocity.

The scaling factors are one of the Retro's strongest suits. This is where its real power resides. They allow the user to make extensive use of incoming MIDI data, making the Retro flexible enough to work well in a wide variety of applications. Due to space constraints, it is not possible to describe in detail each individual Scaling Factor, but here is an overview of just a few of the possibilities

- Conversion of MIDI Switch Controllers to trigger pulses
- Keyboard rescaling to allow the full 0 to 127 MIDI note range from a 61-key keyboard
- Logarithmic and anti-logarithmic scaling of incoming MIDI data
- Conversion of individual MIDI Note On messages to gates or pulses at specific outputs (for drum machines or individual analog synthesizer events)
- Inverted gates from MIDI Note On messages (Note On turns off Gate, Note Off turns it on)
- 50 ms pulse and inverted pulse, and channelized gates and pulses. (A specific MIDI Note On on a specific MIDI channel produces a gate or pulse; these also can be inverted.)

In addition, there is a special Scaling Factor, designed for using the Retro with a Minimoog, that combines a MIDI keyboard controller's Pitch Bend wheel value with the note number and sends the converted result over a single CV output. Other controllers can be substituted in place of Pitch Bend. Each Patch can have its own MIDI channel, or you can use the user-selectable default channel.

Aside from the MIDI features already discussed, the Retro's MIDI implementation covers the expected functions, including Program Change mapping, real-time display of certain incoming MIDI messages, and System Exclusive patch dump. Program Change maps are created and accessed directly through the CPT key, which is convenient; on many devices, this function would be hidden in a submenu.

PAIA MV-8

The MV-8 is PAiA's latest entry in the world of MIDI-to-CV conversion. The company previously offered single-channel converters, and the new unit essentially is eight of these packaged in 2U rack-mount enclosure. The MV-8 provides bidirectional conversion: In addition to MIDI-to-CV conversion,

Product Summary

PRODUCT:
Retro MIDI-to-CV converter
PRICE:
$595
MANUFACTURER:
Clarity
Nelson Lane
Garrison, NY 10524
tel. (914) 424-4071

RETRO MIDI-to-CV CONVERTER

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

Product Summary

PRODUCT:
MV-8 MIDI-to-CV processor
PRICE:
$399 (assembled)
$299 (kit)
MANUFACTURER:
PAiA Electronics
3200 Teakwood Lane
Edmond, OK 73013
tel. (405) 340-6300

MV-8 MIDI-to-CV PROCESSOR

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

incoming control voltages and gate signals can be converted to outgoing MIDI data.

Instead of 1/4-inch phone jacks, the MV-8's front panel has a 32-point RCA jackfield comprised of eight gate ins, eight gate outs, eight CV ins, and eight CV outs. Also on the front of the unit are MIDI In and Out jacks, CV trimmers for input and output voltage adjustments, a slide switch labeled Mode Aux (discussed later), the power switch, and a 16-switch DIP switch block that provides access to the various modes of operation. To its credit, the MV-8 comes with a built-in power supply.

The MV-8's design is in sharp contrast to that of the Retro. The first obvious difference is that the MV-8 is not programmable; it operates under the mode of operation set with the DIP switches, and that's it. There are no visual displays on the unit; the only feedback the user gets regarding the current state of the device is the position of the various switches. This makes working with the MV-8 a rather tedious proposition, as it often seems like you're flying blind. The central design concept of the unit is rather intriguing, however.

The MV-8 is comprised of two basic elements, the MCVI (MIDI/CV interface) CPU and the MUX (Multiplexer/De-Multiplexer) card. The MCVI is the heart of the MV-8, handling the computations that convert MIDI data to control voltages and vice-versa. The MUX card allows the MCVI to work with eight CV inputs and outputs and eight Gate inputs and outputs.

The device comes with one MUX card, the Master MUX, installed, but up to sixteen MUX's can be supported by a single MV-8, allowing up to 128 CV/gate input/output channels to be addressed. There's a catch, though: You have to install them yourself. This is in keeping with PAiA's do-it-yourself philosophy, but it isn't what every musician wants. Still, the MV-8's expandable design offers considerable potential for those who know how to take full advantage of it.

MODES OF OPERATION

The MV-8 has ten modes of operation that accommodate various types of applications. The first two modes, Controller/Switch Input and Output, are intended for applications such as retrofitting signal processors and mixing consoles with MIDI capability. In these modes, the MV-8 converts MIDI Control Change messages into control voltages and gates, or vice-versa, depending on whether you are in Input or Output mode. Up to four MUX cards can be addressed, with card 1 corresponding to controllers 0 to 7, card 2 corresponding to controllers 8 to 15, and so on. In MV-8 modes that allow CV/gate input as well as output, Input or Output modes are conveniently selected with the Mode Aux switch on the front panel.

The third mode, Mono Voice Output mode, requires 1 to 3 MUX cards, depending on the needs of the specific application. This mode is designed to control up to eight synths in a multitimbral fashion. Up to eight channels of MIDI Mode 4 messages are output to multiple MUX cards (if available) as control voltages and gates. In a three-card configuration, Pitch is de-multiplexed to the first card, Velocity to the second, and specific voice parameters to the third. The voice parameters supported are Pitch Wheel, Channel Pressure, Mod Wheel, Breath Controller, Aftertouch, Footpedal, Data Entry, and Volume.

Another indication of the MV-8's high degree of flexibility is its fourth mode, called Note Switch Conversion mode. Intended for applications that require large numbers of control voltages and gates (such as lighting-control systems), this converts MIDI Note On/Off messages to gate voltages, and vice-versa. CV-to-MIDI conversion is not possible in this mode.

Modes 5 and 6 are Mono Voice Output and Input modes, intended for comprehensive control of single monophonic synths. In Output mode, incoming MIDI notes are converted to pitch and velocity CV outputs, while six Continuous Controllers (Pitch Bend, Mod Wheel, Channel Pressure, Foot Controller, Data Entry, and Volume) are supported by the remaining six CV outputs. The first two gate outputs become Trigger and NotTrigger (negative-going trigger), while the remaining six are supported by MIDI Switch Controllers 64 to 69. In Input mode, CV and gate inputs are converted to the corresponding MIDI data.

Mono Voice Output mode is perfect for controlling monophonic, modular instruments such as the ARP 2600,

allowing all kinds of modulation destinations (filter cutoff, envelope parameters, oscillator frequencies, etc.) to be controlled and automated by a MIDI sequencer. Performances of these parameters could be recorded, edited, perfected, and stored for later use, allowing older instruments to become a practical component of a MIDI setup.

The MCVI's seventh mode currently is undefined ("reserved for future expansion"), and the eighth mode is a testing/debugging tool designed to convert the MCVI into a development platform for MIDI and control applications.

The ninth and tenth modes, Poly Squash and Poly Cycle, are for polyphonic control of up to eight monophonic synths, similar to the Polyphonic mode on the Retro. Incoming MIDI Poly Mode Note On/Offs on the MCVI's basic MIDI channel are converted to control voltages and gates.

The difference between Poly Squash and Poly Cycle lies in the output assignment of incoming MIDI Note Ons. In Poly Squash mode, Note On messages are converted and assigned to outputs in the order in which they are received. For example, if you play a three-note chord, the first note goes to output 1, the second to output 2, and the third to output 3. But if you release the second note and play a new note, it will be routed to the first available output, which is output 2. This allows the player to know and control which notes in a chord will be sent to which output. This is highly useful, especially if eight radically different instruments are connected to the various outputs.

In Poly Cycle mode, each Note message received is sent to the next output in cyclical fashion, i.e., to outputs 1, 2, 3, 4, and on in a continuous cycle. In the previous example, when you release the second note and play a new note, it will be routed to output 4, the next-highest output.

PETER DIGGS

Clarity's Retro MIDI-to-control voltage converter is easy to use and seems aimed at the studio market, while the extremely flexible PAiA MV-8 is better-suited to the experimenter.

▼ Both units offer lots of control, but they have different orientations.

PERFORMANCE

I tested the Retro and MV-8 with a Sequential Prophet-10 and an Oberheim OB-X. Because the Prophet has two sets of CV and gate inputs (one for a single voice of each of its two internal Prophet-5s), I could treat it as two separate instruments, giving me three instruments when combined with the OB-X's voice 1 control capability.

I used this three-synth configuration to test the Retro's Polyphonic mode and the MV-8's Poly Squash and Poly Cycle modes, both of which functioned quite well. I also used both converters to add MIDI Volume and Filter control to the OB-X's pre-existing MIDI retrofit, which only supports Note and Program Change messages. This worked beautifully and opened up a new degree of control over the instrument, especially when the volume and filter changes were recorded into a sequencer. This was equally effective on the Prophet-10, which also allows external CV control over parameters such as oscillator frequency.

PROBLEMS

The only problems I encountered during testing were with the MV-8, and these proved extremely frustrating. The review unit did not function at all for the first hour of testing, and after checking and rechecking my connections, synths, and the documentation, I phoned PAiA to find out what was going on. Following PAiA owner John

Simonton's suggestion, I open up the MV-8 and discovered that one of the cards was partially out of its edge connector, rendering the unit completely nonfunctional. After I firmly reseated the card and closed the MV-8's cover, the box still refused to work. On a hunch, I reopened it, and discovered that the simple act of replacing the cover had dislodged the card again. This time, I left the cover off, and the unit worked normally. It was not very reassuring, to say the least.

My other main complaint about the MV-8 is in the quality of its physical construction. The unit's enclosure appears to be made of ultra-light-gauge sheet metal, which clearly is not the most robust material currently available on this planet. The whole box has a decidedly "homemade" air about it. If you are good with a soldering iron and have experience with this sort of thing, you could probably repackage the MV-8 in a much sturdier enclosure, replace its RCA jacks with 1/4-inch phone jacks, and swap its switches with heavy-duty replacements. This would not be an insurmountable task, nor would it be extremely costly in terms of time or materials, and it would improve the box greatly.

Although the final MV-8 manual was not yet finished, I received a documentation package containing three different manuals: the MCVI/MUX Expander System Operation Manual, MCVI CPU Operation Manual, and Preliminary MV-8 Operation Manual. All were made of badly photocopied sheets, stapled together. This made learning the MV-8 a rather unenjoyable task. Hopefully, the final documentation will be far better than the preliminary version.

CONCLUSIONS

Despite these complaints, I was impressed with the flexibility of the MV-8's design, as I was with the versatility of the Retro in different areas, particularly the Scaling options. Both units offer lots of control over CV-based devices, but the two clearly have different orientations. I believe the Retro is the best choice for the musician who owns one or more voltage-controlled devices and wants immediate "plug-'n'-play" performance. The Retro's programmability, convenience, and MIDI implementation make it well-suited for use in studios and live performance applications.

For the more electronically inclined do-it-yourselfer, the MV-8 can offer formidable expandability and adaptability, if you have the patience. The Retro seems aimed at the studio market, while the MV-8 could function in a experimenter's workshop or as the central nervous system in a computer-controlled lighting rig. In its present incarnation, I would be extremely worried about taking the MV-8 on the road with me, while the Retro just needs secure mounting in a rack-mounted drawer.

At a list price of $595, the Clarity Retro is not cheap. However, its smart design, compact package, and relative ease-of-use make it an excellent choice for those serious about MIDI-to-CV conversion. By contrast, the PAiA MV-8 lists for $399 assembled, or $299 in kit form, and the company had to cut corners somewhere. Consequently, its physical construction doesn't do justice to its raw power and expansion potential. The core design of the MV-8's electronics is solid and versatile; it just needs to find a better home. ●

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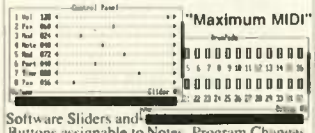

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The Digital Bandwidth

Having absorbed the flood of high-tech music products, electronic musicians look to video for a new technological challenge.

By Daniel Sofer

The juxtaposition of January's MacWorld and National Association of Music Merchants (NAMM) shows created an interesting set of circumstances. MacWorld was fired up with the latest possibilities of digital technology. Yet at NAMM, a music show that once similarly enthralled people, the latest digital plaything inspired mostly yawns. After all, everyone makes a digital piano, digital synthesizer, or sampler. Have I become jaded, or is there another reason this all seems so blasé?

This question speaks to the dramatic changes in the music industry over the past ten to fifteen years. Many of the changes can be attributed to a few bright minds who dreamed up useful things to do with new technology. But advancing technology offered capabilities that already were dreamed up long before.

The ENIAC debuted in 1946 as the world's first digital computer. Today, we have disposable microchips more powerful than the ENIAC. Computers are so commonplace, we take them for granted.

As computers become simultaneously faster, smaller, and cheaper, the applications that digital technology makes possible become increasingly diverse. I call this threshold of technological possibility the Digital Bandwidth.

Once upon a time, Oberheim's digital sequencer, with its total storage capacity of 128 notes, was state-of-the-art. And how exciting it was! Then Roger Linn placed the biggest memory chips he could find into a speedy microcomputer to create something powerful enough to actually play back drum sounds. Because drums are noisy and quite short, they were well-suited to the technology's limitations at the time.

Eventually, computer memory grew. You could save sound onto a floppy disk. Time and technology progressed to the point where you could get multiple piano, string, sax, trumpet, and drum samples onto a memory chip, and the D-50, M1, and Proteus were born.

A breakthrough occurred with the ability to record and play directly onto disk, creating a memory capacity the size of an entire album. And in all of this we went from the mediocre sound quality of AM radio to the breathtaking realism of CD.

Today, I have a recording studio on my desktop and a sampler that comes out of the box with more sounds than I have time to play. The current level of digital technology allows me to accomplish everything I need for music and sound. I move from inspiration to a compact disc without ever having to leave my house.

Now that our music needs are taken care of, how can we utilize the computer's ever-expanding capabilities? Where does that Digital Bandwidth lead? To video. The reason MacWorld excited people was a little piece of software Apple unleashed on the world—a software extension called *QuickTime*—that lets any reasonably fast Macintosh (running System 6.0.7 or later) play real-time video. It brings digital recording of image and sound to the desktop. From a video perspective, personal computers are relatively slow, so their images are small, slow, and grainy, like a video version of the Ensoniq Mirage. However, these factors are limited only by computer horsepower, which, as with samplers, soon will improve.

What does this mean for musicians? Two things. First, video will join the digital club of audio and MIDI. Therefore sound people, as half of the audio/video equation, should pay attention. As applications for video expand, so will opportunities for new music.

Second, on a strictly audio basis, keyboards and drum machines now are where guitars have been for a long time, a place where musicality and style are far more important than technological bells and whistles. I met someone at a previous NAMM show who was flabbergasted by the clock rate of Peavey's then-new synthesizer.

Those days are over, and just as well. Now that we musicians have a chance to sit back and count our techno-blessings, maybe we can start making some music.

Just as the MIDI recording studio has shrunk to the size of a videocassette, so has the audio and video studio. Sony has a new digital audio cassette the size of a postage stamp. We should welcome these technological changes, yet not be a slave to them. We should use what works for us, because as Tower of Power says, "What is hip today, might become passé."

A creator of sound and user manuals for many ground-breaking products, **Daniel Sofer** *currently works as a technical writer, multimedia producer, and, occasionally, a musician. His company, Interface, specializes in Japanese translation, publishing, and presentations.*

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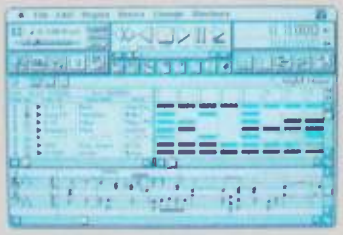

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